Asia-Pacific
Economic Cooperation

The APEC LCMT Project Wrap-up Symposium

ANNEX

Tokyo, Japan (Online), 10 September 2021

APEC Energy Group

October 2022

APEC Project: EWG 01 2019A

Produced by
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List of Presentations

The Outline of the APEC Low-Carbon Model Town Project Development

APEC LCMT Project Wrap-up Symposium
10 September 2021
Diego Rivera Rivota, Researcher, APERC

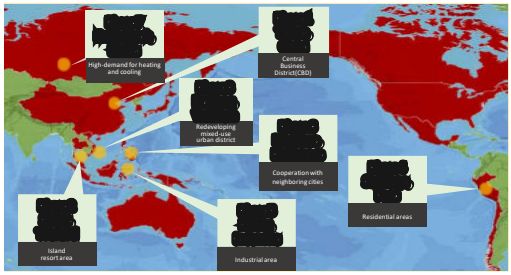
The Launch of the APEC LCMT Project

- The APEC LCMT(Low-Carbon Model Town) Project was launched in response to the declaration at the 9th APEC Energy Ministers Meeting, held in Fukui, Japan in 2010.
- Ministers discussed low-carbon pathways to energy security through cooperative energy solutions and noted that the introduction of low-carbon technologies in city planning to boost energy efficiency and reduce fossil energy use is vital to manage rapidly growing energy consumption in urban areas of the APEC region.
- The main objective of the Project is CO2 emissions reduction.

Key Activities (Phases 1-7)

1. Development of "The Concept of the Low-Carbon Town in the APEC Region(The Concept)" and the "APEC Low-Carbon Town Indicator(LCT-I) System"
   - The Concept provides a basic idea of a low-carbon town and an effective approach to its development.
   - The LCT-I System, developed based upon the Concept, is a self-assessment tool to assess and monitor the progress of each LCT development project.
2. Feasibility studies for seven case towns, each in a different APEC economy with different characteristics in urban development.
3. Policy reviews for seven case towns.

The LCMT case towns during Phases 1-7, subject to Feasibility studies and policy reviews



LCMT Symposium and Focused FS (Phase 7-Dis. Phase 3)

- The LCMT Symposiums started in Phase 7. Its primary purpose is to support LCT development in the APEC region through promoting the utilisation of the LCT-I System, sharing information on advanced LCT projects in the world, and exploring the possibility of developing bankable LCT projects in APEC economies.
- Volunteer Towns have been selected at each symposium. Then, each Volunteer Town has been subject to a feasibility study focused on specific areas.

LCMT Symposiums	Host Town	Year	Selected Volunteer Towns
First Symposium	Jakarta, Indonesia	2017	1- Banda Aceh (Indonesia) 2- Hang Tuah Jaya (Malaysia) 3- Shah Alam (Malaysia)
Second Symposium	Da Nang, Viet Nam	2018	1- Da Lat (Viet Nam) 2- Davao (the Philippines)
Third Symposium	San Borja, Peru	2019	1- La Molina (Peru) 2- Khon Kaen (Thailand) 3- Phu Quoc (Viet Nam)

Dissemination Phase 3(current and final phase)

- The LCMT Project Wrap-up Symposium today is expected to reinforce the network of LCMT since its launch, in addition to the primary purpose of the LCMT Symposium.
- Participants can bring back to their home economies not only lessons learnt from one single event but the results of the 10-year project, which has been widely applied and accepted in APEC economies.
- In the current Dissemination Phase 3, the feasibility studies that have been under implementation are in La Molina (Peru), Khon Kaen (Thailand) and Phu Quoc (Viet Nam).

The 15 participating towns of the LCMT project

1. Yujiapu CBD, Tianjin, China (2011)	9. Hang Tuah Jaya, Malaysia (2019)
2. Koh Samui, Thailand (2013)	10. Shah Alam, Malaysia (2019)
3. Da Nang, Viet Nam (2014)	11. Davao, The Philippines (2020)
4. San Borja, Peru (2016)	12. Da Lat, Viet Nam (2020)
5. Bitung, North Sulawesi, Indonesia (2016)	13. La Molina, Peru (2021)
6. Mandaue, Cebu, The Philippines (2017)	14. Khon Kaen, Thailand (2021)
7. Krasnoyarsk City, Russia (2018)	15. Phu Quoc, Viet Nam (2021)
8. Banda Aceh, Indonesia (2019)	

*The number in parentheses shows the year in which the project for each town was completed(or under implementation).

Thank you for your attention.

[redacted]

Li ZHU, President
APEC Sustainable Energy Center

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

Low-Carbon Model Development in Yujiapu Financial District

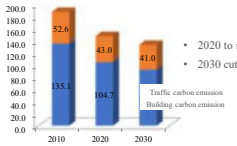
Tianjin Innovative Finance Investment Co., Ltd.(TIFI) is the operator of Yujiapu Financial District, undertaking the overall planning, development and construction, investment attraction and management of the whole District. In terms of industrial clustering, TIFI cooperates with government departments, enterprises, institutions, the public and other APEC economies in Yujiapu. In terms of operation and management, with the goal of "low-carbon Yujiapu, smart financial district", TIFI will create a low-carbon smart industry chain covering the whole process of technology research, investment and construction, as well as operation and management to drive the development of the regional economy and the regional low-carbon town.

天津新金融投资有限责任公司
Tianjin Innovative Finance Investment Co.,Ltd.

Contents

CO_2 reduction results and roadmap

Taking the average carbon emission level of Tianjin in 2010 as the benchmark for target setting and the actual built-up area normal operation carbon emission level as the comparison object respectively, the total carbon emission target of Yujiapu is 1.466 million tons in 2020 and 1.322 million tons in 2030, which will achieve the absolute total target emission reduction of about 30%.

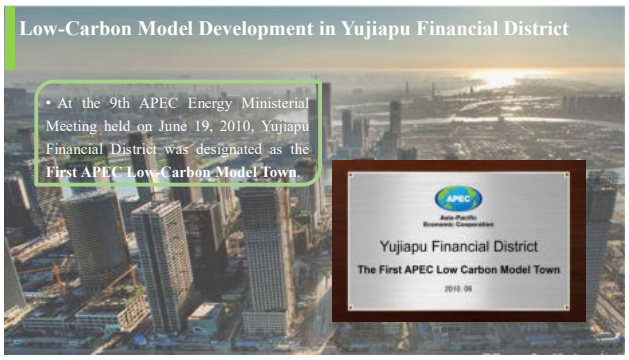


- 2020 to reduce carbon dioxide emissions by about 20% compared with 2010;
- 2030 cuts total carbon dioxide emissions by about 30% from 2010 levels.

Introduction of Yujiapu Financial District

- Yujiapu is located in Tianjin, China. Tianjin is the second largest city in the north of China, located at the north of the north China plain. Tianjin Binhai New Area, located at the eastern coast of Tianjin, is in the core area of the Bohai Economic Rim, with a total area of 2270 square kilometers.
- Yujiapu Financial District covers an area of 3.86 square kilometers and surrounded by water on East, West, and South side. The District is planning to build 120 buildings with a total construction area of 9.5 square kilometers which is a comprehensive international central business district with business and financial functions, including commercial, exhibition, leisure, cultural and entertainment functions.

Low-Carbon Model Development in Yujiapu Financial District



Technical Path of Low-Carbon City Construction

Low Carbon Energy

Northern cooling center

Southern cooling center

Coverage rate of intensive regional energy supply≥70%

It planned 7 Cooling Supply Centers in Yujiapu Financial District to provide high quality cooling service to 120 plots, with the total service area of 6900000㎡, in the percentage of 72.9% of the planned construction area.

Underground Space

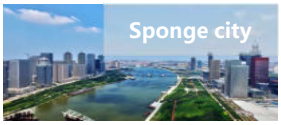
- The underground space within boundary line of building is nearly 4 million square meters
- Function: Transportation/commerce/culture/leisure/parking /disaster prevention

- Vehicle system
- Pedestrian system
- Commercial system
- Common ditch system
- Rail transportation system

KPI Low-carbon Town Index System

Low Carbon Landscape

River landscape, Open space, green belt of Central Avenue and the green roofs, Green ratio close to 40%



Green Building

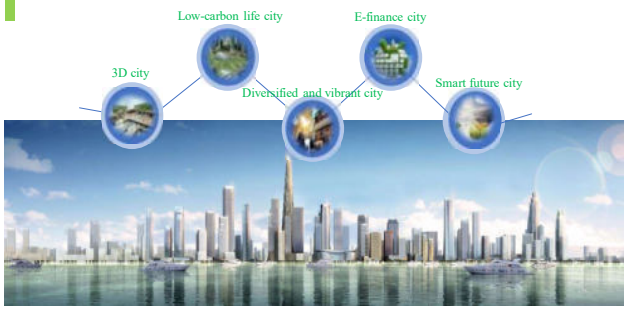
- 100% green building coverage in the area
- over **70%** high-star green building

Low Carbon Transportation

Seven kinds of public transportation, TOD complex function

- **High speed rail** - Long distance foreign public transport services, implement the docking of Yujiapu and Beijing in 45min; In September 2015, It has been built and put into use;
- **Metro** - long and middle distance, both inside and outside, At present, Z4 subway is under construction;
- **Customized bus** - Long and middle distance connection between the two city;
- **Regular bus line** - the internal and external transportation service in middle and short distance;
- **Inside shuttle bus** - Transfer orbit and external bus stops;
- **Bicycle rental** - Internal short low carbon travel; Riverside park of slow-traffic system is under construction;
- **Sightseeing boat** - Haihe river tour.

Low-Carbon Decomposition of City Orientation



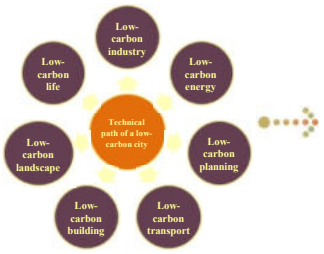
Low-Carbon Targets

CERT

C1 a new town realizing absolute carbon emission reduction (CER);
C2 a town with all CER indexes reaching international leading level.

Environmental targets	Spatial targets	Social and economic targets
E1 a high-density metropolis with a good natural environment; E2 a city at a leading level in intensive utilization of resources and energy; E3 a smart city owning intellisense technology and environment.	S1 a 3D city with a high-density attractive layout; S2 a city with high-performance green buildings and high-carbon-sink low-carbon landscape; S3 a highly accessible city realizing convenient traffic through mass transit and non-motorized traffic; S4 a mixed-function city with characteristic urban blocks and vibrant streets.	SE1 a regional financial center attractive to individuals and companies; SE2 an innovative city in low-carbon economy, leading carbon finance and carbon trading; SE3 a city guiding low-carbon life and low-carbon operation by low-carbon policy.

Technical Path of Low-Carbon City Construction



- Compact city
- TOD model
- Mixed use of urban functions
- Develop green buildings
- Reduce energy demand
- Select low-carbon energy
- Raise energy efficiency
- Reduce and recycle wastes
- Encourage mass transit and non-motorized traffic
- Raise carbon sink of natural landscape

Milestone Meetings

2013.7.22 Kick-off meeting of APEC Low-Carbon Town Promotion Actitivities

Energy Administration held kick-off meeting of APEC Low-Carbon Town Promotion at Dianyutai Hotel.

The President Assistant of Tianjin University, Liu Yaochang led a group of members from APEC Sustainable Energy Center Preparatory Working Group for participation, and further clarified the role of Tianjin University in promotion activities and responsibilities and implementation plan of APEC Sustainable Energy Center Preparatory Working Group.

2014.1.22 APEC LCT Index System Review Meeting, Beijing

Zhang Yuqing, Deputy Director of the Energy Administration hosted APEC LCMT Index System Review and Communication Meeting in China People's Palace.

More than a hundred delegates from the Foreign Ministry, the NEA, the NDRC, the MHURD, the CDB, local governments, research institutions, the project unit and business representatives participated.

Milestone Meetings

2014.3.21 Seminar on foundation of APEC Sustainable Energy Center

Tianjin University successfully held the Forum of APEC Sustainable Energy Development and Seminar on establishment of APEC Sustainable Energy Center, nearly hundreds of leaders and delegates from NMFA, NEA ,NMST, the Development and Reform Commission of Tianjin, Tianjin Science and Technology Committee attended.

During the meeting, Li Jiajun, the president of Tianjin University officially announced the establishment of Tianjin Energy Research Center and Sustainable Energy Research Center of Tianjin University.

Tianjin Energy Research Center and Sustainable Energy Research Center of Tianjin University gather a lot of wisdom and insight from experts and scholars in terms of technical consulting, academic contributions and international communication, providing a strong intellectual support to establish sustainable energy system in China. In addition, Tianjin University is leading the preparatory work of APEC Sustainable Energy Center based on these two centers, which serve as a solid foundation.

China LCT Promotion Activities

2012.11.14 Start Ceremony of Low-Carbon Town Tour in China, Tianjin

"New Energy-New City APEC Forum of Low-Carbon Town development and Start Ceremony of Low-Carbon Town Tour in China" is supported by APEC, National Energy Administration (NEA) and Tianjin Development and Reform Commission, and held by Tianjin University and Tianjin New Financial Investment Company.

2012.11.16
The Tianjin Yujiapu LCMT

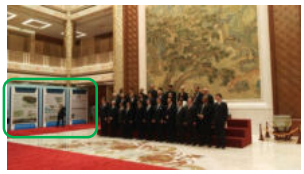
2012.12.21
Songhuajiang Farm, Heilongjiang

2014.3.7
Shenzhen City

2013.8.30
Dongxiang, Jiangxi Province

2012.12.14
Dalian City

Exhibition on Promotion Activities



Establishment of APEC Cooperative Network of Sustainable Cities

ADOPTED FIRST TIME

The 22nd APEC Economic Leaders' Meeting

2014 APEC Leaders' Declaration

APSEC is the official institute to implement CNSC

- The APEC Cooperative Network of Sustainable Cities was first adopted in the *2014 APEC Leaders' Declaration* in response to the *Beijing Agenda* for establishing APEC Urbanization Partnerships in the 2014 APEC Economic Leaders' Meeting.

51. We recognize that the Asia-Pacific is currently experiencing booming urbanization. We realize that sustained and healthy development of urbanization is conducive to promoting innovative growth and realizing robust, inclusive and sustainable development in the Asia-Pacific.

52. We commend the constructive work undertaken by APEC this year in promoting urbanization cooperation in the Asia-Pacific region, and endorse ***the APEC Cooperation Initiative for Jointly Establishing an Asia-Pacific Urbanization Partnership.***

53. Recognizing the range of urbanization challenges and opportunities across APEC economies, we commit to collectively promote cooperation projects, and to further explore pathways to a new-type of urbanization and sustainable city development, featuring green, energy efficient, low-carbon and people-orientation.

——2014 APEC Leaders' Declaration

Establishment of APEC Cooperative Network of Sustainable Cities Program Joint Operation Center

- After preliminary communication and efforts, APSEC held a preparatory meeting with China State Construction Co., Ltd. in Tianjin University in July 2017.
- Establishment Ceremony of APEC Cooperative Network of Sustainable Cities Program Joint Operation was held in September 2017.

CNSC Work Contents – Urbanization

26. Under the pillar of Urbanization, we seek to identify new drivers of economic growth by pursuing urbanization and sustainable city development. We support APEC partnership initiatives on urbanization and undertake to establish a cooperative network of sustainable cities in APEC economies. We will organize forums, hold policy dialogues, and utilize international sister-cities programs to promote cooperation and share experiences on urbanization and sustainable city development.

27. We will facilitate the use of existing resources for research and capacity building on urbanization. We encourage member economies to support urbanization cooperation and urbanization-related projects, including by making voluntary contributions to establish a sub-fund within the APEC framework.

28. We applaud progress made in the APEC Low Carbon Model Town Project and the promotion activities under it. We underscore the importance of eco-city and smart city cooperation programs, and undertake to explore pathways to green urbanization and sustainable city development.

——APEC Accord on Innovative Development, Economic Reform and Growth

Cooperative Network

APEC Cooperative Network of Sustainable Cities is an open, share and equitable network for 21 APEC economies by APSEC at the 51st Meeting of APEC Energy Working Group in 2015 in Canberra, Australia, which is consist of "APEC Cooperative Network for Low Carbon Energy Efficient Cities" and "APEC Sustainable City Service Network".

- APEC Cooperative Network for Low Carbon Energy Efficient Cities

- APEC Sustainable City Service Network

CNSC Work Contents – Urbanization

- The initiative is re-emphasized in the 2015 APEC Leaders' Declaration and APSEC is recognized as the official institute to implement CNSC

14. We encourage **APSEC** to continue its work in expanding sustainable city development across the region, cutting-edge clean energy technologies and other programs on energy resiliency.

We instruct EWG to **work with APSEC** with the assistance of the LCMT-TF to undertake APEC Cooperation Initiative for Jointly Establishing an Asia-Pacific Urbanization Partnership endorsed by APEC Leaders in 2014.

——12th EMM, Cebu Declaration, Philippines

137. We welcome efforts in implementing the APEC Cooperation Initiative for Jointly Establishing an Asia-Pacific Urbanization Partnership. We encourage relevant fora and sub-fora, including platforms like the Asia-Pacific Sustainable Energy Center (**APSEC**), to make contribution to the implementation process.

——27th JMS, Manila Philippines

APEC Forum on Sustainable Cities

Achievements of CNSC

Achievements of CNSC

☐Award-Energy Smart Communities Best Practice Award

List of China's Winning Cases in 2019 the 4th ESCI Best Practices Awards Program

Category	Name	Award
Smart Building	Design and Construction Integration(EPC)Project of PNG and China Friendship School	GOLD
	Building Energy Efficiency Program	SILVER
Smart Grids	Smart Integrated Energy Microgrid in Customer Service Center	SILVER

☐Project-APEC Self-funded Projects

NO.	Project Number	Project Name
1	EWG 07 2015S	Workshop on the Establishment of a Cooperative Network of Sustainable Cities (CNSC) in APEC Economies
2	EWG 06 2018S	Capacity Building on Biomass Energy Utilization based in Moutai Circular Economy Ecological Industrial Park in APEC Region
3	EWG 11 2018S	Research on Effective Strategies for Overcoming the APEC Sustainable Urbanization Gaps
4	EWG 12 2018S	Research on Forms of Low-Carbon Energy System and Best Practices for APEC Sustainable Cities
5	EWG 03 2019S	Energy Smart Communities Initiative (ESCI) Promotion Program in China and Training
6	EWG 09 2019S	Research on the Role of Urban Planning for Addressing Climate Change and Disasters
7	EWG 04 2020S	Innovative Approaches for Scaling-Up Renewable Energy Deployment in APEC Region
8	EWG 04 2021S	Research on Means to Overcome Shortage of Basic Urban Energy-Climate Data

Achievements of CNSC

☐Program-Indicator System of Zhangjiakou Sustainable Cities

Primary indicator：6
Secondary indicators：21

Sustainable Cities	Internationalization of the City	International City Branding
		Internationalized service capability
	Energy intensive and efficient utilization	Greenhouse gas emissions
		Energy supply
		Energy consumption
		The promotion of renewable energy
	Resources environment and urban construction	Water conservation
		Ecological support and environmental quality
		Sustainable Urban Space
		Transportation and Regional Connectivity
		Waste disposal
	Urban development and social livelihood	Urbanization development level
		Poverty alleviation and poverty relief
		Health and welfare
	Development quality and innovation drive	Basic economic indicators
		Industry Coordination and Economic Resilience
		Innovation Environment and Innovation Capability
	Urban governance and government efficiency	Legal System and public participation
		Public safety and disaster resistance and reduction
		Government service efficiency
		Smart service and governance

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Thank you for your attention !

Achievements of CNSC

Presentation 3

Low-Carbon Model Town in Koh Samui Municipality

Ms. Supinya Srithongkul
Deputy Mayor of Koh Samui Municipality
and
Mr. Kamol Tanpipat
Deputy Managing Director
Bright Management Consulting Co., Ltd.

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

LCMT SAMUI ISLAND
Low Carbon Model Town: Samui Island

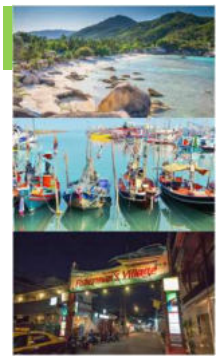
Introduction of Koh Samui

Koh Samui is in the Gulf of Thailand, east coast, and is the third largest Island in Thailand. This Island is one of the tourism destination in Thailand.

Name of City: Koh Samui
Status: City Municipality
Province: Surat Thani
Total Area: 227 km²
Population: 68,894 of registered (2018)
300,000 of non-registered

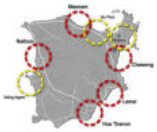
Reaching to Samui:

- By bus to mainland of Surat Thani and connecting to Samui via public ferry.
- By airplane (direct flight to Samui Airport).
- By personal cars and connecting to Samui via ferry.



Introduction of Koh Samui

Administrative:



5 Sub-districts (Tambon)
3 Potential Areas

Climate: Tropical weather
Average temperature is 29°C with

- The highest temp. at 37°C between Apr. and May
- The lowest temp. at 21°C between Dec. and Jan.

Economic: Rely on agriculture, tourism, commercial, and industry.

Environmental: Waste generated is around 140tons/day

- 29.36% is Plastic
- 27.35% is Organic Waste

Introduction of Koh Samui

Low-Carbon Model Development in Koh Samui

SAMUI Acton Plan, DEDE

Extending from LCMT Project, DEDE intended to putthe measures into action to identify short / medium / long term. The results has been successfully brought to stakeholder consultation to disseminate and seek agreement.

Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY

2012 — 2012 — 2021

APEC Asia-Pacific Economic Cooperation
LCMT SAMUI ISLAND Low Carbon Model Town: Samui Island

APEC Low Carbon Model Town Project (LCMT) Phase 2

Proposing some low carbon measures e.g., energy efficiency and renewable energy, low-carbon building, eco-lifestyle, and conceptualize and disseminated to involving stakeholders.

gef TGO UNDP

The Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand

The project funded by gef commits to collaborate with TGO and UNDP. The project is to evaluate the CCF and LEDS, also, develop the pilot low carbon implementation projects as guidance for the city.

Low-Carbon Model Development in Koh Samui

LCMT SAMUI ISLAND
Low Carbon Model Town: Samui Island

Recap for APEC Low Carbon Model Town Project (LCMT) Phase 2

Town: Koh Samui
Funded by: APEC
Year of Project: 2012
Objective ofProject:

Toplan, develop, and implement the concrete roadmap in order to lower the carbon emission from selected town while the natural resources are effectively utilized, and the economic growth still remains.

Project Developer:

DEDE
EEC Engineering Network
and Bright Management Consulting

Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY

Low-Carbon Model Development in Koh Samui

Recap for APEC Low Carbon Model Town Project (LCMT) Phase 2

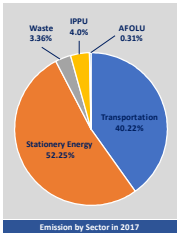
CO_2 Reduction Results and Roadmap

City Carbon Footprint (CCF)* between 2013 and 2017 by using *GPC Standard* and reporting the results with BASIC+ level

Year	Emission by Scope (Unit: tCO_2e)			
	Scope 1	Scope 2	Scope 3**	Total
2013	278,805.05	313,761.76	112,790.28	**705,357.79**
2014	268,737.28	328,670.08	112,790.28	**710,197.64**
2015	292,458.21	357,904.78	112,790.28	**763,153.27**
2016	323,347.37	367,569.00	112,790.28	**803,706.65**
2017	347,168.55	360,558.57	112,790.28	**820,517.40**

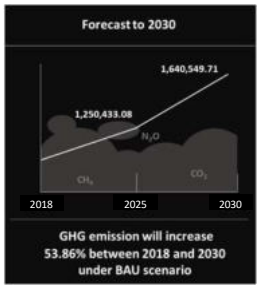
Remark * The CCF was evaluated under the project of *"Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand"*; funded by gef which commits to collaborate with TGO and UNDP. The project timeline is between 2016 and 2021.

** Scope 3 emission was evaluated from fuel used by air and marine transportation which is constant rate of fuel use between 2013 and 2017.



Emission by Sector in 2017

CO_2 Reduction Results and Roadmap



Base Year: 2017

Year of Consideration: between 2018 and 2030

Condition: BAU Scenario

Assumption Applied for Forecast:

Stationery Energy sector applied the assumption of energy growth rate at provincial level.

Transportation sector applied the assumption of energy growth rate at provincial level.

Waste sector applied the assumption of registered and non-registered population growth rate; then, multiply with waste emission per capita at base year.

IPPU sector applied the assumption of registered and non-registered population growth rate; then, multiply with IPPU emission per capita at base year.

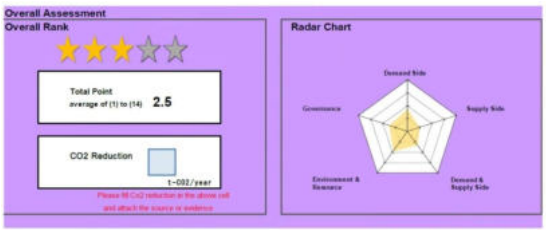
AFOLU sector applied the assumption of annual change in land use; then, multiply with AFOLU emission per area at base year.

Low-Carbon Model Development in Koh Samui

	Low Emission Measures	Sector where the measures applied	Current Status	Duration of Measures (Year)	Expect of CO_2 Reduction (tCO_2e)	Annual CO2 Reduction
Short-Term Measures: 9 Measures (to be implemented within 2022)						
1	Replace with LED bulbs to increase lighting efficiency	Energy Efficiency	Integrated with city's development plan	17	184,832.55	10,872.50
2	Install LED bulbs for public roads	Energy Efficiency		12	14,727.87	1,227.32
3	Promote public EV mini-buses (whole-island route) 5buses	Transportation	Tentative	10	2,537.67	253.77
4	Promote public EV mini-buses (Airport - Chaweng route) 5 buses	Transportation	Tentative	10	991.06	99.11
5	Install organic waste compost bins in households	Waste Management	Integrated with city's development plan	5	14,614.50	2,922.90
6	Establish waste management stations to produce compost	Waste Management		20	11,443.99	572.20
7	Forest restoration / rehabilitation	Agriculture and Forestry		20	11,514.00	575.70
8	Mangrove forest plantation	Agriculture and Forestry		20	96,470.00	4,823.50
9	Increase city green areas	Agriculture and Forestry		20	33,323.40	1,666.17
Medium-Term Measures: 6 Measures (to be implemented between 2023 and 2025)						
10	Replace split type AC with inverter type (100%)	Energy Efficiency	Tentative	10	149,417.20	14,941.72
11	Promote solar power generation system	Energy Efficiency	Tentative	20	200,496.06	10,024.80
12	Promote solar hot water generation system	Energy Efficiency	Tentative	20	425,210.75	21,260.54
13	Install solar floating power generation system	Energy Efficiency	Tentative	20	446,859.72	22,342.99
14	Promote the use of EV motorcycles (10%)	Transportation	Tentative	10	25,904.41	2,590.44
15	Increase efficiency of waste treatment and conversion of RDF	Waste Management	Tentative	20	509,813.33	25,490.67
Long-Term Measures: 1 Measures (unable to be implemented immediately but need time to be completed within 2030)						
16	Increase energy efficiency by using a chiller system	Energy Efficiency	Tentative	20	86,678.62	4,333.91
				Total Expect CO_2 Reduction (tCO_2e)	**2,214,835.15**	**123,998.3**

Notable Achievements

Self-assessment results by LCT-I system



Future Plan

The Future Plan of Samui Development Strategy

Strategy 1: Economic Recovery, Creating Career, Market, Income
Strategy 2: Developing of City, and Tourism
Strategy 3: Sanitary and Well-being
Strategy 4: Social and Welfare
Strategy 5: Environmental and Sustainability
Strategy 6: Empowering Youth and Local People
Strategy 7: Samui Smart City

1. **Promote and Coordinate with Community for Sustainability Environmental Preservation and Rehabilitation**
2. **Coordinate with Community for Mangrove Preservation and Rehabilitation**
3. **Promote and Encourage the Marine Center, and Fish Breeding to enhance Sustainability Coastal Marine Ecosystem**
4. **Build on the Waste Management Program with Private and Community Sector**
5. **Build on the Wastewater Management and Provide Knowledge for Private and Community Sector**
6. **Promote the Coordination Framework for "Samui Green Economy" Program**
7. **Low Carbon City Development**

Low-Carbon Model Town in Images

Energy Efficiency Implementation


Install LED bulbs for public roads
(Source: https://


Install EV charging station
(Source: www.kohsamuicity.go.th)


Biomass from agricultural waste
(Source: LCC Project gef, TGO, and UNDP)

Agriculture and Forestry Implementation

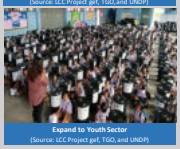

Forest restoration / rehabilitation
(Source: www.kohsamuicity.go.th)


Preservation of Mangrove
(Source: www.kohsamuicity.go.th)

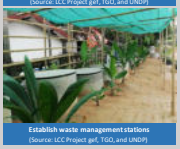
Low-Carbon Model Town in Images

Waste Management Implementation


Creation of Voluntary Group
(Source: LCC Project gef, TGO, and UNDP)


Expand to Youth Sector
(Source: LCC Project gef, TGO, and UNDP)


Install organic waste compost bins in households
(Source: LCC Project gef, TGO, and UNDP)


Establish waste management stations
(Source: LCC Project gef, TGO, and UNDP)


Coconut waste management
(Source: LCC Project gef, TGO, and UNDP)


Waste management by warping and sending to mainland for appropriate management

Ms. Supinya Srithongkul
Deputy Mayor of Koh Samui Municipality

and

Mr. Kamol Tanpipat
Deputy Managing Director
Bright Management Consulting Co., Ltd.
Email: kamolt@bright-ce.com

Thank you for your attention !

Presentation 4

Mr Minh Huy TRAN,
Officer of Energy Management Division
Danang Department of Industry and Trade

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

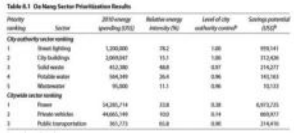
Introduction of Da Nang city

- Area: 1,283 km2
- Population: 1.2 million
- The fourth largest seaport of VN
- Da Nang is in a tropical monsoon zone with high temperatures and a stable climate
- Da Nang's economy has historically been dominated by the industry and construction sectors, but this is slowly changing.
- Currently, the services sector became the largest economic sector in the city as measured by gross output. The tourism sector is also expected to grow, as the city strives to become a major domestic tourist sector that capitalizes on the city's beaches and proximity

2

Low-Carbon Model Development in Danang city

- Efficient energy: Public lighting



2016 - Feasibility study report on the application of LED lights in publiclighting

2018 - Pilot project to replace Sodium public lighting with LED lights at 19 main streets with nearly 3,000 light points (5% of total lights). The investment in the form of ESCO, the investor implements the project, the city returns the investment capital within 5 years

Currently, the People's Committee implement the LED replacement project in phaze 2 with a replacement schedule of about 10% per year to 2030

3

Low-Carbon Model Development in Danang city

- Renewable energy: Rooftop solar power

2017 - Technical potential map of rooftop solar power

QĐ 02/2019/QĐ-TTg: Rooftop solar power projects are implemented with the electricity purchase and sale mechanism according to the separate delivery and receiving directions of the two-way meter, FIT 9.35 Uscents/kWh. Total installed capacity 3.5 MWp

capacity of rooftop solar power 169.54 MW (about 17.76% of technical potential) to by 2025,, reaching 293.92 MW (about 30.78% of the technical potential) by 2030 and 402.24 MW (about 42.13% of the technical potential) by 2035

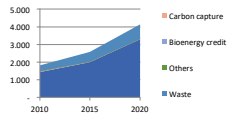
QĐ 11/2017/QĐ-TTg: Rooftop Solar projects are implemented net-metering using a two-way metering system.

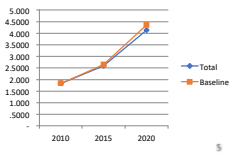
QĐ 13/2020/QĐ-TTg: Adjust the FIT price of rooftop solar power to 8.38 Uscents/kWh. Total installed capacity 75 MWp

4

CO2 reduction results and roadmap

	Mt CO2e	2010	2015	2020
1	Fuel Combustion	1,44	2,00	3,29
2	Industrial Processes	-	-	-
4	Agriculture	0,12	0,11	0,11
5	LULUCF	(0,07)	(0,08)	(0,09)
6	Waste	0,34	0,57	0,83
7	Others	-	-	-
X2	Bioenergy credit	-	-	-
X3	Carbon capture	-	-	-
	Total	**1,83**	**2,59**	**4,13**
	Baseline	**1,83**	**2,64**	**4,35**
	Percentage reduction	-	2%	5%





5

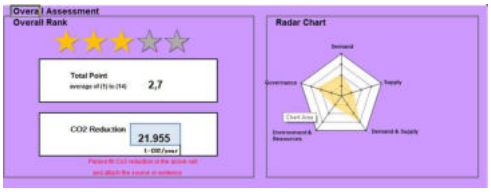
Co-benefits

- The air pollution index (API) in urban areas was maintained at less than 100;
- Noise levels in residential areas under 60 db(A), on main roads under 75 db(A);
- Average urban green area at 6 – 8 m2/ person;
- Percentage of households with access to clean water in city center and rural area were 97.83% and 76.81% respectively;
- 100% of industrial wastewater met discharge requirements;
- The proportion of domestic solid waste collected in urban areas was higher than 95%, in rural areas higher than 70%;
- In 2020, over 83% of domestic wastewater was collected, over 50% was properly treated in accordance with standards.

6

Self-assessment results by ICLEI system

- Please explain in more detail about the current status and challenges to low-carbon town development.



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Policy plan

- According to the construction project of Da Nang - Environmental city approved in Decision No. 1099/QD-UBND dated April 2, 2021, the GHG emission reduction target is as follows: The rate of GHG emission reduction from solutions to develop new and renewable energy: by 2025, reduce by 1-2%, by 2030 by 5-7%; By 2025, 100% of public transport by bus will meet Euro 4 emission standards; by 2030, 25% of public buses will run on electric motors out of the total number of buses in operation in the city; The rate of daily-life solid waste collected and treated up to meet standards will reach > 95% by 2025, and by 2030.
- Implement the program on economical and efficient use of energy in the 2021-2030 period, in which the minimum energy saving level is 5% compared to the forecasted energy consumption. the whole city in the period of 2020-2025 and achieve a savings of at least 7% in the period of 2020-2030.
- The project of developing rooftop solar power to 2025 with a vision to 2035 sets the following goals: Total installed capacity of rooftop solar power 169.54 MW (about 17.76% of technical potential) to by 2025, , reaching 293.92 MW (about 30.78% of the technical potential) by 2030 and 402.24 MW (about 42.13% of the technical potential) by 2035.
- The Scheme on Proposing locations for construction of electric car charging stations, mechanisms to encourage the development of electric cars, electric car charging stations, sets out the following objectives; By 2025: To build 150 level 1 and 2 charging stations. and 15 level 3 charging stations; By 2030: Build 250 level 1, 2 and 50 level 3 charging stations.

8

Low-Carbon Model Towns in Images

9

- Mr Minh Huy TRAN
- Email: huytm@danang.gov.vn
- Officer of Energy Management Division - Department of Industry and Trade
- Da Nang city, Vietnam

Thank you for your attention !

APEC designates San Borja as a "Low-Carbon Model Town"

On November 18, 2013, in the city of DA NANG - VIET NAM, San Borja was officially designated as a "Low-Carbon Model Town" by the APEC Forum, becoming the first Latin American city and the fourth in the world to implement the low carbon city project.

In 2014, the Sustainability and Climate Resilience Consultant at Hitachi Consulting of the Asia Pacific Economic Cooperation - APEC, prepared the "Final Report: Low Carbon Model Town (LCMT) Project Phase 4 Feasibility Study", which was officially presented and delivered to the district in December of the same year.

The Municipality of San Borja, in compliance with the recommendations of the aforementioned report, assumes the goal of reducing carbon emissions by 85% by 2035.

For which the work plan for a sustainable city approved by MAYOR'S DECREE N° 010 - 2017 - MSB - A, December 27, 2017 is prepared.

APEC
Designación de APEC San Borja: Ciudad Modelo de Baja Emisión de Carbono 2014

San Borja ACTITUD

Green SAN BORJA

Target for the year 2035: **Implement 12 urban bio-gardens (one in each sector) in the district, benefiting 2,000 families.**

ACTIVITY

Project for Implementation of Bio-gardens

590 participating families
29.5%

ADVANCE TO 2021

5

- **Bio-garden** BOULEVARD II
- **Bio-garden** LIMATAMBO
- **Bio-garden** KALLPAWASI
- **Bio-garden** MALVINAS
- **Bio-garden** BOULEVARD I

IMPLEMENTATION OF URBAN BIO-GARDENS


Bio-garden Boulevard I


Bio-garden Boulevard II


Bio-garden Limatambo


Bio-garden Kallpa Wasi


Bio-garden Malvinas

SUSTAINABLE MOBILITY

Target for the year 2035: "Muévete en Bici" (Move by bike) connected with Surco, Surquillo and San Isidro

ACTIVITY

Interdistrict connection

Target to 2035
100%

ADVANCE TO 2021

3

- SURCO
- SURQUILLO
- SAN ISIDRO

SUSTAINABLE MOBILITY

Target for the year 2035: 50 KM OF BIKE LANES WITHIN SAN BORJA

ACTIVITY

50 KM of bike lanes

Target to 2035
100%

ADVANCE TO 2021

53 KM

SUSTAINABLE MOBILITY

Target for the year 2035: 4 025 MT CO2 AVOIDED

ACTIVITY

INCREASE OF USERS AND BICYCLE LANES

Target to 2035
25.8%

ADVANCE TO 2021

1039 TM CO2 eq

Source: Municipal Thematic Observatory - OMT

ENERGY PLANNING

Target for the year 2035: DISSEMINATING AND PROMOTING THE USE OF ALTERNATIVE ENERGIES - 66500 PEOPLE SENSITIZED

ACTIVITY

SENSITIZATION

Target to 2035
30%

ADVANCE TO 2021

20 000
SENSITIZED

DISSEMINATING AND PROMOTING THE EFFICIENT USE OF ALTERNATIVE ENERGIES

KALLPA WAS — Casa de las energías

San Borja ACTITUD

ENERGY PLANNING

DISSEMINATING AND PROMOTING THE EFFICIENT USE OF ALTERNATIVE ENERGIES

San Borja ACTITUD

ENERGY PLANNING

Target for the year 2035: More than 1 MT CO2 avoided per year and a production of 456 MT organic fertilizer.

ACTIVITY

Organic fertilizer production per year

Target to 2035
58.8%

ADVANCE TO 2021

268 tons of compost produced per year

Total of 11 tons CO2

San Borja ACTITUD

SAN BORJA RECYCLES

Target for the year 2035: 150 UNDERGROUND CONTAINERS

ACTIVITY

INVESTMENT PROJECT FOR THE IMPLEMENTATION OF CONTAINERS

Target to 2035
73.3%

ADVANCE TO 2021

110 underground containers

San Borja ACTITUD

SAN BORJA RECYCLES

Implementation of fixed and mobile points

Mobile points tour the district's parks

Fixed points placed in strategic locations where most of the housing complexes are located..

San Borja ACTITUD

SAN BORJA RECYCLES

Target for the year 2035: That 80% of the collection of the San Borja Recycles program is recyclable material.

ACTIVITY

SELECTIVE COLLECTION OF SOLID WASTE

Target to 2035
117 %

ADVANCE TO 2021

NON-RECYCLABLE MATERIAL	54.58 TM
RECYCLABLE MATERIAL	606.86 TM
TOTAL MATERIAL COLLECTED	661.44 TM

94.22 % recyclable material

San Borja ACTITUD

SAN BORJA RECYCLES




URBAN PLANNING - Green Streets

Target for the year 2035: Small gardens project and promotion of the Green Roof Program

ACTIVITY

Small gardens project and promotion of the Green Roof Program

Target to 2035
100%

ADVANCE TO 2021

1

Green roof Municipal Palace


URBAN PLANNING - San Borja River Park

Target for the year 2035: Canalization Project of the Surco River

ACTIVITY

Canalization Project of the Surco River

Target to 2035.
50 %

ADVANCE TO 2021

1

Canalization, San Borja Norte Av. with Artes Norte Av.

Eco-Efficient Design
Eco-efficient Buildings

Target for the year 2035 : Promoting standards for sustainable construction

ACTIVITY

THE AIM IS TO STRENGTHEN AND PROMOTE ECO-EFFICIENT CONSTRUCTION.

Target to 2035.
50%

ADVANCE TO 2021

50%

- 3 MUNICIPAL ORDINANCES
- 2 MAYORAL RESOLUTIONS

ORDINANCE N° 496-MSB

"Creates the Green Building Promotion Program."

Height bonus

Buildings that comply with this new green building system will obtain a building height bonus as an incentive.

Exceptionally they will be able to obtain a height of 12 stories, in the same way those located in special regulation zone 3 will obtain a maximum height of 8 stories.

This benefit does not exonerate the buildings from complying with the other urban parameters..

Green building projects must meet minimum requirements:

- Free area of 20%.
- Side and rear setbacks must have
- 50 % destined to green areas
- Green roof
- Subway containers
- Sustainable building certification

GREEN ROOFS
A new way of building has begun

NEW GREEN AREAS for the city from the private sector.

4,285.84 m2 of new green areas have been generated, which will contribute to the better development and quality of life of the population, not only of San Borja but of the city of Lima in general.

SAN BORJA URBAN GREEN

Target for the year 2035 : **100,000 TREES IN THE DISTRICT, REFLECTING A TREE COVER OF 25%.**

ACTIVITY

Development of the 2nd Georeferenced Forestry Inventory

Tree cover

21.6%

ADVANCE TO 2021

Existing trees
86228

Tree planting in San Borja

SAN BORJA URBAN GREEN

Target for the year 2035 : **MORE THAN 100,000 MT CO2 AVOIDED PER YEAR**

ACTIVITY

Work plan for planting and maintenance of trees

MT CO2 AVOIDED

38.5 %

ADVANCE TO 2021

38600

MT CO2 CAPTURED BY URBAN TREES

MUNICIPALIDAD DE SAN BORJA

Presentation 6

Low-Carbon Model Town in North Sulawesi

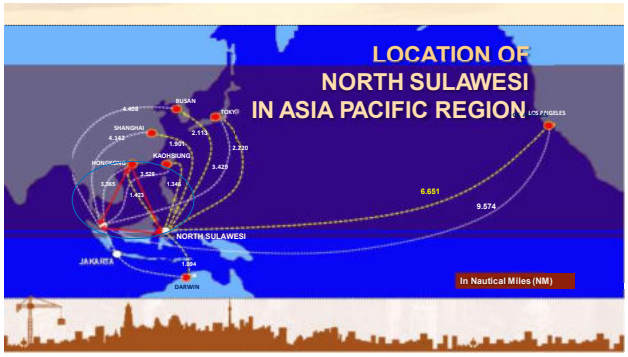
Government of North Sulawesi
Regional Planning and Development Board

APERC

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

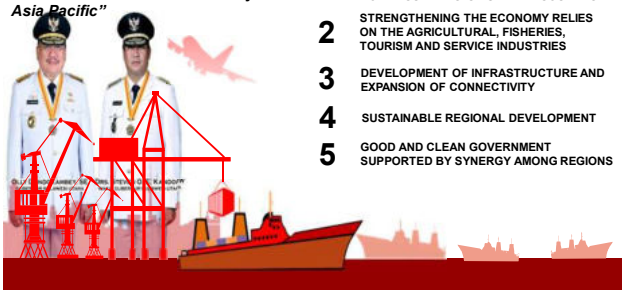
JENNY KAROUW
Head of North Sulawesi Regional Planning and Development Board



Mid-Term Development Planning of North Sulawesi, 2021 - 2026

VISION:

"Advanced and Prosperous North Sulawesi as Indonesia's Gateway to Asia Pacific"



MISION:

1. IMPROVEMENT IN THE QUALITY OF NORTH SULAWESI'S HUMAN RESOURCES
2. STRENGTHENING THE ECONOMY RELIES ON THE AGRICULTURAL, FISHERIES, TOURISM AND SERVICE INDUSTRIES
3. DEVELOPMENT OF INFRASTRUCTURE AND EXPANSION OF CONNECTIVITY
4. SUSTAINABLE REGIONAL DEVELOPMENT
5. GOOD AND CLEAN GOVERNMENT SUPPORTED BY SYNERGY AMONG REGIONS

MISION #4

SUSTAINABLE REGIONAL DEVELOPMENT

ACHIEVEMENT STRATEGIES

- Improving the quality of residential environments;
- Encouraging the achievement of the target of access to proper drinking water and sanitation;
- Increasing the use of renewable energy;
- Enhancing the effort of disaster mitigation and climate change adaptation;
- Improving the management and conservation of natural resources, biodiversity and its ecosystems.

PRIORITY PROGRAMS

REGIONAL PLANNING DEVELOPMENT BOARD	ENVIRONMENTAL AGENCY	TRANSPORTATION AGENCY	FORESTRY AGENCY	ENERGY AND MINERALS AGENCY	INDUSTRIAL AND TRADE AGENCY
INFRASTRUCTURE AND SPATIAL DEVELOPMENT PLANNING BIODIVERSITY EVALUATION AND REPORT -REVIEW ON GREENHOUSE-GAS EMISSIONS ACTION PLAN	- MONITORING AND EVALUATION THE ENVIRONMETAL POLLUTION AND DEGRADATION -ENVIROMENT CONSERVATION AND PROTECTION	-PARKING MANAGEMENT AND CONTROL -EMISSION TEST FOR VEHICLES AND HEAVY EQUIPMENTS -ECO-SMART DRIVING COURSES	- MAINTENANCE THE UTILIZATION OF FORESTRY RESOURCES FOREST MANAGEMENT PROGRAM -FOREST PROTECTION AND CONSERVATION	-ENERGY PLANNING, MANAGEMENT AND DEVELOPMENT -ENERGY CONSERVATION AND PROTECTION	THE DEVELOPMENT OF SPECIAL ECONOMIC ZONE BITUNG

Low-Carbon Model Development in North Sulawesi

- ***The existence of Photovoltaic Power Plant (21 MW), Geothermal Power Plant (120 MW), and Hydroelectric Power Plant dispersed throughout the region (61,98 MW)***
- ***Some North Sulawesi Gov't Buildings use Photovoltaic Panel as energy resources***

North Sulawesi Target in Renewable Energy

- National 22.500 MW in 2025
- North Sulawesi 832 MW in 2025, Consist of:

1. PLTU SULUT I (BINJEITA) 2 X 25 MW
2. PLTG MINAHASA PEAKER (LIKUPANG) 150 MW
3. PLTG SULBAGUT PEAKER (LIKUPANG) 150 MW
4. PLTA SAWANGAN 12 MW
5. PLTU SULUT III (KEMA) 2 X 50 MW
6. PLTU SULBAGUT II (UNALLOCATED) 2 X 100 MW
7. PLTMG MPP AMURANG 120 MW
8. PLTP LAHENDONG V & VI 2 X 20 MW
9. PLTA POIGAR II 30 MW
10. PLTP KOTAMOBAGU 80 MW

Electrical Condition of North Sulawesi

Existing Geothermal Power Plant

No	Name of Power Plant	Capacity (MW)	Year	Managed by	Location
1	Lahendong 1	20	2002	PLN	North Sulawesi
2	Lahendong 2	20	2007	PLN	North Sulawesi
3	Lahendong 3	20	2009	PLN	North Sulawesi
4	Lahendong 4	20	2011	PLN	North Sulawesi
5	Lahendong 5	20	2017	IPP	North Sulawesi
6	Lahendong 6	20	2017	IPP	North Sulawesi
TOTAL		120			

Electrical Condition of North Sulawesi

Existing Hydroelectric Power Plant

Power Plant PLN	Capacity (MW)	Power Max (MW)	Power Plant IPP	Capacity (MW)	Power Max (MW)
PLTA Tonsealama	14.38	11.00	PLTM Mobuya	3.00	3.00
PLTA Tanggari I	18.00	17.60			
PLTA Tanggari II	19.00	19.00			
PLTM Poigar	2.40	2.40			
PLTM Lobong	1.60	1.40			
PLTM Kolondom	1.60	0.80			
PLTM Tomini	2.00	1.90			
TOTAL PLN	58,98	54,10	TOTAL IPP	3.00	3.00
TOTAL PLN + IPP	61,98	57,10			

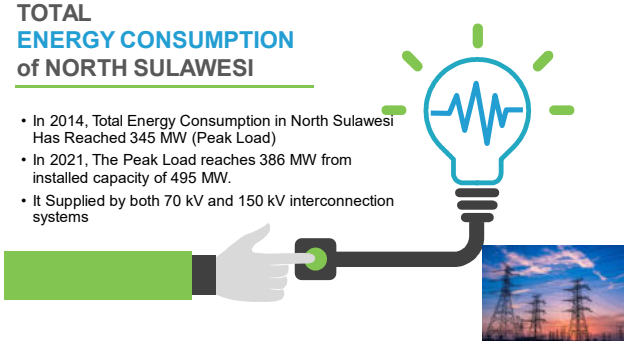
Electrical Condition of North Sulawesi

Existing Solar Power Plant

NO	LOCATION	PEAK LOAD CAPACITY (kW)	INFORMATION	MANAGED BY
1	Bunaken	335	Operated	PLN
2	Miangas	85	Operated	PLN
3	Marampit	125	Operated	PLN
4	Marore	120	Operated	PLN
5	Makalehi	260	Operated	PLN
6	Rooftop Tahuna	50	Operated	PLN
7	Likupang	15,000	Operated	IPP
TOTAL		15,975		

TOTAL ENERGY CONSUMPTION of NORTH SULAWESI

- In 2014, Total Energy Consumption in North Sulawesi Has Reached 345 MW (Peak Load)
- In 2021, The Peak Load reaches 386 MW from installed capacity of 495 MW.
- It Supplied by both 70 kV and 150 kV interconnection systems



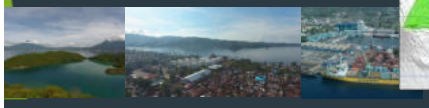
Recapitulations of Emission Reduction and Mitigate Action in North Sulawesi

No.	Year	CO2 Reduction
1.	2020	0.35 M CO_2 eq
2.	2019	0.34 M CO_2 eq
3	2018	0.29 M CO_2 eq
4.	2017	0.24 M CO_2 eq
5.	2016	0.18 M CO_2 eq
6.	2015	0.03 M CO_2 eq
7.	2014	0.01 M CO_2 eq

Source: https://pprk.bappenas.go.id

PREVIEW OF BITUNG CITY

- *The Bitung City has an area of 33.008,60 Ha. Geographically, Bitung City located at 125°01'43" – 125°18'18" E and 1°23'23" – 1°35'39" S.*
- *Bitung is bounded by the North: Likupang District (North Minahasa Regency) and Sulawesi Sea; East by Molucca Sea and Pacific Ocean; South by North Minahasa and West by North Minahasa as well.*
- *Total Population of 225.134 inhabitants, with115.531 Male and 109.603 Female.*
- *Bitung SEZ was estabilished on May 21 st , 2014 by Government Ordinance (Peraturan Pemerintah) No. 32/14.*
- *Being Inaugurated on April 1 st ,2019 by Indonesian President Mr.Joko Widodo o*
- *Total area of Bitung SEZ of 534 Ha, with 92,79 Ha in phase I Development.*



Bitung Special Economic Zone (SEZ)

Assigned : Government Regulation No 32/2014
Inaugurated: April 1st, 2019

Location:
45 Km from Manado
40 Km from Sam Ratulangi Airport
7 Km from Bitung Container Terminal

Proposer: Gov't of North Sulawesi

Core Business:
1. Fishery Industry
2. Coconut processing and its derivatives
3. Logistic
4. Pharmaceutical industry

Area:
- Total Area: 534 Ha
- Phase I Development: 92,79 Ha
- Occupied Area: 92,79 Ha
- Status (Building Rights/Other Use Rights): 92,79 Ha

Investment Plan (Until 2025) :
- Area Development: Rp 2,3 Trillion
- Investment value: Rp 32,89 Trillion

Investment Plan (Phase I until 2019) :
- Area Development : Rp 79,62 Billion
- Investment value : Rp 3,796 Trillion

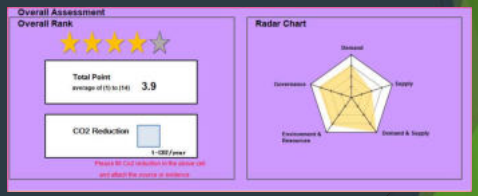
Labor Needs:
- Projected 2025 = 34.710 people
- Realisation until 2018 = 70 people

Economic Impact Projected:
Increasing output Rp 8-11 Trillion toward economy (2025)

Low-Carbon Measures in SEZ Bitung

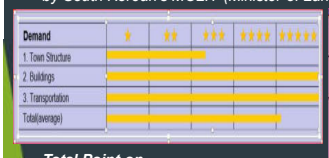
Self-assessment results by LCT-I system

By using LCT-I system, there are Overall Low-Carbon Measures in Bitung SEZ:



Low-Carbon Measures in SEZ Bitung - Demand

The North Sulawesi's Regional Planning and Development Board (BAPPEDA) identifies the low-carbon measures in SEZ Bitung. The ongoing development processs of SEZ Bitung, BAPPEDA evaluates the low-carbon measurement based on several planning documents, such as Masterplan of SEZ Bitung made by South Korean's MOLIT (Minister of Land, Infrastructure and Transport).

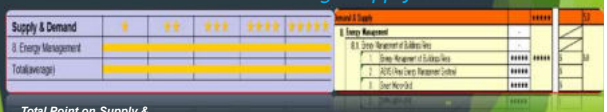


Total Point on Demand: 4.1

Low-Carbon Measures in SEZ Bitung - Supply

Total Point on Supply: 3.0

Low-Carbon Measures in SEZ Bitung - Supply & Demand



Total Point on Supply & Demand: 5.0

Low-Carbon Measures in SEZ Bitung - Environment & Resources

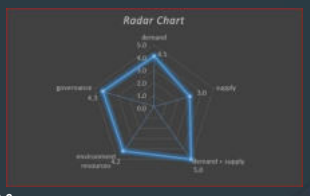
Total Point on Enviroment & Resources: 4.2

Low-Carbon Measures in SEZ Bitung - Governance

Total Point on Governance: 4.3

Self-evaluation Results

This Chart indicates the low-carbon town development of SEZ Bitung, Indonesia. It is clearly stated that improving the environment and resources side in relation to support the low carbon town development in SEZ Bitung needs the cooperation among related stakeholders.



Total Average Point: 3.9

Self-evaluation Results

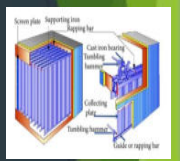
DEMAND SIDE

- *SEZ Bitung offers a number of the various types of housing, shaping the north-south linkage on site.*
- *Residential zone are equipped with lots of supporting facilities in walking distance.*
- *The TOD's is also included in our mid-term planning as part of Super-Hub*

Self-evaluation Results

SUPPLY SIDE

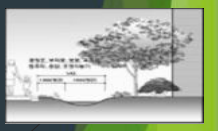
- *Power demand is identified for industrial, logistics and other support facilities separately.*
- *70% for industrial and logistic facilities*
- *30% for other facilities*
- *There is a plan for using renewable energy, mainly used geothermal and Gas energy*
- *Total power demand is 56 – 75 MWA*



Self-evaluation Results

DEMAND AND SUPPLY SIDE

- *SEZ Bitung implements a proportional building layout arrangement, smart micro-grid and providing supporting facilities in walkable distance.*
- *Promote the energy saving, cost reduction and minimization of damage to ecosystem through the layout, preserving the natural terrain to the maximum extent*



Self-evaluation Results

ENVIRONMENT AND RESOURCES

SEZ Bitung proposes the eco-friendly plan which consist of:

- *Construct a natural ecology complex in which the natural environment can co-exist by associating natural resources with the ecological circulation*
- *Secure sufficient green areas in the district to minimize the adverse environmental impact, including minimizing pollution causing facilities and excluding environmental pollution sources*

Self-evaluation Results

GOVERNANCE

- *The Government of North Sulawesi has established some rules related to low-carbon initiative such as:*
- *Mid-Term Development Planning 2021-2026 (TBA)*
- *Spatial Planning 2014-2034 (North Sulawesi Rule No. 1/2014)*
- *Reducing GHG Action Plan (Governor Rule No. 56/2012)*
- *LCMT team work at SamRat Univ. Rule No. 39/UN12.10/LL/2017*

Future of SEZ Bitung

The Special Economic Zone of Bitung will become a domestic and global model for sustainable, low carbon urban and industrial planning, and will contribute to the state goal of reducing GHG emissions by 26% by 2020 (29% by 2030) compared to a Business-as-Usual Scenario. This vision will be implemented developing the Low Carbon Model Town strategy along the following four axes:

- *Ensure alignment with existing local and central development policies, regulatory frameworks and institutional set-ups;*
- *Reduce energy consumption through the use of clean, green energy generation and more energy efficient technologies and practices;*
- *Ensure an efficient and environmentally balanced management of resources through the utilisation of the best available low carbon technologies for industry, commercial and residential areas, for solid waste and wastewater management, for forestry and land use, and for transportation;*
- *Apply an accurate, transparent and functional monitoring, reporting and verification system (MRV) of the GHG emissions and additional sustainable development impacts.*
- *Promote the low-carbon vehicles to reduce fuel consumption*
- *Reducing the fossil fuel energy usage by promoting eco-driving contributes to the low-carbon town development in SEZ Bitung.*

PROBLEMS

- THE ABSENCE OF ENERGY PLANNING DOCUMENTS FOR NORTH SULAWESI PROVINCE , SEZ AREA AND BITUNG CITY
- CAPACITY BUILDING FOR GOVERNMENT OFFICIALS, INDUSTRIAL SECTORS, SCHOLARS
- THE DEVELOPMENT OF RENEWABLE ENERGY NEEDS A LOT OF FUNDS (VERY EXPENSIVE)
- ADVANCED TECHNOLOGY TO EXPLORE THE RENEWABLE ENERGY POTENTIAL

Implemented projects

No	PROGRAMS	Bitung Gov't	North Sulawesi Gov't	Ministry of Energy and Mineral Resources	Donor Countries Via IEA
1	CAPACITY BUILDING		Conducting Socialisation of the Masterplan of Regional Energy	Conducting Training on Implementation of Energy Audit in Government buildings in Bitung City, Manado City and North Sulawesi Province	Conducting the field trip to Bitung City, in collaboration with the Ministry of Energy and Mineral Resources conducting workshop with the stakeholders.
				Conducting the Training on Formulation of the Masterplan of Regional Energy	Proposed Projects to APEC in relation to Capacity Building via Autralia-Indonesia Center

Implemented projects....continued

No	PROGRAMS	Bitung Gov't	North Sulawesi Gov't	Ministry of Energy and Mineral Resources	Donor Countries Via IEA
2	Preparation of land-use administration	Providing the land and data of land ownership in SEZ's area. Preparing general administrative management personnel in SEZ's Bitung	Preparing and proposing the land management right to the central gov't	Supporting the ongoing processes in collaboration with National SEZ Board	
3	Development of Basic Infrastructure	Land clearing from squatters	Developing Entrance access to SEZ, and Administrative office (collaboration with Ministry of Industry)		

CONCLUSION

- Bitung SEZ development should be continously encouraged in order to provide economic and social impacts for people.
- The development of SEZ Bitung is expected to absorb as musch as possible local workforce.
- Need a breakthrough in relation to SEZ's land acquisition
- As an industrial area, SEZ Bitung requires a large amount of energy. Therefore, the utilisation of renewable energy resources is absolutely neccesary.
- The implementation of renewable energy use requires technological as well as financial support
- North Sulawesi has renewable energy potential (solar, hydro, wind and geothermal). It needs advanced technologies and funds to explore.

JENNY KAROUW

Head,
North Sulawesi Regional Planning and Development Board
www.bappeda.sulutprov.go.id

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Indonesia.

Thank You

EnP./Ar. Araceli Barlam,
Head, City Environment and Natural Resources Office (CENRO)
Local Government Unit
Mandaue City

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

Introduction of Mandaue City

- Highly Urbanized City,
- Located in the island province of Cebu, Central Visayas (Region 7),
- A coastal city situated on the central eastern region of Cebu Island, Cebu City (north-west& south-west), Consolacion (north-east), Mactan Island (south-east coast) where Airport and Lapu-lapu City is located,
- **32.85** square kilometers land area,
- **27** barangays (villages)
- **364,116** total population (2020 Census of Population and Housing)

Vision of Mandaue City

The City's vision is to be a green city with sustainable economic development focused on high value manufactured consumer products for better living standards of its populace through inclusive governance.

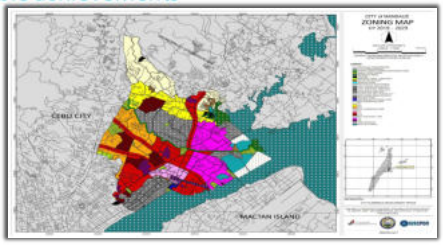
Low-Carbon Model Development in Mandaue City

PLANS	PROGRAMS / ACTIVITIES	STUDIES
Comprehensive Land Use Plan (CLUP 2019-2029)	Green Loop; Pedestrian Lane, Bike Lane, Eco-fence, Green Learning Park, Butuanon Viewing Deck, Mahiga Linear Park	Mangrove Community Structure in Cansaga Bay: Baseline Assessment
10-year Ecological Solid Waste Management Plan (2018-2028)	Green Building Program	Project GUHeat
Safe Closure & Rehabilitation Plan	Mangrove Eco Park (Bamboo Park)	APEC - LCMT Phase 6 Feasibility Study
Local Climate Change Action Plan (2020-2030)	Tree Growing Program and Urban Gardening with Provincial Government and Non Government Organization CAFÉ-I	Final Report: Preparatory Survey for the Septage Management Project for MCWDs Service Area by: JICA
Climate Change Adaptation Framework	Purok System (self govern community-Jichikai System)	Title of the Feasibility Study on Sterilization System - New Medical/Infectious Waste Management
Local Public Transportation Route Plan (LPTRP 2021-2025)	Barangay Monthly Organizational Review Meeting (BMORM)	
	Circular Economy Partnership with GUUN	
	4th International River Summit 2018	
	Butuanon River Watershed Management Board	
	Asia Smart City Conference in Yokohama	

Ordinances that supports LCMT

ZONING ORDINANCE	Stipulates for Green and Open Spaces and Regulates land's allowable uses
GREEN BUILDING ORDINANCE	Regulates any development in the five Planned Unit of Developments to be low carbon.
LOCAL PUBLIC TRANSPORTATION ROUTE ORDINANCE	Regulates the 4 intra city route structure.
BIKE LANE ORDINANCE	Promotes safety environment for the bicyclist.
PUROK (COMMUNITY) SYSTEM ORDINANCE	Address the different issues on solid waste, security, flooding, health, and other concerns at the barangay level

Notable achievements



COMPREHENSIVE LAND USE PLAN (CLUP)- ZONING MAP

Notable achievements

7

Notable achievements

8

Notable achievements

9

9

Notable achievements

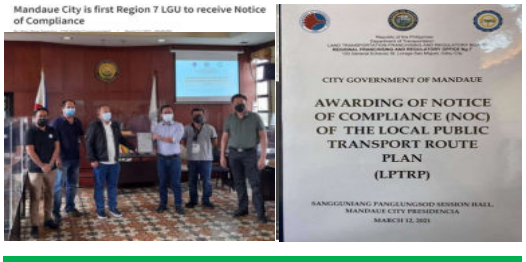
10

Notable achievements

11

11

Notable achievements



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Notable achievements

GREEN LEARNING PARK

13

13

Notable achievements

PARTNERSHIP WITH GUUN, ON CO2 EMISSION REDUCTION BY UTILIZING THE CITY'S RESIDUAL WASTES, SUPPORTED BY THE CITY OF YOKOHAMA AND THE MINISTRY OF THE ENVIRONMENT IN JAPAN (MOEJ)

14

Notable achievements

MANGROVE COMMUNITY STRUCTURE IN CANSAGA BAY: BASELINE ASSESSMENT

15

15

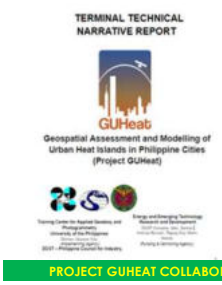
Notable achievements

MANGROVE ECO-PARK (BAMBOO PARK)

16

16

Notable achievements

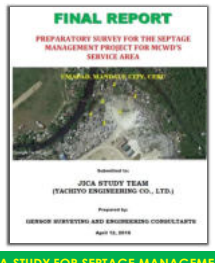


PROJECT GUHEAT COLLABORATION WITH THE UNIVERSITY OF THE PHILIPPINES (UP)

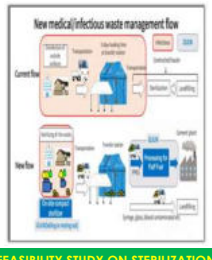
17

17

Notable achievements



JICA STUDY FOR SEPTAGE MANAGEMENT PROJECT



FEASIBILITY STUDY ON STERILIZATION SYSTEM

18

18

Notable achievements

URBAN GARDENING PARTNERED WITH CAFÉ-I (N.G.O) AND SUGBUSOG (PROVINCIAL GOVERNMENT PROGRAM)

Notable achievements

TREE GROWING PROGRAM

Notable achievements

PUROK SYSTEM (SELF GOVERN COMMUNITY/ JICHIKAI SYSTEM)

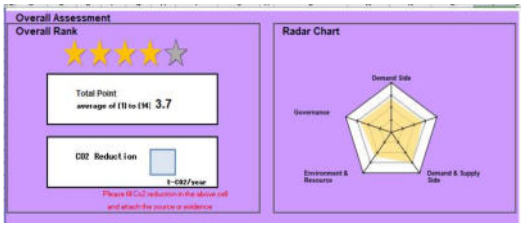
Notable achievements

BARANGAY MONTHLY REVIEW ORGANIZATIONAL MEETING (BMORM)

Notable achievements

ATTENDED THE 8TH ASIA SMART CITY CONFERENCE IN YOKOHAMA JAPAN

Self-assessment results by LCT-I system



LCT-I OVER ALL ASSESSMENT

Challenges in Low Carbon Development

- Limited and reliable quantification of distributed carbon sources/sectors and sinks for GHG emission inventory,
- Limited knowledge in the conduct of standardized methods for measurable, reportable and verifiable greenhouse gas emissions data,
- Lack of government personnel that are capable or familiar in its implementation (i.e. Green Building Certified practitioners and other expertise, and limited of expert/specialist to lead the conduct of GHG emission), and
- The Local Public Transport Route Plan's implementation is still limited due to the pandemic.

Future Plan

To realize the vision of the City the initiated policies, projects and programs that have been implemented in support of LCMT will be continued;

- Implementation and monitoring of the medium and long term policies, projects, and programs; Green Building Ordinance, Zoning Ordinance, LPTRP Ordinance, Bike Lane Ordinance and other policy that supports the Green Loop.
- Implement Adaptation of Climate Change Adaptation Framework and the Local Climate Change Adaptation Plan
- Prioritize projects for implementation
- Find funding sources/linkages for big-ticket projects/programs
- Strengthen Inter-City & Multi-stakeholder's cooperation
- Cost Effective Solid Waste Management Plan

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Recommendations for Low Carbon Development

- Formalize data collection procedure for liquid fuels in the City in order to improve quality of carbon accounting.
- Investigate the use of municipal waste-derived and company-derived biogas.
- Deploy grid-supported solar charging stations, utilizing roofs of covered transit areas as a component of e-trike and e-jeepney program.
- Investigate the feasibility of developing multi-utility energy centres.
- Maintain a watching brief on the opportunity for solar water heating and provide awareness through support of uptake if demand unfolds.
- Introduce higher fuel efficiency vehicle standards and high quality standards for gasoline and diesel (as part of domestic program).

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Head, City Environment and Natural Resources Office (CENRO)
Local Government Unit Mandaue City

Thank you for your attention !

Roman Teleshun
International Affairs Division of Mayor's Department, consultant
Krasnoyarsk City Administration

Krasnoyarsk City Administration

APERC

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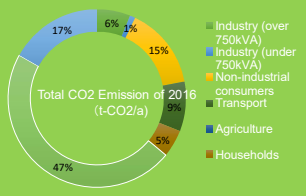
10 September 2021

CO2 emission monitoring

CO2 emission related to energy consumed in 2016



Total CO_2 emission: **12 million tons**

✓ In 2016 CO_2 emission intensity in Krasnoyarsk was **11 tons/capita**.

4

Introduction of Krasnoyarsk

- Location: 56° 00'43"N 92° 52'17"E
- Economy: The Russian Federation
- Region of the Russian Federation: Krasnoyarsk Region
- Internal division: 7 administrative districts
- Mayor: Sergei Eremin
- Founded in: 1628
- Area: 379.5 km²
- Climate type: continental
- Time zone: UTC + 7:00
- Population: 1,092,851 (2021)
- Density: 2 765 people/km²
- Official language: Russian

2

Mitigation measures

Measures implemented by Krasnoyarsk City Administration:

- Energy efficient lighting was used in the city streets - new generation "smart" lamps were installed, which regulate energy consumption depending on the level of ambient light and traffic intensity;
- 246 135 hectares around the city of Krasnoyarsk in 2019 were allocated as a forest park green belt of the city with appropriate handling measures being implemented;
- 73 units of public transport with an environmental class of at least Euro-4, 26 new trolleybuses were purchased;
- 2 automated posts for monitoring atmospheric air pollution were commissioned in the Kirovsky and Sverdlovsky districts of Krasnoyarsk;
- Automated traffic control system was launched, to which 487 traffic light objects are connected;
- A specialized mobile group of round-the-clock duty of the state environmental supervision was created, the main functions of which are: analysis and feedback on citizens' appeals; scheduled and unscheduled inspections of business entities; preparation and submission to the court of materials of cases on administrative offenses in the sphere of ecology

5

Low-Carbon Model Development in Krasnoyarsk

- Sectors where low-carbon policies or actions were applied:
  - Town Structure
    - Promotion of the use of public transport
  - Transport
    - Restructuring and strengthening the public transportation network
    - Reducing CO2 emissions of transportation
  - Area Energy System
    - Shutting down small-scale boiler houses (heat only power plants) and gradually switching to high-efficient CHP plants
    - Reducing heat loss in the exist heating pipe network
  - Greenery
    - Conservation and creation
    - Creating a green network
  - Industry
    - Inducing local industries to implement measures aimed at pollution decrease

3

Mitigation measures

Measures implemented by large industry located in Krasnoyarsk:

JSC RUSAL Krasnoyarsk

- the transfer of electrolysers to the Ecological Soderberg technology was completed. In total, 1 954 electrolysers were transferred to this technology. The technology increases the efficiency of gas removal for the main harmful substance - fluorine compounds (F, fluorides);

LLC "Siberian Generating Company"

- more than 99% of inorganic dust is captured by electrostatic precipitators, the installation of which began in 2020 at the second stage of the ecological modernization of CHP-1;
- 2 ineffective heat sources - boiler houses No. 1 and No. 2 permanently stopped their boilers in 2020. Houses of Svobodny Avenue (Krasnoyarsk), which received heat and hot water from them, have already been connected to the Krasnoyarsk CHP-2 (35 boiler houses in total are planned to be transferred, 9 boiler houses have already been transferred since 2019);
- pilot operation of a new chimney with a height of 275 meters, erected in 2019 in order to increase the dispersion of emissions and reduce the surface concentration of harmful substances, has begun;
- commissioning works on the installation of automatic sensors to control industrial emissions of pollutants into the atmospheric air at the Krasnoyarsk CHPs of Siberian Generating Company have been completed, the systems are being tested;

LLC "Krasnoyarsk Cement"

- a new electrostatic precipitator was put into operation, which will allow stable operation of the gas cleaning system and reduce the amount of dust and waste gases;
- installation of an automatic measuring system for emission control on the chimney of the roasting furnaces (the system is operating in test mode).

6

Self-assessment results

Until the introduction of the Russian domestic project "Ecology" main problem in the implementation of low-carbon policies in Krasnoyarsk was absence of necessary funding for the programs (measures) developed on the municipal level.

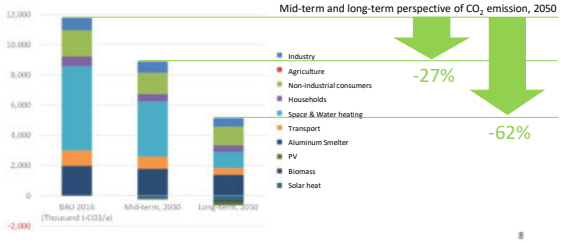
As for now, the budget allocated within this project allows for implementation of major changes in the city life (including widening the territory occupied by city trees, wider introduction of electric public transport, future gasification of the city's CHPs).

One more implementation problem was grounded in the source of GHG and other air pollutants – industrial plants within Krasnoyarsk. Modernization of their infrastructure also demanded large budget, which were not always easy to allocate in the difficult economic situation.

Still, currently the situation is developing for the better and RUSAL and its Krasnoyarsk Aluminum Smelter (the greatest industrial emitter of CO2 and other air pollutants in Krasnoyarsk) have announced plans to reduce the emissions and to make the company CO2 neutral by 2050.

7

Perspectives



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Thank you for your attention !

Parmakope
Head of Economic and Natural Resource Division
Urban Development Planning Agency

APERC

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10 September 2021

GHG emission profile and modeling

- The source of greenhouse gases (GHG) emissions is obtained from energy sector, transportation, industry, waste and agriculture. In which the latest available o e

Introduction of Banda Aceh

Area: 61 km²	9 Sub District 90 villages	Elavation: 0,8 m Above sea level
Population: 252.890 Inhabitant	Human Development Index (HDI): 84.37	
Inflation (%): 3.46	Ekonomic growth(%): 4.49**	GDP per Capita: 4.471 USD 66.18 MIDR

94 % Clean Water Coverage
99,27 % Livable House
88 % Waste Collection Service Coverage
14,33 % Green open space
91,72 % Liveable houses

2

Mobility dynamic

GREEN
TRANSPORTATION

6 corridors
5 route for feeder bus (electric bus)

Low Carbon Model Development in Banda Aceh City

Mission VI (Medium term development 2017 – 2022)

Realizing the City of Banda Aceh to be an environmentally friendly, green, clean, resilient, and sustainable

Focus on :

- Green Transport
- Green Energy
- Green Waste
- Green Open Space

3

GREEN WASTE

Gampong Jawa Sanitary Landfill

- 238 ton solid waste per day
- 1,9% recycled, reused 10,5%, 84% to Sanitary Landfill

WASTE COLLECTING POINT

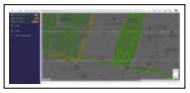
- Waste Collecting Point is a waste collection system according to community participation
- Implemented in 11 villages and 34 schools

GREEN OPEN SPACE

- **Target 30%** Green Open space of total area (20% public, 10% privat)
- **Eksisting 14,33% public gree space**
- **Urban Forest**
- **Green corridor**

Hutan Kota Tibang

e-Berindah: application for monitoring and evaluating cleanliness based on community participation



- Banda Aceh tree database
- Displays information about the tree such as tree species, age, donor and tree coordinates.

UTILIZATION OF METHANE GAS FROM SANITARY LANDFILL

Collecting methane gases (20 pipe vertical)

ENERGY SAVING LIGHTING

- 11.660 Street lighting
- 12% Lamp of LED
- 86% Lamp of Mercury
- 2% Lamp using Solar panel

Distributed for ±200 poor household around sanitary landfil

GREEN ENERGY

The utilization of solar panel and LED lamp for street lighting and in government building to introduce solar energy and LED

LCTI-1 Evaluation of Banda Aceh

11

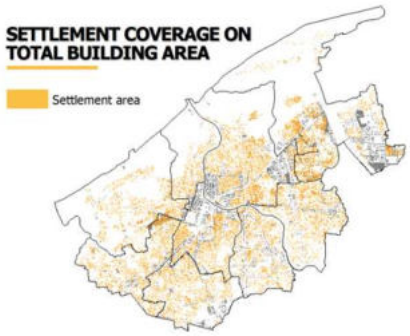
Introducing a cold box system that uses solar energi for fishermen to store fish

LCT-1 SHEET1. DEMAND

1. Town structure

- Building covers around 16% of total city area
- Residential area covers around more 60% of total building
- Most building are in used
- Bus Rapid Transit Transkutaraja has been established, but it has has not influenced the land use yet.
- BRT is not integrated with vertical development currently

12



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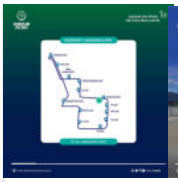
LCTI-1 SHEET 1. DEMAND

3. Transportation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LCTI SHEET1. DEMAND

2. Building

- Banda Aceh has not established system or criteria for thermal performance and energy saving equipment performance yet.
- The use natural energy has not commenced yet. But the planning for such policy has been intruducing in planning document such as Regional Action Plan for Green Gases Reduction (RAD GRK) 2013-2018 and Regional Action Plan for Green Gases Reduction (RAD GRK) 2020-2025 and also Greenhouse Gases Reduction – Trikarsa Bogor, and master plan for smart compact City 2016-2021
- There is already effort to formulate green construction guideline

14

LCTI-1 SHEET 1. DEMAND

3. Transportation


17

LCTI-1 SHEET 1. DEMAND

3. Transportation

- BRT already operating at 6 corridors and 5 route for electric Bus (try out)
- Bicycle lane exist but does not properly. Bicycle use only for sport on holiday.
- The new bridge, fly over and underpass already build in some inter section
- Banda Aceh has not formulated subsidy system for low carbon vehicle yet
- Eco driving has been implemented but limited scale
- Traffic congestion in peak hour.

15

LCTI-1 SHEET 2. SUPPLY

4. Area Energy System

- Banda Aceh city has not establish plan for area energy system

5. Untapped Energy

- There are several efforts to introduce untapped energy in small scale for example the utilization of methane from black water treatment plant and landfill to produce energy for surrounding poor household


18

LCTI-1 SHEET 2. SUPPLY

6. Renewable Energy

- The utilization of solar panel and LED lamp for street lighting and in government building to introduce solar energy and LED
- Introducing a cold box system that uses solar energy to store fish

7. Multi-Energy System

- The government has not introduced multi energy system yet.

LCTI-1 SHEET 3. DEMAND & SUPPLY

8. Energy Management System

- The Government still has not introduced energy management of building/area and AEMS (Area energy management system)
- Smart micro has not been introduced yet.

LCTI-1 SHEET 3. DEMAND & SUPPLY

9. Greenery

- Target 30% Green Open space of total area (20% public, 10% privat)
- Eksisting 14,33% public gree space
- Urban Forest
- Green corridor

10. Greenery

- Water usage concept has not been deveped yet.
- Recycled waste water is used in some fasilities
- Recyled waste water from black water treatment plant is used for watering green corridor

LCTI-1 SHEET 4. ENVIRONMENT AND RESOUCES

11. Waste Management

- 238 ton solid waste per day
- 1,9% recycled, reused 10,5%, 84% to Sanitary Landfill
- Waste reduction target in waste masterplan
- Government regulation for waste reduction
- Waste bank at school and other public facilities to separate plastic waste
- Full waste separation has not been implemented yet
- Plastic waste separation by scavenger for waste recycling

LCTI-1 SHEET 4. ENVIRONMENT AND RESOUCES

12. Pollution

- Effort to reduce air pollution has been implemented in small scale by the utilization of emission control facility which control emission from public transportation and freight vehicle
- The city government has established sanitation regulation to reduce contamination

LCTI-1 SHEET 4. ENVIRONMENT AND RESOUCES

12. Pollution

- Reduce water pollution by developing waste water treatment Plant (WWTP) in Gampong Jawa
- 5 WWTP's are functional currently (communal and market)

LCTI-1 SHEET 5. GOVERNANCE

13. Policy Framework

- Effort toward low carbon town are integrated into planning document. In doing so, the Banda Aceh city also establish cooperation with international agency such as CityNet, CDIA, UCLG etc.
- The city government assigns regular budget to extend green space
- DDR is integrated into planning document
- The conservation of coastal are
- Sanitation master plan as guideline to counter flood and developing drainage infrastructure

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LCTI-1 SHEET 5. GOVERNANCE

14. Education and Management

- Cooperation with Green Community
- Community participation program is planned in document such as Smart Compact City Master Plan and The Action Plan Green House Gas Emission Reduction
- Community association for green planning called P2KH (Green City development Program) consist of city official, green community and academician to function green city. But the community does not function well in the last few year. It is necessary to empower the community.

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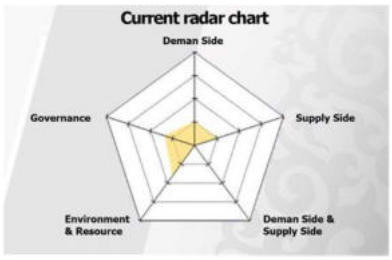
LCTI-1 SELF EVALUTION RESULT



27

FUTURE PLAN OF LOW CARBON DEVELOPMENT

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FUTURE PLAN OF LOW CARBON DEVELOPMENT

Assesment Item

- Bus Rapid Transit Transkutaraja separated lane
- Improving the coverage area of BRT Transkutaraja
- Transit Oriented Development (TOD) along the BRT line
- Establishing system for energy saving construction, including in measuring thermal performance, energy saving equipment performance and natural.
- Establishing green construction guidelines
- Promoting low carbon vehicle and eco driving
- Introducing area energy
- Increasing the utilization of renewable energy

29

FUTURE PLAN OF LOW CARBON DEVELOPMENT

Assessment Item

- Introducing multi energy system
- Intruducing energy management, area energy management system, and smart micro grid
- Ektending greenery
- Improving the effort to reduce water usage and increase water reuse
- Optimizing waste reduction effort
- Increasing waste reuse and recycling
- Improving emission measurement and monitoring facilities
- Regular check of water pollution
- Increasing the effort to reduce soil contamination

30

FUTURE PLAN OF LOW CARBON DEVELOPMENT

Assessment Item

- Establishing the goal for low carbon town and carry actual effort
- Secure budget for low carbon town
- Establishing Business/Life Contigency Plan in pilot area
- Implementing development based on spatial master plan
- Carrying education for low carbon town
- Increasing the role of community association

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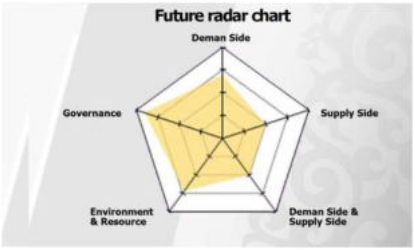
LCTI-1 SELF EVALUATION RESULT



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Parmakope
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Low Carbon Model Town in Vedio

33

[redacted]

TPr Rozaidi bin Mahat,
Urban Planner / Head of Sustainability, Hang Tuah Jaya Municipal Council
on behalf of
Datuk Shadan Othman, President of Hang Tuah Jaya Municipal Council, Melaka, Malaysia

APERC

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

Introduction of HANG TUAH JAYA

HANG TUAH JAYA MUNICIPAL COUNCIL

Hang Tuah Jaya Municipal Council established under Section 3 of The Local Government Act 1976 (Act 171) as a Local Authority of Hang Tuah Jaya.

Establishment
Officially begin the operation on 1st January 2010

Area
144.6 square kilometre / 35,733.04 acres

Population
190,529 (2018)

Economy
City GDP estimated at 7,897 (RM millions 2010 prices)*

Climate

	Current Observation	Projection for 2050	Projection for 2050
Average Annual Temperature	26.2 °C	27.1 °C (+3.3%)	27.7 °C (+5.7%)
Average Annual Rainfall	1,891 mm	1,998 mm (+5.6%)	2,068 mm (+9.4%)

Reference – Assumption Pertains: Southern Region (HC3 & BLRD, 2018, pg.87)

GHG Inventories*
1.03 million ton CO_2e
*Reference – Hang Tuah Jaya GHG Inventory Report 2019

2

Introduction of HANG TUAH JAYA

3

Introduction of HANG TUAH JAYA

[redacted]

Mitigation Target:
"As City Manager, we committed to reduce 665,000 tCO2e by 2030 relatively to the BAU scenario; to achieve the level of 0.072 Intensity Carbon per GDP (reduction of 45%) to support state vision and commitment"

MITIGATION

Adaptation Goal:
- Reduce property damage caused by monsoon and flooding by 2030
- Reduce the number of dengue cases by by 2030
- Reduce the days of water rationing caused by drought by 2030

ADAPTATION

Current Level / Projection / Target:
To increase green cover in the city for lowering temperature and carbon sequestration

OFF-SETTING

Document / Report / Project / Program

[redacted]

4

Low Carbon Model Development in HANG TUAH JAYA

- Sectors where low-carbon policies or actions were applied & timeline

Buildings
Tier 1: Demand
All new development within the area to apply Green Building Rating (volunteer basis)
Adoption of Malaysia Standard (MS) 1525:2019 (Mac 2020)
Green incentive on green construction & development

Transportation
Tier 1: Demand
Apps for Smart Parking Hang Tuah Jaya (2018)
Introduction 'Green Bus Network Corridor' (under study – GFCP)
Incentive and parking rebate for EV (2018)
Mobility as a Service (MaaS) – e-hailing

Area Energy System
Tier 1: Supply
Smart Grid program (2019)
District Cooling System (DCS) project in MITC area (preliminary stage)

Education & Management
Tier 1: Governance
Community awareness on mitigation and adaptation
Special program on Low Carbon Eco-Schools and Green Ambassador
Climate financing and Budgeting

Renewable Energy
Tier 1: Supply
Decarbonized Community program. To encourage community to apply solar panel installation through Net Energy Metering Program (on going project)
Completion of 2 solar farm project (private initiatives) with total capacity 58 MW (2019)
Policy on investment and developing solar farm

Policy Framework
Tier 1: Governance
High level commitment on achieving Low Carbon City Status by 2030 and Net Zero Carbon City by 2050
Integration and link-up with state commitment on GHG reduction and environmental protection


Low Carbon Town Indicator (LCT-I)

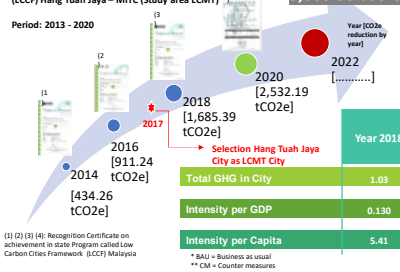
5

[redacted]

Performance of Low Carbon Cities Framework (LCCF) Hang Tuah Jaya – MITC (Study area LCMT)

Period: 2013 - 2020

TOTAL REDUCTION: **5,563.08 tCO_2e**



(1) (2) (3) (4): Recognition Certificate on achievement in state Program called Low Carbon Cities Framework (LCCF) Malaysia

Green Growth Hang Tuah Jaya

Item	Trend (Increase/ Decrease)	Explanation Factor
Gross Domestic Product (GDP)	Increase	Economy driven by city
Population	Increase	Natural growth
Carbon Emission/ GHG	Increase (with control) Lower than Business As Usual (BAU)	Due to increase population, lifestyle and demand
Carbon Intensity (per GDP / per Capita)	Decrease (due to high GDP and lower Carbon Emission / footprint)	* More business opportunity. Example: Shifting to clean energy (solar panel)

	Year 2018	Year 2030 [BAU]*	Year 2030 [CM]**
Total GHG in City	1.03	1.52	0.86
Intensity per GDP	0.130	0.127	0.072
Intensity per Capita	5.41	6.39	3.61

* BAU = Business as usual
** CM = Counter measures

City Roadmap GHG Year 2030

[redacted]

Smart Grid Project Melaka (Hang Tuah Jaya)

Launching ceremony for Smart Grid Demonstration Project on 15 September 2020

Melaka is one of the pioneer states in the economy to debut smart grid technology with an aim to spearhead its high-tech city concept. Melaka was among 28 cities from 11 countries worldwide to be chosen for the smart grid demonstration project.

The project is under the initiative of the Global Environment Facility (GEF) and the United Nations Industrial Development Organization has been appointed as global project manager.

The implementation of the project comes under the purview of Housing and Local Government Ministry as well as Malaysian Industry-Government Group for High Technology (MIGHT).

This five-year-long project aims to make Melaka a sustainable city through methods of reducing greenhouse emissions and boosting renewable energy.

"MIGHT showed their appreciations to the technology contributors in Melaka that allowed their technologies to be integrated with this smart grid demonstration project i.e. large-scale solar farm, EV charging system, BEMS, AMI, solar thermal system etc. All four municipals in Melaka had agreed to become the technology contributors and lead the initiatives in Melaka. They were Majlis Bandaraya Melaka Bersejarah (MBMB), Majlis Perbandaran Alor Gajah (MPAG), Majlis Perbandaran Jasin (MPJ) and Majlis Perbandaran Hang Tuah Jaya (MPHTJ). Other contributors come from various types of background i.e. state GICs, industries and universities"

https://www.thestar.com.my/news/nation/2020/09/15/melaka-to-debut-smart-grid-technology-as-part-of-global-project-says-mb

Building Energy Online Data Monitoring System

"Building Energy Online Data Monitoring (BEDOS)" System is a system designed to monitor the energy usage by consumer/building owner. Energy consumer/building owner will be able to publish their energy consumption by this system.

BEDOS able to provide historical energy consumption data display and analyze the data to provide energy report. Apart from energy consumption, it is also allow users to establish energy baselines and trace energy saving performance to help consumer manage energy usage.

Municipal has encouraged all building in city area to install the system through some financial assistance. The system will directly serve the reporting for GHG inventory

Screenshot of Hang Tuah Jaya Office Building Energy Consumption on 19 July 2020 http://bedos.mphtjb.gov

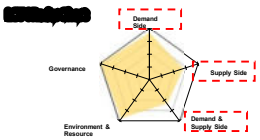
Rainwater Harvesting Project for Schools in Hang Tuah Jaya

Hang Tuah Jaya Low Carbon Eco Schools Program has launched the project to support the implementation to reduce the water usage at the schools building. Some financial assistance was provided to all the school within the city area. The project contribute some of reduction carbon footprint and efficient water management. Also focus on awareness among students as future investment.

Energy Audit Report Implementation

Retrofit high efficiency chiller no 1 and no 3: Upgrade controller and displayed from NC25-4 to Vision 2020i Touchscreen. Upgrade refrigerant control from modulator motor to electric expansion valve

[redacted] by LCMT system



To focus on 3 aspect on Tier 1 (demand side, supply side and demand & supply side) and maintain / enhance the performance for governance and environment & resource

Current Status

As result from LCMT study, Hang Tuah Jaya focus on building sector and transport sector for GHG reduction.

Current project / program:

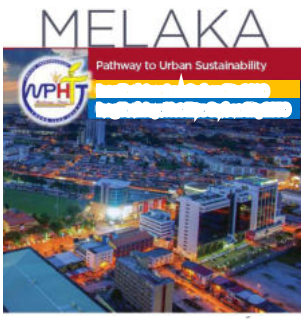
De-carbonize community program, solar installation, energy monitoring, mobility as a service project MaaS (e-hailing, food delivery service, etc. & greenery (carbon sequestration)

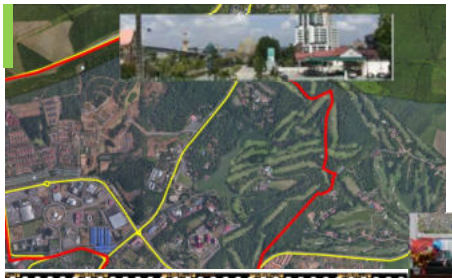
Challenges

Hang Tuah Jaya put an efforts on capacity building to all the stakeholders and community as a continuous learning process and increase understanding. Limitation on implementation of large-scale project due to the availability of funding available. Actively to promote the green growth as one of the main indicator and game-changer for the city

[redacted]

1	Put priority on specific target for Hang Tuah Jaya based on LCMT recommendation	
2	Focus on energy management part and integration with Sustainable Development Goals (SDGs) 2030 - SDG 7: Clean Energy - SDG 13: Climate Action	
3	Looking forward for additional support from APEC for implementation stage. Establish networking with other participants city	
4	Apply for international funding / investment	
5	Consider for post pandemic COVID-19	





[redacted]

Short video: Hang Tuah Jaya aspiration

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Hang Tuah Jaya City, Melaka, Malaysia

Thank you for your attention !

Low-Carbon Model Town in
Shah Alam.

Annie Syazrin Ismail
Shah Alam City Council

APERC

APEC Low-Carbon Model Town
Project Wrap-up Symposium

10 September 2021

SHAH ALAM CITY INITIATIVE
smart, liveable and resilient

LOW CARBON CITIES 2030

Introduction of Shah Alam

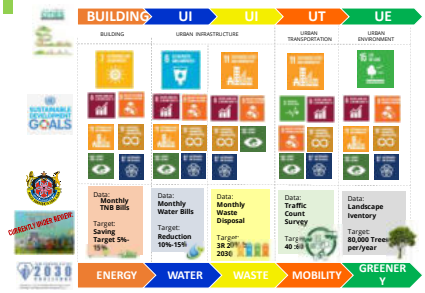
Low-Carbon Model Development in Shah Alam

Shah Alam City Council Commitment

13 CLIMATE ACTION

Shah Alam City Council is committed to implement LCCF program that anchored from 4 Low Carbon elements.
Shah Alam City Council aimed to reduce carbon emission by 45% by 2030 from baseline year of 2015.

LCCF & SDGs



&

LCCF expansion project

CO_2 reduction results and roadmap

PILOT PROJECT
SECTION 14, TOWN CENTER
159.89 Hectares / 395 Acres

Year of 2015
Total Number of Building
12/23 units
(52%)

Year of 2016
Total Number of Building
20/23 units
(86%)

In 2017
23 Premise from 23 Premise (100%)
Smart Partnership / Strategic Partners

TOTAL EMISSIONS (P)	60,474.94	57,914.37	53,798.45	53,341.93	47,683.36
BUSINESS AS USUAL (B)	60,474.94	60,474.94	60,474.94	60,474.94	60,474.94
REDUCTION ACHIEVED (B-P)		2,560.57	6,676.49	7,133.00	12,791.58
PERCENTAGE,% REDUCTION (B-P)/B		4.23%	11.04%	11.79%	21.15%
DIAMOND RECOGNITION	BASELINE ONLY	1 DIAMOND	3 DIAMOND	3 DIAMOND	3 DIAMOND

Notable achievements

OTHER SUSTAINABLE DEVELOPMENT PROJECT TO SUPPORT LCCF:

BUILDING ENERGY

Based on the assessment results in 2019, WISMA MBSA has achieved 7.90% reduction in carbon emissions equivalent to 454.64 tCO2

Total Saving :
USD 50,500.98 / Month
USD 606,011.73 / Year

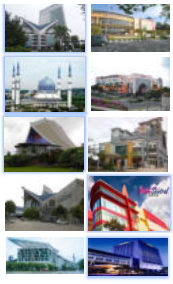
CERTIFICATE BY SEDA ON LOW CARBON BUILDING ASSESSMENT GREEN OPERATION

CERTIFICATE BY GREENTECH ON LOW CARBON BUILDING (2019)

Unofficial results in 2020 :-
3 Diamond
853.39 tco2
14.91%

CO_2 reduction results and roadmap

ANNUAL ELECTRICITY CONSUMPTION 23 BUILDING INTOWN CITY CENTER



NO.	PARTNER	BASELINE 2015	2016	2017	2018	2019
1	MAYBANK	949,355	1,105,504	1,002,007	1,851,000	1,898,728
2	MENARA AFFIN / MENARA SERBA DINAMIK	4,106,610	4,114,050	4,119,430	3,987,667	4,028,543
3	SHAH ALAM CONVENTION CENTRE	2,701,503	2,590,657	2,244,510	2,124,813	2,047,507
4	MIZUNI	945,329	841,441	1,045,002	1,075,155	993,051
5	LAWAN KUDDIYA	1,967	3,117	10,373	1,087	561
6	GALERI SHAH ALAM	42,141	43,786	29,173	25,704	32,350
7	AVISENA SPECIALIST HOSPITAL	5,592,955	5,520,120	5,230,541	5,193,054	5,311,308
8	PLAZA PERANGGANG	3,908,111	4,520,677	4,022,356	3,676,479	3,544,380
10	GRAND BLUEWAVE SHAH ALAM	6,621,996	6,329,802	6,771,363	6,407,661	6,202,986
11	WISMA MBSA	7,771,521	8,119,468	7,426,075	7,481,021	7,057,330
12	MENARA MBSB	3,333,579	4,471,013	3,546,455	3,351,816	3,153,768
13	BANGUNAN DARUL EHSAN	4,031,838	4,172,541	4,164,937	4,287,986	4,397,060
14	BANGUNAN UMNO SELANGOR(KOMPLEKAN MUARA)	1,019,093	1,075,120	1,062,344	1,139,477	48,341
15	JABATAN AUDIT NEGARA SELANGOR	258,195	249,865	231,104	210,013	241,329
16	WISMA PKPS	2,153,700	2,258,640	2,060,980	1,841,390	192,065
17	MASJID SHAH ALAM	2,406,021	3,197,736	2,961,256	3,050,297	2,510,992
18	PEJABAT POS	640,486	741,775	660,771	590,500	668,749
19	HENTIAN PUSAT BANDAR	9,024	12,002	11,056	10,499	12,276
20	PLAZA ALAM SENTRAL	13,075,765	13,213,436	11,929,846	11,778,622	10,019,167
21	SACC MALL	4,726,170	4,647,990	4,172,755	3,873,229	3,842,838
22	PLAZA ANGGERIK	944,239	906,473	835,015	744,374	661,384
23	KOMPLEKS PKNS	8,085,574	8,288,009	8,128,623	8,842,067	9,615,186
	TOTAL	73,335.17	76,423.22	71,676.97	71,543.91	66,279.90
		54,773.90	53,037.72	49,743.82	49,651.47	45,998.25
	Occupancy	8,957	8,957	8,957	8,957	8,957
	% Reduction		-4.23%	2.25%	2.43%	9.61%

Unit : kwh

SACC LOW CARBON INITIATIVES : BUILDING ENERGY

ENERGY

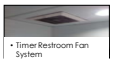
- Building Energy Audit

- SM ARTBus System

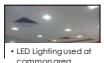
- Timer AHU System

- Timer Car Park Lighting

- Energy Saving Lift System



- Timer Restroom Fan System

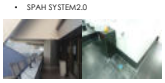


- LED Lighting used at common area

WATER

- Energy & Water Saving Pump

- SPAH SYSTEM2.0



WASTE

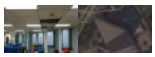
- Promote reduction on waste program
- Promote recycle program

- Recyling program between building in Town Center

Other initiatives undertaken by MBSA

Roof Garden

Natural Ventilation Car Park

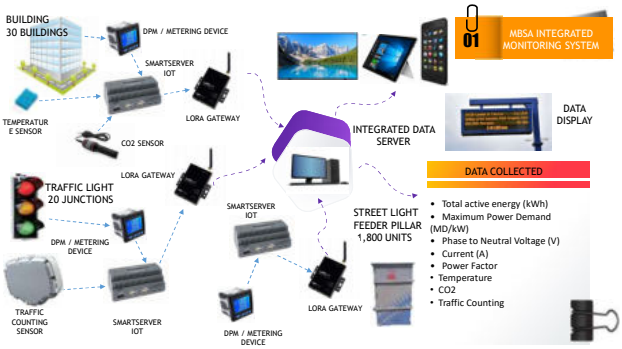


Natural Lighting & Building Orientation

District Cooling with Thermal Storage

Self-assessment results by LCT-I system

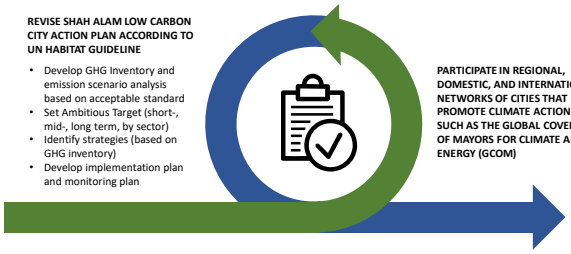
13



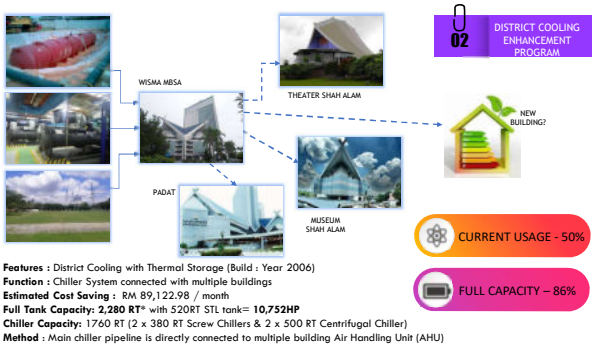
Future plan

REVISE SHAH ALAM LOW CARBON CITY ACTION PLAN ACCORDING TO UN HABITAT GUIDELINE

- Develop GHG Inventory and emission scenario analysis based on acceptable standard
- Set Ambitious Target (short-, mid-, long term, by sector)
- Identify strategies (based on GHG inventory)
- Develop implementation plan and monitoring plan

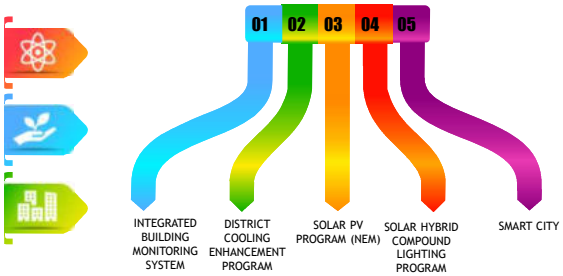


PARTICIPATE IN REGIONAL, DOMESTIC, AND INTERNATIONAL NETWORKS OF CITIES THAT PROMOTE CLIMATE ACTION SUCH AS THE GLOBAL COVENANT OF MAYORS FOR CLIMATE AND ENERGY (GCOM)



Features : District Cooling with Thermal Storage (Build : Year 2006)
Function : Chiller System connected with multiple buildings
Estimated Cost Saving : RM 89,122.98 / month
Full Tank Capacity: 2,280 RT* with 520RT STL tank= **10,752HP**
Chiller Capacity: 1760 RT (2 x 380 RT Screw Chillers & 2 x 500 RT Centrifugal Chiller)
Method : Main chiller pipeline is directly connected to multiple building Air Handling Unit (AHU)

Future Plan



Features : Replacing CFL & Fluorescent with LED bulbs
Function : Substitute bulbs with the same price and better performance with lower energy usage
Method : Replace dysfunctional bulbs one after another


04
SOLAR PV PROGRAM (NEM)
TERMINAL SECTION 17
MARKET (2 UNITS)
SOLAR PV PROGRAM (NEM)
MBSA HALL (60 UNITS)
DECSRIPTION
Element on LCCF program
Used with integrated building monitoring system for data collection
Project used MBSA development budget


05
SMART CITY
Planning and Cityscape
Total Inventory
City Management
Infrastructure and Utility Maintenance
Revenue Management
Source of Data and Information
City Monitoring and Control
Development Approval Records
"Shah Alam towards "SMART, LIVABLE dan RESILIENCE CITY"
Potential and Opportunity in DIGITALISATION


Thank you
Terima kasih
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Romeo Lintapan
Statistician II
Office of the City Planning and Development Coordinator, City Government of Davao

APERC

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

Introduction of Davao City

- Davao City is a highly urbanized city in the island of Mindanao, The Philippines. The city has a total land area of 2,443.61 square km.
- Topographically, a substantial part of Davao City is mountainous, characterized by extensive mountain ranges with uneven distribution of plateaus and lowlands.
- Aside from being one of the major cities in the economy, its historic role as area of convergence for trade and commerce in the eastern part of Mindanao, as well as the strategic location of its international sea and air ports made it suitable to serve as the prime trade center in the Brunei Darussalam-Indonesia-Malaysia-Philippines-East ASEAN Growth Area (BIMP-EAGA).
- The barangay is the smallest local government unit in the Philippines. Each barangay is headed by a Barangay Captain. The Davao city is comprised of 182 barangays grouped into 11 political and 3 congressional districts.

Low-Carbon Model Development in Davao City

Low-carbon policies in Davao City include the following:

- Comprehensive Land Use Plan (2013-2022) for sectors such as Industry, Agriculture, Tourism, Waste Management, and Water Resources;
- Philippine Energy Efficiency Action Plan for 2016–2020 for sectors such as Industrial, Transport, Commercial buildings, and Residential buildings;
- Power Development Plan 2016-2040 for the Power sector; the Philippine Energy Plan 2016-2030 which will be covering Fuel Supply, Renewables, and Oil and Gas;
- Renewable Energy Roadmap 2017-2040 for the Renewable Sector;
- Davao City Transport Roadmap for the different modes of transport; and
- Davao Regional Development Plan 2017-2022 for the Agriculture and Industry sectors in the city.

CO2 Reduction Results and Roadmap

Proposed List of Low Carbon Measures in Davao City

Sector	BAU Scenario (GHG Emission in 2030 $MTCO_2$)	Low Carbon Interventions (LCI) Proposed	GHG Emissions post LCI implementation (in 2030)
Transport	0.915	Implementation of Odd & Even Road Rationing Scheme for private cars only	0.777
Untapped Energy	1.13	12 MW of Waste to Energy plant in the Davao city	1.09
Buildings (Residential and Commercial)	0.881	Implementation of energy efficiency building codes	0.798
Energy Management System	1.17	Implementation of Building Energy Management System	1.05

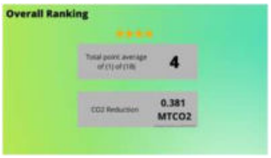
Mainstreaming

- Local Climate Change Action Plan (LCCAP) –this already approved Plan helps in mainstreaming projects and policies into the government development plans that will address the climate emergency and was implemented by the City Government to focus on the GHG Inventory (GHGI), mitigation, and adaptation.
- Comprehensive Land Use Plan (CLUP) 2019 – 2028 –is a planning document prepared by the LGUs to rationalize allocation and proper use of land resources. It has inclusions of policies that will also help address the GHG emission in the city through the proposed zoning ordinance includes policies that limits entry of highly-pollutive and highly-hazardous industries. CLUP is now approved in its second reading at the Sangguniang Panlungsod. Included in this Plan is the Zoning Ordinance, which was implemented in 2015 and declared a total of 74,684 hectares (or 31% of the city's land area) as conservation, forest, parks recreation or mangrove rehabilitation. Among its regulations is the required 15 percent green space in all developments in the city.
- Forest Land Use Plan (FLUP) 2019 – 2024 –this Plan advances policies such as the protection, enhancement, and advancement of forest lands in the city and covers all the forest land areas, as well as the watersheds within the territorial jurisdiction of the city.

Mainstreaming

- Davao City Ecological Solidwaste Management Ordinance –was enacted in to promote improved methods of waste collection, separation, processing, recovery, and disposal.
- Conversion of Used Cooking Oil to Bio-Diesel Fuel Program –this project, which converts used oil to biodiesel fuel, is now operational. This aims to reduce the use of petroleum diesel as it greatly contributes to the GHG emission.
- High Priority Bus System (HPBS) –a project under the Davao City Transport Roadmap, which aims to developing a transport system that is greener, reliable, and efficient in serving the community.
- Bicycle Ordinance of 2009 –Highlighted in this policy is the inauguration of the 54.7-kilometer bike lane network that stretches across 14 road sections of the city. Cycling can reduce carbon footprint, so the more people being encouraged to choose cycling to and fro can create a significant impact in the future.

Self assessment results by LCT-I system



Self assessment results by LCT-I system

Tier 1	Tier 2	Ranking
Demand	Transportation	3.5
Supply	Untapped Energy	4
Demand and Supply	Energy Management System	4
Environment and Resources	Waste Management	5
Governance	Policy Framework	
	Education and Management	3.5
Total Point Average		4

Self assessment results by LCT-I system

Current status and challenges to low-carbon town development

- The City Government of Davao's struggles are the limited data that are useful to improve or implement low-carbon initiatives and funding for these projects as the City Government of Davao is also mindful of implementing other infrastructure projects that have been prioritized prior to these. Apart from that, the city has not encountered any more problem in the implementation of low-carbon policies so far as the City Government coordinates and/or consults with the stakeholders in the process of creating and implementing policies that would serve the best interest of the constituents or of the City.

Future plan

- The low carbon development of the city is continuous and is actively being planned or implemented as the goal to become a low carbon city remains part of any stage of its economic development, regardless of the challenges. Having passed the Local Climate Change Action Plan (LCCAP) 2019-2023, the city emphasized the effort to reduce greenhouse gas (GHG) emissions as among its climate change mitigation. In fact, the first-ever conducted GHG Inventory in the city is the first step to managing GHG risks and identify reduction opportunities through projects, policies, and other initiatives.
- As of now, among the projects in the city that is believed to greatly contribute to low carbon emission once fully implemented are the High Priority Bus System (HPBS), which regulates the number of vehicles through replacing the 7,000 public utility jeepneys with over 1,000 bus units to lower the carbon footprint discharged by vehicles, it is targeted to be fully operational by October 2023; and the Comprehensive Land Use Plan (CLUP) 2019 – 2028 which highlights a policy that limits entry of highly-pollutive and highly-hazardous industries and requires green architectures in all infrastructures in the city under the Zoning Ordinance, it is now being proposed in the City Council for approval.
- Meanwhile, reviving the city's Bicycle Ordinance of 2009 by developing facilities and infrastructures for bikers is an indication that the city envisions a city with a reduced carbon footprint through cycling. Other low carbon initiatives in the city such as the Conversion of Used Cooking Oil to Bio-Diesel Fuel Program is well implemented in the city.

Low-Carbon Model Town in images

Romeo Lintapan
Statistician II
Office of the City Planning and Development Coordinator, City Government of Davao

Thank you for your attention !

Low-Carbon Model Town in [Da Lat, Viet Nam]

Minh Tran,
Vice Head of Environment Dept
Institute of Regional Sustainable Development

APERC

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

Contents

Summary of Interventions

Overview of interventions – Da Lat

Sector	Intervention	Target (by 2030)	Cost (Million USD)	Cumulative CO_2 Savings ($MTCO_2$)
Transportation	Penetration of low emission fuel– 2W & 4W EV & Biofuel in goods vehicle	40% of total vehicle stock	0.5	0.131
	Modal shift - Establishment of non-motorized vehicle and pedestrian Infrastructure	Shift of 5% vehicular passenger	0.6	0.082
	Aggregation of passenger occupancy in personal vehicles through ride sharing options[1]	-	-	-
Area Energy System	Aggregated heating/cooling supply units[2]	-	-	-
Untapped Energy	Waste to Energy – Power generation through incineration of solid waste.	Utilization of total solid waste generated (~185MT)	75.00	0.181
	Ground source heat pump - heating purpose in commercial and residential buildings	25% of total building stock	0.01	0.00001
Renewable Energy	Rooftop Solar Power Generation in residential and commercial buildings[3]	-	433	0.165
Multi Energy System	Cogen or CHP plants produce electricity along with heating which can be used for heating system	35% of commercial buildings	0.003	0.00003
Energy Management System	Integrated Building Energy Management Systems (BEMS) for monitoring and controlling energy-related building plant and equipment	-	Finance varies with project	20% of energy consumption
Town Structure	Town planning concepts to reduce vehicular (Transit Oriented Development) & increase carbon sequestration (Green Redevelopment) for new area[4]	-	-	-

Overview of interventions – Da Lat

Non-Motorized Transport Infrastructure

Concept	Development of dedicated road routes for use by cycles & pedestrians only
Need	Da Lat provides bicycle routes for tourists. Similar route for citizens will reduce need for 2W
Benefit	• Reduced traffic congestion in roads • Reduced use of fossil fuel based vehicles • Promote walking and cycling i.e. potential to improve citizens' health • Reduce incidence of road accidents

Ride Sharing Options

Concept	Sharing ride with co-passengers travelling in same route
Need	Short trips within Da Lat city can be completed through bike/car sharing
Benefit	• Reduced traffic congestion in roads • Reduced cost of ownership of vehicles • Reduce emission by reducing vehicles on road • Provides new opportunity for local businesses

District Energy System (DES)

Concept	Centralized production of steam/hot water,/chilled water transported through underground pipes to buildings where used for heating/cooling purpose.
Need	Heating requirements of commercial building esp. hotels can be provided through DES
Benefit	• Reduces overall energy loss in power generation • Reduced environmental footprint • Increases space in buildings by eliminating need for boilers & chillers

Waste to Energy

Concept	Generating power through incineration of organic substances present in urban solid waste
Need	Existing incinerators can be retro-fitted to add equipment for generating electricity
Benefit	• Reduce landfill need • Create alternate revenue source • Reduces intensity of air & land pollution • Promotes reuse of discarded material

Photo Source: [1]NMT in Bogota,[2]NMT in Dar-es-Salaam, [3]Ride sharing in HCM, Hanoi

Source: [1]Project Team Analysis,[2]CAI-Asia Center

Overview of interventions – Da Lat

Ground Source Heat Pump (GSHP)

Concept	Utilize ground as heat source/sink to provide heating/ cooling needs with minimal use of fossil fuels
Need	Heating requirements of building esp. residential can be provided through GSHP
Benefit	• Utilization of renewable energy source & lower fossil fuel use • Reduce dependency on grid power • Cost savings for user over lifetime

Co-generation plant (CHP)

Concept	Generating power & heat by using same amount of fuel as conventional power generation unit
Need	Cost in setting up individual units in commercial buildings for heating/ cooling can be avoided
Benefit	• Reduced fuel use & emissions due to higher efficiency of CHP (85%) over thermal (40%) • Can be combined with DES for heating & power generation solution for city

Building Energy Management System (BEMS)

Concept	• Use of electronic system for monitoring, analysing and controlling energy consumption of buildings • Automated to optimize power consumption by switching off applications while not in use
Need	Commercial buildings, especially hotels, can reduce up power consumption by up to 20%
Benefit	• Eliminates wasteful power consumption • Cost savings from reduced power consumption • Contributes to lower emissions

Town Structure

	Transit Oriented Development	Green City Land Use Planning
Concept	Maximize residential, leisure & business space within walking distance of public transport	Increases green spaces within cities - increasing carbon sequestration
Need	Expansion area can integrate such concepts to ensure sustainable development in future	
Benefit	• Making future developments emission proof • Increased convenience of citizens in transportation and quality of life	

Photo Source: [1]Flowchart of GSHP,[2]Flowchart of CHP

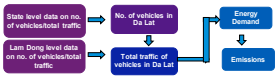
BAU Scenario

BAU Scenario – Transport Sector

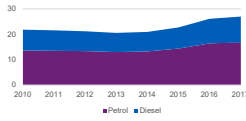
Key Characteristics of Sector

- Roadways major means of transportation
- Category of road transport - 2W, 4W passenger (i.e. cars, buses, taxis) & 4W freight vehicles
- 93% of total vehicle population comprise 2W[1]
- Share of fuel in 4W passenger – 80% petrol, 20% diesel[2]
- 2W – 100% petrol and 4W freight – 100% diesel

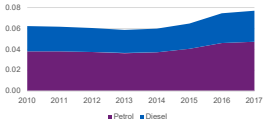
Methodology



Energy Consumption in Transport Sector (KTOE)



CO_2 emission in Transport Sector ($KTCO_2e$)



- ***Overall vehicle population increased by 3% CAGR with 4W passenger vehicles having the highest increase (17% CAGR)***
- ***Emissions also increased by 3% CAGR indicating vehicle efficiency/ has remained constant***

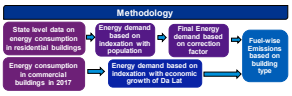
Source: [1]Project Team Analysis,[2]CAI-Asia Center

BAU Scenario – Buildings Sector

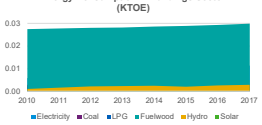
Key Characteristics of Sector

- Fuelwood (61%) is primary fuel in residential buildings followed by electricity (27%). Coal and other fuels comprise 12% of total energy consumption[1]
- In commercial buildings, electricity is only source of energy[2]
- Practice of building energy system limited and rooftop solar power practiced sparingly[2]

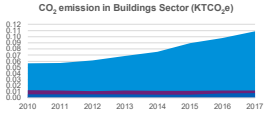
Methodology



Energy Consumption in Buildings Sector (KTOE)



CO_2 emission in Buildings Sector ($KTCO_2e$)



- ***Residential buildings comprise 97% of consumption in buildings sector***
- ***Overall energy demand increased by 3% CAGR with highest growth in commercial buildings sector (15% CAGR)***
- ***Emissions has increased by 8% CAGR primarily due to increased use of fossil fuels (LPG, kerosene) in residential sector***

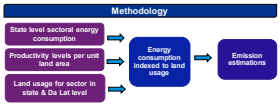
Source: [1]IEA, [2]Stakeholder consultation

BAU Scenario – Agriculture & Fisheries Sector

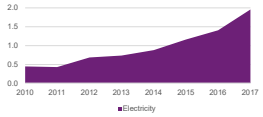
Key Characteristics of Sector

- Agriculture important contributor to economic output of Da Lat
- Sector includes crop production & aquaculture
- Level of mechanization limited and electricity is utilized for running irrigation pumps

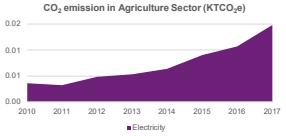
Methodology



Energy Consumption in Agriculture Sector (KTOE)



CO_2 emission in Agriculture Sector ($KTCO_2e$)



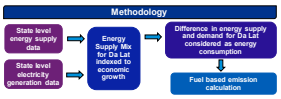
- ***Agriculture accounts for >99% of energy consumption of this sector while the rest is due to aquaculture***
- ***Overall energy demand increased by 23% CAGR & emissions increase by 22% CAGR***

BAU Scenario – Energy Supply

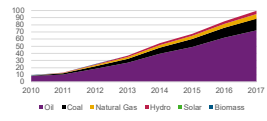
Key Characteristics of Sector

- Oil products like petrol, diesel contribute to 58% of energy supply for Da Lat due to consumption of transport sector[1]
- Coal in primary form contributes to 5%, in residential sector[1]
- Power supply exclusively from domestic grid, emissions trend similar to state level scenario[2]
- Coal (49%), natural gas (29%) and hydro (20%) key sources of electricity[1]

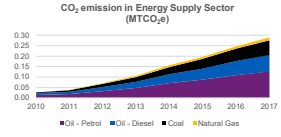
Methodology



Energy Consumption in Energy Supply Sector (KTOE)



CO_2 emission in Energy Supply Sector ($MTCO_2e$)



Energy supply for Da Lat is dependent on fossil fuels (>90%) and increased focus on renewables, untapped sources of energy can help reduce this dependence and reduce emissions

Source: [1]IEA, [2]Stakeholder consultation

BAU GHG Projection of overall city

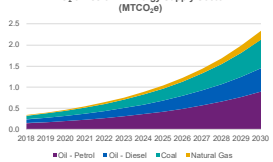
Energy Supply Sector

- Losses in conversion of primary fuel to final usable form leading to emissions in supply side
- Dependence on coal for power generation will also lead to increase in emissions
- In order to reduce emissions, ***reduction in fossil fuel consumption*** in power generation and ***increased focus on alternate energy sources*** can contribute to lower emissions

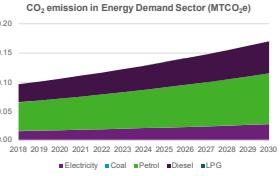
Energy Demand Sector

- Continued use of fossil fuels (especially in transport sector) will be major contributor of emissions (~83% in 2030). Use of low emission fuels can help reduce emissions
- Use of measures to increase efficiency in demand side can also help reduce demand for power which is expected to contribute to 16% of total emissions in 2030.

CO_2 emission in Energy Supply Sector ($MTCO_2e$)



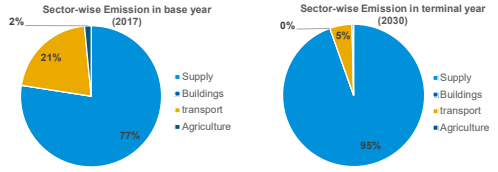
CO_2 emission in Energy Demand Sector ($MTCO_2e$)



Sectoral contribution to GHG emissions

Observation on sectoral share of emissions

- Emissions in supply side set to increase by 18% CAGR between 2017 and 2030 in case BAU scenario continues
- Increase in emissions for other sectors to be about 4% CAGR during same period
- Share of supply side in emissions will increase from 77% to 95% due to continued dependence on fossil fuel especially coal and natural gas in power generation
- Losses in primary energy present in petrol and diesel due to inefficiencies in transportation systems will further contribute to emissions in supply side



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Best Practices & Learnings

Learnings from case studies for Da Lat

Case studies of regions/activities closely resembling operating scenario of Da Lat had been selected and they provide following learnings:

1. **Waste to Energy plant - Ngu Hanh Son District (Vietnam), Hanoi (Vietnam)**
   - Potential to prevent emissions caused by incineration of >160MT of solid waste
   - Contribute to generation of electricity for local consumption
2. **Introduction of EVs - Ngu Hanh Son District (Vietnam)**
   - Reduce dependence on fossil fuel run vehicles & reduce GHG emission
3. **Modal shift - Establishment of bike network - Ho Chi Minh City & Hanoi (Vietnam)**
   - Lower dependency on fossil fuel run vehicles and reduce GHG emission
   - Also reduce road congestion and provide added attraction to tourists
4. **Implementation of Green Building Standards – Jakarta (Indonesia)**
   - Increase energy requirement in buildings and reduce GHG emissions
5. **Introduction of ride sharing options & improving public transport system – Ho Chi Minh City & Hanoi (Vietnam)**
   - Reduce requirement of fossil fuel vehicles and provide business opportunities for locals
6. **Energy Management System - Ngu Hanh Son District (Vietnam)**
   - Energy consumption in buildings expected to increase by 10% CAGR between 2010 & 2030 under existing conditions
   - EMS system as and when installed helps in energy reduction by up to 20%

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Low Carbon Intervention in pre-selected assessment areas

Low Carbon Interventions – Town Structure & Buildings

Town Structure

Interventions related to town planning that aim to reduce carbon emissions

PROPOSED INTERVENTION	RATIONALE
Transit oriented development (TOD)	1. Maximize amount of residential, business and leisure space within walking distance of public transport. 2. Increase public transport ridership by reducing use of private cars and promoting sustainable urban growth.
Green city land-use planning	1. Increase green/forest spaces within city 2. Develop green channels/green pathways for pedestrian movement 3. Develop mixed use plans to reduce distance between areas of activities & minimize need for motorized transport
Infill of vacant land and redevelopment of existing landuse	1. Development of vacant parcels within previously built areas to optimize prior infra investment & land use. 2. Conversion of existing property to another use to increase economic value & reduce emissions

Appropriate planning & town structure related intervention can reduce overall emissions by *15-20%*

Assessment of areas to be considered under Town Structure intervention currently underway

Buildings

Reduction in overall energy demand in buildings by implementation of Green Building Code

Energy Simulation to estimate energy savings achieved by implementing Green Building Code

Energy simulation using eQUEST software for 7 different building types, in conformance with local Green Building guidelines

Energy Efficiency Case → Base Case

Results of using energy efficient building envelope, HVAC, lighting equipment for 5 orientation to be developed

Results of using conventional building materials, HVAC, lighting equipment developed

Key areas where outputs of software simulation will be developed

Whole Building Simulation | Daylighting Simulation | Exterior Lighting Simulation | Thermal Performance Simulation

Simulation modelling underway for 5 different orientation for building envelope of each box model at building envelope level and not site level

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Low Carbon Interventions – Transportation

PROPOSED INTERVENTION	RATIONALE
Shift to Electric Vehicles (Public and Private)	• Adoption of Electric buses and taxis reduces dependence in fossil fuels i.e. petrol & diesel
Solar powered battery swapping station	• Utilizing solar power for charging EV batteries can increase use of renewables
Use of bio-fuels for freight vehicles	• Freight vehicles, covering long distances in one journey, appropriate for use of bio-diesel • Da Lat, having vast swathes of agricultural land, can be used to grow input for the biofuels. • Use of bio-diesel requires no additional investment & can be used by normal diesel vehicles
Developing non-motorized transport infrastructure	• Development of dedicated routes for use by cycles & pedestrians supplement needs of tourists & reducing need for fossil fuel vehicles
Aggregation of passenger through ride sharing options	• Ride sharing options, which convey two to four people in a ride would lead to lesser trips as compared to personal vehicles. • Lesser fuel consumption and hence, reduced emissions. • 2-wheelers being widely used option can be transformed in to bike taxis to reduce number of vehicles on road.

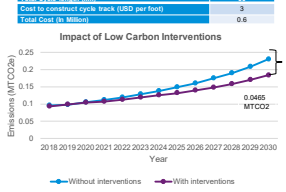
Financial implication of intervention

Low Emission Vehicles (Electric Vehicles)[1]

Cost (USD)	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
2W	2002	2263	4821	7851	8835	1540 6	1730 4	1938 5	2166 4	2415 7	2688 3
4W	124 9	1787	4341	8309	1154 1	2239 5	3076 8	4170 6	5592 4	7433 0	9806 5

Non-Motorized Transport

Total Cycle length (km)	60
Cost to construct cycle track (USD per foot)	3
Total Cost (in Million)	0.6



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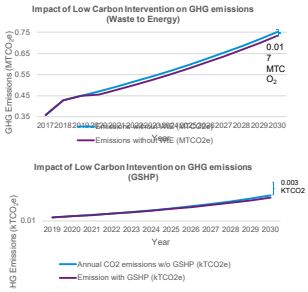
Low Carbon Interventions – Untapped Energy

PROPOSED INTERVENTION	RATIONALE
Generation of energy in the form of electricity through incineration of solid waste	• 160MT of solid waste in2017 • Based on population growth expected to produce 185MT by 2030 which can supply fuel to 5MW WtE plant. • Existing incinerators can be retrofitted with requisite equipment to develop a WtE plant. • Assist in waste management & provide alternate means of power generation.
Ground source heat pump (GSHP) for heating in residential buildings	• Da Lat being a hill station, there is a need in heating commercial and residential buildings • In most cases grid electricity is utilized. • Energy available in the Earth's crust can be utilized to act as alternate source of energy to provide for the heating requirements • Reduces dependence on external source of energy as well as reducing emissions related to power generation.

Cumulative Financial Requirement for intervention till 2030	
Waste to Energy	USD 75,000,000
GSHP	USD 11,525



Low Carbon Interventions – Multi-Energy & Area Energy System

Multi-Energy System

PROPOSED INTERVENTION	RATIONALE
Cogen (CHP) plants	• CHP capture and utilizes heat otherwise wasted in power generation • CHP require less fuel to produce the same amount of energy. • Also CHP systems can be used for power supply as well as heating/cooling requirement

Preliminary estimate of investment requirement for CHP in Da Lat

Year	Power generation Capacity (kW)	Investment required (US$)
2020	0.00005	166
2021	0.00011	202
2022	0.00019	243
2023	0.00038	517
2024	0.00071	621
2025	0.00125	742
2026	0.00196	1187
2027	0.00287	1413
2028	0.00420	1674
2029	0.00591	1975
2030	0.00809	2782

Assessment of areas for detailed feasibility study of CHP systems is currently underway

Area Energy System

PROPOSED INTERVENTION	RATIONALE
Aggregated heating/ cooling systems	• Aggregated systems connect renewables, waste heat, thermal storage, power grids and heat pumps for heating/cooling of multiple buildings through single system • Requires up to 50% less primary energy consumption than individual heating/cooling units

Considerations for estimating feasibility of intervention

Step 1:
Gathering input data
- Built-up area of building
- Occupancy of building
- Development time
- Power & water tariff
- Cooling demand per sqm
- Operational parameter (COP, EFLH)
- Costs of setting up systems
- CO_2 emission baseline

Step 2:
Development of model for emission reduction:
- End-user description
- Hourly cooling demand of typical design day
- Estimate technical requirements of plant
- O&M cost of plant
- Estimate emission reduction

Step 3:
Financial assessment of intervention to assess feasibility:
- Tariff structure for district cooling
- End-user discount for using district cooling

Assessment of areas to be considered for feasibility of Area Energy System is currently underway

Low Carbon Intervention – Renewables & Energy Management System

Renewables

PROPOSED INTERVENTION	RATIONALE
Grid tied Gross metering - Rooftop Solar Power Generation	• Available rooftop area in residential buildings can be utilized to install solar panels • Reduce dependence on grid electricity which in turn depends on fossil fuel for generation

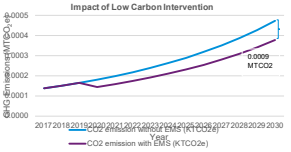
Calculation for maximum solar power potential of Da Lat

Parameter	Value
Total residential area (as per Land Use Plan of Da Lat)	14449300 sqm
Total available rooftop area	3612325 sqm
Maximum power generation capacity (as per standard conversion)	0.36 GW_{peak}
Financial requirement for installing solar panel (as per case studies)	433 million USD
Maximum emissions savings (based on electricity generation avoided)	0.162 MTCO2e

Assessment of available rooftop area in Da Lat for estimation of achievable targets currently underway

Energy Management System

PROPOSED INTERVENTION	RATIONALE
Installation of EMS in buildings	1. Reduce energy consumption by 20% by automatically optimizing consumption & helping user make controlled decision on power consumption 2. Phase-wise installation recommended to ensure maximum penetration: • Phase I: Existing public buildings • Phase II: Existing commercial buildings • Phase III: Existing private office building • Phase IV: Existing residential building



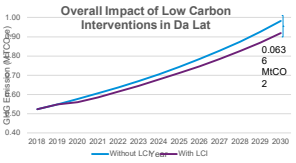
Low Carbon Intervention – Overall city

Emission Reduction

- Adoption of Low Carbon Interventions will lead to cumulative savings of 0.40 $MTCO_2e$
- Savings from WtE intervention, low emission vehicles, NMT infrastructure will account for 46%, 33% and 21% of cumulative savings
- Savings in other interventions are area-based & will be determined after stakeholder consultation

Investment Requirement

- Cumulative investment of USD 17.33 million required for implementing interventions between 2020-2030.
- WtE plant cost alone comprises USD 16.7 million followed by construction of non-motorized infrastructure (USD 0.6 million)
- Investment in procuring EVs is USD 11620 and in installation of GSHP is USD 11525
- Investment in other interventions to be calculated based on



Source of funding for low carbon interventions

Multi-lateral funding agencies	*Government Funding*	*Private sector entrepreneurs*
• ADB funding USD 100 mn for WtE project in Mekong Delta (Vietnam)[1] • World Bank funding USD 500 mn in solar rooftop project in India[2]	• Use of biofuels for commercial transport is part of Da Lat Green Growth Plan • Government funds can be utilized by developing robust implementation mechanism	• Private sector players already introducing ride sharing facilities in Hanoi & HCM • Local govt. can invite such private players to invest in Da Lat

Proposals can be prepared for sourcing of funds from Govt. & multilateral agencies
Private sector players can be invited to invest in new business propositions

Detailed assessment of funding sources and mechanisms to be conducted as part of feasibility study
Feasibility study also provide information relevant for preparing proposals

Post-workshop consultation to be undertaken to gather data to facilitate assessment in feasibility study

Source: [1]ADB Website, [2]World Bank website

Thank You

IRSD, Viet Nam

KPMG

NIKKEN

Fernando Magallanes,
Forestry Engineer
Municipality of La Molina

La Molina

Road to a sustainable city

10 September 2021

Introduction of La Molina

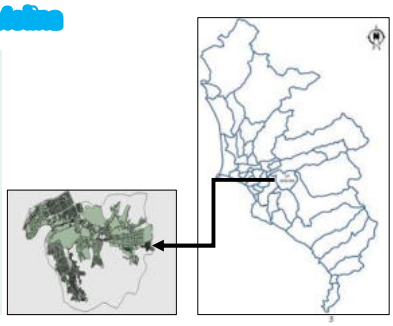
Introduction of La Molina

2021

✓POPULATION: The population of metropolitan Lima is 11'591,004 inhabitants, while La Molina has a population of 178,200 inhabitants.

✓EMISSIONS: Lima emites 15'432,105 tons of CO_2 annually, and La Molina 260,000 tons of CO_2 emitted annually.

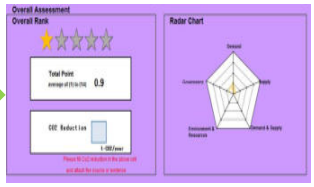
✓URBAN GREEN: Metropolitan Lima has 4.9 m² of green area per inhabitant, while in La Molina every person has 10,5 m² of green areas.



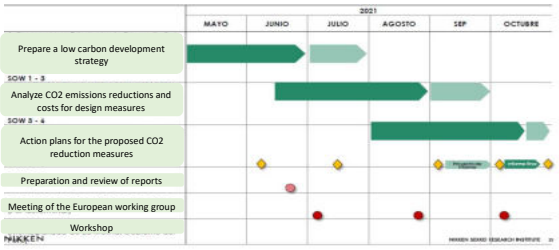
Self-assessment made by APEC Logistics

Asia-Pacific Economic Cooperation

APEC Low-Carbon Town Indicator System Guideline



APEC Low-Carbon Model Town Project

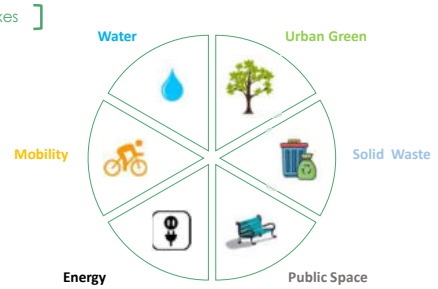


Low-Carbon Model Development in La Molina

A greener city, walkable and accessible, that encourages healthier lifestyles, with meeting spaces that encourage respect and love for nature. And committed to a development that involves low carbon dioxide emissions.

Low Carbon Model Development in La Molina

[Main Axes]



7

Low Carbon Model Development in La Molina

[Main Projects]

- Tech Irrigation
- PTAR
- Green Corridors
- Urban Forest
- Molihuertos
- Ecological Park
- Tree Phone
- Molibike
- Molibus
- EcoRecicla
- Green Waste
- Solar Energy
- River Park
- Moliterrazas

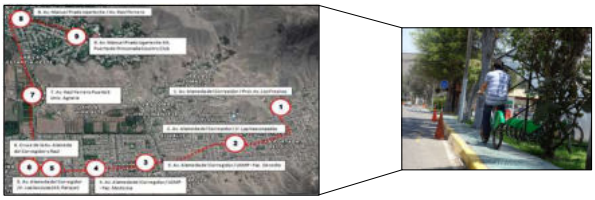
8

Low Carbon Model Development in La Molina

[Mobility]

[MoliBike]

Promotion of use of the Bicycle with the Molilbike program, in addition to that, it has 15km of bike lines. Also there are 9 stations.



2019 15 km of bike lines → **2020** 20 km of bike lines → **2021/2022** 50 km of bike lines

Low Carbon Model Development in La Molina

[Mobility]

[Molibus]

The municipality promotes the use of mass transportation to use fewer private cars.

Low Carbon Model Development in La Molina

[Water]

[Technified irrigation]

Technified irrigation systems to reduce the amount of water used in the irrigation of parks and avenues.

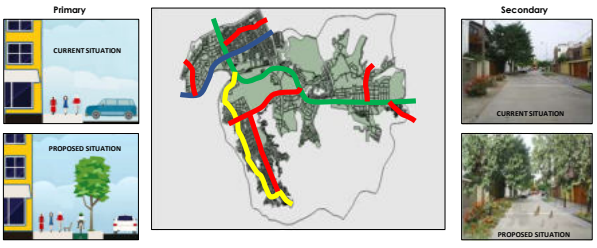
2019 20 parks → **2020** 24 parks → **2021/2022** 30 parks

Low Carbon Model Development in La Molina

[Urban Green]

[Green Corridor]

It will seek to have more urban trees in some streets and avenues.

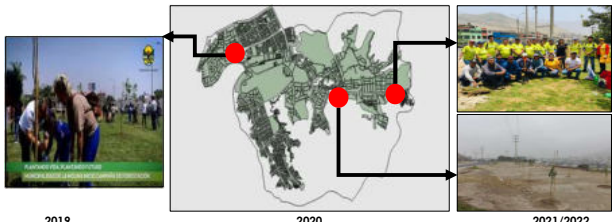


Low Carbon Model Development in La Molina

Urban Green

Urban Forest

Creation of small urban forests distributed all over the district.



2019	2020	2021/2022
3 forests →	5 forests →	7 forests

Low Carbon Model Development in La Molina

Urban Green

Tree Phone

Both programs add forest plantations.

2019	2020	2021/2022
1000 trees →	5000 trees →	10 000 trees

Low Carbon Model Development in La Molina

Urban Green

Molihuertos

The Municipality of La Molina promotes urban agriculture.

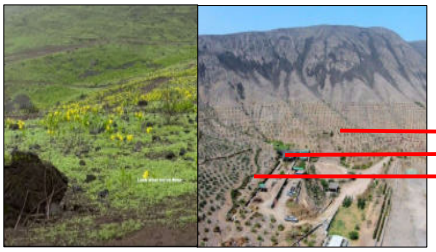
2019	2020	2021
0 beneficiaries →	100 beneficiaries →	600 beneficiaries

Low Carbon Model Development in La Molina

Urban Green

Ecogical Park

The ecological park of La Molina gives value to the hillsides, it is a space for public enjoyment. It Will be part of a regional conservation area for Lima.

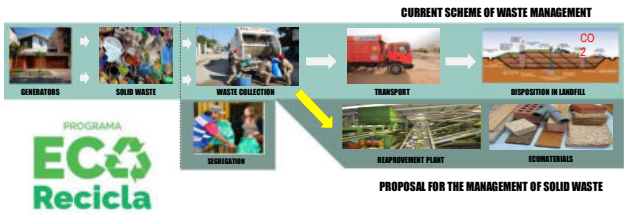


- **Forests**
- **Tree nursery**
- **Residual Water treatment plant**

Low Carbon Model Development in La Molina

Solid Waste

Eco Recicla



Low Carbon Model Development in La Molina

Solid Waste

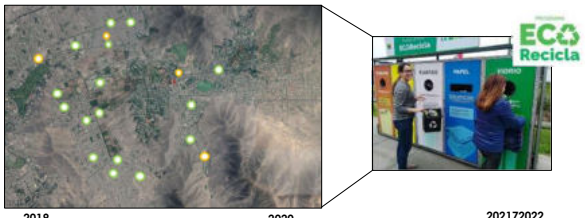
Eco Recicla

Low Carbon Model Development in La Molina

Solid Waste

Eco Recicla

The program has collected 227 tons directly, also has 3 associations of recyclers who have collected 115 tons.



2019
500 ton
20 points

2020
550 ton
23 points

202172022
600 ton
26 points

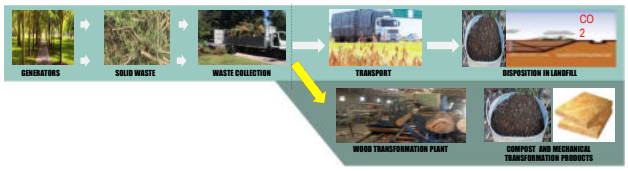
Low Carbon Model Development in La Molina

Solid Waste

Green Waste

This project looks for 100% reuse all green waste.

CURRENT SCHEME OF GREEN WASTE MANAGEMENT



PROPOSAL FOR THE MANAGEMENT OF GREEN WASTE

Low Carbon Model Development in La Molina

Solid Waste

Green Waste

It seeks to take advantage of all the grass that leaves the maintenance service of the green áreas.

Low Carbon Model Development in La Molina

Public Space

River Park

Low Carbon Model Development in La Molina

Public Space

Molíterrazas

Low carbon model development in La Molina

La Molina and carbon footprint

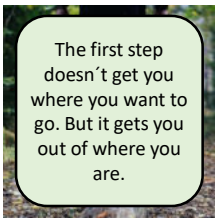
260 thousand tons of CO2 in the year 2019

228 thousand tons of CO2 in the year 2027

- Residential
- Commercial
- Transport
- Solid Waste
- Institutional

Low Carbon Model Town in Images

Finalphase



Fernando Magallanes Iberico
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Forestry Specialist
La Molina Town, Set 2021

Thank you for your attention !

Low-Carbon Model Town in Khon Kaen Municipality

Mr. Boonyarit Phanichrungruong
Deputy Mayor of Khon Kaen Municipality
and
Mr. Padungsak Unontakarn
Assistant Managing Director
Bright Management Consulting Co., Ltd.

Department of Alternative Energy Development and Efficiency MINISTRY OF ENERGY

APERC

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

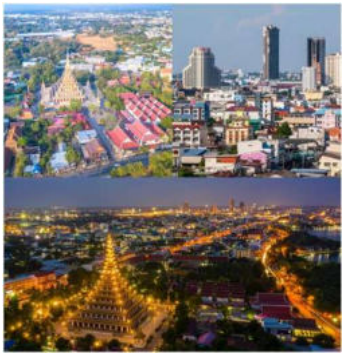
Introduction of Khon Kaen

Khon Kaen is commercial and political center of Isan (or Northeast Region Thailand). This is a dynamic city which has been one of the fastest-growing areas in Thailand.

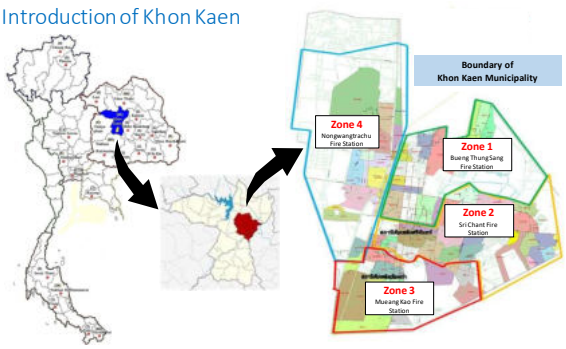
Name of City:	Khon Kaen Municipality
Status:	City Municipality
District:	Muang Khon Kaen
Province:	Khon Kaen
Total Area:	46 km²
Population:	120,143 of registered
GPP:	200,00 Million THB

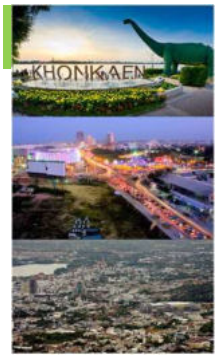
Reaching to Khon Kaen:

- By personal cars, bus, or train.
- By airplane (Khon Kaen International Airport).



Introduction of Khon Kaen





Introduction of Khon Kaen Municipality

Administrative:

Zone	No. of Community
1	17
2	28
3	31
4	19
Total	95

Climate: Tropical savanna climate

Economic: Rely on tourism, and industry.

Environmental: Waste generated is around 210 tons/day – composition is:

- 59% is Organic waste
- 23% is Plastic / Foam waste
- 6% is Paper waste
- 2% is Fabric waste
- 10% is others

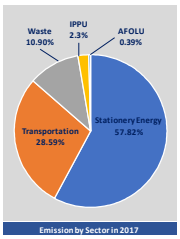
CO_2 Reduction Results and Roadmap

City Carbon Footprint (CCF)* between 2013 and 2017 by using *GPC Standard* and reporting the results with BASIC+ level

Year	Emission by Scope (Unit: tCO_2e)					
	Stationery Combustion	Transportation	Waste	IPPU	AFOLU	Total
2013	212,651.89	80,743.82	80,166.65	7,875.28	1,137.73	**382,575.38**
2014	215,206.98	154,741.55	86,057.50	7,992.57	1,253.90	**465,252.50**
2015	226,252.29	98,768.23	84,413.15	7,905.45	1,375.26	**418,714.38**
2016	236,234.41	105,854.45	77,470.79	9,579.31	1,513.86	**430,652.81**
2017	239,076.54	118,214.43	45,078.71	9,497.45	1,613.15	**413,480.28**

3.44 tCO_2e per capita per year

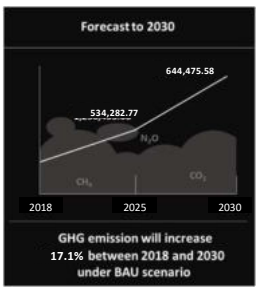
9,105 tCO_2e per km^2 per year



Emission by Sector in 2017

Remark * The CCF was evaluated under the project of *"Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand"*; funded by gef which commits to collaborate with TGO and UNDP. The project timeline is between 2016 and 2021.

CO_2 Reduction Results and Roadmap



Base Year: 2017

Year of Consideration: between 2018 and 2030

Condition: BAU Scenario

Assumption Applied for Forecast:

Stationery Energy sector has CO_2 emission growth rate at **3.04%** per year between 2018 and 2030.

Transportation sector has the highest of CO_2 emission growth rate at **4.85%** per year between 2018 and 2030.

Waste sector has CO_2 emission growth rate at **2.86%** per year between 2018 and 2030.

IPPU sector has negligible CO_2 emission growth rate.

AFOLU sector has negligible CO_2 emission growth rate.

Low-Carbon Model Development in Khon Kaen Municipality

	Low Emission Measures (Study)	Short-term (2022-2023)	Medium-term (2023-2025)	Long-term (2026-2030)	Expect of CO_2 Reduction (TCO_2e)
Energy Efficiency Measures					
1	Replace with LED bulbs to increase lighting efficiency	✓			42,695.36
2	Install new lighting equipment for public roads	✓			
3	Create new implementation framework with private sector to enhance future EE projects		✓		
Alternative Energy Measures					
4	Install new lighting equipment, solar cell, for public area	✓			57,756.00
5	Production of biodiesel	✓			
6	Energy production from solar energy (self-consumption)	✓			
Waste Management Measures					
7	Establish waste management stations to produce compost	✓			20,468.62
8	Install composting bin at household	✓			
9	Promote 3Rs activity	✓			
Transportation Management Measures					
10	Promote and enhance biodiesel for vehicle	✓			59,955.57
11	Promote and enhance gasohol for vehicle	✓			
12	Establish LRT	✓			
13	Promote walking and cycling		✓		
14	Promote private EV vehicle			✓	
15	EV vehicle for public transportation			✓	
Agricultural and Forestry Management					
16	Increase green area				1,452.00
				Total Expect CO_2 Reduction (TCO_2e)	182,327.05

Low-Carbon Model Development in Khon Kaen Municipality

Project of Recycle Waste Segregation
Supported by: Municipality / gef, UNDP, and TGO
CO_2 Reduction: 667 TCO_2e between January 2018 and July 2021

Project of RDF Development
Supported by: Municipality
CO_2 Reduction: 96,007 TCO_2e between November 2016 and July 2021

Low-Carbon Model Development in Khon Kaen Municipality

Project of Solar Cell Installation at Wastewater Treatment Plant
Supported by: Municipality / gef, UNDP, and TGO
CO_2 Reduction: 22 TCO_2e between August 2019 and July 2021

Project of Solar Rooftop Installation at Municipal Market
Supported by: Municipality / gef, UNDP, and TGO
CO_2 Reduction: 23 TCO_2e between August 2019 and July 2021

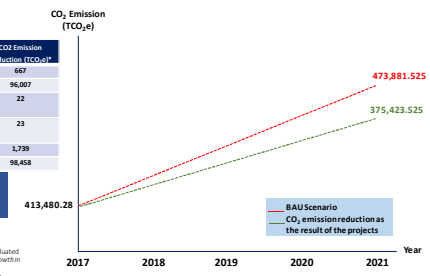
Low-Carbon Model Development in Khon Kaen Municipality

Project of Establish Waste Management Station
Supported by: Municipality / gef, UNDP, and TGO
CO_2 Reduction: 1,739TCO_2e October 2018 and July 2021

Low-Carbon Model Development in Khon Kaen Municipality

Project	CO2 Emission Reduction (TCO_2e)*
Recycle Waste Segregation	667
RDF Development	96,007
Solar Cell Installation at Wastewater Treatment Plant	22
Solar Cell Installation at Municipal Market	23
Establish Waste Management Station	1,739
Total	98,458

Almost **21%** reduction of CO_2 emission in 2021 compared with BAU scenario.



Remark * The CO_2 emission reduction was evaluated under the project of "*Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand*", funded by gef which commits to collaborate with TGO and UNDP.

Notable Achievements

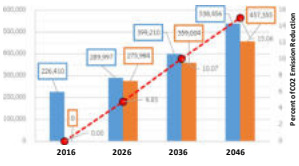
Self-assessment results by LCT-I system

None of self-assessment due to the project is currently in the developing phase.

Future Plan

The development of public transportation through "**Light Rail Transit**" or LRT is currently in the process of draft contract preparation.

The expected outcome is to enhance Khon Kaen Smart City Development, CO_2 and energy use reduction.



Year	Annual CO_2 Emission* (tCO_2e)		CO_2 Emission Reduction	Percent of Reduction
	BAU	With LRT		
2016	226,410	-	-	-
2026	289,997	275,984	14,013	4.83
2036	399,210	359,004	40,206	10.07
2046	538,456	457,355	81,101	15.06

Remark * The CO_2 emission reduction was evaluated under the project of *"Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand"*; funded by gef which commits to collaborate with TGO and UNDP.

Low-Carbon Model Town in Images

The Municipality was awarded the **"Clean Energy for Life"** which a reward granted by Power Development Fund under the Office of Energy Regulatory Commission (ERC)
(Source: https://sdg.kku.ac.th/1053)

6MW of RDF Power Plant
(Source: https://

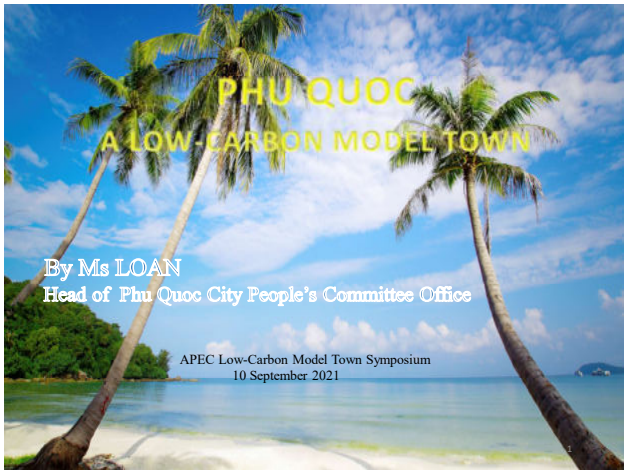
Solar rooftop installation at Municipal market and public building
(Source: Achieving Low Carbon Growth in Cities through Sustainable Urban Systems Management in Thailand)

Mr. Boonyarit Phanichrungruong
Deputy Mayor of Khon Kaen Municipality

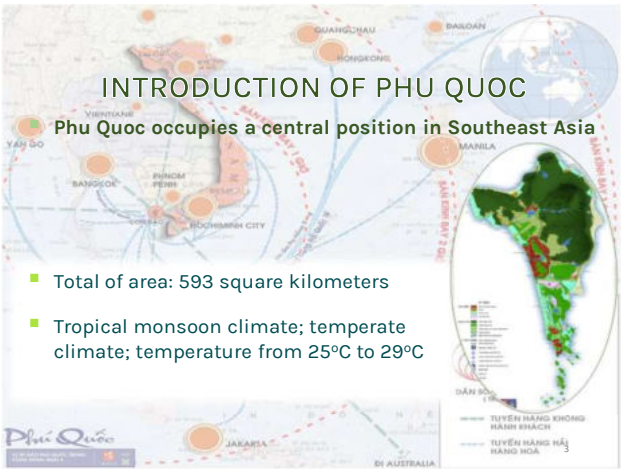
and

Mr. Padungsak Unontakarn
Assistant Managing Director
Bright Management Consulting Co., Ltd.
Email: kamolt@bright-ce.com

Thank you for your attention !


PHU QUOC
A LOW-CARBON MODEL TOWN
By Ms LOAN
Head of Phu Quoc City People's Committee Office
APEC Low-Carbon Model Town Symposium
10 September 2021


CONTENTS
1. Introduction of Phu Quoc
2. Low Carbon Models and notable achievements
3. Environment protection
4. Plans for future


INTRODUCTION OF PHU QUOC
Phu Quoc occupies a central position in Southeast Asia
Total of area: 593 square kilometers
Tropical monsoon climate; temperate climate; temperature from 25°C to 29°C


The forest area accounts for 67% of the island area
A rich source of surface water and a dense network of rivers and brooks
Fresh air


Population (2021)
155.339 people
COMMERCE - SERVICE - TOURISM
AGRICULTURE
FISHERY

Phu Quoc has a power system connecting with the power grid via the 110kV undersea cable system

and is now building the second overhead electricity cable (220kV)

9

CO_2 reduction results and roadmap

- ✓ Using no oil thermal power sources.
- ✓ Making use of solar power to help reduce fossil energy consumption (the number of households investing in roof voltage is 239 households by December 2020)
- ✓ Developing renewable energy projects in separated islands (Tho Chau.....)
- ✓ Reducing greenhouse gas emissions, carrying out propaganda solutions to save electricity such as responding to the Earth Hour campaign; replacing incandescent lamps with compact lamps... Thereby, the statistical commercial electricity is 380 million kWh, down 17% compared to the expected commercial electricity according to the socio-economic development rate of 2020.

CO_2 reduction results and roadmap

- ✓ Invest in building domestic waste treatment plants in Bai Bon hamlet, Ham Ninh commune to take of waste sources to create products for human use (electricity, fertilizer...)
- ✓ Invest in building the electric bus system to serve the travel of people and tourists.
- ✓ Development of green areas in the transport system to reduce greenhouse gas emissions.
- ✓ Receive targeted budget support from the European Union (EU) in Vietnam's sustainable energy transition program has been issued-EU in decision 1367/QĐ-TTg dated July 28, 2021 of the Prime Minister in Viet Nam

Some disadvantages:

- On-going works and projects

- Funding for science and technology

- Investors with low carbon emission in mind

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ENVIRONMENT PROTECTION

- Phu Quoc always makes efforts to contribute to the socio-economic development in accordance with environmentally sustainable development.
- Phu Quoc has been expanding several programs and projects in the field of environment protection.

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ENVIRONMENT PROTECTION

- Collecting and treating household waste in the whole locality have reached over 90 percent. (The total amount of household waste collected in 2020 is about 70,000 tons of garbage, on average about 300 tons/day)
- Phu Quoc does not have a centralized wastewater treatment system.
- Strengthening the inspection and supervision of production and business establishments and construction projects

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Future plan of the LCMT in Phu Quoc

-Promote the application of science and technology.

-Exchange fuel, smart traffic technology and green transport to reduce greenhouse gas emissions.

-Save electricity from 5%, equivalent to a reduction of 19.500 tons of CO a year.

- Exploiting, rationally and effectively using land and natural resources; protect the primary forest ecosystem, continue to maintain the forest area

- Building a regional environmental monitoring system, applying geographic information system (GIS)

- Controlling agricutural and forestry production activities and environmental monitoring system.

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17

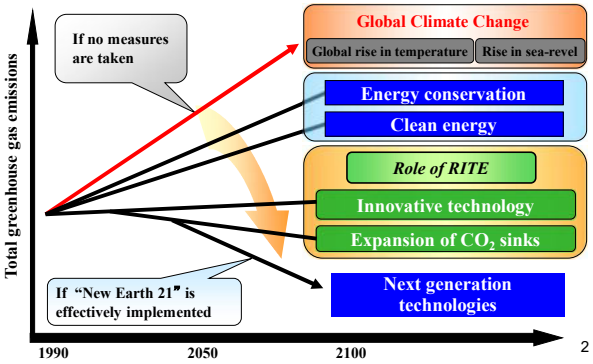
Overview of RITE

Takashi Honjo
Senior Managing Director

Research Institute of
Innovative Technology for the Earth

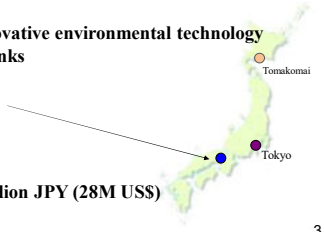
"New Earth 21": Earth Regeneration Plan

proposed by Japanese government in 1990 Houston Summit

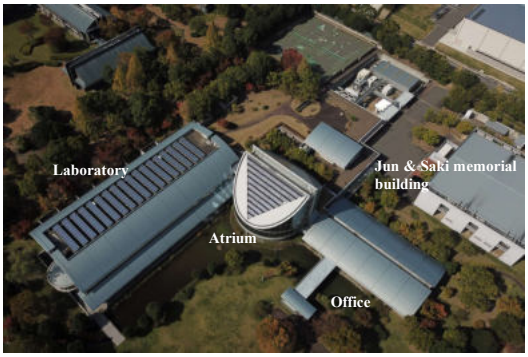


Profile of RITE

- Objective : R&D of industrial technologies that contribute to the conservation of the global environment and the progress of the world economy
- Establishment : July 1990 (Supported by MITI, local governments, academic circles and industries)
- Activities : Development of innovative environmental technology
  Expansion of CO_2 sinks
- Location : Kansai Science City
- Staffs : 173 (August 2021)
- Annual budget : Approx. 3.1 billion JPY (28M US$)
  (105 JPY/US$)

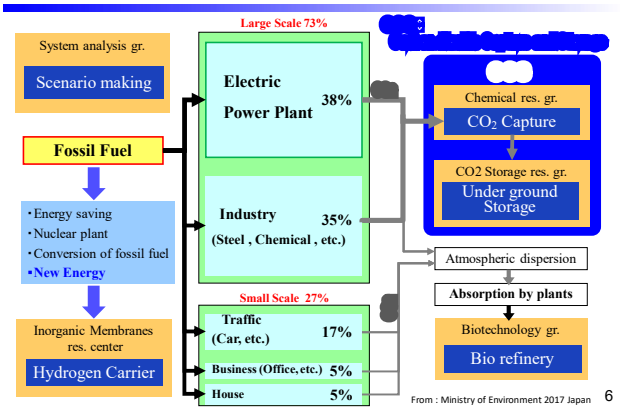


Headquarters



Focuses of RITE Activities

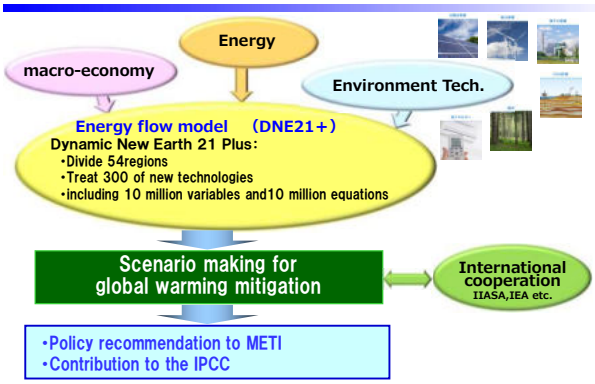
Our Projects to Reduce CO_2 emission



From : Ministry of Environment 2017 Japan

System

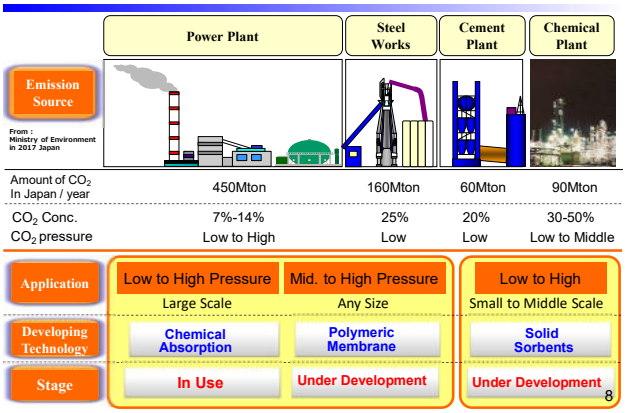
Policy analysis for GHG emission



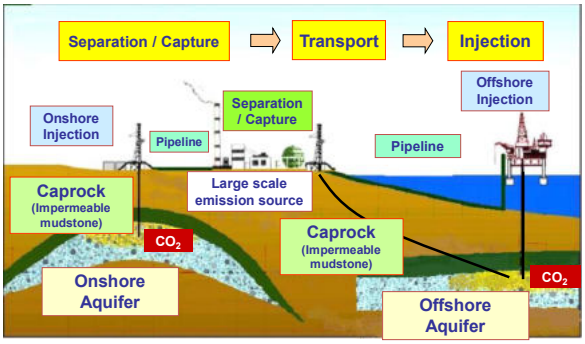
C O P : Conference of the Parties
IPCC : Intergovernmental Panel on Climate Change

CCS
Chemical

CO_2 Separation and Capture

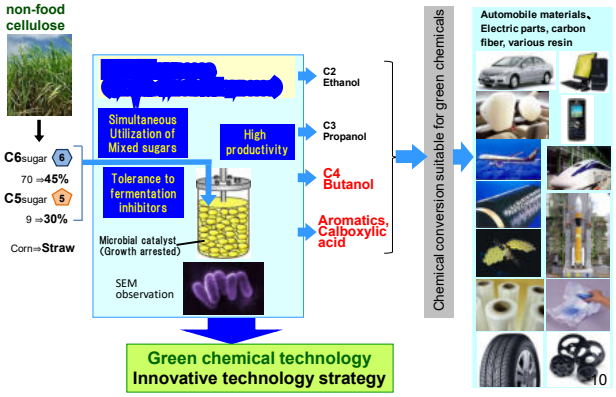


CCS: Carbon Dioxide Capture and Storage



Biotech

Bio Refinery



International Cooperation

United States

・**Lawrence Berkeley National Laboratory（LBNL）**
Research collaboration on monitoring technology by optical fiber

・**The National Renewable Energy Laboratory（NREL）**
Research collaboration on bio-butanol and bio-hydrogen

France

・**National Center for Scientific Research（CNRS）**
Research collaboration on bio-hydrogen

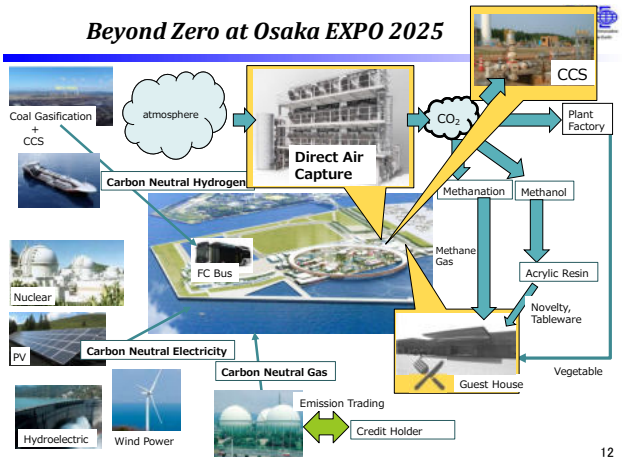
Inter-National

・**International Institute for Applied System Analysis（IIASA）**

・**Standardization of CCS （ISO/TC265）**

・**Intergovernmental Panel on Climate Change（IPCC）**
Support Japanese government

Beyond Zero at Osaka EXPO 2025



Management Team


President
Prof. Kenji Yamaji


Advisor
Prof. Yoichi Kaya


Deputy Director-General
Yoshiaki Sugitani


Senior Managing Director
Takashi Honjo


Managing Director
Yutaka Kawakami


Group Leader
Dr. Masayuki Inui


Group Leader
Prof. Shin-ichi Nakao


Group Leader
Isamu Yagyu


Group Leader
Dr. Keigo Akimoto


Group Leader
Dr. Ziqiu Xue

5

Thank you for your attention

[redacted]

Michi Kohno
President and CEO
Michi Creative City Designers Inc.

APERC

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

MICHI CREATIVE CITY DESIGNERS INC.

Summary of the project (1)

Towns	Economies	Phases
San Borja	Peru	Development
Mandaue	The Philippines	
Davao		Dissemination
Banda Ache	Indonesia	
Phu Quoc	Vietnam	

Section 1 - Achievements

- Quantitative data of GHG emission reduction have not been obtained in the volunteer towns of the dissemination phase.
- Adequate amendments and reinforcements on existing laws, regulations and ordinances have been made to be in line with LCMT recommendations.
- Momentum towards the low-carbon towns has been raised among both municipalities and the communities of residents.
- Understanding on the ways to tackle GHG emission reduction and to monitor the current status and progress of efforts has been disseminated among participants.

Section 2 – Areas of opportunity

- Difficulties in obtaining data with accuracy and transparency from many stakeholders including private sectors – *Will become a "MUST" anyway*
- Capacity building of municipality human resources with skills of data analysis and action planning – *An area APEC can assist member economies*

Summary of the project (2)

Towns	Economies	Phases
San Borja	Peru	Development
Mandaue	The Philippines	
Davao		Dissemination
Banda Ache	Indonesia	
Phu Quoc	Vietnam	

Section 3 – Looking ahead

- Local governments should work with the central governments to coordinate their plans with the central policies in order to continue their low-carbon plans.
- For the prioritization of low-carbon policies over other policies, consultations by external organizations like APEC are effective.

Section 4 – About the LCMT project

- All the participating towns recognize the LCMT project and LCT-I useful.
- They have learned the methodologies of fact finding, identifying the priority areas, and systematic planning from the LCMT project.
- Some action items suggested may fall in central government's responsibility, and it would be helpful to municipalities if the APEC documents included hints on the capacity building of municipality personnel on this issue.

Summary of the project (3)

Reinforcement of policies, laws, regulations and ordinances

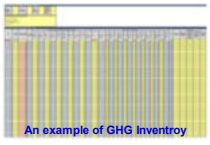
Categories	Examples of focus areas
GHG emission reduction	✓ Local Climate Change Action Plan (LCCAP) ✓ Promotion of sustainability education
Building	✓ Green Building Code ✓ No building zone along a river
Transportation	✓ Ordinance on bike-lane ✓ High Priority Bus System and BRT
Solid waste management	✓ Solid waste collection
Water treatment	✓ Ordinances on water (river) environment
Land use and greenery	✓ Enforcement of comprehensive land use plan (CLUP) ✓ Forest Land Use Plan (FLUP)

[redacted]

Mandaue, The Philippines

Self-governed communities

Davao, The Philippines



Bicycle lane in Davao

[redacted]

Banda Ache, Indonesia

Waste collecting point

Collecting methane gases from sanitary landfill

Utilization of solar panels

San Borja, Peru

Urban greening by citizens

Solid waste management and recycling

Kallpa Wasi Eco Park for education

Changes in the Landscape of Low Carbon Towns

2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Jun					Dec					Apr	

APEC Energy Ministerial Meeting

COP21 Paris Agreement

Climate Summit
Commitments for acceleration of actions

Low Carbon Town → **Zero Carbon Town**

All the cities and towns on the Earth shall have to become "Zero Carbon Towns".
Being a "Low Carbon Model Town" will no longer be a special status, but just universality.

Continuous Value of APEC Low Carbon Model Towns

The unchanging:

Methodologies towards Zero Carbon Towns, the participating towns learned from Low Carbon Model Towns Project

- ✓ Approaches in five aspects: (1) Demand side, (2) Supply side, (3) Demand and supply sides, (4) Environment and resources, (5) Governance
- ✓ Self-assessment and progress monitoring by Low-Carbon Town Indicators

The volatile:

Technologies applicable and available

- ✓ Energy-related technologies
- ✓ Measurement and forecasting
- ✓ Data analytics and AI
- ✓ Hydrogen society

Opportunities for Improvements

The "Concept":

- ✓ Sixth Edition, the latest edition, was published in November, 2016, and nearly five years have passed since then.
- ✓ Technologies and the "best practices" have changed and evolved during these years.

Issues

Proposal

- ➢ Periodical (biennial?) revision of "The Concept of the Low-Carbon Town in the APEC Region" to include the latest technologies and examples ***(APEC's regular funding)***

LCT-I:

Issues

- ✓ Selection of indicators unsuitable to developing economies
- ✓ Uneven and irrational weighing among assessment areas

Proposal

- ➢ Full-fledged revision of LCT-I ***(Onetime cost)***

MICHI CREATIVE CITY DESIGNERS INC.

Michinaga Kohno
President and CEO,
Michi Creative City Designers Inc.
michi@michi-city.com

Thank you for your attention !

APERC

APEC Low-Carbon Model Town Project Wrap-up Symposium

10 September 2021

Low-Carbon Model Towns Review

Hung-Wen LIN

Green Energy and Environment Research Laboratories

Industrial Technology Research Institute

Chinese Taipei

Low-Carbon Model Towns

Viet Nam
- Da Lat
- Da Nang

https://zh.wikipedia.org/wiki/File:Vietnam_catholic_dioceses_map.svg

Malaysia
- Hang Tuah Jaya
- Shah Alam

https://www.google.com/maps/

Peru
- La Molina

https://www.familysearch.org/wiki/en/Peru_Genealogy

Assessment framework of the LCT-I System

	Tier 1	Tier 2 (No. of Tier 3 indicators)
Directly Related	Demand	1. Town Structure (3) 2. Buildings (4) 3. Transportation (6)
	Supply	4. Area Energy System (1) 5. Untapped Energy (1) 6. Renewable Energy (1) 7. Multi Energy System (1)
	Demand & Supply	8. Energy Management System (3)
Indirectly Related	Environment & Resources	9. Greenery (2) 10. Water Management (3) 11. Waste Management (2) 12. Pollution (3)
	Governance	13. Policy Framework (4) 14. Education & Management (2)

Da Lat, Viet Nam

Tier 1	Tier 2	Achievements
Demand	• Town Structure • Buildings • Transportation	• Energy Simulation to estimate energy savings achieved by implementing Green Building Code • Reduce vehicular (Transit Oriented Development) & increase carbon sequestration (Green Redevelopment) for new area • Increase public transport ridership；Penetration of low emission fuel；Non-motorized vehicle and pedestrian Infrastructure；Personal vehicles sharing
Supply	• Area Energy Sys. • Untapped Energy • Renewable Energy • Multi Energy Sys.	• Aggregated heating/cooling supply units • Waste to Energy - Power generation through incineration of solid waste. • Ground source heat pump - heating purpose in commercial and residential buildings • Rooftop Solar Power Generation in residential and commercial buildings • Cogen or CHP plants produce electricity along with heating which can be used for heating system
Demand & Supply	• Energy Management System	• Integrated BEMS for monitoring and controlling energy-related building plant and equipment
Environment & Resources	• Greenery • Water & Waste Management • Pollutions	• Assist in waste management & provide alternate means of power generation. • Increases green spaces within cities - increasing carbon sequestration
Governance	• Policy Framework • Education & Management	• Multi-lateral funding agencies • Government Funding • Private sector entrepreneurs

Data Source: Presentation file of Da Lat

Da Nang, Viet Nam

Tier 1	Tier 2	Achievements
Demand	• Town Structure • Buildings • Transportation	• Public lighting
Supply	• Area Energy Sys. • Untapped Energy • Renewable Energy • Multi Energy Sys.	• Rooftop solar power
Demand & Supply	• Energy Management System	
Environment & Resources	• Greenery • Water Management • Waste Management • Pollutions	• The air pollution index (API) in urban areas was maintained at less than 100 • Average urban green area at 6 – 8 m²/ person • Percentage of households with access to clean water in city center and rural area were 97.83% and 76.81% respectively • 100% of industrial wastewater met discharge requirements • >95% of domestic solid waste collected in urban areas, in rural areas >70%; • In 2020, over 83% of domestic wastewater was collected, over 50% was properly treated in accordance with standards.
Governance	• Policy Framework • Education & Management	• Develop new and renewable energy • Program on economical and efficient use of energy • Develop rooftop solar power • Construct electric car charging stations • Specify the interest rate support policy

Data Source: Presentation file of Danang

Hang Tuah Jaya, Malaysia

Tier 1	Tier 2	Achievements
Demand	• Town Structure • Buildings • Transportation	• All new development within the area to apply Green Building Rating (volunteer basis) • Adoption of Malaysia Standard (MS) 1525:2019 (Mac 2020) • Green incentive on green construction & development • Apps for Smart Parking Hang Tuah Jaya (2018) • Introduction 'Green Bus Network Corridor' (under study – GFCP) • Incentive and parking rebate for EV (2018) • Mobility as a Service (MaaS) – e-hailing
Supply	• Area Energy Sys. • Untapped Energy • Renewable Energy • Multi Energy Sys.	• District Cooling System (DCS) project in MITC area (preliminary stage) • Decarbonized Community program. To encourage community to apply solar panel installation through Net Energy Metering Program (on going project) • Completion of 2 solar farm project (private initiatives) with total capacity 58 MW (2019) • Policy on investment and developing solar farm
Demand & Supply	• Energy Management System	• Smart Grid program (2019) • Building Energy Online Data Monitoring System • Energy Audit Report Implementation
Environment & Resources	• Greenery • Water & Waste Management • Pollutions	• Carbon sequestration • Rainwater Harvesting Project for Schools in Hang Tuah Jaya
Governance	• Policy Framework • Education & Management	• High level commitment on achieving Low Carbon City Status by 2030 and Net Zero Carbon City by 2050 • Integration and link-up with state commitment on GHG reduction and environmental protection • Community awareness on mitigation and adaptation • Special program on Low Carbon Eco-Schools and Green Ambassador • Climate financing and Budgeting

Data Source: Presentation file of Hang Tuah Jaya

Shah Alam, Malaysia

Tier 1	Tier 2	Achievements
Demand	• Town Structure • Buildings • Transportation	• Natural Lighting & Building Orientation ; District Cooling with Thermal Storage • Replacing CFL & Fluorescent with LED bulbs
Supply	• Area Energy Sys. • Untapped Energy • Renewable Energy • Multi Energy Sys.	• Solar PV
Demand & Supply	• Energy Management System	• Integrate building monitoring system for data collection
Environment & Resources	• Greenery • Water & Waste Management • Pollutions	• Roof Garden • Natural ventilation car park • Promote reduction on waste program : Promote recycle program : Energy & Water Saving Pump System
Governance	• Policy Framework • Education & Management	• LCCF program that anchored from four GHG Reduction element. MBSA aimed to reduced GHG with minimum 3% yearly target from 2015 to 2019. While, MBSA final mission to fulfill domestic Carbon Reduction of 45% by 2030 • Shah Alam Low Carbon Action Plan 2017

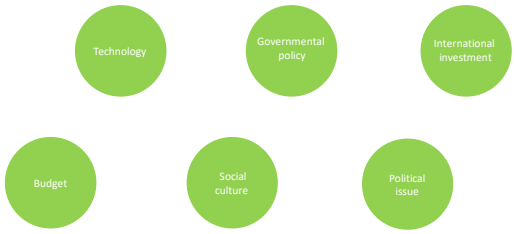
Data Source: Presentation file of Shah Alam

La Molina, Peru

Tier 1	Tier 2	Achievements
Demand	• Town Structure • Buildings • Transportation	• Promotion of use of the Bicycle, 15km of bike lines, 9 stations. • Green roofs • The municipality promotes car sharing for neighbors to use fewer private cars. • The municipality promotes the use of mass transportation to use fewer private cars.
Supply	• Area Energy Sys. • Untapped Energy • Renewable Energy • Multi Energy Sys.	• Solar energy • West heat Recovery
Demand & Supply	• Energy Management System	
Environment & Resources	• Greenery • Water & Waste Management • Pollutions	• Technified irrigation systems to reduce the amount of water used in the irrigation of parks and avenue. • Urban trees in streets and avenues. • Creation of small urban forests distributed all over the district. • Green roofs to reduce air pollution, noise and grow food. • The ecological park : Forest, Tree nursey, Residual Water treatment plant • 700 trees was planted in coordination with neighbors and volunteers. • Eco Recycle, Green Waste Management
Governance	• Policy Framework • Education & Management	• Environmental Policy • Framework law (Law 30754) on climate change • Develop awareness workshops to reduce greenhouse gas emissions in schools, neighborhoods and the general public

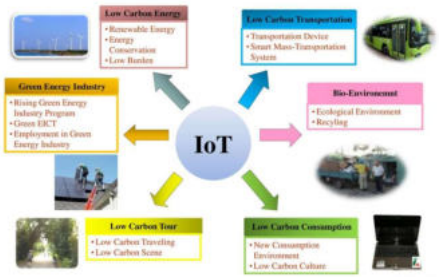
Data Source: Presentation file of La Molina

Main Obstacles for Achieve The Low Carbon Town



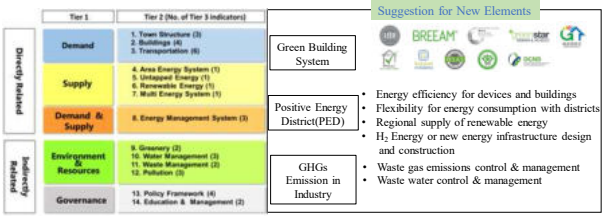
Data Source: Pre Survey of Low-Carbon Model Towns

Ideas for the LCT Development



Idea for the LCT-I System

- An integral part of comprehensive approaches towards sustainable urbanization
- Technology, spatial, regulatory, financial, legal, social and economic perspectives are included
- Interaction and integration between buildings, the users and the regional energy, mobility and ICT system.



Thank you for your attention !

Conclusions

- Net zero carbon emission is the global target in 2050
- To achieving net-zero in the future, need to break in familiar or habitual thinking, and make significant progress in the innovation of clean, energy conservation & system integration technology.
- Low carbon model towns are important demonstration sites to achieve the target of net zero carbon emission.
- Performance measure standard making and execute the performance verification regularly are good methods to maintain the low carbon city.

Presentation 20

Reflections on LCMT – 5 city projects and broader aspects

Alan Pears AM, Senior Industry Fellow, RMIT University, Fellow Climate and Energy College University of Melbourne

APEC Low-Carbon Model Town Wrap-up Symposium

10 September 2021 (JST)

Hosted by Japan (Online)

Organised by Asia Pacific Energy Research Centre (APERC)

Krasnoyarsk

My role in LCMT and APEC

- Research and review **visits to 10 LCMT cities** and visits to 12 APEC cities for other reasons
- Input to LCMT documents
- Presentation to APEC **Energy Ministers meeting**, Cebu 2015 *Our efficient, smart, flexible, distributed and diverse energy future*
- Presentation to APEC **workshop**, Manila 2016 *Energy Efficiency Policies and Practices in MSMEs - Australian Experience [MSME=Micro, Small and Medium-sized Enterprises]*
- Presentation to Canberra APEC **Energy Working Group** 2016 *Low Carbon Model Towns Project: A personal perspective on its evolution and future directions*

LCMT Sites I reviewed for this symposium	Personal visit	Response to APEC Questionnaire	Review of presentation for this symposium
Tianjin, China (Yujiapu – greenfield financial district)	2016	N	Y
Koh Samui island, Thailand	2015	Y	Y
Bitung, Indonesia (within province of North Sulawesi)		Y	Y
Krasnoyarsk, Russia	2016, 2017	Y	Y
Khon Kaen, Thailand		Y	Y

Common issues for cities

Koh Samui – roadside shops, for tourism and micro-business development

Broad issues

- Complex interactions between city, provincial and central governments
- Limited resources, local capabilities and funding/finance for city governments, planning and implementation
- Cities lack formal powers and resources, while facing many immediate pressures and priorities
- Crises divert resources and funds (eg COVID pandemic, floods, storms, wild fires)
- Changing city leaders and staff lead to changing priorities
- Challenges making low carbon action a high priority for community, business and leaders: focus on immediate, tangible issues
- Challenges addressing local factors eg extreme climates, local cultural factors, inefficient district heating

Detail

- Poor data, inconsistent indicators, irregular reporting
- Future energy demand and economic growth often over-estimated
- Potential of many benefits from energy efficiency improvement, digitalisation under-estimated; costs od EE and RE are falling

Success factors for cities

China – winter Olympics (APSEC)

Small generators – expensive, dangerous, polluting, inefficient!

Broad issues

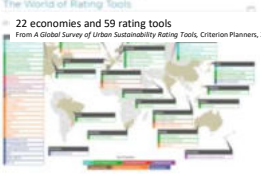
- Incorporate low carbon measures in high profile events – transport upgrades, icon buildings, promotional materials
- Build city's profile as leader, demonstration, pilot in provincial and central programs and policies
- Central, provincial leadership and support, international funding

Detail

- Link to local issues and concerns – sustainable tourism, waste management, air pollution, low pollution cooking, traffic congestion, safety, improving reliability of power supply, local climate, etc
- Promote achievements, reward innovators
- Voluntary action, incentives, visible improvements can motivate (eg free Wi-Fi in public transport, safe infrastructure for e-bikes, public lighting)
- Effective communication, including social media
- Partnerships with research organisations, businesses, city networks
- Innovative financing for implementation by business, community, city, government agencies

Issues for cities and LCMT

An option for LCT-I to reflect progress?



22 economies and 59 rating tools

From A Global Survey of Urban Sustainability Rating Tools, Criterion Planners, 2014

Two-edged swords

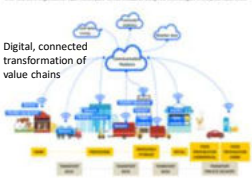
- Regulations and institutions (eg energy utilities) can block, support or lead change
- Communities and influential groups can oppose 'perceived threat' or feel victimised by change

LCMT and LCT-I issues

- Engagement with international experts, feasibility studies very helpful, LCT-I assessment built knowledge, supported and focused policy, action
- Cities need support, training to implement and regularly repeat LCT-I assessment and track progress
- Limited focus of LCT-I on progress
- Greenfields project ratings based on plans, not performance
- Self assessment lowers barriers to adoption but limits consistency
- LCT-I competes with many other rating systems

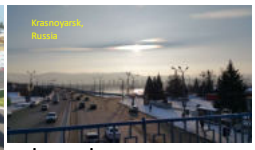
Emerging issues for cities

Krasnoyarsk – increasing cooling

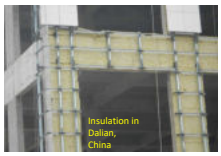


Digital, connected transformation of value chains

- Zero net emissions ASAP
- Climate resilience, recovery (building back better) after natural disaster, with net zero carbon infrastructure decisions – eg building materials (50% of global steel) and future operating emissions
- UN Sustainable Development Goals, global funding needed
- Divert capital to zero carbon investment – global businesses under increasing pressure
- Focus on energy efficiency and smart management/energy storage – integrate demand side and supply side policy development and implementation
- Cars occupy a lot of valuable space and are expensive to own and operate – reduce need to travel, use zero carbon, space-efficient transport modes
- Low carbon tourism and business travel: virtual travel and 'meaningful' carbon offsets
- Adapt to smart, connected distributed, flexible, accountable business/manufacturing/energy models, circular economy, resilient supply chains


Krasnoyarsk,
Russia

Thankyou


Insulation in
Dalian,
China


Zero net energy building, Japan


Tianjin, China