



Global  
Green Growth  
Institute

# GGGI

## Thailand Country Planning Framework

2017-2021







GGGI  
Thailand Country  
Planning Framework  
2017-2021



# Foreword

Thailand's development paradigm has evolved in the context of global and domestic changes, resulting in a shift from a "growth-oriented approach" to a new, holistic model of "people-centered development". This new development model is ingrained in the *Twenty-Year National Strategy (2017-2036)*, which serves as an umbrella for national development plans and a tool for cooperation. *The Twelfth National Economic and Social Development Plan (2017-2021)*, the country's five-year national development plan, further emphasizes an inclusive development approach. Its ultimate goal is to bring the nation toward prosperity, security, sustainability and happiness, and at the same time support the attainment of the Sustainable Development Goals (SDGs) and climate change commitments under the Paris Agreement. Thus, green growth and a low-carbon society are identified as key development objectives for the country.

Since 2014, the Global Green Growth Institute (GGGI) has actively worked shoulder-to-shoulder with the Royal Thai Government to establish a strong green growth foundation for Thailand. In early 2016, Thailand, with the Cabinet's approval, became a GGGI member country. This signals Thailand's commitment to green growth and its recognition of the shared value of this development paradigm in cooperation with GGGI.

Throughout the first two years of GGGI's presence in Thailand, GGGI provided support to the Office of Natural Resources and Environmental Policy and Planning (ONEP) under the Ministry of Natural Resources and Environment, in developing a practical and implementable greenhouse gas (GHG) reduction roadmap for the Thai industrial sector. The sector is the country's key economic driver accounting for over one-third of the country's total energy consumption and GHG emissions. GGGI also supported the government in developing the Nationally Determined Contribution (NDC) Action Plan for the Industrial Sector, which aims to guide the country in achieving its ambitious GHG reduction target of 20-25% by 2030 as part of Thailand's commitments under the Paris Agreement.

In order to further assist the Royal Thai Government in accomplishing its development objectives, SDGs and NDC target in the next five years under this Country Planning Framework 2017-2021, GGGI will continue to catalyze the green energy transition in the Thai industrial sector. Simultaneously, in collaboration with the Royal Thai Government, GGGI will promote green and resilient urban development in Thailand's Special Economic Zones. These development themes are mutually accepted among GGGI, ONEP, and private and public stakeholders as key engines to green growth in the country.

Thailand has embraced green growth and followed His Majesty the late King Bhumibol Adulyadej's Sufficiency Economy philosophy, which incorporates a green growth development model. This development model and GGGI's vision for a resilient world achieved through strong, inclusive and sustainable green growth are unambiguously complementary to each other. It is our belief that the collaboration between Thailand and GGGI will lead the country to meet its country development vision in the next twenty years.



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Global Green Growth Institute



**Dr. Raweewan Bhuridej**  
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Policy and Planning



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# Abbreviations and Acronyms

<b>BAU</b>	Business as Usual
<b>CO<sub>2</sub>e</b>	Carbon Dioxide Equivalent
<b>CPF</b>	Country Planning Framework
<b>GDP</b>	Gross Domestic Product
<b>GGGI</b>	Global Green Growth Institute
<b>GHG</b>	Greenhouse Gas
<b>ktoe</b>	Kiloton of Oil Equivalent
<b>MtCO<sub>2</sub>e</b>	Million Tons of Carbon Dioxide Equivalent
<b>NDC</b>	Nationally Determined Contribution
<b>NESDP</b>	National Economic and Social Development Plan
<b>ONEP</b>	Office of Natural Resources and Environmental Policy and Planning
<b>SDG</b>	Sustainable Development Goal
<b>SEZ</b>	Special Economic Zone
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change





# Executive Summary

## Background

Thailand, the second-largest economy in South-East Asia, has been transitioning from an agriculture-based economy to a more industrialized one since the economic boom it experienced in the late 1980s. Since its graduation to middle-income country status in 2011, the Royal Thai Government has turned its focus to escaping the “middle-income trap” to sustain its economic growth and low poverty rate, and at the same time achieve greater income equality and economic modernization. In doing so, Thailand must address the growing environmental and climate impacts caused by its rapid economic development.

Thailand is extremely vulnerable to climate change, which manifests itself in the form of water shortages, droughts and floods. The country is also a growing contributor to global climate change, ranked 18<sup>th</sup> in total greenhouse gas (GHG) emissions in 2012, which is nearly triple its 1990 levels.

Thailand’s energy-intensive industrial sector is a significant contributor to its GHG emissions, powered by 49% petroleum and oil products. This translates into reduced energy security and high air pollution, as well as a net economic loss of roughly USD 900 million to the Thai economy.

Additionally, rapid and unplanned urbanization in Thailand is a growing challenge, associated with highly concentrated public services, environmental degradation and regional income disparities.

## National Priorities

The Royal Thai Government recognizes the importance of a green growth approach to reaching its full development potential. The Thailand 4.0 initiative outlines a new model of growth that relies on a value-based economy, which focuses on innovation, technology and services. Green growth is well reflected in Thailand’s policy and planning documents, including the *Twelfth National Economic and Social Development Plan* (12<sup>th</sup> NESDP), *Climate Change Master Plan*, and international commitments such as the Sustainable Development Goals, Nationally Appropriate Mitigation Action and the Nationally Determined Contribution (NDC).

To achieve its NDC target to reduce GHG emissions by 20–25% by 2030, the Royal Thai Government has an ambitious goal to increase renewable energy to 30% of the supply mix, and reduce energy intensity by 30% by 2036. In the area of urbanization, the 12<sup>th</sup> NESDP elaborates a set of priorities to develop low-carbon, climate-resilient and livable cities that have sustainable green economic

development and fair income distribution. Simultaneously, the Royal Thai Government will develop Special Economic Zones (SEZs) to achieve Thailand’s regional economic growth goals. This presents an opportunity to incorporate spatial and economic planning, and to thereby maximize Thailand’s green growth potential.

## About the Country Planning Framework

Since 2014, the Global Green Growth Institute (GGGI) has built a strong presence in Thailand and partnership with the Royal Thai Government through its support in the implementation of Thailand’s *Climate Change Master Plan*. With the success of this project, Thailand became GGGI’s 26<sup>th</sup> member in 2016. This Country Planning Framework (CPF) outlines two strategic outcomes that will guide the next phase of GGGI’s partnership with Thailand from 2017 to 2021. At its core, this CPF aims to assist Thailand in delivering its 12<sup>th</sup> NESDP, NDC, and renewable energy and energy efficiency targets. GGGI will: (1) continue to support the green energy transformation of Thailand’s industrial sector; and (2) support green urban development in Thailand by integrating green growth and climate resilience into the spatial and economic planning of urban areas, focusing particularly on those within the 12<sup>th</sup> NESDP’s planned SEZs.

## GGGI’s Impact Pathway

GGGI will support Thailand in the timely delivery of its 12<sup>th</sup> NESDP, NDC, and scaled-up renewable energy and energy efficiency targets, to achieve green growth through two key strategic outcomes.

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## Strategic Outcome 1: Increased Investment in Renewable Energy and Energy Efficiency in the Industrial Sector Catalyzes the Green Energy Transition in Thailand

**GGGI’s interventions will support the Royal Thai Government’s goals of:**

- Reduced national energy intensity by 14.4% by 2021;
  - 17.7% renewable energy in final energy consumption by 2021;
  - GHG emissions reduced by 8–11% by 2021.
-

Thailand's industrial sector accounts for 37.1% of the country's total energy consumption and 27.9% of the country's GHG emissions<sup>1</sup>. Substantial investments in renewable energy and energy efficiency are critical to climate change mitigation. However, there is a significant lack of capital, project design capacity and access to financiers, particularly among small and medium-sized enterprises. To accelerate the transformation of this sector, the Royal Thai Government needs a clear action plan for green energy, clearer rules for industry owners and private sector investors, and a policy and regulatory environment that incentivizes investment in the industrial sector. Accordingly, GGGI will support the Royal Thai Government by:

- Strengthening capacity of stakeholders to implement the NDC, through improved renewable energy and energy efficiency project development, monitoring, reporting and verification support, knowledge sharing, technology transfer and others;
- Developing an NDC action plan for the industrial sector that provides clear milestones for achieving the country's NDC targets;
- Developing investment plans and a pipeline of bankable, green energy projects and linking them to potential sources of finance;
- Facilitating dialogue and coordination between all actors and stakeholders to increase overall awareness in green energy investment;
- Designing necessary policies, regulations and tariff schemes to support renewable energy and energy efficiency investment.

These activities are intended to catalyze increased investment in green energy in the industrial sector, an essential element of NDC implementation. These investments, as noted in the NDC will contribute to industrial sector cost savings, reduced GHG emissions, and improved health and air quality for areas located near industry. In the longer term, this sectoral transformation can enhance industry sector competitiveness, job creation, efficient natural resource use, stronger public health and energy security.

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## Strategic Outcome 2: Green city development in Thailand's Special Economic Zones results in low-carbon, climate-resilient and livable cities that contribute to sustainable economic development and fair regional income distribution.

### GGGI's interventions will support the Royal Thai Government's goal of:

- GDP growth of 5% per annum to 2021;
- GHG emissions reduction of 8-11% by 2021;
- Reduced air pollution emissions, especially PM<sub>10</sub>, to meet national air quality standards;
- Improved climate resilience.

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While some work has been done to improve the environmental and climate profile of Thailand's cities in regions outside of Bangkok, the Royal Thai Government has no national approach to achieve its goal of providing low-carbon, climate-resilient and livable cities that contribute to sustainable economic development and fair regional income distribution. The Royal Thai Government plans to establish SEZs in 10 provinces around the country, with urban planning and development as a central component. This effort is an opportunity to enhance national economic growth and competitiveness, while also promoting prosperity, income equality and quality of life for populations living within the SEZs. GGGI will support the Royal Thai Government by:

- Mainstreaming green growth and climate-resilient principles into SEZ development policies and plans;
- Identifying linkages and synergies between green and climate-resilient city development and SEZ development, and supporting the integrated planning of cities within the SEZs;
- Strengthening the capacity of government and relevant stakeholders to design, plan and implement bankable smart, green and climate-resilient city development projects, through training and knowledge sharing programs.

GGGI's work will broaden the impact of green growth for Thailand beyond industrial sub-sectors and into the urban areas in which they are located. As a result of GGGI's support, Thailand will have greener and climate-resilient SEZ development that can impact the economic modernization and quality of life in regional areas. In addition to the GDP growth resulting from productive SEZs, better planned urbanization will impact the ability of local governments to provide clean energy, transport, waste and water management, housing and public buildings, and other services. Greening industrial zones will also contribute to achievement of the NDC target for GHG emissions reduction, and improvement of air quality and associated health impacts.

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1 Global Green Growth Institute, Industry Greenhouse Gas Reduction to Support the Implementation of Thailand's Climate Change Master Plan: Greenhouse Gases Diagnostic Report, 2014



# 1. Introduction to the Country Planning Framework

The Country Planning Framework (CPF) lays out GGGI's green growth objectives and interventions that aim to support Thailand in the 2017-2021 period. The CPF objectives are derived from the Institute's Strategic Plan 2015-2020, reflect GGGI's comparative advantage, and are in alignment with national goals and priorities of economic growth, poverty reduction, social inclusion and environmental sustainability.

The CPF is aligned to GGGI's corporate values, demonstrating:

- **Joint ownership** – The CPF formulation is undertaken by GGGI's country team in close dialogue with government counterparts and other stakeholders. The document is co-owned and endorsed by the government, demonstrating commitment among both parties to collaborate on the mutually goals;
- **Transformational outcomes** – GGGI takes a long-term outlook and aims for catalytic CPF outcomes that can

trigger transformational change. The achievement of these outcomes is enhanced through partnership and synergy with other development actors;

- **Boldness** – GGGI responds to challenges with optimism. CPF outcomes seek to design and scale up creative new solutions and continually learn and adapt to evolving local contexts;
- **Excellence** – The CPF process is underpinned by technical rigor, demonstrating thought leadership and drive toward continuous improvement;
- **Inclusiveness** – GGGI respects and prioritizes diversity, information sharing among a broad set of stakeholders and equal opportunity in its collaboration and interventions. CPFs are designed to respond to national poverty reduction and social inclusion challenges;
- **Integrity** – GGGI upholds high standards for transparency and accountability. CPF analysis balances the findings of analytical reports and data with stakeholder feedback.

In drafting the Thailand CPF, GGGI has consulted extensively with green growth stakeholders from across government, financial institutions, civil society and private sector. Consultations were held via bilateral meetings, roundtables, and workshops hosted jointly by GGGI and its key government counterparts at the Office of Natural Resources and Environmental Policy and Planning (ONEP). The CPF aligns with national development policies and strategies, including the Thailand 4.0 development vision and the Twelfth National Economic and Social Development Plan (12<sup>th</sup> NESDP), as well as international commitments under the Sustainable Development Goals (SDGs) and Thailand's Nationally Determined Contribution (NDC) to the United Nations Framework Convention on Climate Change (UNFCCC).

GGGI's ability to achieve the long-term outcomes of the CPF will depend on resource mobilization and the anticipated cooperation and support of the Government and other relevant stakeholders.

### Box 1. About GGGI

GGGI was founded to support and promote a model of economic growth known as "green growth", which targets key aspects of economic performance such as poverty reduction, job creation, social inclusion and environmental sustainability.

GGGI envisions a resilient world achieved through strong, inclusive and sustainable growth, and is dedicated to supporting the transition of GGGI partner countries toward a green growth model. In pursuit of these goals, GGGI works with developing and emerging countries to design and deliver programs and services that demonstrate new pathways to pro-poor economic growth.

GGGI supports stakeholders through two complementary and integrated work streams—Green Growth Planning & Implementation, and Investment & Policy Solutions—that deliver comprehensive products and services designed to assist in developing, financing and mainstreaming green growth into nation economic development plans.

GGGI's interventions emphasize changes in four priority areas considered to be essential to transforming countries' economies including energy, water, land use and green cities.

Headquartered in Seoul, Republic of Korea, GGGI also has representation in a number of partner countries.



## 2. Thailand's Green Growth Context

### 2.1 Economic Growth

Thailand, the second-largest economy in Southeast Asia, has been transitioning from an agriculture-based economy to a more industrialized one since the economic boom the country experienced in the late 1980s. In this transition, the country faces structural changes, such as rising labor costs, the relocation of footloose industries to neighboring countries, along with changes in the international environment and volatile politics in the mid-2000s.

Since its graduation to middle-income country status in 2011, the Royal Thai Government has turned its focus to escaping the “middle-income trap” to sustain its economic growth and low poverty rate, and at the same time achieve greater income equality and economic modernization. Average growth has slowed down during the 2005-2016 period and further growth is constrained by labor shortage, low-quality education, low research and development investment, depleting natural resources, and other factors.

Presently, the Thai economy relies heavily on exports. The industrial and service sectors are the major sources of the country's gross domestic product (GDP). The industrial

sector accounts for almost 40% of GDP, and the service sector (including the financial, education, and hotel and restaurant sectors) accounts for 24.9%. Although the agriculture sector employs the majority of the country's labor, it generates only 8.4% of the country's GDP<sup>2</sup>.

### 2.2 Environmental Sustainability

**Several decades of rapid economic growth have caused severe negative environmental impacts.** Energy discoveries and generation have powered new industry development. Simultaneously, these have led to air pollution, waste and public health problems. Industrial and agricultural development have negatively affected forests, rivers, soil and the country's rich biodiversity. Unsustainable tourism and urban development have inevitably affected natural ecosystems.

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2 Global Green Growth Institute, Industry Greenhouse Gas Reduction to Support the Implementation of Thailand's Climate Change Master Plan: Greenhouse Gases Diagnostic Report, 2014

Thailand is extremely vulnerable to climate change, which manifests itself in the form of water shortages, droughts and floods. The country is also a growing contributor to global climate change, ranked 18<sup>th</sup> in total greenhouse gas (GHG) emissions in 2012<sup>3</sup>, which is nearly triple its 1990 levels.<sup>4</sup>

Thailand's energy-intensive industrial sector is a significant contributor to its GHG emissions, powered by 49% petroleum and oil products. This translates into reduced energy security and high air pollution, as well as net economic loss of roughly USD 900 million to the Thai economy.<sup>5</sup>

Rapid and unplanned urbanization in Thailand is also a growing challenge, associated with highly concentrated public services, environmental degradation and regional income disparity.

Thailand's net GHG emissions in 2011, taking into account the net carbon sequestration from land use, land-use change and forestry, were 234.58 MtCO<sub>2</sub>e.<sup>6</sup> The energy sector was the largest contributor, accounting for 222.94 MtCO<sub>2</sub>e or 73% of total emissions. The second largest contributor was agriculture (53 MtCO<sub>2</sub>e, 17.3%), followed by industrial processes (18 MtCO<sub>2</sub>e, 6%), and waste (11.4 MtCO<sub>2</sub>e, 3.7%).

Thailand is very vulnerable to climate change impacts as it has long coastlines and fragile agriculture systems. The country's Second National Communication to the United Nations Framework Convention on Climate Change (UNFCCC)<sup>7</sup> reports that rainfall across all the regions in Thailand can potentially increase by 10-20%, although the number of days with rainfall and heavy rainfall is not expected to change much. Moreover, all regions will be warmer due to an increase in maximum and minimum temperatures by 2 degrees Celsius, and the duration of the cold season will be shortened. A modelling and assessment of climate change vulnerability indicates that climate change is likely to have a detrimental effect on the severity of droughts and floods, agricultural yields and food security, settlement and human security, tourism, and natural resources. Ten cities that are vulnerable to climate change in the future are Bangkok, Nakhon Sawan, Khon Kaen, Nakhon Ratchasima, Surin, Ubon Ratchathani, Buriram, Kamphaeng Phet, Sisaket, and Udon Thani.<sup>8</sup>

3 World Resources Institute, CAIT Climate Data Explorer.

4 PBL Netherlands Environmental Assessment Agency, Trends in Global CO<sub>2</sub> Emissions: 2015 Report.

5 Approximately THB 32 billion according to GGGI's Industry GHG Reduction to Support the Implementation of Thailand's Climate Change Master Plan Project.

6 ONEP, "Thailand's First Biennial Update Report," December 2015, <http://unfccc.int/resource/docs/natc/thabur1.pdf>.

7 ONEP, *Thailand's Second National Communication under the United Nations Framework Convention on Climate Change* (Bangkok, 2011), <http://unfccc.int/resource/docs/natc/thainc2.pdf>.

8 Kampanart Piyathamrongchai, "Climate Change Vulnerability

## 2.3 Poverty Reduction and Social Inclusion

Over the last two decades, the poverty rate has decreased from 63% in 1986 to 42% in 2000, and to 11% in 2014 as income has risen.<sup>9</sup> However, the national income distribution is worsening, with the Gini coefficient<sup>10</sup> showing an upward trend over the past 40 years.<sup>11</sup> In 2009, the country's poorest 20% had only 4.6% share of the national income, while the country's richest 20% had 54.4%. Many factors are at play here, including the uneven distribution of government spending, the large economic gap between urban and rural areas, and decreasing investment in agriculture.

The unemployment rate has decreased steadily since the early 2000s. The rate averaged 1.48% from 2001 until 2016, reaching an all-time high of 5.73% in January 2001 and a record low of 0.39% in November 2012. This low rate can be explained by a high degree of underemployment, the counting of off-season agricultural workers among the employed, a decreased workforce due to a shrinking population growth rate and undocumented migrant workers.<sup>12</sup>

With a rapid change in economic structure, Thailand has transformed from a predominantly rural country to an increasingly urban nation. Thailand's urbanization rate has increased from 37.5% in 2005 to 50.3% in 2015.<sup>13</sup> Slums are highly concentrated in the capital city of Bangkok. Slum population as a percentage of the urban population increased from 19.5% in 1990 to 26% in 2005.<sup>14</sup>

As for gender equality, Thailand has performed relatively well. The country is one of the world's top 10 countries with the highest number of female executives.<sup>15</sup> However, only 6.1% of seats in the national Parliament were held

Assessment in Thailand," 2015, [https://www.env.go.jp/en/earth/cc/ws\\_nap2015/Plenary2-1-Dr\\_KampanartP\\_Thailand.pdf](https://www.env.go.jp/en/earth/cc/ws_nap2015/Plenary2-1-Dr_KampanartP_Thailand.pdf).

9 World Bank, "Thailand Overview," September 2016, <http://www.worldbank.org/en/country/thailand/overview>.

10 A low Gini coefficient indicates a more equal distribution, with 0 corresponding to complete equality, while a higher coefficient indicates more income disparity.

11 A low Gini coefficient indicates a more equal distribution, with 0 corresponding to complete equality, while a higher coefficient indicates more income disparity. Nicholas Grossman, Apiradee Treerutkuarkul and Jim Algie, ed., *Thailand's Sustainable Development Source Book* (Bangkok: Editions Didier Millet, 2015).

12 Suttinee Yuvejwattana, "Thailand's Unemployment Rate is a Ridiculously Low 0.6%. Here's Why," *Bloomberg*, February 2, 2015, <https://www.bloomberg.com/news/articles/2015-02-02/thailand-s-unemployment-rate-is-a-ridiculously-low-0-6-here-s-why>.

13 Statista, "Thailand: Urbanization from 2005 to 2015," <http://www.statista.com/statistics/455942/urbanization-in-thailand/>.

14 Multiple Indicator Cluster Surveys 2005/2006, cited in IndexMundi, "Slum Population: Thailand," <http://www.indexmundi.com/thailand/slum-population.html>.

15 Nicholas Grossman, Apiradee Treerutkuarkul and Jim Algie, ed., *Thailand's Sustainable Development Source Book* (Bangkok: Editions Didier Millet, 2015).

by women in 2014.<sup>16</sup> In order to advance gender equality, the Royal Thai Government initiated the “Women’s Development” program with four key pillars: (1) enhancing female participation in the policymaking process;

(2) improving healthcare services; (3) strengthening women’s right to human security; and (4) fostering more economic participation.

**Table 1. Thailand at a glance**

Population (United Nations, 2016)	68.14 million	
Area (sq. km) (United Nations, 2014)	513,120	
GDP (current USD) (World Bank, 2015)	395.3 billion	
Gross national income per capita, PPP (current USD) (World Bank, 2015)	5,620	
World Bank classification	Upper Middle-Income	
Poverty rate (World Bank, 2014)	11%	
Percentage of population under the national poverty line (World Bank, 2014)	10.50%	
Human Development Index (United Nations Development Programme, 2014)	0.726, ranked 93 <sup>rd</sup> out of 188	
CO <sub>2</sub> e emissions (metric tons per capita) (United Nations, 2014)	4.45	
	Energy	222.94
	IPPU*	18.23
Greenhouse gas inventory (MtCO <sub>2</sub> e) in 2011 (ONEP’s First Biennial Update Report, 2015)	AFOLU*: Emissions	96.11
	AFOLU*: Removal	-114.13
	Waste	11.43
	Total emissions	348.71
	Net emissions	234.58
Forest area (% of land) (World Bank, 2015)	32.10%	
Agricultural land (% of land area) (World Bank, 2013)	43.30%	
Arable land (% of land area) (World Bank, 2013)	32.90%	
Permanent cropland (% of land area) (World Bank, 2013)	8.81%	
Rice area (Ha) (CGIAR, 2014)	10,834,500	
Paddy yield (t/Ha); (CGIAR, 2014)	3.01	
Percentage of alternative energy consumption (Royal Thai Government’s Department of Alternative Energy Development and Efficiency, 2015)	12.94%	
Percentage of alternative energy consumption expected in 2036 (Royal Thai Government’s Department of Alternative Energy Development and Efficiency, 2015)	30%	
Availability of freshwater (m <sup>3</sup> per year per capita) (World Bank, 2014)	3,315 m <sup>3</sup> per year per capita	
Environmental Performance Index (Yale, 2016)	69.54, ranked 91 <sup>st</sup> out of 180	
Global Competitiveness Index (World Economic Forum, 2015-2016)	4.6, ranked 32 <sup>nd</sup> out of 140	
Income Gini coefficient (United Nations Development Programme, 2013)	39.4	
Urbanization rate (Statista, 2016)	50.3	

\*IPPU = Industrial processes and product use; AFOLU = Agriculture, forestry and other land use

16 United Nations Development Programme, “About Thailand,” <http://www.th.undp.org/content/thailand/en/home/countryinfo.html>.





## 3. National Priorities

### 3.1 National Green Growth Plans and Strategies

#### 3.1.1 Sufficiency Economy

The “Sufficiency Economy” philosophy, which was initiated by His Majesty the late King Bhumibol Adulyadej, provides the country with an overarching development framework that is based on moderation and ethical behavior. The Sufficiency Economy philosophy has three pillars:<sup>17</sup> moderation, reasonableness and risk management, which forms the foundation for sustainable development in Thailand, and is expected to lead the country toward prosperity, and economic, social and political stability, over the next twenty years.<sup>18</sup>

17 Chaipattana Foundation, “Philosophy of Sufficiency Economy,” [http://www.chaipat.or.th/chaipat\\_english/index.php?option=com\\_content&view=article&id=4103&Itemid=293](http://www.chaipat.or.th/chaipat_english/index.php?option=com_content&view=article&id=4103&Itemid=293).

18 National Economic and Social Development Board, “The Twenty-Year National Plan, Sustainable Development Goals and the Twelfth NESDP,” 2016, [http://www.trf.or.th/index.php?option=com\\_attachments&task=download&id=3894](http://www.trf.or.th/index.php?option=com_attachments&task=download&id=3894).

#### 3.1.2 The Twelfth National Economic and Social Development Plan (2017-2021)

A five-year NESDP serves as the basis for fiscal budget planning and allocation, and guidance for detailed planning and implementation by relevant ministries and downstream organizations. The plan serves as the pathway for future plans to achieve targets stated in the *Twenty-Year National Strategy (2017-2036)* that is comprised of six strategies: (1) security; (2) competitiveness; (3) human resource development; (4) equality and equity; (5) environmental friendly growth; and (6) governmental management.

The 12<sup>th</sup> NESDP indicates that by 2021, Thailand aims to be a trading and service nation, and a transportation and logistics hub of the region with high income that is fairly distributed, sustainable agricultural practices, an innovative industrial sector and environmental sustainability. Six strategies of this plan are aligned with the *Twenty-Year National Strategy (2017-2036)*, and the four remaining strategies are specific to the 12<sup>th</sup> NESDP, including: (1) international cooperation for development; (2) regional,

city, and Special Economic Zone (SEZ) development; (3) science, technology, research and innovation; and (4) basic infrastructure development and logistics.

Under the 12<sup>th</sup> NESDP, a number of strategies are relevant to green growth, as follows:

- **Strategy 2 – Ensuring Fairness and Reducing Social Disparities.** This strategy aims to address income inequality by reducing the poverty rate to less than 6.5%, and improving the Gini coefficient to 0.41.
- **Strategy 3 – Strengthening the Thai Economy and Competitiveness.** This strategy aims to accelerate investment in infrastructure and logistics systems, as foundations to enhance the country’s competitiveness, expand the economy and transform Thailand into a high-income country by 2027, with an average GDP growth of 5% per annum, and per capita income of USD 8,200 by 2021.
- **Strategy 4 – Green Growth and Sustainability.** The Green Growth and Sustainability strategy aims to accelerate natural resources and environmental conservation and rehabilitation processes. It aims to increase forest cover to 40% of total land area, and ensure appropriate municipal solid waste management in 75% of the targeted areas by the end of the 12<sup>th</sup> NESDP period. The strategy also aims to reduce GHG emissions by 7-20% by 2020, compared to the business as usual (BAU) projection.<sup>19</sup> In addition, the strategy aims to increase climate resilience and adaptation capacity.
- **Strategy 7 – Infrastructure and Logistics Development.** Under the energy objective of the Infrastructure and

Logistics Development strategy, the government aims to reduce the country’s energy intensity from 8.22 to 7.70 ktOE/billion baht, and increase the share of renewable energy by 17.34% by 2021.

- **Strategy 9 – Regional, City and SEZ Development.** This strategy aims to promote growth distribution to the less developed parts of the country. The Royal Thai Government sets a specific strategy for each region: a high value-added economy in the north; a self-sufficient economy in the north-east; strong industrial development in the central region; diversified sources of income in the south; and advanced technology industry expansion in the eastern seaboard. Green cities are one of the initiatives under this strategy.

Figure 1 below provides a summary of the green growth-related targets in the 12<sup>th</sup> NESDP.

### 3.1.3 Thailand 4.0

To escape from the “middle-income trap”, the Royal Thai Government initiated the **Thai Economy 4.0: Transforming toward the Value-Based Economy (Thailand 4.0)**, which presents the key steps in Thailand’s economic transition. Under this initiative, the country has progressed from the phases “Thailand 1.0: Agriculture”, to “Thailand 2.0: Light Industry”, and to “Thailand 3.0: Heavy Industry”. The next step is to advance to “Thailand 4.0: A Value-Based Economy” that focuses on innovative industries and services. This new engine of growth will require the country to be more competitive, with solid social and environmental quality. Thus, a low-carbon society has been identified as one of the emerging priorities for this new model of development.

Figure 1. Summary of green growth-related targets in the 12<sup>th</sup> NESDP.

STRATEGY 2	ENSURING FAIRNESS AND REDUCE SOCIAL DISPARITIES	Less than 6.5% poverty rate	0.11 Gini coefficient (fair income distribution)		
STRATEGY 3	STRENGTHENING THAI ECONOMY AND COMPETITIVENESS	5% GDP growth rate			
STRATEGY 4	GREEN GROWTH STABILITY AND SUSTAINABILITY	40% forest cover	Nationally Appropriate Mitigation Actions (NAMA) target of 7-20% compared to BAU in 2020	Appropriate management of Municipal Solid Waste by 25%	Increases climate resilient and adaptation capacity
STRATEGY 7	INFRASTRUCTURE AND LOGISTICS DEVELOPMENT	Reduced energy intensity from 8.22 to 7.70 ktOE/billion baht	17.34% share of renewable energy in total final energy demand in 2021		
STRATEGY 9	REGIONAL, CITY, AND SPECIAL ECONOMIC ZONE (SEZ) DEVELOPMENT	Fair income distributions among regions	Green and livable cities developed		

Source: Modified from National Economic and Social Development Board, 2016

19 Note that the 12<sup>th</sup> NESDP was developed before Thailand ratified the Paris Agreement.

**This development model indicates a critical need for green growth in Thailand in the years to come, particularly in the greening of industries and cities.** It emphasizes the need for the country's industry—the major economic driver—to become more competitive through more efficient and effective utilization of resources and energy. Simultaneously, to support value-based and innovative industries and a low-carbon society, cities—where the majority of the country's population live and where industries are located—will need to be developed in a smarter and more sustainable manner to minimize negative impacts as a result of Thailand 4.0. This will ensure that the country meets the ambitious Sustainable Development Goals (SDGs) and committed GHG emissions reduction targets.

### 3.1.4 Climate Change Master Plan

**Thailand's Climate Change Master Plan (2015-2050) echoes the 12<sup>th</sup> NESDP by committing the country to sustainable low-carbon growth and climate resilience by 2050.** The vision will be implemented through integrating plans, directions and measures in all sectors at both national and sub-national levels. The plan aims to mitigate GHG emissions and ensure the country's adaptability to climate change. It also includes building readiness for the implementation of the master plan, and developing data, knowledge and technology to support climate change adaptation and sustainable carbon growth.

The *Climate Change Master Plan* sets the overall GHG emissions reduction target at 7-20% in 2021 compared to BAU projection (2005 is a base year), depending on the level of international support. The medium-term target is for renewable energy sources to make up at least 25% of the energy supply by 2021. The ultimate long-term goal is to reduce energy intensity by 25% over the BAU projection by 2030. This will require a concerted effort among all sectors, including energy and industry.

## 3.2 International Commitments

### 3.2.1 Sustainable Development Goals

Thailand is committed to collaborate with the international community on a wide range of initiatives related to climate change, sustainable development, water, forestry, wildlife and human development.

**Thailand ratified the SDGs, and they are well integrated in the 12<sup>th</sup> NESDP's international strategy.** To implement the SDGs, the Royal Thai Government established the National Committee on Sustainable Development with the Prime Minister as the chairperson. Three sub-committees were established: (1) sub-committee on SDGs implementation, tasked to develop key performance indicators for the SDGs and a monitoring system; (2) sub-committee on knowledge sharing and the

sufficiency economy; and (3) sub-committee on data repository. The National Economic and Social Development Board has been assigned as the main responsible agency.

### 3.2.2 Nationally Appropriate Mitigation Action

**Thailand submitted its Nationally Appropriate Mitigation Action with the objective of reducing GHG emissions by 7-20% by 2020,** subject to the level of international support in the form of technology development and transfer, finance and capacity building, through actions in the energy and transportation sectors. The potential measures include renewable and alternative energy sources, energy efficiency improvements, biofuels in transportation, and a sustainable transit system.

### 3.2.3 Nationally Determined Contribution

**Thailand's NDC was formulated based on key national plans and approved by the Cabinet.** With ratification of the Paris Agreement in September 2016, Thailand intends to reduce its GHG emissions by 20% from the projected BAU level by 2030. The BAU is projected from reference year 2005 in the absence of major climate change policies (BAU2030: approximately 555 MtCO<sub>2</sub>e). The level of GHG emissions reduction could reach up to 25%, subject to adequate and enhanced access to technology development and transfer, financial resources and capacity building support, through a balanced and ambitious global agreement under the UNFCCC.

The NDC covers economy-wide commitments. According to the draft *NDC Roadmap*, the country aims to reduce its GHG emissions by 115.6 MtCO<sub>2</sub>e by 2030. Energy and transport will play a major role with a 97.75% share (113 MtCO<sub>2</sub>e), followed by waste (1.73%; 2 MtCO<sub>2</sub>e), and industrial processes and product use (0.52%; 0.6 MtCO<sub>2</sub>e). Within the energy and transport target of 113 MtCO<sub>2</sub>e, energy in industry has the largest share of 38% (43 MtCO<sub>2</sub>e), followed by transport (36%; 41 MtCO<sub>2</sub>e), electricity generation (21%; 24 MtCO<sub>2</sub>e), residential (4%; 4 MtCO<sub>2</sub>e), and building (1%; 1 MtCO<sub>2</sub>e). As such, the most significant contribution in achieving NDC targets will come from energy in the industrial sector. However, it is worth noting that an inclusion of emissions from land use, land-use change and forestry in the NDC remains to be decided by the Royal Thai Government.

To achieve GHG emissions reduction in the energy sector, the Royal Thai Government has set an ambitious goal to increase renewable energy to 30% of the supply mix from 12.94% in 2015, and an energy efficiency target to reduce energy intensity by 30% by 2036, compared to the baseline level in 2010. This will be attained through implementation of the *Alternative Energy Development Plan (2015-2036)* and *Energy Efficiency Plan (2015-2036)*.



## 4. GGGI's Engagement in Thailand

### 4.1 GGGI's Achievements

In September 2015, GGGI and the Royal Thai Government—through ONEP in the Ministry of Natural Resources and Environment—signed the *Memorandum of Understanding on Green Growth Cooperation*. In January 2016, signaling further commitment to green growth and in recognition of GGGI's valued support, the Cabinet approved Thailand's official membership to GGGI, making it the 26<sup>th</sup> member.

GGGI has built a strong presence in Thailand and has established a strong partnership with the Royal Thai Government over the course of the project entitled, "Industry GHG Reduction to Support the Implementation of Thailand's Climate Change Master Plan" (Industry GHG Reduction Project). Beginning in 2014, the project has worked with ONEP to assist the Royal Thai Government in implementing its *Climate Change Master Plan* by developing a practical and implementable *GHG Reduction Roadmap*

*for the Thai Industrial Sector*. The roadmap focuses on three sub-sectors: automotive parts, palm oil and frozen seafood industries.<sup>20</sup> The roadmap provides details of how the sectors could effectively reduce their GHG emissions, and identifies cost-effective GHG reduction measures for each sector, with the intention to enhance the sectors' competitiveness and advance the country's green industry development.

The roadmap shows that the Thai industrial sector has significant potential to improve and move toward a green

20 The selection of these sub-sectors was based on a multi-criteria analysis: (1) ongoing activities (roadmaps developed by other donors); (2) abatement potential; (3) economic importance; (4) readiness and sustainability; and (5) government's priorities. Comprehensive consultations with relevant stakeholders were also conducted to validate and refine the result.

growth pathway. With the effective implementation of the roadmap through the framework of long-term agreements, the targeted sub-sectors could reduce approximately 3-5 MtCO<sub>2</sub>e, which translates to about THB 4.3 billion (USD 123 million) in savings. The implementation of similar roadmap activities across the manufacturing sector could lead to the reduction of 23-37 MtCO<sub>2</sub>e, or 4-7% of the country's emissions, potentially saving THB 32 billion for the Thai economy.

This roadmap is a key tool for achieving the Royal Thai Government's ambitious goal to become a low-carbon society by 2050 and fulfill its NDC commitments, and is used as the key input for the *NDC Action Plan for the Industrial Sector*, developed by GGGI in 2016-2017.

## 4.2 GGGI's Comparative Advantage in Thailand

### 4.2.1 Energy in Industry

**Energy in industry is expected to be the largest contributing sub-sector in Thailand's GHG emissions reduction at 38% of the total energy contribution.** Industry is also the key sector for Thailand 4.0, which aims to create value-based industries and enhance their competitiveness.

Since the beginning of its presence in Thailand in 2014, GGGI has been working extensively with Thailand's industrial sector. Through the Industry GHG Reduction Project, GGGI worked closely with the government counterpart, the Ministry of Industry, as well as the Federation of Thai Industries, industrial clubs and associations, and other relevant stakeholders to develop the *GHG Reduction Roadmap for the Thai Industrial Sector*. The roadmap, which uses a bottom-up approach, is the first-of-its-kind in Thailand and it is considered a powerful tool to reduce the country's GHG emissions and increase competitiveness.

**As a result of the Industry GHG Reduction Project, GGGI is equipped with strong expertise and experience working with Thailand's industrial sector.** During project implementation, GGGI identified the levels of GHG emissions for the industrial sector, projected future GHG levels, identified cost-effective GHG reduction measures, and worked with partners to develop the practical and implementable roadmap. GGGI can effectively leverage this expertise and experience to assist Thailand in reducing industry GHG emissions and strengthening its competitiveness. GGGI can also utilize strong local networks and relationships with government agencies and industries to help the country achieve its green growth objectives. In addition, GGGI will draw on its international connections to global funds, multilateral banks, and in-house expertise on bankable projects, to leverage finance

for GHG reduction projects.

**Although there are several development agencies working in the energy sector as a whole, few organizations are focused on the industrial sector.** The scope of the interventions needed in this sector is much larger than the development support currently being offered from different agencies.

### 4.2.2 Cities

In line with the 12<sup>th</sup> NESDP's objective to promote growth distribution and green cities, SEZs will be established in 10 provinces around the country, focusing on selected target industries and sustainable urban development. Both new industries and cities will be developed alongside each other in the SEZs, which are expected to be the new economic growth engine for the country.

**With GGGI's successful implementation of the Industry GHG Reduction Project, GGGI is now in a strong position to expand its reach to assist the Royal Thai Government in integrating green growth into SEZ development.** GGGI can leverage its strong expertise, past experience and extensive network in greening the industry to ensure that SEZ's industrial development is green and sustainable.

**GGGI also has a strong track record of working on green cities in other countries, including Cambodia, the Philippines and Mexico.** This will provide a great opportunity for cities in Thailand to learn directly from GGGI's green city programs in other countries.

**While a few government and development agencies (e.g., Thailand Greenhouse Gas Management Organization, United Nations Development Programme and the World Bank) are engaged in urban development, none of them are focused on SEZs.** As such, GGGI is taking an innovative angle and will be the first agency to work on the SEZ-city nexus.

Considering the above, GGGI is in an ideal position to expand its green industry expertise and leverage its green cities capability to assist Thailand's SEZ development in a sustainable manner.



## 5. Theory of Change

GGGI's primary objective is to assist Thailand in achieving its national green growth priorities and delivering on its international commitments.

GGGI's interventions will strengthen planning, financing and institutional frameworks through tailored technical assistance, capacity building and knowledge sharing programs, with the goal of increasing Thailand's potential for mobilizing increased investment for green growth.

Extensive consultations with government and other stakeholders revealed a strong need for support in addressing challenges faced in the GGGI thematic areas of Energy—particularly industrial energy consumption—and Green Cities. As core contributors to GHG emissions, economic growth, jobs and competitiveness, the two thematic areas are critical to unlocking Thailand's green growth potential and realizing the Thailand 4.0 vision of a low-carbon, value-based economy. At the same time, GGGI's interventions will support the Royal Thai Government's efforts to achieve goals in the 12<sup>th</sup> NESDP, meet renewable energy and energy efficiency targets, and deliver on its NDC commitments and the SDGs. While these strategic

outcomes are set for the 2017-2021 period, in the longer term, GGGI will explore opportunities for future interventions in the areas of sustainable landscapes and agriculture as these sectors play an important role in reducing Thailand's GHG emissions.

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### 5.1 Strategic Outcome 1: Increased Investment in Renewable Energy and Energy Efficiency in the Industrial Sector Catalyzes the Green Energy Transition in Thailand

**GGGI's interventions will support the Royal Thai Government's goals of:**

- Reduced national energy intensity by 14.4% by 2021;
  - 17.7% renewable energy in final energy consumption by 2021;
  - GHG emissions reduced by 8-11% by 2021.
-

### 5.1.1 National Objectives

Energy demand is growing very rapidly in Thailand. From 2004-2013, the country's economy grew at an average annual rate of 3.65%, while energy consumption increased at an annual average rate of 2.3%.<sup>21</sup> With limited domestic energy resources, the country has no choice but to import significant amounts of fossil fuel energy, especially crude oil and coal, to cope with the increasing demand. Crude oil and coal are major sources of air pollution and GHG emissions. In 2014, the import of fossil fuels accounted for 47% of the total primary energy supply and 10% of GDP. The country also relies heavily on imported natural gas for electricity generation. This significant reliance on fossil fuel imports seriously compromises the country's energy security.

Given the fact that the Thai economy continues to grow, the country's energy production needs to keep up with its rising demand. It is projected that electricity demand will increase at an annual rate of 2.6% between 2015 and 2036.<sup>22</sup> This rising demand is a huge challenge for the country since domestic energy resources, especially natural gas in the Gulf of Thailand, are declining. Furthermore, prices of imported energy are generally more expensive than domestic resources, and the imported value is already massive.

With this rapid rate of consumption growth pattern relying on imported fossil fuels, Thailand has been suffering from several negative impacts. They include

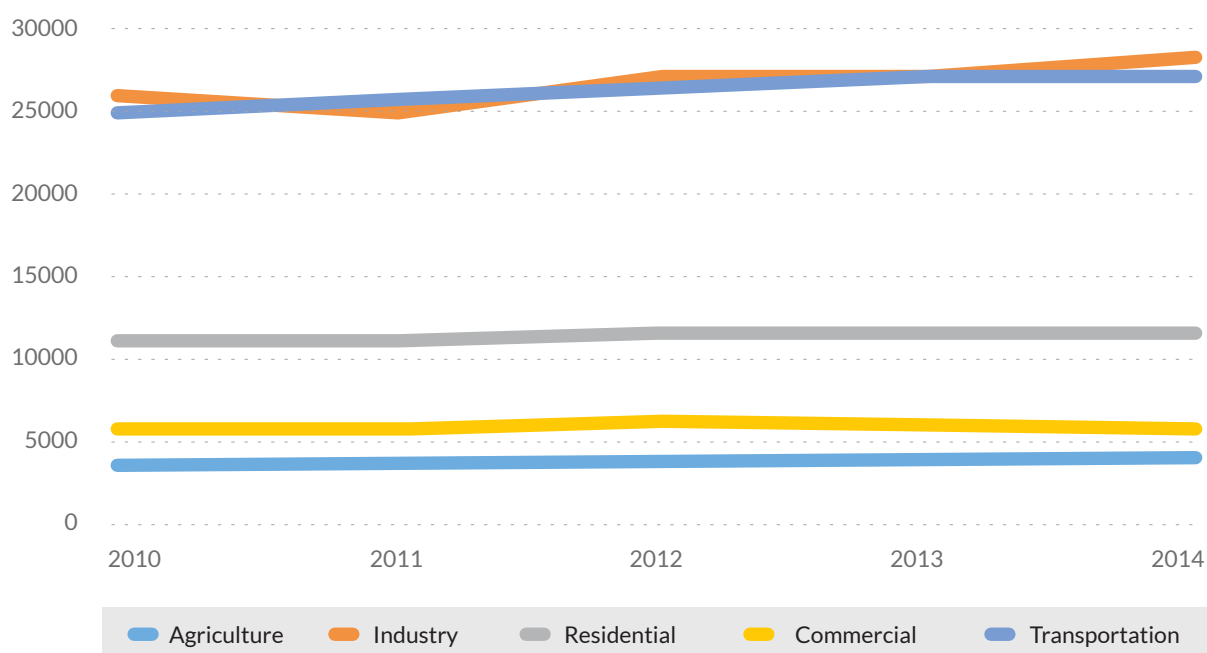
a loss of economic growth potential of at least THB 32 billion, lack of energy security, increasing GHG emissions, and high pollution and health impacts especially in the energy and industrial sectors. The major pollutants are sulfur dioxide, particulate matter and volatile organic compounds.

With the plan to advance the country's competitiveness through Thailand 4.0, there is strong pressure for the country to enhance its resource utilization and cost saving through energy efficiency. Moreover, the country needs to strengthen its energy security through fuel diversification to more domestic-based and sustainable fuels, such as renewable energy, a sector in which the country has significant potential.

The manufacturing industry (categorized as "Industry" in Figure 2. Thailand's final energy consumption, 2010-2014) is the main engine of the Thai economy, contributing to 40% of GDP. The manufacturing industry is also the largest energy consumer—consuming more than one third of the country's total energy consumption—and accounts for 27.9% of the country's GHG emissions. Furthermore, this sector has the highest energy consumption growth rate with an average rate of 3.4% between 2013 and 2014.

The industrial sector has the highest rate of energy intensity compared to other sectors, at 8.29 ktoe/billion baht of GDP. The rate of energy intensity of other sectors is less than 6 ktoe/billion baht of GDP. In terms of the

Figure 2. Thailand's final energy consumption, 2010-2014



Source: Department of Alternative Energy Development and Efficiency, Energy Efficiency Plan (2015-2036), 2015

21 Department of Alternative Energy Development and Efficiency, Energy Balance of Thailand, 2015

22 Energy Policy and Planning Office, Ministry of Energy, Power Development Plan, June 30, 2015.

growth rate of energy intensity, the industrial sector also had the highest rate, at 1.2%, during the period of 2010-2014, while other sectors have less than 0.5% to negative growth rates. This clearly demonstrates that there is a large opportunity for energy efficiency improvement in the industrial sector.

As the industrial sector is crucial for economic development, consumes the majority of energy resources, and is expected to be the major GHG reduction contributor under the NDC framework, effective development of renewable energy and energy efficiency projects in this sector will be critical for the country to address the above-mentioned challenges, enhance competitiveness and achieve green growth.

**Addressing the industrial energy challenge and developing a world-class manufacturing sector is critical to achieving the Thailand 4.0 development model.** The Royal Thai Government has committed to this vision and developed a robust and ambitious set of strategies and targets to bring it to reality, including:

- *12<sup>th</sup> NESDP, Strategy 3* – Aims to increase the country's economic competitiveness ranking<sup>23</sup> and be within the top 25 ranked countries;
- *Power Development Plan (2015-2036)* – Sets a target to achieve a 20% share of power generation from Renewable Energy sources by 2036;
- *Alternative Energy Development Plan (2015-2036)* – Aims to increase Renewable Energy in final energy consumption from 12% in 2014 to 30% by 2036;
- *Energy Efficiency Development Plan (2015-2036)* – Aims to reduce energy intensity by 30% by 2036, compared to the baseline level of the year 2010;
- *Climate Change Master Plan (2015-2050)* – Outlines plan for 7-20% GHG emissions reduction below BAU level by 2021;
- *NDC commitments* – Aims to reduce GHG emissions by 20-25% (compared to BAU level) by the year 2030;
- *NDC Roadmap* – The industrial sector is expected to contribute approximately 8% to the total 20% GHG emissions reduction goal by the year 2030.

### 5.1.2 Barriers

Thailand has great potential for renewable energy and energy efficiency development, especially in the industrial sector. However, there are a few major challenges preventing full and accelerated deployment of the country's renewable energy and energy efficiency.

**Government lacks strong emissions tracking and monitoring tools for the industry sector.** The Energy Conservation Promotion Act of 1992 requires large

industries and commercial buildings (“designated factories and buildings”) to: (1) appoint energy managers; (2) monitor, record and submit energy consumption reports to the government; (3) conduct third-party energy audits; and (4) set up reduction targets and prepare detailed implementation plans. However, the act covers only large industry, the energy information does not provide a full and comprehensive picture of the sector's GHG emissions levels, and the requirement is difficult to enforce. With a lack of comprehensive GHG emissions tracking and monitoring tools for the industrial sector, it is very challenging for the country to track and monitor the progress of emissions reductions and initiate corrective actions in a timely manner.

**Government lacks strong plans to support industrial renewable energy and energy efficiency development for the industrial sector.** There is a noticeable gap in industrial actors' capacity to plan and manage alternative energy activities such as renewable energy and energy efficiency. This is often due to the lack of exposure to information about available technologies, and their potential implications on cost and regulatory compliance. Although the government has clear policies and plans for improving renewable energy and energy efficiency development at the national level,<sup>24</sup> they have yet to be fully implemented in the industrial sector. The Royal Thai Government lacks a coordinated plan and set of clear actions for industrial actors to make energy efficiency improvements and transition their total consumption mix to a higher proportion of renewable energy. Without this support, the industry sector is likely to continue to underperform, and renewable energy and energy efficiency development is likely to be implemented in a fragmented way.

**Both government and industry lack project development skills.** A proper scale up of renewable energy and energy efficiency will require massive investment from public, private, national and international sources. In many cases, industrial operators can identify project concepts that they would like to develop, such as waste to energy, biomass power, biogas power and boiler efficiency improvement. However, many of the industrial operators, especially small and medium-sized enterprises, do not have sufficient capacity to turn those concepts into high-quality project proposals that can attract investment. Many operators are not familiar with the requirements of project proposals, especially financial data, while others may not have sufficient access to potential investors.

**Investors have weak access to information on renewable energy and energy efficiency projects.** Further complicating the investment challenge in Thailand is the lack of access to information. Local investors from

23 International Institute for Management Development, “World Competitiveness Ranking,” <http://www.imd.org/wcc/world-competitiveness-center-rankings/world-competitiveness-yearbook-ranking/>.

24 Such as the *Power Development Plan (2015-2036)*, *Alternative Energy Development Plan (2015-2036)* and *Energy Efficiency Plan (2015-2036)*.



nationally-based financial institutions are generally not familiar with renewable energy and energy efficiency projects and, therefore, tend to evaluate these types of projects as much riskier than they really are. This high-risk perception makes the cost of finance (e.g., interest rates) higher than it should be, and makes it more difficult for potential projects to be financially feasible. While international investors tend to be more familiar with renewable energy and energy efficiency projects, as they have more diverse human resources and experiences, they lack reliable networks in Thailand to facilitate the development of concepts into bankable renewable energy and energy efficiency projects.

### 5.1.3 GGGI's Response

To address the above-mentioned challenges, GGGI can deliver services in the areas of sector- and/or sub-sector-level planning, implementation support and capacity enhancement, such as:

- Strengthening the capacity of stakeholders to implement the NDC, through improved renewable energy and energy efficiency project development, monitoring, reporting and verification support, knowledge sharing, technology transfer, and more;
- Developing an NDC action plan for the industrial sector that provides clear milestones for achieving the country's NDC targets;
- Developing investment plans and a pipeline of bankable, green energy projects and linking them to potential sources of finance;
- Facilitating dialogue and coordination between all actors and stakeholders to increase overall awareness of green energy investment;
- Designing necessary policies, regulations and tariff schemes to support renewable energy and energy efficiency investment.

### 5.1.4 Results

With this set of activities, the environment for increased investment and policy implementation will be greatly improved. GGGI can effectively leverage its direct experience in developing the *GHG Reduction Roadmap for the Thai Industrial Sector* to assist the Royal Thai Government in formulating an NDC action plan for the industrial sector. This is also a natural follow-up program for GGGI, in which the results from the roadmap could be effectively used to develop the sectoral action plan. The lists of GHG reduction measures for the industrial sector in the roadmap provide an ideal starting point for GGGI to help the country in identifying, developing and mobilizing finance for renewable energy and energy efficiency projects.

## Intermediate Outcome

- Improved green energy planning for the industrial sector that integrates green growth (GHG emissions reduction targets, natural environment and human health factors, and cost saving measures), and takes into account key investment drivers for public and private sector investors;
- Prepared bankable project proposals, and increased investment in renewable energy and energy efficiency in the industrial sector;
- Stronger collaboration between the government and the private sector;
- Strengthened capacity of relevant stakeholders to implement the NDC.

## Strategic Outcome

As a result of the intermediate outcomes, together with the momentum of additional clean-energy bankable projects, the development of renewable energy and energy efficiency will catalyze a green energy transition in the country. The industrial sector will be a vital engine driving Thailand toward its 2036 energy targets and 2030 NDC target of 20-25% GHG emissions reduction (compared to BAU level). The targets could be achieved by reaching the necessary 2021 trajectory of a 14.4% reduction in national energy intensity, achieving a 17.7% share of renewable energy, and reducing 8-11% GHG emissions reduction. According to the *NDC Roadmap*, the industrial sector is expected to contribute approximately 8% to the 20% GHG emissions reduction target.

## Impact

Air pollution and adverse health impacts will be reduced as a result of green industrial development and a green energy transition. Air pollutants, e.g., sulfur dioxide, particulate matter and volatile organic compounds, are expected to decrease. Consequently, negative health impacts, especially cardiovascular and respiratory mortality will likely decrease. With more efficient use of energy, the country's energy intensity will decrease, which will directly enhance its competitiveness and resource utilization. Diversification to more domestic and sustainable renewable energy use will effectively reduce the country's imports and enhance the country's energy security. Ultimately, the country will achieve its Thailand 4.0 and low-carbon society objectives, which can effectively put the country in a transformative, innovative and sustainable economic growth trajectory.

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## 5.2 Strategic Outcome 2: Green City Development in Thailand's Special Economic Zones Results in Low-Carbon, Climate-Resilient and Livable Cities that Contribute to Sustainable Economic Development and Fair Regional Income Distribution

GGGI's interventions will support the Royal Thai Government's goals of:

- GDP growth of 5% per annum to 2021;
- GHG emissions reductions of 8-11% by 2021;
- Reduced air pollution emissions, especially PM<sub>10</sub>, to meet national air quality standards;
- Improved climate resilience.

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### 5.2.1 National Objectives

Thailand is rapidly transforming from a predominantly rural country to an increasingly urban one, with half of the country's population currently living in cities. Bangkok, as well as other big cities, is currently facing several negative environmental impacts. With the concentration of urban development primarily in Bangkok and other major cities, national income and economic development has been unevenly distributed throughout the country. In 2013, the richest province had almost 24 times more gross provincial product than the poorest one. At the same time, the provision of public services in many cities are not adequate—resulting in severe environmental damage, harm to human health and economic loss. For example, with approximately 100 treatment plants to accommodate more than 8,000 municipalities around the country,<sup>25</sup> Thai cities often have no choice but to discharge their wastewater into natural waterways, which leads to wastewater problems. In 2015, municipal solid waste added up to 29.09 million tons, of which 7.09 million tons were burned or dumped in open landfills or abandoned lands.<sup>26</sup>

Bangkok is a prime example of the effect of poor public transport provision—not only does it contribute to local pollution and GHG emissions, it also reduces people's quality of life and adds to the country's economic losses. Bangkok's traffic jams cause THB 11 billion (USD 317 million) a year in lost economic opportunity.<sup>27</sup> In Thai cities, air quality monitoring reveals that the levels of PM<sub>10</sub><sup>28</sup>

have consistently exceeded national standards.<sup>29</sup> In 2000 alone, it was found that the health impact cost of PM<sub>10</sub> for Thailand's six major cities was USD 644 million; of which USD 424 million was attributed to Bangkok, and the rest to Chiang Mai, Nakhon Sawan, Khon Kaen, Nakhon Ratchasima, and Songkhla.<sup>30</sup>

Additionally, cities are a major source of energy consumption and GHG emissions. Bangkok alone uses one-third of the country's electricity. With the growth of other cities around the country, the proportion of energy consumption for cities has become very significant. This causes a rapid increase in GHG emissions. Around 34% of GHG emissions are estimated to come from urban areas. Poor urban planning (e.g., new roads that cause flooding) has made the country's cities prone to climate change impacts and more frequent disasters, especially floods. The big flood in 2011 that affected 13.6 million people caused the loss of more than 800 lives and USD 42.5 billion to the Thai economy.<sup>31</sup> The recent flood in the southern part of the country in early 2017 cost Thailand almost 1% of its GDP.

**Having realized the challenges of rapid and unmanaged urban development in major cities, and massive income gaps in less developed cities, the Royal Thai Government aims to address these problems through the 12<sup>th</sup> NESDP's Strategy 9 – Regional, City and SEZ Development.** There are four targets under this strategy (three of which are relevant to green growth), as follows:

- Target 1 – Income gap reduced and fair income distribution enhanced;
- Target 2 – Livable cities that are safe, environmentally friendly, prosperous and effective transport systems developed for each province;
- Target 3 – Cities' green and sustainable economy developed and quality of people's life improved;
- Target 4 – SEZs developed to enhance the country's competitiveness and sustainable development.

Under this strategy, SEZs, which have designated geographical areas in 10 border provinces<sup>32</sup> around the country will be established. SEZs are expected to become a new economic growth engine for the country, and new development centers along the country's borders. SEZs

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25 Nicholas Grossman, Apiradee Treerutkuarkul and Jim Algie, ed., *Thailand's Sustainable Development Source Book* (Bangkok: Editions Didier Millet, 2015).

26 PCD, 2016, <http://www.pcd.go.th>.

27 Yukano Ono, "Reforming Bangkok's Snarled Traffic," *Nikkei Asian Review*, October 6, 2016, <http://asia.nikkei.com/Features/Urban-crisis-in-Asia/Reforming-Bangkok-s-snarled-traffic>.

28 PM10 is particulate matter 10 micrometers or less in diameter.

29 Nuntavarn Vichit-Vadakan and Nitaya Vajanapoom, "Health Impact from Air Pollution in Thailand: Current and Future Challenges," *Environmental Health Perspectives* 119 (2011): A197–A198, <https://ehp.niehs.nih.gov/wp-content/uploads/119/5/ehp.1103728.pdf>.

30 Pollution Control Department, "PM Concentration and Health Impacts," [http://infofile.pcd.go.th/air/DIESEL2\\_PM%20Concentration%20and%20Health%20Impacts.pdf?CFID=352144&CFTOKEN=81402552](http://infofile.pcd.go.th/air/DIESEL2_PM%20Concentration%20and%20Health%20Impacts.pdf?CFID=352144&CFTOKEN=81402552).

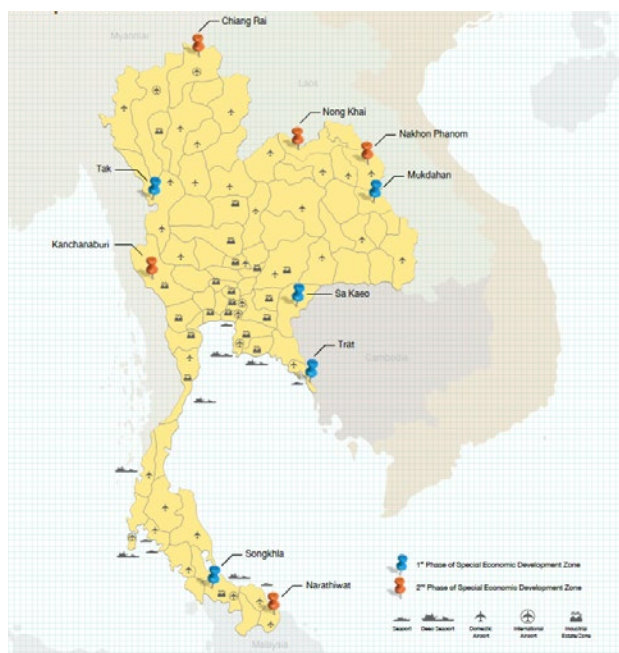
31 Nicholas Grossman, Apiradee Treerutkuarkul and Jim Algie, ed., *Thailand's Sustainable Development Source Book* (Bangkok: Editions Didier Millet, 2015).

32 There are two phases of SEZs development. The first phase will include five provinces: (1) Tak; (2) Mukdahan; (3) Sa Kaeo; (4) Trat; and (5) Songkhla. The second phase will include another five provinces: (6) Nong Khai; (7) Narathiwat; (8) Chiang Rai; (9) Nakhon Phanom; and (10) Kanchanaburi.

aim to unlock economic development potential (e.g., rich natural resources and wide availability of human resources) for the development of target industries<sup>33</sup> that are tailored for each area. Additionally, SEZs endeavor to promote cross-border trade, investment and labor mobility between Thailand and its neighboring countries. Cities will be developed alongside each SEZ to support regional and industrial development.

The Royal Thai Government envisions that SEZs will be a key mechanism to promote balanced and sustainable economic development, integrated environmental management, effective transportation systems, clear identity and culture, and effective urban management. The Royal Thai Government will provide the necessary infrastructure with a 2016 budget of nearly THB 6.2 billion, as well attractive investment incentives, e.g., tax holiday. Public participation will be encouraged in making key decisions and formulating new policies and plans, and natural resources and environmental management will be promoted.

Figure 3. Location of SEZs



Source: Office of Board of Investment, 2015

Both the central government and provincial governments are responsible for the planning and implementation of SEZs. The central government, through its National Committee on SEZs and six other sub-committees, will be the key bodies in deciding and approving SEZ areas and plans, providing an overall SEZ framework, monitoring and evaluating SEZ development, providing investment incentives and initiating relevant policies, and raising public awareness. The provincial governments are tasked with the responsibility of formulating SEZ local development plans, implementing and providing oversight to SEZ development

33 The target industries include: (1) agro, fishery and related industry; (2) ceramic; (3) textile and leather; (4) furniture; (5) gems and jewelry; (6) medical devices; (7) engine, vehicle parts, machinery, equipment and parts; (8) electrical appliance; (9) plastic products; (10) medicine; (11) logistics; (12) industrial estates; and (13) tourism.

in their provinces, ensuring public acceptance, and raising awareness at the local level. Local SEZ offices have been established in the ten target provinces.

**To support the SEZs, cities that are livable, safe and environmentally friendly will be developed. As these cities are still in the planning stage, SEZs provide an ideal opportunity to incorporate green growth into urban development for SEZs.**

This initiative is in line with the 12<sup>th</sup> NESDP's Strategy 2 – Ensuring Fairness and Reducing Social Disparities, Strategy 3 – Strengthening Thai Economy and Competitiveness, Strategy 4 – Green Growth and Sustainability, and Strategy 9 – Regional, City and SEZ Development. This initiative is particularly relevant to Strategy 4's Target 3 – to improve environmental quality and reduce negative health impacts. Under this strategy, green city development is one of the key actions used to address climate change adaptation and resilience to natural disasters.

### 5.2.2 Barriers

In order to achieve this strategic outcome, there are few identified challenges as described below.

**Green growth and climate resilience are not integrated into SEZ national development plans and policies.**

Despite the existence of several relevant plans and strategies—including the Climate Change Master Plan, Alternative Energy Development Plan, Energy Efficiency Plan, Transport Infrastructure Development Strategy and Roadmap for Waste Management—they have not been designed for the purpose of improving green city or developing SEZs. The concept of green growth, and the important guidance of these plans and strategies must be incorporated into any future national SEZ development plans and strategies. These will serve as guidance to central government agencies, local governments and related stakeholders on how to advance sustainable and climate-resilient green city and SEZ development.

**Green city development is not integrated into local SEZ plans.** Despite the fact that SEZs aim to promote sustainable development and improve quality of life, the consultations reveal that the views on green growth and climate resilience are missing from the local SEZ plans. In the absence of these perspectives, it will be difficult for the country to achieve its ambitious development objectives through the SEZ mechanism. There is a clear need for green city plans that address economic development, resource efficiency, job creation and climate resilience.

**Limited capacity to design, plan and implement bankable green and climate-resilient city projects.** There is a lack of bankable green and climate-resilient city development projects (e.g., waste-to-energy, transport). This could be explained by the fact that provincial or local governments have limited capacity to identify and develop the necessary

projects. Moreover, issues around green and climate-resilient city development are new and emerging, and the capacity of central and local government agencies to address these issues has yet to be built. In many instances, however, the green cities issue is being viewed as a new initiative rather than a new way of managing cities.

### 5.2.3 GGGI's Response

To address the challenges, GGGI's will offer the following services to the Royal Thai Government to ensure SEZ's sustainable green city development:

- Mainstreaming green growth and climate-resilient principles into SEZ development policies and plans;
- Identifying linkages and synergies between green and climate-resilient city development and SEZ development, and supporting the integrated planning of cities within the SEZs;
- Strengthening the capacity of government and relevant stakeholders to design, plan and implement bankable, smart, green and climate-resilient city development projects, through training and knowledge sharing programs.

### 5.2.4 Results

GGGI plans to leverage its experience in advancing Thailand's green industry through the development of the *GHG Reduction Roadmap for the Thai Industrial Sector* and Thailand's Community-Based Eco-Industrial Town Development to support sustainable and green SEZ development.

### Intermediate Outcome

- Improved SEZ national development plans and policies that integrate green growth and climate-resilient principles;
- Local SEZ development plans that address green growth and climate resilience;
- Bankable green and climate-resilient projects;
- Strengthened capacity in green and climate-resilient development.

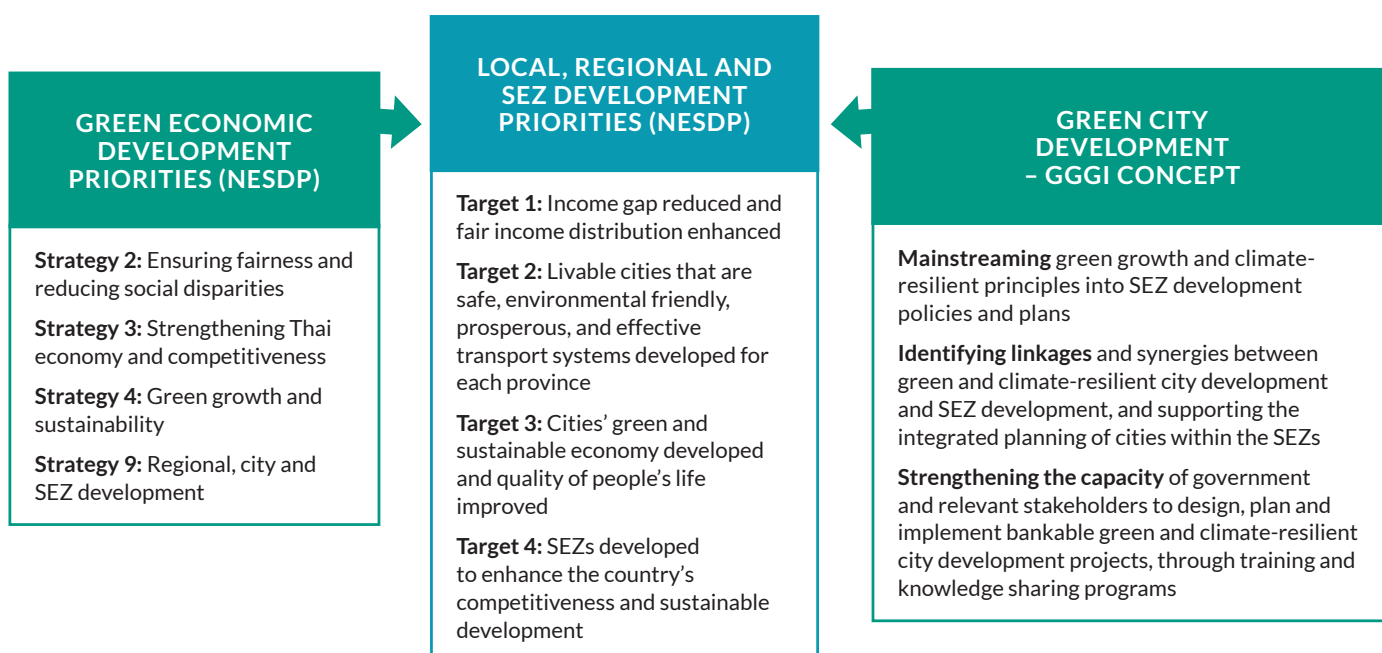
### Strategic Outcome

As a result of the intermediate outcomes, green city development will be catalyzed and well-integrated into Thailand's SEZs. SEZs, which are expected to play significant roles in future country's economic development, will be developed in a sustainable manner and be a green growth engine for the country.

### Impact

With GGGI's intervention, air pollution, especially PM<sub>10</sub> that causes significant negative health impacts, will be reduced to meet national standards. It is also expected that the quality of life will be improved with green and livable city development, while at the same time effectively help the country achieve its annual 5% economic growth rate. Greener and climate-resilient SEZ development will support Thailand with reducing its GHG emissions and meeting its NDC 2030 targets. In addition, better planned urbanization will positively impact the ability of local governments to provide clean energy, sustainable transport, waste and water management, housing and public buildings, and other services. Overall, the interventions will enable the country to realize the Thailand 4.0 development vision in a green and sustainable manner.

Figure 4. National priorities and GGGI's green city development intervention











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