

Green Economy Policy Scoping Report of Thailand

Opportunities and options for macroeconomic
and sectoral policy reform to advance
an inclusive green economy





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Executive Summary

The Green Economy Policy Scoping Report of Thailand aims to identify key issues and areas that play pivotal roles in transforming Thailand into a green economy. This report provides an economic, environmental, and social profile of Thailand, as well as elaborating on the national plans and institutional arrangements relevant to the green economy transition. Finally, the report identifies gaps and barriers that pose obstacles to Thailand's green economic transition and offers recommendations on priority areas at both the macroeconomic and sectoral levels. These recommendations will redirect Thailand towards becoming an inclusive green economy.

Thailand is a middle-income country that experienced a transition from agriculture to manufacturing and then to the service sector. Despite the agricultural sector contributing only 6 percent to the GDP, it comprises of as much as 40 percent of the Thai population. This imbalanced pattern of development illustrates how a substantial portion of the Thai manpower is still trapped in rural areas. With re-alignment of agricultural price policies as well as implementation of capacity-building programs, much of this rural labor can be released from agriculture to support the growing manufacturing and service industries, and hence creating a demand for green jobs.

On education, as much as 86-88 percent of Thai children receive primary education and 67-69 percent obtain secondary education. Towards 2020, the number of high vocational and university graduates continues to increase to nearly 30 percent. Within university education, there is a growing number of curricula in the Thai tertiary institutions that offer programs in environmental studies. Currently, Thailand is able to produce as much as 3,000 graduates in areas related to environmental management, which will support the growing demand for green jobs.

On climate change, Thailand aims to reduce greenhouse gas emissions by 20 percent from the BAU (Business As Usual) scenario by the year 2030, achieve carbon neutrality by the year 2050, and attain net zero emission by the year 2065. The target sectors for carbon

reduction are energy, transportation, and industry. Promotion of renewable energy through the feed-in tariff incentive enabled Thailand to significantly reduce its reliance of fossil fuels. On carbon sink, Thailand needs to explore opportunities to unlock the potential of commercial forestation that can take place in most of the encroached forest reserve areas. Commercial reforestation will enable Thailand to achieve its carbon offset goals as well as help generate income, restore ecological balance, and promote the use of biomass as a renewable energy source.

Thailand shows a strong commitment towards becoming a green economy and pursuing sustainable development through its hierarchical government planning structure. The Tier 1 development plan consists of the twenty-year long-term National Strategy 2018-2037. Tier 2 development plans include the National Strategy on Eco-Friendly Development and Growth, the National Reform Plan, and the 13th National Economic and Social Development Plan. Tier 3 development plans comprise sectoral plans such as the Climate Change Master Plan (2015-2050), Thailand's Nationally Determined Contribution Roadmap on Mitigation (NDC 2021-2030), the National Adaptation Plan (NAP2018-2050), the Sustainable Development Goals (SDGs) Road Map Development, and the 2021-2027 Bio-Circular-Green Economy Strategy (BCG Model). The energy plans, such as the National Energy Plan (draft), the Power Development Plan, the Alternative Energy Development Plan, and the Energy Efficiency Plan, are included in Tier 3 as well. The green economy transition in Thailand is well-integrated and administered within the overall development planning framework, where the mechanisms of green economy transition are key components of the BCG model, as well as the climate change and energy development plans.

This Scoping Report develops a SWOT Analysis on Thailand's green economy transition, revealing several strengths that will facilitate the process. These strengths include comprehensive development planning, fiscal structure readiness, human resource capability, and institutional arrangement. However, there are weaknesses, gaps, and barriers that will need to be overcome, namely macroeconomic strategic planning, poverty incidences, inadequate laws and regulation, and political commitment.

Given the stage of development as well as the existing structure of economic governance, this Scoping Report proposes a policy framework that will steer Thailand away from the conventional growth path and restructure the economic governance that will shift Thailand on the green economy growth path.

Three key components of the policy framework recommended are:

- Maintaining steady growth,
- Steering economy towards green economy, and
- Providing a sound enabling environment.



Maintaining steady growth is a prerequisite as it will provide Thailand with sufficient income to reduce poverty, escape the middle-income trap, and enable Thailand to embark on the green growth path. Distortionary interventions, such as agricultural price subsidies or energy price subsidies, need to be eliminated, while at the same time the government spending needs to be streamlined towards improving labor and resource productivity. The continued increase in national income will enable Thailand to engage in green production and green consumption. Public financing, on the other hand, can focus on green infrastructure, such as smart grid, technological innovations in green energy, smart farming, and green industry.

Once the economy is equipped with robust growth engine, there is a need for Thailand to steer economy towards becoming a green economy by institutionalizing the necessary incentive mechanisms. Needed incentive mechanisms include carbon tax, carbon market, feed-in tariff, and green bonds. The existing Environmental Fund can be deployed to finance green expenditures and support green investments. In areas where the private sector has gained production efficiency, such as in renewable energy production, Thailand should consider market liberalization and redefine the role of the energy generation authority. Instead of solely focusing on energy generation, the authority should take on a new responsibility as the industry regulator.

Finally, Thailand needs to provide a sound enabling environment to support the green economic transition. This Scoping Report identifies three areas that require continuous support: capacity-building, revision of laws and regulations, and promoting sustainable finance.

Green economy transition is already embedded within the Thai BCG model and national plans at large. However, PAGE network can enhance the process of this transition by providing support in the key areas and sectors that are currently obstacles to green economy. With correct intervention, Thailand will realize the fruits of green economy and sustainable development within a reasonable timeframe.





Key Messages

- An inclusive green economy characterizes societies in which resources are structured towards building resilience and achieving low carbon emissions. Through participation, an inclusive green economy will grow along the sustainable development path, where the fruits of economic expansion will be realized by all citizens.
- Thailand addresses the inclusive green economy concept through the BCG model, which places emphasis on establishing a bioeconomy, circular economy and green economy. The BCG model together with the BCG Action Plan was endorsed by the Thai Government in 2021 and will guide Thailand towards long-term sustainable development.
- To embark on the inclusive green economy growth path, Thailand needs to remove the distortionary interventions, such as agricultural price subsidies or energy price subsidies, such that resources can be redirected towards efficient utilization and income generation.
- With the BCG model and removal of distortionary interventions, it is expected that there will be improvement in productivity and steady long-term economic growth. For Thailand to embark on the green economy transition, it is vital that Thailand escapes from the middle-income trap so as the economy can generate sufficient income to support sustainable consumption and production.
- Capacity-building is fundamental in the process of transforming Thailand towards becoming an inclusive green economy. In addition to the already existing curricula that are able to produce manpower to serve the growing demand for green jobs, additional effort is still needed in areas such as Industry 4.0 or smart farming. Capacity-building is vital for Thailand in raising per capita income and escaping the middle-income trap.

- Several incentive mechanisms will need to be institutionalized for Thailand to achieve carbon neutrality and net zero emission. These instruments include a carbon tax, carbon market, incentives for carbon sink through commercial forestry, renewable energy promotion, and sustainable finance through instruments such as green bonds.
- Thailand needs to divorce poverty alleviation measures from agricultural and energy pricing policies. Deploying agricultural and energy price support programs has proven to be detrimental to both agricultural productivity and energy efficiency, let alone its inability to alleviate poverty.
- To enable Thailand to be equipped with the necessary instruments, new legal structures are needed, and some existing legal frameworks need to be modified. Legislations that need to be institutionalized are the climate change act and the biodiversity conservation act.





T

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 balanced 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 PM_{2.5} air pollution and greenhouse gas emissions, 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 aligns with the UN Sustainable Development Goals (SDGs). The National Committee on Sustainable Development, chaired by the Prime Minister, has been established since 2013 to monitor progress in all seventeen SDGs and to oversee coordination among agencies to overcome obstacles.

Thailand continues to push green development a step further by integrating work in bio-economy (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 work plans (NSTDA, 2021). 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. Bio-economy emphasizes investments in biologically-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.

Since the outbreak of COVID-19 in 2020, the course of development in Thailand experienced a sharp decline in economic activities, largely due to the ban on international travel and tourism, followed by the shutdown of businesses. To alleviate such economic downturn, Thailand implemented several health containment measures as well as fiscal assistance packages to boost the aggregate demand particularly at the grassroots level. As for the supply side, the Thai government aims to deploy the BCG model as a means to overcome the middle-income trap, reduce social inequality, and restore the economic engine and societal confidence after the COVID-19 crisis.

In 2021, Thailand was in the process of preparing the draft of the 13th National Economic and Social Development Plan (NESDP), or the draft 13th Plan, scheduled to be launched in 2022. The draft 13th Plan is a five-year plan that serves as a road map and budgeting guideline for Thailand's development from 2023 to 2027. The key development theme of the draft 13th Plan is "High-Value and Sustainable Thailand" that underscores a technology and knowledge-based creative economy, with innovation as the driving force. The five goals of the 13th Plan are 1) structural change towards becoming an innovative economy; 2) human development for the New Normal; 3) equal opportunity and fairness; 4) sustainable production and consumption; and 5) resilient society under new global challenges. Thailand's transition towards a green economy will be based on the Sufficiency Economy Philosophy that serves as an overarching guide for national development. (NESDC, 2021b)

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. 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.

Despite ongoing efforts, further initiatives are required to facilitate Thailand's green transition over the next five years. This Scoping Report, therefore, presents the existing knowledge on Thailand's sustainable development, with a specific focus on BCG initiatives, while highlighting current policy gaps. The report also proposes main policy entry points for strengthening BCG work plans, identifying gaps for further analysis, as well as providing recommendations on how PAGE Thailand can become instrumental in ensuring a smooth inclusive green economy transition.

1.2 Study methodology

This Scoping Report thus aims to

- 1) Identify main policy entry points to expedite PAGE support 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.

The Scoping Report follows a qualitative research methodology. Data is collected from official statistics and documents, interviews of government officials and representatives of private sector councils, and communications with international experts from PAGE agencies.





2

Overview of macroeconomic policy and green economy transitions

The Thai economy is characterized as being diverse, comprising of production and exports of goods and services from three major economic sectors: services, manufacturing and agriculture. Being a diverse economy helps cushion Thailand against shocks, but at the same time, the high degree of openness also puts Thailand at risk 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 ineffectiveness of the trickle-down effect in Thailand arises from high levels of market concentration. In addition, underdeveloped human resources have resulted in income becoming concentrated among the upper decile segment of the population. With a large bulk of the population still earning moderate income, Thailand needs to engage in productivity improvement in order to get the economy out of the middle-income trap. Simultaneously, there is a need to steer 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 manufacturing as it approached 2010. Figure 2.1 shows the percentage of income from manufacturing to GDP that rose from 34 percent in 2000 to 39 percent in 2010. This transition to a manufacturing-based economy was achieved at the expense of the agriculture share in GDP that decreased from 9 percent to only 7 percent. Despite this declining share of agriculture in GDP, agriculture and the rural sector still account for as much as 40 percent of the Thai population. Having as large as 40 percent of the population in agriculture, while the sector itself only contributes 7 percent to GDP, leaves Thailand with challenges, such as poverty, income inequality and a lack of inclusive development.

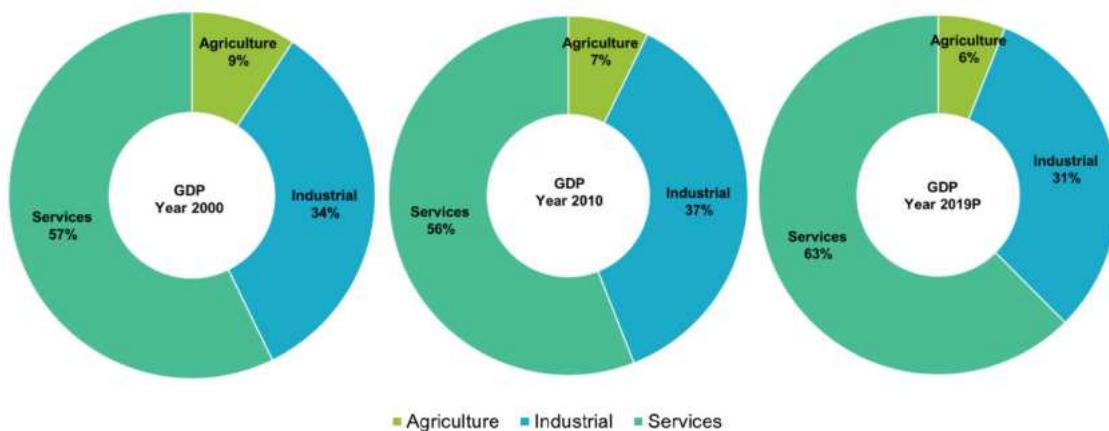


Figure 2.1 Sectoral shares of Thailand's Gross Domestic Product (GDP)

Source: NESDC (2021a)

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 percent of GDP in 2010 to as high as 63 percent of GDP in 2019. This increase is met at the expense of the shrinking manufacturing sector that declined from 37 percent of GDP in 2010 to 31 percent of GDP in 2019. The agricultural share in GDP also continued to decline slightly from 7 percent to 6 percent of GDP during this time period.

The Thai macroeconomic growth rates fluctuated during 2010s and 2020s. As the Thai economy is characterized by a high degree of openness with the value of exports and imports taking up as much as 65 percent and 58 percent of GDP respectively in 2023, the Thai macroeconomic fluctuations are predominantly determined by fluctuations in global trade and internal supply shocks. The subprime mortgage crisis and international 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 spread 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 percent (See Figure 2.2).

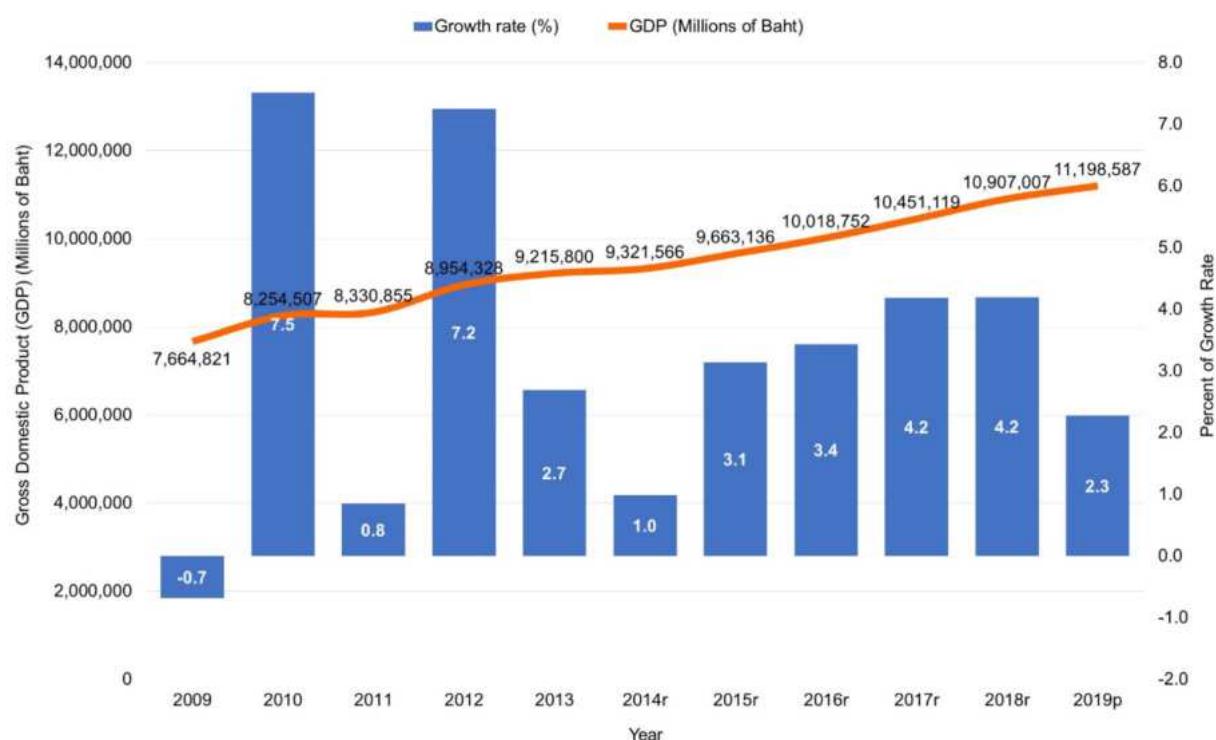


Figure 2.2 Trends in GDP and growth rates

Source: NESDC (2021a)

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 pressure on macroeconomic management as fluctuations in national income will call for fiscal policy re-adjustments, particularly government spending. When an external shock occurs, the government has to divert its resources away from long-term development goals, such as greening the economy, to support the affected sectors. As a result, the government budget for green and low carbon initiatives could be jeopardized. Therefore, maintaining a stable economic growth path is crucial for a smooth and 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 averaged around 3.5 percent per year (See Figure 2.2). The key driver for this long-term growth is the exporting industries such as the service, tourism, and manufacturing sectors (The World Bank, 2023).

The high degree of openness of the Thai economy puts pressure on macroeconomic management as fluctuations in national income will call for fiscal policy re-adjustments. When an external shock occurs, the government has to divert its resources away from long-term development goals, such as greening the economy, to support the affected sectors. As a result, the government budget for green and low carbon initiatives could be jeopardized. Therefore, maintaining a stable economic growth path is crucial for a smooth and successful transformation to a green and low carbon society.

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, absorbed 19.7 million workers or about 50 percent of the labor force in 2020. On the other hand, the agricultural sector, despite generating only 6 percent of GDP, employed as much as 11.7 million workers or 30 percent of the labor force. The manufacturing sector took up the remaining 6.3 million workers or about 16 percent of the labor force. This pattern of employment calls for a consideration of agricultural labor productivity improvement to bridge the income gap and move Thailand towards a more inclusive development trajectory.

The agricultural sector, despite generating only 6 percent of GDP, employed as much as 11.7 million workers or 30 percent of the labor force. This pattern of employment calls for a consideration of agricultural labor productivity improvement to bridge the income gap and move Thailand towards a more inclusive development trajectory.

The above statistics shows Thailand's transition from what used to be an agrarian society to manufacturing and service one. This transition has experienced a lag effect where economic activities and income shifted out from agriculture to manufacturing and servicing while as much as 30 percent of the labor force is still trapped in agriculture. These workers, mostly growing rice, corn, casava, sugarcane, and rubber in rural areas, contribute a mere 6 percent to the country's GDP. This skewed pattern of economic transition can be attributed to the Thai agricultural policies that aimed to alleviate poverty by maintaining subsistence-level incomes rather than improving productivity. Specifically, the policies focus on income enhancement through price support or income stabilizing schemes for the main food crops. As a result, farmers are insulated from adjusting their farm outputs in response to crop price fluctuations. Consequently, while the contribution of agriculture to GDP has been falling to only 6 percent, a substantial portion of the labor force, as much as 30 percent, is still trapped in rural areas.

The policy implication is for Thailand to divorce agricultural policies from poverty reduction policies. The Thai agricultural policies need to emphasize re-structuring where resources need to be geared away from the less productive and less competitive agriculture to the more competitive farm produce such as fruits. Poverty alleviation policies, on the other hand, should be designed and deployed independently from agricultural policies. Bundling agricultural policies with poverty alleviation measures, such as farm price support or subsidies programs, has not been effective in lifting poor farmers out of poverty or improving farm productivity.

In terms of unemployment, Thailand has registered a low unemployment rate of around 1 percent 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 workforce. The scheme should also enhance efficiency in the labor markets, provide the necessary social safety nets, and improve work efficiency in the public sector.

On informal employment, Thailand's informal economy remains large, making up 33 percent of employment in the growing services sector and 56 percent in agriculture. The informal economy refers to economic transactions that are not officially recognized, which can cause issues such as under-taxation or a lack of protection for workers (Buddhari, A., & Rugpenthum, P., 2019). There is a high concentration of women in Thailand's informal sector, meaning that women are more likely to be excluded from labor and social security protections (OECD 2020). This demonstrates the need for policies that are gender-sensitive and account for the reality of the informal economy.

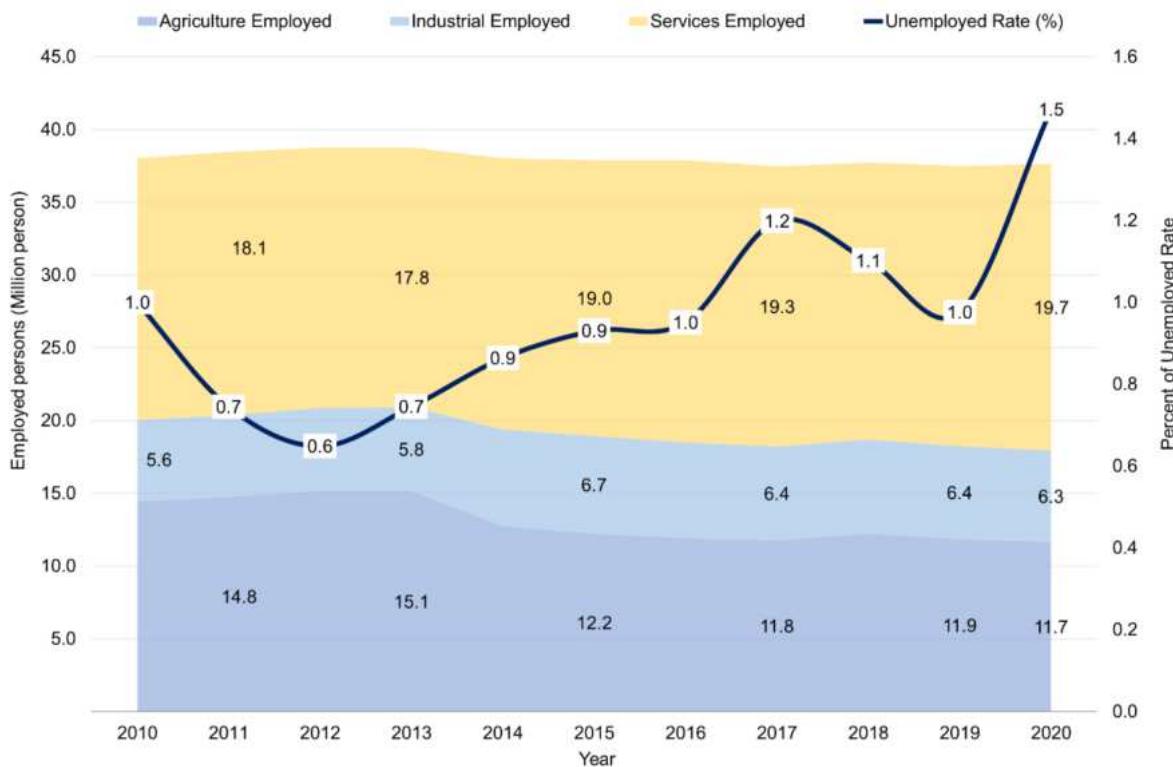


Figure 2.3 Employment by sector and unemployment rates 2010-2020

Source: Labor Force Survey, National Statistical Office (2021)

Thailand needs to divorce agricultural policies from poverty reduction policies. Bundling agricultural policies with poverty alleviation measures, such as farm price support or farm subsidies programs, has not been effective in lifting poor farmers out of poverty nor improving farm productivity.

During the COVID-19 pandemic, the Bank of Thailand reported that unemployment nearly doubled from 1 percent to close to 2 percent in 2020 (Bank of Thailand, 2022). Furthermore, one of the main impacts of the COVID-19 on the labor market in Thailand was an increase in poverty, as the volume of work, measured in terms of hours worked, declined along with the overall economic activities. The loss of income among informal workers pushed many below the poverty line. As a result, the share of the working poor in Thailand is expected to increase from 4.7 percent to at least 11 percent of total employment (ILO, 2020).

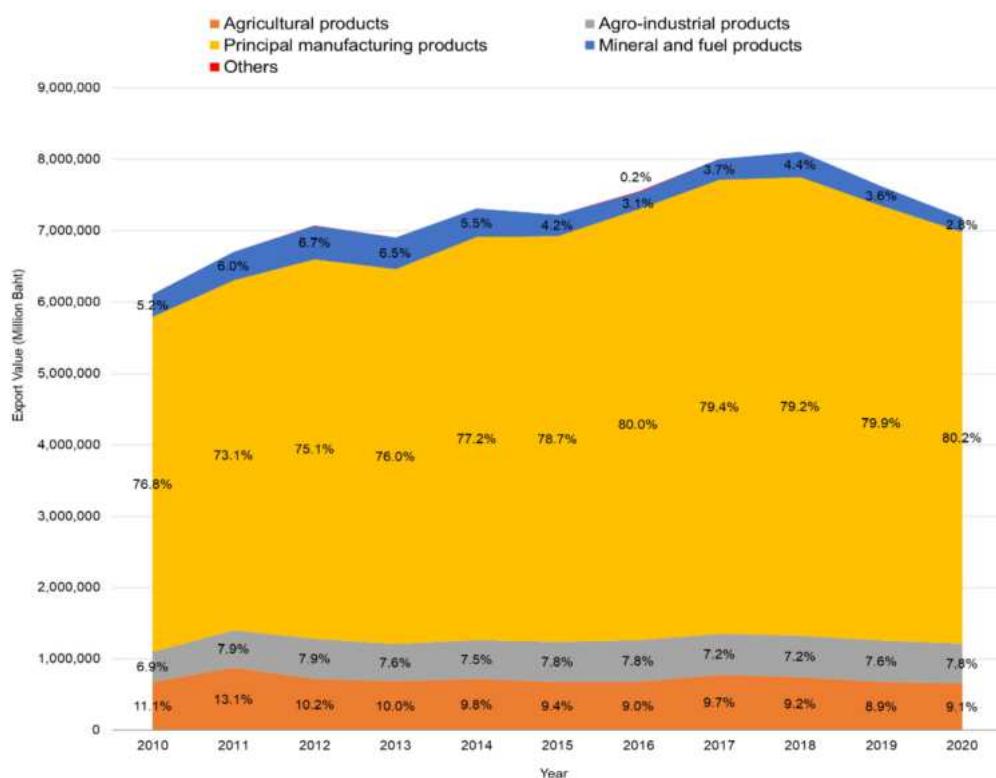


Figure 2.4 Export structure from 2010 to 2020

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

Export-import structure

Thailand's structure of exports plays an important role in shaping the Thai economy particularly in light of increasing concerns of the carbon contents of tradable goods and services in the global trade platform. In 2020, export earning accounted for as much as 65 percent of the Thai GDP. 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 society.

In 2010s, manufacturing goods took up more than 70 percent of Thailand's total exports, before reaching 80 percent in 2020. The major manufacturing exports are electronics, vehicles, machinery and equipment, and food items (See Figure 2.4). The share of agricultural exports, such as rice and rubber, decline slightly from 13 percent in 2011 to 9 percent in 2020. The third largest export sector is the agro-industrial goods that are largely made up of processed agricultural products, such as processed foods and frozen foods.

It is worth noting that the export sector has contributed significantly to the Thai GDP. In 2021, export earnings accounted for as much as 65 percent of GDP. While high value of exports reflects the comparative advantage of the Thai economy, such a high percentage of export share to GDP can also pose macroeconomic

risks to the economy as well. Any fluctuation in global trade, such as wars or pandemics, will have a significant impact on export demand, economic stability, and hence the green growth path as well. The current COVID-19 pandemic has severely impacted the Thai economy. As a result, the government needed to divert planned expenditures away from environmental categories to provide support to those affected by the pandemic. The current public debt that is needed to restore Thailand from the pandemic will also erode future economic growth, including the future green growth path as well. Thus, maintaining a stable macroeconomy by adopting balanced growth engines and diversification of exported goods will provide a strong foundation for steering Thailand towards a green economy.

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 for 27.1 percent, fuel accounted for 13.2 percent, and consumer goods accounted for 12.7 percent. While the volume of imports into Thailand varies with GDP, the structure of imports shows only small changes. A positive sign is observed with imports of fossil fuel, with the percentage share of fuel lubricants to the total value of import declining slightly from 19.1 percent in 2011 to 13.2 percent in 2020. This decline in the import of fossil lubricant was replaced by the use of domestically produced renewable energy inputs (See Figure 2.5).

Maintaining a stable macroeconomy by adopting balanced growth engines and diversification of exported goods will provide a strong foundation for steering Thailand towards a green economy.

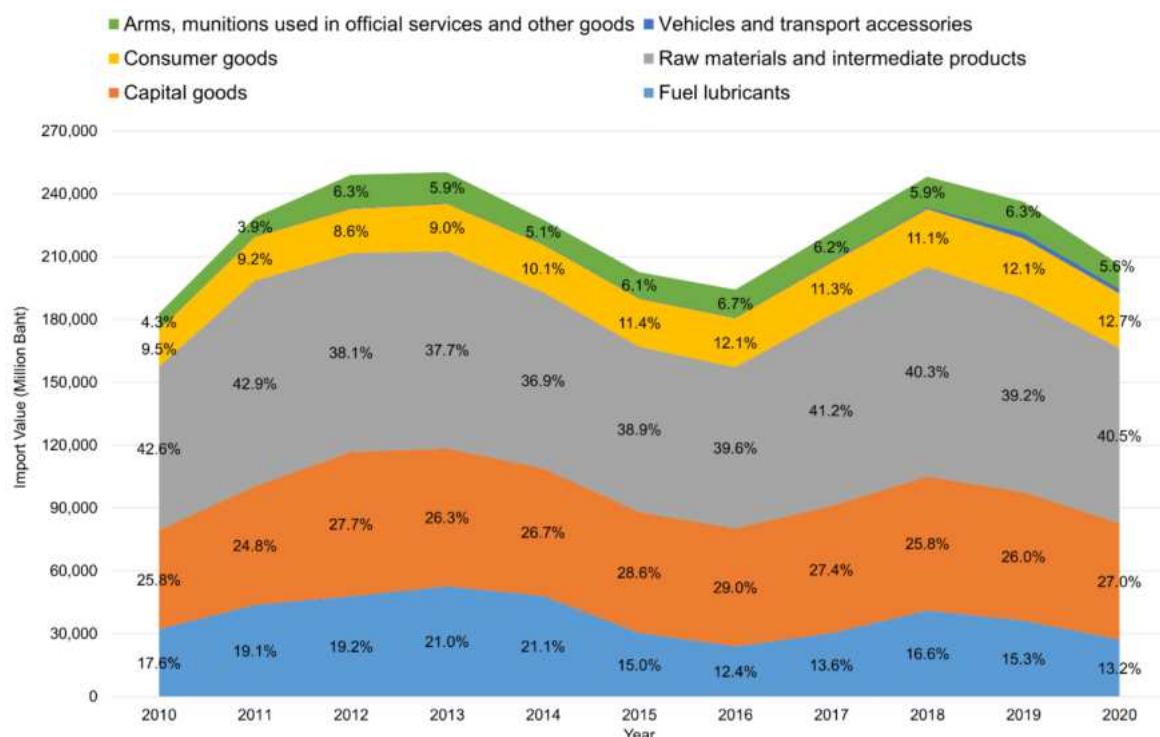


Figure 2.5 Import structure from 2010 to 2020

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

2.2 Social profile

Income and inequality

With an annual per capita income of USD 7,189 in 2020, Thailand is positioned as a middle-income country that enjoys a long-term growth rate of 3.5 percent. Despite the continuous economic expansion, Thailand envisions to maintain this long-term economic growth and escape the middle-income trap. This is an important prerequisite that promises to generate the momentum needed to drive the economy towards becoming a green economy. Figure 2.6 shows how the continued economic expansion over the past decade has improved the livelihoods of many poor Thais. The number of people living in poverty 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 percent in 2010 to only 6.24 percent in 2019.

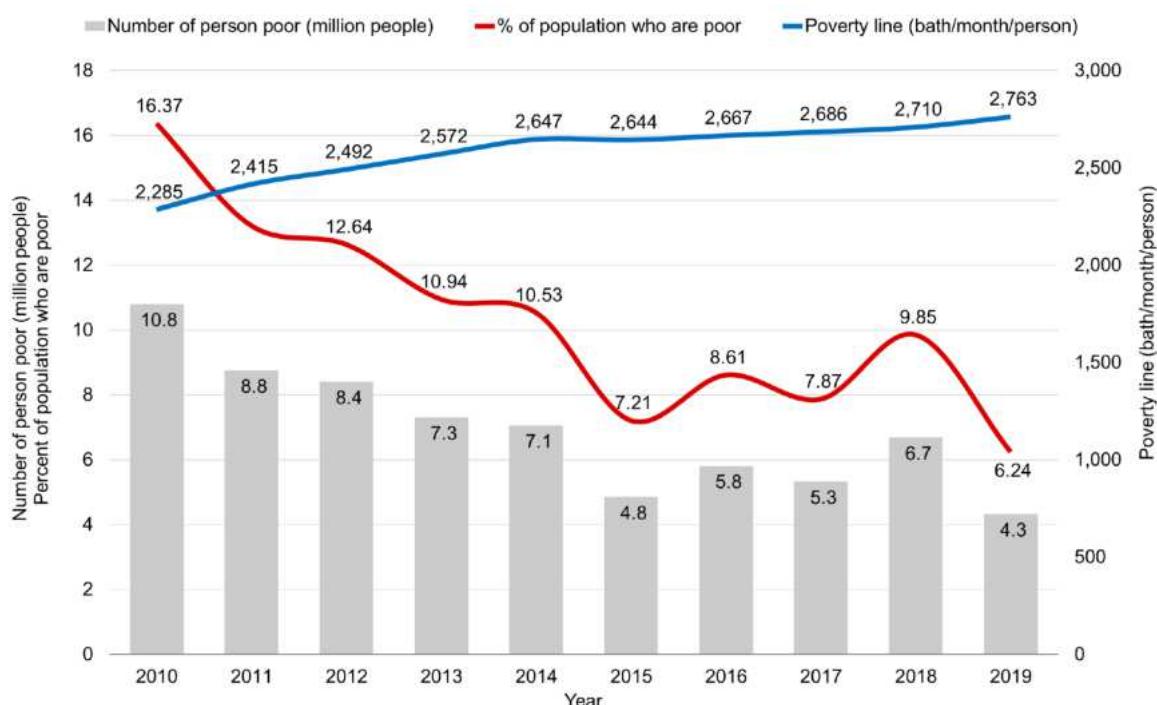


Figure 2.6 People living in poverty and poverty rates in Thailand

SOURCE: NESDC (2021a)

While the general population of Thailand has escaped poverty over the past decade, Figure 2.7 shows that the structure of poverty remains unchanged, with most of the poor residing in rural areas. The poverty rate in rural areas has been approximately double that of urban areas. It is important to note that the poverty rates are based on the national poverty line, as shown in Figure 2.6, which may not reflect the true standard of living of the poor. This is because the cost of living in rural areas is lower than that in urban areas.

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. Although income inequality remains a challenge for Thailand's economic management in the coming years, the income gap has been narrowing during the past decade as shown in Figures 2.7, 2.8, and 2.9. Figure 2.9 shows that the GINI coefficients that are calculated based on both income and consumption slowly improved from 2010 to 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 during this time period.

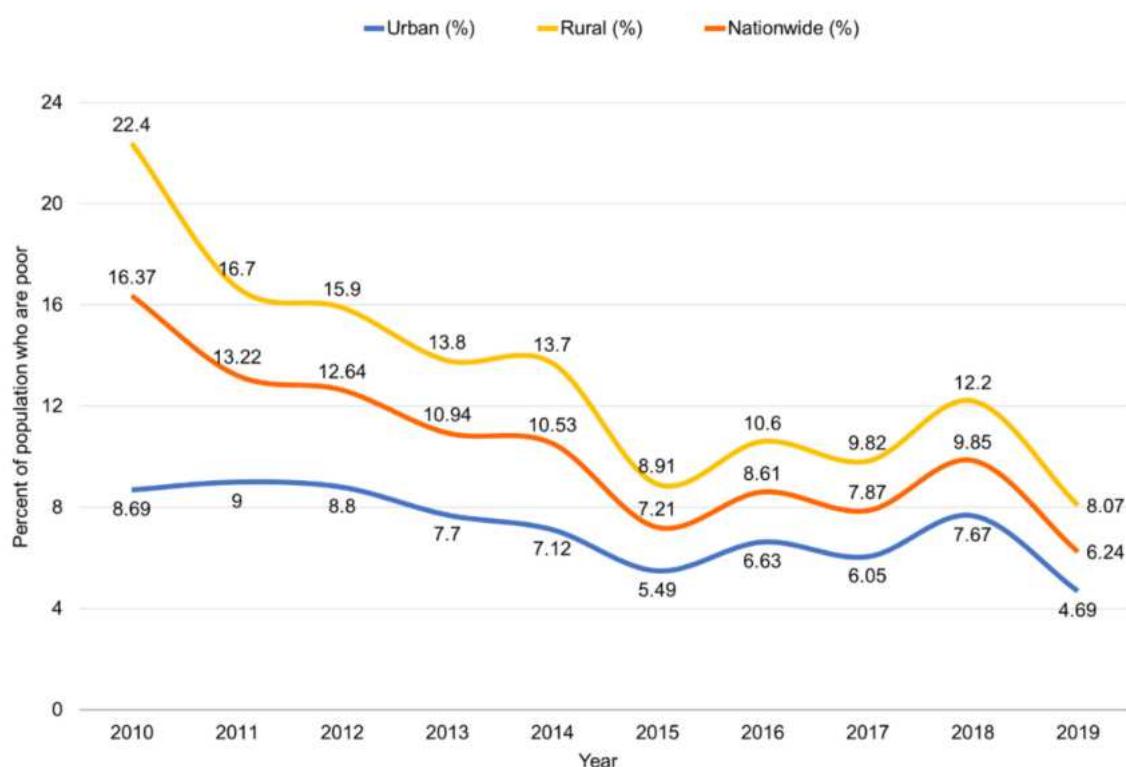


Figure 2.7 Poverty rates between urban and rural population

Source: NESDC (2021a)

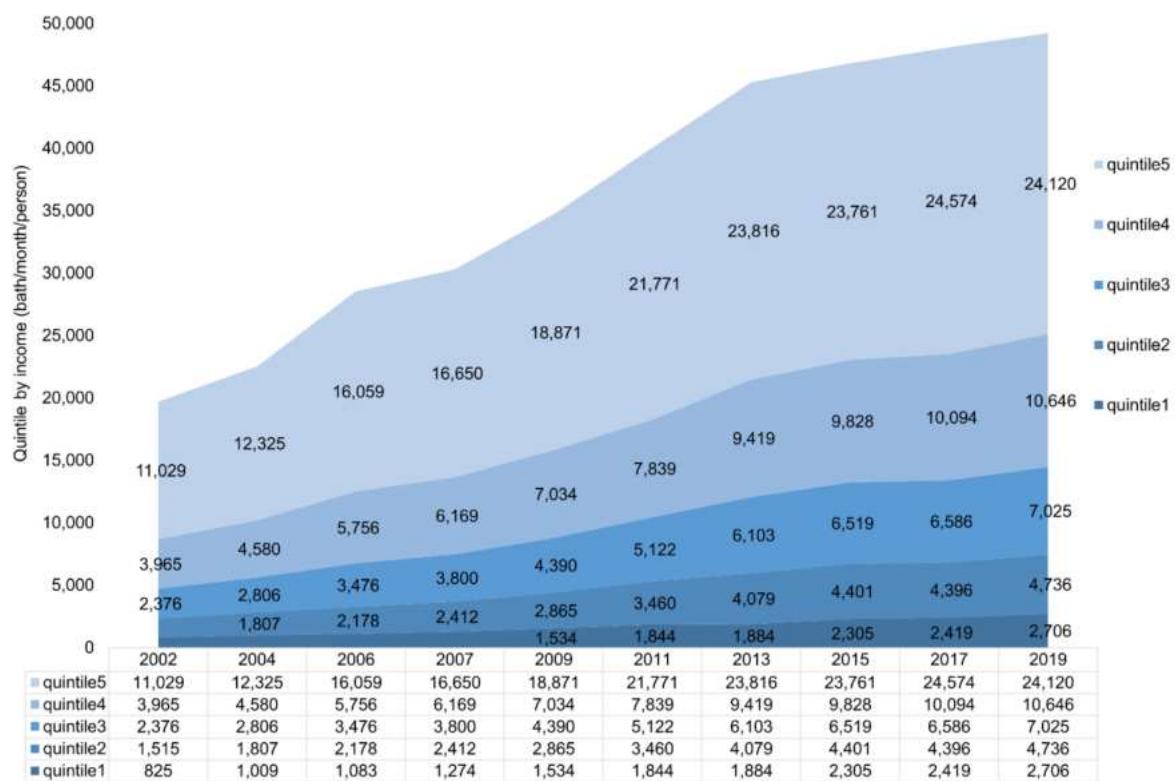


Figure 2.8 Per capita income by quintile

Source: NESDC (2021a)

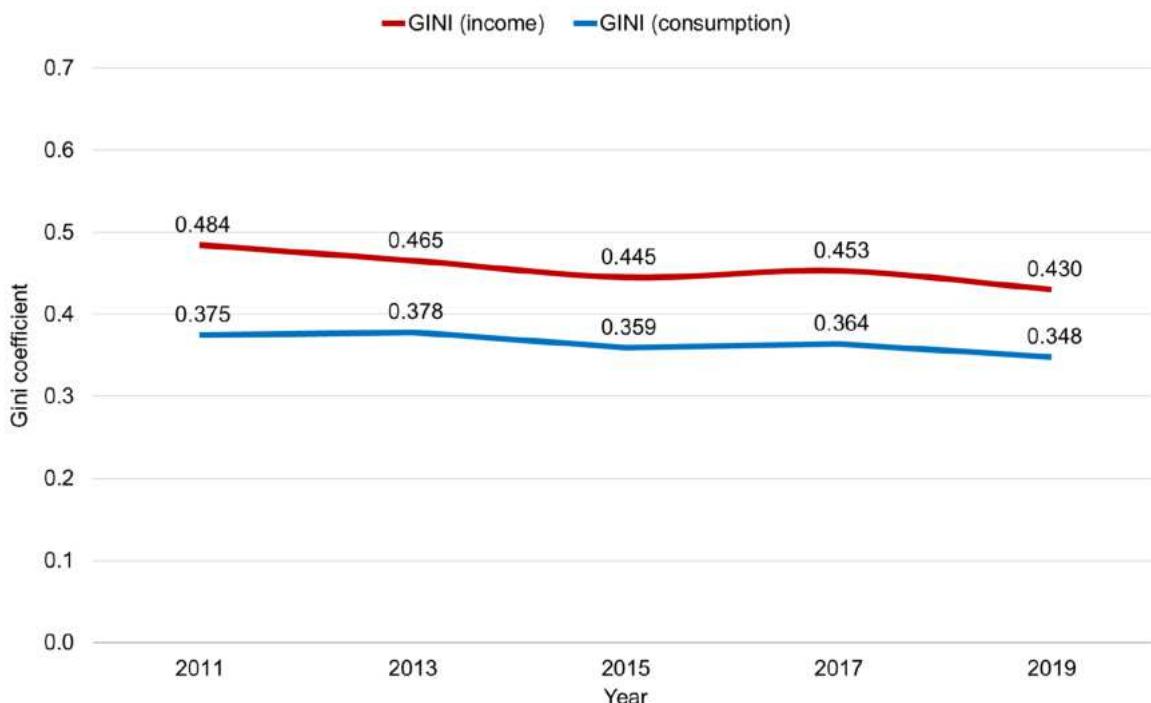


Figure 2.9 Gini coefficients

Source: NESDC (2021a)

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 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 the Thai 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 undistorted energy prices is important. In this instance, Thailand needs to craft its energy pricing carefully where energy pricing measure is divorced from poverty alleviation measures. Provision of 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 unnecessarily benefit from such subsidies. When energy prices are subsidized, it will further lead to smuggling of subsidized energy across the border as well. This has led to a substantial fiscal burden on the government budget.

Thailand needs to maintain the long-term economic growth momentum so as to move the economy out of 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.

Formulating an undistorted energy pricing scheme is an important mechanism for ensuring a successful transition to a green economy. However, the correct price incentives that can deter consumers away from fossil fuel and promote renewable will most likely affect the cost of living, which can impact the poor families through higher diesel and cooking propane prices. In this regard, Thailand needs to separate the issue of green economy transition from poverty reduction. While challenging initially, Thailand needs to start establishing a poverty targeting program where government assistance is tailored to meet the specific needs of poor families. Subsidizing fossil fuel will never get people out of poverty. However, translating such subsidies into effective poverty targeting program will yield promising outcomes in poverty alleviation.

Thailand needs to craft its energy pricing carefully where energy pricing measures are divorced from poverty alleviation measures. Provision of 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 unnecessarily benefit from such subsidies.

Education

Thailand has been rather successful in terms of school enrollment, with as much as 86-88 percent of children being able to attend primary school during the last decade. The success is made possible owing largely to the compulsory thirteen-year free education legislation. However, the enrollment rates decline at the secondary school level: only 67-69 percent of children attend lower secondary school, and only 57-60 percent of children attend the upper secondary and vocational school. The drop in enrollment at secondary schools can be explained partly by the higher opportunity costs of attending school such as forgone income and also partly by other indirect costs, such as transportation to farther schools. Although the number of children attending schools is high, Thailand still needs to focus its attention on the quality of education, including the 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 critics 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. On gender equality (Nicol, S., Guven, P., & Pennisi, A., 2021), a World Bank study shows that boys' and girls' enrollment rates at primary and secondary are more or less the same (The World Bank, (n.d.)). At the university level, however, Thai women are more likely to attend and finish university education (The World Bank, (n.d.)).

Table 2.1 School enrollment

Level of education	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Pre-primary education	65.1	53.1	65.7	66.9	67.5	69.4	72.3	75.7	77.0	78.1
Primary education	86.1	87.2	87.6	88.1	87.8	87.2	87.3	88.3	86.7	86.8
Lower secondary education	69.9	69.6	67.6	67.0	68.1	33.4	67.4	68.2	68.6	66.4
Upper secondary education (+vocational certificate)	57.6	55.9	55.1	57.7	57.1	57.7	58.4	57.8	58.4	60.3
Bachelor's degree (high vocational certificate)	23.1	21.9	28.5	29.7	25.5	24.9	27.8	29.1	26.9	28.1

Source: NESDC (2020a)

The COVID-19 pandemic took a hard hit on children attending schools in several ways. The Office of the Basic Education Commission reports that as many as 40,000 students in grades 6-9 are at risk of dropping out or not pursuing further education as online learning becomes too much of a burden for lower income families with school-going children (UNESCO, 2021).

While online learning may be a viable alternative for many families, it is not the case for those who do not have internet access, computers, or mobile phones. Having children at home also poses additional costs to families, as there must be adults supervising them during the day. This situation forces low-income families to bear additional costs of forgoing working hours.

Health

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

Table 2.2 Healthcare coverage

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

Source: National Statistical Office (2020)

2.3 Environmental profile

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

Forest area

Thailand recognizes the importance of its forest coverage, particularly in the northern and western regions. Forests have served several essential roles, namely rainwater storage, flood control, climate control and as habitats for biodiversity resources. Forests will be even more important for Thailand in the years to come because commercial forestry can contribute substantially to income and renewable energy supply. But most importantly, forest coverage, including that from reforestation, will serve as vital carbon sinks and play a key role in achieving Thailand's carbon neutrality goal.

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 due to various factors, including forest concession, shifting cultivation, illegal logging, expansion of agricultural land for production of leading commercial crops such as rice and sugar cane, and more recently, the expansion of illegal maize cultivation in forest reserves to supply raw materials to the animal feed industry. Currently, the total forest coverage declined to only 31.64 percent of the total land area in Thailand. Thailand has set a target of achieving 40 percent forest coverage, which implies a commitment to reforesting 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 costly manner. Commercial forestry will also generate income not only for the local indigenous people but also for many other downstream industries, such as furniture manufacturing and renewable energy production.

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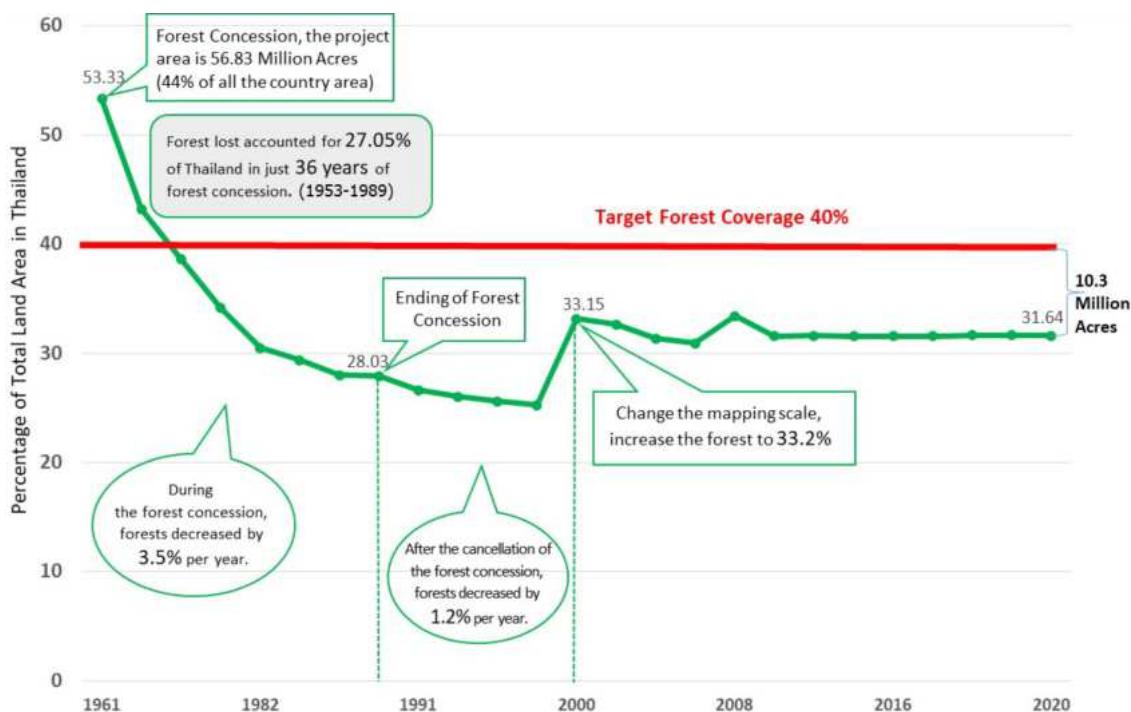


Figure 2.10 Forest coverage in Thailand

Source: Royal Forest Department (2021)

Air quality

Thailand has recently been facing a severe air pollution problem in the form of PM_{2.5}. The concentration of PM_{2.5} is high particularly during the winter months when most parts of the country are under low pressure air that traps particles and dust close to the ground (see Figures 2.11 and 2.12). The sources of PM_{2.5} in Thailand include engine combustion, agricultural open-burning, and transboundary pollution. The Bangkok Metropolitan Area and Chiang Mai province, located in the northern region, are among the areas where people have developed respiratory symptoms associated with high PM_{2.5} concentrations. The northern provinces suffered from high concentrations of PM_{2.5} owing largely to agricultural post-harvest open burning and hotspots in forested areas. Saraburi province in the central region experiences higher concentrations of both PM_{2.5} and PM₁₀ from rock mining for the cement and construction industries.

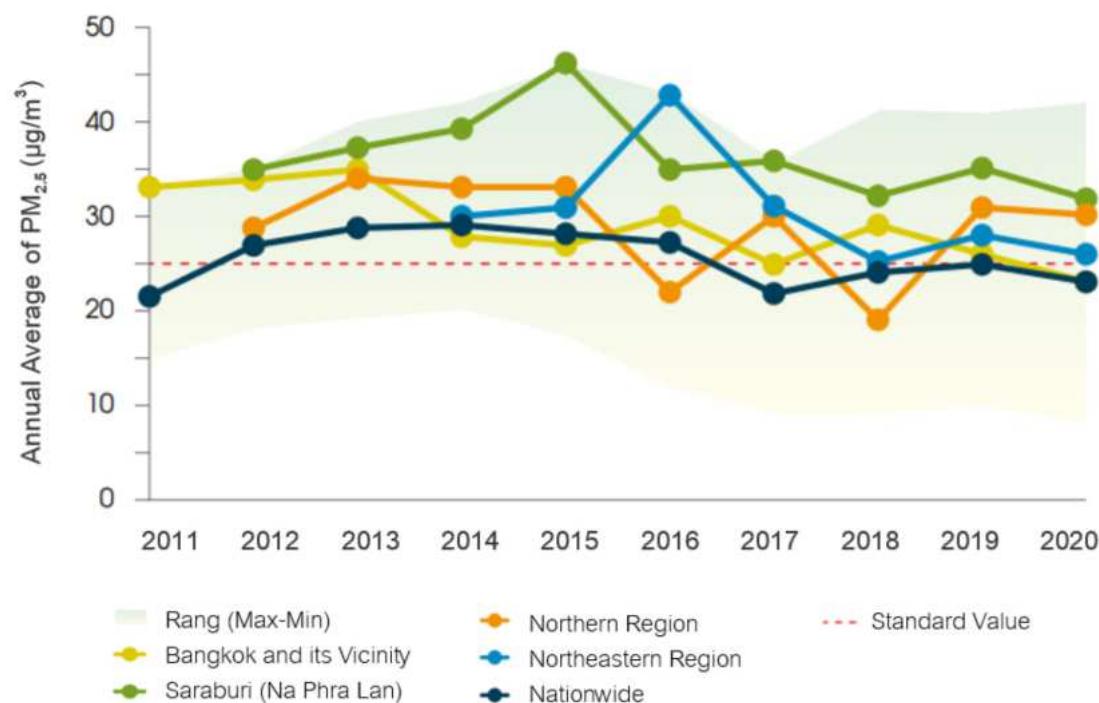


Figure 2.11 Annual averages of PM_{2.5}

Source: Pollution Control Department (2021)

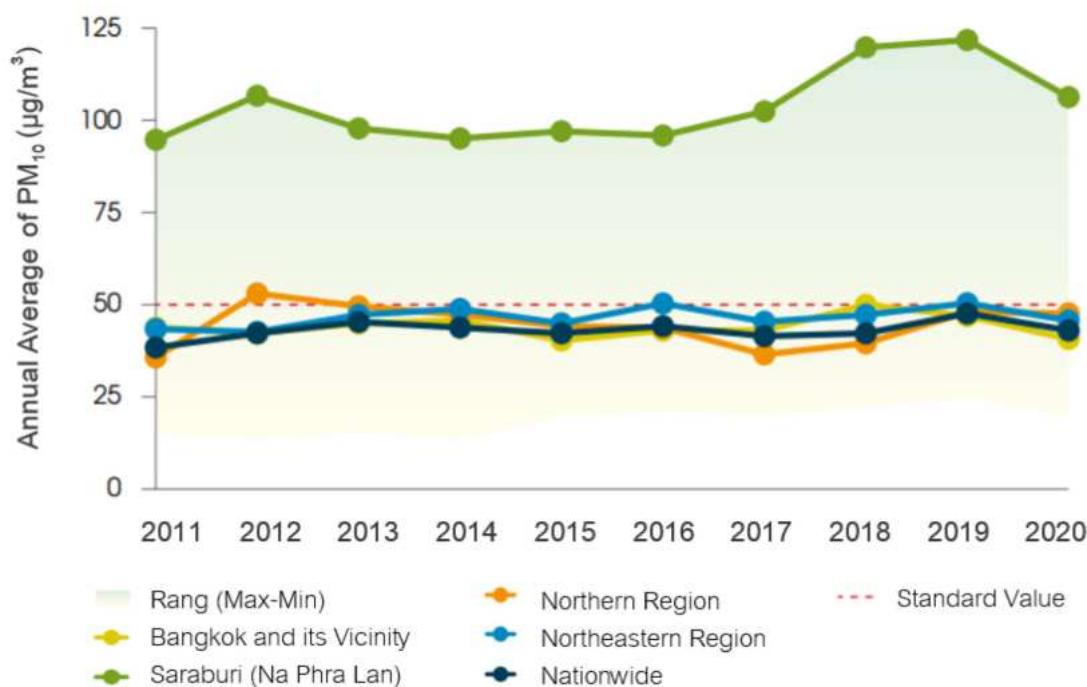


Figure 2.12 Annual averages of PM₁₀

Source: Pollution Control Department (2021)

Municipal solid waste

Solid waste 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, while 9.13 tons are recycled. As much as 7.88 tons of solid wastes still end up being improperly disposed. Inappropriate disposal of solid wastes leads to issues such as sewer blockages, which in turn lead to urban flooding and ocean pollution. Municipalities and local governments, together with the energy authorities, need to adopt more effective solutions for solid waste management, including waste-to-energy, recycling, waste sorting, and garbage collection fees. In connection with the green economy transition, Thailand needs to capitalize on waste-to-energy potentials. The country's administrative framework, including price incentives such as the feed-in tariff scheme, needs to be restructured in order to increase the share of renewable energy to the total energy profile.

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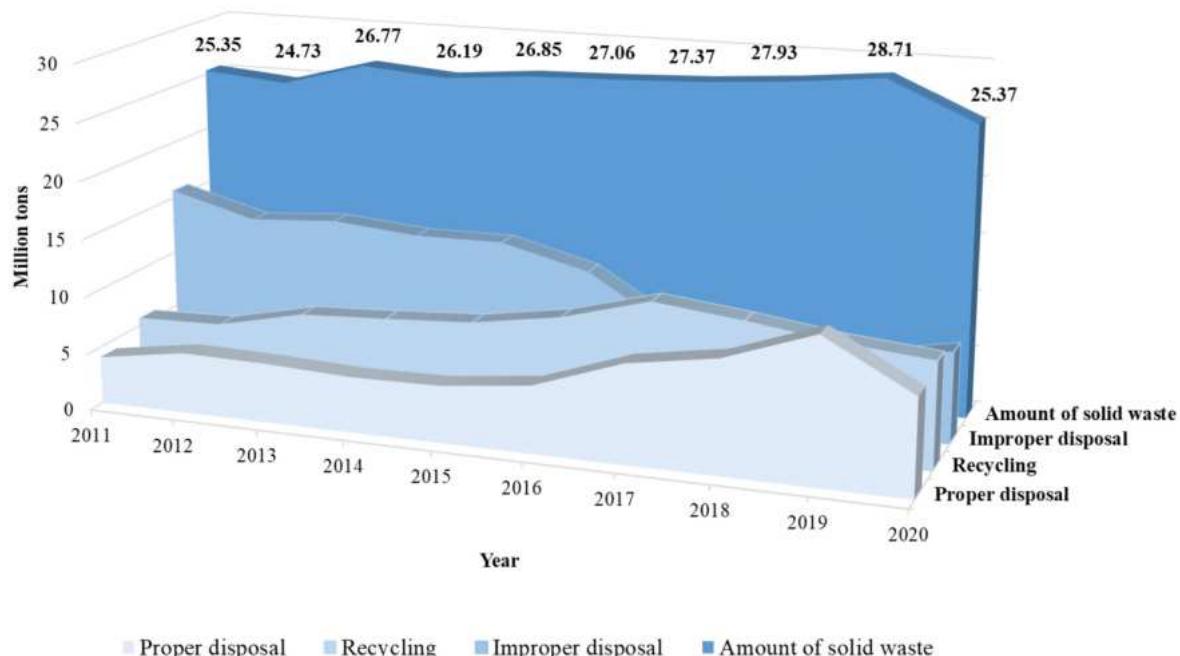


Figure 2.13 Municipal solid wastes

Source: Pollution Control Department (2021)

Water quality

Water quality in public waterways in Thailand is generally good, with the exception of congested waterways in urban areas. Figure 2.14 shows that most public waterways are in good or fair condition. However, the water quality is considered poor in some congested locations, mostly in cities where households discharge wastewater into public waterways without proper treatment.



Figure 2.14 State of surface water quality countrywide

Source: Pollution Control Department (2021)

Climate change

Thailand has been actively engaged in climate change dialogue and communication with the United Nations Framework Convention on Climate Change (UNFCCC). During COP26, where leaders of member countries pledged their voluntary carbon reduction commitments, adaptation strategies, resource mobilization to support carbon reduction, and cooperation in areas beneficial for combating climate change, the Prime Minister of Thailand made the following statement:

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) as guiding frameworks for its transition towards becoming a low carbon and resilient society. On mitigation, Thailand intends to reduce its greenhouse gas (GHG) emissions by 20 percent from the projected business-as-usual (BAU) level by 2030. The level of contribution could be increased up to 25 percent, contingent upon sufficient access to technology development, 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 the country towards climate-resilient and low greenhouse gas emission development while at the same time serve as a basis for enhancing its subsequent NDCs.

Greenhouse gas emissions

Thailand's greenhouse gas emissions rose from around 245 MtCO₂ eq in 2000 to 354 MtCO₂ eq in 2016. This constitutes about a 2.5 percent increase in greenhouse gas emissions per year. Energy is the largest contributor to Thailand's greenhouse gas emissions, accounting for a rising share of the total emissions, from 67.2 percent in 2000 to 71.65 percent in 2016 (see Figure 2.15). Methane emissions from the agricultural sector are the second largest contributor to the country's greenhouse gas emissions. While the total amount of greenhouse gas emissions from agriculture increased from 48.9 MtCO₂ eq in 2000 to 52.1 MtCO₂ eq 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 waste sectors made up the remaining greenhouse gas emissions.

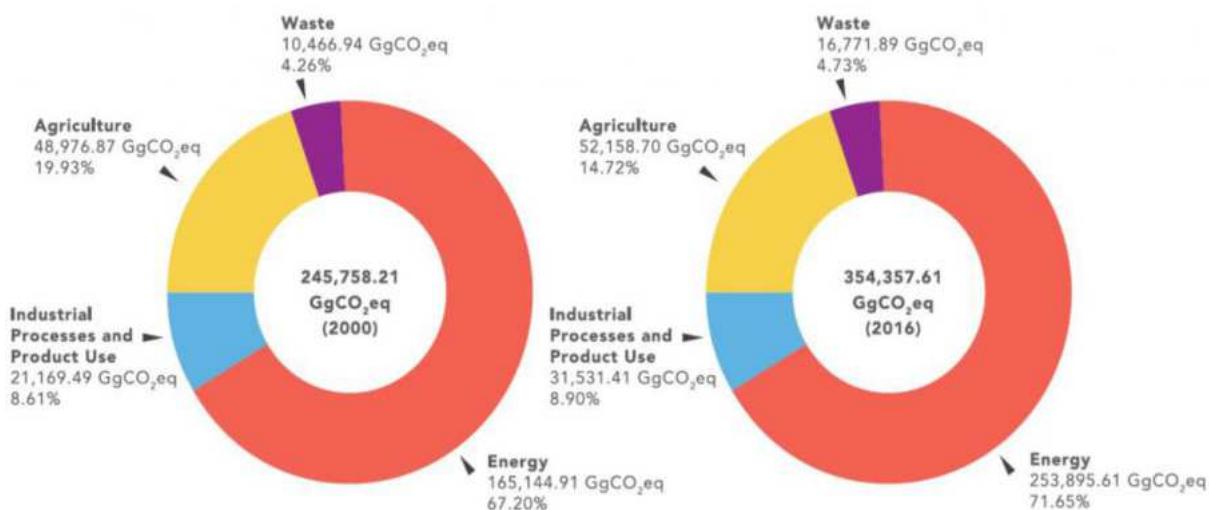


Figure 2.15 Greenhouse gas emissions by sectors in 2000 and 2016

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

Within the energy sector, the total emissions of 253,895.61 GgCO₂ eq were comprised of fuel combustion (42.84 percent), transportation (27.21 percent), manufacturing and construction (19.53 percent), and other sources (6.10 percent). Fugitive emissions from fuel accounted for only a little over 4.33 percent of the total greenhouse gas emissions from the energy sector (Office of Natural Resources and Environmental Policy and Planning, 2020).

Figure 2.16 shows Thailand's greenhouse gas projections for the BAU and the 2-degree target. To meet the 2-degree target, Thailand needs to reduce greenhouse gas by as much as 52 percent from the BAU level in the year 2050. Figure 2.17 shows the projected sectoral breakdown of greenhouse gas emission up to the year 2050. The total greenhouse gas emissions are expected to continue increasing, with a higher percentage attributed to the energy sector; Thailand sees reforestation as a key strategy for carbon sequestration, offering a potential carbon sink potential of around 100 MtCO₂eq in 2050.

Thailand needs to craft a set of subsidies mechanisms to reduce farm emissions from activities such as rice plantation and livestock. Such subsidies mechanisms should promote the restructuring of the Thai agricultural sector, focusing on product diversification, improving production and water utilization efficiency, and simultaneously reducing carbon emissions. To harness the potential of carbon sinks, Thailand will need to engage in a commercial reforestation program that will not only generate income but also serve as a means of carbon sequestration.

Thailand has adopted several incentive mechanisms to facilitate its transition towards a low carbon society. These mechanisms include increasing the share of renewable energy via a feed-in tariff framework, providing investment incentives for electric vehicle production, as well as promoting improved automobile combustion through new vehicle tax incentives. In the future, Thailand will need to explore the possibility of adopting a carbon tax system or establishing a tradable carbon market that will serve to further promote economic efficiency in carbon emissions. A carbon tax system and tradable carbon market will also enable Thailand to respond to the upcoming carbon reduction pressure from its trading partners through the Carbon Boarder Adjustment Mechanism (CBAM), which is expected to be implemented in the near future.

As the agricultural sector contributed as much as 14.72 percent to Thailand's greenhouse gas emissions in 2016, the country needs to craft a set of subsidies mechanisms to reduce farm emissions from activities such as rice plantation and livestock. Such subsidies mechanisms should promote the restructuring of the Thai agricultural sector, focusing on product diversification, improving production and water utilization efficiency, and simultaneously reducing carbon emissions. These tasks are the important components of the Thai BCG model to be discussed later in this report. Furthermore, to harness the potential of carbon sinks, Thailand will need to engage in a commercial reforestation program that will not only generate income but also serve as a means of carbon sequestration.

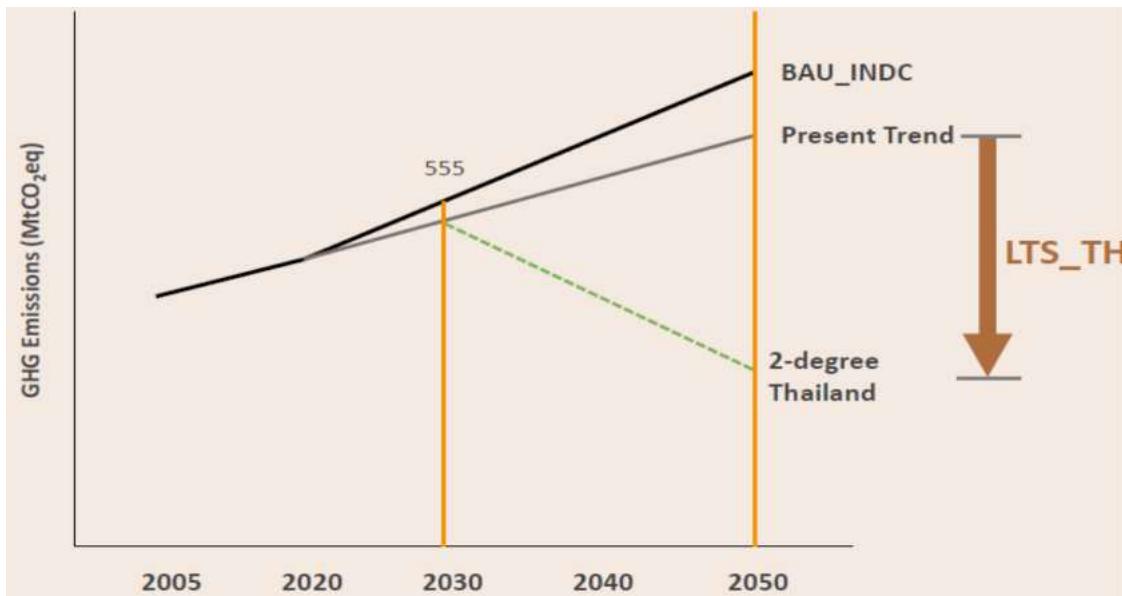


Figure 2.16 Greenhouse gas emissions projections

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

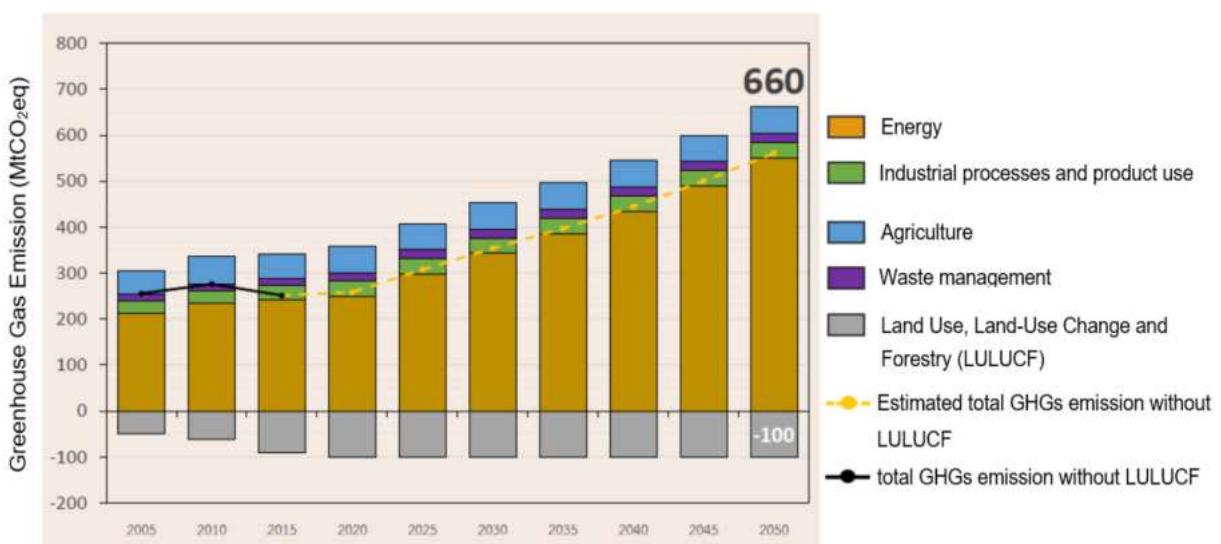


Figure 2.17 Projection of greenhouse gas emissions by sector in 2050

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

Adaptation

In the context of climate change actions, adaptation has been a concern for many developing countries, owing largely to the vulnerability of their low-income populations. With a high percentage of the populations still residing in rural areas and practicing agriculture, increases in the frequency of storm surges will affect many vulnerable communities. Additionally, rising sea levels will impact the livelihoods of coastal populations. For Thailand, climate change poses weather-related risks in various sectors, including agriculture and food security, tourism, public health, and human settlements. To effectively address these challenges, it is crucial to implement adaptation measures that specifically target the more vulnerable segments of the population. This includes recognizing the needs and vulnerabilities of the elderly, children, and women, who are often the victims of weather-related risks, such as droughts and severe floods.

Based on damage statistics from 1998 to 2017, the Climate Risk Index (CRI) constructed by 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 in 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 during both floods and droughts, resilient infrastructure in both rural and urban areas, and changes in farming practices and ways of life.

2.4 Green economy in Thailand

Green economy initiatives in Thailand began in the late 1980s when natural resource management was incorporated into the 6th and 7th National Economic and Social Development Plans. At that time, the adoption of green economy policies and measures was voluntary. Three decades later, the 11th and 12th National Economic and Social Development Plans contained clearer strategic movements towards becoming a green economy. Examples include, among others, low carbon production in the industrial sector, the transition toward clean energy in the energy and transportation sectors, promotion of sustainable agriculture, and market development for green products and services.

At the national level, the green economy has been embedded in the National Strategy (2018-2037), with one of those strategies focusing on eco-friendly development, growth, and society by means such as

- Reducing greenhouse gas emissions,
- Developing climate change mitigation/adaptation mechanisms,
- Building security and resilience with regard to water resources and energy
- Promoting environmentally-friendly agriculture, and
- Increasing the use of renewable resources.

To support the implementation of this strategy, policy tools and incentives have been introduced. These include measures such as emission taxes, natural resource usage fees, certification, and eco-labelling for many products, just to name a few.

Along with the National Economic and Social Development Plans and National Strategies (2018-2037) mentioned above, there are also a number of sectoral plans that are instrumental for Thailand's 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 address sustainable production and consumption via channels such as green procurement, sustainable tourism, and sustainable city management. Third, the Climate Change Master Plan (2015-2050) focuses on the reduction of greenhouse gas emissions and adaptation to climate change. Finally, the Environmental Quality Promotion and Conservation Plan (2017-2025) and energy efficiency and renewable energy plans contain elements that support Thailand's green economy transition. These plans, together, provide detailed guidelines for policy 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

Green production

- Measures against illegal, unreported, and unregulated (IUU) fishing
- Measures against illegal logging
- Organic farming
- Production of eco-friendly products and services

Waste reduction and management

- Promotion campaigns for waste reduction, reuse, and recycling

Emission and pollution control

- Reduction of greenhouse gas emission
- Reduction of air and water pollution
- Green transportation initiatives

Natural resources and the environment

- Conservation of natural resources and biodiversity
- Increases of green spaces in urban areas

Green capacity-building initiatives

- Incorporation of climate change into school curricula
- Training programs for green jobs (Table 6.3 for a comprehensive list)
- Other awareness building initiatives

Source: Analysis by authors



3

Mapping key institutions and organizations

Thailand's transition towards a green economy relies on several factors, among which are institutional arrangements and incentive structures that will guide society towards long-term sustainability. At the global level, effective communication with the UNFCCC, along with scientific evidence from the IPCC, and close monitoring of the SDGs, are considered most crucial in driving countries towards sustainability.

3.1 Institutional mapping

At the national level, Thailand operates under two key documents: the National Strategy (2018-2037) and the Five-year National Economic and Social Development Plans. From 2022 to 2027, the course of development in Thailand will be guided by the 13th National Economic and Social Development Plan or the 13th Plan. In this regard, the National Economic and Social Development Council (NESDC) will take the leading role in integrating green and sustainable growth into Thailand's development roadmap.

With regard to climate change, 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 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 known as Thai-VER.

More specifically, in relation to greenhouse gas reduction in the energy sector, the Ministry of Energy is responsible for projecting future energy demand and production as outlined in the Power Development Plan (PDP). As for the promotion of renewable energy, the Department of Alternative Energy Development and Efficiency, under the Ministry of Energy, is responsible for the more detailed preparation of renewable energy strategies.

At the implementation level, the provision of environmental services and monitoring are administered by both the central government, through their local offices, and local governments such as municipalities. National and regional environmental issues such as monitoring of water quality, air quality, and industrial hazards, fall under the responsibilities of the local offices of central government agencies. Municipalities, on the other hand, are responsible for more household affairs, specifically, sanitation, waste collection, and waste treatment.

In the private sector, the Thai Chamber of Commerce, the Federation of Thai Industries, and the Joint Standing Committee on Commerce, Industry and Banking have been very actively engaging private companies in sustainability practices. These private bodies also stay updated on climate change developments around the world to ensure that Thai businesses align with global trade requirements and standards.

On public financing, the Ministry of Finance and the Bureau of Budget are key agencies responsible for preparing 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 developing the tax structure, such as the implementation of carbon tax, that will steer Thailand towards a low carbon future. The Board of Investment (BOI), an independent body, offers tax incentives to encourage investors to engage in green investments, such as investments in electric vehicles.

On technological advancement in addressing climate change, many innovations are derived from research outcome at Thai universities and research institutes. These technological advancements, both in pure science and social science, also rely on public funding provided by Thailand Research Fund (TRF) and Thailand Science Research and Innovation (TSRI). These two funding agencies are pivotal as their resource funding policies shape the direction of knowledge production, which forms the backbone of national development. It is important to note that research funding through these agencies prioritizes sustainable development and the transition to a low carbon society.

In terms of green jobs, Thai tertiary institutions are able to respond effectively to the growing demand for environmentally focused workforce. Table 3.1 shows the number of university graduates in degrees related to environmental management, of which green economy and sustainable development are a part. Out of the total of 154 universities in Thailand, there are as many as 78 universities offering as many as 198 curricula in areas related to sustainable development and the green transition. In 2021, these curricula produced 3,373 graduates specializing in environmental studies, accounting for approximately 1.35 percent of the total number of university graduates that year. It is worth noting that, out of the 3,373 graduates in environmental studies, 73 percent were female, indicating the significant role of women workers in Thailand's green transition. It is also important to note that as these tertiary institutions, operating as semi-private universities, are well-positioned to effectively meet the increasing demand for green jobs in the Thai labor market.

Table 3.1 Thailand's tertiary education graduates in green programs

Total number of universities	154
Total number of universities with environment curricula (50.6 percent)	78
Total number of curricula related to environment studies	198
● Bachelor's degree	105
● Master's degree	65
● Doctoral degree	28
Total number of graduates	250,660
Total number of graduates in environmental studies (1.35 percent)	3,373
- Male (28 percent)	920
- Female (72 percent)	2,453
● Bachelor's degree	2,836
- Male	708
- Female	2,128
● Master's degree	456
- Male	176
- Female	280
● Doctoral degree	81
- Male	36
- Female	45

Source: Ministry of Higher Education, Science, Research and Innovation (2022)

In 2021, the Thai tertiary education produced 3,373 graduates specializing in environmental studies, accounting for approximately 1.35 percent of the total number of university graduates that year. It is worth noting that out of the 3,373 graduates in environmental studies, 73 percent were female, indicating the significant role of women workers in Thailand's green transition.

Thailand's transition towards being a green economy is part of a larger development initiative: the Bio-Circular-Green economy (BCG) model. This initiative was put forward by the Ministry of Higher Education, Science, Research and Innovation (MHESI), whose mandate is to oversee tertiary education, public research institutes, and research funding. The BCG model is based on leveraging various research findings and identifying areas with potential contributions for future development. To drive the implementation of the BCG model, the government established an initial network of key agencies. Figure 3.1 provides a list of these institutions designated with a key role in Thailand's BCG model and the transition towards a green and sustainable economy. It is important to note that there are several other agencies and institutions engaged in BCG initiatives but may not be included on the list.



Figure 3.1 Mapping of institutions

Source: Analysis by authors

3.2 Government committees

The mapping of key institutions in Figure 3.1 outlines key agencies whose mandates are related to the green economy transition. These key institutions were established by law with specific roles and mandates that were defined based on the intended areas of focus at the time of their establishment. However, over time, the structure of these institutions can be rearranged to better address the ongoing development challenges.

In light of climate change, the Office of Natural Resources and Environmental Policy and Planning (ONEP) is designated as the focal point for communication with the UNFCCC and other related agencies. ONEP is also responsible for preparing Thailand's Intended Nationally Determined Contribution Report (INDC) and National Adaption Plan (NAP). However, Thailand does not have a single agency with complete authority to oversee all the various issues related to sustainable development or the green economy transition.

Climate change, green economy, and sustainable development, require coordination among several government, private, and civil servant entities through the form of national committees, committees, subcommittees, and working groups. These government committees consist of a chairperson, committee members, and advisors or specialists in the related fields. The roles of government committees are to prepare policy documents that define directions and mandates, coordinate work progress among the agencies involved, address obstacles and overlapping activities, and provide opportunities for exchanges of opinions.

Sustainable development, especially the monitoring of progress towards the 17 SDGs, is managed by the National Committee for Sustainable Development (CSD) and its subcommittees. Thailand's green economy transition, which is part of the Bio-Circular-Green (BCG) model led by the Ministry of Higher Education, Science, Research and Innovation (MHESI), requires coordinated efforts among relevant agencies. This coordination is overseen by the Bio-Circular-Green (BCG) Policy Board, the National BCG Management Committee, and the BCG Model Implementation Committee, which consist of representatives from concerned agencies. Under these bodies, there are several specific subcommittees responsible for implementing all eleven areas of BCG. These areas include:

- | | |
|---------------------------------|---------------------|
| 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) Human Resources | |

The climate change issues, in particular, are managed under the National Committee on Climate Change Policy (NCCC), which includes the Subcommittee on Mitigation and the Subcommittee on Adaptation. The work plans on decarbonization are 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 is structured through policy documents that serve as guidelines for agencies in developing their annual work plans and budget proposals. To ensure alignment with the overarching development agenda, policy documents must maintain coherence, with specific or sectoral policy documents nested within the broader theme of the national development agenda. To achieve policy coherence, the Thai policy documents are categorized into three levels of hierarchy: Tier 1, Tier 2 and Tier 3. At the highest level, the Tier 1 policy document is the National Strategy (2018-2037). The other policy documents and sectoral policies are thus nested under this National Strategy.

Tier 1 policies

The National Strategy (2018-2037) is the highest level of Thailand's national development agenda. It aims to provide a twenty-year long-term vision that guides national development towards improving the well-being of citizen, ensuring sustainability, and promoting national security.

The National Strategy (2018-2037): The vision of Thailand's 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) includes six long-term development strategies as follows:

- 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 the strategies on eco-friendly development and growth, competitiveness enhancement, strengthening human capital, and social cohesion and equity.

Tier 2 policies

Following the key strategies outlined in the National Strategy (2018-2037), there are three Tier-2 policy documents that provide more specific guidelines for Thailand's development agenda.

The Master Plans 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's 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 various areas that require reform. In relation to the BCG model, green growth, and sustainable development, there are six specific areas within the National Reform Plan that will strengthen Thailand's 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: This five-year master plan or the 13th Plan is considered a key policy document that provides a medium-term development guideline for Thailand. The 13th Plan was launched and enforced in 2022. There are 4 main development agendas in the 13th Plan: 1) High Value-Added Economy, 2) High Opportunity Society, 3) Eco-Friendly Living, and 4) Key Enablers for Thailand Transformation.

Tier 3 policies

Tier 3 policies encompass diverse sectoral development plans that outline expected outcomes, key performance indicators, and implementation strategies. In relation to the green economy transition, there are five areas of sectoral plans that will become instrumental in Thailand's green transition and sustainable development. These areas include climate change, natural resources and environment, sustainable development, BCG, and energy. Table 4.1 presents the specific sectoral plans within each of these five areas.

Box 4.1 Tier 3 policies in connection with green transition

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:

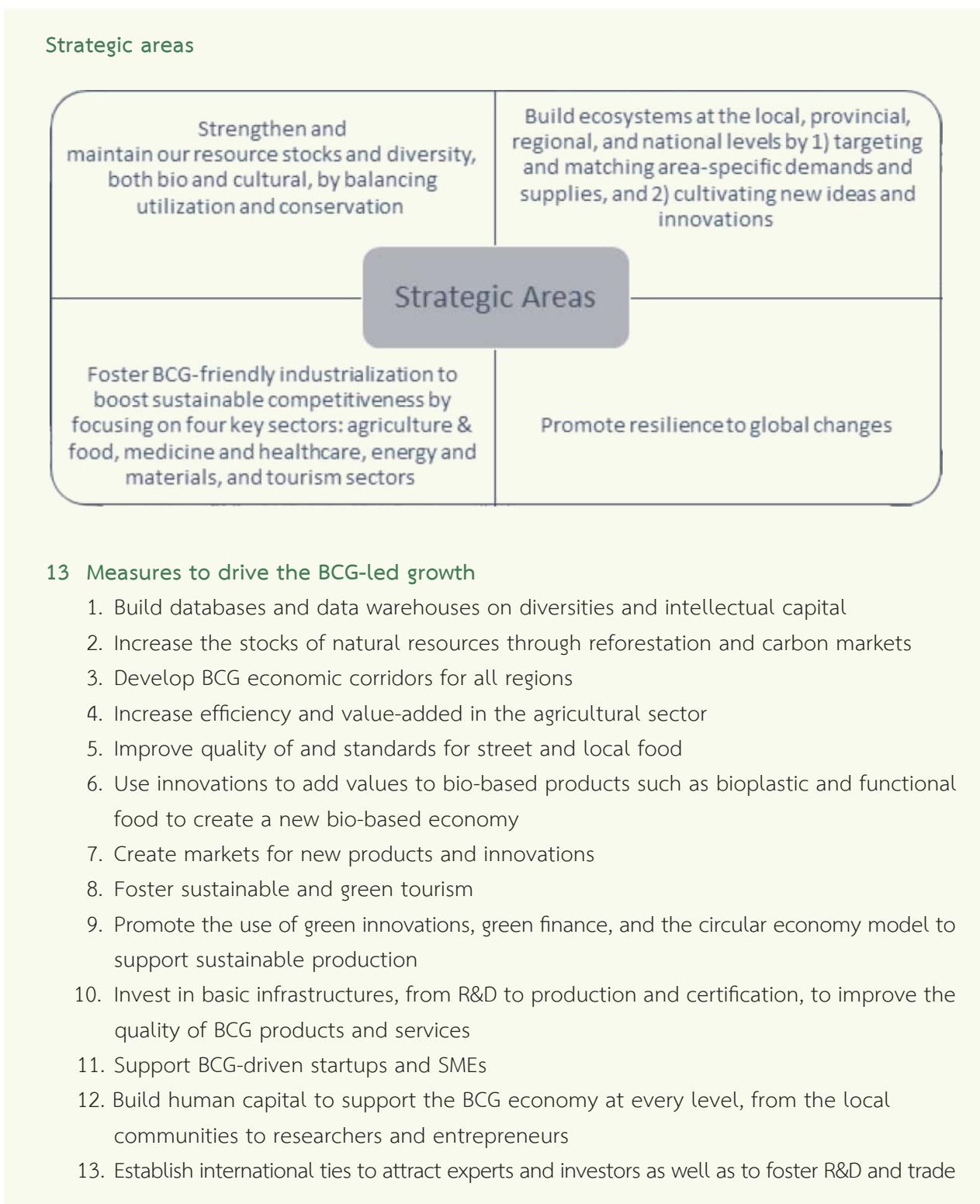
- (Draft) National Energy Plan
- Power Development Plan (PDP)
- Alternative Energy Development Plan (AEDP)
- Energy Efficiency Plan (EEP)
- Strategic Plan for Electric Vehicle Promotion
- Gas Plan
- Oil Plan

Source: Compiled by authors

4.2 The Bio-Circular-Green Economy (BCG) model

The Thai government has adopted the BCG model as the main driver for economic and social development in Thailand. The BCG model relies on the full utilization of innovation that is based on Thailand's competitive advantages with the aim to support sustainable growth. The “Bio” component draws upon Thailand's strengths as an agricultural-based economy and its rich bio and cultural diversity. The target sectors are agriculture, food, pharmaceutical and medicine, bioenergy, biochemistry, and bioplastics. The “Circular” component aims to reduce and economize on waste and pollution through processes such as reuse and recycling. The target sectors include plastic, automobile tires, building materials, metal electrical parts, and vehicle batteries. The “Green” component emphasizes environmentally friendly initiatives to support green transition and growth. The target activities involve reducing greenhouse gas emissions in the energy sector and increasing the use of renewable energy. Given the technological requirements in these domains, Thailand will need to prioritize socially feasible R&D and research innovations to effectively drive the BCG agenda in the long term.

Box 4.2 Overview of the BCG Strategic Plan



13 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: National Science and Technology Development Agency (2021)

The Thai government has adopted the BCG model as the main driver for economic and social development in Thailand. The BCG model relies on the full utilization of innovation that is based on Thailand's competitive advantages with the aim to support sustainable growth. The "Bio" component draws upon Thailand's strengths as an agricultural-based economy and its rich bio and cultural diversity. The "Circular" component aims to reduce and economize on waste and pollution through processes such as reuse and recycling. The "Green" component emphasizes environmentally friendly initiatives to support green transition and growth.

Box 4.2 provides an overview of the current BCG Strategic Plan, including strategic areas and measures to advance the BCG agenda. At the current stage, the main strategic plan, along with sectoral action plans, has 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. The helix will work through four main mechanisms: 1) BCG sectoral development, 2) BCG talent & enterprise development, 3) BCG area-based development, and 4) BCG frontier research and knowledge.

Whether or not the BCG agenda will be effective depends on how Thailand can 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 respond to these challenges, the working teams and action plans on these specific hurdles have been prepared. All of these efforts will make the BCG agenda a comprehensive driver of Thailand's sustainable development and transition to the inclusive green economy.

4.3 SDGs nationalization process

The concept of an inclusive 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 closely related to the green economy, as outlined in Table 4.1

Goals and plans

Thailand has incorporated the SDGs into its National Strategy (2018-2037). All of the SDGs described in this chapter contribute toward the national goal of promoting environmentally friendly growth. In addition, the national goal of improving social equality is encompassed by SDG 8 on decent work and economic growth. SDG 9 on industry, innovation, and infrastructure will help boost Thailand's competitiveness, making it another crucial element of the country's national strategies. Hence, the SDGs are ingrained in the country's national strategies. In addition to the National Strategy (2018-2037), the SDGs have also been incorporated into the National Economic and Social Development Plans. Specifically, the SDGs align well with the 12th Plan's fourth strategy on environmentally friendly growth for sustainable development (see Table 4.2).

Table 4.1 Key SDGs and indicators considered in Thailand's Scoping Report

SDG 8 Decent work and economic growth	SDG 9 Industry, innovation, and infrastructure
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 8.4 Improve progressively, through 2030, global resource efficiency in consumption and production and endeavor to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programs on sustainable consumption and production, with developed countries taking the lead 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	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 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 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
SDG 12 Responsible consumption and production	SDG 13 Climate actions
12.2 By 2030, achieve the sustainable management and efficient use of natural resources 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 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse 12.7 Promote public procurement practices that are sustainable, in accordance with national policies and priorities 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	13.2 Integrate climate change measures into national policies, strategies and planning 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

Source: Definitions of indicators from The United Nations, (n.d.)

Policies and incentives

Following the national-level plans are the area-specific roadmaps for several 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 of 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 through cross-agency collaborations via national committees and subcommittees described above. Box 4.3 provides examples of current policies and initiatives.

Box 4.3 Examples of key players, policies, and incentives by SDG indicators

SDG 8: Decent work and economic growth

- **8.3 Formalizations of SMEs:** The National Science and Technology Development Agency (NSTDA) and the Digital Economy Promotion Agency (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, and 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, elderly, 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 Works (DIW). 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 phased out. For instance, gasoline subsidies are now only in place for E20 and E85 fuels. The 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 the 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 into various plans and policies from the national level down to the organization level. See Table 4.2 for some examples.
- **13.3 Climate change awareness:** Climate change is incorporated into school curricula at every level. The basic education core curriculum (2017) includes climate change in three subject areas: science, social studies, and health & physical education. At the tertiary level, climate change is part of the general education curriculum that is required for all university students. Government agencies also offer 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.

Source: Interviews with various organizations by authors

Progress

According to a recent report from UNRCO (Lekprichakul, T., 2021), Thailand needs to accelerate its progress to achieve many of the SDG indicators identified in this scoping report (see Table 4.2). There are a few exceptions, such as indicator 12c, where the country can maintain its current progress, and indicators 12.2, 12.4, and 13.2, which require a reversal of the current trends. Additionally, Lekprichakul, T. (2021) identifies a significant number of indicators for which progress cannot be measured. These findings highlight the needs to 1) accelerate progress toward numerous 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

		SDG 8: Decent work & economic growth	SDG 9: Industry, innovation & infrastructure	SDG 12: Sustainable Consumption & Production (SCP)	SDG 13: Climate actions
National Goals		To promote environmentally-friendly growth			
Plans		National Strategy: Strategies for national competitiveness enhancement, eco-friendly development & growth, social cohesion & just society National Reform Program: Economy, natural resources & environment, energy National Economic and Social Development Plan (12 th): Strategy 4 on environmentally friendly growth for sustainable development National Economic and Social Development Plan (13 th): Milestone 10 on circular economy and low carbon society, Milestone 11 on risk management, mitigation, and adaptation to climate change and natural disasters	To improve social equality To boost national competitiveness		
Policies & Incentives		Master Plan on Labor Development • depa's initiatives to support farmers and SMEs • Department of Skill Development's training programs on green technologies (see Section 6.2) • Department of Industrial Work's Green Industry Program (see Section 6.1)	Ministry of Industry's Strategic Plan • Department of Skill Development's training programs on green technologies (see Section 6.2) • Department of Industrial Work's Green Industry Program (see Section 6.1) • Various waste management initiatives (see Section 6.3)	SCP Roadmap • Phasing out of fossil-fuel subsidies by the Fuel Fund • Department of Industrial Work's Green Industry Program (see Section 6.1) • Various waste management initiatives (see Section 6.3)	NDC Roadmap, NAP, Climate Change Master Plan • Climate change and related issues have been incorporated into several plans and strategies at the national level. One clear example is Milestone 11 on climate change adaptation. • Climate change incorporated into curricula at every level • Various training programs by government agencies
Progress	8.3	Formalizations of SMEs	9.2 Sustainable/inclusive industrialization	12c Fossil-fuel subsidies	13.2 Climate change policies
	8.5	Full employment&decentwork	9.4 Sustainable & clean industries	12.2 Sustainable use of natural resources	13.3 Climate change awareness
	8.4	Material resource efficiency	9.3 Small-scale industries access to finance	12.4 Managing chemicals & waste	
				12.5 Reduction in waste generation	
				12.7 Public procurement practice	

Progress: ■ Maintain progress to achieve target, ■ Accelerate progress to achieve target, ■ Reverse trend to achieve target, ■ Cannot be measured

Source: Lekprichakul, T., (2021)

Box 4.4 Gender mainstreaming in Thailand in the context of an inclusive green economy transition

Thailand has been making progress towards gender equality in recent years. Legally, the Gender Equality Act (2015) was the first law in Thailand to define and prohibit gender discrimination. The 2017 Constitution also contains elements on equality between men and women as well as gender discrimination and gender budgeting (Nicol, S., Guven, P., & Pennisi, A., 2021).

Thailand is in good standing relative to other Southeast Asian countries when it comes to many gender equality domains, such as women's education and corporate leadership. Yet, gender gaps still exist in women's formal labor force participation and in politics (Nicol, S., Guven, P., & Pennisi, A., 2021), as well as in LGBTQ rights.

On women empowerment and development, the Women's Development Strategy 2017-2021 outlines five key strategies: 1) paradigm shift measures, 2) empowerment measures, 3) enabling condition measures, 4) protective and corrective measures, and 5) measures and mechanisms to strengthen women in development. This strategy in conjunction with its accompanying Action Plans offers vocational training courses and free job placement for underprivileged women and female youth (Thailand 2016). The strategy could be further supported by gender budgeting via tools such as gender tagging of budget programs (Nicol, S., Guven, P., & Pennisi, A., 2021).

On LGBTQ rights front, Thailand has been off to a good start by explicitly extending protection to transgender people in the Gender Equality Act 2015. However, several gaps remain to be minimized and eliminated. For example, recognition of transgender people in various domains such as official documentation, education, and military conscription is limited (United Nations Development Programme, 2018).

Gender equality is a significant area of consideration for Thailand's transition toward the green economy to be inclusive. One reason is that many of the highlighted key sectors and domains in this report are traditionally male-dominant, for example, renewable energy and other areas within engineering and digitalization. However, it is worth noting that women play an important role in some sectors emphasized in the BCG plan, namely tourism, agriculture and food, and healthcare.

To promote women empowerment and development during an inclusive green economy transition, the Women's Development Strategy along with its Action Plans can serve as a good starting point. These initiatives can particularly benefit women from underprivileged groups, ensuring their active participation and equal opportunities in the process.

4.4 Nationally Determined Contributions (NDC)

On October 26, 2020, Thailand submitted the revised nationally determined contributions (NDC) to the UNFCCC. In this revision, Thailand committed to reduce its greenhouse gas emission by 25 percent from the 2005 business as usual (BAU) by 2030, instead of the previous 20 percent commitment. To drive the carbon reduction initiatives towards this NDC goal, Thailand sets out three major strategic plans:

- (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 4.5 for detail).
- (3) The NDC Supportive Action Plan 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 greenhouse gas emission by 7-20 percent from the BAU. Thailand was able to meet this target, for example, by achieving a 14.09 percent 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 greenhouse gas emissions by 115.6 tCO₂e by 2030. Over 95 percent of the reduction will be coming from the energy and transportation sectors. Details on several measures in these three sectors are outlined in the NDC Sectoral Action Plans and are illustrated in Box 4.5

Box 4.5 Summary of measures in the NDC Sectoral Action Plans

Energy and transportation sectors (9 measures)

- Efficiency enhancement in electricity generation and in electricity consumption in households, commercial, government buildings, the manufacturing sector, and the transportation sector.
Examples of policies: the promotions of energy-efficient light bulbs and refrigeration/air conditioning systems
- Renewable energy sources (biomass, biogas, waste, solar, wind, and hydro power) and the use of biofuels in vehicles

Waste management (4 measures)

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

Industrial processes and products (2 measures)

- Clinker substitutes and eco-friendly coolants

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

The NDC Roadmap for Mitigation outlines several challenges in achieving the 115.6 tCO₂e greenhouse gas reduction goal and suggests that international finance mechanisms may help accelerating the progress towards 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's greenhouse gas emissions will be within the year 2030,
- Thailand is to become Carbon Neutral within the year 2065, and
- Thailand's Net Zero Emission target 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 sectors. 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 will have to 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 are one of the key drivers for economically sound and sustainable abatement of greenhouse gas. Carbon trading and markets in Thailand are under the supervision of the 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 cap and trade requirement; participation in carbon trading is on a voluntary basis. The current carbon trading platforms in Thailand are:

- (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 two of years. Details on T-VER are provided in Box 4.6

Thailand's participation in the trade of Certified Emission Reductions (CERs) within CDM has been limited and has declined in recent years due partly to low carbon prices in this platform. To support 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 4.6 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 of 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

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

Attempts have been made to increase transactions and liquidity in T-VER. As a way to boost the demand for T-VER carbon credit, TGO established Thailand Carbon Neutral Network (TCNN). The network aims to promote collaborations among the government, the private sector, and local communities in driving carbon neutral and net zero emission initiatives. As a result, the TCNN 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 lower transaction costs, both in monetary and non-monetary terms, and to encourage more trading of T-VER credit in the future (TGO, 2021).



5

Review of macroeconomic policies and identification of gaps

5.1 Macroeconomic policy changes to incorporate COVID-19 realities

Being an open economy that relied heavily on export income and earnings from international tourism, the Thai economy was severely impacted by the COVID-19 pandemic that began in early 2020. In that year, the Thai economy registered a negative 6.1 percent decline in GDP growth rate. Aside from engaging in several containment measures, such as shutdowns, curfews, and travel restrictions, the Thai government allocated substantial effort and resources to provide the needed healthcare facilities for infected individuals and launched a comprehensive nationwide vaccination campaign.

Given the significant impact of COVID-19, public budget had to be reallocated away from what was originally intended to fund public healthcare spending and fiscal stimulation measures. In relation to the green spending, 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 macroeconomy can halt the momentum of the green transition.

Government stimulation measures to boost the economy in 2020 include several forms of matching-payment schemes, such as half and half shopping scheme, direct cash payment into e-wallet, shopping rebates, travel subsidy programs, soft loans to small and medium scale entrepreneurs, tourism promotion, university tuition fee reduction, and tax rebate schemes.

Given the significant impact of COVID-19, public budget had to be reallocated away from what was originally intended to fund public healthcare spending and fiscal stimulation measures. In relation to the green spending, 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 macroeconomy can halt the momentum of the green transition.

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, and energy planning. However, it is often found that each sectoral plan has its specific targets and objectives but lacks sufficient linkages with the other plans. For instance, the irrigation plan may aim to increase the irrigation area through the development of new reservoirs and irrigation systems, but it fails to adequately address how this expansion will impact conservation areas, as parts

of forest reserves will have to be included as water storage. Similarly, attempts to increase industrial output and income may not take into account how this expansion will impact the amounts of carbon emissions, PM_{2.5}, or wastewater to be discharged into public waterways.

It is, therefore, essential for Thailand to develop a resource constraint optimization algorithm specifically designed for policy analysis. This type of economic modeling will enable policymakers to recognize the opportunity costs of policy implementations in some sectors, as they may require sacrifices in other sectors of the economy. In the context of the inclusive green economic transition, it is important to acknowledge that some economic sectors may need to undergo slower growth in order for the country to move towards sustainability.

Economic modeling will enable policymakers to recognize the opportunity costs of policy implementations in some sectors, as they may require sacrifices in other sectors of the economy. In the context of the inclusive green economic transition, it is important to acknowledge that some economic sectors may need to undergo slower growth in order for the country to move towards sustainability.

At the local level, Thailand has also been engaged in several local development initiatives, such as investments in power plants, road and highspeed train construction projects, irrigation system projects, and airport construction projects. These large-scale investments in many local areas demand a comprehensive analytical model capable of assessing the benefits and costs of alternative options. The model should also consider the benefit and costs incurred to different groups of stakeholders should a particular option be adopted, as well as how such investment projects can be best financed. Such an analytical model is still absent in the Thai policy formulation process, and policy analysis is currently carried out piece by piece. Such an 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 need for acceleration in a number of indicators related to Sustainable Consumption and Production (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 in how these strategies and plans are implemented. For example, the BCG plan incorporates many SDGs into its strategies. Implementing this plan can be challenging for two reasons. First, the plan requires cooperation from

various parties, from the government to the private sector and the civil society. Second, 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, and such training should cover a wider range of jobs and skills. As the first step, capacity and awareness building should be deployed in the key strategic sectors/activities highlighted in this report: decarbonization (carbon tax/markets and renewable energy), green technologies related to industries and agriculture, and waste management.

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

Maintaining macroeconomic prudence is a necessary fundamental for driving an economy along a steady green transition growth path. Two macroeconomic management issues are relevant to the green economy transition. First, improving factor productivity to raise per capita income is crucial to moving Thailand out of the middle-income trap and maintaining long-term growth potential, which is fundamental to a successful green economy transition. Second, ensuring short-term economic stability will instill business confidence and minimize the need to engage in public debt financing. Prolonged public debt will hamper future growth and well-being as resources are diverted towards current consumption.

In practice, it is often observed that agencies, private and public alike, deviate their focus from prudent macroeconomic management. They tend to focus on key policy indicators that are not in line with prudent macroeconomic management or the green economic transaction. Examples of such indicators are increases in export, investment, agricultural output, and tourism activities. Changes in these macroeconomic policy indicators are often viewed not in the overall context of maintaining long-term growth potential nor short-term stability. Most importantly, measuring the success of macroeconomic performance based on such indicators will generally neglect the negative impacts they may have on society. As such, it is therefore imperative that the Thai government adopts a more comprehensive view of sustainable development goals and inclusive green economy transition by including macroeconomic policy indicators such as the share of renewable energy, greenhouse gas emissions, long-term productivity improvement, and economic stability.

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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. To this front, many of the green industry initiatives in Thailand are in line with the circular economy concept. To provide an overview of the Thai policy landscape in this area, Table 6.1 maps the relevant policies to the UNIDO's five policy themes for supporting the green industry. Among these policies, one highlight is the DIW's Green Industry Program, which is further elaborated in Box 6.1.

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

Theme	Current policy landscape in Thailand
1. Integrated policy framework	<p>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.</p> <p>Policy tools and monitoring systems already in place: There exist indicators and monitoring mechanisms on green industry transformation led by the DIW. The DIW is working to update their protocols to better facilitate this transformation as well as better accommodate some factories that might have struggled during the COVID-19 pandemic.</p>
2. Enabling environment	<p>Financial institutions: Sustainable finance initiatives have started in Thailand. The Working Group on Sustainable Finance (WG-SF) has been established to lay out plans and policies supporting sustainable financing agendas in Thailand.</p> <p>Demand and market opportunities: There are some niche markets for green products and services. Green procurement, both in the private and public sectors, should be encouraged to sustainably build demands and markets for these products and services.</p> <p>Phasing out of distorting subsidies: Fossil fuel subsidies are being phased out.</p> <p>International cooperation and trade: Thailand has been working with various international organizations and NGOs on numerous green initiatives, including training programs. To support international trade of green products, Thailand should ensure that its national standards/certificates are accepted by the global market.</p>

Theme	Current policy landscape in Thailand
3. Industry-led initiatives	<p>Initiatives at multinational and large enterprises: There are a number of pilot programs by large corporations according to the Committee on Trade and Industries' White Paper on Circular Economy.</p> <p>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.</p>
4. Harnessing technologies	<p>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.</p> <p>R&D initiatives and supports: Domestic R&D in the 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.</p>
5. Mixes of policy instruments	<p>Market-based: The DIW is in the process of initiating and developing market-based policies such as fee exemptions for advanced-levels green factories.</p> <p>Voluntary-based: The Green Industry Program by the DIW is voluntary-based with some information-based rewards, i.e., certification and labelling.</p> <p>Information-based: Green Industry certification and labelling by DIW.</p>

Sources: UNIDO (2011); interviews and document from relevant organizations compiled by authors

Box 6.1 The Green Industry Program

The DIW's Green Industry Program is a voluntary-based certification program that guides factories through 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 percent of its factories on this Program by 2022.

Sources: Green Industry (n.d.) and the interview with Department of Industrial Works

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 investments.
- (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, for example, Green Hydrogen. Therefore, R&D and technology transfers in related areas should be encouraged. However, it is important to note that 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 but 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 institutionalized 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 few years. In addition, SMEs usually face constraints in accessing credit and financial products, making them particularly vulnerable in the transition towards an inclusive green economy. Consequently, future sustainable finance initiatives should tackle these specific issues and provide support in these areas.

6.2 Green jobs

Thailand has started embracing green jobs and green employment into the 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 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 International Labor Organization (ILO, 2017) highlighted four key areas 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 performs 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 sectors. 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 towards 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 2010s. 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 and 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, the National Science and Technology Development Agency (NSTDA) emphasized the importance of agriculture as one of the backbones to drive the BCG agenda in Thailand. Moreover, the Department of Skill Development provides training programs related to smart farming and solar photovoltaic technologies.

Simultaneously, municipal waste management represents a collaborative effort involving both the public and private sectors. Notably, upcycling and recycling practices have gained significant traction 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. However, a just transition into an inclusive green economy will also require skill development for Thai workers, the establishment of green job markets, and the provision of social safety nets for workers that might have fallen behind. The next subsection will outline Thailand's labor policies addressing these aspects.

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Current policy landscape

According to a recent report by the ILO assessing 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 6.2 (ILO, 2021). It is worth noting that most of these policy areas fall under the supervision of the Ministry of Labor, highlighting its significant role in shaping the green job policies in the country.

Table 6.2 Thailand's green labor policy readiness and progress

Policy	Readiness Level	Progress
Green agenda	Significant	The BCG concept has been incorporated into national strategies and various area-specific plans. See Section 4.2 for details.
Industrial & sector policies	Significant	
Social protection	Significant	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.
Enterprise policies	Some	Large enterprises and multi-national companies have started to incorporate green transformation and sustainable growth into their plans and operations.
Green skill development	Some	There exist about 20 BCG-related skill training programs under the Department of Skill Development.
Cross-cutting issues – labor rights, standards & social dialogue	Some	The current legal framework and labor-related infrastructure provide basic supports for these cross-cutting issues, but they are not specific to the inclusive green economy.
Green labor market	Limited	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.
Occupational safety and health (OSH) for climate change	Limited	Most of the current OSH initiatives focus on reducing work-related accidents. One program related to the BCG agenda aims to increase awareness on safe chemical usage in the agriculture sector.

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 for insured workers who may lose their jobs in the transitioning process or experience losses caused by natural disasters resulting from climate change. However, the social security system covers only a small percentage of the Thai population.¹ Those outside the system, such as informal workers who have less job security, are typically more vulnerable to changes and uncertainties.

The public healthcare schemes, covering around 98 percent of the population, provide better coverage than the social security system (National Health Security Office, 2021). However, these schemes offer only basic healthcare coverage and will not suffice to support workers during significant career transitions. All together, these findings emphasize the needs to extend the coverage of career-related social protection measures.

Skill development and capacity-building

The Department of Skill Development (DSD) under the Ministry of Labor is the focal point for government-led skill development initiatives. The DSD currently integrates elements of the green economy, such as waste reduction, into all of its training programs. Furthermore, 20 out of its over one thousand training programs focus on developing green skills such as solar cell maintenance and smart farming (See Table 6.3). These green skills training programs were launched in all 76 provinces across Thailand and primarily target workers in the private sector.

Although most, if not all, of the programs listed in Table 6.3 emphasize green skill development, the green concepts are embedded in all of the DSD's training programs. While not policy-focused per se, this demonstrates the DSD's commitment in building the green culture and facilitating sustainable practices in day-to-day operation.

¹ Only 16.4 million out of the 66.2 million population were under the social security system at the end of 2020. (Social Security Office, 2021)

Box 6.2 Showcase: The Training Programs on Green Cooling

Thailand RAC NAMA (Thailand Refrigeration and Air Conditioning Nationally Appropriate Mitigation Action) is a joint initiative between the Ministry of Energy, EGAT, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), among others, to promote the Thai cooling sector's transition towards green cooling technologies. As part of this initiative, training infrastructure for service technicians has been established via the Department of Skill Development's training network. Eight training centers have been established nationwide, and 222 head technicians and chief trainers have been trained. These resources will serve as focal points for next-stage training for a wider set of students and technicians in the future.

Source: Department of Skill Development (2021a)

Table 6.3 The Department of Skill Development's training programs related to the green economy

Training programs		Number of Participants in 2021
1	Usage and Maintenance NGV Fuel Automobile	20
2	The Clean Air in Homes and Small Commercial	24
3	Maintenance of Air Conditioning in Homes and Small Commercial	282
4	Solar Equipment Maintenance	809
5	Green Tiling with Cement Adhesive and Sealant	20
6	Electrical Energy Conservation for Industrial	20
7	Installation and Inspection of NGV Fuel for Car	76
8	Installation of NGV Fuel Systems for Automobile	20
9	Installation R32 Refrigerant Split-Type Air Condition	20
10	Safe Use of Flammable Natural Refrigerants	120
11	Growing Hydroponic Vegetables that are Non-toxic	114
12	Design and Installation IoT Control System for Planting	20
13	Application of Internet of Thing for Agriculture	111
14	Design and Use of Solar Incubators for Processing of Agricultural Product	40
15	Application of Solar Cell System for Agriculture	338
16	Embedded Control Design for Agriculture	20
17	Installer of Smart Solar Energy Farm Systems	78
18	Farm Management and Improvement	25
19	Unmanned Aerial Vehicle (Drone) for Agriculture	262
20	Installation and Maintenance Solar Cell System Techniques	525

Source: Department of Skill Development (2021b)

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 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. However, a smooth transition towards a green economy would require more direct and well-established labor market mechanisms and infrastructure.

On the occupational safety and health (OSH) front, the current attempts primarily focus on minimizing work-related accidents. However, in line with the green economy transition and challenges posed by climate change, future OSH initiatives should also address occupational hazards arising from industrial transitions, rising temperatures, and extreme weather events, among other factors. These are just a few examples of the broader range of issues that need to be considered in order to ensure comprehensive and effective OSH measures in the face of evolving circumstances.

Ability to implement policy and progress monitoring

The Ministry of Labor has some infrastructure for implementing and monitoring new policies aimed at supporting the transition to an inclusive green economy. For instance, an extensive network of training centers under the Department of Skill Development can facilitate upskilling and reskilling training programs across 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 fair and equitable. Finally, the Office of Permanent Secretary for Labor has already been tasked with monitoring Thailand's progress towards SDGs, and it can also assume the responsibility of monitoring the progress of the inclusive green economy transition.

6.3 Waste management

Thailand has been facing the issue of solid waste management, as the total volume of total solid waste generated exceeds the capacity of proper solid waste management. While the effort of private recycling and garbage collection by the poor contribute significantly to solid waste recycling, a large volume of solid waste is still managed through open-pit dump sites or left untreated. Improper disposal of solid waste in coastal areas is also the major cause of ocean debris in Thailand.

Although municipalities and local governments have adopted an economic instrument, namely the solid waste management fee, to address waste management, this system needs to be strengthened. Currently, the solid waste management imposes 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 the amount of solid waste generated.

Waste-to-energy is an area that can help reduce the volume of untreated solid waste. However, there is a limitation on the amount of electricity generated from solid waste that can be sold to electricity authorities. The bottle neck lies in obtaining electricity purchase agreements with the electricity authorities, which has prevented many entrepreneurs from fully engaging in the production of electricity from renewable energy sources.

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The vast volume of plastic waste has also been a concern for Thailand. During the past 10 years, about 2 million tons of plastic waste were generated each year, accounting for 12 percent of the total solid waste. Out of this amount, only 0.5 tons of plastic waste were recycled, while the remaining 1.5 million tons were disposed of in landfills. Most of plastic waste in Thailand is single-use items, comprising plastic bags, plastic cups, plastic straws, and polystyrene boxes/containers. These single-use plastics not only cause blockages but also contribute to the growing problem of ocean debris.

Plastic waste generated along canals and rivers upstream ends up as ocean debris in the Gulf of Thailand and adversely affects marine life and ecology. Plastic waste, once entered the ecosystem, disrupts the food chain and is often washed up on beaches. The Thai government together with the private sector has joined efforts in minimizing single-use plastic via public awareness campaigns. Such efforts were successful in some parts of the Thai society when large supermarkets, department stores, and convenient stores joined hands in not giving free plastic bags to customers. However, single-use plastic bags are still commonly used in the informal sector of society.

6.4 Energy

Thailand has made significant improvement in integrating renewable energy into its energy system. The target of renewable energy has increased over time, indicating that Thailand has embarked on a journey to decarbonize the energy sector. Evident progress can be observed through initiatives such as the wider adoption of gasohol and biodiesel, the implementation of energy efficiency measures, and the introduction of various energy conservation programs.

Furthermore, new initiatives are seen in the policy shift from EURO 3 and 4 refinery standards to the cleaner EURO 5 standard, which will become effective on January 1, 2024. Adopting the EURO 5 standard and shifting to renewable energy sources will not only promote decarbonization but also help alleviate the severe PM_{2.5} air pollution problem, which is partly attributed to the use of diesel engines.

In line with its commitment to sustainable energy practices, the Ministry of Energy has made a bold declaration to refrain from investing in new coal-fired power plants. However, there are obstacles and bottlenecks that need to be addressed in this transition, namely the expansion of power grid systems.

Power generation

Over the past decade saw an increase in the use of renewable energy in electricity generation. 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. The increased utilization of biomass, for example, will generate additional income for farmers as they can now sell agricultural wastes and by-products.

To utilize and reap the full benefits of renewable energy sources, there is a need for Thailand to continue supporting technological innovation of all the targeted types of renewable energy described, as well as exploring new opportunities, such as green hydrogen and various forms of carbon sequestration. Technological innovations in renewable energy will help lower energy costs and complement Thailand's green transition.

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Thailand has recently switched from the use of adder-cost to feed-in tariff as a mechanism to incentivize private sector involvement in the production of electricity from renewable energy sources. The feed-in tariff structure is an attempt to provide just enough income to cover the cost of electricity generation for participating businesses. As each type of renewable energy incurs different costs, the tariff structure offers to buy electricity from different renewable energy sources at different prices. As electricity generation is regulated, private companies interested in joining the feed-in tariff mechanism must seek permission and obtain a purchase agreement from an electricity authority to sell their generated electricity. Obtaining this purchase agreement has been a key bottleneck in Thailand's renewable energy development owing partly to the limitation of the current grid system as well as the higher costs of electricity from renewable sources.

Thailand is at a stage where the role of energy authorities needs to be revised, shifting from being energy producers to becoming regulators. In this regard, there is a need for the Thai electricity authorities to focus on providing a robust electricity grid system that can support the private sector's interest in producing electricity from renewable sources. A movement towards liberalization and free market competition in renewable energy generation will also enable Thailand to reap the full benefits of technological innovations and lower costs associated with renewable energy.

There is a need for the Thai electricity authority to focus on providing a robust electricity grid system that can support the private sector's interest in producing electricity from renewable energy sources. A movement towards liberalization and free market competition in renewable energy generation will also enable Thailand to reap the full benefits of technological innovations and lower costs associated with renewable energy.

Energy and electric vehicles (EVs)

Renewable energy will play a vital role in the Thai economy and support the growing demand for renewable energy from emerging industries that require 100 percent renewable energy. Furthermore, renewable energy will be a key driver in supporting the electric vehicle (EV) market, allowing EV users to fully benefit from decarbonization.

Recognizing the importance of EVs in the decarbonization process, the Thai government has committed to promote the use and production of EVs. The current incentive package for electric vehicles includes import tax reduction on EVs, excise tax reduction on EVs, subsidies on batteries, electric pickup trucks, electric motorcycles, and import tax reduction on EV parts. These policies will introduce a dramatic shift in energy production and consumption in Thailand, as the demand for gasoline will be shifted more towards electricity.

6.5 Natural resource management

Forest and biodiversity resources

Forest ecology is important for Thailand for several reasons, including its role in regulating water flow and preventing floods during the rainy seasons, ensuring a continuous water supply during the dry seasons, providing a vital habitat for biodiversity, acting as a carbon sink, and contributing to 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 its forest coverage to meet the target of having 40 percent of the total land area as forest cover. Two issues facing the forest authorities are the legality of human settlement in the forest areas and how to best introduce reforestation in place of commercial agriculture that has encroached a large part of forest reserves in the northern provinces of Thailand.

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Human settlement in forest reserves has been an uphill battle for the Thai authority. Despite several containment arrangements implemented, there are still several communities residing in disputed forest reserve areas, necessitating the need for resettlement arrangements.

In the northern provinces, a significant portion of Thai forests has been encroached upon by illegal corn plantations, which are intended as inputs for the animal feed industry. These illegal corn plantations in the highlands are managed under a well-organized network, where the private sector has institutionalized processes for seed, fertilizer, pesticides, and sale arrangements. 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 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 remain in Thailand, one of which is rock mining to serve the cement and construction industry. There are, however, still some small-scale mines that are scattered in some parts of Thailand.

In 2017, Thailand passed a new Mining Act that contains several measures designed aimed at improving mining management and controlling environmental impacts from mining. One notable development is the enforcement of mining zones, whereby new mines will only be permitted if they are 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 in irrigation dams as well as irrigation systems. While the past expansion of the irrigation systems has benefited the farmers, especially those in the central plain, the issues of efficiency in water utilization, water conservation, and water distribution have been a concern. Furthermore, continued investments in water storage, such as medium-scale or large-scale dams, may impact forest reserves and wildlife as those dams are often located in restricted forest areas.

The newly enacted Water Resource Act BE 2558 contains a provision that water resource is no longer free. Authorities can now impose a water user charge as a way to increase efficiency in water utilization and to generate revenue to be used for the maintenance of irrigation systems.

The launch of the Eastern Economic Corridor (EEC) as a new economic zone covering eastern provinces, such as Chonburi, Rayong, and Chachoengsao, introduces new challenges related to diverting water resources from agriculture to meet the industrial water demand. Consequently, ensuring efficient water utilization, as well as achieving water justice, emerge as pivotal concerns for Thailand's sustainable development.

6.6 Others

Digitalization is one of the main driving 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, for example, as a part of the Thailand 4.0 agenda. In the inclusive green growth transition that is addressed under the 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 inclusive green economy transition (see Table 6.4). In addition, the agency's policy targeting could help fill in the current gaps in Thailand's inclusive green economy transition. In particular, the agency targets SMEs and farmers, two of the most vulnerable groups within Thailand's current inclusive green economy 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 depas's initiatives related to the inclusive green economy transition and SDGs

Initiatives	The inclusive green economy transition and SDGs prospects
Manpower development (focusing on digital skills) Reskill the current workforce Upskill the future workforce Build new skills for the general public	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 inclusive green economy transition context.
Digital transformation & digital Startups depa has been investing in and supporting various digital startups in Thailand. Sectors that are related to the inclusive green economy 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 percent. 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: Digital Economy Promotion Agency (2021)





7

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” (Working Group on Sustainable Finance, 2021).

The transition toward inclusive 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 inclusive green economy transition.

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7.1 Public green finance

Since 2020, the Thai government has allocated 108-121 billion baht per annum to environment-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 percent) and the creation of growth on the environment-friendly quality of life (22.6 percent), 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 by 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 greenhouse gas emissions from the energy sector, some other initiatives, for instance, those related to 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, approximately only 3-4 percent, and has been declining even before the COVID-19 pandemic (see Figure 7.1). This declining trend still continues even after the pandemic. The scarce and decreasing budget was also evident in several interviews with many government agencies working in areas related to the environment and SDGs. These findings suggest the need to reallocate resources back to sustainability and the environment after the recovery from the pandemic. Furthermore, other sources of funding, such as sustainable finance initiatives, should also be explored, as the recovery period 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 the government budget dedicated to environmental causes is rather small as discussed earlier. Therefore, Thailand must also seek investment from other sources through sustainable finance initiatives.

Table 7.1 Breakdown of the 2021 environmental government budget

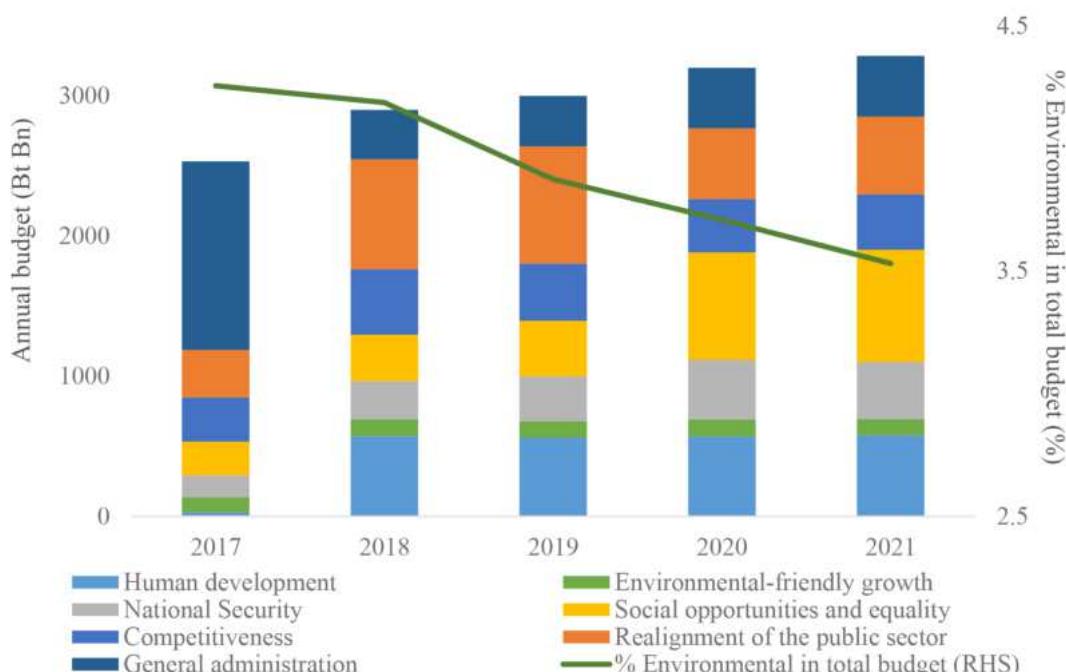
Programs	Budget (THB bn)	Percent of total Budget
Integrated program on management of water resources	65.5	56.5
Programs on public sector personnel	18.8	16.2
Fundamental program on creation of growth on the environmental-friendly quality of life	13.4	11.5
Strategic program on supporting creation of growth on the environmental-friendly quality of life	12.9	11.1
Strategic program on creation of sustainable growth with regard to conservation, rehabilitation and destruction prevention of natural resources	3.6	3.1
Strategic program on coping with repercussions from climate change	1.1	0.9
Strategic program on dealing with pollution and the environment	0.4	0.4
Strategic program on creation of sustainable growth of marine economic society	0.3	0.3
Strategic program on elevating paradigms to stipulate the future of the country's natural resources	0.01	0.0
Total	116	100

Source: Budget Bureau (2021)

Table 7.2 Expenditures in projects related to BCG and sustainable development in 2020

Units/Projects	Expenditures (THB Mil)
National Science and Technology Development Agency <ul style="list-style-type: none"> Promoting Bio Economy as a new source of regional income Smart Farmer 	10 48
Department of Agriculture <ul style="list-style-type: none"> Development of smart farming technologies 	8.2
Office of Natural Resources and Environmental Policy and Planning <ul style="list-style-type: none"> Operations related to climate change Efficiency enhancement in the management of watershed areas, biodiversity, and SCP 	12.7 17.9
Energy Policy and Planning Office <ul style="list-style-type: none"> R&D in renewable energy Pilot study for smart grid 	6.2 6.7
Department of Industrial Works <ul style="list-style-type: none"> Green Industry Program Eco Industrial Town 	24.8 21.2
Department of Alternative Energy Development and Efficiency <ul style="list-style-type: none"> Development and efficiency enhancement initiatives in renewable energy Development and efficiency enhancement initiatives in energy conservation 	357 59

Source: Budget Bureau (2020)

**Figure 7.1 Thailand's government budget breakdown (2017-2021)**

Source: Data from Budget Bureau (2021)

7.2 Sustainable finance in Thailand

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, aiming to establish a commercially viable and sustainable financial sector by 2025 (Working Group on Sustainable Finance, 2021). The development of a sustainable financial sector would benefit Thailand by

- (1) Financing the real economy's transition toward sustainable growth and development, and
- (2) Managing 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.

In addition to the WG-SF working as a spearhead, the sustainable finance initiatives would also involve several other parties—public, private, domestic, and international agencies. 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). As another example, UNDP and the Integrated National Financing Framework have also ventured into various projects on financing the SDGs.

Table 7.3 KSIs in the Sustainable Finance Initiatives

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

Source: Working Group on Sustainable Finance (2021)

In Thailand, the Bank of Thailand has already joined the NGFS, signifying the country's commitment to these endeavors. The sustainable finance initiatives within Thailand also 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, several large corporates have issued green bonds (Thai Bond Market Association (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, 2021a). Table 7.4 presents examples of ongoing sustainable finance projects and initiatives, showcasing the breadth of efforts in this domain within Thailand.

Table 7.4 Examples of sustainable finance initiatives and projects in Thailand

Initiatives/Projects	Details
Green bonds	There are 37 bonds currently classified as green, social, sustainability bonds and sustainability-linked bonds by ThaiBMA. These bonds were issued in 2019-2021 mostly by large corporates in the energy and transportation sectors.
Green loans and financial products	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 percent 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.
Thailand Sustainability Investment (THSI)	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 percent of the stock market size).
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: <ul style="list-style-type: none"> ● Sustainability reporting, ● Task force on climate-related financial disclosures (TCFD) in finance, and ● Corporate sustainability strategy.

Sources: ThaiBMA (2021) and SET (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 timelines for the KSI_s 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 (Working Group on Sustainable Finance, 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 sustainable finance initiatives, at least in the beginning phase, should focus on the various segments of the domestic financial markets due to several reasons. First, domestic sources account for around 80 percent of all funds in Thailand (United Nations Thailand, 2021). Second, there are still significant gaps in accessing sustainable financial products. While some large corporates have already ventured into green and sustainable finance, broader awareness must be cultivated among the general public. Domestic investors, as well as the public sector and project owners, should develop understanding about sustainability in order to drive real demands and supplies of sustainable 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 credit. These groups are also less experienced and less knowledgeable about credit and financial products. The Policymakers would have to consider these aspects when formulating taxation policies, incentives, and capacity-building initiatives.

Thailand's effort in addressing sustainability in the financial sector is still in an early phase. The country would benefit from lessons learned from other similar countries, but the current examples, for instance, in WG-SF (2021), are mostly lessons learned 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.





8

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

Since as early as the 1980s, Thailand has shifted the mode of economic and social development towards natural resource conservation and environmental conservation by establishing the Ministry of Natural Resources and Environment. After 2000, sustainable development and inclusive green economy were incorporated into Thailand's development agenda. The success of Thailand's growth path towards sustainable development and inclusive green economy depends largely on how the country can make use of its advantages and opportunities while at the same time overcoming its weaknesses and safeguarding itself from possible global disturbances and shocks.

Table 8.1 provides a SWOT analysis for Thailand's green transition. Thailand has a long period of modern development that was accompanied by development planning. Currently, Thailand's development plans are categorized into Tier 1, Tier 2, and Tier 3 as discussed earlier. These development plans are used for budgeting, as well as measuring performance of government agencies. The well-established fiscal structure, comprising tax systems, government budgeting, and public structure, enables Thailand to adopt a variety of incentive instruments to promote the green economy transition. Table 8.1 also shows that the ability of Thailand to produce more than 3,000 graduates in the fields related to environmental management per year will continue to strengthen Thailand's capacity for the inclusive green economy transition. With Thailand having embarked on a balanced growth path since 1980s, institutional arrangements have been put in place to adequately address natural resource conservation and pollution control. The establishment of the Ministry of Natural Resources and Environment, Thailand Greenhouse Gas Organization, and the enactment of the Environmental Promotion and Conservation Act B.E. 2535 (1992) provided Thailand with the institutional apparatus for sustainable development.

There are opportunities that will support Thailand's movement towards the inclusive green economy transition. The growing awareness of climate change risks and decarbonization has led the private sector to demand for more renewable energy so as to comply with business standards. Such awareness is also observed in the Thai financial sector, where preparation for sustainable finance between the Bank of Thailand, the Stock Exchange of Thailand, and the Securities and Exchange Commission has already commenced. Furthermore, there are several supports from the international agencies, such as the BioFin initiatives and the SDGs of the UNDP, having assisted Thailand's national development in becoming sustainable and green.

Table 8.1 SWOT Analysis of Thailand inclusive green economy

STRENGTHS	WEAKNESSES
<ul style="list-style-type: none"> ● Comprehensive development planning ● Fiscal structure readiness ● Human resource capability ● Institutional arrangement 	<ul style="list-style-type: none"> ● Macroeconomic strategic planning ● Poverty incidence ● Law and regulation ● Political commitment
OPPORTUNITY	THREAT
<ul style="list-style-type: none"> ● Growing green awareness ● Sustainable finance groundwork ● International support 	<ul style="list-style-type: none"> ● Trade requirement (CBAM) ● Global instability

There are, however, weaknesses and threats that can become obstacles to Thailand's inclusive green economy transition. The policies that appear in Tier 1, Tier 2 and Tier 3 of the national plans are generally presented from the sectoral and departmental perspectives and describe the pathways for Thailand in moving forward in each sector. It is, however, imperative that such planning practices need to collate all sectoral development pathways into a comprehensive macroeconomic national development plan that emphasizes linkages, complementarity, and most importantly, the trade-offs between sectoral developments. Constructing such plan requires an analytical tool, which will require investments and capacity support. Developing such tool can then serve as a PAGE entry point for Thailand in the future.

Poverty reduction is another area that consumes much of the public budget and resources. More importantly, poverty reduction strategies are generally implemented through several sectoral development policies, which can sometimes create distortions. For example, the current energy policy includes subsidies for diesel and cooking propane to support low income families. Similarly, agricultural subsidies are in place to safeguard farmers from price fluctuations. There are also agriculture credit policies to support farmers, but these policies may hinder the efficient allocation of agricultural credit. Failure to effectively formulate poverty reduction policies can jeopardize the inclusive green economy transition both directly and indirectly. Lastly, a continued political commitment, law revision, as well as enacting new legal framework, such as the Climate Change Act or Biodiversity Act, are essential fundamentals for Thailand green growth path.

Failure to effectively formulate poverty reduction policies can jeopardize the inclusive green transition both directly and indirectly. Prolonged poverty incidence will prevent a large segment of the Thai population from engaging in sustainable consumption and production and limit the degree of inclusiveness in the green transition.

As an inclusive green economy requires a reallocation of resources away from fossil-based towards renewable and the transfer of human resources into green jobs, there is a need for Thailand to sufficiently safeguard itself from both external and internal disturbances and shocks. The recent COVID-19 pandemic and the Ukraine political unrest have demonstrated the diversion of significant fiscal resources from green development to help cushion the society against hardships caused by these events. Additionally, oil price crises arising from international political disputes also affected public spending and livelihood, thus hampering the inclusive green growth path. These occurrences support the need for Thailand to adopt fiscal and monetary policies and strengthen the domestic industries to minimize the impact of global uncertainty and risks.

There is a need for Thailand to sufficiently safeguard itself from both external and internal disturbances and shocks. The recent COVID-19 pandemic and the Ukraine political unrest showed how substantial fiscal resources were diverted away from green development to help cushion the society against hardships caused by these events.

8.1 National plan, policies, and SDG nationalization process

Thailand's policy framework was previously discussed in Section 4.1, where policy documents were categorized into Tier 1, Tier 2 and Tier 3. Section 4.2 provides the outline of the BCG model that serves as the overarching principle for Thailand's inclusive green economy. The key elements of the BCG model that support an inclusive green economy are renewable energy development, waste recycling, and smart farming. Furthermore, Section 4.2 provides an overview of Thailand's policy framework for achieving the SDGs.

The BCG economy model is established as a driving framework for sustainable growth and social development in Thailand over the next few decades. This model is built upon Thailand's key competitive advantages and future development pathways: "Bio" from Thailand's agricultural-based economy, "Circularity" to ensure efficiency in resource utilization, and "Green" to address sustainability and climate change goals. The main target sectors of the BCG model include agriculture and food, medicine and healthcare, energy and materials, and tourism. A significant portion of the BCG model will be driven by new technologies such as modern agricultural and pharmaceutical technologies, so a significant effort in capacity building is required. The BCG model also emphasizes the preservation of local biodiversity and culture as well as enhancing the engagement of the local communities in the green growth path.

The BCG model is built upon Thailand's key competitive advantages and future development pathways: "Bio" from Thailand's agricultural-based economy, "Circularity" to ensure efficiency in resource utilization, and "Green" to address sustainability and climate change goals.

On the SDGs front, Thailand has incorporated the SDGs into its plans at all levels, from the National Strategy to the National Economic and Social Development Plans, as well as various sectoral and organization-level plans. Implementation-wise, policies to drive the SDGs in Thailand are usually led by individual government agencies with some cross-agency collaboration. Progress-wise, Thailand needs to accelerate its progress toward many SDG indicators as described in this report to achieve its goals. The country also needs to develop a better monitoring mechanism for some indicators (see Table 4.2).

Although Thailand has continuously increased its share of renewable energy in the total energy consumption, there is still room for further improvements in terms of renewable energy price support scheme (feed-in tariff), carbon tax scheme, establishment of a carbon credit market, investment in smart grid infrastructure, and the re-organization of the electricity regulatory body. In the future, Thailand needs to take advantage of the ongoing advancements in renewable energy technology and cost reduction by liberalizing its electricity production. The role of electricity production must be carried out more by the private sector and small-scale power generation while the governing body assumes the role of a regulator.

The ILO has highlighted four areas for green job promotion in Thailand: environmental health and climate change, sustainable production and organic farming, municipal waste management, and renewable energy. Thailand has already started some initiatives related to green jobs, including a few training programs on green skills. Yet, more effort, particularly in green labor market and occupational safety and health, is required to drive green jobs ambition in Thailand. On the policy implementation front, Thailand is equipped with some infrastructure, such as a network of training centers and the social security system. Nonetheless, the infrastructure should be expanded to better cover vulnerable groups, such as improving the social safety net for informal workers and establishing green training programs for women.

8.2 Macroeconomic policy changes to incorporate COVID-19 realities and gaps in macroeconomic scenarios and modeling

As was discussed in Section 5.1 and 5.2, there is a need for Thailand to develop macroeconomic models and policy tools that enable policymakers to identify the complementarity and trade-offs among policy objectives, as well as the interactions between sectoral developments. Such macroeconomic models and policy tools will also need to address not only the intra-temporal trade-off issues but also the inter-temporal trade-off issues. Furthermore, the models should be able to trace the impact of policy decisions on labor market adjustments, income distribution, and poverty incidence. Developing such macroeconomic models to serve as a decision making tool will benefit the inclusive green economy transition by minimizing losses resulting from uninformed policy prescriptions and implementing sound policy recommendations.

According to Pholpirul, P., (2021), COVID-19 has impacted the Thai economy and society in various ways, from morbidity and mortality to devastating effects on jobs, income, consumption, and mental health. At the macro level, the first wave of COVID-19 in 2020 led to a \$48.9 billion loss in social welfare, an 8.5 percent decline in GDP, a 13.6 percent decrease in consumption, and an 11.4 percent reduction in tax revenues. The key factor contributing to the decrease in GDP was the lower number of foreign tourists. The tourism sector was identified as the hardest hit economic sector in Thailand. Within this sector, the largest decline in productivity was observed in accommodation, food, and service activities.

The large incidence of COVID-19 along with accompanying lockdown measures translated into income and job losses, especially among informal workers. Around 4.7 million workers were estimated to have lost or would lose their jobs due to COVID-19. Workers in the accommodation and food service sectors faced the greatest risk of unemployment and income loss. Workers in the wholesale, retail, and manufacturing sectors also experienced some significant impact. Additionally, these workers are vulnerable to prolonged unemployment due to the substitution of technology for labor and obsolete skills.

To alleviate the effects of the pandemic, the government rolled out six relief measures using a budget of over 724 billion baht. However, these measures were unable to fully compensate for the lost income. Furthermore, some vulnerable groups, such as the extremely poor, did not have access to these government relief measures.

The devastating toll the COVID-19 pandemic has taken on the Thai economy has resulted in a redirection of resources and efforts from other development goals. One recent example is a 20-30 percent reduction in Office of Natural Resources and Environmental Policy and Planning (ONEP) annual budget. In addition, the Thai government incurred a trillion baht in additional public debt to manage COVID-19 and alleviate its effects (Pholpirul *et al.*, 2021). This pandemic and its repercussions will inevitably result in a further diversion of resources away from green economy initiatives in the years to come. The public debt that resulted from the numerous government COVID-19 relief measures will also erode future economic growth and green economy transition as resources of the future were shifted to support the COVID-19 victims during the pandemic years.

8.3 Key macroeconomic policy indicators that are not aligned with a green economy transition

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

Table 8.2 Areas for possible policy intervention, the investment needs and challenges and opportunity for the key economic sectors

Key sectors	Current Policies	Investment and resource needs	Challenges and opportunities
Industry	<ul style="list-style-type: none"> ● 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, biofuels, 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 emissions from industrial processes 	<ul style="list-style-type: none"> ● To build awareness on sustainable production among all sizes of firms ● For labor development related to green technologies ● To foster the transition towards 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 	<ul style="list-style-type: none"> ● 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 is still limited. ● There exist some legal limitations on recycling of industrial waste. ● Emission law enforcement should be strengthened.

Key sectors	Current Policies	Investment and resource needs	Challenges and opportunities
Energy	<ul style="list-style-type: none"> ● Promotion of renewable energy (RE) according to the National Energy Plan which targets the share of RE in the total energy consumption to be 50 percent 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 biofuels and biomaterials 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 towards green cities ● Supports for community-level electricity generation/1-MW power plants ● Reduction of GHG emissions 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 	<ul style="list-style-type: none"> ● 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 	<ul style="list-style-type: none"> ● 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 power plants to the surrounding communities are still limited. The funds should also be directed towards mitigating the environmental effects of the power plants.

Key sectors	Current Policies	Investment and resource needs	Challenges and opportunities
Natural Resources	<ul style="list-style-type: none"> ● Plans to manage, restore, and conserve natural resources ● Restoration and conservation of biodiversity ● Water resource management to ensure a sufficient supply of water 	<ul style="list-style-type: none"> ● 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 	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● Improvements in public transportation coverage and connections between different platforms ● Promotion of EV adoption with a targeted share of 30 percent of all vehicles ● Incentives for biofuels ● Upgrade local fuel and vehicle standards to Euro 4 and 5 ● Reduced GHG emissions in the transportation sector 	<ul style="list-style-type: none"> ● To extend and better-connect the basic transportation infrastructure ● In R&D for EVs and their infrastructure such as charging stations 	<ul style="list-style-type: none"> ● Working from home during the COVID-19 pandemic could be a paradigm shift toward less commuting and emissions. ● 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.

Key sectors	Current Policies	Investment and resource needs	Challenges and opportunities
Agriculture and food	<ul style="list-style-type: none"> ● 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 	<ul style="list-style-type: none"> ● 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 	<ul style="list-style-type: none"> ● The demand for environmentally friendly agricultural products is concentrated in the well-educated, high-income groups. Awareness of 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	<ul style="list-style-type: none"> ● 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 	<ul style="list-style-type: none"> ● In R&D for recycling technologies ● In human resource development and awareness building ● In waste management infrastructure ● To support extended producer responsibility (EPR) 	<ul style="list-style-type: none"> ● There are some legal limitations on recycling in the industrial sector that might require revisions. ● A mechanism for electronic waste purchase (from consumers) should be developed.

Key sectors	Current Policies	Investment and resource needs	Challenges and opportunities
New technologies and digitalization	<ul style="list-style-type: none"> ● R&D supports in the focus areas of the BCG model such as agriculture, food, medicine, and tourism ● Supports for public adoption of new technologies through depa ● Development of smart cities 	<ul style="list-style-type: none"> ● In human resource development to support digital transformation and new technologies ● In digital infrastructures such as affordable accesses to devices and high-speed internet ● In R&D in new and digital technologies 	<ul style="list-style-type: none"> ● A substantial investment in human resources is required, both for R&D and for training the labor force. ● Urban planning should take into account environmental aspects such as transportation and waste management. ● Better data collection and management are required in various domains, e.g., city data, overall government data, and energy consumption data.

Source: Analysis by authors





9

Conclusions and recommendations

The Green Economy Scoping Report of Thailand investigates the socioeconomic profile and the state of natural resources and environment of Thailand. This report maps Thailand's progress in terms of sustainable development, green jobs, decarbonization, and transition towards becoming an inclusive green economy. The expected outcome of this report is to identify gaps, prioritize areas for improvement, and identify entry points where PAGE activities are most conducive in transforming Thailand into an inclusive green economy.

Since as early as the 1990s, Thailand has embarked on a pathway towards sustainable development through the recognition of natural resource conservation. These efforts eventually materialized and led Thailand to enact the first Environmental Promotion and Conservation Act BE 2535 in 1992. Ten years later in 2002, the Ministry of Natural Resources and Environment was established. During post 2000, Thailand also established the Committee on Sustainable Development, chaired by the Prime Minister, to oversee the coordination and progress of all the 17 SDG indicators. On becoming a low carbon society, Thailand has submitted a pledge at the Paris Agreement to become carbon neutral in 2050 and to meet the net zero emission target in 2080. These developments provide indications that Thailand is making headway towards becoming an inclusive green economy.

The key elements of Thailand transition towards becoming an inclusive green economy are summarized in Figure 9.1. Given Thailand's stage of development as outlined in this report, Figure 9.1 illustrates that under the conventional growth path or business as usual, it is unlikely that Thailand will be progressing along the inclusive green economy growth path. In order to gear the Thai society towards becoming an inclusive green economy, there are several preparations and initiatives that need to be institutionalized. **Firstly, Thailand needs to maintain steady economic growth momentum in order to escape the middle-income trap. Secondly the Thai economy has sufficient growth momentum and income, there is a need to institutionalize incentive mechanisms that will steer Thailand toward becoming an inclusive green economy.** Currently, much of these green mechanisms have been a part of the BCG model that will drive the country towards sustainable development. The Thai BCG model contains three components: Bio economy, Circular economy, and Green economy. Thailand will also need to facilitate the aforementioned initiatives by establishing a sound and enabling environment that includes capacity-building, revision of law and regulation, and a sustainable finance platform.

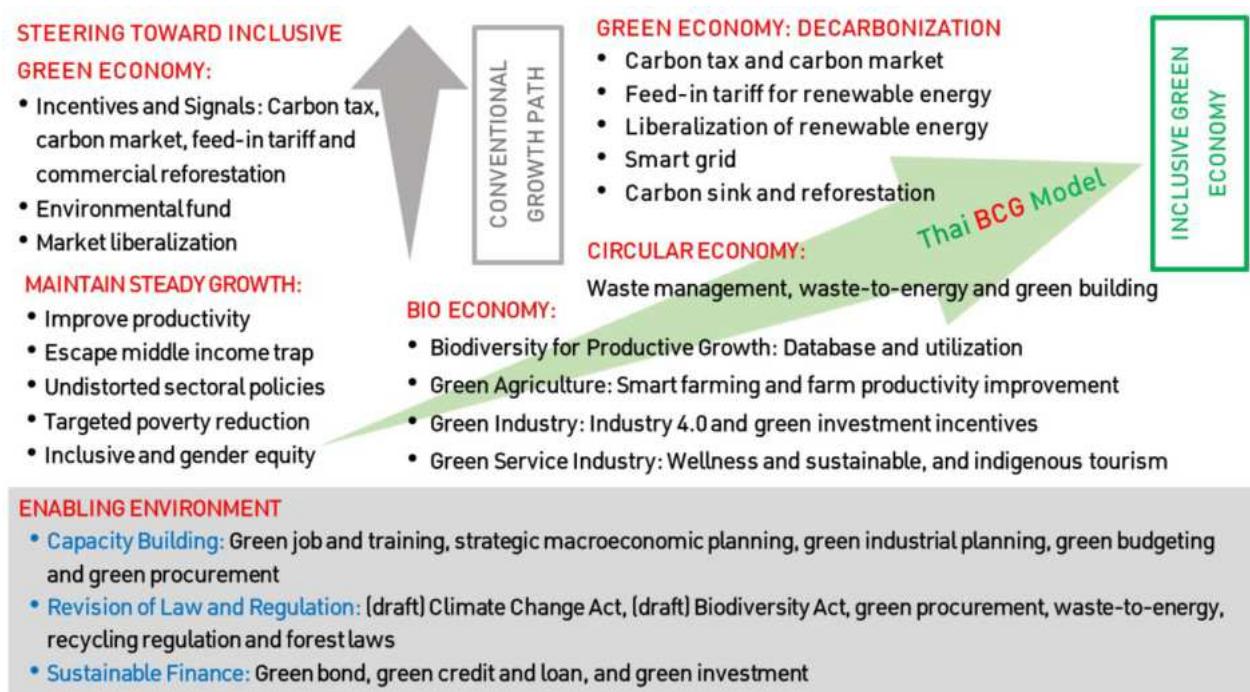


Figure 9.1 Thailand's transition towards an inclusive green economy

Source: Analysis by authors

Maintain steady growth

To redirect Thailand away from the conventional growth path and shift the society towards becoming an inclusive green economy, it is essential for Thailand to be equipped with a strong growth engine that can generate sufficient income for Thailand to escape the middle-income trap. Becoming a green economy often involves the adoption of some incentive mechanisms, such as ecolabelling, to promote green production and consumption. Other examples include a carbon tax, a carbon market, energy-saving codes, and standards for energy efficient buildings. Due to income constraints and the resulting lack of political will, many low-income societies are unable to deploy the correct price incentives or green interventions as these measures may increase the cost of living and impact the livelihoods of the poor population.

It is, however, observed that many middle-income economies, such as Thailand, have the potential to embark on productivity improvement that is essential for long-term economic growth and escape middle income trap. This can be accomplished if, and only if, resources can be reallocated to their best use through capacity-building and elimination of government distortionary measures, such as agricultural and energy price subsidies. Instead, policies should focus on targeted poverty reduction and investment in the necessary infrastructure – physical, social, and economic alike. Once the economy becomes productive and resources are utilized efficiently, indigenous and marginalized populations

can contribute significantly to society. Thailand will then begin to experience a steady increase in per capita income, sustainable long-term growth, and a reduction in poverty incidence. At this stage, it will be appropriate to introduce incentive mechanisms to steer society towards becoming an inclusive green economy.

Maintaining macroeconomic disciplines to stabilize the economy against external and internal disturbances as well as promoting long-term growth is fundamental in shaping the economy towards becoming green and sustainable. Fluctuations in macroeconomics can result in cyclical unemployment and a possible reallocation of public budget away from the green transition to remedy economic hardships caused by these fluctuations. Such macroeconomic instability can impede the momentum and prolong the transition process towards becoming a green and sustainable economy.

Steering towards an inclusive green economy

Once Thailand is able to generate sufficient income through the removal of distortionary policies such as agricultural price subsidies, energy subsidies, as well as other market distortion measures, and implementing capacity-building programs, the country can facilitate the transition of the poor population from stagnating agriculture to more productive sectors such as services and manufacturing. At this stage, it then becomes vital to institutionalize the correct incentive mechanisms that can transform Thailand into an inclusive green economy.

In the energy sector, Thailand needs to engage in an effective decarbonization program by fine tuning the existing energy pricing mechanisms. Moreover, it is also for Thailand to establish a carbon market and a carbon tax system so as to enable entrepreneurs to effectively reduce fossil fuel usage and adopt cost-effective renewable energy practices. Establishing a carbon market will also encourage carbon sequestration initiatives, with reforestation through commercial forestry being a promising arena that yields multiple co-benefits. Commercial and regenerative forestry not only act as prominent carbon sinks but also generate income for local farmers, promote soil conservation, and act as water regulators. The increase in the supply of timber will also support the expansion of downstream timber industries such as furniture and housing.

Thailand should leverage the advancements in renewable energy technology to achieve economies of scale in the production of electricity from renewable sources and lower unit costs of electricity. To this end, there is a need to continuously adjust the feed-in tariff system so as to provide electricity at the lowest cost. **The role of the electricity authorities should be emphasized, and for the benefit of society, the electricity generation market needs to be liberalized, fostering competition among power plants to ensure efficiency. In this new landscape, the electricity authorities would assume the crucial role of being the energy regulator.**

Directing society towards becoming an inclusive green economy will also involve many other incentive mechanisms, such as ecolabeling, carbon footprint, and water footprint. Additionally, continuous support for green agricultural technology is vital for Thailand's sustainable development. It is necessary for the government to continue supporting technological innovations in areas such as low-methane rice cultivation and finding alternative uses of agricultural by-products so as to reduce open burning and enhance water efficiency on farms.

As the implementation of incentive mechanisms will involve both taxing polluting activities and subsidizing green production, there is a need to establish an earmarked fund to facilitate cross subsidization. Currently, Thailand already has an Environmental Fund in operation. This fund can be further utilized to cater cross subsidization efforts in areas that support the green economic transition.

Thailand's BCG Model

Since January 2021, the Thai Cabinet has endorsed a new growth agenda known as the Bio-Circular-Green Economy (BCG) Model. This model will serve as the framework for Thailand's inclusive green economy initiatives, guiding the country towards sustainable development. **The main thrust of the BCG model is based on turning Thailand's comparative advantages in diverse biological and cultural resources into a long-term growth engine.** To facilitate this transition, the BCG Action Plan 2021-2017 has been prepared to promote collaborations among agencies and propel Thailand towards sustainability.

In the bio-economy component, the BCG Action Plan encompasses specific work plans in areas such as smart farming and increasing farm productivity, Industry 4.0 vision, wellness, pharmaceutical, and sustainable-indigenous tourism. In the circular economy component, there are specific plans covering areas such as waste management, waste-to-energy, and green buildings. The green economy component comprises several decarbonization initiatives, namely, the promotion of renewable energy and energy efficiency and network.

Enabling environment

To facilitate Thailand's transition along the inclusive green economic growth path, there are three fundamental enabling environments that need to be addressed. First, capacity-building on green jobs and training is needed in several areas. **A PAGE entry point may be to develop capacity in strategic macroeconomic planning.** This entails constructing macroeconomic models that can integrate multiple sectors of an inclusive green economy into a single decision-making tool. Other areas for capacity-building include green industrial planning, green procurement, and green budgeting.

Second, Thailand needs to prepare the necessary legal framework that to enable the establishment of crucial incentive mechanisms, such as a carbon market and carbon tax. To this end, Thailand needs to enact legislation related to climate change, biodiversity, waste-to-energy, recycling, as well as commercial forestry. These legislations will serve as an important platform empowering agencies to implement the required incentive mechanisms for shifting Thailand towards a green economy.

Third, Thailand has successfully initiated collaboration among agencies and laid the groundwork on sustainable finance. There is, however, much more work to be done to ensure that the market effectively sends signals that encourage increased green investments.

Shaping Thailand towards becoming an inclusive green economy is a challenging task as it entails work coordination among several sectors. The BCG model and the BCG Action Plan that began in 2021 demonstrate Thailand's strong intention towards prospering along a sustainable development path. The BCG Action Plan emphasizes the areas where Thailand has a strong comparative advantage while at the same time outlining climate change strategies for the country. All together, these policies demonstrate the continuous political commitment that will drive Thailand towards a sustainable future.

9.1 Recommendations on priority areas at macro and sectoral levels to support green economy

There are several entry points for policy intervention that are essential for Thailand's transition towards becoming a green and sustainable economy. The following section highlights priority areas where adjustments in existing government policies and measures are necessary to prepare Thailand for future green growth and climate challenges. The recommendations and priority areas outlined here aim to identify barriers, gaps, and opportunities for Thailand to successfully engage in the green economy transition.

Strategic macroeconomic planning

Strategic macroeconomic planning is an essential tool for policymakers to identify policy options, trade-offs, outcomes, and consequences. However, there is currently a gap in Thailand's policies, as they are formulated independently and lack integration across sectors. This limitation hinders the ability to recognize trade-offs between different public policy objectives, for instance, between agricultural development vs. ecosystem conservation, between tourism development vs. waste management, and between industrial expansion vs. achieving carbon neutrality.

To address this obstacle, it is, important for national planning agencies, such as the National Economic and Social Development Council (NESDC), to explore opportunities in capacity-building in comprehensive macroeconomic modeling. This kind of initiatives will enable Thailand to formulate national development plans that account for linkages among key sectors, resource limitations, and trade-offs among development goals. By developing such macroeconomic planning models, Thailand can strategically select a long-term growth trajectory towards becoming an inclusive green economy.

Energy

Thailand's current system of taxes and surcharges on gasoline products does not qualify as a "carbon tax system." Presently, gasoline products are subject to multiple levies, including excise tax, value added tax, energy conservation fund surcharge, energy price stabilization fund surcharge, and fees allocated to local governments. These taxes, surcharges, and fees need to be realigned and harmonized into a unified carbon tax system on energy.

Additionally, other carbon-intensive energy sources, including lignite and natural gas, are not properly taxed. **There is a need for key government agencies, such as the Ministry of Finance and the Ministry of Energy, to collaborate on restructuring energy taxes to better reflect their full cost associated with carbon emissions.**

On electricity, the Thai power generation is currently operated under the feed-in tariff mechanism that is adopted to promote the use of renewable energy sources. Under this scheme, electricity authorities purchase different types of renewable energy at different prices. The feed-in tariff is set in such a way that the high-cost renewable energy will receive a purchasing price higher than that of the lower cost renewable energy. This concept of renewable energy promotion led Thailand to the problem of excessive spending on renewable energy than need be. In the future, it is necessary to narrow the price differences in the feed-in tariff scheme for renewable energy. This will result in more equal pricing for electricity generated from renewable sources. When renewable energy is sold at similar prices, the marginal cost of producing renewable energy from different sources can be effectively equated. This equalization of marginal costs indicates efficiency in electricity production. However, there is a need to introduce variations in the cost of electricity generated from renewable sources to account for their respective environmental impacts.

During the past decade, the world saw a remarkable technological progress in renewable energy generation. The cost of energy from renewable sources such as solar PV has declined, making competitive with fossil fuels. Additionally, the scale of operation of many renewable technologies has decreased in size. These technological innovations suggest that power generation need not be large and monopolized by state enterprises as it used to be in the past. Consequently, there is a need to redefine the role of the energy sector authorities.

By liberalizing the energy market and promoting competition in renewable energy production, Thailand can enhance energy security, reduce greenhouse gas emissions, and foster inclusiveness. This approach would ensure that income is distributed to small renewable energy entrepreneurs that are scattered throughout the country. However, it is crucial to design energy policies that facilitate the participation of small entrepreneurs in energy generation and ensure their fair share of income.

Forestry

Forests serve several functions. The environmental profile section earlier shows that the current forest coverage in Thailand is about 10 million acres short of the national target. Increasing the forest areas to meet the national target will benefit Thailand in many ways. These include achieving a better ecological balance and water regulation, diversifying the economy, creating income and jobs, improving climate control, and, most importantly, serving as a carbon sink.

Increasing the forest coverage by 10 million acres will not be an easy task, especially if Thailand relies solely on government efforts and a limited government budget. **However, commercial forestry presents a promising solution for the country as it can attract private investments in reforestation.** Currently, there is growing interest from the private sector to engage in commercial reforestation, but the current Thai forest laws and regulations pose obstacles. To address this, Thailand can consider adopting fiscal mechanisms, such as forest bonds, as alternatives for Thailand to attract investment funds to be used for commercial reforestation.

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

Agriculture

While agriculture has been a key economic sector and provides income to many rural families, the Thai agricultural sector needs adjustments in order to maintain its international competitiveness as well as to meet the challenges arising from climate change challenges, namely adaptation to extreme weather risks and methane mitigation from rice paddy and livestock. The past Thai agricultural policies have the tendency to be biased towards farmers income subsidies which did not prove to be successful in enhancing the degree of competitiveness of the agricultural sector. This is because the agricultural income subsidies are not designed to enhance farm productivity but rather as a means to ease hardship of the poor farming families. Agricultural subsidies through income supplements also have an effect in trapping a large proportion of the Thai labor force within agriculture when the sector only generates a small percentage of value added to the economy.

In this regard, the Thai government needs to rethink its agricultural policy and divorce agricultural policies from poverty alleviation policies. To effectively address poverty issues, there is a need for targeted government assistance on individual families as each poor family is likely to face different types of hardships. Therefore, the government's effort in poverty reduction needs to be family-based, providing tailored packages that include education, reskilling and upskilling opportunities, healthcare, housing, capital ownership, and supplementary income, to suit each family's needs.

As for agriculture, the Thai agricultural policy should then be directed towards improving farm productivity and efficiency in the utilization of resources such as land, water, and farm inputs. A proper water pricing scheme is necessary to promote efficiency in water utilization and water conservation. Energy pricing should be introduced in order to divert the farmers away from extensive use of subsidized diesel to the use of renewable energy. Farm subsidies need to be reduced in order to minimize farm inefficiency and unproductive public spending in agriculture. Instead, the government effort should focus on technological innovation in farming practices, smart farming, water saving practices, climate resilience farming, crop variety enhancement, and low methane emission practices.

Finally, reducing methane emission from agriculture should be a part of the Thai climate change policy. However, instead of adopting the polluter-pays principle that is generally used to control carbon emission in urban areas or the industrial sector, reducing methane from farming can be carried out via the beneficiary-pays principle so as to lessen the burden on the low-income farming families. Policy instruments under the beneficiary-pays principle may include, for instance, soft loans for new technology adoption, changing farm products, reskilling and upskilling packages, and relocation assistantships.

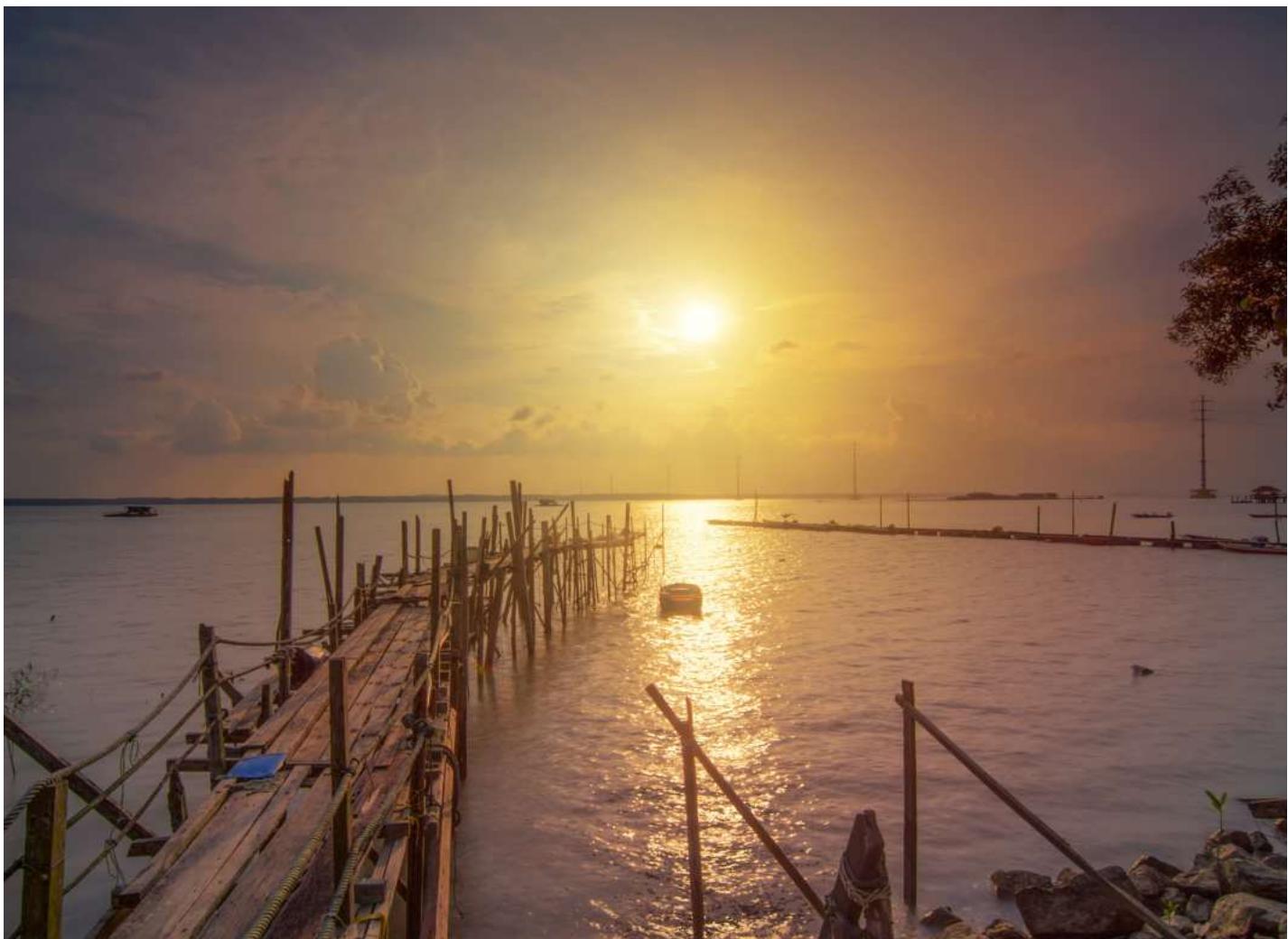
Revision of laws and regulations

From interviews with several agencies, it is learned that many green initiatives face obstacles due to existing legal restrictions. For instance, many agencies are willing to engage in green purchases despite small increases in expenditures. However, such attempts are currently not possible owing to procurement regulations that require bidding and price comparison. Therefore, there is a pressing need to revise laws and regulations in order to enable public agencies to participate in green procurement. These revisions will also complement the market liberalization discussed earlier.

The case of reforestation serves as a prime example. Currently, there are business initiatives aiming at investing resources in commercial forestry. These initiatives will not only enhance Thailand carbon sink potential and improve ecosystems, but also provide the agricultural sector with a more resilient climate control system and generate more jobs and income. Such initiatives have not been made possible owing in large to the limitations imposed by existing forest laws and timber export restrictions. Similarly, waste management and waste recycling are also constrained by legal restrictions on waste transportation. To pave the way for green economic transformation, it is crucial to revise several Thai regulations that currently impede progress in these areas.

To streamline resources toward a green economy Thailand needs to enact two significant pieces of legislation: the Climate Change Act (draft) and the Biodiversity Act (draft). These two legal frameworks play a crucial role in enabling Thailand to fully engage in key initiatives such as carbon market creation, the design of infrastructures for resilient settlements, and the enhancement of farm productivity.

Thailand's journey to become an inclusive green economy is not paved with roses. Removing the existing distortionary measures, such as agricultural and energy price subsidies, will be politically challenging but will enable Thailand to harness the welfare improvement from better resource utilization. Implementing appropriate incentive systems to pave way for sustainable consumption and production will face resistance from those who are made worse off. Therefore, the green economic transition will need to be equipped with a benefit sharing mechanism where all stakeholders can take their shares of this development. Macroeconomic management also plays an important role in the inclusive green economy transition. Fiscal arrangements need to be designed to insulate the economy from external shocks while at the same time prevent unproductive public spending as it will erode future growth. Finally, poverty alleviation policies must not be overlooked. A well-designed and well-targeted poverty alleviation package will not only reduce the need to deploy distortionary subsidies which will hinder the green economy transformation but, most importantly, will enable a large segment of the Thai labor force to contribute to and benefit from the green economy transition.



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Appendix I: Interviews and meetings with major stakeholders

Stakeholder	Date and time	Key discussion point
Department of Alternative Energy Development and Efficiency	August 26, 2021; 8.30 AM	Various issues related to renewable energy in Thailand, including the National Energy Plan, roles of electricity authorities, and the liberalization of electricity generation, among others
Department of Industrial Works	August 24, 2021; 1.30 PM	The department's initiatives related to the green economy, with a significant emphasis on the Green Industry Program
Digital Economy Promotion Agency	August 27, 2021; 1.30 PM	Digital economy initiatives in Thailand and their roles in the green economy transition
National Science and Technology Development Agency	September 1, 2021; 1.00 PM	The BCG model, its backbone, and the supporting/relevant policies
Office of Industrial Economics	August 26, 2021; 10.30 AM	The implementation of the BCG model to generate value-added and facilitate efficient resource utilization in the targeted industries
Office of the Permanent Secretary of Labor	August 31, 2021; 1.30 PM	Labor policies related to the inclusive green economy transition, including training programs, OSH issues, and existing policies for women and informal workers
Office of Transport and Traffic Policy and Planning	September 1, 2021; 9.30 AM	Public transportation, EVs in public transportation, and relevant policies and incentives
The Department of Agriculture	Questionnaire and email correspondents	Policies for creating, developing, promoting, and driving agricultural research, technology, and innovation excellence; including the transformation of agricultural products to add value, upgrading production standards for crops and agricultural products to ensure agricultural safety, conservation, restoration, protection, value creation, and utilization of biodiversity, as well as the transfer of crop production technologies suitable for the environmental and social conditions of farmers under the development guidelines according to the BCG model
The National Economic and Social Development Council	September 14, 2021; 9.30 PM	The 13 th National Economic and Social Development Plan, focusing on elements related to the green economy agenda, such as the BCG model, decarbonization, and policies related to natural disasters and climate change
The Office of Natural Resources and Environmental Planning	September 9, 2021; 9.30 PM	Policy to promote sustainable conservation and restoration of resources and the environment, such as biodiversity and water resources, etc.
Main ideas from Focus Group: Green Economy in Thailand	November 9, 2021	Invaluable feedback from stakeholders on various issues such as carbon tax and carbon market, the liberalization of electricity generation and the grid system, and green financing





Inclusive green economy enables Thailand to restructure the economic governance that necessitates a more efficient and equitable use of resources essential for sustainable development.

Inclusive green economy aims to make adjustments to the key incentive mechanisms that are essential in preparing Thailand for climate change challenges both in terms of becoming a resilient and low carbon economy society.

Inclusive green economy will become a new platform for Thailand to embark on a higher and more sustainable economic growth trajectory for the benefits of society as a whole.

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