



# ***The Bangkok Master Plan on Climate Change 2013-2023***

## **Executive Summary of the Comprehensive Review of the Progress of Implementation**

**Achievements, Remaining Challenges, Emerging Needs and Ways Forward**



**Bangkok Metropolitan Administration (BMA)**

Prepared in cooperation with Japan International Cooperation Agency (JICA)  
through the Project for Strengthening Institutional Capacity for the Implementation  
of Bangkok Master Plan on Climate Change 2013-2023

## Achievements

**Greenhouse gas (GHG) mitigation is in steady progress as a whole in Bangkok:** Quantitative assessment of the Comprehensive Review revealed the amount of GHG emissions of **42.75 million t-CO<sub>2</sub>e in 2016**. As the Master Plan sets the mitigation target of 46.44 million t-CO<sub>2</sub>e, which is 13.57% reduction from the business-as-usual (BAU) scenario in 2020, the level of emissions has drawn a steady pathway so far towards the achievement of the goal (Figure 1).

**Infrastructure development improved the resilience of Bangkok against negative impacts of climate change to some extent:** Progress in the development of hard infrastructure, such as drainage works and underground waterways, contributed to increasing the resilience to natural disasters such as flooding. Yet, there are remaining needs for soft measures, such as elaborating a hazard map.

**Progress of mitigation actions in the 4 sectors and adaptation planning are as follows (Figure 2):**

**Environmentally sustainable transport:** GHG emissions marked **12.41 million t-CO<sub>2</sub>e in 2016**. The amount is well below the BAU emissions of 15.62 million t-CO<sub>2</sub>e of the same year. Also, it is lower than the target of 14.91 million t-CO<sub>2</sub>e in 2020.

**Energy efficiency and alternative energy:** GHG emissions reached **25.81 million t-CO<sub>2</sub>e in 2016**. While the emissions slightly increased from the baseline of 25.60 million t-CO<sub>2</sub>e in 2013, they are still lower than BAU emissions of 2016.

**Efficient solid waste management and wastewater treatment:** The record shows **4.57 million t-CO<sub>2</sub>e in 2016**. The amount of emissions is similar to that of the base year, but still below BAU emissions in 2016.

**Green urban planning:** Due to scarcity of space for greening, absorption amount stood at **-0.045 million t-CO<sub>2</sub>e**. This is far from the target in 2020.

**Adaptation planning:** Indicators of some adaptation projects showed steady progress, such as in RangKhe retention pond project. But some others failed to mobilize budget, such as hazard mapping.

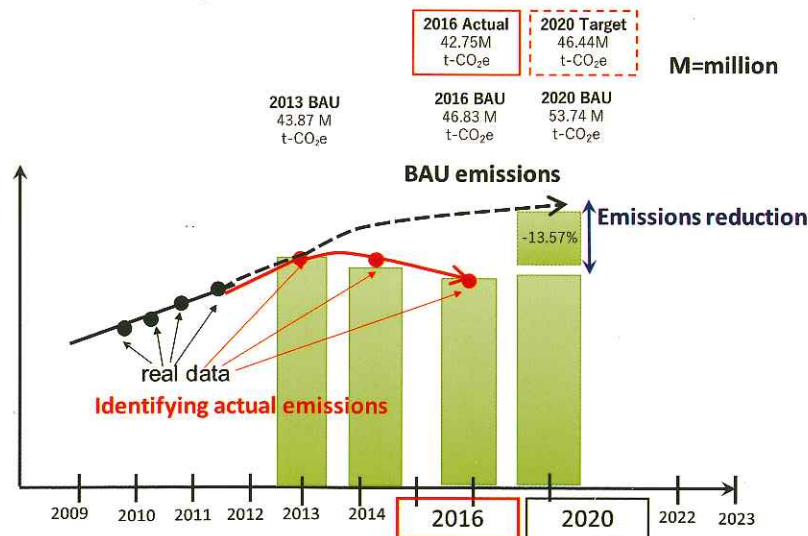


Figure 1: Actual emissions reduction of 2016 and comparison with 2020 year target in Bangkok

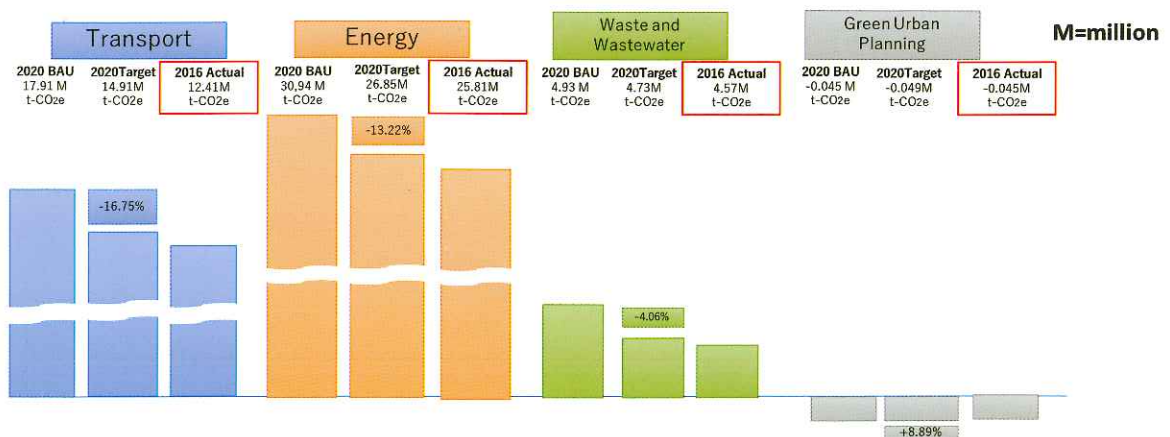


Figure 2: Actual emissions and comparison with the BAU and the targets in 2020 by sector

**Major GHG reductions have occurred in the transport and energy sectors.** Statistical data from the Ministry of Transport and the Ministry of Energy shows a large decrease in CNG and LPG taxis in Bangkok area.

Also, fuel switching from regular gasoline and diesel to mixed bioethanol and biodiesel seems to be influential. Increased efficiency in diesel-fueled vehicle contributed to decreasing GHG. The number of passengers using public transportation such as Bangkok Transit System (BTS) and Mass Rapid Transit (MRT) is growing, which implies GHG emission reduction is realized by shifting from private vehicles.

In the energy sector, the electricity consumption in the residential sector increased relative to the BAU. However, energy consumption in the commercial sector decreased than the BAU. The energy efficiency support program by the Department of Alternative Energy Development and Efficiency (DEDE), the Ministry of Energy, has led to less electricity consumption in major department stores and hospitals. **The BMA also made efforts to reduce energy consumption in its offices and hospitals.**

**Efforts to strengthen the institutional arrangement for climate action is in progress.** To implement the Master Plan, the BMA established 5 Task Forces to take practical actions in the transport, energy, waste and wastewater, green urban planning and adaptation sectors. Also, the Working Group has been formed to coordinate technical works of the Task Forces

and report to the Steering Committee, which oversees the progress of implementation and policy directions. Meanwhile, during the implementation period of the JICA Project, the Steering Committee has been organized in conjunction with the Joint Coordinating Committee (JCC), which is a management committee for the cooperation between the BMA and JICA. As a new and additional effort, the BMA established Climate Change Strategies Sub-division (CCS). Since its launch, the CCS has played a critical role of coordinating these bodies and served as a focal point of climate change actions in the BMA (Figure 3).

**Mainstreaming of climate actions has been initiated through integrating mitigation and adaptation project proposals into budget and planning cycle.** Though it is still at its embryonic stage, the Task Forces considered prioritized projects to be implemented under the Master Plan. And through the Working Group and the Joint Coordinating Committee/Steering Committee (JCC/SC), such prioritized projects were recommended to the relevant BMA departments. Those recommendations were integrated in their budget request to the Department of Budget.

**Also, the importance of linking with higher policy goals, such as the BMA's mid-to-long term strategies, has been recognized.** To facilitate establishing such a linkage, officials from the Strategy and Evaluation Department (SED) have been added in the Task Forces.

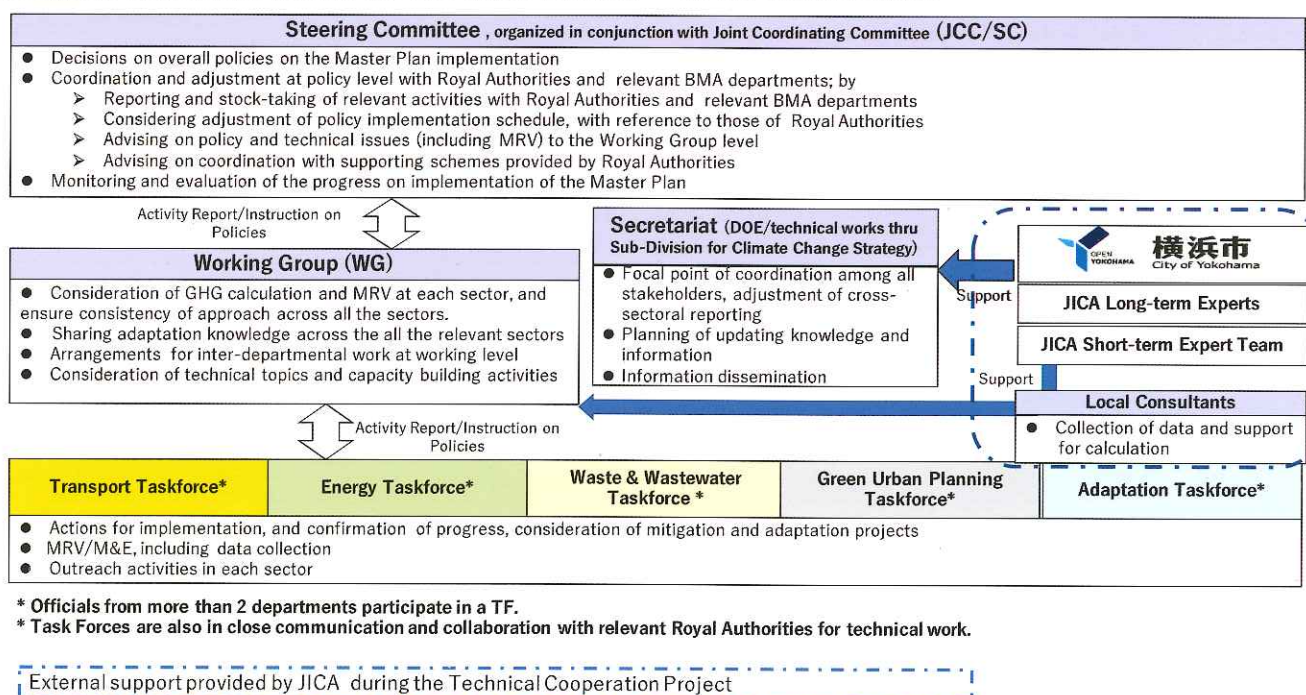


Figure 3: Institutional arrangement for the implementation of the Bangkok Master Plan on Climate Change 2013-2023 as of May 2019

## Methodologies

The objectives of the Comprehensive Review are:

- To track the progress of implementation of the Master Plan by quantitative and qualitative assessment of actions listed;
- To identify challenges and needs and synthesize lessons learned and;
- To guide the way forward for further actions needed for strengthening climate actions.

The scope of the review is mitigation actions in the 4 sectors and adaptation planning contained in the Master Plan. For mitigation, all GHG emissions within the geographical boundary of the BMA are basically covered. In this regard, GHG emissions not only from premises under the control of the BMA but also from the private sector, other authorities and citizens are covered. For adaptation, activities to address prioritized issues, namely, flood, coastal erosion, and drought are within the scope.

**Primary timeframe of the Review is 2013-2016 due to the data availability** but activities in 2017 and 2018 were also reviewed to the extent possible.

**Quantitative evaluation of GHG emissions by sector** were conducted to identify the progress towards achievement of mitigation targets in 2020, as follows;

✔ **Environmentally sustainable transport:** Statistical data for annual energy consumption for transport by fuel type (sales amount of gasoline, natural gas, diesels etc.) in Bangkok is the major reference. Also, to assess the causes of increase or decrease in GHG emissions, the number of registered vehicles and passengers of public transport (BTS, MRT, etc.) were also collected.

✔ **Energy efficiency and alternative energy:** Annual fuel consumption data at the national level (source by DEDE) is a primary reference. As there is no separate data for sales of fuels for households, offices and industry in the BMA area, emissions were identified by downscaling the national statistical data to the BMA level, using population size as the parameter.

✔ **Efficient solid waste management and wastewater treatment:** Organic waste amount as a source of CH<sub>4</sub> in landfills is the basis for the waste sector. For calculation, the First Order Decay Model (FOD) was used according to the IPCC Guidelines. Also, energy consumption for collecting and shipping waste, including intermediary transport centers, is also calculated. For the wastewater sector, amount of electricity used at BMA's wastewater treatment sites is the main reference data. All of them are directly collected by the BMA, or through service contractors.

✔ **Green urban planning:** In the Master Plan, the Biotope Area Factor (BAF) was set as 0.8525 t-CO<sub>2</sub>e for absorption per rai (1,600 m<sup>2</sup>), based on the average number of trees and coverage of green areas. The absorption amount in the green urban planning sector was identified by multiplying registered land for greening and the BAF.

As well as tracking GHG emissions at sectoral level, **measurement, reporting and verification (MRV) of GHG emissions at project level was conducted. This is especially useful to know the scale of impact of particular mitigation actions.**

**Monitoring and evaluation of adaptation are based on indicators set under respective projects.** Amongst them, process indicators show the progress of action by activity milestones (e.g. "a request of budget made", or "a feasibility study completed"). Other indicators show impacts of adaptation and strengthened resilience (e.g. the number of potential loss of human lives avoided by issuing a hazard map and regulations for zoning and relocation.).

**The Task Forces also conducted stocktaking of efforts to check whether projects listed in the Master Plan are conducted.** For this activity, they collected information from budget records in the relevant departments. By taking these ways of analysis, the BMA endeavored to increase accuracy of the Review.

## Remaining Challenges

**Challenges remain in some key sectors.** For example, the Bangkok Master Plan calls for GHG emissions reduction in the energy sector by promoting energy efficiency measures within BMA buildings and other facilities. However, at the present stage, efforts to promote energy efficiency are not enough to achieve the target set by the Key Performance Indicators (KPI). Also, despite the fact that the promotion of energy efficiency and renewable energy in the private sector is the key to reducing GHGs in Bangkok, BMA departments have a limited mandate to work with the private sector for this purpose. In addition, there is a room for improvement in increasing human resources and knowledge about energy efficiency.

In the transport sector, there will be new and extended BTS and MRT lines in the future. However, for ensuring the use of public transportation, the BMA and the Ministries need to design and implement effective policy to induce shift from private vehicles.

In the past years, several projects related to adaptation to climate change have already been planned and implemented. However, most of these projects were conducted as part of other efforts, not necessarily aimed at adaptation to climate change. In this regard, it is sometimes difficult to assess the impact of increasing the resilience. Also, due to the lack of explicitly mentioning adaptation, it is difficult to track the progress.



Photo: A flooded Street in Bangkok in 2011

### **Human resources of the CCS are still limited.**

After the establishment of the sub-division, the office has been assigned with several important duties, including the coordination for implementation of the Bangkok Master Plan on Climate Change. However, due to the small number of staff members, the office has a capacity challenge to process all the tasks in a timely manner. In other words, a bottleneck of coordination work may be addressed by increasing human resources as well as technical capacity of the CCS.

As for efforts to mainstream climate change, the current actions have been brought up in a bottom up manner mostly. For example, priority projects for budget requests are developed by the Task Forces, and after discussions at the Working Group, and the Steering Committee, they are introduced as an input to respective departments for budget request actions. These inputs may not be reflected in budget requests, in case there are other priorities in departments, as there is not a strong top-down guidance to secure a room for a request for climate change projects.

The issue of climate change has not been integrated fully yet in mid-and long-term development policies of the BMA. For this reason, there is not a clear linkage with BMA's vision for a future city development. In order to strengthen efforts to build a low carbon and climate resilient Bangkok, it is important to consider climate actions in middle and longer terms, bearing in mind challenges and opportunities from climate actions. Also, to accelerate such efforts, it is important to raise awareness on climate change of all BMA officials, including high-level decision makers.



Photo: Bangkok Skytrain as an important means of low carbon transport

## Emerging Needs

At the UNFCCC COP21, the Paris Agreement was adopted in December 2015. The Royal Government of Thailand has its commitments under the Paris Agreement. Guided by the Government, the BMA is supposed to play its proportional role to contribute to implementing climate actions. On 19 November 2018, the National Committee on Climate Change endorsed the Action Plans for Nationally Determined Contribution (NDC) and the National Adaptation Plan (NAP). In the NDC, roles of the BMA have been directly mentioned either as a “key” or “supporting” agency to implement mitigation actions and conduct their MRV.



Photo: Bangkok citizens with medical masks to avoid PM<sub>2.5</sub>

There is a time gap in the mitigation target for Bangkok. Since the current Bangkok Master Plan was designed along with the Thai Government’s Nationally Appropriate Mitigation Actions (NAMAs), it only set the mitigation target at 2020. As the Government set the mitigation target at 2030, it is expected that the BMA also set a new target, in alignment with the Government (Figure 4).

Apart from policy development of international climate change framework, local environmental issues also suggested that the BMA should strengthen climate actions. In early 2019, Bangkok citizens suffered from heavy air pollution due to PM<sub>2.5</sub> with a high risk of health damage. One of the causes of the air pollution is exhaust gas from diesel vehicles and controlling such an emission became a matter of priority. When reducing GHG emissions from some vehicles, it is also possible to control pollution by PM<sub>2.5</sub>. In this case, efforts to combine mitigating both air pollution and climate change will be an effective approach to tackle the issues.

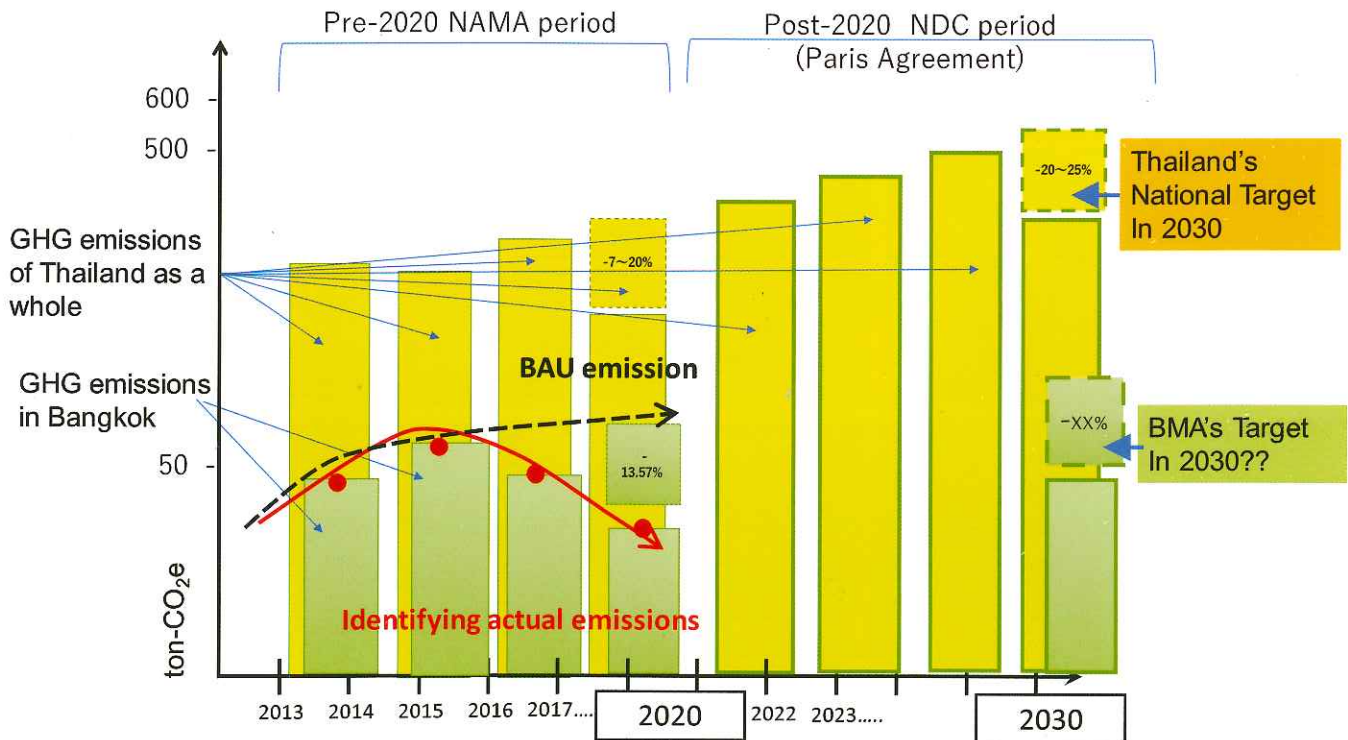


Figure 4: An emerging gap in mitigation target after 2020 for the BMA

## Ways Forward

**A new mitigation target at 2030 should be set for the BMA's climate actions.** Given the fact that the mitigation target has been one of key drivers for climate actions, it is necessary to update the target. Bearing in mind that now the Government has its mitigation target at 2030, it is also useful for the BMA to set the mitigation target at 2030.

**Updating actions mentioned in the NDC Action Plan and NAP is necessary.** Since the Government has already defined the role of the BMA in implementing these policies, the BMA should review and update its climate actions along with them to ensure an appropriate response.

**Mainstreaming climate actions within BMA's policy is crucial.** In particular, the BMA should start considering **establishing a stronger linkage with higher policy documents, such as the Bangkok Strategy for Development.** At the same time, the BMA should continue to integrate climate actions into regular planning and budget request cycle. And appropriate KPI should be established for climate actions in the sectors.

**The co-benefit approach to address climate change and other urban challenges is important.** For example, for replacing old diesel vehicles with low emission vehicles contributes to both reducing air pollution (such as PM<sub>2.5</sub>) and GHG mitigation. Also, accelerated shift from private vehicles to public transport can reduce

both traffic congestion and CO<sub>2</sub> emission from driving. In many cases, working on climate change may increase economic viability of actions by saving energy cost, as well as paving the way for additional financial support for climate change.

**Strengthening collaboration with the Government is key.** For example, in order to advance energy efficiency in buildings owned by the BMA and the private sector, energy data collection and energy efficiency benchmarking should be initiated in collaboration with DEDE. Also, in the transport sector, enhancing the public transport network (Figure 5) by connecting existing and new BTS and MRT, as well as providing supplementary feeder transport should be accelerated in cooperation with Authorities under the Ministry of Transport (OTP, MRTA, etc.).

**Strengthening collaboration with C40 will provide various opportunities to exchange updated information on climate change policy actions by member cities.** In this regard, the BMA should fulfill requirements as a member of the group, such as updating the GHG inventory.

**Strengthening the capacity of the CCS is important for sustainable efforts to address climate change issues in the BMA.** In this regard, the number of staff members should be increased, and an effective modality of work can be elaborated in collaboration with its partners.

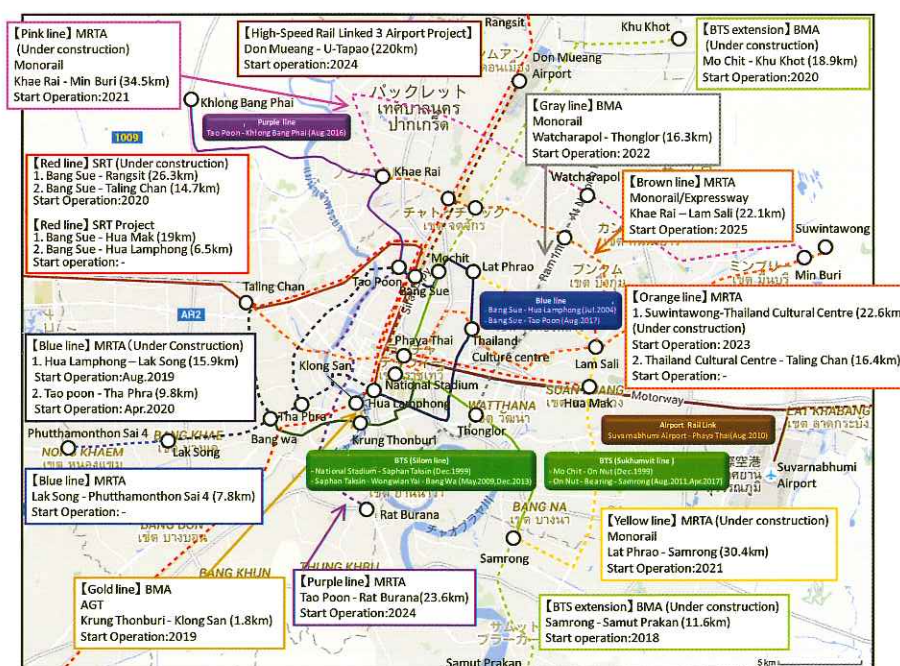


Figure 5: Image of the public transport network with enhanced connectivity

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