NEA-LCCP EWG, Seoul, 2016

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APEC Low-Carbon Town Indicators (LCT-I) System (1st edition)

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LCT-I System, 1st edition

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3. Scoring Criteria and Assessment Method
4. Example of TIER3
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Background APEC LCMT Project since 2010

2010：**APEC Low Carbon Model Town Project** has been founded.
APEC LCMT project is formed with **Concept making** and **Feasibility Study**.
Yujiapu, Tianjin, China was selected as 1st town for FS, Phase1.

2011: Phase1 FS has conducted in Yujiapu, China

2012：Phase2 FS in Samui Island, Thailand

2013：Phase3 FS in Danan, Vietnam
"Started the fundamental study for LCT-Index since 2013"
LCT Index was concluded in necessary for more further dissemination of LCT

2014：Phase4 FS in San borja, Lima, Pelu

2015: Phase5 FS in Bitung, Indonesia

2016: Phase6 FS in Mandaue, Metro-Cebu, Philippine

2017: Phase7 FS in ??

Background & Schedule for LCT-I

2013 EWG45(Thailand) **LCT Indicator has been concluded in necessary**

2014 Preliminary study (2014 ver.)

2015 Development of draft revision

- EGW49 (Korea) Framework of Indicator System
- Trial use — Trial self-diagnosis in the previous 5 LCMT case towns, etc.
- EGW50 (Hawaii) Final draft

2016 Final Report

- Meeting with Study group A(APERC)
- EGW51 (Australia) Workshop of the APEC LCT-I System
- EGW52 (Russia) Certification of LCT-I System 1st edition

2017 Application of the APEC LCT-I system

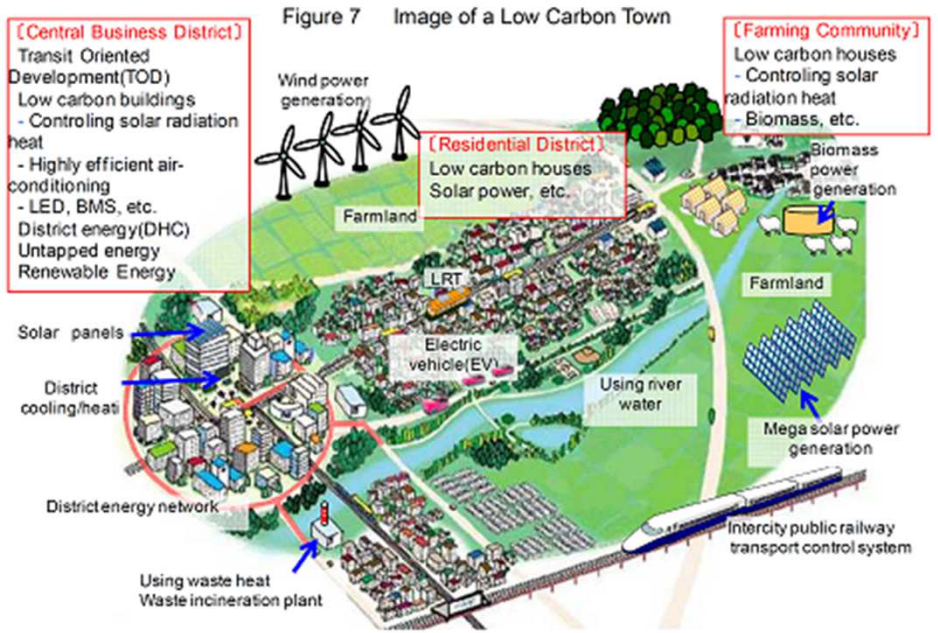
- LCMT Forum ,etc.

Information sharing with ISO will be continued

Features and Purpose of LCT-I

- Focus on **developing and achieving "Low-Carbon" towns / cities**
- **Part of the "Concept of Low Carbon Model Towns** in the APEC Region"
- **Not for comparison with other towns/cities**, but for defining town policies for low-carbon, and for tracking the progress

Figure 7 Image of a Low Carbon Town



Source: based on Special Report SR-79,2008, National Institute for Environmental Studies

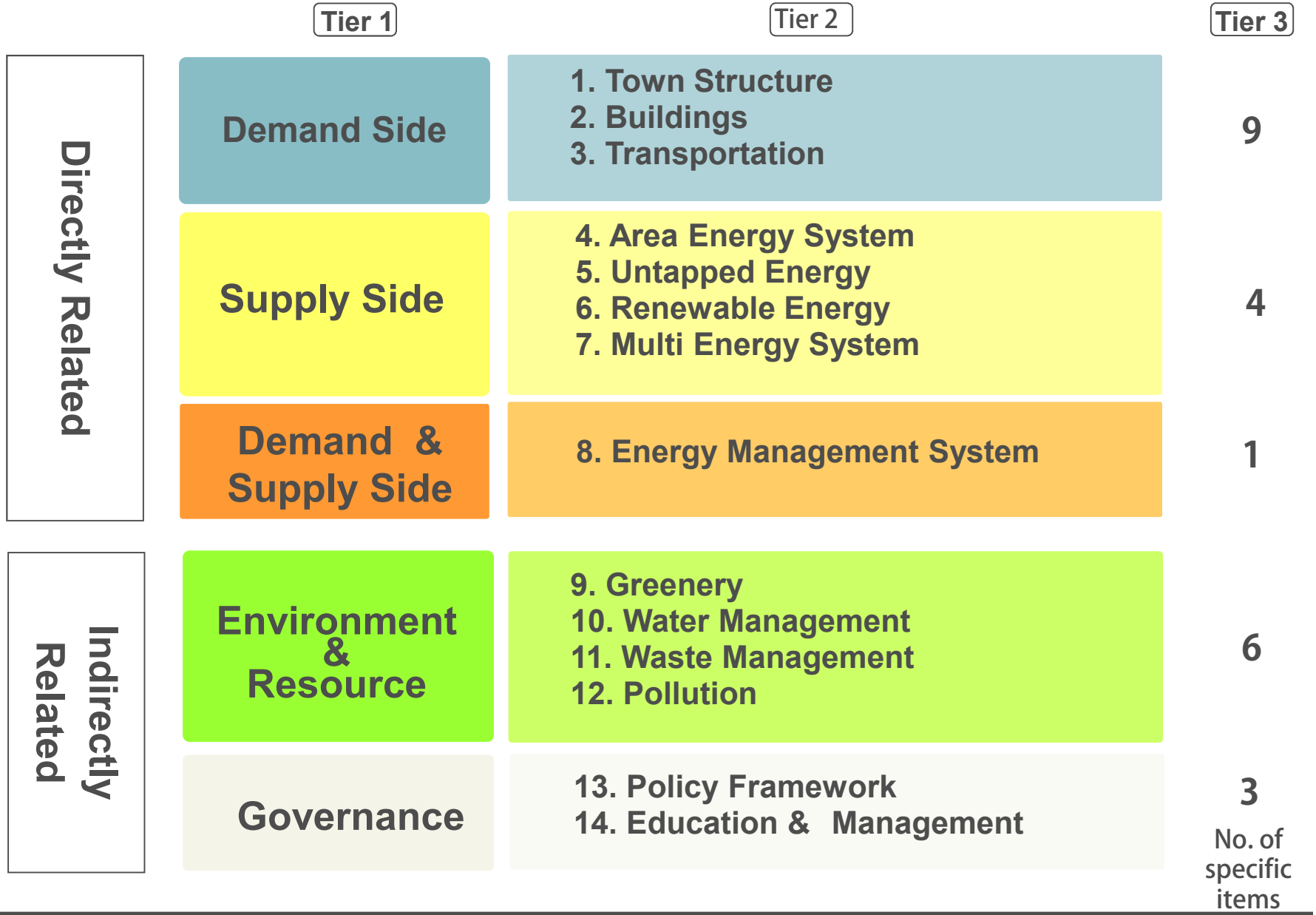
- **Simple and Easy-to-understand for the usage** by government and municipal officials, rather than professional city planners(and contractor)
- **Reflect the circumstances of each economy** and the characteristics of the project (as as possible).

Features and Purpose of LCT-I

How to Use the Assessment Results

- **Monitoring the low carbonize progress:**
  Local and/or central governments can monitor the progress of LCT development regularly using the APEC LCT-I System.
- **Visualization of LCT efforts:**
  Efforts toward the LCT can be visualized and encourage its promotion to attract domestic / international developers, investors and related companies.
- **LCT-I supports specific CO2 mitigation in the assessed region:**
  The local or central government will be supported by the result of the LCT-I in order to improve the CO2 emission status in the assessed region.
- **[Optional] Giving incentives will be recommended through LCT-I :**
  LCT projects which has marked excellent LCT-I results will expect to be given an incentive scheme, where priority ; "preferential interest rate" and financial supports by international/regional organizations (World Bank, Asian Development Bank, etc.)

Comprehensive structure of LCT-I System



Indicators for Demand Side

Tier 1	Tier 2	Tier 3
Demand Side	1. Town Structure	1. Adjacent Workplace and Residence 2. Land use 3. TOD
	2. Buildings	1. Energy Saving Construction 2. Green Construction
	3.Transportation	1. Promotion of public transportation 2. Improvement in traffic flow 3. Introduction of low carbon vehicles 4. Promotion of effective use

Policies to develop a Low-Carbon Town

1. Town Structure :

- Establishment of a town structure which minimizes traffic.
- Control of town suburbanization and sprawl

2. Buildings:

- Use Energy-saving equipment (Hardware)
- Prepare a certification system or guidelines (Software)

3.Transportation:

- Transfer public transportation, Car sharing, Introduce EV,PHV,FCV, etc.

Example of TIER 3 Indicators (Ex. Demand side)

3. Transportation / 1. Promotion of public transportation)

Assess efforts in transportation measures toward a low carbon society

★	Efforts in measures for transportation are not made. However, a system for their formulation has been established.
★★	Efforts in measures for transportation are not made. However, a system for their formulation has been established, and prospects for their establishment are clear.
★★★	One or more measures for transportation are in place.
★★★★	Three or more measures for transportation are in place.
★★★★★	Five or more measures for transportation are in place.

Introduction of leading public transportation systems

LRT

BRT

Source : Institute for Transportation & Development policy

Indicators for Supply Side

Tier 1	Tier 2	Tier 3
Supply Side	4. Area Energy System	1. Area energy system
	5. Untapped Energy	1. Untapped energy
	6. Renewable Energy	1. Renewable Energy
	7. Multi Energy System	1. Multi Energy

Policies to develop a Low-Carbon Town

- **4. Area Energy System: Introduction of district energy systems such as DHC**
- **5. Untapped Energy: Utilization of exhaust heat from sewage heat, heat from subway / underground shopping area, etc.**
- **6. Renewable Energy: Introduction of renewable energies such as solar, wind, and small small-scale hydropower, and biomass, etc.**
- **7. Multi Energy System: Introduction of high energy efficiency system (Cogeneration or Combined Heat and Power)**

Example of TIER 3 Indicators (Ex. Supply side)

7. Multi Energy System / 1. Multi Energy

Assess the presence or absence of introduction plans for CHP (or Cogeneration) in an electric power supply system.

★	There are no plans for introduction in place. However a system for introduction has been established.
★★	There are no plans for introduction in place. However a system for introduction has been established and prospects for its introduction are clear.
★★★	There are plans for introduction in place.
★★★★	There are introduction plans which have been implemented.
★★★★★	There are introduction plans which have been implemented. In addition, a subsidy system, etc. for expansion of implementation has been established.

-Multi energy refers to CHP (Combined Heat and Power) and Cogeneration.
-CHP and Cogeneration are systems which use natural gas, petroleum, propane gas, etc., to simultaneously generate electricity and waste heat by means of an engine, turbine, fuel cell, etc.
-The recovered waste heat, converted into steam or hot water, can be used for air-conditioning or heating. By effectively using heat and electricity without waste, an overall system energy efficiency of 75-80% (based on the potential energy of the fuel source) can be achieved. (source: ANRE Japan homepage)

Indicators for Environment & Resource

Tier 1	Tier 2	Tier 3
Environ-ment & Resource	9. Greenery	1. Securing Green Space
	10. Water Management	1. Water resources
	11. Waste Management	1. Waste products
	12. Pollution	1. Air 2. Water Quality 3. Soil

Policies to develop a Low-Carbon Town

- **9. Greenery: Creation of cool spots by green shade**
- **10. Water Management: Recycling of waste water, 3R activities (Reduce, Reuse, Recycle), setting environmental standard, etc.**
- **11. Waste Management: Controlling and reducing the amount of discharged waste, garbage, etc.**
- **12. Pollution: Setting environmental criteria, Efforts to achieve the criteria**

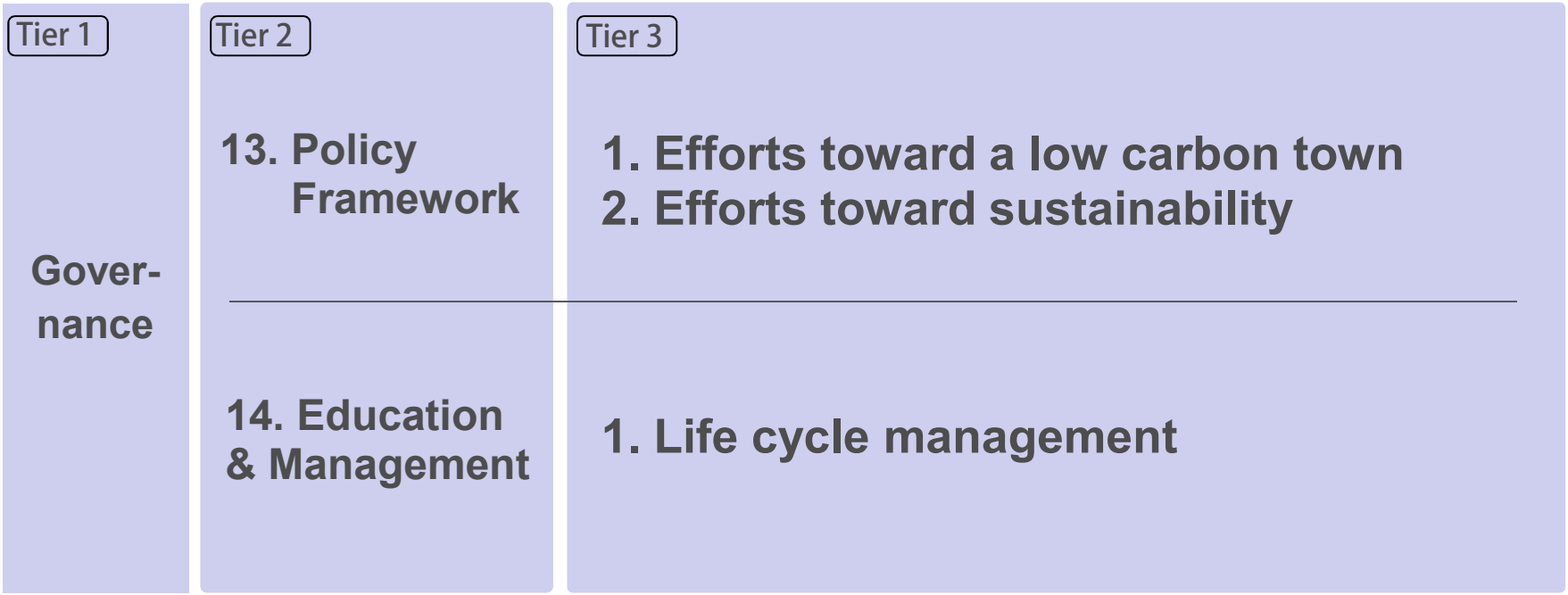
Example of TIER 3 Indicators (Ex. Environment & resource)

10. Water Management / 1. Water resources

Assess the presence or absence of efforts to reduce water usage.

★	**Efforts are not made. However, a system for their formulation has been established.**
★★	**Efforts are not made. However, a system for their formulation has been made, and prospects for their formulation are clear.**
★★★	**Efforts are being made.**
★★★★	**Efforts are being made and actual reduction goals and fiscal year accomplishments are shown.**
★★★★★	**Efforts are being made and actual reduction goals and fiscal year accomplishments are shown. In addition, a subsidy system etc. for introduction of equipment is in place.**

Indicators for Governance

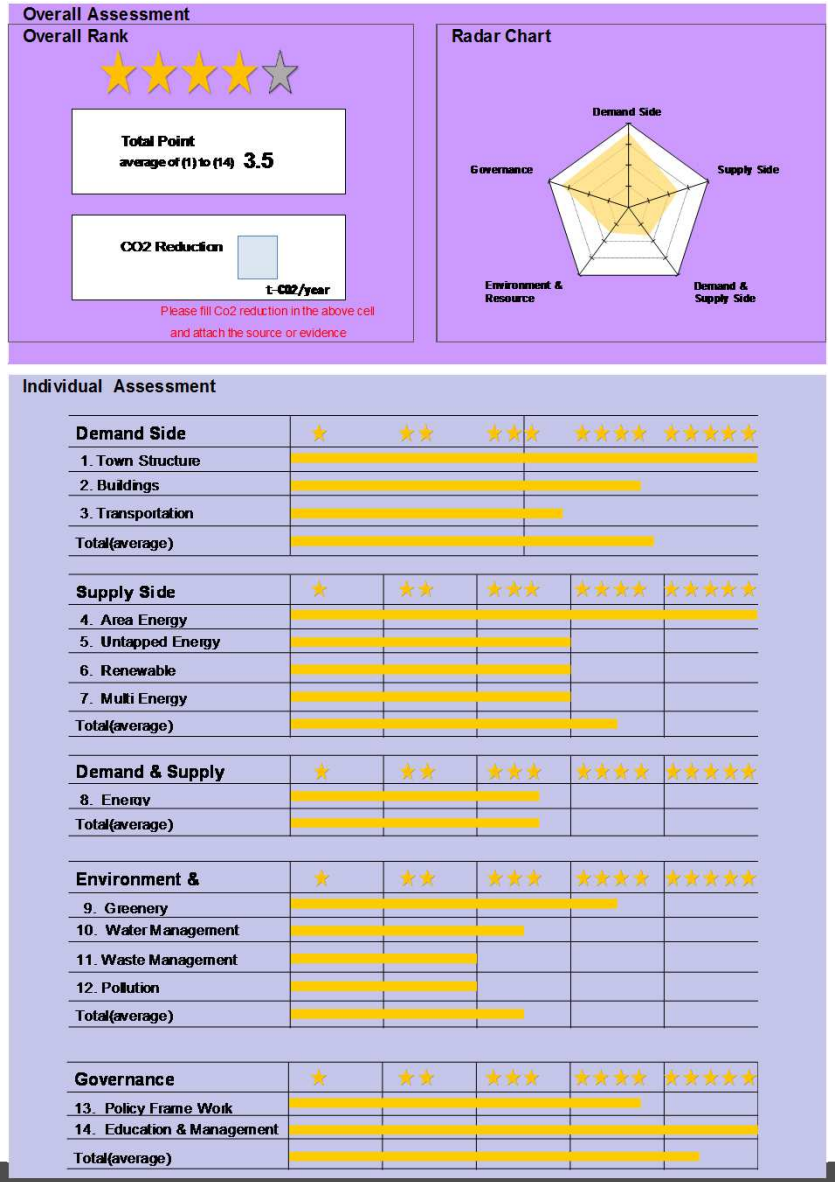


Policies to develop a Low Carbon Town

- **13. Policy Framework: Preparation of a low carbon guidebook, global warming countermeasures, Life Continuity Plans (LCP), Business Continuity Plans (BCP), educational systems, campaigns, etc.**
- **14. Education & Management: Environmental education (environment studies, eco driving, etc.) , establishment and operation of area management organization, etc.**

LCT-I Evaluation Sheet

Output Sheet 1

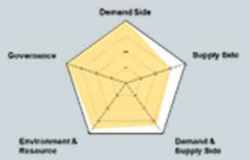
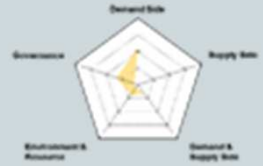


Output Sheet 2

Yujiapu Central Business District

evaluation sheet				
		★★★		3.5
Demand Side		★★★★		4.6
1. Town Structure	-			
1.1. Adjacent Workplace and Residence	-			
1. Residential Use and Non-residential Use	★★★★★		5	
1.2. Land Use	-	★★★★★		5.0
1. Efficient Land Use	★★★★★		5	
1.3. TOD (Transit Oriented Development)	-			
1. City Development Centered on Public Transportation	★★★★★		5	
2. Buildings	-			
2.1. Energy Saving Construction	-			
1. Thermal Insulation Performance	★★★★★		5	
2. Energy Saving Equipment Performance	★★★★★	★★★★	5	4.5
3. Natural Energy	★★★★		4	
2.2. Green Construction	-			
1. Green Construction Guidelines	★★★★		4	
3. Transportation	-			
3.1. Promotion of Public Transportation	-			
1. Easy-to-Use Public Transportation	★★★★★		5	
2. Comprehensive Transportation Measures	★★★★★		5	
3.2. Improvement in Traffic Flow	-			
1. TDM (Transportation Demand Management)	★★★★★	★★★★	5	4.2
2. Transportation Infrastructure Planning	★★★★★		5	
3.3. Introduction of Low Carbon Vehicles	-			
1. Introduction of Low Carbon Vehicles	★★★★★		5	
3.4. Promotion of Efficient Use	-			
1. Support for eco-driving	-		0	
Supply Side		★★★		3.5
4. Area Energy System	-			
4.1. Area Energy	-	★★★★★		5.0
1. Introduction of Area Energy	★★★★★		5	
5. Untapped Energy	-			
5.1. Untapped Energy	-	★★★		3.0
1. Introduction of Renewable Energy	★★★		3	
6. Renewable Energy	-			
6.1. Renewable Energy	-	★★★		3.0
1. Introduction of Renewable Energy	★★★		3	
7. Multi Energy System	-			
7.1. Multi Energy	-	★★★		3.0
1. Introduction of a Multi Energy system	★★★		3	
Demand & Supply Side		★★		2.7
8. Energy Management	-			
8.1. Energy Management of Buildings/Area	-			
1. Energy Management of Buildings/Area	★★★★	★★	4	2.7
2. AEMS (Area Energy Management System)	★★★★		4	
3. Smart Micro Grid	-		0	

Trial evaluation by self-diagnosis on LCMT Phase 1-5 Towns

Economy	Town (LCMT FS)	Type of Town	Radar Chart*
China	Yujiapu (Phase1)	**Urban(CBD)**	
Thailand	Samui Island (Phase 2)	**Rural(Village Island)**	
Vietnam	Danang (Phase3)	**Urban(Commercial Oriented Town)**	
Peru	San Borja (Phase4)	**Urban(Residential Oriented Town)**	
Indonesia	Bitung (Phase5)	**Urban(Commercial Oriented Town)**	

***These results are merely the results of a trial, and do not ask additional efforts regarding APEC or the individual economies.**
In addition, it is not comparison with other economies.

Thank you for your attention!

ANNEX

< Outcomes from preliminary study >

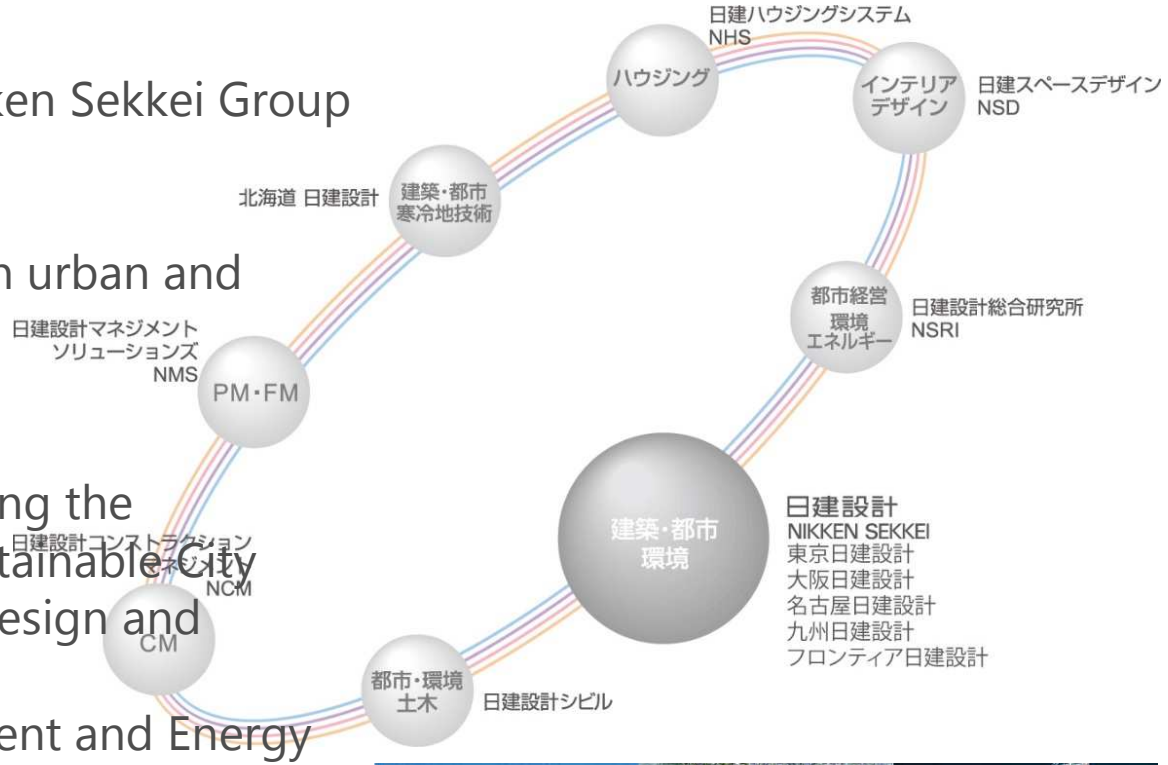
Nikken Sekkei Research Institute (NSRI)

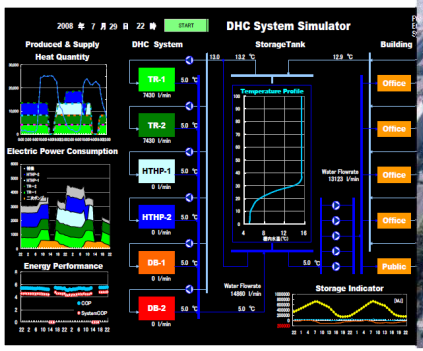
Founded as Consulting firm of Nikken Sekkei Group in 2006

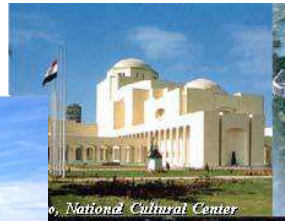
Over 70 experts globally engages in urban and environmental projects.

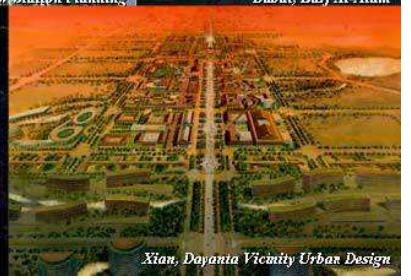
[SERVICES]

- Policy making, Planning, Supporting the Implementation for Smart City, Sustainable City
- Urban Environment and Energy Design and Operation Support
- Analysis, Simulation for environment and Energy
- Consulting Business Scheme (PPP,PFI)









Background of LCT-I

- **A Indicator system** to evaluate low carbon-ness comprehensively in town has been **concluded in necessary** at the EWG45 in Thailand, 2013, the initial idea of indicators was introduced as a part of the Concept and Japan started the preliminary study for it.

- **The progress of preliminary study** has been reported in EWG46, EWG47,2014 and EWG48, 2015 meetings.

- **Framework of Indicator System** has been reported in EWG49 meetings, 2015.

- **Draft of Indicator System and 1st trial evaluation** as self-diagnosis have been reported in EWG50 meetings, 2016.

Structure of Assessment System

- The Assessment System is comprised of **five major items (Tier 1) , 14 middle items (Tier 2) and 23 specific items (Tier 3)** aiming maximum usability by minimum item number.

- Tier 1 is divided into items which **directly** influence CO2 emissions and items which **indirectly** influence CO2 emissions.

- Tier 2 is broken-down into more specific indicators and criteria as Tier 3 to evaluate broader issues for Low carbon town issues.

- The assessment system was comprised with referring existing advanced assessment systems like CASBEE, LEED, etc.

Scoring Criteria and Assessment Method

- **The revel of achievement is assessed by a 5 star(★) system.**
- **3 ★ is the standard value.**
- **In Tier 3 indicator, the case of a three point scale (1★,3★,5★) and a four point scale (1★,2★,3★,5★) may be applied depending on the targets of Tier 3 at times.**
- **If there are no effort in urban planning, target criteria, action plans, nor any measures, No ★ would be given.**
- **The quantitative assessment like energy consumption should be conducted according to the analysis guidelines that were founded by each economy or the international standards.**

Indicators for Demand & Supply Side

Tier 1	Tier 2	Tier 3
Demand & Supply Side	8. Energy Management System	1. Energy management of building and area

Policies to develop a Low-Carbon Town

8. Energy Management System

- **Establishment of a whole system to monitor and operate the energy in a area**
- **Introduction of energy management system into buildings, households, and factories**
- **Monitoring and control of energy demand and supply through utilizing ICT, etc.**

Example of TIER 3 Indicators (Ex. Demand side)

Transportation (Promotion of public transportation)

- **Develop traffic nodes to improve the convenience of public transportation.**
- **Introduce car sharing, park-and-ride and pioneering public transportation methods such as BRT and LRT as means of mass transportation.**
- **Promote eco driving.**
- **Introduce EV, PHV, HEV, FCV, natural gas vehicles, diesel vehicles, etc.**

Tier 1	Tier 2	Tier 3
Demand Side	1. Town Structure	1. Adjacent Workplace and Residence 2. Land use 3. TOD
	2. Buildings	1. Energy Saving Construction 2. Green Construction
	3. Transportation	1. Promotion of public transportation 2. Improvement in traffic flow 3. Introduction of low carbon vehicles 4. Promotion of effective use

Example of TIER 3 Indicators (Ex. Supply side)

Multi Energy System (Multi Energy)

- **Introduction of a high energy efficiency system.**
- **In addition to CO2 emissions reduction effect, energy saving effect, cost reduction effect, can also be considered (During normal hours).**
- **Furthermore, Cogeneration system in cases of emergency can be expected as a distributed power source system (at emergency time).**

Tier 1	Tier 2	Tier 3
Supply Side	4. Area Energy System	1. Area energy
	5. Untapped Energy	1. Untapped energy
	6. Renewable Energy	1. Renewable Energy
	7. Multi Energy System	1. Multi Energy

Example of TIER 3 Indicators (Ex. Environment & resource)

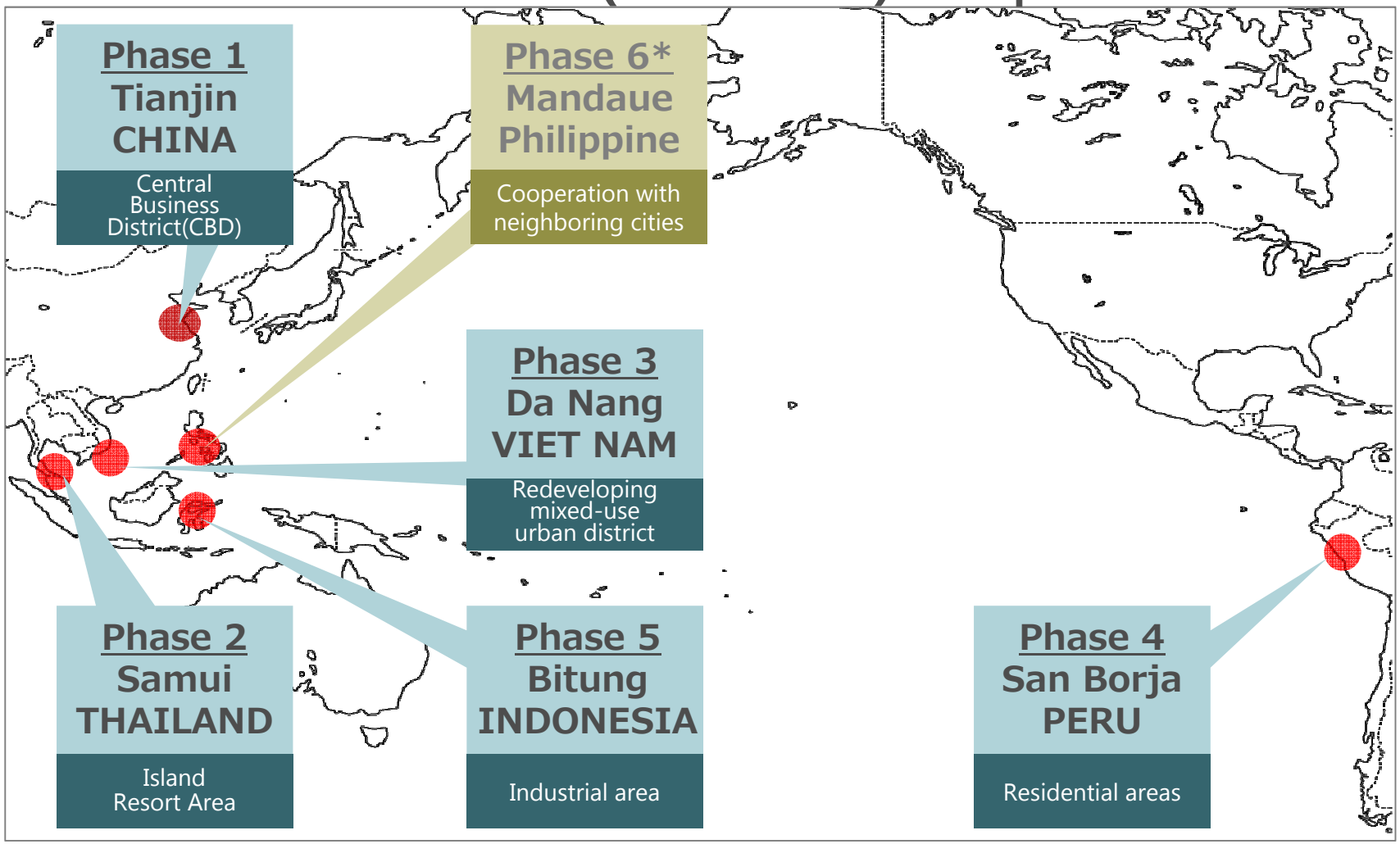
Water Management (Water resources)

- Recycling of waste water
- 3R activities (Reduce, Reuse, Recycle)
- Setting environmental standard
- Promotion of water recycling

Tier 1	Tier 2	Tier 3
Environ-ment & Resource	9. Greenery	1. Securing Green Space
	10. Water Management	1. Water resources
	11. Waste Management	1. Waste products
	12. Pollution	1. Air 2. Water Quality 3. Soil

Trial evaluation by self-diagnosis

Selected 5 Towns (Phase1～5) *Except Mandaue

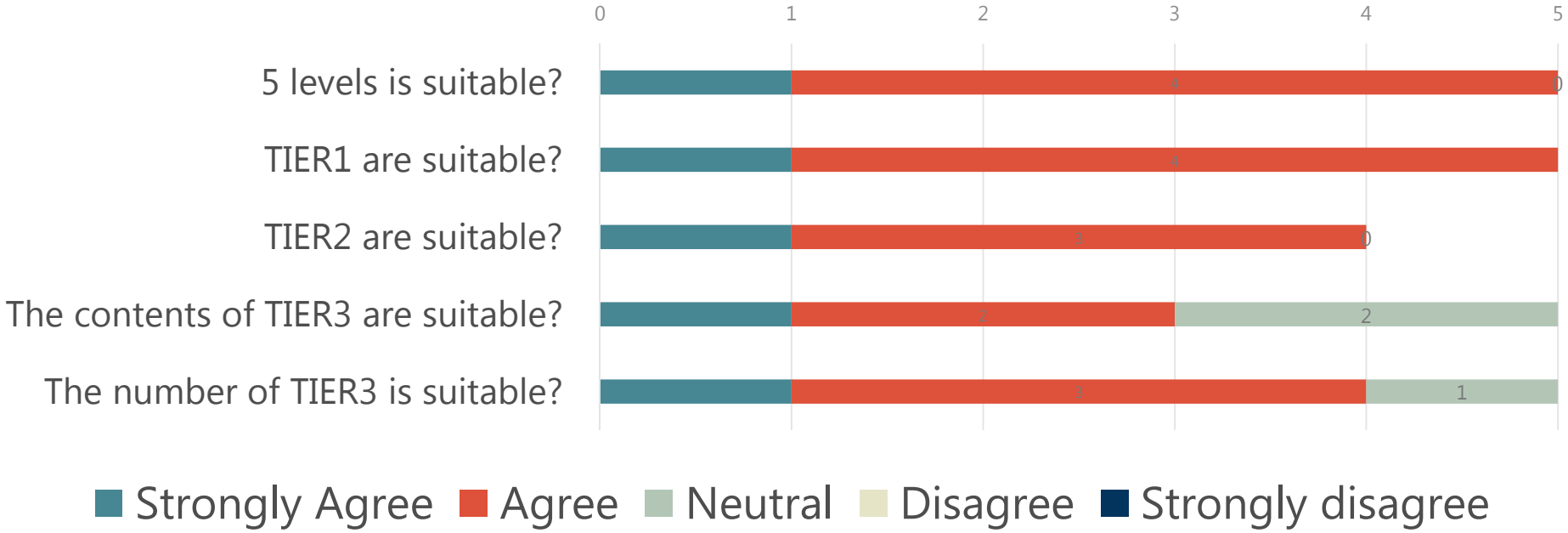


Source Adapted from METI

Results of Trial (2)

Questionnaire：

Do you agree?



Next Stage of LCMT Project

LCMT Project so far

The Concept of LCT — Refined five times

Case Towns — A wide range of towns have been dealt with through the F/S (6 case Towns as in 2016)

International standard — The APEC LCT-I system will be introduced into international standard(ISO).

For Disseminating LCT in the APEC region

For example

- LCMT Forum (participants: government, experts, international institutions)
  - Lecture, report, Follow-up, etc.
  - APEC Low-Carbon Town Award program
- Incentive scheme
  - Financial support (with low interest rete)
  - Development with Priority, etc.
- In-depth F/S

Source Adapted from METI