The APEC LCMT Project Wrap-up Symposium Report

About the APEC LCMT Project

The APEC Low-Carbon Model Town (LCMT) Project originated at the 9th APEC Energy Ministers Meeting in 2010 and was further propagated by the 12th APEC Energy Ministerial Meeting in 2015. It was a multi-year project that included the LCMT Phases 1-7 and the LCMT Dissemination Phases 1-3.

In the LCMT Phases 1-7 (2011-2017), the Concept and the Low-Carbon Town Indicator (LCT-I) system were established as crucial guidelines to advance Low-Carbon Town (LCT) development in APEC economies. Meanwhile, seven full-scale feasibility studies and policy reviews were implemented in Tianjin (China), Koh Samui (Thailand), Da Nang (Viet Nam), San Borja (Peru), Bitung (Indonesia), Mandaue (the Philippines) and Krasnoyarsk (Russia).

In the LCMT Dissemination Phases 1-3 (2018-2021), the project's spillovers continued to propagate regarding the APEC's rapid growth in energy consumption. Eight focused feasibility studies were conducted in Banda Aceh (Indonesia), Hang Tuah Jaya and Shah Alam (Malaysia), Davao (the Philippines), Da Lat and Phu Quoc (Viet Nam), Khon Kaen (Thailand) and La Molina (Peru).

Finally, four APEC LCMT symposiums were held in 2017, 2018, 2019 and 2021 (including this wrap-up symposium).

Outline of the Symposium

The APEC LCMT Project Wrap-up Symposium was hosted by Japan and virtually organised by the Asia Pacific Energy Research Centre (APERC) on 10 September 2021, with 92 participants from 14 APEC economies. The Symposium summed up the activities of the APEC LCMT project that were conducted over the last ten years, sharing the lessons learnt about LCT development with planners and policymakers and reinforcing the existing LCMT network in the APEC region. The agenda of the Symposium consisted of the following sessions:

1. **Opening**: Welcome remarks from the Ministry of Economy, Trade and Industry (METI) Japan and Chair of APEC Low-Carbon Model Town Taskforce (LCMT-TF), followed by the APERC presentation on the outline of the APEC LCMT project development.

2. **Reports of participating towns**: Speakers presented the current status of LCMT developments, advantages, and disadvantages for each town. Subsequently, Japan shared its experience in developing a low-carbon town and projects to reduce CO_2 emissions.

3. **Reviews from the experts and Q&A**: Three experts presented their comments and suggestions for the participating towns, followed by Q&A.

4. **Closing**: Closing remarks.

Key highlights of speakers from participating towns

Although participating towns have different low-carbon approaches, measures in reducing CO_2 emissions are mainly related to five major items in Tier 1 of LCT-I assessment areas (Demand, Supply, Demand & Supply, Environment & Resources, and Governance). The followings are notable features of each low-carbon town.

Yujiapu: The Yujiapu Central Business District (CBD) was designated as the first APEC LCMT at the 9th APEC Energy Ministerial Meeting held in 2010, and a full-scale feasibility study was conducted in 2011. Yujiapu introduced the Key Performance Indicators (KPIs) system, which was applied to set out the specific targets to reduce CO_2 emissions under four categories: space, resource, operation, and environment.

Koh Samui: A full-scale feasibility study for Koh Samui was conducted in 2012 in LCMT Phase 2. Notable achievements of low-carbon development in Koh Samui included: expansion to additional CO_2 reduction projects, creation of a new coordination framework among local stakeholders, expansion of renewable energy development projects, inspiration for other sectors regarding CO_2 reduction, and creation of a new voluntary group to address organic waste issues at the household level leading to the reduction of waste sent to municipal landfills.

Da Nang: A full-scale feasibility study for Da Nang was conducted in 2013 in LCMT Phase 3. Solar energy has been one of the top priorities of Da Nang authorities in low-carbon development. The technical potential map of rooftop solar power has been investigated and deployed since 2017. As a result, the installed capacity of rooftop solar power reached 75 MW in 2020, expected to reach approximately 294 MW and 402 MW by 2030 and by 2035, respectively.

San Borja: A full-scale feasibility study for San Borja was conducted in 2014 in LCMT Phase 4. Eco-efficient design and eco-efficient building programs were introduced to strengthen and promote eco-efficient constructions. As of 2021, 4 286 m^2 of new green areas were generated, contributing to a better quality of life.

Bitung: The full-scale feasibility study for the Special Economic Zone (SEZ) of Bitung was conducted in 2015 in LCMT Phase 5. Bitung SEZ is expected to become a sustainable, low carbon urban and industrial planning model, contributing to the domestic targets in reducing GHG emissions. As an industrial area, enhancing renewable energy utilisation is highly significant for Bitung to reduce CO_2 emissions.

Mandaue: A full-scale feasibility study for Mandaue was conducted in 2016 in LCMT Phase 6. The city's vision is to be green with sustainable economic development focused on high-quality manufactured consumer products for better living standards. Green corridors are being established at the Butuanon River, Mahiga River and other waterways in the city. Open and green spaces are also being implemented in other parts of Mandaue, such as streets, city parks, and wetlands.

Krasnoyarsk: A full-scale feasibility study for Krasnoyarsk was conducted in 2017 in LCMT Phase 7. Energy-efficient lighting has been used in the city streets, where energy consumption

is regulated depending on ambient light and traffic intensity. The automated traffic control system was launched, to which 487 traffic-light objects were connected.

Banda Aceh: A focused feasibility study for Banda Aceh was conducted in 2018 in LCMT Dissemination Phase 1. The city aimed to achieve 30% of green open space in the total land area (20% in public and 10% in private spaces). Currently, 14.3% of the public area are in green open spaces. In addition, E-Berindah, an application for monitoring and evaluating cleanliness based on community participants, is in operation.

Hang Tuah Jaya: A focused feasibility study for Hang Tuah Jaya was conducted in 2018 in LCMT Dissemination Phase 1. The city established its low-carbon development plan based on the LCT-I System, planning to achieve Low Carbon City by 2030 and Net-zero Carbon City by 2050. The city is implementing decarbonised community program and related policies to encourage the installation of solar panels through the Net Energy Metering program.

Shah Alam: A focused feasibility study for Shah Alam was conducted in 2018 in LCMT Dissemination Phase 1. A notable measure was the construction of a smart city that uses a source of data and information to monitor and control the activities in the city in real-time. Components of the smart city include the decision-making process, planning and cityscape, city management, total inventory, infrastructure and utility maintenance, revenue management, and development approval records.

Davao: A focused feasibility study for Davao was conducted in 2019 in LCMT Dissemination Phase 2. The city implemented the "Conversion of Used Cooking Oil to Bio-Diesel Fuel Program" project in cooperation with the Japanese government. The facility converts used cooking oil to biodiesel fuel used in public jeepneys, trucks, and other vehicles. With this project, the city aimed to reduce petroleum diesel as it significantly contributes to current GHG emissions.

Da Lat: A focused feasibility study for Da Lat was conducted in 2019 in LCMT Dissemination Phase 2. The city has applied rooftop solar power generation in residential and commercial buildings with integrated Building Energy Management Systems (BEMS) to monitor and control energy-related building plants and equipment that aim to reduce energy consumption.

La Molina: A focused feasibility study for La Molina was conducted in 2021 in LCMT Dissemination Phase 3. Several notable projects were developed under a low-carbon town development in La Molina. They included the Carpull project (promoting car-sharing), the Molibus project (promoting the municipal public transport service), the Tech irrigation project (promoting technical irrigation system to reduce the amount of water used in the irrigation of parks and avenues), and the Recycling plant project (promoting recycling and waste-separation).

Khon Kaen: A focused feasibility study for Khon Kaen was conducted in 2021 in LCMT Dissemination Phase 3. The city has promoted and enhanced biodiesel for vehicles, establishing a Light Rail Transit (LRT) system and promoting walking and cycling paths. In addition, private electric vehicles and electric vehicles for public transportation were considered in the development plan.

Phu Quoc: A focused feasibility study for Phu Quoc was conducted in 2021 in LCMT Dissemination Phase 3. Phu Quoc has focused on investments in renewable energy projects in the residential sector. The city encourages households to invest in rooftop solar power to reduce fossil energy consumption.

Keihanna: As a part of an eco-city Keihanna project, the Community Energy Management System (CEMS) was introduced in this Symposium. It included Home Energy Management System (HEMS), Building Energy Management System (BEMS), electric power demand response, and an electric vehicle management centre.

Review from the experts

Mr Michinaga Kohno from Michi Creative City Designers Inc. (Japan) suggested that all cities and towns shall have to become "Zero Carbon Towns" in the following decades. He also stressed that the continuous values of APEC LCMT projects are on the pathway to "Zero Carbon Towns", referring to opportunities for improvements in the Concept and LCT-I system in the APEC Region.

Dr Hung-Wen LIN from Industrial Technology Research Institute (Chinese Taipei) proposed the ideas for the LCT development based on the Internet of Things (IoT), which can connect LCT's components such as low carbon energy, low carbon transportation, bio-environment, low carbon consumption, low carbon tour, and green energy industry over the internet. The LCT indicator system is becoming an integral part of comprehensive approaches towards sustainable urbanisation, including technology, spatial, regulatory, financial, legal, social and economic perspectives.

Mr Alan Pears from RMIT University and Climate and Energy College University of Melbourne (Australia) suggested that participating cities/towns should consider net-zero emissions targets, climate resilience, sustainable development, energy efficiency, smart energy management, zero-carbon and space-efficient transport modes, low carbon tourism and business travel, circular economy, and resilient supply chains in various areas.

Overall, this Symposium summed up activities that were implemented in a ten-year APEC LCMT project. Participants have gained not only lessons learnt from a single event but also the results of the 10-year project, which has been widely applied and accepted in APEC economies. The Symposium had a special meaning for economies that had conducted the feasibility studies before, reminding them about the restless effort for city planning toward a greener and cleaner environment.