Data Collection Survey on Urban Sustainable Environmental Development Strategy in Metro Cebu

Final Report

March 2013

JAPAN INTERNATIONAL COOPERATION AGENCY

NIKKEN SEKKEI Research Institute
PADECO Co., Ltd.

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Abbreviations

AAGR	Annual Average Growth Rate
BCP	Business Continuity Plan
BEMS	Building and Energy Management System
BOD	Biochemical Oxygen Demand
BPO	Business Process Outsourcing
BRT	Bus Rapid Transit
CDS	City Development Strategy
CEBECO	Cebu Electric Cooperative Inc.
CFL	Compact Fluorescent Light
CIADP	Cebu Integrated Area Development Project
CITOM	Cebu City Traffic Operations Management
CMP	Community Mortgage Program
CNG	Compressed Natural Gas
CPA	Cebu Port Authority
DENR	Department of Environment and Natural Resources
DILG	Department of the Interior and Local Government
DOE	Department of Energy
DOTC	Department of Transportation and Communications
DOTI	Department of Trade and Industry
DPWH	Department of Public Works and Highways
DSWD	Department of Social Welfare and Development
4E	Engineering, Education, Enactment and Enforcement
ESL	English as a Second Language
EV	Electric Vehicle
FDI	Foreign Direct Investment
FIT	Feed-In Tariff
F/S	Feasibility Study
GDH	Gifts, Decors and Housewares
GHG	Greenhouse Gas
GRDP	Gross Regional Domestic Product
GPRS	General Packet Radio Service
GUCI	Global Urban Competitiveness Index
HEMS	Home Energy Management System
ICLEI	International Council for Local Environmental Initiative

ICT	Information and Communication Technology
IT	Information Technology
ITS	Intelligent Transport System
JAC	Japan Airport Consultants
JICA	Japan International Cooperation Agency
KOICA	Korea International Cooperation Agency
KPO	Knowledge Process Outsourcing
LED	Light Emitting Diode
LGU	Local Government Unit
LPG	Liquefied Petroleum Gas
LRT	Light Rail Transit
LTO	Land Transportation Office
LTRFB	Land Transportation Franchising and Regulatory Board
MCDC	Metropolitan Cebu Development Council
MCDCB	Metro Cebu Development and Coordinating Board
MCIA	Metro Cebu International Airport
MCIAA	Metro Cebu International Airport Authority
MCLUTS	Metro Cebu Land Use and Transport Study
MECO	Mactan Electric Company
MERALCO	Manila Electric Company
METI	Ministry of Economy, Trade and Industry
MICE	Meeting, Incentive, Convention, Exhibition
MLC	Movement for Livable Cities
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
M/P	Master Plan
NEDA	National Economic and Development Authority
NESTS	National Environmentally Sustainable Transport Strategy
NGO	Non-Governmental Organization
NPO	Non-Profit Organization
NSDW	National Standards for Drinking Water
NSO	National Statistics Office
OFW	Overseas Filipino Workers
PAGASA	Philippine Atmospheric Geophysical and Astronomical Services Administration
PEZA	Philippines Economic Zone Authority

PLC	Power Line Communications
PPP	Public Private Partnership
PROD	Research, Program and Organizational Development
PRSAP	Philippine Road Safety Action Plan
PS	Pumping Station
PV	Photovoltaics
3R	Reduce, Reuse, Recycle
RA	Republic Act
RAFI	Ramon Aboitiz Foundation Inc.
R&D	Research and Development
RDC	Regional Development Council
SRP	South Road Properties
STRADA	System for Traffic Demand Analysis
SWOT	Strength, Weakness, Opportunity, Threat
TBL	Triple Bottom Line
TEU	Twenty-foot Equivalent Unit
TOD	Transit Oriented Development
TOU	Time-of-Use
USC	University of San Carlos
VECO	Visayan Electric Company
WTP	Water Treatment Plant

1. Introduction

1.1 Background

Metro Cebu, consisting of seven cities and six municipalities, is the second largest metropolitan area of the Philippines with a population of 2.55 million in 2010[1], and is considered to be the economic center of the central Philippines. Recently, the region has been experiencing rapid population growth and urbanization, fueled by economic growth across sectors and the development of industrial clusters such as the Mactan Special Economic Zone. Furthermore, Metro Cebu has expanded its role as a regional trading hub through air and seaport connections, as well as its tourism profile through world-class beach resorts.

Despite these promising indicators of growth, rapid population increase and urbanization also generate real challenges relating to resources and infrastructure. The vulnerability of urban infrastructure in the field of transportation; drainage and sewerage; solid waste management; and provision of power are amongst the major challenges to regional growth. Many of these major urban issues and challenges are "transboundary" in nature; therefore, extend beyond the geo-political boundaries of a single or specific local government units (LGUs).

To address the transboundary challenges, JICA conducted ***the Study on the Cebu Integrated Area Development Master Plan*** in 1994; however, neither local governments nor the various international development agencies have conducted a study of this kind since then. It is therefore recognized that a medium-term infrastructure plan for Metro Cebu is desirable at this time.

In light of such concerns, the Metro Cebu Development and Coordinating Board (MCDCB) was formed through the Memorandum of Agreement (MOA) signed by the local government chief executives, heads of national government agencies, and leaders of private and civil society on 1 April 2011. The objective was to continue their collective efforts to formulate integrated development strategies, policies and standards concerning the following shared and/or common challenges and responsibilities:

- Urban and land use planning and zoning
- Transport and traffic management
- Pollution control and solid waste disposal and management
- Flood control, drainage and sewerage system
- Public safety and security
- Road improvement and infrastructure development
- Urban renewal and shelter
- Coastal resources and watershed management
- Health, sanitation, and environment management
- Climate change adaptation and disaster risk reduction

MCDCB is currently developing a medium term plan for Metro Cebu, and to fully utilize the accumulated data and knowledge, the JICA Study Team has worked closely with MCDCB, especially its program management office, the Ramon Aboitiz Foundation Inc. (RAFI), during the study.

[1] National Statistics Office (2010) Census of Population and Housing

1.2 Objectives

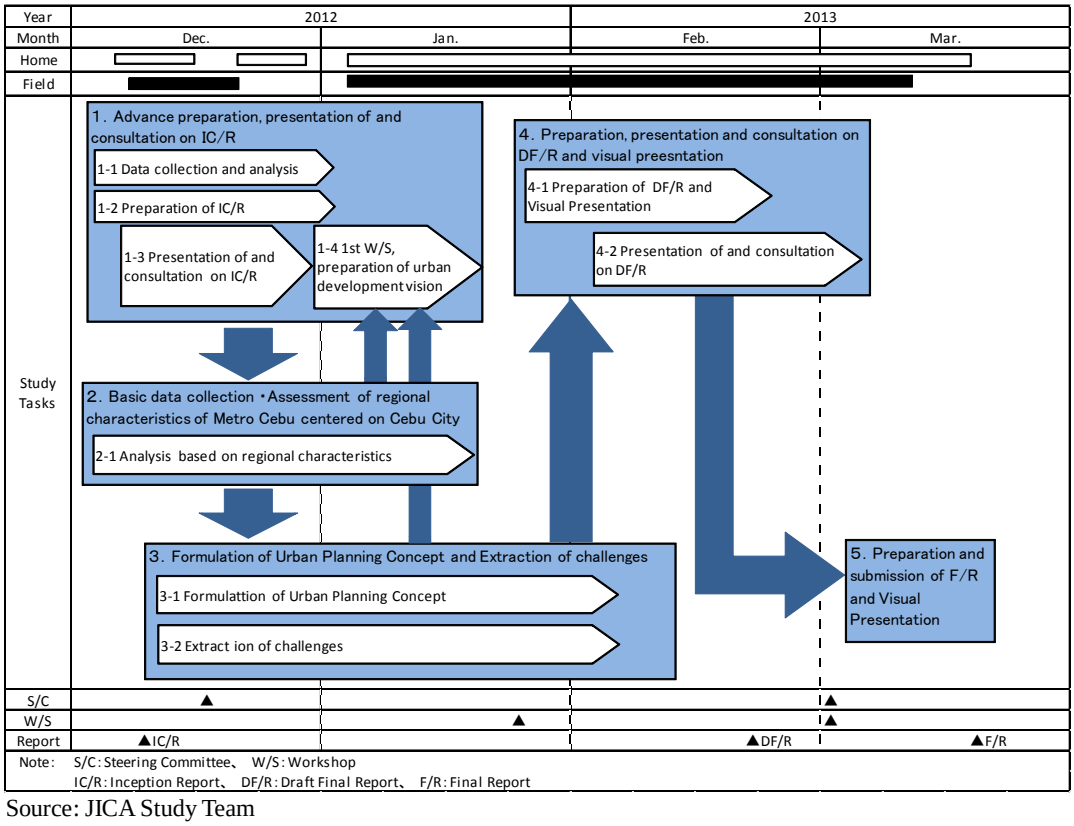
The study aims to formulate a Sustainable Urban Development Vision, along with a strategic roadmap to meet the Vision's objectives and achieve a stronger Metro Cebu by 2050, through a participatory approach. It also aims to extract major development challenges based on a strength/weakness assessment on the regional characteristics of Metro Cebu. Furthermore, the study aims to draft the appropriate development targets for realizing the vision through the active participation of local stakeholders consisting of the Cebu provincial government, LGUs in Metro Cebu, national government agencies, business communities, civil societies, academies, and related organizations.

1.3 Study Area

Metro Cebu is located on the central east coast of the Province of Cebu, in the Central Visayas of the Philippines, and consists of the seven cities of Carcar, Cebu, Danao, Lapu-Lapu, Mandaue, Naga, and Talisay, and the six municipalities of Compostela, Consolacion, Cordova, Liloan, Minglanilla, and San Fernando. The total area of Metro Cebu is 1,069.5 km^2 and its population is 2.55 million (as of 2010).

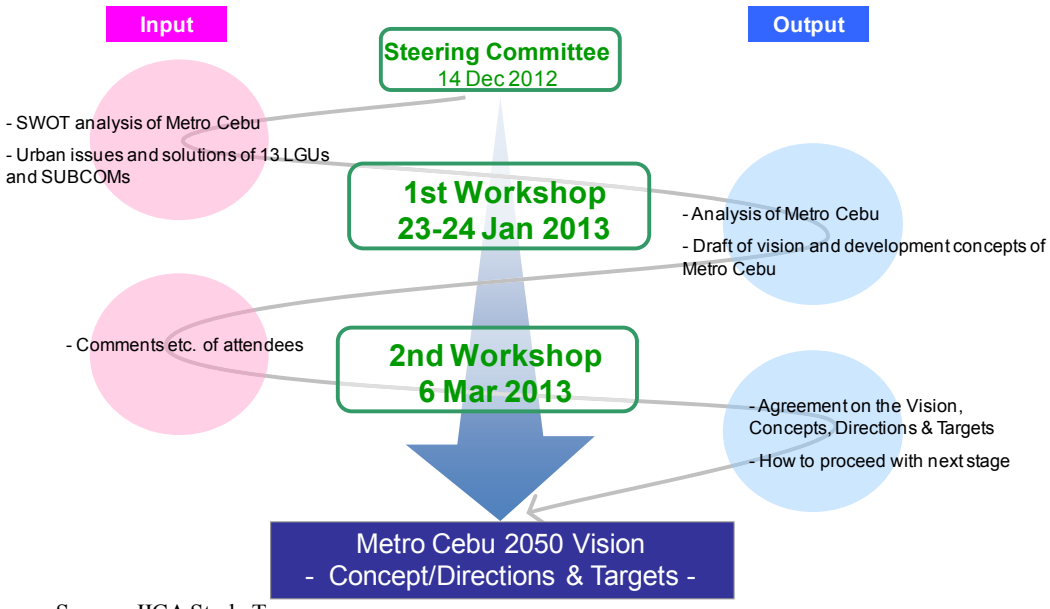
1.4 Study Procedure

Figure 1-1 shows the overall study procedure of the study. Of the full four-month procedure, the initial 1.5 months was committed to the collection and organization of information for the formulation of the vision and the analysis of current baseline conditions in Metro Cebu. Following that, the steering committee and the workshops were held so as to enable a variety of stakeholders to participate in the vision, direction, and target setting processes. The vision formulation process from two workshops is visualized in Figure 1-2.



Source: JICA Study Team

Figure 1-1 Overall Study Procedure



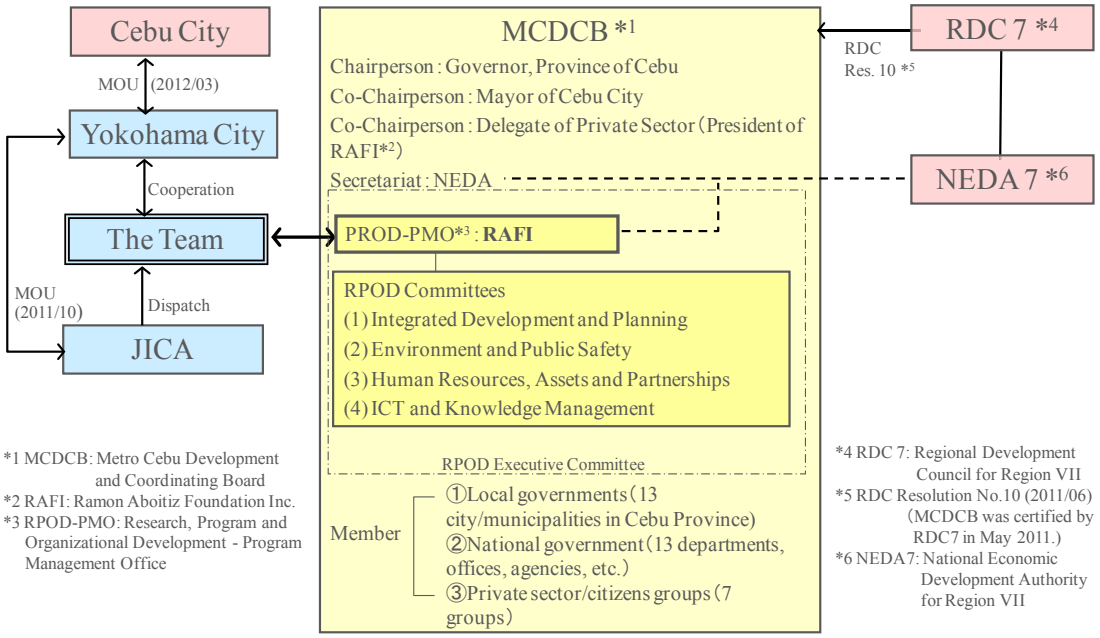
Source: JICA Study Team

Figure 1-2 Participatory Process for Vision Formulation based on Workshops

1.5 Implementation Structure

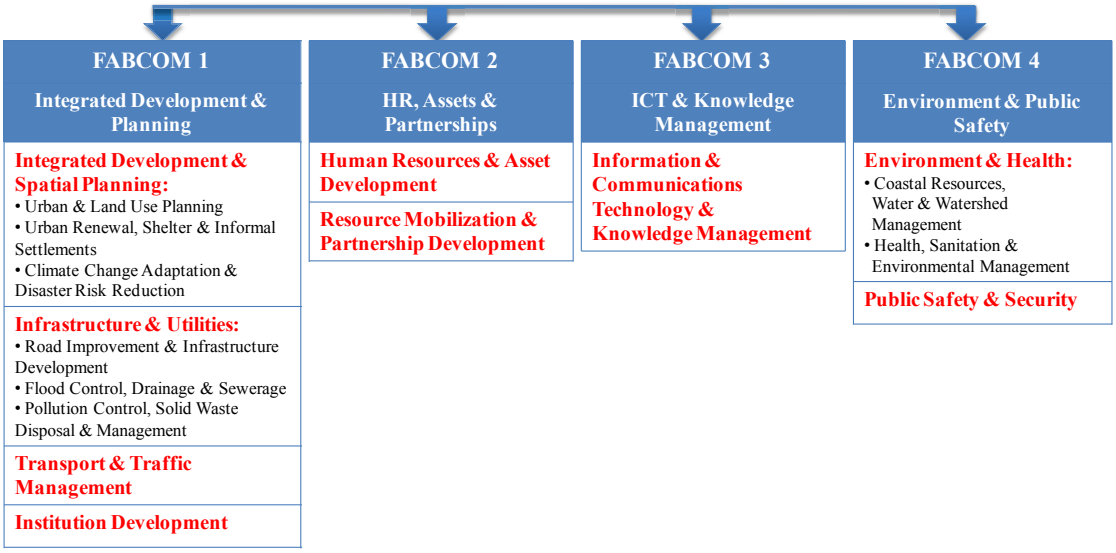
The study was initiated by a request from the City of Cebu to JICA based on a Memorandum of Understanding (MOU) signed in October 2011 for Comprehensive Cooperation to Solve Urban Issues in Developing Countries between the City of Yokohama and JICA, as well as an MOU signed in March 2012 for Technical Cooperation to Develop an Environmentally-friendly and Sustainable City between the City of Yokohama and the City of Cebu.

Hence, the JICA Study Team has collaborated closely with Yokohama City, gaining invaluable inputs from its urban development lessons. It has also worked closely with MCDCB, which has been researching urban issues and potential solutions for Metro Cebu. The implementation structure (Figure 1-3) and the focus area based committee structure of MCDCB (Figure 1-4) are summarized overleaf.



Source: JICA Stud Team

Figure 1-3 Implementation Structure



Source: MCDCB (2012) MEGA CEBU 101: Constructing the City-Region & Providing the Architecture of Participation

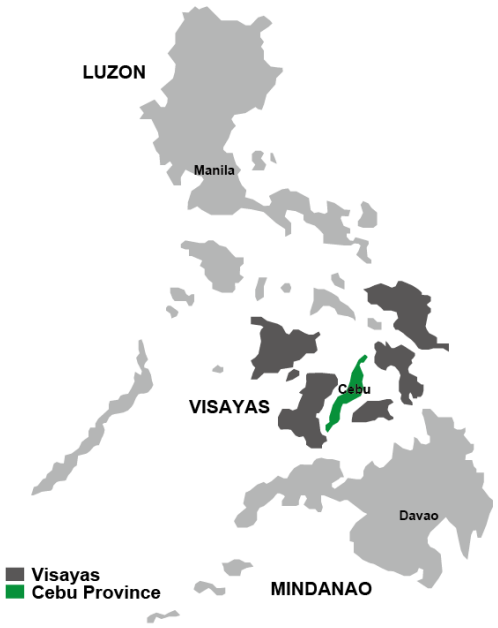
Figure 1-4 MCDCB Focus Area Based Committees and Sub-Committees

2. Context

2.1 Physical Characteristics

Metropolitan (Metro) Cebu located on the central east coast of Province of Cebu in the Central Visayas, is the second largest metropolitan area in the Philippines next to Mega Manila (comprising of Metro Manila and the adjacent provinces of Bulacan, Rizal, Cavite and Laguna). As shown in Figure 2-1, Metro Cebu is strategically located in the center of the Philppines, providing a geographic advantage for logistics and tourism.

In 1997, the Metropolitan Cebu Development Council (MCDC) created by the Regional Development Council (RDC) of Central Visayas (also known as Region VII) defined Metro Cebu as the Cities of Cebu, Lapu-Lapu, Mandaue, Naga, and Talisay, and the municipalities of Compostela, Consolacion, Cordova, Liloan, and Minglanilla. In 2005, the coverage of Metro Cebu was expanded to include Carcar City and San Fernando Municipality in the south and Danao City in the north by the Central Visayas RDC. Today, Metro Cebu is comprised of the seven cities of Carcar, Cebu, Danao, Lapu-Lapu, Mandaue, Naga and Talisay, and the six municipalities of Compostela, Consolacion, Cordova, Liloan, Minglanilla, and San Fernando. Figure 2-2 shows the location of the 13 local government units (LGUs).



Source: JICA Study Team

Figure 2-1 Geographic Location of Cebu in the Philippines

Source: JICA Study Team

Figure 2-2 Metro Cebu's 13 LGUs

The respective land areas of the 13 LGUs and the number of Barangays in each LGU are summarized in Table 2-1.

Table 2-1 Metro Cebu Land Area

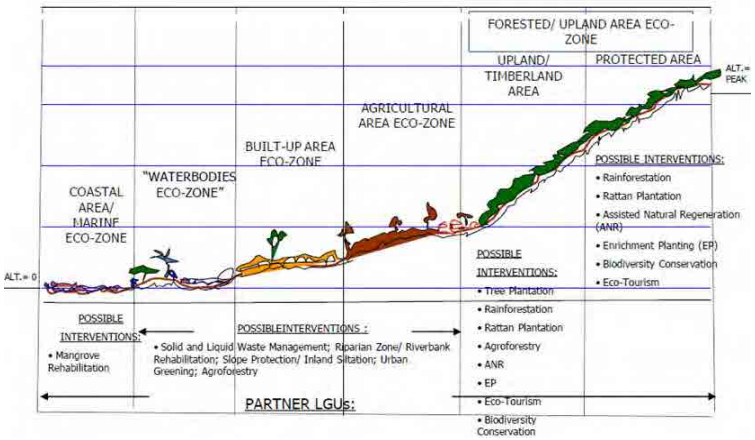
City/Municipality	Land Area (km²) 1995	Land Area (km²) 2009	No. of Barangays
Carcar City	44.04	52.10	14
Cebu City	284.60	291.25	80
Compostela	49.58	44.73	17
Consolacion	162.69	142.25	42
Cordova	43.24	43.70	22
Danao City	29.13	34.87	27
Lapu-Lapu City	59.25	64.23	30
Liloan	51.05	65.96	19
Mandaue City	9.55	7.90	13
Minglanilla	91.30	93.28	28
Naga City	71.61	74.05	21
San Fernando	116.39	116.23	15
Talisay City	44.94	38.98	21
Total Metro Cebu	**1,057.37**	**1,069.52**	**349**
Mega Manila	7,833.40	8,036.41	
Philippines	300,000.00	300,000.00	

Source: DOTC (2011) The Development of Public Transportation Strategic Plan for Metro Cebu

While Metro Cebu's natural resources are an asset to its tourism industry, the geological conditions are also a challenge to rapid urbanization. While the total area of Metro Cebu is approximately 1,070 km^2, it is situated longitudinally between the coast on the east, and mountains to the west (Figure 2-3). Figure 2-4 shows a sectional diagram suggesting the limitations on buildable area. Such physical constraint is a major challenge, especially in the sector of transport and flood control.

Source: NASA Elevation Data

Figure 2-3 Elevation Map of Metro Cebu



Source: MCDCB RPOD Sub-committee on Environment and Health

Figure 2-4 Physical Framework Showing Ecological Zones

Furthermore, a more immediate issue of high priority is the lack of an up-to-date comprehensive land use and urban plan for Metro Cebu. Table 2-2 shows the estimated urban land use by LGU for the ten LGUs of Metro Cebu, which can be summarized as follows. A majority of industrial, commercial and institutional uses are concentrated in the three cities of Cebu, Mandaue and Lapu-Lapu, and serve as employment generators in the region.

- About 48% of urban land is residential, 40% of which is in Cebu City;
- About 64% of industrial areas are in Mandaue City;
- About 51% of commercial area are in Cebu City;
- About 61% of institutional areas are in Cebu City, being the capital of the province and regional center of Central Visayas [1]

Table 2-2 Estimated Urban Land Use by Metro Cebu (ha)

City/ Municipalities	Residential	Commercial	Industrial	Institutional	Open Space	Vacant	Others	Total
1. Cebu City	1,310	272	25	273	143	600	67	2,690
2. Mandaue City	437	128	165	60	15	704	-	1,509
3. Lapulapu City	338	17	9	9	7	20	632 1/	1,032
4. Cordova	126	12	-	12	8	3	-	161
5. Liloan	338	14	2	28	16	6	-	404
6. Consolacion	96	6	19	4	6	9	-	140
7. Compostila	261	12	14	8	21	1	-	317
8. Talisay	205	29	2	25	19	68	1	349
9. Minglanilla	126	32	13	20	5	82	-	278
10. Naga	73	8	10	6	3	9	-	109
Total	3,310	532	259	445	243	1,502	700	6,890

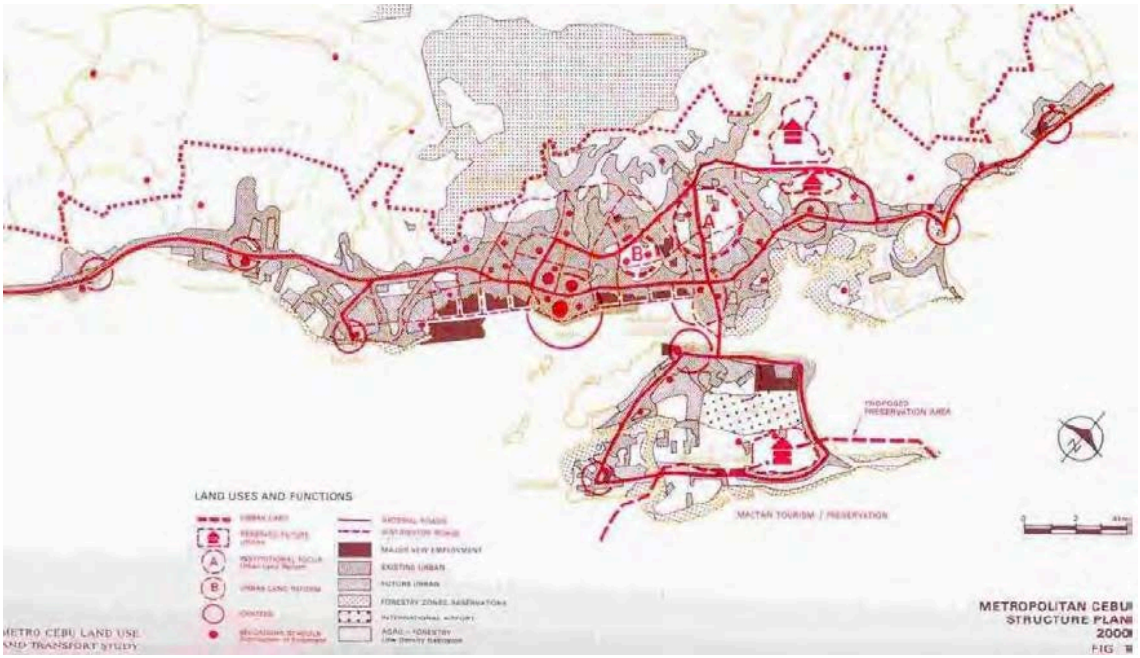
Note: Above data refer to urban land uses only (i.e., built up areas). Recent Developments are not included in the above table.
1/ Includes Mactan International Airport
Source: DOTC (2011) The Development of Public Transportation Strategic Plan for Metro Cebu

As urban and land use planning are closely knit with issues of urban infrastructure, urban planning is inextricably intertwined with the planning of transport, drainage, sewerage, solid waste management, energy, and housing.

Considering these circumstances, the Cebu Integrated Area Development Project (CIADP) recommends the establishment of hierarchical urban growth centers and growth management planning for Metro Cebu as shown below and in Figure 2-5.

- Growth Control Centers (Cebu City, Mandaue City)
- First Order Growth Center (Lapu-Lapu City)
- Second Order Growth Center (Carcar City, Compostela, Cordova, Danao City, Liloan, Naga City)
- Tertiary Growth Center (Consolacion, Minglanilla, San Fernando, Talisay City)

[1] DOTC, Study on the Development of a Public Transportation Strategic Plan for Metro Cebu



Source: DOTC (2011) The Development of Public Transportation Strategic Plan for Metro Cebu

Figure 2-5 CIADP Proposed Structure Plan

2.2 Socio-Economic Characteristics

As the second largest metropolitan area in the Philippines, Metro Cebu has a population of 2.55 million (as of the 2010 Census), with an average annual growth rate during 2000-2010 of 2.83% per annum, and with 68.6% of the population concentrated in the Cities of Cebu, Mandaue, Lapu-Lapu and Talisay (Table 2-3, Table 2-4, and Figure 2-6).

Table 2-3 Population Data for Metro Cebu, 1990–2010

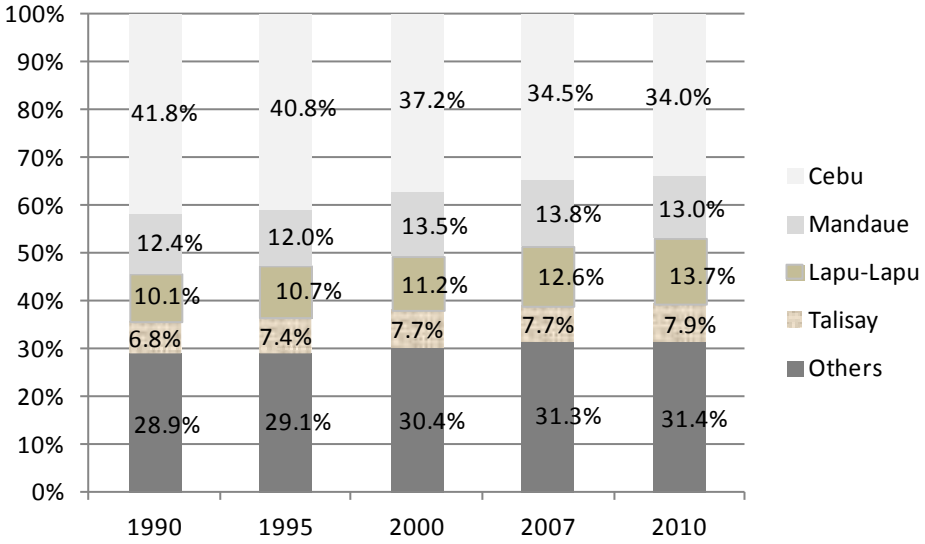
City/ Municipality	1990	1995	2000	2007	2010
Carcar City	70,773	78,726	89,199	100,632	107,323
Cebu City	604,407	662,299	718,821	798,809	866,171
Compostela	21,993	26,499	31,446	39,167	42,574
Consolacion	41,237	49,205	62,298	87,544	106,649
Cordova	22,326	26,613	34,032	45,066	50,252
Danao City	73,185	79,932	98,781	109,354	119,252
Lapu-Lapu City	145,627	173,744	217,019	292,530	350,467
Liloan	42,523	50,973	64,970	92,181	100,500
Mandaue City	179,753	194,745	259,728	318,577	331,320
Minglanilla	50,833	62,523	77,268	101,585	113,178
Naga City	60,397	69,010	80,189	95,163	101,571
San Fernando	35,041	38,700	48,235	54,932	60,970
Talisay City	97,823	120,292	148,110	179,359	200,772
Metro Cebu	1,445,918	1,633,261	1,930,096	2,314,899	2,550,999

Source: National Statistics Office

Table 2-4 Average Annual Population Growth Rate for Metro Cebu (%)

City/Municipality	1990–2000	2000–2010
Carcar City	1.75	1.88
Cebu City	3.75	2.46
Compostela	4.07	4.91
Consolacion	4.31	3.97
Cordova	4.21	5.52
Danao City	4.33	4.46
Lapu-Lapu City	3.64	3.08
Liloan	3.04	1.90
Mandaue City	4.24	3.09
Minglanilla	4.28	3.89
Naga City	2.88	2.39
San Fernando	3.25	2.37
Talisay City	2.34	1.87
Metro Cebu	2.93	2.83

Source: National Statistics Office



Source: National Statistics Office

Figure 2-6 Population Share in Metro Cebu, 1990–2010

Industrial structure by Gross Domestic Regional Product (GRDP) is not available at the Metro Cebu level; however, at the Region VII level, the breakdown is as follows: 10% primary sector (agriculture), 29% secondary sector (industry), and 61% tertiary sector (services). Table 2-5 shows the GRDP by sector and year.

Table 2-5 Industrial Structure (Region VII)

Region	Sector	GRDP by Sector (Billion Pesos at Constant Price) 2003	2004	2005	2006	2007
Region VII	Total	75.8 (100%)	81.3 (100%)	86.2 (100%)	90.3 (100%)	98.2 (100%)
	Primary Sector	9.6 (12.7%)	9.9 (12.2%)	10.1 (11.7%)	9.5 (10.5%)	10.0 (10.2%)
	Secondary Sector	22.7 (29.9%)	24.1 (29.6%)	25.4 (29.5%)	26.7 (29.6%)	28.6 (29.1%)
	Tertiary Sector	43.5 (57.4%)	47.3 (58.2%)	50.7 (58.8%)	54.0 (59.8%)	59.6 (60.7%)

Source: National Statistics Office

The employment by major industry in Region VII (Table 2-6) and the number of establishments and employments by province within Region VII (Table 2-7) suggest that much of the employment and establishments in the region are concentrated in Cebu Province.

Table 2-6 Employment by Major Industry (Region VII)

Major Industry	Year 2005 Philippines	Year 2005 Region VII	Year 2007 Philippines	Year 2007 Region VII
Industry	32,875	2,422	33,672	2,588
Agriculture, Hunting and Forestry	10,763	688	10,768	765
Fishing	1,408	129	1,393	107
Sub - Total (Primary)	12,171	817	12,161	872
Mining and Quarrying	116	15	135	12
Manufacturing	3,043	331	3,060	339
Electricity, Gas and Water	108	5	141	8
Construction	1,616	136	1,740	156
Sub - Total (Secondary)	4,883	487	5,076	515
Wholesale and Retail, Repair of Motor Vehicles, *	6,215	450	6,176	423
Hotel and Restaurants	871	57	907	70
Transport, Storage and Communication	2,471	158	2,600	161
Financial Intermediation	337	26	384	29
Real Estate, Renting and Business Activities	736	29	881	75
Public Administration & Defense, Compulsory Social Security	1,494	107	1,569	113
Education	989	65	1,043	80
Health & Social Work	362	26	396	24
Other Community, Social & Personal Service Activities	781	54	779	53
Private Household With Employed Persons	1,561	147	1,699	173
Extraterritorial Organizations & Bodies	3	*	3	-
Sub - Total (Tertiary)	15,820	1,119	16,437	1,201

Source: National Statistics Office

Table 2-7 Number of Establishments and Employments (Region VII)

Region/Province	No. of Establishments			No. of Employments		
	2005	2006	2007	2005	2006	2007
Philippines	782,980	783,065	783,869	5,479,297	4,984,883	5,187,793
7 Central Visayas	44,379	44,367	44,459	403,308	378,447	396,742
Bohol	6,095	6,089	6,084	28,192	24,909	24,685
Cebu	28,560	28,556	28,651	328,564	312,178	330,071
Negros Oriental	9,106	9,104	9,103	44,585	39,831	40,315
Siquijor	618	618	621	1,967	1,529	1,671

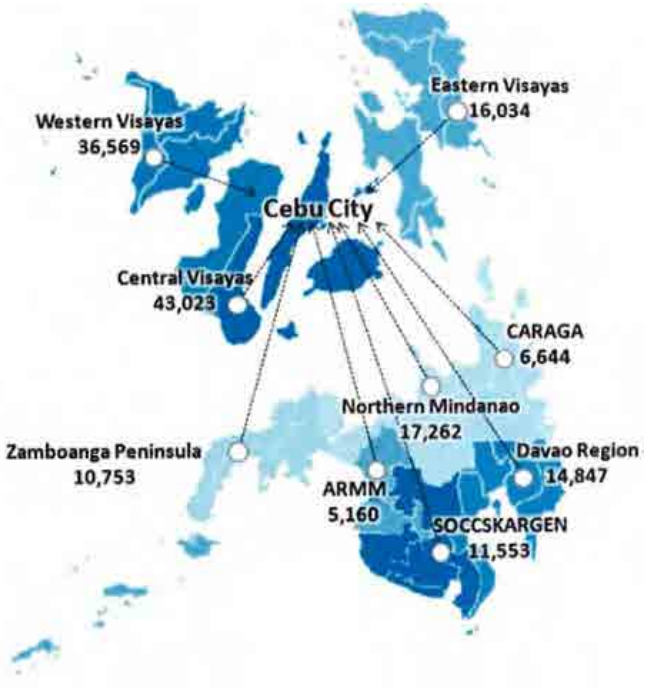
Source: National Statistics Office

One reason for the high employment and establishment share of Cebu Province is the economic zones and industrial parks, overseen by the Philippines Economic Zone Authority (PEZA), which attracts foreign direct investments (FDI) in manufacturing and logistics. The Economic Zones in Cebu Province are shown in Figure 2-7. The Mactan-Cebu International Airport, the second largest international airport in the Philippines, as well as the Cebu Sea Port, located in Cebu City, function as infrastructural enablers for establishments in Metro Cebu.

Furthermore, the abundance of young, highly educated and skilled English speaking workforce makes Cebu an ideal place for IT and Business Process Outsourcing (BPO). The numbers of regional annual graduates are summarized in Figure 2-8. Figure 2-9 shows age Cohort analysis from 2000 to 2010 in Cities of Cebu and Mandaue; and Regional VII. Cities of Cebu and Mandaue witnessed the influx of young people especially from 15–24 years old as of 2010 despite the fact that the outflow of young population was experienced in Region VII. There are currently three IT Parks located in Cebu City. In recent years, land developers have been constructing and expanding shopping malls, IT Parks, business parks, office spaces, sports and recreational facilities for anticipated growth in employment, especially in the tertiary sector.

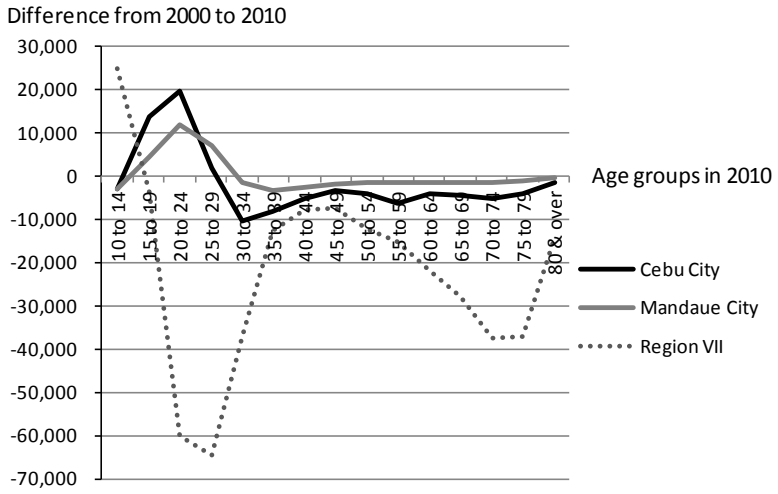
Source: DOTC (2011) The Development of Public Transportation Strategic Plan for Metro Cebu

Figure 2-7 Cebu Economic Zones



Source: Tholons (2011) Cebu City IT-BPO Roadmap

Figure 2-8 Annual Graduate per Region



Source: JICA Study Team based on National Statistics Office

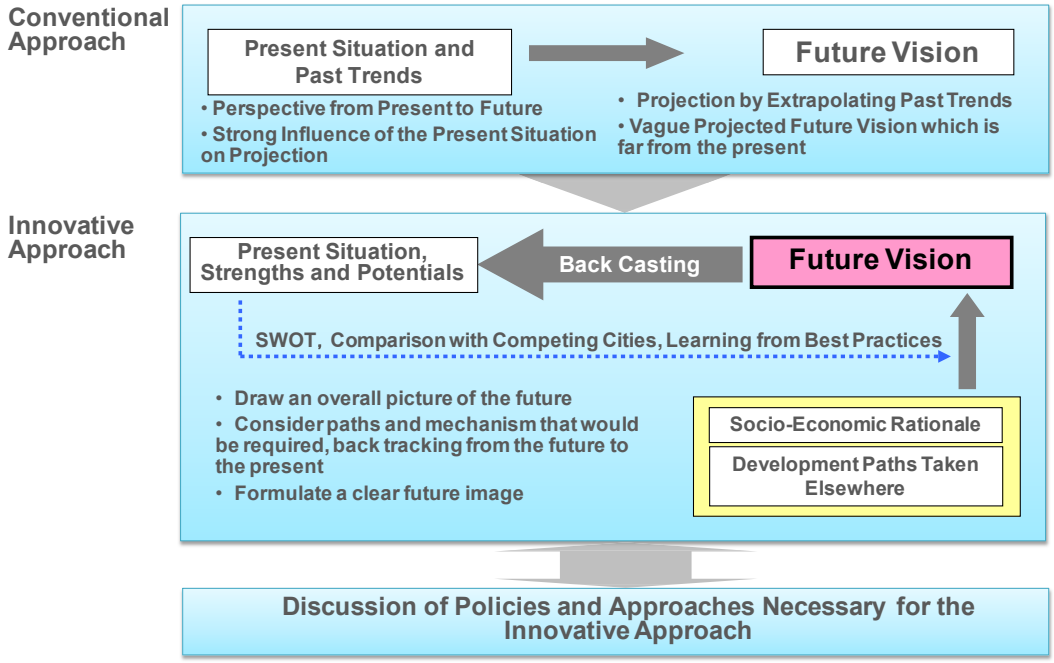
Figure 2-9 Population by Age Cohort Comparison, 2000–2010

3. Methodology

3.1 Vision Formulation by Backcasting Approach

To ensure an effective path to a sustainable urban development vision for Metro Cebu towards 2050, potential resolutions for pressing urban issues and initial development directions and targets that lead to low-carbonization in the Philippines are needed.

In formulating the 2050 Vision for Metro Cebu, the JICA Study Team adopted a "backcasting" approach. Figure 3-1 shows the difference between the conventional forecasting approach and the innovative backcasting approach. In contrast to a traditional "forecasting" approach that extrapolates future scenarios based on the continuation of current socio-economic trends, a "backcasting" approach starts with a possible or desirable future situation, usually described by a set of goals or targets established by assumed events between current and future situations.



Source: JICA Study Team

Figure 3-1 Backcasting Approach

The backcasting approach was applied at the workshops where the vision, strategies and development directions were discussed. At the first shop, the lessons from international precedent cities, including Yokohama City (Japan), Bilbao (Spain), Penang (Malaysia), Curitiba (Brazil), and Singapore were shown in support of formulating a 2050 vision, while the participants shared the results of the SWOT analysis conducted at the Steering Committee to understand the current objective position of Metro Cebu. Those international precedents show the importance of setting long-term urban development policy. In particular, the urban management and development procedure of Yokohama City, based on a vision (General Plan) created in 1965, was shown in detail. Based on the General Plan of Yokohama City, called "Comprehensive Plan to Build an International Port City Yokohama", a long-term development plan indicating six pillar projects was formulated, which guided the construction of Yokohama City's present-day urban structure, including the development of subway and highway networks linking the urban center and suburbs, a symbolical bridge, and the reclaimed urban center of "Minato Mirai 21".

At the second workshop, the target policies of various precedent cities, along with their current conditions, were shown to establish more specific development directions which can provide clarity to the process of formulating a vision. Table 3-1 shows the targets and conditions used for reference at the second workshop. In addition, excellent examples of international precedent cities were discussed, including Laem Chaban Port as an example of traffic improvement and industrial promotion by port relocation (Thailand), Yokohama Smart City Project as an example of a green technologies showcase (Yokohama City), and Hammarby Sjostadt as an example of recycling community (Stockholm, Sweden). By exploring these examples, the participants in the workshop were able to look beyond the short-term and observe the long-term narratives behind successful cities.

Table 3-1 Sample Targets and Situations for Backcasting Approach

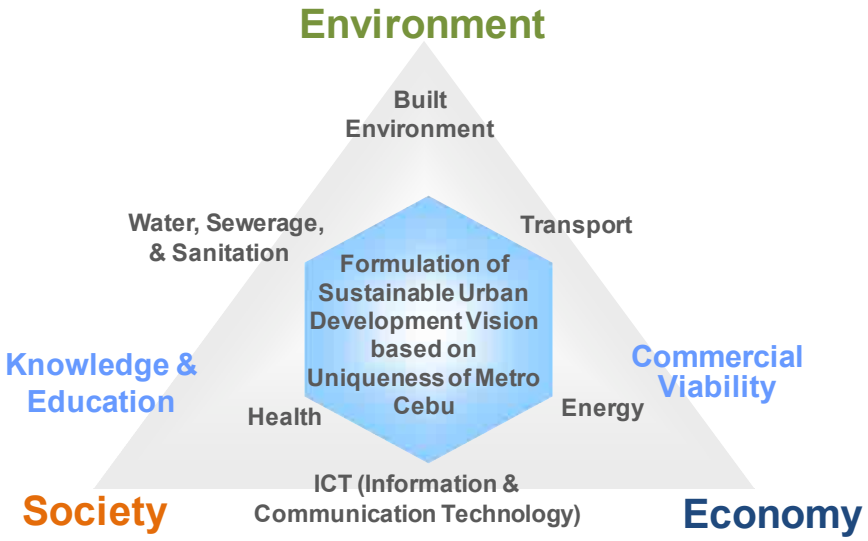
	Targets Used for Reference
Mobility	• Length of mass public transport infrastructure (present state) (e.g. Bus, BRT, LRT, Rail etc): Yokohama, Singapore, Hong Kong, London, New York, Tokyo (28 km–56 km per million population) • Modal split of mass public transport (present state): Yokohama City (42.7%), Bangkok (43.2%), Curitiba (45%), Singapore (44%)
Solid Waste Management	• Recycling rate (target): Yokohama City (G30 Plan) (30%) • Reduction rate of solid waste (present state): Yokohama City (99%), Singapore (95%), Seoul (80%)
Sewerage	• Sewerage treatment population rate (present state): Yokohama City (99.7%), Singapore (100%), Bangkok (40%), Hanoi (10%), Manila (10%)
Drainage	• Return period (target) (Outlet drain and secondary drainage): Yokohama City (5–10 years), Singapore (5 years), Manila (10 years)
Green Space	• Park area per capita: (present state) Yokohama City (4.4 m^2), Tokyo (5.5 m^2), Paris (11.8 m^2), London (26.9 m^2) (target) Ho Chi Minh City (4.0–5.0 m^2) (present state: 0.7 m^2)
Energy	• Energy saving rate: Harumi Island Triton Square, Tokyo (25%) (by district heating system, advanced technologies and area energy management system)

Source: JICA Study Team

3.2 Formulation of Sustainable Development Vision by TBL Approach

In setting a sustainable urban development vision for Metro Cebu, due attention was paid to the triple bottom line (TBL), a holistic concept of sustainability where social, economic, and environmental considerations are identified concurrently in a decision making process. TBL has been a staple for planning sustainable cities and communities since the ratification of the United Nations and International Council for Local Environmental Initiatives (ICLEI) in 2007. Figure 3-2 shows the diagram of the TBL approach and Table 3-2 describes the three components of the approach.

In formulating development directions in this study, the concept and viewpoints indicated in Table 3-2 of the TBL approach were referenced in addition to the unique characteristics of Metro Cebu. This procedure helped to draw out holistic and sustainable development directions, which reveal advantageous possibilities for sustainable actions and policies in Metro Cebu.



Source: JICA Study Team based on United Nations and ICLEI

Figure 3-2 TBL Approach

Table 3-2 Basic Viewpoints of TBL Approach

Socially Sustainable	Economically Sustainable	Environmentally Sustainable
1. Socially inclusive urban structure and infrastructure accessible to all inhabitants (including low-income, foreigners, disabled, elders, and children) 2. Conservation of historical and cultural heritage for enhanced urban character and identity	1. Urban structure which allows for the protection of its inhabitants from natural disasters and health hazardous living conditions 2. Protection and preservation of natural conditions (green space and coastal areas) to be kept for the future generations 3. Environmentally sustainable urban infrastructure accessible to all inhabitants	1. Conservation of historical and cultural heritage for enhanced urban character and identity 2. Economically inclusive urban industrial structure for sustainable economic growth including employment generation and poverty reduction

Source: JICA Study Team based on United Nations and ICLEI

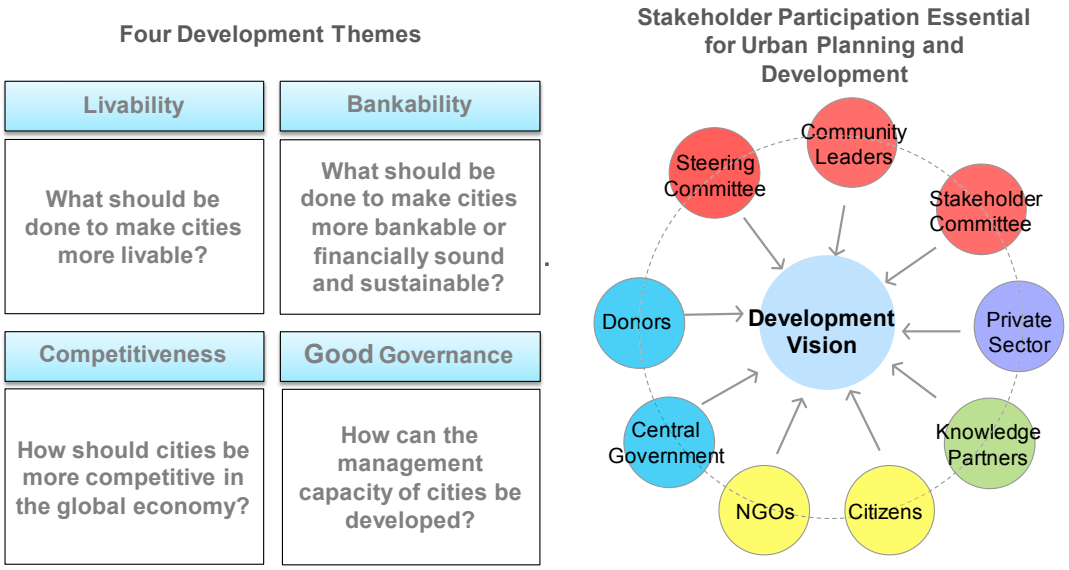
3.3 Two Concepts to Establish Stakeholder Ownership

The Metro Cebu 2050 Vision and its attributes were formulated by a participatory approach in this study. This approach smoothly facilitated the creation of the vision, development directions, and targets, as the discussion was open and the process was transparent. Given that the nationwide general election will be held in May 2013, this vision requires broad endorsement in order to survive the next election cycle. Therefore, a focus must be placed on close communication between a variety of stakeholders without bias and without favor, through a steering committee meeting, workshops, a consultancy meeting, and a number of individual consultation meetings.

To promote stakeholder ownership of the vision and its associated concepts, the participatory approach of the City Development Strategy (CDS) as well as the sustainable urban development and management of Public-Private Partnership were emphasized as a fundamental rule.

(1) Participatory Approach of CDS

CDS, advocated by the World Bank and UN-HABITAT, outlines frameworks for the four basic development themes of Livability, Bankability, Competitiveness, and Good Governance through wide-ranging stakeholder participation (Figure 3-3).



Source: JICA Study Team based on World Bank City Development Strategy and ECO2 Cities

Figure 3-3 CDS Approach

In this study, the 2050 vision for Metro Cebu was discussed using the participatory approach emphasized in the CDS. In general, however, having objective and impartial discussion, respecting all sectors and characterized by long-term perspective, is not easy. This is particularly true for workshops involving over 100 participants with various backgrounds. Hence, to provoke the objective and impartial discussion at the workshops, the principles of discussion for formulating the vision for Metro Cebu were presented (Table 3-3). For this purpose, the characteristics of Metro Cebu as identified through the SWOT analysis, and future scenarios based on socio-economic projections were profiled at the workshops (the detail is shown in Chapter 4).

Table 3-3 Principles of Discussion for Vision Formulation

1. Vision to encourage the balanced development of the whole Metro Cebu The vision should be ensured by giving well-defined targets and assigning roles to individual cities and towns so as to lead to development of the whole Metro Cebu.
2. Comprehensive vision not to be drawn by any specific sector The vision should be aimed at optimizing the total solution through making a comprehensive plan, not dominated by any specific sector.
3. Vision based on the existing and future (2050) conditions of Metro Cebu The potential socio-economic conditions for both present and future (year 2050) Metro Cebu should be thoroughly considered.
4. Vision in thorough consideration of the natural condition in Metro Cebu The vision should present an approach to urbanization which is in harmony with the natural environment of Metro Cebu.

Source: JICA Study Team

To categorize the development directions identified at a series of stakeholder meetings, the four development themes of the CDS approach - Livability, Bankability, Competitiveness, and Good Governance - were utilized. This was one of the most important procedures for making the formulated vision of Metro Cebu clear and easily understandable for the stakeholders (Figure 3-4). Concretely, the development themes of Competitiveness and Livability were employed as strategies indicating economic growth and basic urban services, while the other two development themes of Bankability and Good Governance (also regarded as important drivers of development direction), were merged into one strategy, "Metropolitan Governance". Furthermore, "Mobility" was added to the strategies as a focused development theme for the development of Metro Cebu.

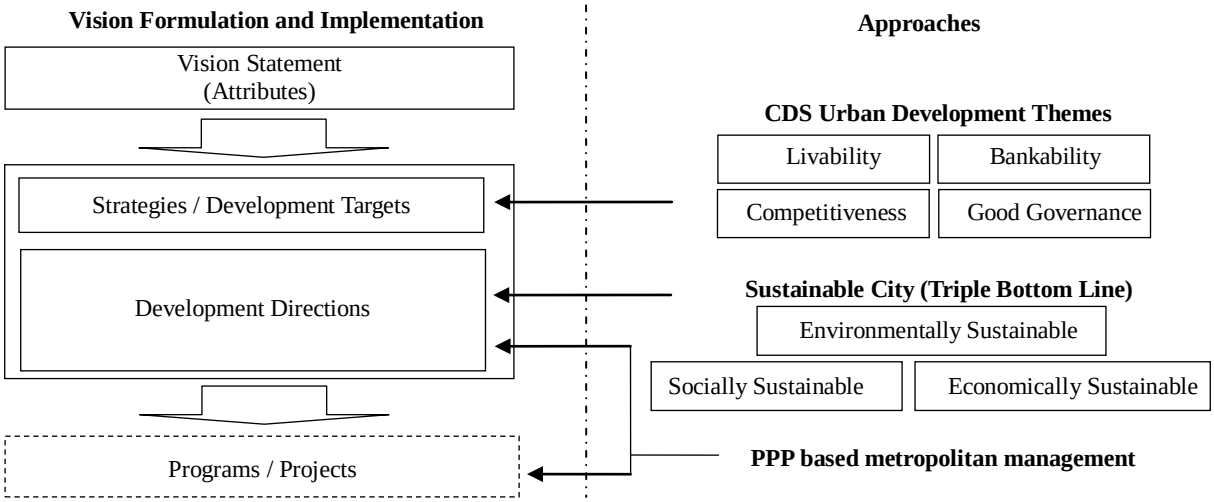
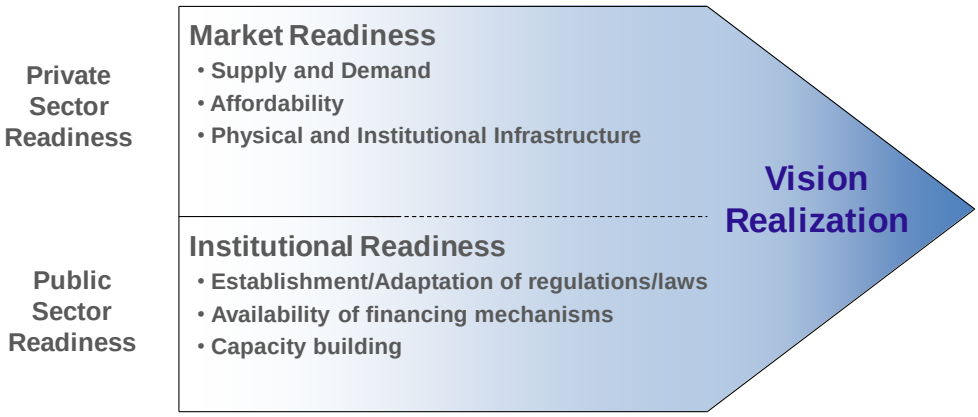


Figure 3-4 Approaches for Vision Formulation

(2) Sustainable Urban Development and Management by Public Private Partnership

To realize a sustainable development vision for Metro Cebu, proceeding with urban management in public private partnership (PPP) is needed. Therefore, PPP guideline must be established at an early stage of vision setting, and taken into account in the composition of the stakeholders. To encourage the collaboration between public and private, it is important to note that the public sector provides institutional and financial support, while the private sector enhances marketability (Figure 3-5).



Source: JICA Study Team

Figure 3-5 Public and Private Sector Cooperation and Ownership

In this study, the concept of urban management in public private partnership was taken into consideration for formulating development directions, which indicate specific actions and policies to materialize the formulated vision (Figure 3-4). For the vision formulation and implementation for Metro Cebu, this consideration is critically important since the financial resource of the metropolitan area is limited and the private sector is already involved in MCDCB which will be a quintessential institution for the metropolitan management.

3.4 Stakeholder Analysis

As this project aims to benefit those who live and work in Metro Cebu, we must identify a wide-ranging group of stakeholders. As interests differ from person to person and organization to organization, it is essential to classify the stakeholders. Categorizing the 100+ participants in the first workshop in January, the stakeholders are classified into the public and private sectors (Table 3-4). The public sector consists of LGUs, provincial government, and national government agencies; whereas the private sector includes civil societies (NGOs/NPOs, community organizations, etc.), business organizations/companies, academies, media, religious organizations, and youth groups.

As for the stakeholders, the degree of their political influence on endorsing the formulated vision, its attributes and development strategies must be taken into account. In the public sector, the 13 mayors of LGUs and the provincial governor; and the 13 vice mayors and the vice governor are leaders in the implementation of a formulated vision. Therefore, strong importance is placed on engaging these individuals so that their crucial endorsement towards the vision and development strategies can be obtained. However, as these individuals are likely to be influenced by political concerns, it is also important to listen to planning officers or administrators who are far less affected by political affairs.

Table 3-4 Stakeholders for Metro Cebu Development

Category	Participants of First Workshop
Public Sector	
Local Government Units (LGUs)/ Provincial Gov.	13 cities & municipalities (Cities of Carcar, Cebu, Danao, Lapu-Lapu, Mandaue, Naga, and Talisay; Municipalities of Compostela, Consolacion, Cordova, Liloan, Minglanilla, San Fernando), Cebu Province
National Government Agencies	National Economic & Development Authority (NEDA), Dept. of Transportation & Communications (DOTC), Dept. of Public Works & Highways (DPWH), Dept. of Environment & Natural Resources (DENR), Dept. of Energy (DOE), Dept. of Trade & Industry (DOTI), Dept. of Education, Dept. of Social Welfare & Development (DSWD), Dept. of Interior & Local Government (DILG), Cebu Port Authority (CPA), Mactan-Cebu International Airport Authority (MCIAA), Phil. National Police, Housing & Land Use Regulatory Board
Donors	JICA
Private Sector	
Civil Society NGOs/NPOs Community Organizations	Ramon Aboitiz Foundation, Inc. (RAFI), Cebu Leads Foundation, Movement for Livable Cebu, Solid Waste Management Association
Business Organizations/ Private companies	Cebu Chamber of Commerce & Industry, Mandaue Chamber of Commerce & Industry, Filipino Chinese Chamber of Commerce & Industry, Japan Chamber of Commerce & Industry, Cebu Business Club
Academies	University of Cebu, University of San Carlos (USC), USC-College of Architecture & Fine Arts
Media	
Religious Organizations	
Youth Groups	

Source: JICA Study Team

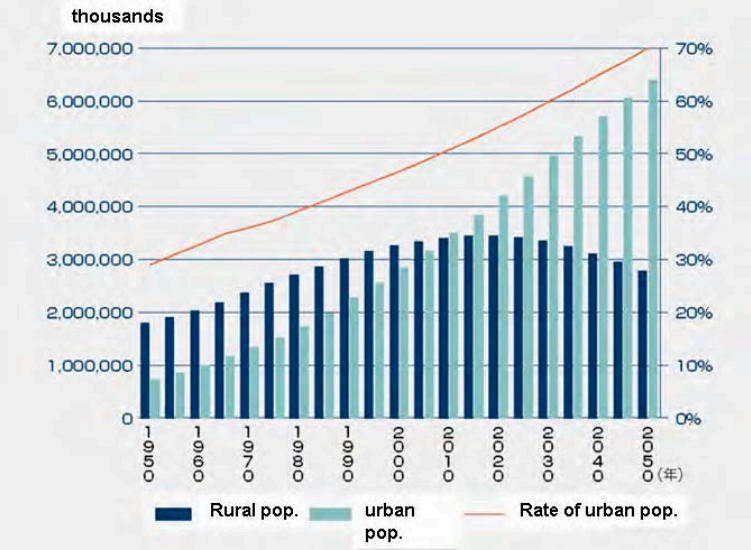
4. Proposed Vision by Backcasting Approach

4.1 The World and Metro Cebu in 2050

In this study, the target year of vision for Metro Cebu is set at 2050. To provoke the objective discussion at the workshop, the future urban situations based on the socio-economic projection in 2050 were introduced as follows.

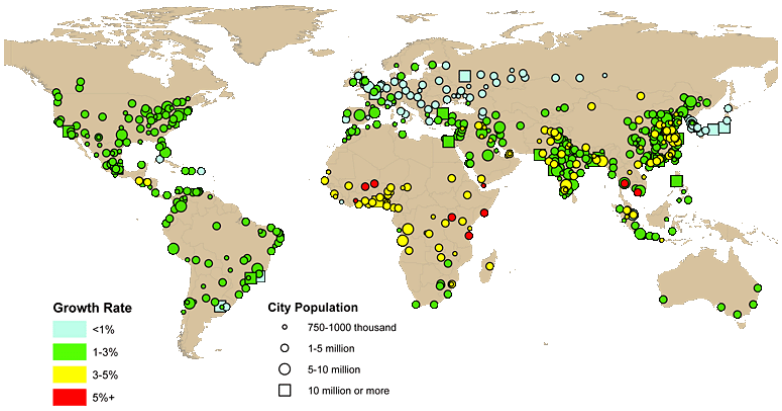
4.1.1 The World and the Philippines in 2050

The world urban population is expected to increase at the annual growth of approximately 70 million, leading to the situation in which over 70% of the world population will live in urban area in 2050. The number of mega cities with the population of over 10 million is also expected to increase, most of which will be in China, South East Asia, India and Africa. The urban population growth stated above is supposed to happen in those mega cities.



Source: United Nations, Department of Social and Economic Affairs

Figure 4-1 Forecast of the World Population Growth



Source: United Nations, Department of Economic and Social Affairs, Population Division: *World Urbanization Prospects, the 2011 Revision*, New York, 2012

Figure 4-2 Growth Rates of Urban Agglomerations from 2011 to 2025

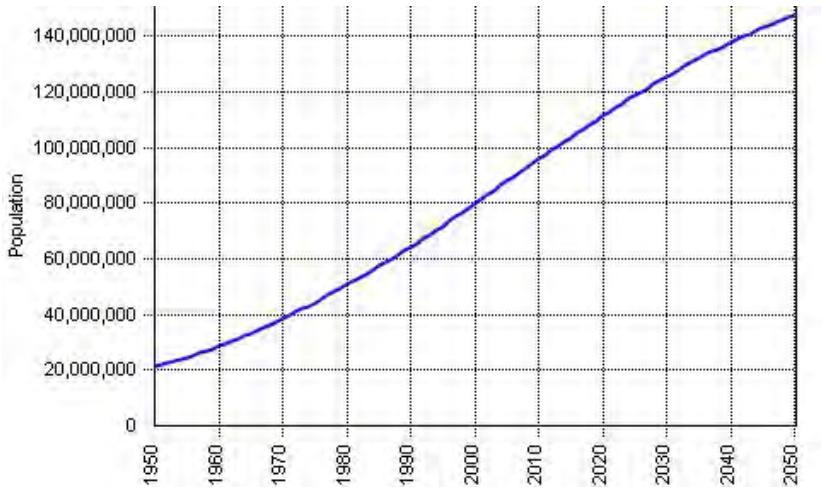
According to the forecast of the world GDP ranking in 2050, Brazil, Russia, India and China (BRICs) show their presence within top 5, followed by ASEAN countries such as Indonesia and Philippines (Figure 4-3).

	1980	2000	2010	2050
1	United States	United States	United States	China
2	Japan	Japan	China	United States
3	Germany	Germany	Japan	India
4	France	United Kingdom	Germany	Brazil
5	United Kingdom	France	France	Russia
6	Italy	China	United Kingdom	Japan
7	Canada	Italy	Brazil	Mexico
8	Mexico	Canada	Italy	Indonesia
9	Spain	Mexico	Canada	United Kingdom
10	Argentina	Brazil	India	France
11	China	Spain	Russia	Germany
12	India	Korea	Spain	Nigeria
13	Netherlands	India	Australia	Turkey
14	Australia	Australia	Mexico	Egypt
15	Saudi Arabia	Netherlands	Korea	Canada
16	Brazil	Argentina	Netherlands	Italy
17	Sweden	Turkey	Turkey	Pakistan
18	Belgium	Russia	Indonesia	Iran
19	Switzerland	Switzerland	Switzerland	**Philippines**
20	Indonesia	Sweden	Poland	Spain

Source: GS Global ECS Research

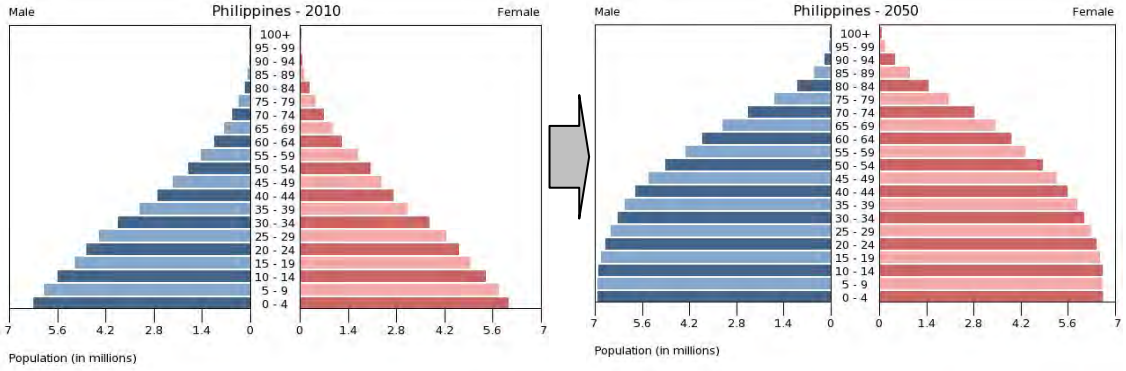
Figure 4-3 Forecast of the World GDP Ranking

The population of the Philippines is projected to increase at a high growth rate and reach 140 million by 2050 (Figure 4-4). Accordingly, the population pyramid of the Philippines will be changed from the current pyramid-shape to bell-shaped, meaning that the Philippines will become one of the aging societies in 2050 (Figure 4-5).



Source: U.S. Census Bureau, International Data Base

Figure 4-4 Population Forecast of the Philippines



Source: http://www.census.gov/ipc/www/idb/country.php

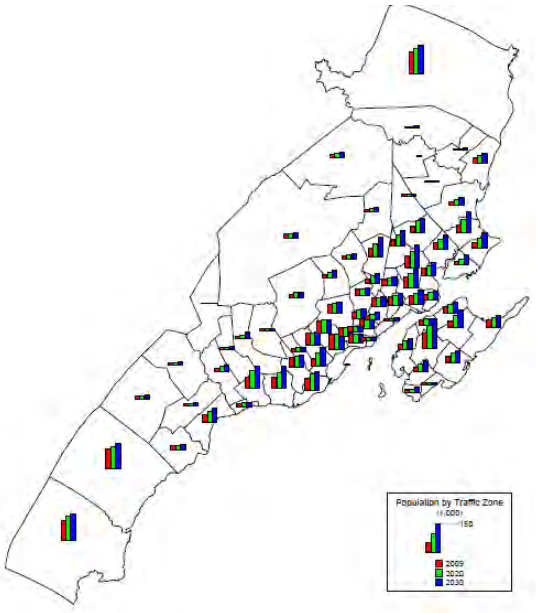
Figure 4-5 Population Pyramid of the Philippine in 2010 and 2050

4.1.2 Population Forecast and Envisioned Urban Issues for Metro Cebu in 2050

(1) Population Forecast of Metro Cebu

There are two existing study sources that forecast the population of Metro Cebu: *JICA & DPWH (2010) The Study of Master Plan on High Standard Highway Network Development in the Republic of the Philippine* and the study conducted by MCDCB. JICA/DPWH forecasts the population of Metro Cebu in 2030 at 3.953 million, whereas MCDCB does at 4.27 million. MCDCB also predicts the population in 2050 at 7.27 million, assuming the annual growth rate at 2.7% (Figure 4-6 and Table 4-1).

City/ Municipality	Population Forecast ('000s) 2009	2020	2030
Carcar City	104.0	121.9	138.0
Cebu City	823.5	968.5	1,119.3
Compostela	41.6	56.5	68.8
Consolacion	96.4	154.2	214.8
Cordova	48.8	72.3	99.6
Danao City	112.5	129.4	145.4
Lapu-Lapu City	285.6	415.3	522.4
Liloan	101.7	165.7	248.5
Mandaue City	337.9	460.5	588.9
Minglanilla	109.7	156.4	195.8
Naga City	99.9	128.0	158.0
San Fernando	102.4	117.5	131.1
Talisay	189.5	252.3	322.3
Metro Cebu	2453.5	3198.5	3952.9



Source: JICA & DPWH (2010) The Study of Masterplan on High Standard Highway Network Development in the Republic of the Philippines

Figure 4-6 Population Forecast of Metro Cebu by JICA and DPWH

Table 4-1 Population Forecast of Metro Cebu by MCDCB

Year	Metro Cebu (million)	Density (/km^2)	Outside Metro Cebu (million)	Density (/km^2)	Total Cebu (million)
1995	1.63	1,404	1.29	308	2.92
2000	1.93	1,659	1.43	341	3.36
2007	2.31	1,990	1.53	367	3.85
2010*	2.50	2,155	1.63	398	4.13
2030*	4.27	3,672	2.83	678	7.10
2050*	7.27	6,257	4.82	1,156	12.09

*Growth assumption: 2.7% per year
Source: MEGA CEBU 101: Constructing the City-Region & Providing the Architecture of Participation, MCDCB / RPOD, December 12, 2012

The forecast by JICA & DPWH (2010) seems reasonable, taking the past trend and regional balances into consideration. On the other hand, the forecast by the MCDCB study seems higher simply forecasting with a growth rate of 2.7% per year, which is an almost same rate as the current rapid growth rate of 2.8% per year (see Chapter 2). Therefore, the Study Team basically utilized the values forecasted by JICA & DPWH (2010). However, the JICA & DPWH (2010) forecasted the population until 2030. For the 2050 population, therefore, the study team utilized the value forecasted by the MCDBC.

(2) Envisioned Urban Issues of Metro Cebu in 2050

Based on the socio-economic forecast, several important sector issues for the formulation of 2050 vision for Metro Cebu, including traffic, water, energy and solid waste, were examined, which were presented at the first workshop (the detailed descriptions are stated in Chapter 6).

Transportation

Future growth of total vehicle trip numbers in Metro Cebu is forecast to grow by a factor of 1.47 by 2030 from 2009, with projected further increases by 2050. Accordingly, transport issues such as environmental pollution, chronic traffic congestion, inefficient network, poor connectivity, reduced accessibility, safety issues, poor public transport and a worsening pedestrian environment, will be deeply compounded if a long term integrated improvement plan is not put in place.

The existing port facilities have a number of constraints, such as shallow water depth, limited space allowing no expansion, high shipping costs, and weak connectivity to other areas. As a result of these weaknesses, the competitive strength of industries in Metro Cebu will be reduced. Furthermore, long term air traffic growth, including international and domestic passenger movements at MCIA will place constraints on economic growth if improvement measures are not delivered in order to facilitate this growth.

Water (Sewer and Sewerage / Drainage)

The volume of waste water and the BOD value are projected to increase according to the population growth in Metro Cebu. If effective countermeasures are not taken, the water quality of the rivers and the ocean will be seriously deteriorated.

Impervious areas of Metro Cebu will increase according to the expansion of urbanized areas. In addition, the rainfall volume is expected to increase in the future. Considering those situations in the future, the amount of rainwater infiltrating the ground decreases and the inundation areas caused by the rain are expected to increase.

Energy

The additional power of approximate 2,000 MW will be needed toward 2030 for Visayas Grid, which covers Metro Cebu, to deal with the future energy demand according to the population growth. In addition, electricity consumption per capita will increase three times higher than the current one in 2030.

Waste

According to the economic growth of Metro Cebu, the municipal waste volume per capita is projected to increase three times larger in 2030 and six times larger in 2050 than the current volume.

In Metro Cebu, approximately 1,000 tons per day of waste is currently ending up in landfills, but a total amount of municipal waste will increase according to the population growth and economic growth. Without any countermeasures for the reduction of municipal waste, 14-30ha landfill site will be needed annually in the future.

4.2 Analysis of Current Metropolitan Situation

4.2.1 SWOT Analysis by the JICA Study Team

For the formulation of 2050 vision for Metro Cebu, in particular for application of the backcasting approach, it was important for JICA Study Team itself to analyze the metropolitan situation broadly and properly by its expertise, which could initiate the objective discussion with a long-term perspective at the workshops and other stakeholder meetings. Table 4-2 indicates the results of SWOT analysis conducted by the study team.

Table 4-2 SWOT Analysis Conducted by JICA Study Team

Strength

General	• Second economic zone in the Philippines • Second largest Mactan-Cebu International Airport • International marine resort (Mactan), abundant natural resources for tourism • Most successful Mactan Economic Zone in the Philippines • Large development site (e.g. SRP)
Energy	• Clean electric power with high utilization rate of geothermal energy
Transport	• Strategic connections (international airport and sea port) • High number of walking trips (35%, DOTC 2011) • Jeepney and tricycle as tourism resources
Waste Management	• Voluntary garbage separation in Barangay • Commercialization of products made of recycled wastes (art work, compost) • Composting technology and compost trading market in the private sector • Technological infrastructure to recycle sorted plastic into plastic bags
Water	• Rainwater drainage network and its management experience • Potential drainage using natural slope • Easy connection to sewage pipe in newly developed area • Private sector initiative to utilize existing sludge withdrawal venders

Weakness

General	• Vulnerable infrastructure (frequent power blackouts) • Water pollution, rise in sea level, disasters (earthquake, typhoon)
Energy	• High electric power rate (No expectation for drastic rate reduction) • Increase of CO_2 emissions due to the growth of coal power generation • Tight situation for power supply and demand after 2015, No natural gas pipeline
Transport	• Lack of mass public transport • Severe traffic congestion and lack of connectivity and hierarchy • Lack of integrated walking and cycling provision and environment • Road safety issues • Deteriorating air quality attributed to emissions from motor vehicles
Waste Management	• Dumping of organic wastes to rivers leading to Marine pollution and odor • Overflow of Inayawan landfill site (odor, visual pollution, contaminated water) • Over 300 Scavengers and inadequate intermediate treatment facility • Technology shortage to implement garbage separation and recycling • Lack of a forecasting plan for future waste emission
Water	• Lack of a mid to long-term plan for drainage and waste water treatment • Lack of government budget, No experience of waste water treatment • Difficulty to build drainage treatment facility in densely populated areas • Difficulty to connect sewage pipes in the area where decomposition tanks are found, High population density

Opportunities

General	• Globally emerging smart city plans as a business solution • Philippines' environment measure to promote the use of untapped energy • Population growth and aging society leading to a high demand for retirement destinations
Energy	• Proactive promotion of renewable energy, energy conservation and climate change adaptation measures • Tax benefits and buyback systems for renewable energy power producers
Transport	• Introduction of first BRT in the Philippines as a pilot project • BRT will provide a platform to develop wider public transport and accessibility improvements • Tourism provides market for walking and cycling trips if pedestrian environment improved
Waste Management	• Enact solid waste management law, Establish solid waste management committee, Cebu City's policy for garbage separate collection • Implementation of gasification power generation • Cost/technology-aid system for resource recovery facilities in Barangay • High demand in recycled construction aggregates and timber • Potential to create resource recycling and reuse society (building material, compost) , Potential to utilize cutting-edge technology

Threat

General	• Accelerating competition among urban areas in the world • Differentiate Metro Cebu from Metro Manila and overseas urban areas
Energy	• Rise in power price caused by tight supply and demand • Soaring power price due to the delay of power development • Global and local impact on environment with development of coal power plants
Transport	• Increasing car use • Increasing gas price and bus fare due to energy-price increases • Opposition from jeepney drivers (labor union) towards modal-shift driven by BRT implementation

Waste Management	• Increase in waste treatment costs (due to population and waste increase, odor, transport cost to alternative sites) • Remaining years of alternative disposal site for Inayawan (approx. 10 yrs) • Inadequate recycle infrastructure for building materials and E-Waste • Inadequate treatment system for medical waste
Water	• Climate change due to global warming • Lack of government budget

Source: JICA Study Team

4.2.2 Current Problems and Potentials of Metro Cebu

Based on the analysis of current metropolitan situation conducted by the JICA Study Team, the current problems and potentials of Metro Cebu are summarized as stated below.

<Problems>
- Poverty (Slums & Squatters, limited economic integration)
- Poor Water Supply & Sanitation (Flooding)
- Poor waste management
- Poor Transport Infrastructure
- Poor Governance
- Low Global Ranking (Image & Competitiveness), etc.

<Potentials>
- Educated, Skilled, Creative & English Speaking People
- History & Cultural Heritage (but not utilized so far), Tourism
- Transport Hub – Linkage with international
- Resort Destination

4.3 Comparative Analysis of Precedent and Competitor Cities

As stated in Chapter 3, JICA Study Team adopted the backcasting approach for the formulation of 2050 vision for Metro Cebu. In this context, the lessons from the international precedent cities were provided at the first workshop. On the other hand, comparison with surrounding competitor cities is also important for the vision formulation. This section describes the results of analysis of such the precedent cities and comparison with competitor cities.

4.3.1 Extraction of Cities for Comparison

The comparison with precedent and competitor cities has two objectives: to find out some factors which differentiate Metro Cebu from surrounding competitor cities, and to find out some factors which are lacking or insufficient in Metro Cebu. For the first objectives, the Study Team extracted the competitor cities, including Manila as the capital of the Philippines, Bangkok, as more developed capital of Thailand, Hanoi and Bali as a resort destination similar to Cebu. For the second objectives, the study team extracted the precedent or benchmark cities, including Yokohama City and Singapore which have created international and sustainable communities and Stockholm and Copenhagen which have created nature-friendly communities focusing on eco-efficient policies. In addition to those cities, the study team also extracted several international precedent cities for the second objectives by focusing on specific approaches of urban development. For example, Bilbao has executed the urban rejuvenation policies centered on culture, and Curitiba has promoted high-density urban development along the public transport corridors.

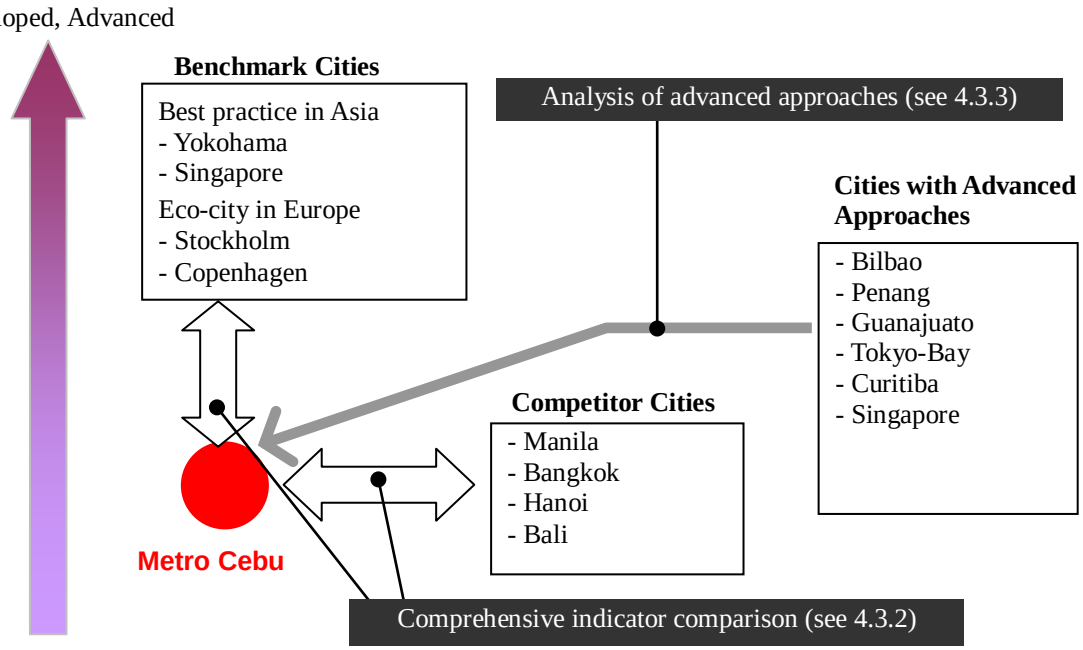
To evaluate those international precedent and competitor cities, several indicators were set, including socio-economic conditions and the degree of infrastructure development such as

traffic, energy and water supply, sewage and sewerage and solid waste management. The cities having specific approaches for urban development were evaluated by a case study format (Table 4-3 and Figure 4-7).

Table 4-3 Measures for Evaluation of Extracted Cities

	Objective of Evaluation	Measures/ Indicators
Comprehensive indicator comparison (see 4.3.2)	Evaluation of whole approaches of cities	Nine indicators derived from socio-economic data, traffic, energy, waste, water related data
Analysis of advanced Approaches (see 4.3.3)	Extraction and evaluation of specific approach of cities	Introduction of each approach through case study format

Source: JICA Study Team



Source: JICA Study Team

Figure 4-7 Extracted Cities and Measures of Analysis

Table 4-4 Extracted Cities and Reasons of Extractions

	City	Country	Reasons for extraction	Measures: indicator comparison	Measures: Case study
1) Competitor City	Manila	Philippines	Capital of the Philippines, which Metro Cebu should enhance differentiation the most	○	
	Bangkok	Thailand	One of the most developed cities in SE Asia as a near future vision of Metro Cebu	○	
	Hanoi	Vietnam	One of the most growing cities in SE Asia	○	
	Bali	Indonesia	One of the most developed resort destination in SE Asia which Metro Cebu should enhance differentiation the most	○	
2) Benchmark City	Yokohama	Japan	Second city to Tokyo and reputation as an international city in Asia	○	
	Singapore		Successful example of ASEAN cities	○	○
	Stockholm	Sweden	Reputed sustainable cities in Europe with various environmentally friendly approaches	○	
	Copenhagen	Denmark		○	
3) City with Advanced Approach	Bilbao	Spain	Development of Catalyst projects		○
	Penang	Malaysia	Acceleration of pillar projects		○
	Curitiba	Brazil	Transit Oriented Development		○
	Guanajuato	Mexico	Regional coalition		○
	Tokyo bay	Japan	Regional coalition		○

Source: JICA Study Team

4.3.2 Comprehensive Indicator Comparison

(1) Comparison of Extracted Cities by Indicators

The extracted cities were evaluated with five ranks by each indicator. Table 4-5 shows the data source and evaluation concept of rank scale for indicators. The results of evaluation of extracted cities by those indicators are shown in Table 4-6 and Table 4-7.

Table 4-5 Data Source and Concept of Rank Scale for Indicators

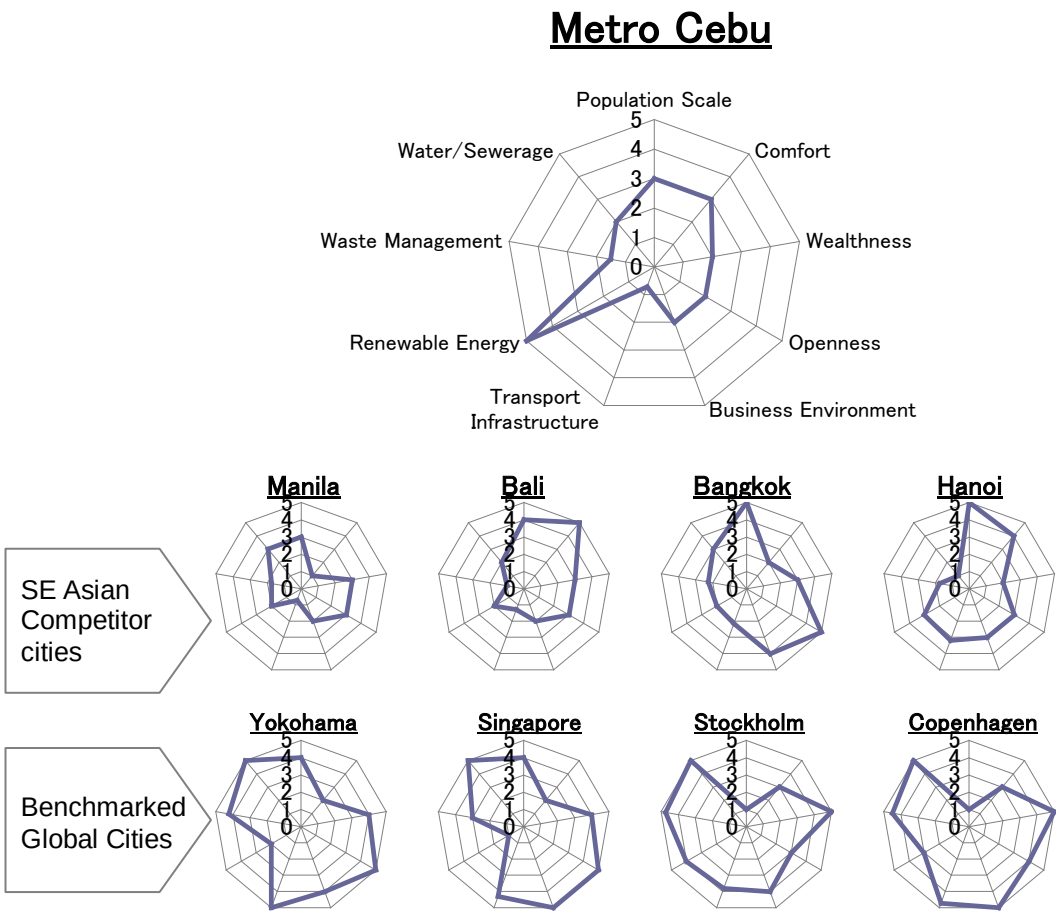
Indicators	Data Sources	Concept of Rank Scale
1. Population Scale	Population of each city	More population (5), Less population (1)
2. Comfortable	Population density of each city	High population density (5), Low population density (1)
3. Wealthiness	GRDP/capita of each city	High (5), Low (1)
4. Openness	# at immigration of each city	More (5), Less (1)
5. Business Environment	Ranking of "Doing Business 2013", World Bank	Easy for business (5), hard for business (1)
6. Transport Infrastructure	"Logistics Performance Index", World Bank and Containerisation International Yearbook	Superior in traffic mobility (5), inferior in traffic mobility (1)
7. Renewable Energy	Renewable energy to generation ratio of each city	High (5), Low (1)
8. Waste Management	Level of segregation, collection and recycling approaches of municipal wastes of each city	Segregation, collection and comprehensive recycling are done (5), Without treatment (1)
9. Water / Sewage	Level of achievement such as sewage population rate and sewage treatment	For the most citizens adequate treatment is done (5), Only treatment with septic tank (1)

Source: JICA Study Team

(2) Radar Chart of Extracted Cities Comparison

The extracted cities were evaluated based on the aforesaid indicators, which were illustrated in the form of radar chart (Figure 4-8) Compared to the competitor cities in Southeast Asia, Metro Cebu is inferior in "Population scale," "Wealthiness (GRDP per capita)," "Openness (# of immigrants)," "Business environment." Compared to the benchmarked international cities, Metro Cebu is inferior especially in basic infrastructure such as traffic, waste management and water.

On the other hand, the indicator of "Comfortable (low population density)" is superior to other competitor cities in Southeast Asia which have higher population density, and "Renewable energy to generation ratio" is also superior to other cities including sustainable cities in Europe such as Stockholm.



Source: JICA Study Team

Figure 4-8 Radar Chart of Extracted Cities Comparison

Table 4-6 Comparison with Competitor Cities in Southeast Asia

City		**Metro Cebu**	**Manila**	**Bali**	**Bangkok**	**Hanoi**
Country		Philippines	Philippines	Indonesia	Thailand	Vietnam
Social Framework	Population (City)	866,171	1,660,714	531,924 (Denpasar)	8,249,117	6,500,000
	Population (Metro)	2,550,999	11,553,427	3,643,471 (Bali)	–	–
	Density (City)/km^2	2,974	43,079	682 (Denpasar)	–	1,943
	Density (Metro)/km^2	2,385	18,093	–	5,259	–
Economic Framework	GRDP ($ billion)	2.5 (2009 Central Visayas)	149 (2008, PPP)	7.6 (2011, Nominal)	119 (2008, PPP)	42 (2008, PPP)
	Export ($ million)	4,713 (2005)	–	–	–	–
	Immigration (million people)	0.57 (2011)	3.0 (2011)	2.8 (2011)	12.2 (2011)	1.9 (2011)
Area	Area (km^2) (City)	291	39	128	–	3,345
	Area (km^2) (Metro)	1,070	639	5,637	1,569	–
Environmentally friendly technologies for urban city (Energy management)	Power price	Highest level in south east Asia	Highest level in south east Asia	Less expensive by 40% than Metro Cebu	About half price of Metro Cebu	Approx. 40% compared with Metro Cebu
	Supply and demand situation	Tight situation on supply and demand in 2015 (expected)	Peak demand: Annual growth rate 4.5% (to 2030)	Peak demand: Annual growth rate 7.7% (to 2030)	Peak demand: Annual growth rate 6% (to 2020)	Peak demand: Annual growth rate 10% (to 2030)
	Percentage of RE generation	Approx. 64% in 2010 on power generation basis	Approx. 15% in 2010 on power generation basis	Approx. 12% in 2010 on power generation basis	Approx. 12% in 2010 on power generation basis	Approx. 28% in 2010 on power generation basis
	Incentives for RE	High	High	High	Very High	High
Urban Transport	Public Transport Overview	No mass public transport. Public transport centered on paratransit including jeepneys, multicabs, pedicabs, and tricycles. Some bus services operating in peripheral areas and not in the Cebu city.	Multimodal public transport system including mass transit (LRT, MRT, Rail) supported by bus services and paratransit (mainly jeepneys)	Jakarta, Indonesia used for transport comparator due to available information. A multimodal public transport network of BRT and bus serves the city alongside paratransit	Multimodal public transport system including mass transit (BTS Skytain, MRT), supported by bus and paratransit (tuk-tuk)	Largely bus and paratransit based system. However mass transit (Metro) is planned
	Total Mass Public Transport Network Length (km)	N/A	Bus N/A LRT1 20 km LRT2 13.8 km MRT 16.9 km	Jakarta BRT 268 km (80 km under construction) Bus 21,564 km (2001)	Bus 5,163 km (1988) Metro 20 km BTS 23.5 km	Metro 182.5 km (planned)
	Public Transport Modal Share (Bus, BRT, LRT or rail) (out of total person trips)	Bus 0.6% (2011)	56.3% (1996) Rail 2.3% Bus 14.9% Minibus 39.1 (excluding walking trips)	32.0% (2002, Jakarta) Rail 1.3% Bus 9.8% Microbus: 20.9%	43.2% (2002) Bus 37.6% Rail 5.6%	Bus 4.4% (2005)
	Paratransit Modal Share (out of total person trips)	Jeepney/multicab 28.5% and tricycle/trisikad/pedicab 16% (2011)	13.4% (1996) (excluding walking trips)	4.0% (2002, Jakarta)	N/A	0.9% (2005)
Transport (Freight and logistics)	Container Transaction Volume: TEU	Philippines: 1,916,105 TEU World Rank: 41 **Cebu Port:** 492,776 TEU World Rank: 157 Cebu Port is the second largest port in the Philippines after Davao Port in terms of container handling volume. Due to the lack of space for expansion, shallow water depth (8.0–9.3m) and congested access road to the port, the relocation of Cebu Port, especially its international cargo handling function, has been recommended in JICA (1994), JICA (2002) and METI (2012). Among the five candidate relocation sites recommended by JICA (1994), i.e., Consolacion, Mactan North reclamation area, Mactan South reclamation aera, Cebu South Reclamation Area, and Minglanilla Reclamation area, JICA (2002) and METI (2012) concluded that Consolacion is the most recommendable relocation site from the economical aspects, accessibility to the current Cebu Port, future expansion, adjustability to the airport and environmental conditions. According to METI (2012), whilst cargo handling functions are transferred to the new port according to an increase in its demand, the	Philippines: 1,916,105 TEU World Rank: 41 **Manila Port:** 125,0421 TEU World Rank: 295 JICA (2004) developed the Philippine Port System Strategy (PPOSS), a strategic national port master plan with the target year 2024 and an urgent development plan with the target year 2009. Six major ports i.e., Manila, Subic, Batangas, Cebu, Cagayan de Oro/Mindanao and Davao) were selected as a national gateway port. Among them, Subic and Batangas were developed/ reinforced 80 km northwest and 110 km south from Manila to decongest and supplement Manila Port.	Indonesia: 8,129,379 TEU World Rank: 15 **Tanjung Priok:** 4,714,857 TEU World Rank: 24	Thailand: 6,648,532 TEU World Rank: 20 **Laem Chabang Port:** 5,068,076 TEU World Rank: 21 As part of the Eastern Seaboard Development Program from 1980s to the first half of 1990s, Leam Chabang Port with 14 m depth was constructed 130 km south from Bangkok to supplement and substitute Bangkok River Port with 8.5–11 m depth, which did not allow entry of large container vessels. A new industrial zone, access road/railway and inland container depot were concurrently prepared, leading to contribute to the economic growth, diversify the access mode of transport, as well as decongest the surrounding area for both Bangkok and Laem Chabang.	Vietman: 5,983,583TEU World Rank: 21 **Hai-phong Port:** 953,646TEU World Rank: 101 Hai Phong Port, the second largest cargo handling port in Vietnam next to Saigon, is not able to receive large vessels due to a shallow water depth of 7 m. To accommodate an increasing container demand, the development of Lach Huyen Port with 14 m in water depth has been ongoing under public private partnership scheme together with the construction of access road.

City		**Metro Cebu**	**Manila**	**Bali**	**Bangkok**	**Hanoi**
Country		Philippines	Philippines	Indonesia	Thailand	Vietnam
		part of the existing port will be redeveloped for solely passenger use and the rest of the water front area will be converted to a commercial district and open space.				
Urban Waste Management	Sorting	In some communities, organic wastes and paper wastes are sorted for composting. It, however, is not found at all levels.	Waste from commercial areas, high waste generation areas, medical wastes are separated by the private sector.	Sorting for hotels is made only by private sector.	Sorting of recyclable wastes in large cities by private sector	Sorting of recyclable wastes in large cities by private sector
	Collection	Barangay acts as the operating body in waste collection. However, the collection rate is limited. Much of the urban waste is scattered, and waste dumping in the river and ocean can be found.	Regular collection and transport of urban wastes are made by collection network to FDS	Collection of urban waste not meeting waste generation volume, and a great deal of waste is still scattered.	Regular collection and transport of urban wastes are made by collection network to FDS	Collection of urban waste not meeting waste generation volume, and a great deal of waste is still scattered.
	Treatment and Disposal	In the past, waste was deposited in the Inayawan Sanitary Landfill. Now, however, the volume of generated waste exceeds the capacity, resulting in open dumping. Composting facilities are small in scale.	In the past, mountains of waste in urban areas due to lack of disposal infrastructure were a problem (currently upgraded).	Open dumping, much of the waste resulting in contaminating the ocean	Composting and incineration facilities are upgraded toward more appropriate infrastructure.	FDS capacity nearing end. While there are concepts for large scale incineration, implementation of sorting at the individual level is slow.
	Incineration and Recycle	<10% <10%	<20%	<10%	<40%	<10%
	Challenges and Measures	Small scale composting projects are widely found with a limited amount of subsidies. Some Barangays have BOP projects focusing on commercialization of products made from collected magazine wastes.	Removal and disposal of the mountains of waste, as well as establishing an urban waste management flow	Development of a sanitary land fill, collection of urban wastes, increase in rate of appropriate waste treatment	General policy for waste to energy exists, but there is much opposition from residents, requiring many social skills for solving the current challenges.	General policy for waste to energy exists, but there is much opposition from residents, requiring many social skills for solving the current challenges.
Drainage	Rainwater Drainage	• Rainwater drainage network is established in Cebu City, Lapu-Lapu City, and Mandaue City. However, insufficient drainage with waste accumulated results in frequent flooding.	• Rainwater and drainage collected and removed through a combined sewerage system in urban areas. • Due to the low altitude of the urban areas, 70% of the drainage is planned to be pumped. Drainage facilities are planned on a 10 year probability. However, due to illegal dumping of wastes, drainage capacity is only at an about 2 year probability	• No drainage facilities are provided, and so there is much damage from flooding in Dempasar District, Singaradja City Buleleng Province, Negara Town and Dempasar City and its vicinity.	• Rainwater and drainage are collected and removed through a combined sewerage system in urban areas. • For flooding control, there is currently a plan to set pumping facilities in the 15 areas most susceptible to flooding	• Combined sewerage system has been established during the French occupation, and approximately **40%** of the urban population of Hanoi City have access to drainage pipes.
	Sewage Treatment	• In terms of sewage treatment, **80%** of households use septic tanks or a similar sanitary toilet facility. • Concentrated sewage treatment facilities only exist for industrial areas and small scale commercial areas	• Urban sewerage is operated by two private companies (MWCI and MWSI) and sewerage adoption rate is approximately **10%** at 80,000 m^3/day (which treats drainage as well).	• In terms of sewage treatment, there are sewage pipes for only about 40,000 people within Dempasar, and the remaining is septic tanks. • Treatment capacity of each sewage treatment facility is 36,000 m^3/day.	• In 2008, the seven sewage treatment facilities totaled to a **40%** treatment rate.	• In 2008, domestic wastewater of 400,000–450,000 m^3/day, industrial wastewater of 260,000 m^3/day is discharged to rivers, of which approximately 10% is subject to treatment. • Wastewater treatment is conducted by 2 pilot plant facilities (3,000 m^3/day and 4,000 m^3/day) and most of domestic wastewater is treated through a decomposition tank
	Septic Tank	• Maintenance of septic tanks is insufficient and much of sewage is discharged to the rivers. • Extraction from septic tanks is rarely conducted, and septic tank treatment facilities are not operated appropriately, and sludge is directly conveyed to FDS.	• Most households use septic tanks, of which adoption rate is **80%.**			
	Utilization of Sludge as Energy		• Part of sludge is used as fertilizer for sugar cane farms		• Compost production from sewage sludge is **5 ton/year**. Efficient sewage treatment from the implementation of pipelines allows for control of methane gas generation, leading to measures against global warming.	
	Water Reuse		• Treated sewerage is partially (4,000 m^3/day) at industrial parks.		• Grey water usage (re-use of treated sewage water) is **3%**.	

Source: JICA Study Team

Table 4-7 Comparison with Benchmark Global Cities

City		**Metro Cebu**	**Yokohama**	**Singapore**	**Stockholm**	**Copenhagen**
Country		**Philippines**	**Japan**	**Singapore**	**Sweden**	**Denmark**
Social Framework	Population (City)	866,171	3,697,894	4,737,000	818,603	509,861
	Population (Metro)	2,550,999	–	–	1,996,896	1,872,706
	Density (City) /km^2	2,974	8,450	6,489	3,917	5,794
	Density (Metro) /km^2	2,385	–	–	307	–
Economic Framework	GRDP ($ billion)	2.5 (2009 Central Visayas)	–	215 (2008 PPP)	70 (2008 PPP)	49 (2008 PPP)
	Export ($ million)	4,713 (2005)	–	–	–	–
	Immigration (million people)	0.573 (2011)	–	13.2 (2011)	2.6 (2009)	4.7 (all of Denmark 2011)
Area	Area (km^2) (City)	291	437	707	209	88
	Area (km^2) (Metro)	1,070	–	–	6,519	–
Environmentally friendly technologies for urban city (Energy management)	Power price	Highest level in south east Asia	More expensive by 20%–30% than Metro Cebu	Highest level in south east Asia	Less expensive by 30%–40% than Metro Cebu	Less expensive by 20%–30% than Metro Cebu
	Supply and demand situation	Peak demand: Annual growth rate 4% (to 2030) Tight situation on supply and demand in 2015 (expected)	Peak demand: Annual growth rate 2% (to 2021)	Power generation: Annual growth rate 2.8% (to 2030)	Power generation: Annual growth rate 0.4% (to 2020)	–
	Percentage of RE generation	Approx. 64% in 2010 on power generation basis	Approx. 7% in 2011 on power generation basis	0%	55%	32%
	Incentives for RE	High	Very High	Medium	High	Very High
Urban Transport	Public Transport Overview	No mass public transport. Public transport centered on paratransit including jeepneys, multicabs, pedicabs, and tricycles. Some bus services operating in peripheral area and not in the Cebu city.	Multimodal public transport system including mass transit (extensive rail/subway) supported by a extensive bus network	Multimodal public transport system including mass transit (MRT and LRT) supported by an extensive bus network (including ferries)	Multimodal public transport system including mass transit with extensive metro, commuter rail, regional rail, light rail, tram and bus system all present within the city.	Multimodal public transport system including mass transit (metro and rail) supported by a bus network (including harbour/sea bus)
	Total Mass Public Transport Network Length (km)	N/A	MRT 146.5 km (2011) LRT 28.8 km (2011)	MRT 146.5 km (2011) LRT 28.8 km (2011)	Metro 108 km LRT 29.5 km +Suburban Rail	Metro 22 km S-train 200 km
	Public Transport Modal Share (Bus, BRT, LRT or rail) (out of total person trips)	Bus 0.6% (2011)	42.7% (2008) Rail: 37.2% Bus: 5.5%	44% (2011) Bus: 25% Rail: 19%	59% (2005)	27% (2010)
	Paratransit Modal Share(out of total person trips)	Jeepney/multicab 28.5% and tricycle/trisikad/pedicab 16% (2011)	0% (2008)	0% (2011)	0% (2005)	0% (2010)
Transport (Freight and Logistics)	Container Transaction Volume : TEU	Philippines: 1,916,105 TEU World Rank: 41 **Cebu Port:** 492,776 TEU World Rank: 157	Japan: 17,726,645 TEU World Rank: 7 **Yokohama Port:** 3,280,191 TEU World Rank: 36	Singapore: 29,178,500 World Rank: 3 **Singapore Port:** 28,431,100 TEU World Rank: 2	Sweden: 1,327,407 TEU World Rank:49 **Gothenburg Port:** 796,000 TEU World Rank: 116	Denmark: 709,147 TEU World Rank: 60 **Aarhus Port:** 447,000 TEU World Rank: 168
Urban Waste Management	Sorting	In some communities, organic wastes and paper wastes are sorted for composting. It, however, is not found at all levels.	Full range sorting of containers & packaging, PET bottles, glass and aluminum cans	For the purpose of incineration treatment, waste is sorted and collected by 3 types (burnable, non-burnable, and recyclable).	Established centers for reuse and remake of electric wastes and clothing. In addition to sorting, reduction of generation is promoted.	Sorting by 12 different types and full scale recycling. Waste generation reduction measures such as deposits for PET bottles are implemented
	Collection	Barangay acts as the operating body in waste collection. However, the collection rate is limited. Much of the urban waste is scattered, and waste dumping in the river and ocean can be found.	Utilization of low emission waste station collection cars, and implementation of programs to increase collection efficiency	Regular waste collection network is arranged, and there is no scattered urban waste.	Collection is innovative, such as the use of EV which utilizes power generated from urban wastes and biomass.	Waste boxes are set throughout the city to increase efficiency of collection and transportation. Collection occurs when there is a certain amount of waste
	Treatment and Disposal	In the past, waste was deposited in the Inayawan Sanitary Landfill. Now, however, the volume of generated waste exceeds the capacity, resulting in open dumping. Composting facilities are small in scale.	Containers and packaging, oversize wastes, urban wastes and sorting residue are incinerated for power generation, and metal residues are recycled.	Similar to Japan, almost all waste is incinerated, and only about 10% is landfill disposed.	The utilization of biomass is recommended to the residents, and recycling through compositing and gasification is conducted.	Urban wastes are incinerated, waste heat are distributed to the city via pipelines. In the spring and summer, compost is used as heat source.
	Incineration and Recycle	<10%	< 100%	< 90%	< 100%	<100 %
	Challenges and Measures	Small scale composting projects are widely found with a limited amount of subsidies. Some Barangays have BOP projects focusing on commercialization of products made from collected magazine wastes.	“The 3R Dream Plan” calls for full range waste sorting and recycling, allowing for closing of one incineration facility to cut operation costs.	The future plan is to reuse incinerated ash such as for slag, and to develop a sustainable treatment structure.	Much emphasis on low carbon society utilizing wastes. Future plans for use of biogas for waste collection vehicles	In 2016, there is a construction plan for the new waste in which an energy building is constructed with an artificial ski course set on the roof.

City		**Metro Cebu**	**Yokohama**	**Singapore**	**Stockholm**	**Copenhagen**
Country		**Philippines**	**Japan**	**Singapore**	**Sweden**	**Denmark**
Drainage	Rainwater Drainage	• Rainwater drainage network is established in Cebu City, Lapu-Lapu City, and Mandaue City. However, insufficient drainage with waste accumulated results in frequent flooding.	• Drainage is set for 61% of 5 year probability rain, and 34% of 10 year probability rain. Due to costs, most are set for 5 year, with low grounds and high population areas set for 10 years	• Rainwater drainage was included in a comprehensive rainwater drainage plan which decreased the 3,000 ha of flooding area in 1970s to 56 ha in 2011. • Rainwater treatment was targeted to: 1. Alleviation of Flooding 2. Prevention of Flooding 3. Improvement of Flood Countermeasures • Specific measures included: 1. Increase drainage capacity of rivers and drains 2. Inflation of ground levels 3.Monitoring of floods • Flood treatment currently 100%	• Rainwater and sewage included in Stockholm Water Program, which is based on the EU water policy framework which calls for the understanding of water volume and quality of surface stream water and underground water from the perspective of watershed management • In terms of rainwater, the combined sewage system has a negative impact on the water quality of lakes during rainfall, and measures are being considered.	• Rainwater and discharge during rainfall is a major cause of ocean water pollution, and measures to equalize rainwater overflows such as rainwater held by plants, use of accumulated water for grass and toilets, permeable soils, and ponds are in plan. • In order to control rainwater overflow, IT technology such as SCADA is utilized to monitor the water levels at the entrance of discharge on a real-time basis.
	Sewage Treatment	• In terms of sewage treatment, **80%** of households use septic tanks or a similar sanitary toilet facility. • Concentrated sewage treatment facilities only exist for industrial areas and small scale commercial areas	• Maintained through a combined and separated sewerage system • In 2009, 99.7% of the population's sewage (approximately 1,500,000 m^3/day) is aggregately treated. • The city has 8 sewage treatment facilities with high treatment technology to eliminate nitrogen and phosphorus.	• Maintained through a separated sewage system • 6 sewage treatment facilities	• 100% of sewage water for 1 million inhabitants of Stockholm (approximately 355,000 m^3/day) is treated, and advanced treatment to eliminate nitrogen and phosphorus is conducted to maintain the water quality of lakes.	• 90% of sewage is combined sewerage system and 10% is by separated sewerage system. • Two advanced treatment facilities eliminate nitrogen and phosphorus. • Through awareness building, water conservation measures is promoted to decrease generation of sewage water.
	Septic Tank	• Maintenance of septic tanks is insufficient and much of sewage is discharged to the rivers. • Extraction from septic tanks is rarely conducted, and septic tank treatment facilities are not operated appropriately, and sludge is directly disposed to FDS.				
	Utilization of Sludge as Energy		• Sludge generated from sewage treatment is made into biogas through anaerobic digestion and used as fuel for the facilities. • Digestive sludge is incinerated and used as cement ingredient or soil improvement agents. • Part of the treated water is filtered and ozone treated and sold for reuse for water for parks or construction.	• Sludge treated by anaerobic digestion for reuse of methane • Final sludge is incinerated and disposed in landfill	• Sludge from sewage treatment is made into biogas by anaerobic digestion and used as fuel for cars. • Digestive sludge is reused for agricultural fertilizer and mining cover soil.	• Sludge from sewage treatment is made into biogas by anaerobic digestion and used as fuel for gas power generation. • Digestive sludge is incinerated.
	Water Reuse			• Part of treated water is further treated (membrane) in 3 facilities and 190,000 m^3/day of water is reused as drinking and industrial water.		
	Other		• Spaces in sewerage pipeline are used for optical fibers.		• Temperature difference of outside and sewage water is used as heating system.	

Source: JICA Study Team

(3) Reference: Global Livability Survey (Example of World Cities Comparison Indicators)

"Livability Report" published by Economist Intelligent Unit (EIU) is one of the examples of the world city comparison survey. The evaluation indicators of the survey are composed of five categories: 1) Stability, 2) Healthcare, 3) Culture & Environment, 4) Education and 5) Infrastructure (Table 4-8).

Table 4-8 Evaluation Indicators of Global Livability Survey

Stability
Prevalence of petty crime
Prevalence of violent crime
Threat of military conflict
Threat of civil unrest/conflict
Threat of terrorism
Healthcare
Availability of private healthcare
Quality of private healthcare provision
Availability of public healthcare
Quality of public healthcare provision
Availability of over the counter drugs
General healthcare indicators
Culture & Environment
Climate: Humidity/Temperature rating
Climate: Discomfort to travelers
Cultural hardship: Corruption
Cultural hardship: Social/Religious restrictions
Cultural hardship: Level of censorship
Recreation: Sports
Recreation: Culture
Recreation: Food and drink
Availability of consumer goods and services
Education
Availability of private education
Quality of private education provision
General public education indicators
Infrastructure
Transport: Quality of road network
Transport: Quality of public transport
Transport: Quality of regional or international links
Availability of good quality housing
Utilities: Quality of energy provision
Utilities: Quality of water provision
Utilities: Quality of telecommunications infrastructure

Source: Livability Report, Global livability survey January 2010, EIU

The JICA Study Team compared Metro Cebu and major Asian cities by the use of results of this survey. Since there are no corresponding data of Metro Cebu, the study team made an assumption based on the collected information.

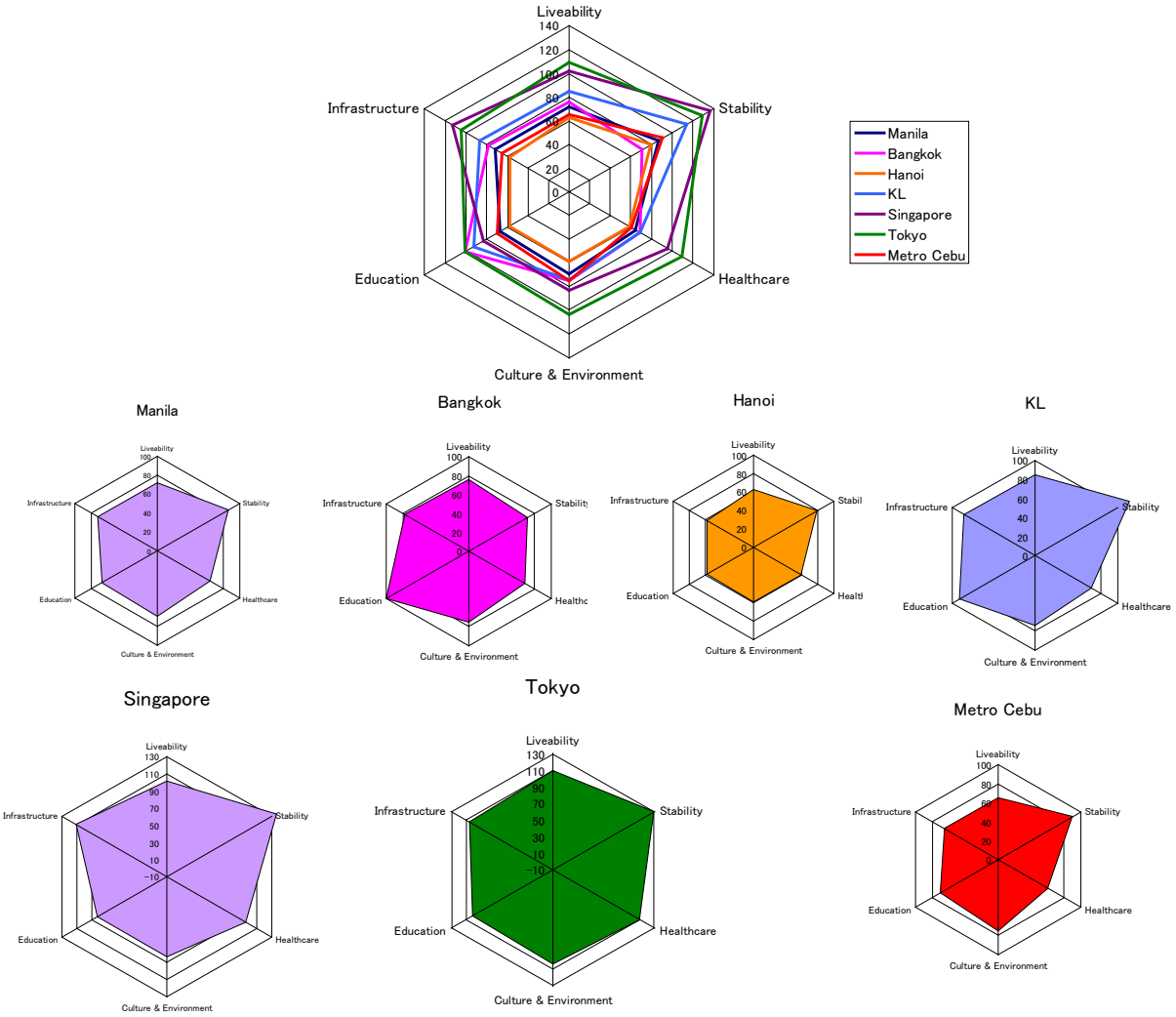
The value of each indicator shows the relative score based on New York City (NYC) (NYC is scored as 100 for all indicators). According to this survey, Tokyo is superior to NYC in all indicators, and Singapore's scores are almost next to Tokyo. On the other hand, the cities in Southeast Asia such as Manila, Bangkok, Hanoi and Kuala Lumpur have comparatively low scores for almost all indicators. Metro Cebu is assumed to have similar characteristics to them,

but the scores of "Stability" showing public safety, political instability, etc. and "Culture & Environment" showing mild weather, accessibility to recreational facilities, etc. are considered relatively higher.

Table 4-9 Comparison between Major Asian Cities and Metro Cebu

	Livability	Stability	Healthcare	Culture & Environment	Education	Infrastructure
Manila	72	86	64	69	67	72
Bangkok	76	71	68	75	100	78
Hanoi	63	79	59	59	58	58
KL	85	114	68	74	92	86
Singapore	102	136	95	83	83	112
Tokyo	109	129	109	103	100	104
Metro Cebu	65	90	60	75	70	65

* Scores of "Metro Cebu" were evaluated by the JICA Study Team.
* All scores are based on "NYC=100."
Source: JICA Study Team based on the data from Livability Report, Global livability survey January 2010, EIU



Source: JICA Study Team based on the data from Livability Report, Global livability survey January 2010, EIU

Figure 4-9 Rader Chart of Comparison of Major Cities in Asia Based on Livability Survey

4.3.3 Analysis of International Cities with Advanced Approaches

In this section, the examples of excellent practice in the international precedent cities are shown, which were presented at the first workshop on 23 January 2013.

(1) Bilbao, Spain

Bilbao was once prosperous as an industrial city. However, abandoned areas and unemployment caused by the closure of factories provided the city with serious urban issues. To deal with those issues, the city has carried out the urban rejuvenation policies centered on culture, including the construction of Guggenheim Museum and reorganization of the aforesaid abandon spaces, which has produced abundant open spaces in the urban center and as a result successfully attracted tourists.

(Challenges)

- Environmental Degradation
- Industrial Decline
- Unemployment

(Solutions)

1. Environmental Rehabilitation: River Cleanup
   - Port removal
   - Connecting city to river
   - New waterfront promenade
2. Implementation of a Catalyst Project: Guggenheim Museum
   - Funded by the regional government (Basque country)
   - Paid for facility, and compensated the Guggenheim Foundation
   - Tourism surged and the museum paid for itself in four years.
3. BILBAO EFFECT: Development Leapfrogging
   - Public Space Improvements
   - Historic Rehabs + Projects Capitalizing on Local Merits
   - Art, Design and Culture

Source: JICA Study Team

Figure 4-10 Images of Bilbao, Spain

(2) Penang, Malaysia

To overcome the economic fallout, Penang City organized various events and projects in cooperation with internationally-renowned designers, including the strategic project like Batu Kawan Eco City for the attraction of overseas investors.

(Challenges)

- International Disinvestment
- Middle-income Trap
- Economic Stagnation

(Solutions)

1. Identifying Local Components of Excellence
   - Engaged the Public: City Forum Process
   - Engaged International Design Experts
   - Identified Existing and Emerging Economic Clusters
2. Creating Concepts for Strategic Projects
   - Batu Kawan Eco City: connecting territorial opportunities with strategic projects
   - Bayan Lepas Innovation Hub: tying in with local universities and businesses
3. Dialogue with International Investors
   - Branding of strategic projects
   - Partnership between Local Development Corporation + marketing teams

Source: JICA Study Team

Figure 4-11 Images of Penang, Malaysia

(3) Guanajuato State, Mexico

To overcome a lack of cooperation between the cities in Guanajuato State, the state has carried out the policies through establishment of Guanajuato State Planning Institute in cooperation with international consultant, including traffic reorganization and clustering industries, which have been implemented beyond the city boundaries and produced successful results.

(Challenges)

- Uncoordinated Regional Planning
- Poor Connectivity
- Economic Stagnation

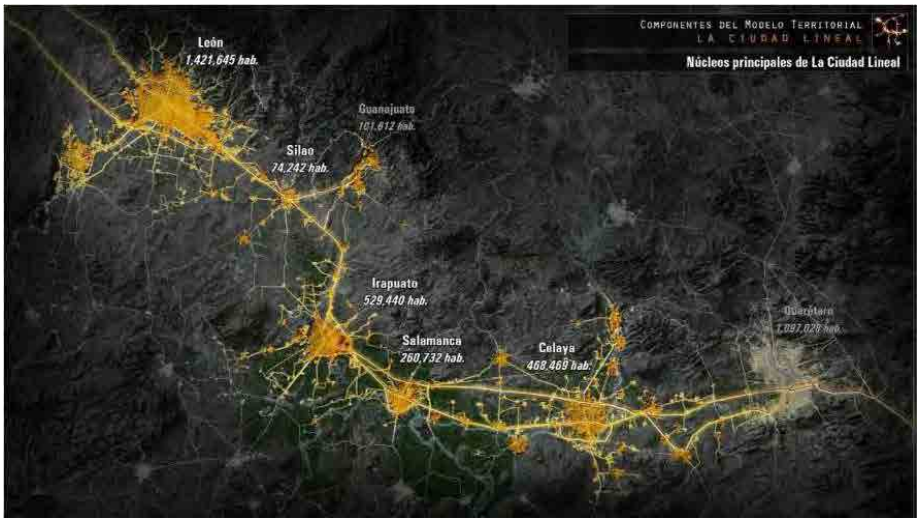
(Solutions)

1. Creation of the Guanajato State Planning Institute
   - External to government
   - Influence over local agencies established by state law
   - Engaged international designers and consultants
   - Re-conceptualizing the region with new spatial models

2. Forging New Connections

- New regionally coordinated transportation infrastructure
- Trams at local level
- New highways and railroads at regional level

3. Crafting an Economic Balance
- Identifying existing and emerging economic clusters
- Planning for spatial synergies



Source: JICA Study Team

Figure 4-12 Images of Guanajuato, Mexico

(4) Tokyo Bay, Japan

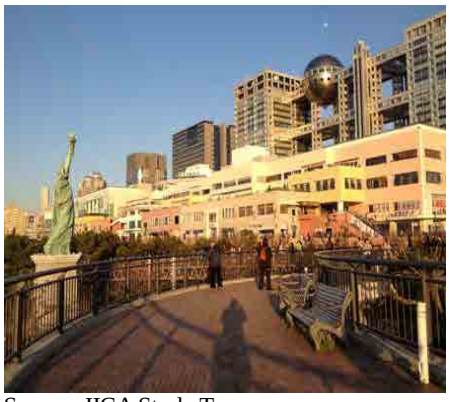
Tokyo Bay was once the highly concentrated manufacturing areas which led the rapid economic growth in Japan. After Japan's industrial transformation into a service-based economy, the main urban functions of the area have also changed to business, commercial and amusement. Those new urban functions were allocated in a well-balanced manner and efficiently connected with the airport and ports by the traffic infrastructures, including highways and railroads.

(Challenges)
- Postwar Recovery Process + Need to Modernize
- Urban Sprawl + Managing High Density Population
- Environmental Degradation

(Solutions)

1. Distributing Industry and Ports
   - Keihin Industrial Belt and Keiyo Industrial Belt
   - Refineries, petrochemical plants, engineering, shipbuilding, etc
   - Ports of Tokyo, Chiba, Kawasaki, Yokohama, Yokosuka, Kisarazu
2. Concentrating Urban Activity and Density
   - Makuhari new city (new CBD)
   - Tokyo Disney Resort, Kasai Seaside Park, leisure and entertainment
   - Inner harbor redevelopment in Odaiba
   - Yokohama Minato Mirai 21 new CBD

3. Forging New Connections
    - Highway, rail transport, airport, seaports, all very well integrated
    - 1997: new bridge connecting east and west sides of bay




Source: JICA Study Team

Figure 4-13 Images of Tokyo bay, Japan

(5) Curitiba, Brazil

In Curitiba, high-density urban development has been promoted along the public transport corridors (BRT), which was guided by the formulated urban planning master plan. The City has successfully realized "Compact City Concept" and preserved the green areas surrounding the urban areas.

(Challenges)
- Uncoordinated Development
- Proliferation of Automobiles
- Urban Sprawl

(Solutions)
1. Planning Institute + New Master Plan
    - IPPUC (Planning Institute) was established in mid 1960s
    - External to the government, allowing for continuity across administrations
    - Gov officials participated in an advisory board
    - New Master Plan was powerful, and presented by charismatic planners
    - Plan is still being followed today
2. Innovative Transportation Strategy
    - BRT system established, married to land use planning process
    - Affordable + and utilized by 85% of the population
    - Replicated in many cities
3. Protection of Green Space
    - 52 square meters of green space per person

Source: JICA Study Team

Figure 4-14 Images of Curitiba, Brazil

(6) Singapore, SG

With few developable lands and limited resources, the national government of Singapore has undertaken strong initiatives and conducted the integrated national development programs excluding sectionalism. In this context, the national government has encouraged innovative industries in cooperation with the private sector and academic researchers and has enhanced community activities through online civic participation portals.

(Challenges)

- Environmental Degradation
- Limited Natural Resources
- Managing High Density Population

(Solutions)

1. Integrated Development
   - Long term integrated planning
   - All policy agendas are aligned: energy, transport, industry, urban planning
   - Pragmatism, eclecticism, transparency, government unity
   - Strong support of public sector and government workers
2. Promoting Innovative Ideas
   - Cooperation with Private Firms and Academic Researchers
   - Application of Grants
   - LIVING LAB program
3. Fostering Community Action
   - The Railway Corridor Project
   - Online civic participation portals

Source: JICA Study Team

Figure 4-15 Images of Singapore

4.3.4 Potentials for Draft Vision of Metro Cebu Based on the Comparison with International Precedent Cities

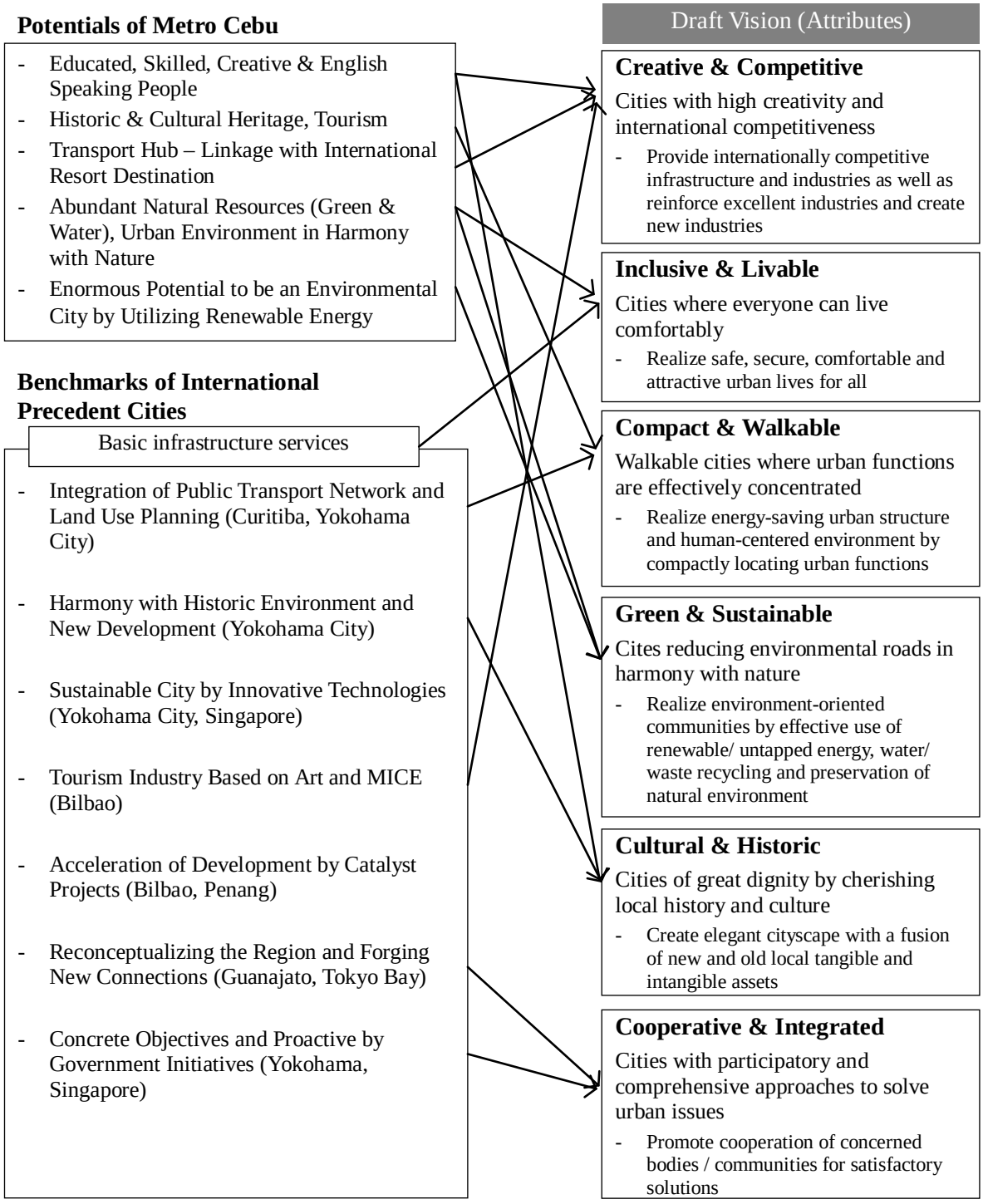
The JICA Study Team extracted several policies that will strengthen the existing resources and enhance the strengths of Metro Cebu. Based on the international precedent city examples, the followings are regarded applicable to Metro Cebu; therefore, being the bases for formulating the draft vision.

- Abundant nature (water and green) and urban environments harmonized with nature
- Considerable potential of sustainable city based on abundant renewable energy such as geothermal energy
- Concrete objectives and proactive government initiatives (Yokohama City and Singapore)
- Integration of public transportation network and land use planning (Curitiba and Yokohama)
- Harmony with historic environment and new development (Yokohama City)
- Sustainable city by innovative technologies (Yokohama City and Singapore)
- Tourism industry based on Art, MICE (Bilbao)
- Re-conceptualizing the region and forging new connections (Guanajuato and Tokyo Bay)
- Acceleration of development by catalyst projects (Bilbao, Penang)

4.4 Draft Vision Formulation by Backcasting Approach

(1) Draft Vision by Backcasting Approach

The JICA Study Team prepared and presented the draft vision at the first workshop to provoke the efficient and effective discussion for formulating the 2050 vision for Metro Cebu. Figure 4-16 presents the draft vision that the study team presented at the workshop. These are derived from the SWOT analysis and the potential policies based on the international precedents as shown before. As described in Chapter 5 in detail, although the intensive discussion was taken place at the workshop, the basic framework of the draft vision was not changed.



Source: JICA Study Team

Figure 4-16 Draft Vision Formulation by Backcasting Approach

(2) Approach toward Draft Vision

Creative & Competitive

To promote the economic development of Metro Cebu, the existing industries with a future potential, such as tourism and BPO, need to be upgraded exploring their versatility. For future economic development, Metro Cebu needs to compete with Manila as well as overseas interurban cities. In Singapore, for example, the intellectual industries have been promoted by the public and private partnership. Creative & Competitive is set as a draft vision to guide such direction for economic development.

Inclusive & Livable

Currently basic urban services in Metro Cebu, such as water supply, sewage and sewerage, drainage and solid waste management, are in poor condition. Those services are the necessary and indispensable services in the daily life for the people. Inclusive & Livable is set as a draft vision to realize comfortable living environment for all.

Compact & Walkable

To reduce the chronic congestion in Metro Cebu, introduction of mass public transport and sea-based transport systems are examined. In addition, the destruction of nature caused by the urban sprawling and population increase has become a critical issue. In Curitiba, for example, by compactly allocating urban functions along the public transport axes, traffic congestion has been reduced, walkable living environment realized, and green environment preserved. Compact & Walkable is set as a draft vision to reduce traffic congestion and realize pedestrian-oriented urban spaces.

Green & Sustainable

Metro Cebu enjoys abundant natural resources of water and green and utilizes a great deal of renewable energy, especially geothermal energy. This advantage will help Metro Cebu realize environment-oriented metropolitan area. In Stockholm, for example, environment-oriented urban development has been encouraged by utilizing untapped and renewable energy sources and introducing energy-saving technologies. In such manner, Green & Sustainable is set as a draft vision to preserve the natural environment and ensure harmony with nature.

Cultural & Historic

Although Metro Cebu has many historic buildings, those assets have not been effectively utilized for tourism development and community enhancement. For example, Yokohama City has successfully promoted the tourism industry and provided amenities in the urban environment by utilizing historic buildings and structures. Cultural & Historic is set as a draft vision to guide the utilization of historical assets and create attractive urban landscape with dignity.

Cooperative & Integrated

Many urban challenges in Metro Cebu cannot be addressed solely by one LGU because such challenges are observed beyond municipal boundaries. Since strengthening or establishing the metropolitan management system or organization covering the areas of 13 LGUs, for which MCDCB currently has such a function, is regarded as one of the most important issues, Cooperative & Integrated is set as a draft vision for the future cooperation among 13 LGUs.

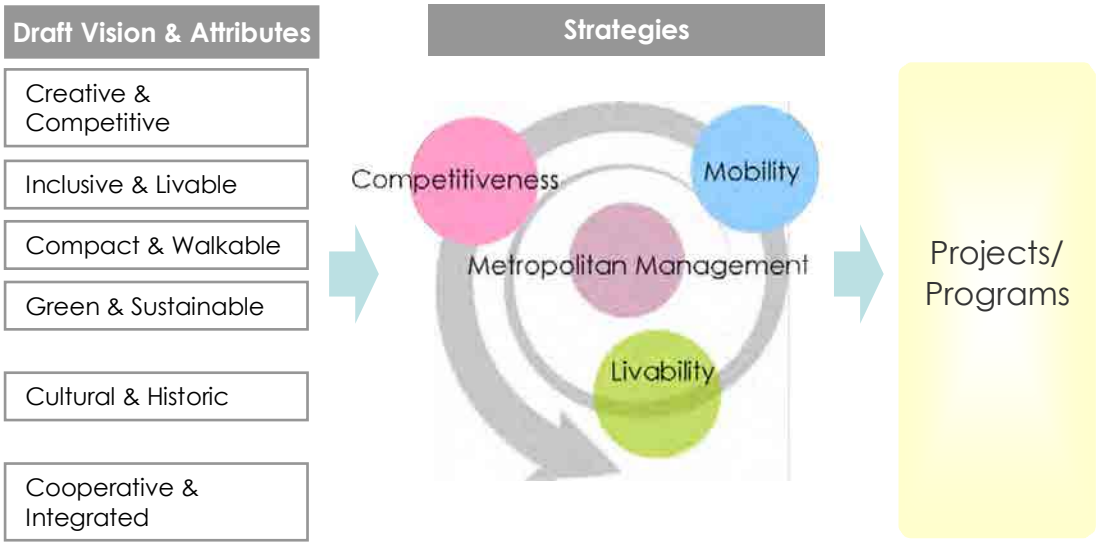
4.5 Setting Strategies for Clarification of Development Directions

The vision proposed by the JICA Study Team shows the ideal situation of Metro Cebu in 2050. As the vision was illustrated with its six attributes, the proposed vision was set having Metro

Cebu's characteristics with a broad perspective. As described in the next chapter, the proposed vision was finalized at the first workshop having almost same framework as the study team proposed.

To realize the vision, however, policies which connect between the vision and projects/ programs to be implemented are needed. For this purpose, the Study Team proposed strategies as clear and easily understandable policies for a wide range of stakeholders of Metro Cebu development, which clearly categorize a wide range of development directions and projects/ programs.

For setting the strategies, the four development themes of the CDS approach: Livability, Bankability, Competitiveness and Good Governance, were utilized as indicated in Chapter 3. Considering the development directions of Metro Cebu which were from the discussion with the stakeholders, the development themes: Competitiveness and Livability were employed as strategies indicating economic growth and basic urban services, while other two development themes: Bankability and Good Governance, which were also regarded as important driving forces to materialize identified development directions, were merged into one strategy, "Metropolitan Governance." Besides, "Mobility" was added to the strategies as a focused development theme for the development of Metro Cebu (Figure 4-17).



Source: JICA Study Team

Figure 4-17 Proposed Strategies for Clarification of Development Directions

5. Study Procedure

5.1 Major Meeting Record

In order to develop a comprehensive vision and its attributes for an environmentally sustainable urban development in Metro Cebu, extensive cooperation, dialogue, and consultation between the stakeholders of Metro Cebu and the JICA Study Team are essential. As shown in Table 5-1, a steering committee meeting, a first workshop, a consultancy meeting and a second workshop were held in addition to individual interviews and consultation meetings.

Table 5-1 Major Meeting Record

Date	Meeting	Number of Attendees
14 December 2012	Steering Committee Meeting	37
23 January 2013	1st Workshop (Day 1)	103
24 January 2013	1st Workshop (Day 2)	81
4 February 2013	Consultancy Meeting	40
6 March 2013	2nd Workshop	97

Source: JICA Study Team

5.2 Steering Committee

5.2.1 Overview

A steering committee meeting was organized to present the inception report on Friday 14 December 2012 at the Eduardo Aboitiz Studies Center with the following purposes:

- Provide a general overview of the study
- Introduce the urban development experience of Yokohama City
- Discuss the characteristics of Metro Cebu through SWOT analysis

The 37 attendees included five mayors from Cebu City, Mandaue City, Talisay City, Compostela, and Liloan. The meeting commenced with introductions of each participant[1], followed by a presentation on the purpose and process of the study. Urban development lessons were further shared by Yokohama City leading to an intensive Q&A session. Major questions raised in this session are shown below:

- What was the driving force to formulate the vision?
- What was the decision making criteria to formulate the vision?
- What were the criteria used to select the six major projects?

Images from the presentations and Q&A session are shown in Figure 5-1.

[1] At the introduction session, it was announced that the endorsement was given to this survey at Regional Development Council Region VII.

Source: JICA Study Team

Figure 5-1 First Session of Steering Committee Meeting

5.2.2 SWOT Analysis

A SWOT analysis is a benchmarking process used in strategic planning to provide a realistic assessment of the environment in which an entity operates. A SWOT identifies Strengths and Weakness, which are internal factors that have affected the successes and failures of an entity, most of which are controllable. It also identifies Opportunities and Threats, which are external factors that can have influence over an entity in the future and are not necessarily controllable.

The afternoon session of the steering committee was devoted to a SWOT exercise, where stakeholders addressed key strengths, weaknesses, opportunities and threats of Metro Cebu as well as keywords for potential urban development vision of Metro Cebu 2050.

Participants were divided into two groups and asked to contribute attributes of the SWOT and keywords for the Metro Cebu 2050 Vision. Upon the completion of the task, opinions were discussed among the groups, classified by category, and presented to all the participants. Images from the SWOT session are shown in Figure 5-2.

Source: JICA Study Team

Figure 5-2 SWOT Analysis

<Strength>
It is commonly understood that the main strength of Metro Cebu is its geographic location, being situated on the center of the Philippines. In addition, hard infrastructure including the international airport, port, and economic zones; and soft infrastructure including well-educated, skilled, and a creative English-speaking workforce were all mentioned as core strengths. Furthermore, Cebu's rich history and culture, multilayered governance structure and well-maintained peace and harmony are factors contributing to the region's attractiveness.

<Weakness>
Among others, lack of urban and land use plan is highlighted by the participants. Originating from poor planning, the low level of physical and social infrastructure is recognized as a major bottleneck for development in Metro Cebu. These factors cause frequent flooding. Other than the infrastructure- and planning- related factors, corruption in the political system is widely regarded as a weakness in Metro Cebu as well as the Philippines as a whole.

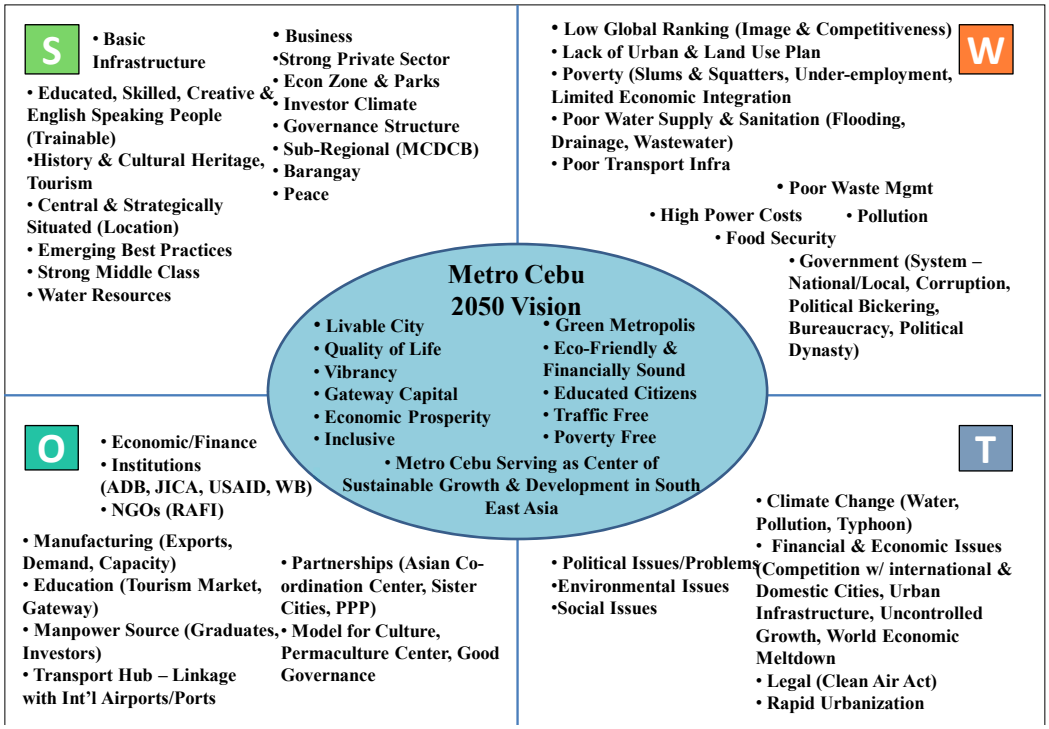
<Opportunity>
As a potential for the future development of Metro Cebu, the existence of private partners, NGOs, and international development agencies were mentioned. With the cooperation from such organizations, it is anticipated that funding and technical assistance on sustainable urban development will be available for future development plans. Furthermore, Metro Cebu's current strengths - including its English-speaking citizens and rich history and culture – provide considerable potential for Metro Cebu to be an educational, cultural, and permacultural center.

<Threat>
Regarding the external factors that impede the growth of Metro Cebu, several exogenous events have been discussed such as climate change, natural disasters, environmental pollutions, and world economic meltdown. Environmental issues have captured extensive attention owing to the Clean Air Act of the Philippines prohibiting the use of solid waste incineration.

<Vision>
Keywords for Metro Cebu 2050 Vision are summarized as follows: livable, vibrant, prosperous, inclusive, green, sustainable, financially-sound, traffic free and poverty free, supported by educated citizens. The following three words can be extracted to represent the future image of Metro Cebu; livable, vibrant and competitive.

- Livable: traffic free, inclusive, poverty free, green, eco friendly, sustainable
- Vibrant: economic prosperity, financially-sound
- Competitive: gateway capital

The final output of the SWOT session is summarized in Figure 5-3.



Source: JICA Study Team

Figure 5-3 SWOT Analysis and 2050 Vision for Metro Cebu

5.3 First Workshop

5.3.1 Overview

Following the steering committee meeting on 14 December 2012, the first workshop was held on 23–24 January 2013 with 103 attendees on the first day and 81 attendees on the second day, including two mayors from Cebu and Talisay and a vice mayor from Compostela. The objective of this workshop was to formulate an integrated sustainable urban development vision and its attributes for Metro Cebu towards 2050.

The workshop started with a presentation entitled "World in 2050" describing the scenario of an urbanized Metro Cebu 2050 by the JICA Study Team, followed by presentations on urban issues and potential resolutions by local government units (LGUs) in Metro Cebu and Metro Cebu Development and Coordinating Board Sub-Committees (MCDCB SUBCOMs). During the presentation of "World in 2050," the engines of growth for Metro Cebu were identified as ICT/IT Enabled Services and Business Process Outsourcing (BPO), Ship Building and Repair, Mass Housing, Creative Sector and Tourism. Despite these growth engines, it was warned that Metro Cebu would encounter even more serious urban challenges than it has already faced, unless a unified vision is established and appropriate measures are taken.

5.3.2 Urban Issues and Potential Resolutions

Prior to the workshop, the JICA Study Team visited 13 LGUs to explain the survey outline for those who were not able to attend the steering committee meeting in December, and to follow up the SWOT assignment for those who attended the meeting. At the same time, the assignment sheet (Table 5-2) was delivered in both electronic and hard copy so that urban issues that LGUs face would be summarized and potential resolutions to the issues would be discussed among local officials.

Table 5-2 Assignment Sheet for First Workshop

Issues to be addressed	Resolutions		
	Directions	Approaches	Actions/Targets
Raise any issue for promoting Sustainable Urban Developmnet of Metro Cebu (by individual sectors).	Describe directions or principles and approaches to resolve the raised issues. If necessary, concretely state procedures, targets and others for resolution.		
(Example)			
Transport			
Traffic congestion at downtown	Smooth traffic networking	Introduction of public transport between Mactan Isl.	To attain public transport mode share of ●●% .

Urbanizing Concept
Propose urbanizing concept or key word(s) appropriate to carry out the aforesaid resolutions.
(Example) Walkable City Sustainable and Eco-efficient City

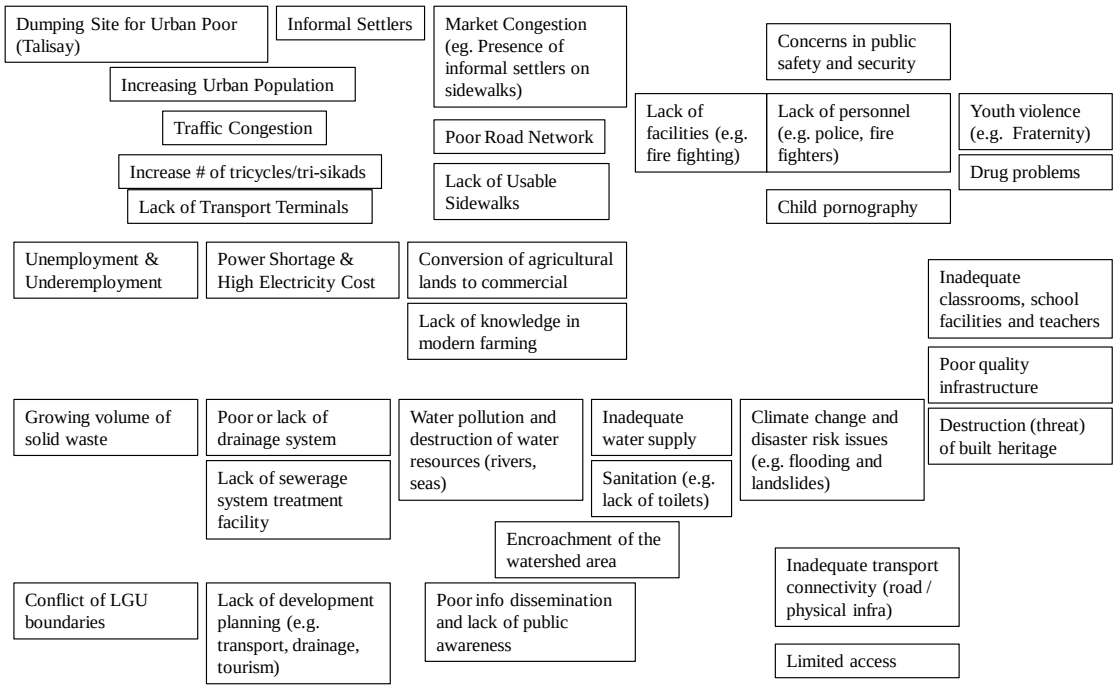
Source: JICA Study Team

Moreover, MCDCB SUBCOMs were consulted on Friday 18 January 2013 to better understand their core issues, and the fundamental urban problems in Metro Cebu from the viewpoint of these sector-based experts (Figure 5-4). Judging by relevance to this survey, the four SUBCOMs chosen to consult with the JICA Study Team were 1) Integrated Development and Spatial Planning, 2) Infrastructure and Utilities, 3) Transport and Traffic Management, and 4) Environment and Health. At the end of each consultation, the aforementioned assignment sheet was also provided.


Source: JICA Study Team

Figure 5-4 Consultations with MCDCB SUBCOMs

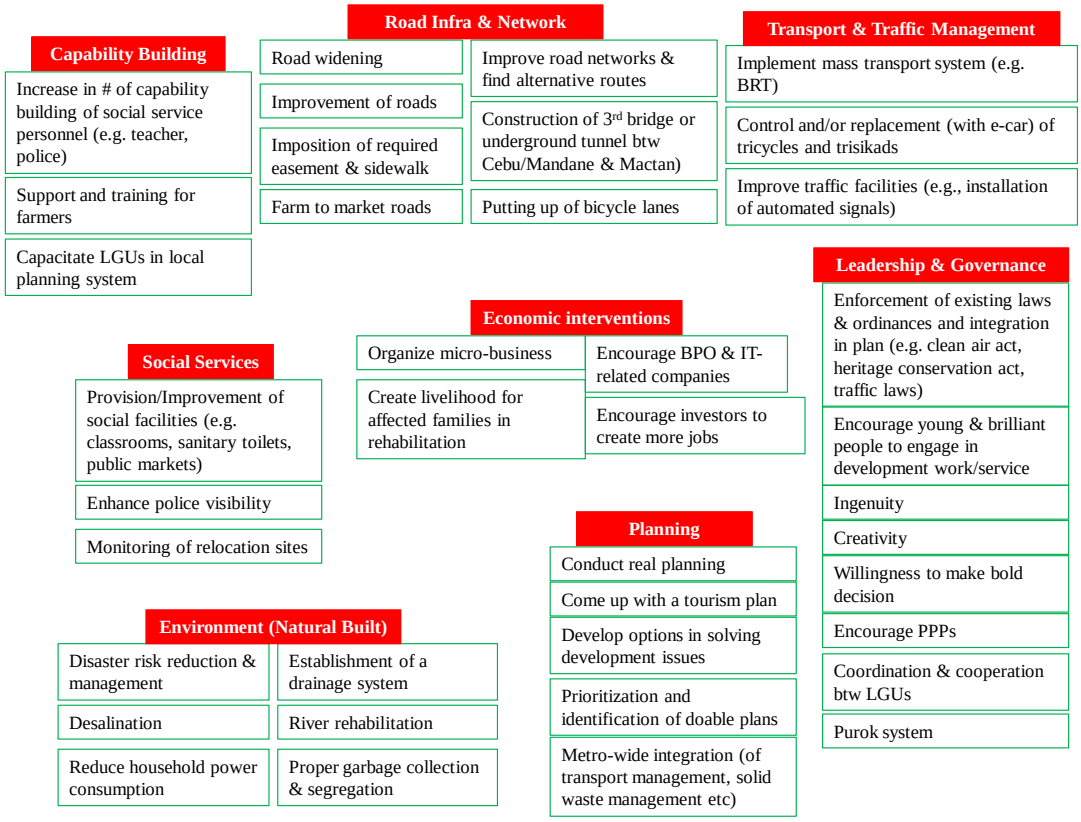
The importance of this assignment is that it gives the local stakeholders the opportunity to visualize the problems they are familiar with, and moreover to discuss the big picture. By understanding the strategies that the local stakeholders wish to set forth, consolidating the long term vision for entire Metro Cebu becomes possible. Summarizing the issues presented by LGUs and SUBCOMs, the issue Map for Metro Cebu was yielded (Figure 5-5).



Source: JICA Study Team

Figure 5-5 Urban Issue Map for Metro Cebu

Likewise, potential resolutions to address these extracted issues were summarized through dialogue between the participants (Figure 5-6). In order to visualize the potential resolution map, resolution items were classified within the following eight categories: Capability Building, Road Infra and Network, Transport and Traffic Management, Social Services, Economic Interventions, Leadership and Governance, Environment (Natural Built), and Planning.



Source: JICA Study Team

Figure 5-6 Potential Resolution Map by Category for Metro Cebu

Box 5-1 Experiences of Yokohama –The Compatibility of Economy and Ecology–

During the period of rapid urban growth in 1960s, Yokohama City suffered from wide-ranging urban challenges. Among them, five issues were identified to be addressed urgently, as follows:

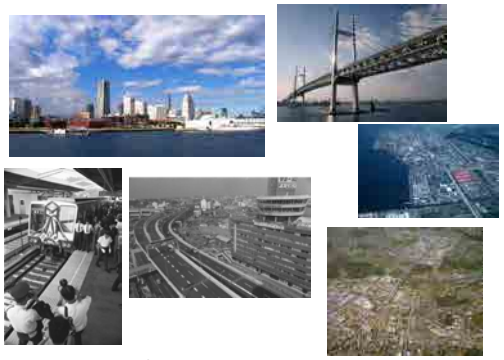
- Increase in solid waste
- Severe congestion attributed to the shortage of road network
- Decrease in water resources
- Environmental degradation
- Insufficient land for public use

Six Major Projects

To address the key urban challenges and in turn revitalize Yokohama, the six major projects (Figure 5-7) were planned and implemented, leading to develop the city's fundamental structure.

Planning and Coordination Bureau

Yokohama is the first city in Japan to establish an innovative planning and coordination bureau in late 1960s. The bureau has helped avoid the vertical decision making process and nowadays almost every Japanese municipalities are equipped with such a bureau.



Source: City of Yokohama (2012) Yokohama as a Global City

Figure 5-7 Six Major Projects

Box 5-2 International Precedent Cities

In today's globalized world, cities located far away from one another deal with many of the same challenges. Thus, one of the most important steps for Metro Cebu to achieve a successful creative transformation is to review relevant international precedents and learn their lessons. Six cities and city regions in the following three separate categories were reviewed at the workshop, in addition to the aforementioned experiences in Yokohama City.

1. **Creative Strategic Projects**
   - Bilbao, Spain
   - Penang, Malaysia
2. **Regional Cooperation Between Cities**
   - Guanajuato State, Mexico
   - Tokyo Bay, Japan
3. **Achieving Greater Sustainability**
   - Curitiba, Brazil
   - Singapore

Source: JICA Study Team

Figure 5-8 Six Precedent Cities

During the presentation, strong importance was placed on the processes that these cities established to reach their goals, as well as the fact that their success did not take place overnight. Given that Metro Cebu has struggled with regional cooperation, environmental management, and transport planning, structures of governance and procedural relationships between adjacent and/or overlapping jurisdictions will need to be critically analyzed.

5.3.3 Vision and its Attributes

Based on the keywords, issues, and potential resolutions presented by stakeholders in Metro Cebu on the first day of the workshop, the stakeholders drafted and proposed an urban development vision and its attributes on the second day (Table 5-3, Table 5-4).

Table 5-3 Initial Vision Statement

An inclusive, livable, and competitive Metro Cebu, where a unique blend of natural and cultural heritage combined with vibrant and skilled citizens, deliver a sustainable and prosperous future

Source: JICA Study Team

Table 5-4 Initial Vision Attributes

Attribute	Definition
Cultural & Historic	The fusion of a vibrant and modern urban environment that embraces cultural and historical heritage
Creative & Competitive	Develop business environment and strengthen logistic functions to encourage creative industries and strengthen a gateway function by utilizing abundant skills and resources
Inclusive & Livable	Realize safe, secure, comfortable and attractive urban lives, develop basic environmental infrastructure, including water supply, drainage, sanitation and living environment
Compact & Walkable	Walkable cities/towns where urban functions are effectively concentrated and accessible
Green & Sustainable	Sustainable development that preserves and natures the unique natural environment
Cooperative & Integrated	Participatory and collaborative to identifying, planning, and delivering approaches to urban solution

Source: JICA Study Team

Based on the suggestions and proposals made by the participants, the vision attributes were reworded through the intensive discussion (Table 5-5). Images from the vision attribute setting process are shown in Figure 5-9.

Table 5-5 Change in Attributes by a Participatory Approach

Change in Attribute	Note
Cultural & Historic	1. No change was proposed.
Creative & Competitive → **Innovative, Creative & Competitive**	1. In order for Metro Cebu to be globally competitive, the element of "Innovative" is crucial and therefore the word was added.
Inclusive & Livable → **Inclusive, Equitable & Livable**	1. The attribute of equality was missing, thus "Equitable" was added.
Compact & Walkable → **Interconnected & Compact**	1. Considering the size of Metro Cebu, not entire area is necessarily compact and walkable. Rather, being connected to each LGU is important and thus "Interconnected" was added. At the same time, given the opinion that not entire Metro Cebu needs to be walkable, "growth areas" was attached to "walkable", i.e., **"Interconnected, Compact & Walkable Growth Area"** 2. Not all the growth area in Metro Cebu needs to be walkable. What matters more is whether growth areas are compact or

Change in Attribute	Note
	not and thus the word of walkable was removed from attribute and instead included to its definition, i.e., **"Interconnected & Compact Growth Area**"
	3. To be consistent with the other attributes that end with adjectives, "Growth Area" was removed to be **"Interconnected & Compact"** (proposed by the JICA Study Team).
Green & Sustainable → **Green**	1. To address climate change and natural disasters, it is imperative for Metro Cebu to be "resilient", i.e., **"Green, Sustainable & Resilient"**
	2. As "sustainable and resilient" was also included in the definition, it was taken out from the attribute. At the same time, Metro Cebu focuses more on the development phase rather than post-development phase as it is forecasted to grow steadily. Hence, "development" was added, i.e., **"Green Development"**
	3. To be consistent with the other attributes that end with adjectives, "Development" was removed and the attribute became **"Green"** (proposed by the JICA Study Team).
Cooperative & Integrated → **Integrated, Coordinated & Participative**	1. "Coordination and Participation" is prerequisite to "Cooperation" and therefore the "Coordination and Participation" was added and "Cooperation" was removed, i.e., **"Integrated, Coordinated & Participative"**.

Source: JICA Study Team

Source: JICA Study Team

Figure 5-9 Vision Formulating Process at First Workshop

The attribute definitions were concurrently reworded with the changes in attributes (Table 5-6 to Table 5-11). It is noted that the first revision is marked in bold red, the second in underlined blue, and the third in italic green.

Table 5-6 Definition of Cultural & Historic

Original	The fusion of a vibrant and modern urban environment that embraces cultural and historical heritage
Revised 1	The fusion of a vibrant and **sustainable** ~~modern urban~~ environment that embraces **Cebuano** cultural**,** ~~and~~ historical **and natural** heritage**, with a sense of identity and belonging**
Revised 2	The fusion of a vibrant and **sustainable** ~~modern urban~~ environment that embraces Cebu's ~~**Cebuano**~~ cultural**,** ~~and~~ historical **and natural** heritage**, with a sense of identity and belonging**
Finalized	The fusion of a vibrant and sustainable environment that embraces Cebu's cultural, historical and natural heritage, with a sense of identity and belonging

Source: JICA Study Team

Table 5-7 Definition of Innovative, Creative & Competitive

Original	Develop business environment and strengthen logistic functions to encourage creative industries and strengthen the gateway function by utilizing abundant skills and resources
Revised 1	Develop **a strong education and** business environment **that maximizes key economic drivers and employment opportunities** and strengthen logistic functions to encourage creative industries and strengthen the gateway function by utilizing abundant skills and resources
Revised 2	A forward looking, innovative, proactive and adaptive ~~Develop~~ ~~**a strong**~~ **education and** globally competitive business environment **that maximizes key economic drivers and** ~~**employment**~~ livelihood **opportunities** ~~and strengthen logistic functions to encourage creative industries and strengthen the gateway function by utilizing abundant skills and resources~~
Revised 3	A ~~forward looking, innovative,~~ proactive and adaptive*, effective and quality* **education** *system* **and** globally competitive business environment **that maximizes key economic drivers and** livelihood **opportunities**
Finalized	A proactive, adaptive, effective and quality educational system and globally competitive business environment that maximizes key economic drivers and livelihood opportunities

Source: JICA Study Team

Table 5-8 Definition of Inclusive, Equitable & Livable

Original	Realize safe, secure, comfortable and attractive urban lives, develop basic environment infrastructures, including water supply, drainage, sanitation and living environment
Revised 1	Realize safe, secure, comfortable and attractive urban lives, develop basic ~~environment~~ **hard and soft** infrastructures, including **health,** water supply, drainage, sanitation, **transport, communication, power** and living environment **for all**
Revised 2	A developed, responsive and efficient physical and social infrastructure that provides ~~Realize~~ safe, secure~~, comfortable~~ and ~~attractive urban lives, develop basic environment~~ ~~**hard and soft**~~ ~~infrastructures, including~~ **healthy**~~, water supply, drainage, sanitation,~~ ~~**transport, communication, power**~~ ~~and~~ living environment **for all** members of society
Finalized	A developed, responsive and efficient physical and social infrastructure that provides safe, secure and healthy living environment for all members of society

Source: JICA Study Team

Table 5-9 Definition of Interconnected & Compact

Original	Walkable cities/towns where urban functions are effectively concentrated and accessible
Revised 1	~~Walkable cities/towns~~ **A connected Metro Cebu** where urban functions are effectively concentrated and accessible **with convenient mass transport and a strong pedestrian environment**
Revised 2	~~**A connected**~~ A physically and economically integrated **Metro Cebu** communities where day to day growth areas ~~urban functions~~ are effectively clustered ~~concentrated~~ and walkable ~~accessible **with convenient mass transport and a strong pedestrian environment**~~
Revised 3	~~A~~ *P*hysically, ~~and~~ economically *and socially* integrated **Metro Cebu** communities where ~~day to day~~ *individual* growth areas are *compact* ~~effectively~~ ~~clustered~~ and walkable
Finalized	Physically, economically and socially integrated Metro Cebu communities where individual growth areas are compact and walkable

Source: JICA Study Team

Table 5-10 Definition of Green

Original	Sustainable development that preserves and nurtures the unique national environment
Revised 1	Sustainable **and resilient** development that preserves and nurtures the unique national environment
Finalized	Sustainable and resilient development that preserves and nurtures the unique national environment

Source: JICA Study Team

Table 5-11 Definition of Integrated, Coordinated & Participative

Original	Participatory and collaborative to identifying, planning, and delivering approaches to urban solution
Revised 1	~~Participatory and collaborative t~~**T**o identify~~ing~~, plan~~ning~~, and deliver~~ing~~ approaches to urban**/rural** solutions**, a strong citizen's participation, involvement, responsive governance and its transparency is needed**
Revised 2	~~**T**o identifying, planning, and delivering approaches to urban**/rural** solutions**, a**~~A **strong citizen's participation** and collaboration together with~~**, involvement, responsive governance**~~ that identifies, plans, and delivers integrated solutions ~~**and its transparency is needed**~~
Revised 3	A **strong citizen's participation** and collaboration together with **responsive** *and accountable* **governance** that identifies, plans, and delivers integrated solutions
Finalized	A strong citizen's participation and collaboration together with responsive and accountable governance that identifies, plans, and delivers integrated solutions

Source: JICA Study Team

The attribute formulating processes mirror the thrust of the program involving coordination and creativity among its people, in preserving Cebu's treasures that lies in its culture; the competitiveness of the city and its sustainable and smart development.

After setting the vision attributes, vision statement was also rephrased and rewarded, reflecting the participant opinions through discussions. Firstly, participants agreed that the original definition of Cultural & Historic attribute was closed to the vision statement they aspired for, and therefore the vision statement was revised based on the attribute definition (Table 5-12).

Table 5-12 Vision Statement

Original	The fusion of a vibrant and modern urban environment that embraces cultural and historical heritage
Revised 1	The fusion of a vibrant and **sustainable modern urban/rural** environment that embraces **Cebuano** cultural, **historical and natural** heritage, **with a sense of identity and belonging with strong citizens' participation and responsive governance**
Revised 2	~~The fusion of a~~ A vibrant and **sustainable** ~~**modern urban/rural**~~ environment that embraces **Cebuano** creativity and its cultural, **historical and natural** resources ~~heritage~~, ~~**with a sense of identity and belonging**~~ **with strong citizens' participation and responsive governance**
Revised 3	A vibrant, *equitable,* ~~and~~ **sustainable** *and competitive* environment that embraces *Cebu's* ~~**Cebuano**~~ creativity and its cultural, **historical and natural** resources, **with strong citizens~~'~~ participation and responsive governance**
Finalized	A vibrant, equitable, sustainable and competitive environment that embraces Cebu's creativity and its cultural, historical and natural resources, with strong citizen participation and responsive governance

Source: JICA Study Team

Table 5-13 shows the finalized vision statement and Table 5-14 shows the finalized vision attributes.

Table 5-13 Finalized Vision Statement

A vibrant, equitable, sustainable and competitive environment that embraces Cebu's creativity and its cultural, historical and natural resources, with strong citizen participation and responsive governance

Source: JICA Study Team

Table 5-14 Finalized Vision Attributes

Attribute	Definition
Cultural & Historic	The fusion of a vibrant and sustainable environment that embraces Cebu's cultural, historical and natural heritage, with a sense of identity and belonging
Innovative, Creative & Competitive	A proactive, adaptive, effective and quality educational system and globally competitive business environment that maximizes key economic drivers and livelihood opportunities
Inclusive, Equitable & Livable	A developed, responsive and efficient physical and social infrastructure that provides safe, secure and healthy living environment for all members of society
Interconnected & Compact	Physically, economically and socially integrated Metro Cebu communities where individual growth areas are compact and walkable
Green	Sustainable and resilient development that preserves and nurtures the unique national environment
Integrated, Coordinated & Participative	A strong citizen's participation and collaboration together with responsive and accountable governance that identifies, plans, and delivers integrated solutions

Source: JICA Study Team

Box 5-3 Egg Drop Activity to Learn the Importance of Careful Planning and Coordination

Before the afternoon session of the second-day workshop, the participants engaged in a group activity of which goal was to drop an egg without breaking from second floor. The egg represented their vision and the challenge was on how they can enact that vision in the goal of fulfilling it. The activity has proven the importance of careful planning and coordination which are needed in enacting the vision of Metro Cebu.

Source: JICA Study Team

Figure 5-10 Egg Drop Activity

For the last part of the workshop, participants were grouped into specific SUBCOMs in which they chose to participate to discuss how the SUBCOMs can contribute to the implementation and enactment of the formulated vision. In each SUBCOM group, future directions and targets for realizing the vision were widely discussed and later their plans were presented in front of all the participants (Figure 5-11). A group picture taken at the end of the workshop is shown in Figure 5-12.

Source: JICA Study Team

Figure 5-11 Group Discussion in Each SUBCOM

Source: JICA Study Team

Figure 5-12 Group Picture of First Workshop Participants

5.4 Consultancy Meeting

A consultancy meeting was held on 4 February 2013 at the Eduardo Aboitiz Studies Center Plenary Hall for the following purposes.

- Presentation of the vision and attributes output of the first workshop to the LGUs
- Discussion on the need for endorsement of the Metro Cebu Urban Development Vision and Attributes, as well as Development Directions and Targets to be agreed upon at the 6 March Workshop.

The forty delegates who attended the consultancy meeting agreed on the following.

- The Metro Cebu Urban Development Vision and Attributes agreed upon at the 23–24 January Workshop will be considered as the final version
- A short catch phrase capturing the essence of the vision will be agreed upon at the 6 March Workshop
- The MCDCB members will continue to play an active role in the dissemination and alignment of the collective Metro Cebu Urban Development Vision through communication and dialogue with stakeholders including citizens, councilors, and enterprises
- The JICA Study Team will prepare a Development Directions and Targets pertaining to the Metro Cebu Urban Development Vision and Attributes, which will be discussed through individual consultancy meetings with the stakeholders, and to be agreed upon at the 6 March Workshop
- The JICA Study Team will prepare a draft MCDCB Endorsement MOA and Resolution, to be discussed through individual consultancy meetings with the stakeholders, and to be agreed upon at the 6 March Workshop, and signed on 20 March.
- The JICA Study Team will prepare a draft RDC Resolution, to be signed late March.

5.5 Consultancy Meetings with LGUs and the Others

After the consultation meeting on 4 February, the JICA Study Team came up with development directions and targets in line with the formulated vision at the first workshop. The study team also prepared an invitation letter to the second workshop, while drafting endorsement letters for MCDCB board to be held on 20 March and RDC board on 21 March.

To gain input regarding the development directions, targets and draft endorsement letters from the local stakeholders and to invite mayors in Metro Cebu and the acting governor in Cebu Province to the second workshop, a number of consultancy meeting was carried out (Table 5-15, Figure 5-13).

Table 5-15 Consultancy Meeting Record

Date	Meeting	Venue	(Number of) Attendees
18 February	Cebu City	City Hall	Mayor+
	Mandaue City	City Hall	
19 February	Naga City	City Hall	Mayor+
	San Fernando	Municipal Hall	Mayor+
20 February	Talisay City	City Hall	Mayor+
	Minglanilla	Municipal Hall	Mayor+
21 February	Consolacion	Municipal Hall	Mayor+
	Compostela	Municipal Hall	Mayor+
	Danao City	City Hall	
	Liloan	RAFI	Mayor+
22 February	Carcar City	City Hall	Mayor+
	Lapu-Lapu City	City Hall	Mayor+
	Cordova	Municipal Hall	Mayor+
27 February	SUBCOM EXEC	RAFI	12
28 February	Cebu Province	Cebu Province	Acting Governor+
1 March	ARENA 7	RAFI	22
4 March	Business Leaders	RAFI	11
	Civil Society Leaders	RAFI	12

Source: JICA Study Team

Source: JICA Study Team

Figure 5-13 Consultations with ARENA 7

5.6 Second Workshop

As a final consultation meeting between local stakeholders and JICA Study Team, the second workshop was held on 6 March 2013 with 97 attendees, including six mayors from Carcar, Cebu, Compostela, Consolacion, Cordova, and Liloan. The workshop aims at crafting a catch phrase that sum up the tone and premise of the vision formulated at the first workshop as well as presenting development strategies, directions and targets in line with the vision.

The workshop commenced with a review of the first workshop outputs and consultation meetings that JICA Study Team has conducted since December 2012, followed by the discussion on catch phrase for the Sustainable Urban Development Vision and its Attributes. At the discussion, the participants were asked to come up with a memorable catch phrase that follows “Mega Cebu” and a number of suggestions were made as summarized in Figure 5-14 .

- Creating a Vibrant Future Today - Where the Glorious Past & a Vibrant Future Converge - Livable Future through Creative Planning - The Place to Be - Live, Play and Prosper - Passion, Perform and Prosper - SEAL (Smart, Equitable, Advanced, Livable) - **Making WAVES (Wholesome, Advanced, Vibrant, Equitable, Smart)** - Timeless Beauty, Vibrant Growth - A City of Milk and Honey - Second to None - Making Waves, Creating the Future - Vibrant Island in the Pacific - Live, Work and Play. You are secured with us! - Cradle for Sustainable and Prosperous Living	- Toward a Soaring Skyline - Ceboom!!! - Sustainable and Competitive Hub of the Philippines - Reaching out to a New Cebu - The Dawning of a New Cebu - Paradise Again! - CHIC (Creative, Holistic, Inclusive, Competitive) - Your Success is our Business - Reaching the Zenith - Tiny but Glittering in Asia - Thriving - Gearing up for You - Living Smart - Smiling, Thriving, Welcoming - Masterful and Engineered Growth for All - Making WAVES Beyond Living

Source: JICA Study Team

Figure 5-14 Suggested Catch Phrases

Once the potential catch phrases were shown in front, participants were given a chance to explain the meaning of each phrase. Based on the various opinions, discussions as well as the validity of some phrases, ***Making W.A.V.E.S.*** (Wholesome, Advanced, Vibrant, Equitable, Smart) was selected as a catch phrase that sum up the sustainable urban development vision for Metro Cebu.

5.7 Finalization of Metro Cebu 2050 Vision

5.7.1 Competitiveness

Properly allocate and develop urban and industrial functions by taking advantage of resources and characteristics of each area to strengthen economic growth engines including:

(1) Directions

Tourism

Tourist attraction through conservation of historical assets, attraction of domestic/foreign business representatives and tourists through the reinforcement of Meetings, Incentives, Conventions, and Exhibitions (MICE), eco-tourism, medical and healthcare services, and sports and entertainment functions

Tourist attraction through conservation of historical assets

- Take advantage of potential cultural assets in each LGU
- Dissemination of information on cultural assets through various mediums including the internet and social media
- Creation of attractive urban centers by conservation and revitalization of historical areas

Source: Yokohama City (left), JICA Study Team (right)

Figure 5-15 Image of Directions for Tourism (1)

Reinforcement of community level alliance and cultivation of civic pride through the hosting of regional and cultural events

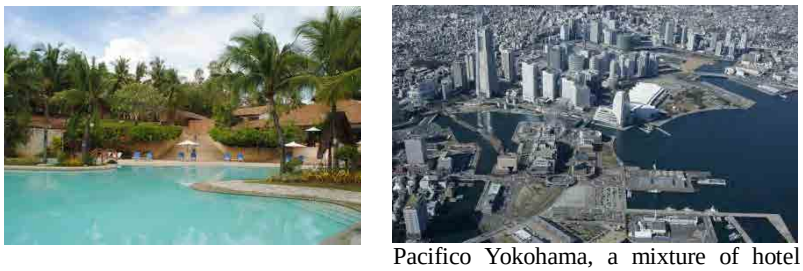
- Host events and Cebuano festivals throughout the year
- Dissemination of information on LGU events through various portals

Source: JICA Study Team

Figure 5-16 Image of Directions for Tourism (2)

Attraction of domestic/foreign business representatives and tourists through the reinforcement of Meetings, Incentives, Conventions, and Exhibitions (MICE)

- Introduction of international conventions in collaboration with hotels and resorts
- Provision of after-convention services, such as distinctive commercial facilities, attractions, etc.



Pacifico Yokohama, a mixture of hotel and conference hall

Source: JICA Study Team (left), Yokohama City (right)

Figure 5-17 Image of Directions for Tourism (3)

Economic growth through the retirement business for foreigners

- Development of long-stay apartments and medical services for retirees
- Commercial and entertainment facilities for elders
- Provision of barrier-free facilities accessible to the disabled and elderly


Retirement housing under construction in SRP

Source: JICA Study Team (left), Sykes Lee & Brydson (right)

Figure 5-18 Image of Directions for Tourism (4)

Enterprise

Economic growth through information technology (IT), business process outsourcing (BPO), knowledge process outsourcing (KPO), the retirement business for foreigners and the development of Cebu-originated new businesses in clean tech products (EVs, etc.) and gifts, décor and housewares (GDH)

Development of Cebu-originated new business in environment-oriented industries

- Clustering of environment-oriented enterprises, such as electrical vehicles (EV), for the provision of necessary resources, infrastructure, and business environment
- Branding and information dissemination on traditional industries, such as furniture making


EV tricycle, Terra Motors Corp., Japan

Branding of Cebuano furniture

Source: Terra Motors Corp. (left), JICA Study Team (right)

Figure 5-19 Image of Directions for Enterprise

Education

Development of world-class human resources through technical and business education and skills training on the bases of 'Cebu Hospitality', and enhancement of K-12 and higher education for adaptive curriculum to advanced industries and English language programs

Development of world-class human resources through technical and business education and training on the bases of 'Cebu Hospitality'

- Enhancement of English language training programs for specific market niches (i.e., education tourism (ESL), overseas Filipino workers (OFWs), call centers, maritime)
- Development of technical and business training programs, especially in the field of hospitality services, such as medical and nursing care, hotel management
- Development of IT, BPO, KPO industries taking advantage of high English communication skills

Utilization of prestigious universities in Cebu, such as University of San Carlos, University of the Philippines to be constructed in SRP

Source: JICA Study Team (left), BPO. biz (right)

Figure 5-20 Image of Directions for Education

Enablers

Development of enablers for competitiveness, including utilities (stable electric and water supply and ICT) and business continuity plan (BCP)

(2) Example Targets for 2050

#1 ranking in South East Asia in international ranking, such as Global Urban Competitiveness Index Rankings (GUCI), Tholons Top 100 Outsourcing Destinations, etc.

Box 5-4 World Ranking by Global Urban Competitiveness

- Prepared by experts and scholars from many countries and regions
- The evaluation is based on:
  1. Scale of Green Economic(GE) GDP;
  2. GE GDP per capita;
  3. GE GDP per square kilometer;
  4. Economic growth rate;
  5. Number of internationally recognized patent applications
  6. Multinational corporation index from the perspective of output
- Cebu is No. 475 out of 500 sample cities, 10 rank lower than in 2007–2008.

Table 5-16 Ranking of Global Urban Competitiveness Report

City	Country	Rank 2009–2010
Tokyo	Japan	3
Singapore	Singapore	8
Yokohama	Japan	21
Bangkok	Thailand	115
Kuala Lumpur	Malaysia	197
Jakarta	Indonesia	210
Manila	Philippines	266
Hanoi	Vietnam	337
Yangon	Myanmar	446
Cebu	**Philippines**	**475**

Source: 2009–2010 Urban Comprehensive Competitiveness Ranking

Box 5-5 World Ranking on Outsourcing Destinations

- Cebu is No. 8 in 2013 world ranking, a rank higher than 2012
- Manila National Capital Region (NCR) is ranked No. 3
- The other higher ranked cities are in India including Bangalore (No. 1) and Mumbai (No. 2)
- Cebu is No. 2 in South East Asia

Table 5-17 Ranking on Outsourcing Destination

Ranking in 2013	Country	City	(Ranking in 2012)
1	India	Bangalore	(1)
2	India	Mumbai	(2)
3	Philippines	Manila NCR	(4)
8	**Philippines**	**Cebu**	**(9)**

Source: 2013 Tholons Top 100 Outsourcing Destinations

Box 5-6 Best Practices for "Competitiveness" Strategy (1)

Best practices of promoting tourism industry through Art / MICE

Case of Bilbao, Spain

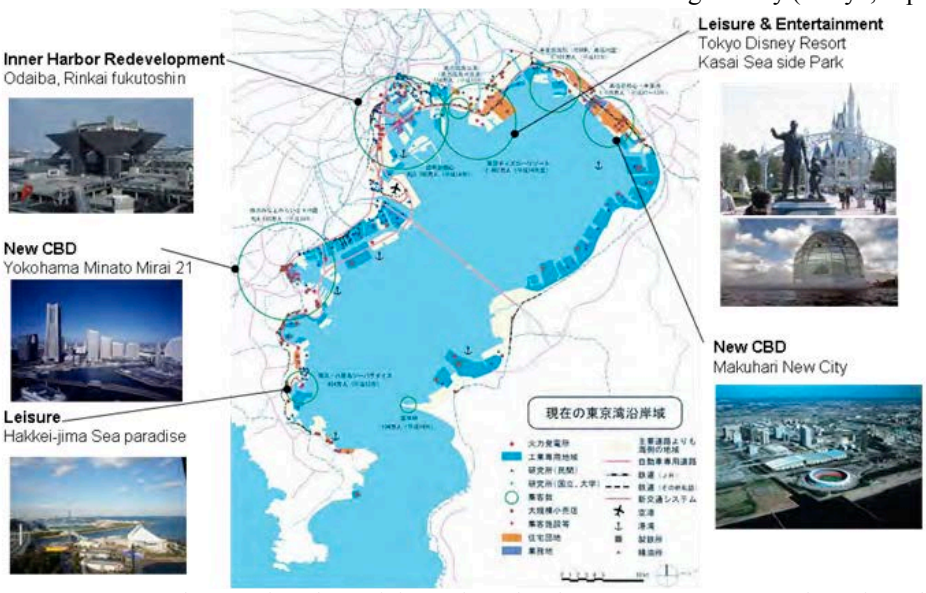
Case of Yokohama City, Japan

Source: Bilbao City (above), Yokohama City (below)

Figure 5-21 Case Study of Bilbao and Yokohama City

Box 5-7 Best Practices for "Competitiveness" Strategy (2)

Well-balanced allocation of industrial clusters and urban functions along the bay (Tokyo, Japan)



Source: JICA Study Team based on Ministry of Land, Infrastructure, Transport and Tourism of Japan

Figure 5-22 Well-balanced Allocation of Urban Functions in Tokyo Bay

5.7.2 Mobility

Ensure accessible and efficient movement within and to/from Metro Cebu through an integrated and sustainable transport system

(1) Directions

Public Transport

Introduce an integrated mass public transport system and sea-based transport linking 13 LGUs in Metro Cebu, and maximize transit orientated development (TOD)

Introduce an integrated mass public transport system and sea-based transport linking 13 LGUs in Metro Cebu, and maximize transit orientated development (TOD)

- Increase in public transport capacity and quality
- Development of public-transport axes in coordination with land use planning
- Improvements in convenient transfer options at public transport hubs
- Locating high density mixed urban functions within a walking distance around public transport hubs
- Development of sea-based transport linking ports of LGUs

Bus Rapid Transit (BRT) Terminal

Cebu Station of Philippine Railway having run in Metro Cebu

Source: newsis.com (left), www. Cebu.PhilippinesHeritage.ph (right)

Figure 5-23 Image of Directions for Public Transport

Road Network

Develop a clear road network hierarchy and improve road network connections such as bypass roads to relieve city centers and to realize more efficient logistics network and provide safe, accessible and attractive pedestrian and cycle environments including sidewalks and bike lanes

Develop a clear road network hierarchy and improve road network connections such as bypass roads to relieve city centers and to realize more efficient logistics network

- Redevelopment of the road network with a clear transport network hierarchy based on the new metropolitan structure
- Improvement of existing routes and development of bypass roads to relieve city centers and to realize more efficient logistics network

Source: Yokohama City (left), JICA Study Team(right)

Figure 5-24 Image of Directions for Road Network (1)

Provide safe, accessible and attractive pedestrian and cycle environments including sidewalks and bike lanes

- Safe and direct connections for pedestrians and cyclists
- Center pedestrian and cycle networks around public transport hubs and greenways including parks and open space (bike lanes, sidewalks, pedestrianized areas)
- To use the pedestrian and cycling proposals to help enhance the sense of place in Metro Cebu city and town centers

Source: JICA Study Team

Figure 5-25 Image of Directions for Road Network (2)

Gateway

Strengthen world-class gateway functions and facilitate air and maritime transport growth (passenger and freight) and improve link between Mactan and Cebu Island

Strengthen world-class gateway functions and facilitate air and maritime transport growth (passenger and freight) and improve Link between Mactan and Cebu Island

- Increase in airport capacity, number and destination of flights, and provision of excellent airport operations and global standard services
- Improvement of accessibility from/to city centers and LGUs, such as through the development of 3rd Mactan Bridge
- Enhancement of attractive commercial facilities in the airport
- Strengthen and reinforce the role and functions of the international port
- Enhancement of attractive commercial facilities in the airport

Source: JICA Study Team

Figure 5-26 Image of Directions for Gateway

Traffic Management

Comprehensive package of traffic management and road safety measures including 4E (Engineering, Education, Enactment and Enforcement), Intelligent Traffic System (ITS), and freight and logistics management

Develop comprehensive package of traffic management and road safety measures including 4E, ITS, and freight and logistics management

- Improve network efficiency through traffic management measures including ITS, parking and traffic education
- Reduction in traffic accidents through a comprehensive package of road safety measures including education and strict enforcement of traffic regulations
- Reorganization and management of freight and logistics distribution across roads, depots, ports and the airport

Graphic panel in Traffic Control Room

Source: JICA Study Team

Figure 5-27 Image of Directions for Traffic Management

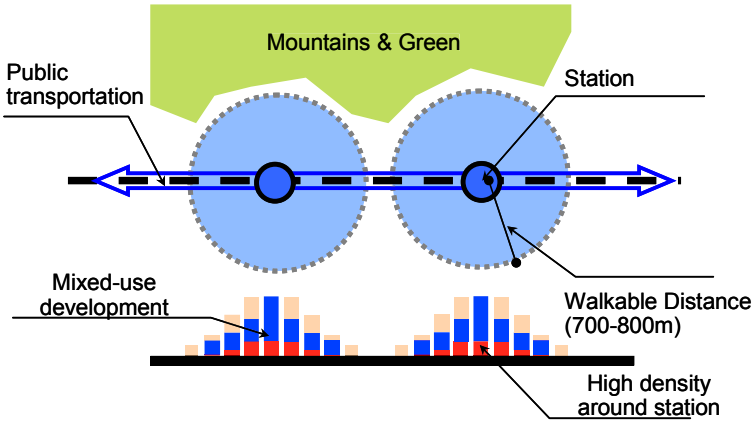
(2) Example Targets for 2050

- Aim to deliver 100 km of mass public transport infrastructure (e.g. Bus, BRT, LRT, Rail etc)
- Achieve modal split of mass public transport (e.g. Bus, BRT, LRT, Rail etc) of 30%–40%

Box 5-8 Transit Oriented Development (TOD)

Compact and Mixed-Use Development in the Vicinity of Station

- Planning urbanized areas within walkable distance from station (approx. 1,500–2,000 ha)
- Realizing low-carbon and people friendly environment
- Preserving nature outside of urbanized areas



Source: JICA Study Team

Figure 5-28 Image of TOD Development

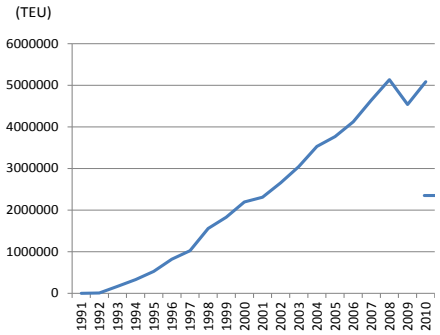
Source: JICA Study Team

Figure 5-29 Example of TOD (Urban Development along Railroad Lines) between Osaka & Kobe, Japan

Box 5-9 Best Practices for "Mobility" Strategy (Gateway)

Enhancement of Gateway Function (Laem Chabang Port, Thai)

- To support and substitute existing Bangkok ports and correspond to large size container vessels, Laem Chabang Port was developed with 14–16 m sea depth located in 130 km south from Bangkok in 1991.
- Laem Chabang Port and Industrial Park are connected with Bangkok by train, highways and other traffic infrastructures. As a result, the freight of the port has increased dramatically.



Changes of freight volume of Laem Chbang Port, 1991–2010
Source: JICA homepage

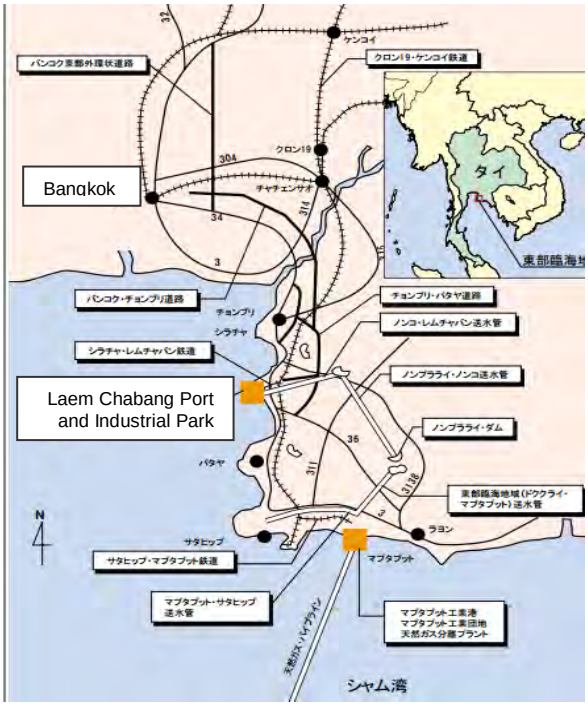


Figure 5-30 Location of Laem Chabang Port Project

5.7.3 Livability

Realize livable communities for everyone by providing a healthy and comfortable living environment with basic urban services and disaster-resistant infrastructure in environmentally sustainable manners, such as conservation of natural resources, utilization of untapped/ renewable energy and recycling resources.

(1) Directions

Basic Services

Provide comfortable living environments for all with 24 hour safe water supply, robust and sufficient drainage & sewage system and with smooth accessibility to public amenities (parks, coastal areas, etc.)

Provision of comfortable living environments for all the people accompanied by human resource development, job creation and accessibility to public amenities (parks, recreation, etc.)

- Upgrading of informal housing through community participation
- Provision of affordable housing close to workplaces through encouraged private sector involvement
- Provision of human resource development and job creation programs

- Provision of health care service for all
- Realize smooth access to public amenities (parks, coast, recreation)


Source: JICA Study Team

Figure 5-31 Image of Directions for Basic Services (1)

Realization of healthy and comfortable living conditions by partnership of governments and citizens in measures for water

- Cleaning of water ways and laying sewers
- Provision of a 24 hour safe water supply system for all
- Provision of sewage and sewerage system with proper sludge treatment system


Source: Yokohama City

Figure 5-32 Image of Directions for Basic Services (2)

Environment

Realize environmentally sustainable community through utilization of untapped/renewable energy (energy management), low-emission vehicles, recycling resources (solid waste management), and recovering bio-diversity and preserving ecological sensitive areas

Provision of living conditions with abundant nature and ecology through bio-diversity and ecological preservation, development of parks and public amenities and improvement of urban permaculture

- Conservation of green and coastal areas by designation of development control areas and strict enforcement of regulations
- Arrangement of parks, open spaces and public amenities in urban areas
- Opening of waterfronts to the people
- Improvement of urban permaculture to realize “local production and local consumption”

Source: Yokohama City (left), JICA Study Team (right)

Figure 5-33 Image of Directions for Environment (1)

Realization of resource circulation community by partnership of governments and citizens through solid waste management (3R, RA9007, waste to energy, etc.)

- Reduction of residual waste to landfill disposal sites through implementation of 3R (Reduse, Reuse and Recycle) based on RA9007
- Improvement of "waste to energy"
- Implementation of appropriate sludge treatment (including septic tank) and effective utilization as resource
- Sanitization of contaminated land site such as landfill disposal site

Source: JICA Study Team

Figure 5-34 Image of Directions for Environment (2)

Realization of energy-efficient communities by effective use of untapped/ renewable energy sources and improvement of energy management

- Shift to sustainable transport modes and low-emission vehicles
- Increase in utilization rate of untapped/renewable energy, such as solar, biomass, etc.
- Introduction of advanced technologies such as high efficient equipments and energy management
- Development of a best practice energy-efficient community in SRP as a showcase to the world

Source: JICA Study Team

Figure 5-35 Image of Directions for Environment (3)

Formation of socially, environmentally and economically sustainable communities by cooperation among Barangays, enterprises, NGOs and NPOs, etc.

- Enhancement of participation and ownership at the Barangay and community level
- Promotion of self-management in each Barangay (recycling, creation of new industries, etc.)


Source: JICA Study Team

Figure 5-36 Image of Directions for Environment (4)

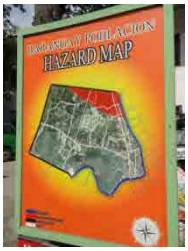
Safety

Improve resilience from natural disasters (flooding) and keep peace and order for safety and crime prevention

Climate change and disaster-resilience

- Formulation of local disaster prevention plans including hazard maps
- Readjustment of the zoning plan and construction of disaster prevention infrastructure, taking into account floods

Source: JICA Study Team



Hazard map for Barangay level

Figure 5-37 Image of Directions for Safety (1)

Creating safe living environment through the reinforcement of community level alliances and moral values

- Reinforcement of crime prevention at the Barangay level
- Reduction in traffic accidents through a comprehensive package of road safety measures including education and strict enforcement of traffic regulations.


Source: JICA Study Team

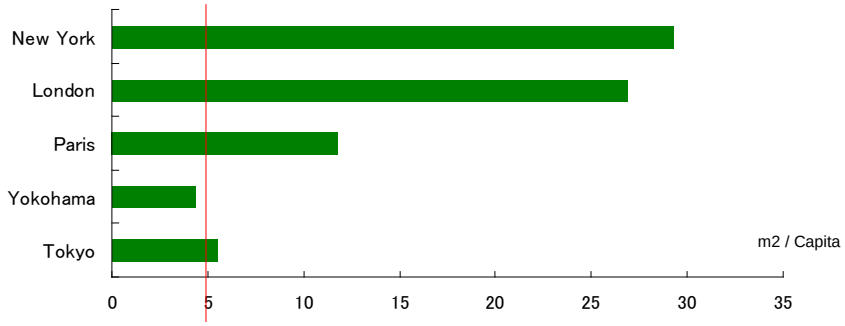
Figure 5-38 Image of Directions for Safety (2)

(2) Example Targets for 2050

- Number of informal settlements in hazardous area: Zero
- Safe Water Supply: 24 hours
- Sewage treatment population ratio: 90%
- Return period: 5–10 years (outlet drain and secondary drainage)
- Park area per capita: More than 5 m^2
- Recycle rate of solid waste: More than 80%
- Reduction of additional power generation capacity: 70%

Box 5-9 Park Area per Capita in International Precedent Cities

The following figure shows the value of park area per capita of the precedent cities. While New York and London has more than 25 m^2 per capita, Tokyo and Yokohama has only approximately 5 m^2 per capita. Referring those data as a benchmark, 5 m^2 per capita is proposed as a targets for 2050 of Metro Cebu, which is close to Tokyo and Yokohama.



Source: JICA Study Team based on Bureau of Environment, Tokyo Metropolitan Government and Ministry of Land, Infrastructure, Transport and Tourism of Japan

Figure 5-39 Comparison of Value of Park Area per Capita of Precedent Cities

Box 5-10 Best Practices for "Livability" Strategy (1)

Green Matrix System
Kohoku New Town, Yokohama, Japan

- Kohoku Newtown has approx. 1,300 ha site and 220 thousand planned population.
- Green networks connecting public parks, existing forests and historic sites (temple or shrine) by foot paths are planned.
- Green area per capita, including privately-owned green, is more than 7 m^2.

Source: Urban Renaissance

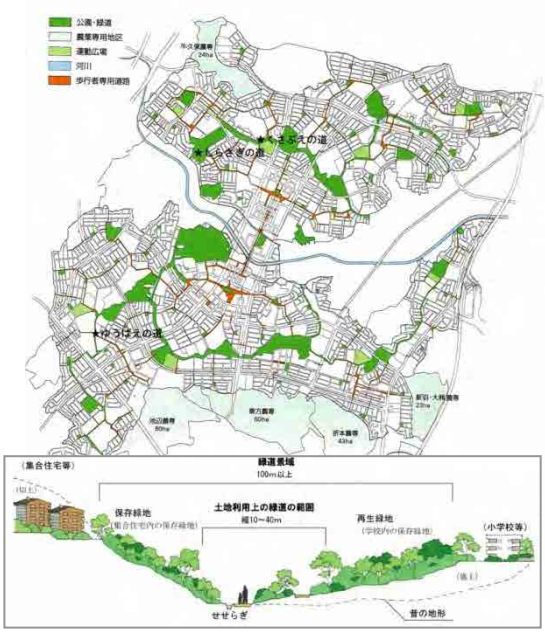
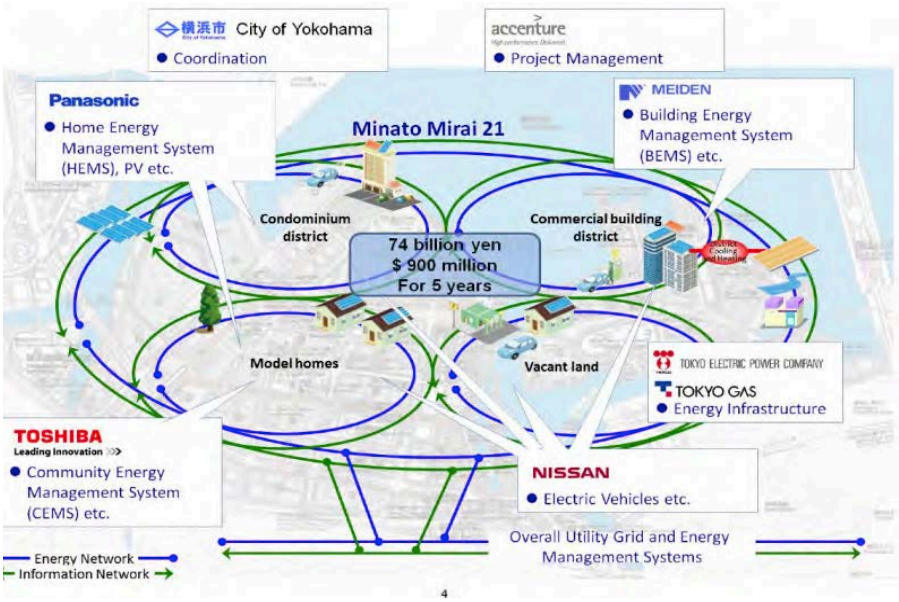


Figure 5-40 Green Matrix in Newtown Development

Box 5-11 Best Practices for "Livability" Strategy (2)

Showcase of Green Technologies / Smart City Project, Yokohama, Japan

- Smart City experiments are in practice at three areas in Yokohama City.
- In Minato Mirai 21 area, the experiments illustrate below are implementing in cooperation with private companies.
  - Energy management system (HEMS, BEMS, CEMS) - electric vehicles
  - Energy infrastructure



Source: Yokohama City

Figure 5-41 Smart City Project in Yokohama City

Box 5-12 Best Practices for "Livability" Strategy (3)

Waste, Water and Energy Recycling Model for Urban Development / Hammarby Sjostadt, Stockholm, Sweden

- Redevelopment of a brown field in the city center with a area of 200 ha.
- A comprehensive recycling model called "Hammarby Model" including waste, water and energy recycle is implementing.

Source: Stockholm City

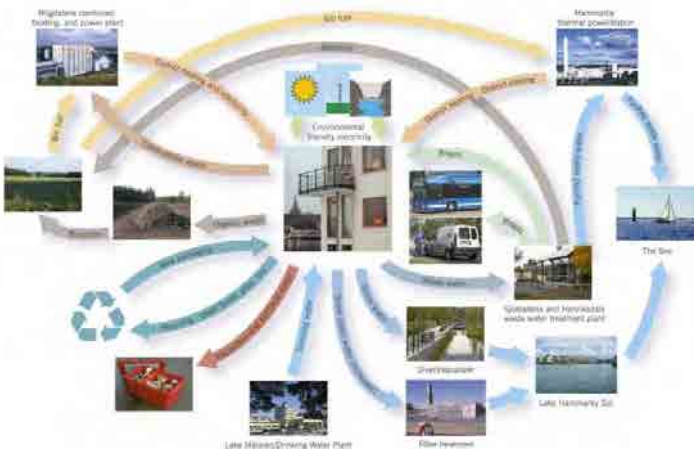


Figure 5-42 Recycling Model in Hammarby, Sweden

5.7.4 Metropolitan Management

Establishment and reinforcement of governance system and organizations for Metro Cebu through cooperation among the province and 13 LGUs

Directions

Organization

Strengthening the mandate of the organization of Metro Cebu Planning and Development Body

Planning

Formulation of a Comprehensive Metropolitan Urban Development Master Plan and Action Plan

Information

Establishment of Integrated Metro Cebu Knowledge and Operations Center for the information dissemination, education, branding and marketing

Management

Management of programs and projects with guidelines for selection, evaluation and monitoring, and establishment of innovative financing and budgeting system, such as public private partnership (PPP)

Box 5-13 Best Practices for "Metropolitan Management" Strategy (1)

Metro Vancouver
Consists of 24 members, including 22 municipalities
Plus, four separate corporate entities operate as Metro Vancouver:

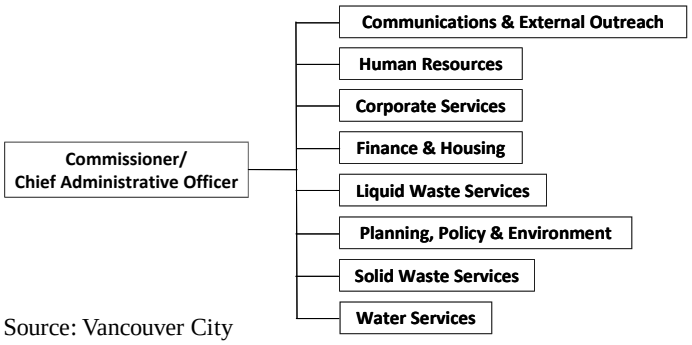
- Greater Vancouver Regional District (GVRD)
- Greater Vancouver Water District (GVWD)
- Greater Vancouver Sewerage & Drainage District (GVS&DD)
- Metro Vancouver Housing Corporation (MVHC)

Each entity is governed by a Board of Directors composed of elected representatives from its respective members.

Board member
2013 Board consists of 40 Directors representing 21 Municipalities, etc.

Scope of services
Core services: drinking water, sewerage and drainage, and solid waste management
Significant services provided directly to the public: provision of regional parks, development of affordable housing

Organization
* Approx. 1,500 employees



Source: Vancouver City

Figure 5-43 Management Structure of Metro Vancouver

Box 5-14 Best Practices for "Metropolitan Management" Strategy (2)

Tokyo Metropolitan Government

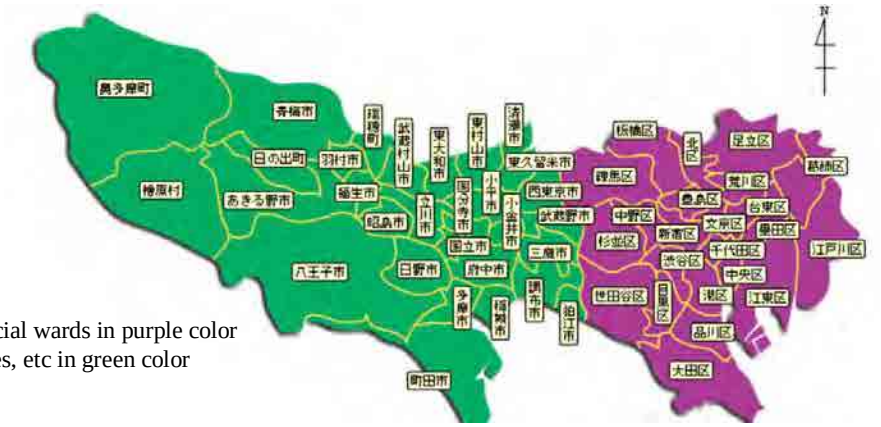
Consists of 23 special wards, 26 cities, 5 towns and 8 villages.
In the 23 wards, the metropolitan government takes on some of the administrative responsibilities of a "city", such as water supply and sewerage services, and fire-fighting, while the wards have the autonomy to independently handle affairs close to the lives of the residents such as welfare, education, and housing.

Tokyo Metropolitan Assembly - Composition

The Tokyo Metropolitan Assembly is made up of 127 members directly elected by Tokyo citizens to serve a term of four years.

The Governor

The Governor is directly elected by the citizens with a four-year term.



23 special wards in purple color
26 cities, etc in green color

Source: Tokyo Metropolitan Government

Figure 5-44 Area of Tokyo Metropolitan Government

Box 5-15 Best Practices for "Metropolitan Management" Strategy (3)

Metropolitan Manila Development Authority (Office of the President)

Chairperson at MMDA
Mr. Francis Tolentino from city of Tagaytay appointed by the president in 2010.

Metro Manila Council
Consists of 17 mayors (13 cities and 4 municipalities) and 8 other members including Secretary at DOTC, DPWH and DOT.

Scope of services
- Development Planning
- Transport and Traffic Management
- Solid Waste Disposal and Management
- Flood Control and sewerage management
- Urban Renewal, Zoning and Land Use Planning and Shelter Services
- Health and Sanitation, Urban Protection and Pollution Control
- Public Safety

6. Development Strategies for Key Issues

6.1 Selection of Key Issues

To develop a unified Metro Cebu 2050 Vision and its attributes, a wide range of stakeholders were consulted through the steering committee meeting, first workshop, consultancy meeting, and second workshop, in addition to individual interviews and consultation meetings. Based on various interviews and consultations during the study, a SWOT analysis at the steering committee meeting, and a presentation by local government units (LGUs) and Metro Cebu Development and Coordinating Board (MCDCB) Sub-committees, an index of outstanding sector challenges and issues emerged (Table 6-1).

Table 6-1 Sectors with Issues by Stakeholder

Sector	Cebu	Compostela	Cordova	Lapu-Lapu	Mandaue	Talisay	Private Sector	Civil Society
Transport	○	○	○	○	○	○	○	○
Drainage	○	○	○	○	○	○	○	○
Solid Waste	○	○	○		○	○	○	○
Power	○						○	
Housing	○			○		○		○
Tourism	○	○				○	○	○
Trade & Industry	○		○				○	○
Education	○	○	○			○		○
Water, Sanitation	○			○				○
Security	○							
Food Security		○						
Illegal Drug & Gang			○					

Source: JICA Study Team

Among the 12 sectors identified by local stakeholders, some are considered to be "transboundary", in nature, and should be resolved at the metro level (13 LGUs together). Thus, considering the characteristics of each sector, the JICA Study Team selected the four priority sectors to be addressed in close cooperation among the members of Metro Cebu as follows.

- Transportation
- Drainage and Waste Water (Flood Control)
- Solid Waste Management
- Power and Smart Technologies

6.2 Transportation

6.2.1 Current Situation and Issues

(1) Introduction and Context

Transportation forms an integral component in unlocking the economic, social and environmental benefits that the 2050 Metro Cebu Vision seeks to deliver, particularly through the aforementioned Mobility strategy component. During this study a wide range of transport stakeholders have been consulted, including the MCDCB Transport Sub-committee. Those engaged thus far include: the 13 LGUs, Department of Transportation and Communications (DOTC), Department of Public Works and Highways (DPWH), Cebu Ports Authority (CPA), Mactan Cebu International Airport Authority (MCIAA), Land Transportation Office (LTO),

Cebu City Traffic Operations Management (CITOM), Movement for Livable Cities (MLC), Highway Patrol Group and Cebu BRT Project Coordination Unit, amongst others.
The purpose of this study is to provide an overall urban development vision for 2050. Discussion of transport project details would need to part of a land use and transport spatial study or master plan. A number of existing transport studies provide context including:

- DOTC, 2011: Public Transportation Strategic Plan for Metro Cebu (including recommendations for developing and promoting sustainable public transportation in Metro Cebu, with a 2030 timeline);
- JICA & DPWH, 2010: The Study of Master Plan on High Standard Highway Network Development In the Republic of the Philippines (includes Metro Cebu);
- DOTC, 2011: National Environmentally Sustainable Transport Strategy (NESTS)
- DOTC, 2011: Philippine Road Safety Action Plan (PRSAP) 2011–2020;
- World Bank, 2011: Sustainable Urban Energy Program (Cebu City);
- Airport studies including JAC & JICA, 2012: Airport Improvement and Development Plan; and KOIKA, 2011: Feasibility study for the New Passenger Terminal;
- Various BRT papers and also the METI, 2012: New Container Cebu Port study; and
- Older relevant studies, principally MCLUTS and the Cebu City Centre Master Plan.

(2) Metro Cebu Transport Issues and Challenges

Outlined in Table 6-2 is a summary of the main transport issues and challenges in Metro Cebu, identified through stakeholder consultation and a review of existing studies.

Table 6-2 Summary of Key Transport Issues and Challenges

Issue/Challenge	Summary Description
Lack of Integrated Planning 	Since MCLUTS (1981) there has been a lack of integrated planning for public transport, land use development, traffic management and the pedestrian environment across Metro Cebu. This has been compounded by • Insufficient integration between cities and municipalities; • Lack of cross sector future visioning and planning; • Lack of zoning and master planning; and • Political constraints.
Public Transport Capacity and Provision	With the aforementioned future public transport demand growth, additional burden will be placed on the Metro Cebu system which already has a number of constraints including: • Insufficient capacity with no mass public transport; • Modal share for paratransit is high at over 70% of vehicular trips – jeepney, multicab, pedicab, tricycle etc (DOTC 2011). This is dominated by jeepneys which have constraints such as poor route optimization, lack of capacity, safety and parking issues, and poor vehicle quality and emissions (DOTC, 2011); • Previously a lack of integrated transport planning and the absence of a clearly defined transport hierarchy; and • Bus system limited to north and south towns/cities.

Issue/Challenge	Summary Description
Worsening Traffic Congestion 	Without long term and integrated planning and innovation, future traffic congestion in Metro Cebu is set to compound existing problems and further constrain the network. In fact in the Do Nothing 2030 scenario, most of the network will experience serious traffic congestion with many central links having a volume/capacity ratio of over 2.0 (JICA & DPWH, 2010). The causes of congestion in Metro Cebu are wide ranging, including increasing car use, the geographical constraints of the confined linear urban area, a lack of a clear road hierarchy, lack of capacity and connectivity, inadequate traffic management, lack of high quality public transport, lack of walking and cycling provision, inefficient jeepneys and parking issues.
Lack of a transport hierarchy and connectivity 	Partly due to the absence of an updated integrated transport strategy, network development has been piece-meal. Metro Cebu suffers from no clear transport hierarchy leading to inefficient network, congestion, lack of connectivity and safety issues. A key concern from the LGUs in addition to congestion itself, is the enforcement of appropriate vehicle types on national roads and other key routes e.g., Mactan circumferential roads (principally to remove tricycles & trisikads, which is beginning to be tested on some national roads). In addition to congestion and no clear hierarchy, connectivity itself will worsen and constraint development. In the short term DPWH are implementing some widening and road improvement schemes, but a long term plan to improve connectivity is required as part of the sustainable transport and land use development.
Inadequate traffic management and un-organized parking 	Whilst some traffic management measures are being developed, particularly in Cebu City by CITOM (installation of automated signal system and lane markings & installation of standard traffic signs) across Metro Cebu there is a lack of a long term traffic management plan and enforcement. This leads to an organized network, particularly parking, where jeepneys and other vehicles obstruct traffic when stopping causing congestion and safety issues. Furthermore, a long term plan for freight management is needed to better rationalize truck roads. Some truck bans are in place, but a wider strategy is needed as currently, particularly in Mandaue, where freight traffic and road maintenance issues are a continuing concern.
Lack of integrated walking and cycling environment 	Another key issue echoed by the LGUs is the lack of walking and cycling infrastructure and the issues with the current vehicle dominated environment. This is compounded by insufficient safe and adequate sidewalks, lack of integrated transport/land use planning, capacity constraints in the current network for cycle lanes (i.e. narrow streets preventing segregation) and congestion and safety concerns. These problems constrain the sense of place in many parts of Metro Cebu, distracting from some of the provincial qualities, and areas for communities to interact.

Issue/Challenge	Summary Description
Traffic safety issues 	Many of the issues above lead to safety problems which will only intensity if unchecked. These include: inadequate traffic signal control system; un-organized jeepney & tricycle's driving/parking behavior; lack of transport hierarchy; poor pedestrian environment, lack of enforcement and legislation; lack of driver and pedestrian education; inconsistent road design standards; lack of bicycle and motorcycle lanes; and an absence of an adequate Metro Cebu database for accident information. The National Road Safety Action Plan (PRSAP) recognizes these issues and has put a 2011–2020 action plan in place.
Future growth constraints at Mactan-International Airport and surface access issues 	Due to the steady increase of traffic and passenger volume some of the airport facilities have become inadequate. The current passenger terminal's capacity is 4.5 million; however total passengers in 2012 were approaching 6.9 million. In response to this, MCIAA has a new passenger terminal at pre-qualification stage to address the short-medium term capacity issues. With increasing traffic congestion problems, lack of mass public transport and constrained network capacity, surface access to the airport will continue to face difficulties if not addressed. Traffic congestion to the airport particularly within Mactan Island is heavy with below 20 km/hr speeds on some approaches (JICA & DPWH, 2010) and heavy congestion associated with Economic Zone traffic. In the 2011 KOIKA study, indicative surveys emphasized the strong reliance on cars and taxis (66% mode share to/from airport) with no buses available and limited jeepneys (2% mode share to/from airport).
Port Constraints 	Cebu Port has a capacity of 600,000 TEU (with the appropriate equipment utilized). In 2010 its TEU was 492,776 TEU. Current issues with Cebu Port include: • Shallow water depth (8–9.3 m) prevent environmentally friendly large vessels to call and do not allow for efficient and economical international shipping; • Deepening of the berth to accommodate bigger container ships is very difficult because of the narrow strait between Cebu Island and Mactan Island. Dredging to 13m started in 2012 but is currently on hold due to financing constraints; • Expansion of the wharf into the sea is also difficult due to structure of the berth (pier type with a retaining wall); • Congested access roads to port, with high growth rate of truck traffic, the situation will be exacerbated; • According to CPA 80% of cargo from the port passes through Cebu City; • High shipping costs reduce competitive advantages over neighboring countries

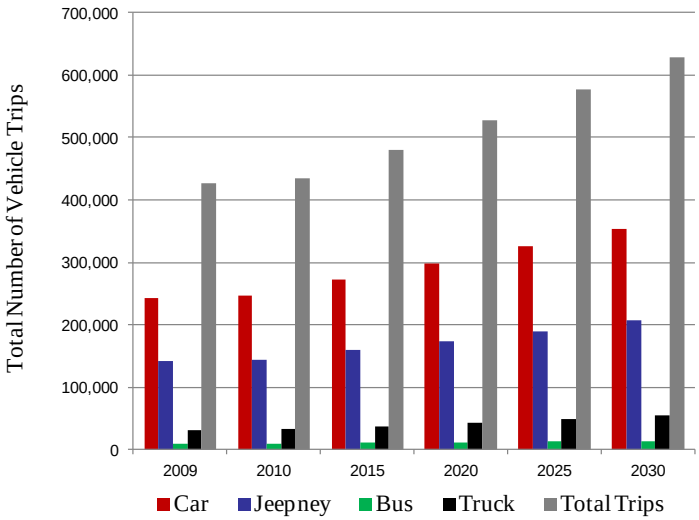
Issue/Challenge	Summary Description
Deteriorating air quality and environmental pollution attributed to traffic emissions 	In the context of the increasing future traffic levels and congestion highlighted above, GHG emissions, air quality, noise levels and energy consumption will become even more of a concern. Some of the key issues were highlighted in the World Bank, 2011 Sustainable Energy Program for Cebu City: • Transport is a major (and growing) contributor to high unsustainable energy usage, consuming 51% of Cebu City's energy; • City-wide transportation accounts for 40% of Cebu's total GHG emissions; • A large proportion of transport energy consumption and emissions comes from inefficient jeepneys that dominate city roads (fuel efficiency and air quality problems); • Ineffective vehicle emissions testing with fragmented enforcement. Vehicles are only required to be tested when they are registered and it is relatively easy for the vehicle to pass the test by simple modifications prior to testing. • High emission vehicles and inefficient driving patterns.
Inadequate climate change and disaster resilience	With resilience issues becoming more of a concern such as flooding, damage to the road network, lack of available routes in cases of disasters – a long term plan will be needed to provide adequate infrastructure to mitigate the impact of environmental hazards and adapt to climate change, as noted in the 2011 Central Visayas Regional Development Plan.

Source: JICA Study Team

6.2.2 Future Perspective

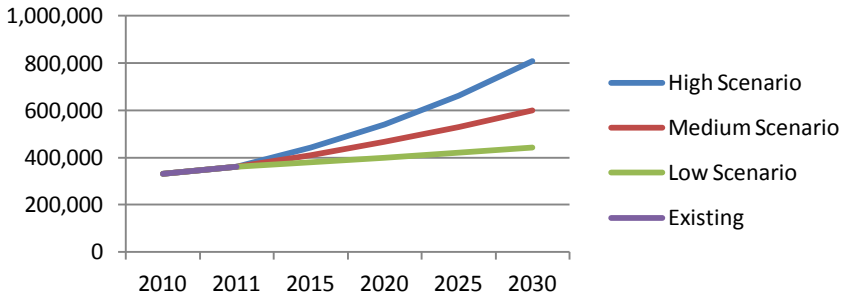
The socio-economic context including population growth to nearly 4 million by 2030 and strong GRDP growth, helps set the future challenges and opportunities that the transport system will face. Figure 6-1 highlights future growth in 2030 through trip numbers by mode in Metro Cebu. Cars, jeepneys and buses have a growth rate of approx. 1.45 between 2009 and 2030 with the truck growth rate at 1.72 based on JICA STRADA (JICA & DPWH, 2010).

A simple forecast of registered vehicles (Figure 6-2), where existing LTO numbers have then been linked to the GRDP scenarios up to 2030, provides an indicative scale of vehicles that the Metro Cebu network may have to accommodate if unchecked. The medium scenario indicates the 2011 to 2030 vehicle growth rate of nearly 1.7.



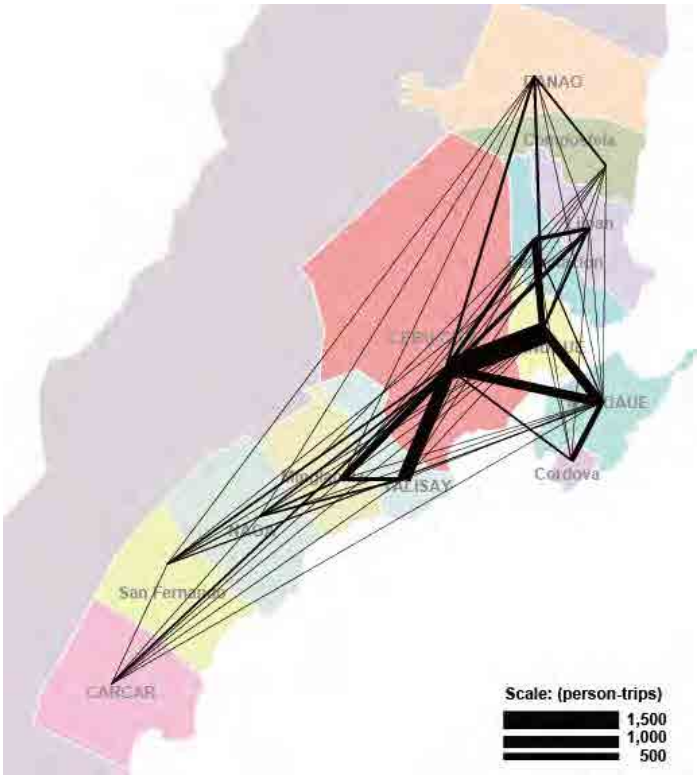
Source: JICA & DPWH, 2010

Figure 6-1 Metro Cebu Total Trip Numbers by Mode



Source: Existing Data from Land Transportation Office, 2012. Future growth indicatively linked to the GRDP scenarios described earlier in this report to provide context only.

Figure 6-2 Registered Vehicles in Metro Cebu



Source: DOTC, 2011 Public Transport Strategic Plan

Figure 6-3 Metro Cebu Passenger Desire Lines

Metro Cebu passenger desire lines are outlined in Table 6-3 from the DOTC Public Transport Strategic Plan (2011), which also highlighted that by 2030 the busiest public transport corridors may need to accommodate up to 390,000 daily boarding passengers, emphasizing the need for mass transit to be an important component of the 2050 public transport network.

In terms of air travel growth, the international and domestic passenger movements at Mactan-Cebu International Airport (MCIA) have been growing at an average of 14% and 9.9% from 2001–2011 respectively (JAC, 2012). The JAC 2011 study included a medium 2009–2030 demand forecast of a growth rate of 2.7 and 3.4 for domestic and international passenger traffic respectively.

6.2.3 Development Direction and Planning Approach

(1) Mobility: Strategy Overview

As previously detailed, three strategies plus metropolitan management have been identified to help deliver the 2050 vision. One of these strategies "Mobility" sets out to address the transportation context. In summary, it seeks to ensure accessible and efficient movement within and to/from Metro Cebu through an integrated and sustainable multi-modal transport system including:

- Integrated multimodal public transport including mass transit and Transit Orientated Development (TOD);
- A clear road network hierarchy and improved road network connections;
- Safe, accessible and attractive pedestrian and cycle environments;
- Comprehensive package of traffic management, road safety measures and freight and logistics management; and

- Strengthen world-class gateway functions and facilitate air and maritime transport growth (passenger and freight).

The mobility strategy must be planned in an integrated way across Metro Cebu. Outlined below are the key principles of the strategy developed using the back casting approach. These principles are in line with the national objectives of National Environmentally Sustainable Transport Strategy (NESTS) including the shift towards more sustainable transport modes. However an integrated transport and land use spatial plan is needed to develop, evaluate and prioritize specific projects including engineering feasibility and social, economic and environmental appraisal etc.

Yokohama Precedent City Future Context – Transport

The future context introduced above presents a number of opportunities for Metro Cebu principally in providing focus for long term integrated transport and land use development. Facing similar issues including growing congestion and traffic pollution, Yokohama undertook a vision setting process to develop a sustainable and well balanced transport system that suited the urban structure of Yokohama. In fact Yokohama explicitly set out to "Address the car dominated society", provide a comprehensive transport network that adopts a well balanced living environment and urban functions, improve public transport such as rapid transit rail and buses, and improve road structure in order to prevent traffic population, accidents and reduce congestion.

Source: Yokohama City

Figure 6-4 Integrated Transport Planning in Yokohama

(2) Mobility: Integrated Multimodal Public Transport System

A key component of the Mobility strategy is to introduce an integrated multimodal public transport system including mass transit, linking the 13 LGUs in Metro Cebu and to maximize Transit Orientated Development (TOD). Some of the key principles include:

- Increase in public transport capacity and quality particularly through delivering a multimodal public transport network including bus and mass transit such as BRT, LRT, rail etc as appropriate;
- Rationalization of paratransit (e.g. jeepneys, minibus, tricycles, trisikads etc) including adaptation of DOTC guidelines (DOTC, 2011);
- Development of public-transport axes in coordination with land use planning, including a long term plan to develop the public transport system and services according to future land use and road network hierarchy.
- Locating high density mixed urban functions within walking distance around public transport hubs – Transit Oriented Development (TOD);
- Development of sea-based transport linking ports of LGUs; and
- A wider package of public transport measures including seamless and convenient transfer/interchange, stop and terminal infrastructure, ticketing and information and marketing etc; and
- Consideration of the "first and last km" to ensure accessibility at start and end of journeys.

In terms of mass transit, the DOTC Strategic Public Transport Plan (2011) set out a Bus Rapid Transit (BRT) line from Talisay to Mandaue via South and North Coastal Roads, supported by express bus services serving the main corridors linking the rest of Metro Cebu. The DOTC also recommended an assessment of possible Light Rapid Transit (LRT) introduction in the long term. Further work has since been undertaken by the World Bank for a BRT pilot project centering on Cebu City (with future phases including an airport connection) due for implementation in 2015/16 (however, this is currently on hold).

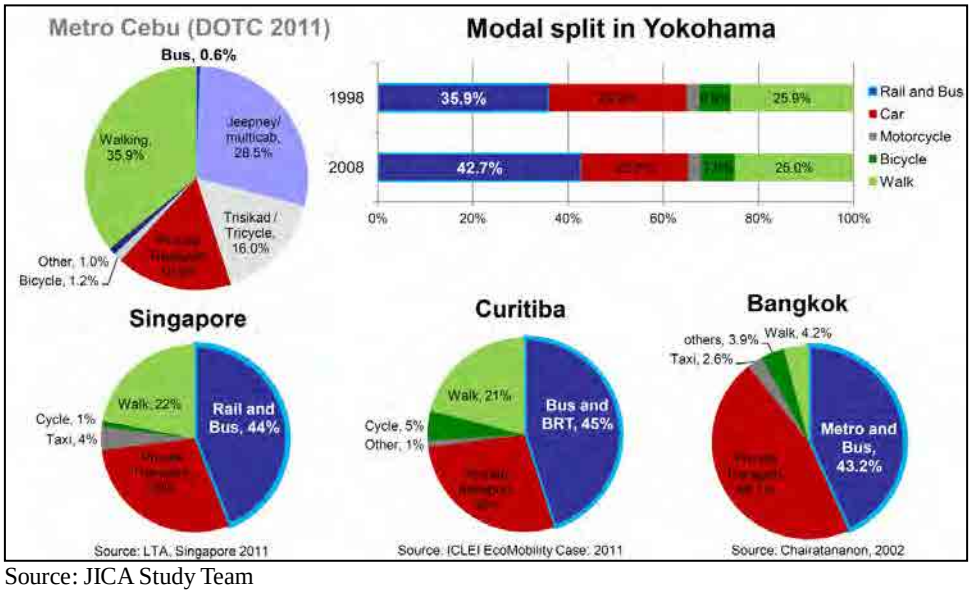
From the long term population, GRDP, employment, traffic and public transport capacity growth outlined for 2030–2050, it is clear that mass transit will play an important role in Metro Cebu 2050 vision. In fact, Metro Cebu once had mass transit at its core, with a railway system from Carcar to Danao before the Second World War. Whilst the BRT pilot project is planned in the short term, the long term plan to 2050 should consider the most appropriate technology or combination to serve future demand and the future land use plan, and therefore (as mentioned in the DOTC, 2011) LRT etc should also be investigated for the long term.

Finally as part of compact cities and towns with concentrated urban functions, Transit Oriented Development (TOD) should be encouraged. This higher density development near public transport hubs should provide an excellent walkable, pedestrian environment and help create a sense of place.

Using the back casting approach, example Mobility targets for 2050 could include:

- Aim to deliver 100 km of mass public transport infrastructure (e.g. Bus, BRT, LRT, Rail etc as appropriate to land use and demand); and
- Achieve modal split of mass public transport (e.g. Bus, BRT, LRT, Rail etc) of 30%–40%.

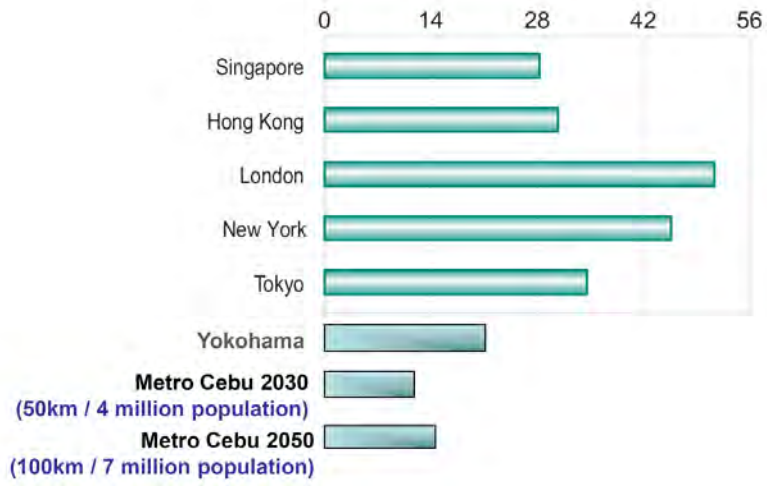
Figures 5-5 and 5-6 help outline the back casting approach used to identify the above targets. For example, when looking at precedent city case studies, mass public transport (including bus) usually accounts for around 40% of the mode share (Figure 6-5). The long term plan for Metro Cebu should aim towards converting its current high paratransit mode share, but also maintain and enhance its high share of walking trips.



Source: JICA Study Team

Figure 6-5 Mode Split Examples

The indicative target of aiming to deliver 100km of mass public transport infrastructure, relates to a broad 2050 assumption of connecting all 13 LGUs with additional connections to MCIAA and SRP etc. Figure 6-6 outlines the context of some precedent cities public transport KMs and future population growth.



Source: Based on LTA 2012. Metro Cebu population indicative

Figure 6-6 Mass Public Transport Length (km) per Million Population

(3) Mobility: Road Network

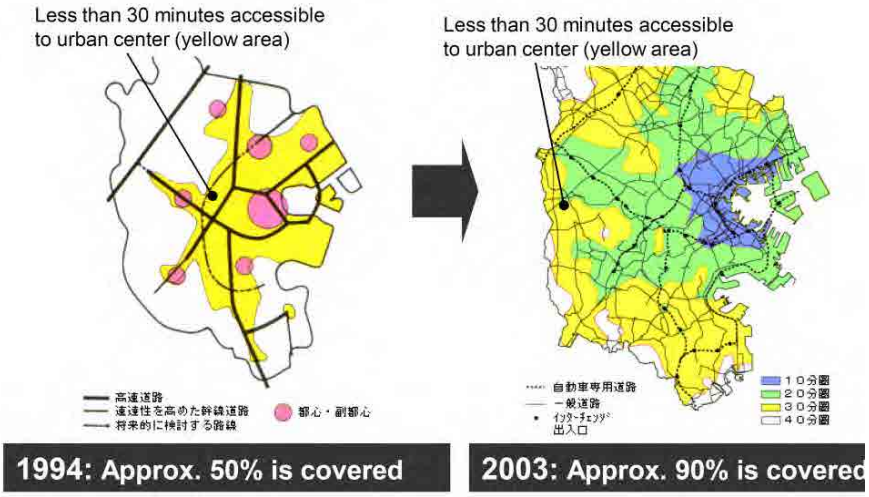
The second attribute of the mobility strategy is to develop a clear road network hierarchy and improve road network connections, but also to provide safe, accessible and attractive pedestrian and cycle environments. Some of the key principles include:

- Redevelopment of the road network with a clear transport network hierarchy based on the new metropolitan structure;
- Improvement of existing routes and development of bypass roads to relieve city centers and improve connectivity; and
- Provide safe, accessible and attractive Pedestrian and Cycle Environments including sidewalks & bike lanes.

Just as Yokohama City's vision set out, the improvement of network efficiency, through re-networking of roads is of paramount important. Whilst sustainable public transport and integrated land use planning will be vital, to fully unlock the economic and social benefits and improve connectivity, further road network development will be required. The JICA & DPWH (2010) Study of Master Plan on High Standard Highway Network Development outlined a number of possible connectivity enhancements to the Metro Cebu network, such as the circumferential bypass. Major road schemes must be part of an integrated sustainable transport and land use plan.

As well as connectivity improvements, the redevelopment of the network must include a clearly defined transport network hierarchy based on the new metropolitan urban structure. As mentioned currently there is no clear, legible network hierarchy so road use perception of appropriate speeds and vehicles is poor. The development of the hierarchy would need to define the role of the primary, secondary and tertiary roads, likely traffic implications of growth on the road network; traffic management including Intelligent Transport Systems (ITS) and parking strategies that complement the proposals.

Using the back casting approach, Yokohama city provides a good example of improved connectivity and accessibility. Figure 6-7 outlines that the road (loop roads and mobility management) and public transport improvements delivered nearly 90% of the city being with 30mins of the centre.



Source: Yokohama City

Figure 6-7 Access to the Urban Center through Highway and Public Transport Improvements (Yokohama, Japan)

As mentioned, provision of safe, accessible and attractive pedestrian and cycle environments including sidewalks and bike lanes is also a key objective to realize a shift towards sustainable modes and to support public transport. This will include principles such as

- Safe and direct connections for pedestrians and cyclists;
- To center pedestrian and cycle networks around public transport hubs and greenways including parks and open space (bike lanes, sidewalks, pedestrianized areas); and
- To define and implement pedestrian and cycling proposals to help enhance the sense of place in Metro Cebu City and town centers

These principles are echoed in the "Livability" strategy.

(4) Mobility: Traffic Management

Another attribute of the mobility strategy includes a comprehensive package of traffic management and road safety measures/approaches, with some of the key principles including:

- Improve network efficiency through traffic management measures including 4E (Engineering, Education, Enactment and Enforcement), ITS and parking;
- Reduction in traffic accidents through a comprehensive package of road safety measures including education and strict enforcement of traffic regulations;
- Reorganization and management of freight and logistics distribution across roads, depots, ports and the airport; and
- Long term plan for demand management.

Also as part of network refinement and development, a key direction is the reorganization and management of freight and logistics distribution across roads, depots and ports, airports etc.

Again, rationalization of freight routes will help reduce congestion, improve efficiency and have environmental benefits.

Another aspect relates to improving road safety particularly for vulnerable users (including children, senior citizens, pedestrians, non-motorized vehicle users, motorcyclist, and persons with disabilities). A comprehensive and long term plan is needed, as echoed by the national PRSAP report, which recommended a range of measures such as improved road safety management, safer vehicles schemes, safer road user education schemes, and improved trauma care and rehabilitation. A reduction in traffic accidents building on the PRSAP target of 50% reduction in the traffic accident rate by 2020 should be pursued.

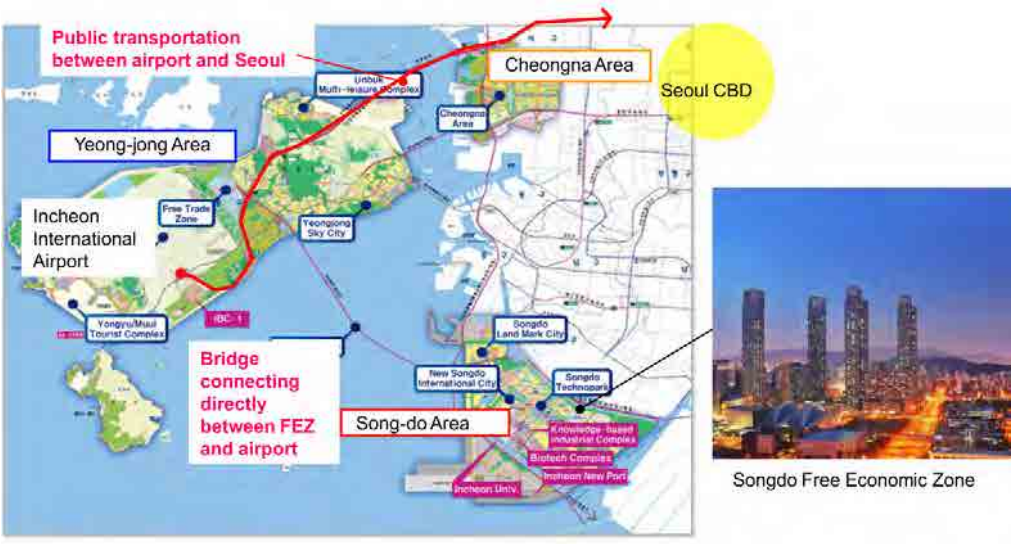
(5) Mobility: Gateways

Another key attribute of the mobility strategy is to strengthen Metro Cebu's world-class gateway functions and facilitate air and maritime transport growth (passenger and freight) and improve the link between Mactan and Cebu Island. Some of the key principles include:

- Increase in airport capacity and the number and destination of flights, and provision of excellent airport operations and global standard services. Potential relocation of the airport in the long term should also be considered;
- Improvement of accessibility from/to city centers and LGUs, such as through the development of 3rd Mactan Bridge and public transport;
- Enhancement of attractive commercial facilities in the airport; and
- Strengthen and reinforce the role and functions of the international port (including potential relocation)

Strengthening the functions of Mactan-Cebu International Airport has been identified as a key transport direction to help unlock economic and social benefits for Metro Cebu and enhance its global competitiveness. As identified above, strong passenger (and cargo) demand is forecast, and will be constrained by the current challenges around capacity, efficiency and surface access problems. MCIAA is pursuing a new passenger terminal to help address this in the short-medium term. As part of the 2050 Vision, development of capacity, aircraft movements and airport operations must be strengthened. However with the forecast growth, additional long term 2050 plans for further expansion or relocation may be required. Relocation to Cordova has been suggested previously however issues around the cost of land reclamation and environmental impacts on the barrier reef are heavy constraints for this option.

Alongside this, focus should also be placed on the airport's role within the Metro Cebu transport network and to improve accessibility and connectivity to the airport from/to city centers and LGUs, including strengthening the Cebu-Mactan Island link and also providing public transport connections. The importance of such airport connectivity is demonstrated by best practices examples including Incheon, South Korea (Figure 6-8).



Source: Korean Free Economic Zones

Figure 6-8 Airport Connectivity: Highway and Public Transport (Incheon, South Korea)

Despite the renewal work of the current port, CPA aspires to relocate its function to a new site because of the issues and constraints highlighted earlier. CPA is considering recommendations from the METI 2012 Study on the New Cebu Container Port and the Redevelopment of the Existing Cebu point (Consolacion site). This long term relocation of Cebu Port offers major benefits in terms of relieving central area of Metro Cebu of heavy vehicles and congestion. Wider consideration of role of other ports as part of a regional strategy is needed.

(6) Livability

Transportation also has a strong role to play in realizing the "Livability" strategy, including the following attributes:

- Basic services: realizing smooth access to public amenities (parks, coast, recreation) centering on the importance of walking and cycling linked to greenways etc;
- Environment: Shift to sustainable transport modes and low-emission vehicles;
- Safety: Reduction in traffic accidents through a comprehensive package of road safety measures including education and strict enforcement of traffic regulations (as above); and
- Climate change and disaster-resilience including a long term plan to provide adequate infrastructure to mitigate the impact of environmental hazards and adapt to climate change.

One of the unique features and strengths of Metro Cebu is the combination of a fast paced life alongside a provincial nature, with strong importance on communities and interaction. The sustainable transport system for Metro Cebu must help address the challenges set out in the previous section, to ensure that whilst efficiency of the network and congestion are reduced, sense of place is preserved and enhanced through a safe and pleasant pedestrian environment. This should include the integration of walking and cycling routes with parks and open space.

At the core of Metro Cebu's sustainable development will be the positive effects of the transport system's transformation on energy and environmental issues. Metro Cebu should seek a shift to

sustainable transport and low emission vehicles to reduce transport's contribution to Metro Cebu energy levels, GHG emissions and identify, reduce and monitor air quality and noise level hotspots.

Increased mode share towards mass public transport using low emission vehicles, rather than inefficient jeepneys will provide a large contribution to these savings, alongside the previously mentioned transit orientated development, wider public transport improvement measures and improved walking and cycling infrastructure.

Low emission vehicles and cleaner fuel should play an important part of the long term transport system. This has already been echoed as part in the National Implementation Plan on Environment Improvement in the Transport Sector (DOTC) and NESTS, 2011. Some schemes are already beginning including EV trials in Mandaue to replace tricycles, and wider pilots of E-Jeepneys and E-tricycles being developed elsewhere in the Philippines (Figure 6-9). In addition, improvement and enforcement of vehicle emissions standards will be required to address the existing public and private vehicle fleet.

Source: JICA Study Team

Figure 6-9 Metro Cebu E-Tricycle Prototype

Wider measures will also contribute to reduction in emissions and energy levels including reducing fuel consumption through education and behavioral change to more efficient driving patterns, a freight and logistics management strategy, reduced congestion and long term travel demand management, including reducing the need to travel.

Finally, transport will contribute to the sector wide directions around the realization of disaster-resistant communities and cities/towns, by supporting a resilient transport network that mitigates the impact of environmental hazards and adapts to climate change. The provision of adequate disaster-resilient infrastructure and planning as part of this strategy is important and provides alternative access to key services.

6.2.4 Action Plan

Outlined below is an indicative action plan of example transportation directions as part of the 2050 Vision. It should be regarded as a long list of directions rather than a project list, which requires further work and a long term integrated transport and land use spatial plan to develop, evaluate and prioritize projects.

Table 6-3 Action Plan of Example Transportation Directions

Strategy and Directions		Short term (2013–2015)	Medium term (2016–2030)	Long term (2031–2050)
Mobility	**Public Transport** Integrated multimodal public transport system including mass transit	• Integrated transport and land use spatial plan to identify, develop, evaluate and prioritize projects • Rationalization of public transport routes study • Short term Public Utility Jeepneys (PUJ) improvements as recommended in DOTC Strategic Public Transport Plan, 2011	• Increase in public transport capacity and quality particularly through delivering a multimodal public transport network including mass transit (delivery of express bus, BRT pilot/extensions and investigation of LRT etc) • Development of public-transport axes in coordination with land use planning • Transit Oriented Development (TOD) • Development of sea-based transport linking ports of LGUs • A wider package of public transport measures including seamless and convenient transfer/interchange, stop and terminal infrastructure, ticketing and information and marketing etc	• Completion of multimodal public transport network including mass transit connecting all 13 LGUs • Transit Oriented Development (TOD)
Mobility	**Road Network**	• Integrated transport and land use spatial plan to identify, develop, evaluate and prioritize projects • Package of short term road network improvements	• Redevelopment of the road network with a clear transport network hierarchy based on the new metropolitan structure • Improvement of existing routes and development of bypass roads to relieve city centers and improve connectivity	• Redevelopment of the road network with a clear transport network hierarchy based on the new metropolitan structure • Improvement of existing routes and development of bypass roads to relieve city centers and improve connectivity
Mobility	**Walking and Cycling Network**	• Integrated transport and land use spatial plan to identify, develop, evaluate and prioritize projects • Cycle lane pilot schemes • Greenway pilot projects • Short term pedestrian improvements	• Safe and direct connections for pedestrians and cyclists • Centre pedestrian and cycle networks around public transport hubs and greenways including parks and open space (bike lanes, sidewalks, pedestrianized areas) • Use the pedestrian and cycling proposals to help enhance the sense of place	

Strategy and Directions		Short term (2013–2015)	Medium term (2016–2030)	Long term (2031–2050)
Mobility	**Traffic Management**	• Integrated transport and land use spatial plan to identify, develop, evaluate and prioritize projects • Strategic parking plan and enforcement of regulations • Improve network efficiency through traffic management measures including 4E (Engineering, Education, Enactment and Enforcement) • Reduction in traffic accidents through a comprehensive package of road safety measures including implementation of the directions and policies of the National Road Safety Action Plan (PRSAP), DOTC 2011	• Improve network efficiency through traffic management measures including 4E (Engineering, Education, Enactment and Enforcement) , ITS and parking • Completion of PRSAP measures • Reorganization and management of freight and logistics distribution across roads, depots, ports and the airport; and • Long term plan for demand management	• Further development of ITS • Reorganization and management of freight and logistics distribution across roads, depots, ports and the airport; and • Long term plan for demand management
Mobility	**Gateway** Port, airport, links	• Integrated transport and land use spatial plan to identify, develop, evaluate and prioritize projects	• Increase in airport capacity and the number and destination of flights, and provision of excellent airport operations and global standard services. Potential relocation of the airport in the long term should also be considered • Improvement of accessibility from/to city centers and LGUs, such as through the development of 3rd Mactan Bridge and public transport • Enhancement of attractive commercial facilities in the airport • Strengthen and reinforce the role and functions of the international port	• Increase in airport capacity and the number and destination of flights, and provision of excellent airport operations and global standard services. Potential relocation of the airport in the long term should also be considered • Improvement of accessibility from/to city centers and LGUs, such as through the development of 3rd Mactan Bridge and public transport • Strengthen and reinforce the role and functions of the international port (potential relocation)
Livability	**Basic Services** Parks and open space (greenways)	• Realize accessible public amenities (parks, coast, recreation) centering on the importance of walking and cycling linked to greenways etc	• Realize accessible public amenities (parks, coast, recreation) centering on the importance of walking and cycling linked to greenways etc	

Strategy and Directions		Short term (2013–2015)	Medium term (2016–2030)	Long term (2031–2050)
Livability	**Environment** Electric Vehicles, emissions, sustainable transport etc	• Roll out of "Road Transport Patrol" program to reduce fuel consumption by 10% (Cebu City) through better vehicle maintenance, efficient driving through seminars/workshops etc • Introduction of EV or hybrid vehicles (pilot schemes) • Improved vehicle emissions standards testing and regulations and other national policy from the National Implementation Plan on Environment Improvement in the Transport Sector (DOTC)	• Shift to sustainable transport modes • Shift towards low-emission vehicles; • Conversion to E-Jeepney • Long term plan for demand management	• Shift to sustainable transport modes • Shift towards low-emission vehicles; • Long term plan for demand management
Livability	**Safety** Road safety, climate change resilience	• Implementation of PRSAP measures (as above)	• Completion of the Implementation of PRSAP measures (as above) • Climate change and disaster-resilience including a long term plan to provide adequate infrastructure to mitigate the impact of environmental hazards and adapt to climate change.	• Climate change and disaster-resilience including a long term plan to provide adequate infrastructure to mitigate the impact of environmental hazards and adapt to climate change.

Source: JICA Study Team

6.3 Drainage and Waste Water

6.3.1 Current Situation and Issues

(1) Drainage

1) Existing Drainage Facility

The drainage system for rainwater in Metro Cebu consists of rivers, channels, conduits and roadside gutters. Flooding occurs regardless of elevation, probably as a result of the lack of adequate drainage dispersal (water runoff and infiltration into surrounding area) and clogging of the drainage facility by garbage and silt deposits (Figure 6-10).

The MCDCB (Metro Cebu Development Coordinating Board) estimates that there are at least 300 flood prone areas in Metro Cebu at the present time. The flooding problem in Metro Cebu has reached a critical and alarming level.

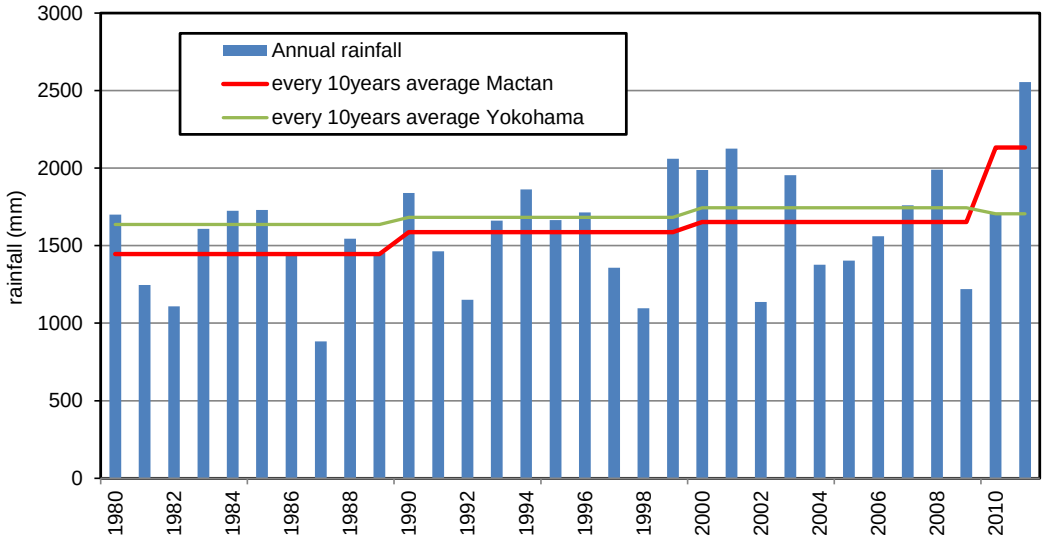
Source: JICA Study Team (left), Yokohama City (right)

Figure 6-10 Condition of Existing Drainage Facility

2) Annual Rainfall

The Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) manage the weather records in the Philippines. Among the rain gauges maintained by the PAGASA, the one nearest to Metro Cebu is in Mactan Islands.

Figure 6-11 shows the annual precipitation from 1980 to 2011 and the average rainfall for ten-year periods. The annual average rainfall over 31 years is approximately 1,600 mm. In comparison, the chart below shows the average rainfall for ten-year periods in Yokohama City. There is slightly less annual rainfall in Mactan than in Yokohama City. The annual average precipitation for each ten-year period in Mactan is on the rise.

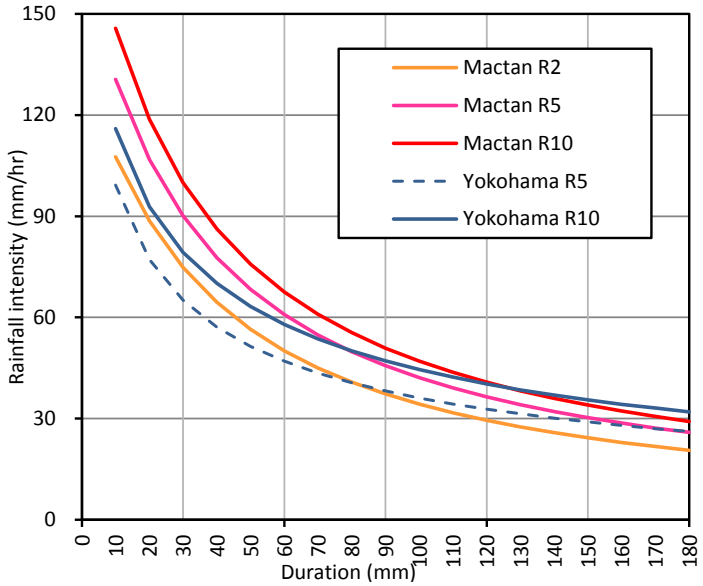


Source: PAGASA, Japan Meteorological Agency

Figure 6-11 Comparison of the Annual Rainfall between Mactan and Yokohama

3) Short Duration Rainfall

Rainfall intensity is one of the key factors affecting decisions on the capacity of the drainage facilities. DPWH plotted the rainfall intensity curve using PAGASA rainfall records for Mactan Islands. Figure 6-12 compares this information with that of Yokohama City.



Source: JICA Study Team

Figure 6-12 Comparison of the Rainfall Intensity Curve between Mactan and Yokohama

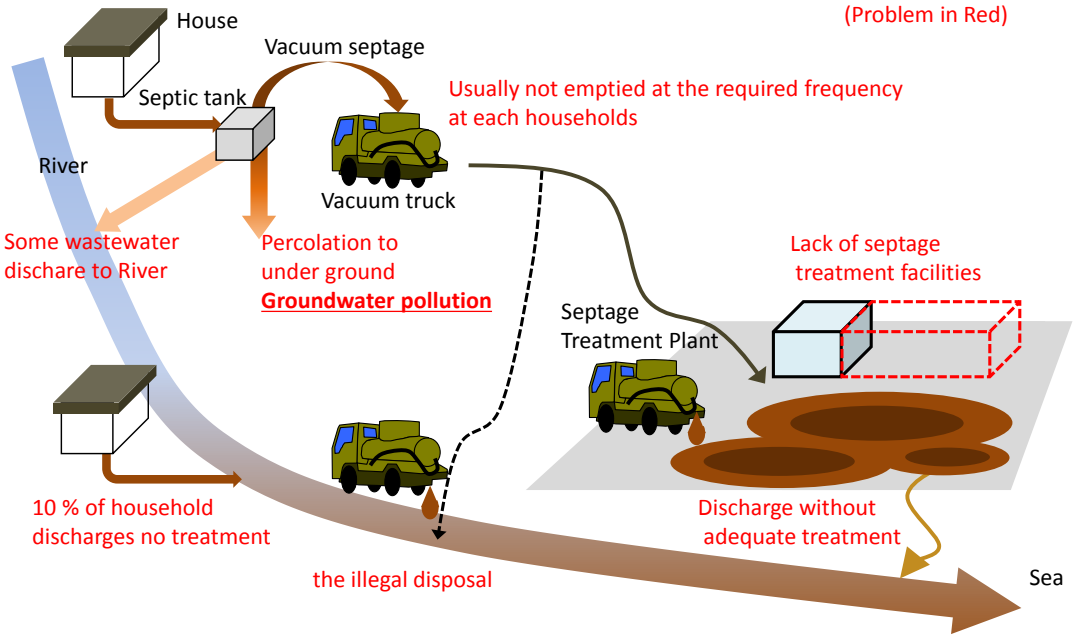
The difference between the rainfall intensity of Mactan Islands and Yokohama City are as follows:

- For the five year return period, the rainfall intensity of Mactan is higher than that of Yokohama City, especially when the rain duration is short.
- The 2 year return period rainfall intensity of Mactan is higher than that of Yokohama City for the 5 year return period when the duration is less than 60 min.

(2) Waste Water

In Metro Cebu 90% of the households have septic tanks. The rest of the population live illegally along the rivers or sea shore and discharge their wastewater into these waters without any form of treatment.

The septic tanks are usually not emptied at the required frequency (once in five years or more). Furthermore, the sludge transported to the disposal location is not processed properly because the thickening and dewatering systems are no longer functioning at the facility. Untreated sludge and wastewater from domestic sources represent a serious pollution problem. Figure 6-14 shows the current situation and issues about septage treatment. Industrial wastewater from some areas is processed at a private treatment facility.



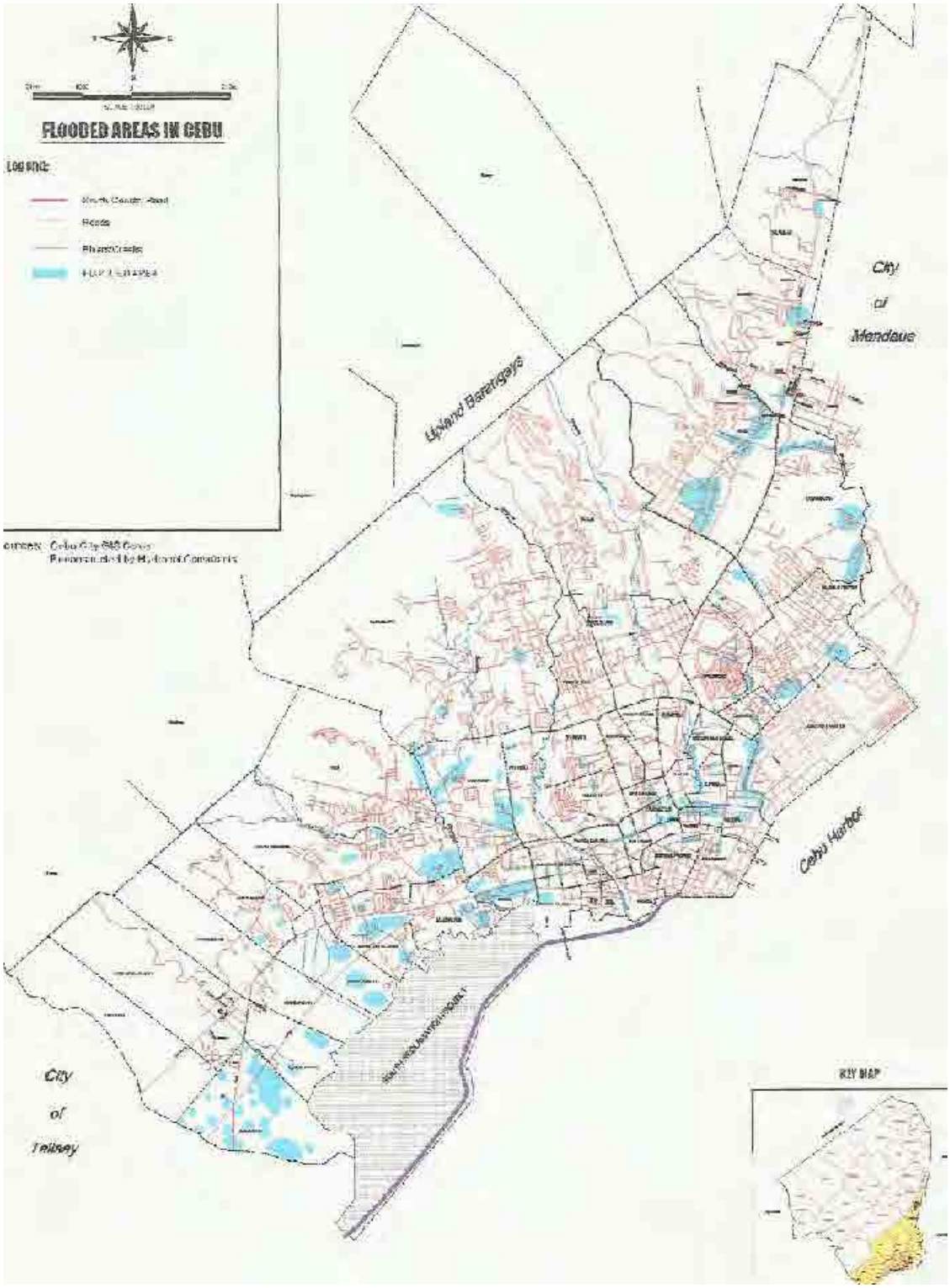
Source: JICA Study Team

Figure 6-13 Current Situation and Issues about Septage Treatment

6.3.2 Future Perspective

(1) Drainage

The flood prone areas in Metro Cebu were investigated in the preparation of the drainage master plan. Figure 6-14 shows the areas that could be inundated. Although flood frequency and maximum flood depth are not studied, the extensiveness of the flood prone areas is clear. It is assumed that flooding is generally caused by a lack of drainage facilities. The flooding problem will worsen because of increasing rainfall and impervious surfaces. More garbage as a result of population growth and thus more clogging of drainage facilities will exacerbate the situation in future.

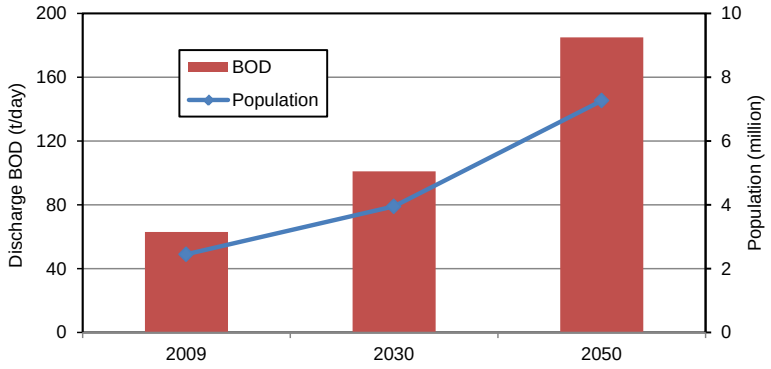


Source: Cebu City (2006) Final Drainage Master Plan/ Preliminary Engineering Report

Figure 6-14 Flood Prone Area in Cebu City

(2) Waste Water

The population in Metro Cebu is projected to triple that of 2009, reaching 4.0 million by year 2030 and 7.3 million by year 2050. The river water quality will become much worse as the population grows, if the inadequate treatment of wastewater and poor maintenance of the septic tanks remain unchanged.



Source: JICA Study Team

Figure 6-15 Prediction of Population and the Discharge Load

With the projected population growth over the period between 2009 and 2050 (Figure 6-15), the resulting increase in waste water discharge into the river and the Biochemical Oxygen Demand (BOD) of the river water is expected to increase three-fold. The groundwater quality would deteriorate as well with the inevitable increase in the number of septic tanks. Pollution of drinking water sources will become a very serious concern.

6.3.3 Development Direction and Planning Approach

(1) Direction and Target

1) Drainage

a. Direction

Drainage facilities must be designed in line with the overarching wastewater development strategy “Livability”. Proper drainage of rainwater would contribute to the development of a safe living city environment.

b. Numerical Target

A return period is an estimate of the interval between rainfall events of a given magnitude that would produce flooding. If the interval is long, the occurrence of heavy rainfall that would cause flooding would be less frequent. It is recommended that “Metro Cebu aims for keeping a city function in good condition against the design rainfall of 5-year return period in the future”. Table 6-4 shows the return period for other cities in the SE Asia and a benchmark international city. Many countries set the return period at more than five years.

Table 6-4 Return Period of Other Cities

	Return period (years)	
City	**Present**	**Plan**
Singapore	Outlet drain and secondary drainage: 5	Outlet drain and secondary drainage: 10
Yokohama	5 to 10	5 to 10
Manila	2	10

Source: JICA Study Team

As the population and activities of Metro Cebu increase in the future, the city/municipal authorities must ensure that the infrastructures keep pace with development and provide an adequate level of security. It may be advisable to choose a longer return period, taking into consideration the high value of the properties and facilities that would exist adjacent to the major water ways.

The rainfall intensity of a 5-year return period for Metro Cebu is higher than that of Yokohama City, requiring more capacity and economic investment for its drainage facilities.

The allowable flood depth for flood prone areas is usually based on a classification of the areas according to required function. An example of the flood protection levels adopted in Japan is shown in Table 6-5.

The acceptable flood depths can be set according to the desired protection levels in each flood prone area.

Table 6-5 Classification of Required Function

Required Function	**Remark**	**Allowable Flood Depth** (cm)
Protection of life	To avoid the inundation in underground shopping centers, underground station and facilities where evacuation would be necessary at the time of a disaster	0
Protection of city activity	To avoid the inundation in shopping districts, city hall and terminal stations	20
Protection of domestic property	To avoid general domestic inundation above floor level	45

Source: Ministry of Land, Infrastructure, Transport and Tourism, Japan

2) Waste Water

a. Direction

The principle objective of wastewater treatment is to allow human and industrial effluents to be disposed of without danger to human health or unacceptable damage to the natural environment. Therefore, the “recovery of the water environment by the appropriate treatment of waste water” is necessary. This would also improve the aesthetics of the area for the large number of tourists expected to visit Metro Cebu from other countries.

b. Numerical Target

Wastewater collection and treatment is necessary to reduce water pollution and threats to human health and the aquatic environment. The design for the improvements to the wastewater treatment system would need to be guided by the target percentage of the population to be served by the collection system, i.e. the wastewater treatment population ratio.
The wastewater treatment population ratio is defined as follows:

population connected to wastewater treatment facilities/ total population
Wastewater treatment facilities include:

- centralized wastewater treatment plants and
- on-site *Johkasou* (household wastewater treatment tank)

The target sewerage treatment population ratio for 2050 is set at 90%.
This can be justified as follows:

a) Most of the benchmark cities achieved 100%
b) It is possible to achieve effluent water quality standard Class B by increasing the treatment population ratio to 90%.

About a)

Table 6-6 shows the sewage treatment population ratio in neighboring countries and in the benchmark city.

Table 6-6 Sewerage Treatment Population Ratio of Other Cities

City	Sewerage Treatment Population Ratio (%)
Singapore	100
Yokohama	99.7
Stockholm	100
Bangkok	40
Hanoi	10
Manila	10

Source: JICA Study Team

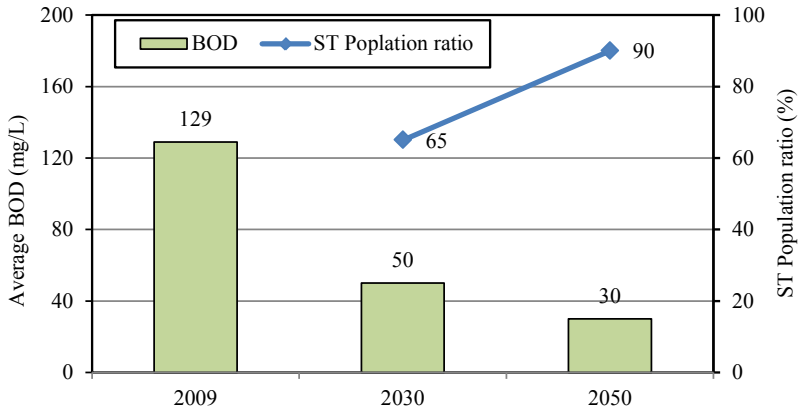
About b)

Table 6-7 shows the water usage and classification in Philippines. At Makati city in Manila, the on-going challenge is to achieve Class B for Manila bay water by cleaning the waterways.
The estimated average BOD for the entire Metro Cebu is shown in Figure 6-16.

Table 6-7 Classification and Beneficial Use for Fresh Water in Philippines

Classification	Beneficial Use
AA	Public Water Supply Class I. This class is intended primarily for waters having watersheds which are uninhabited and otherwise protected and which require only approved disinfection in order to meet the National Standards for Drinking Water (NSDW) of the Philippines.
A	Public Water Supply Class II. For sources of water supply that will require complete treatment (coagulation, sedimentation, filtration and disinfection) in order to meet the NSDW.
B	Recreational Water Class I. For primary contact recreation such as bathing, swimming, skin diving, etc. (particularly those designated for tourism purposes).
C	1) Fishery Water for the propagation and growth of fish and other aquatic resources; 2) Recreational Water Class II (Boatings, etc.) 3) Industrial Water Supply Class I (For manufacturing processes after treatment).
D	1) For agriculture, irrigation, livestock watering, etc. 2) Industrial Water Supply Class II (e.g. cooling, etc.) 3) Other inland waters, by their quality, belong to this classification.

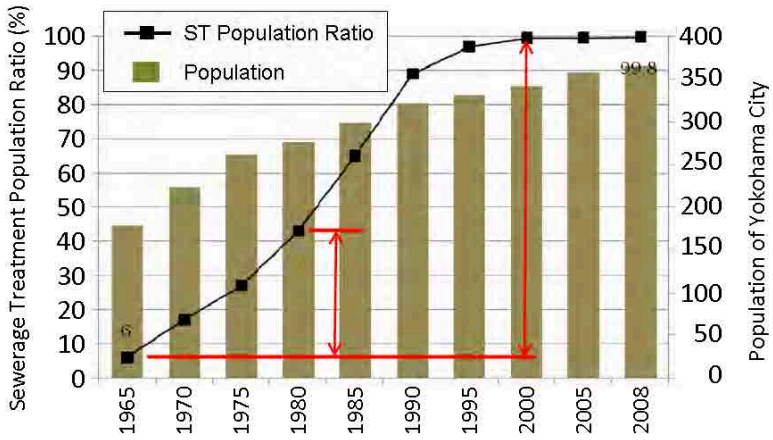
Source: DENR Administrative Order No. 34 Series of 1990



Source: JICA Study Team

Figure 6-16 Average Effluent Water Quality in terms of BOD for the Entire Metro Cebu

Figure 6-17 shows the change in sewerage treatment population ratio in Yokohama. There was a 40% improvement over a 15-year period from 1965 to 1980, and a 90% improvement by year 2000. Therefore, the target set for Metro Cebu is achievable.



Source: Yokohama City

Figure 6-17 Change in Sewerage Treatment Population Ratio in Yokohama from 1965 to 2008

(2) Approach

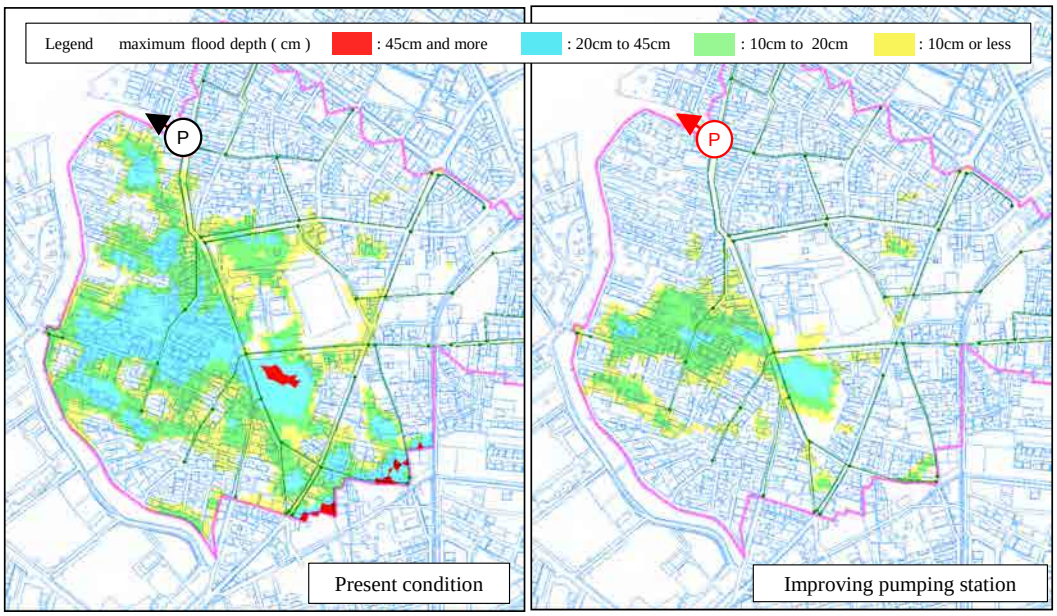
1) Drainage

a. Basic Investigation and Setting Priorities

Some preliminary investigation to identify the flood prone areas and gather basic information on the existing drainage system would be required for the preparation of the master plan for the drainage facilities. This includes examining the rainfall intensity and the inundation that would follow. The preliminary investigation would also help set the priority for the maintenance of the designed facilities.

b. Preparation of Master Plan

The master plan takes into consideration the findings of the preliminary investigations mentioned above, and designs the drainage system to be installed in phases. Hydraulic flood analysis, showing quantitatively the inundation reduction by each measure, would be used for the facility design and setting of priority (e.g., Figure 6-18).



Source: JICA Study Team

Figure 6-18 Sample of Hydraulic Flood Analysis

c. Optimal Installation of Drainage Facility

The master plan would propose the optimal drainage facilities required, including the improvements to the river, channel and creek. Pump facilities would be needed in flood prone areas in the coastal region. Generally, the pumping station needs much land. When a small pump is sufficient, it is effective to install the pump with a gate. This pump does not need much land. A pump facility already in place in Manila has the capacity of 120 m^3/min (Sample picture in Figure 6-19).

Source: KUBOTA (http://www.kubota-pump.com/pumpgate/setti.html)

Figure 6-19 Sample of the Pump with Gate

d. Above Ground Flood Control

Temporary structures such as removable walls and sand bags are flood protecting measures that can be used before the permanent drainage system is in place. A detailed investigation is required to understand the flood depth in each flood prone area and subsequently determine the height required for the protecting walls.

e. Cleaning River, Open Channel and Inlet

While the development of the drainage facilities takes place over an extended period time, some simple flood mitigation measures can be implemented immediately. These include cleaning river ways, opening channels and inlets to increase their flow capacity, thus reducing flooding incidences and damage. The efforts require no special skill or machinery and would raise the inhabitants' awareness of flood prevention and engage their participation in these endeavors.

f. Rainwater Storage, Rainfall Infiltration

It is one of the measures to promote the storage of rainwater in tanks to reduce the quantity of runoffs as well as securing an additional water source when water could be in short supply in the future. Increasing rainfall infiltration would reduce surface runoff and the chance of flooding during periods of heavy rainfall. Any measure to increase the infiltration rate of the area would be useful.

2) Waste Water

a. Thorough Maintenance of Septic Tanks

It is important to utilize the existing septic tanks until the new wastewater collection and treatment facilities are constructed.

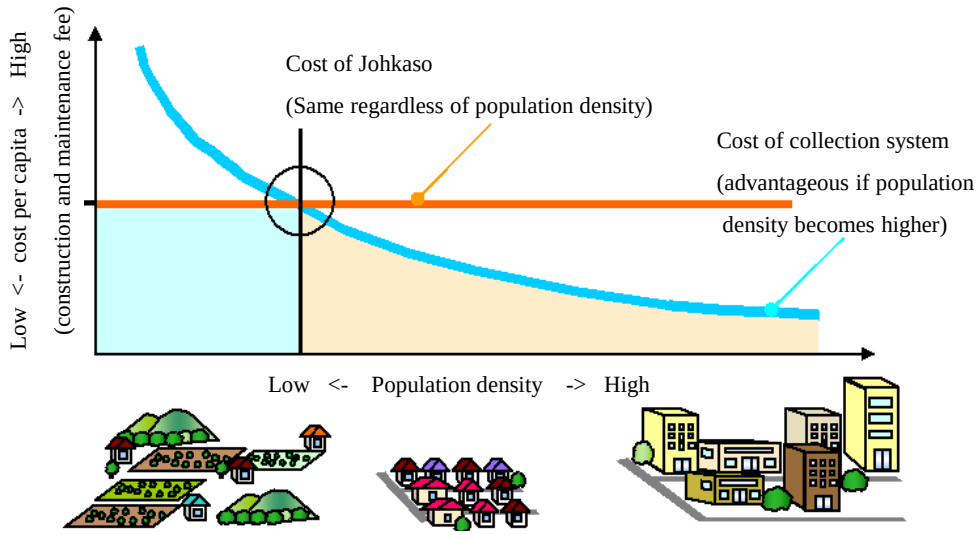
It is also essential to remove the sludge at appropriate frequencies and treat the sludge properly.

The use of septic tanks will continue for ten or more years. A comprehensive plan for septage and sewer sludge treatment should be established to ensure that such treatment facilities are properly maintained and are effective and efficient.

b. Choice of Wastewater Treatment Method

A wastewater collection system is only economical for densely populated areas. For small towns and rural areas where population is spread out, on-site treatment is more appropriate.

The treatment method for each district in Metro Cebu should be chosen based on the above economic consideration.



Source: Vision of Wastewater Treatment Installation in Niigata Prefecture

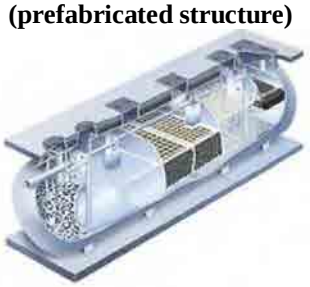
Figure 6-20 Economical Comparison of the Type of Wastewater Treatment

It takes many years to construct a sewage treatment plant. In the mean time it is advisable to install prefabricated large scale *Johkasou* for some of the population to improve the treatment population ratio immediately. Figure 6-21 shows treatment facilities adopted in Japan. The benefits of adopting these treatment strategies in combination must be considered.

Sewage Treatment Plant

Treated population
5,000 and more

Large scale *Johkasou*
(prefabricated structure)



Treated population
51 to 5,000

Johkasou
(prefabricated structure)

Treated population
51 or less

Source: Yokohama City (left), Fuji clean co. Ltd. (center, right)

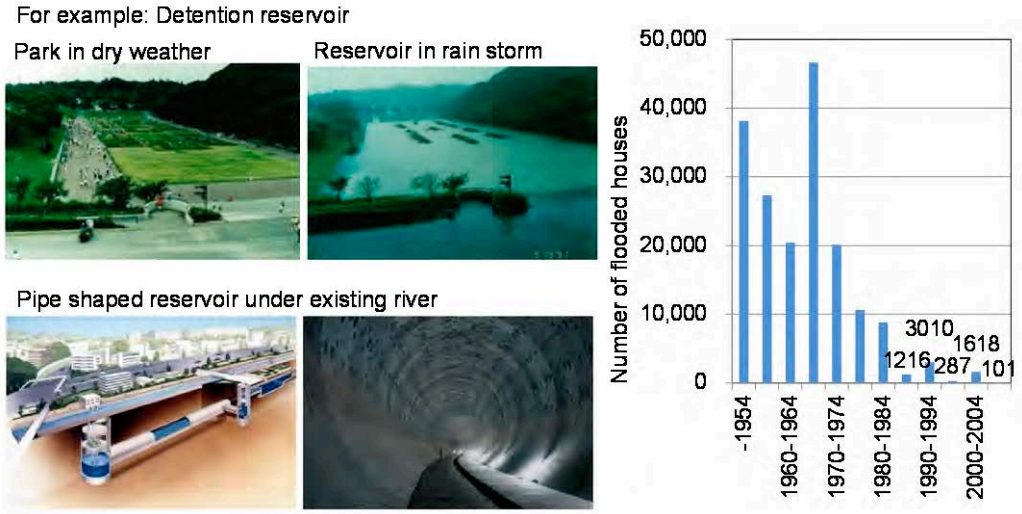
Figure 6-21 Economical Comparison of the Type of Wastewater Treatment

c. Preparation of Master Plan

The master plan would target the areas economically suitable for a collection system. According to the topography of Metro Cebu, a coastal location would be suitable for the treatment plant. However, a lot of industrial and commercial developments are already taking place in the coastal region. It may be difficult to find available space for the wastewater treatment facility. It is more economical to collect and treat the wastewater from the number of cities in one location. It would be necessary to look for the appropriate location among the cities that would be served by the treatment facility.

(3) Best Practice

For mitigation of flood disasters, Yokohama City has conducted many measures such as a detention reservoir, river channel improvement and construction of other drainage facilities. Some of them require large area of land, but Yokohama City uses urban land space effectively. By many measures in combination, Yokohama City has been able to reduce the number of flooded houses.



Source: Yokohama City

Figure 6-22 Flood Measures with Utilizing Land Space in Yokohama City

Because of the lack of septage treatment facilities, the sludge transported to the disposal location is not processed properly in present condition. The introduction of high efficiency treatment facilities is necessary for local small space. In Cebu city, field test of septage dehydration has been conducted by Japanese company. This proof result gets a favorable reception, and prompt introduction is expected.

Source: JICA Study Team

Figure 6-23 Field Test of Septage Treatment Facility in Cebu City

6.3.4 Action Plan

Table 6-8 Timeline of Drainage and Waste Water Treatment

	Short term (2013–2015)	Medium term (2016–2030)	Long term (2031–2050)
Drainage	- Detail investigation - MP/FS - Cleaning waterways* - Rainwater storage, Rainfall infiltration* - Hazard map for flooding - Above ground flood control	- Construction of trunk drainage facilities; e.g., trunk waterway and pumping station (PS)	- Construction of trunk drainage facilities
Waste Water Treatment	- Detail investigation - MP/FS	- Construction of trunk sewerage facilities; e.g., trunk sewer, PS, and water treatment plant (WTP) - Improvement of temporary treatment plant, Large scale *Johkasou*	- Improvement of the sewage system - Reuse treated sewage sludge, treated water - Power generation using digestion gas from sewage sludge - Laying optical fiber in sewer pipes
	- Thorough maintenance of existing septic tanks* - Construction of septage treatment facilities*		

*: Can be implemented immediately
Source: JICA Study Team

6.4 Solid Waste Management

6.4.1 Current Situation and Issues

(1) Garbage Volume Generated per Capita

With an increase in population in Metro Cebu, garbage volume has been increasing widely, raising an issue in solid waste management. During this study, a number of waste management stakeholders were consulted, including 13 LGUs, and recycling facilities were visited to identify issues and challenges. Among them, the interviews with Cities of Cebu, Mandaue and Municipality of Consolacion identified that the daily volume of garbage was at 450 ton in Cebu City, 200 ton in Mandaue City, and 40 ton in Consolacion (Table 6-9). Garbage volume in the 3 LGUs is approximately 400–600 g/day. Because the economic standard of the other LGUs in Metro Cebu is the same level as these 3 LGUs, those garbage volume per capita is also assumed to be the same level. Therefore, data of 3 LGUs is considered as a basic unit of Metro Cebu. Given that the sum of population in these three LGUs is 1,258,000 in 2009, the garbage volume per capita in the said LGUs is estimated at 549 g/day or 200 kg/year.

Table 6-9 Average Waste Generation by Person and Day

	Source	Population in 2009	Garbage Volume in 2009 (tons/day)	Garbage Volume per Capita (g/day)
Cebu City	Interview	824,000	450	546
Mandaue City	Interview	338,000	200	592
Consolacion	Interview	96,000	40	415
Total		1,258,000	690	549 (200 kg/year)

Source: JICA Study Team

(2) Segregation

According to *Ecological Solid Waste Management Act of 2000 (RA 9003)*, garbage in the Philippines is classified into three categories; organic waste, recyclable material, and "other". Garbage segregation has been witnessed at commercial facilities such as a hotel, shopping center, and market. At Barangay, while recyclable materials are well-segregated, organic waste is hardly sorted. According to an official in Cebu City, approximately 10% of the city's population has cooperated in segregating and recycling organic waste.

(3) Collection

Barangay owns garbage collection vehicles and collects garbage based on their own collection rule. Barangay bears the cost incurred by garbage collection. In Cebu City, 60 Barangays own garbage collection vehicles, whilst 20 Barangays do not. Although Cebu City prepares 15 garbage trucks for the Barangays without the trucks, the city has not been able to collect all the garbage. Moreover, even the 60 Barangays with the trucks are not fully collecting their garbage due to the lack of collection trucks, budget, and manpower.

(4) Treatment and Recycle

Recyclable materials such as a cans, bottles, plastic bottles, rigid plastics, paper, and cardboard, are sorted, collected and shipped from Cebu City to Manila and Chinese cities for recycling. On the other hand, biodegradable material is composted at home, in Barangays and private facilities; and then sold to farmers at 5–10 pesos/kg. Because none of the compost facilities are mechanized, their throughputs are ranged from 5–15 tons/day, and therefore the capacity is insufficient. The other waste represented by non-rigid plastic is disposed of in landfill sites. Nevertheless, a private intermediate treatment facility that collects non-rigid plastic as an alternative fuel was constructed in Cebu City in 2011, and the facility processes approximately 100 tons daily, half of which is recycled as an alternative fuel.

(5) Disposal

As stated in *RA 9003*, garbage must be disposed of at a sanitary landfill, meaning that LGUs needs to have their own disposal sites or consign to the private sector to dispose of their waste. While Lapu-Lapu City has its own sanitary landfill site, Consolacion has a private disposal site constructed in 2011. The private company made a contract with Consolacion, Mandaue, Cordova, and Cebu City to dispose of their waste at 700 pesos per ton. In the case of Cebu City, the Inayawan landfill site reached its design capacity. However, as the city was not able to secure an alternative site, resulting into continuous open dumping at the Inayawan, the site has become a small mountain of garbage. Furthermore, landfill leachate kept untreated and contaminated both land and ocean; thus, the Inayawan has not been a sanitary landfill as stipulated in RA 9003. In 2011, Barangay garbage in Cebu City began to be taken to the Inayawan first and then sent to a private disposal site in Consolacion. Nonetheless, due to the limited budget of Cebu City and the truck van imposed on the garbage transport vehicles that pass through Mandaue, it is still some of the Barangay garbage that is carried to the private landfill site in Consolacion, and much of the rest has been accumulated in the Inayawan.

(6) Waste Flow of Metro Cebu

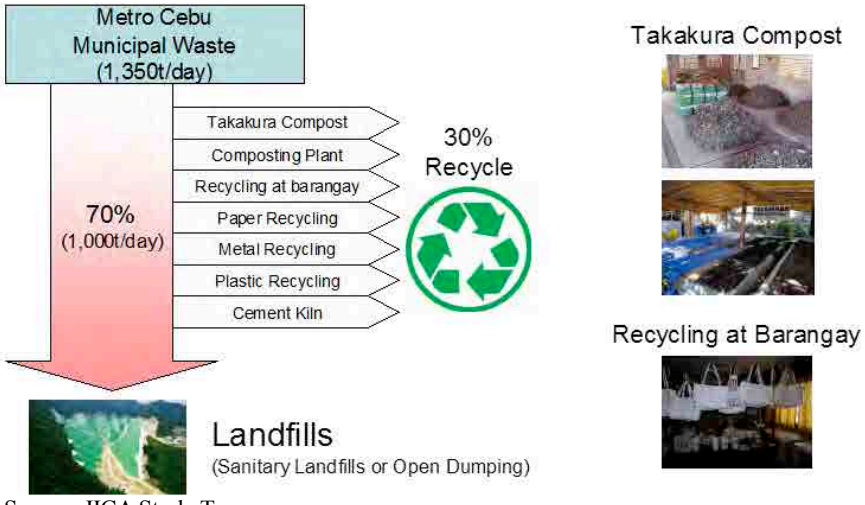
As presented in Figure 6-24, 30% of the entire waste in Metro Cebu is estimated to be recycled and 70% carried to landfill sites. Although the recycling rate is relatively high in Asia, 1,000 tons of waste still needs to be disposed of and for that 5 ha land will be needed.

<Assumption>
Organic Waste
10% of citizens have participated in organic garbage recycling, and about 10 private sector institutions with 10 t/day of capability are in Metro Cebu, it is assumed that about 150 tons/day of organic garbage is composted.

Recyclable Materials
While paper, cans, and plastic bottles are recycled, wrapping paper and disposal products are not usually recycled. It is assumed that around 100 tons/day recyclable garbage is recycled.

Other Garbage
Since about 100 tons is classified with the segregation institution for the alternative fuels which are in Cebu, it is assumed that the day is recycled in 100 tons/day.

Disposal
Specific gravity: 0.7 kg/m^3, Landfill height: 10 m



Source: JICA Study Team

Figure 6-24 Waste Flow of Metro Cebu

6.4.2 Future Perspective

(1) Future Issues in 2050

In Metro Cebu, according to the growth of the population and of the economy, the total amount of municipal waste will exceed 7,000 tons per day in 2050. This is four times larger than that of 2010. In the future, the land of 8–26 ha will be needed annually. As Cebu has narrow land, this is a big issue.

Table 6-10 Estimated Future Volume of Garbage until 2050

	2009	2020	2030	2050
Population	2,454,000	3,199,000	3,953,000	7,270,000
Garbage Volume per Capita (kg/person-year)	200	250	300	350
Total Volume of Garbage (tons/day)	1,344	2,191	3,249	6,971
Volume of Disposal (tons/day)	968	1,577	2,339	5,021
Required Land for Disposal (ha/year)	5.0	8.2	12.2	25.9

Source: JICA Study Team

(2) Direction and Aspiration

At the MCDCB Infrastructure and Utility SUBCOM group, during the workshop held on the 23–24 January, the participant's conversation was as follows:

<Goal / Aspiration>
Further landfill action in Cebu must be stopped, as there is not sufficient land area to accommodate it.

We should do all that is possible to protect the environment of beautiful Cebu. In that direction, current problems such as Inayawan must be dealt with before water sources become more contaminated.

<Direction>
Garbage is pre-sorted in many of the Barangays. However, even in those cases, it is not always recycled, due to a lack of recycling facilities. We must build the structures and infrastructures that would be required to support this recycling, and use organic garbage as compost as much as possible.

Some garbage types, such as plastic, can be brought to facilities which convert it into energy. This will fix two problems with one investment. There are multiple types of waste-to-energy facilities which should be considered.

<Problems>
When we introduce large-scale waste-to-energy facilities, we will need to apportion districts of Metro Cebu to the new plants, respectively. To this end, resources should be applied to the creation of a comprehensive waste management master plan for Metro Cebu, including the configuration of a budget drawing funds from multiple LGU's within the metropolitan hierarchy.

In order to process waste efficiently, Barangays within proximity to one another must increase efforts at cooperative processing, cooperative use of stock yards for recyclable garbage.

Waste-to-energy facilities have a low rate of return for private investors, thus, it is unlikely to hope for a fully private launch. Financial support for such a facility would need to come from some public or civic source of funding.

The people of Cebu will require extensive educative programs to inform them of the high financial investment needed for proper garbage disposal and recycling services. Otherwise, the present system will continue, endangering the natural environment further.

6.4.3 Development Direction and Planning Approach

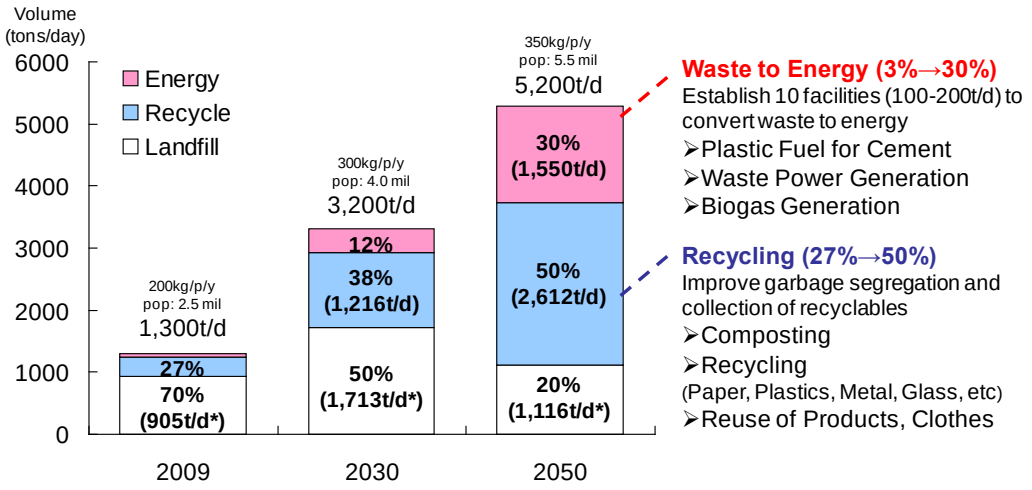
(1) Numerical Targets/Policies

"Livability" was formulated as one of the strategies for sustainable urban development vision for Metro Cebu. As the strategy is for improving basic services and environment, solid waste management plays an important role in this strategy. Based on this strategy, targeting the amount of landfill disposal in 2050 to be the same level in 2009 is aspired for.

(2) Approaches and Projects

In order for the volume of landfill disposal in 2050 to be about 1,000 tons/day which is almost same level in 2009, development targets and directions were examined by the backcasting method using a waste management simulation.

Figure 6-25 shows the simulation result of the ideal waste management plan until 2050 based on the estimated future volume of garbage until 2050 shown in Table 6-10), garbage composition, the current recycling rate, and SWOT analysis. Because the garbage volume of 2050 is forecasted to be 5,229 t, in order to make landfill volume a 1,000 tons/day level, at least 80% of garbage has to recycled or converted to energy.



*Recycling Rate; this recycling rate counted based on input, not output.

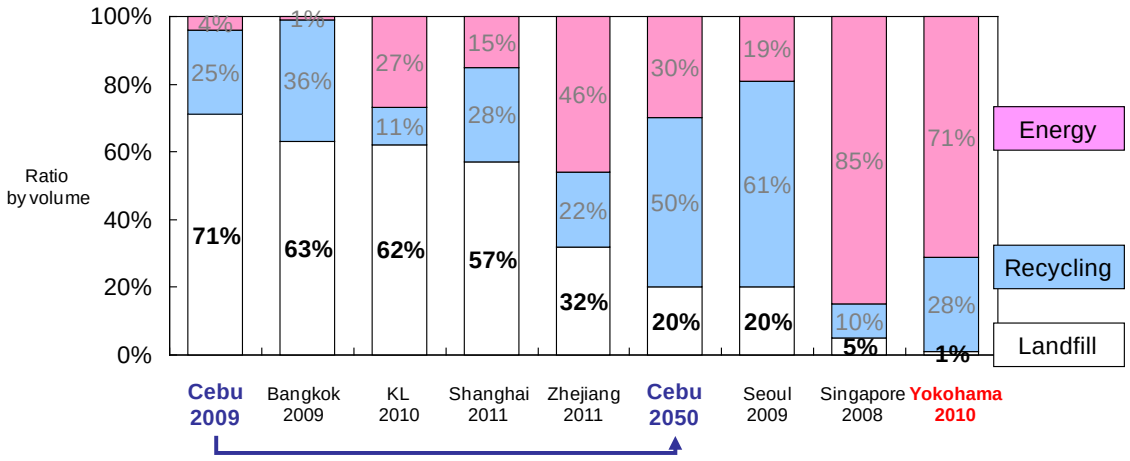
Figure 6-25 Backcasting Model for Waste Management

Development Target

1. The total recycling rate, 28% in 2009, will reach 50% in 2030, and 80% in 2050.
2. In order the recycling rate will be 50% in 2050, composting and recycling are strengthened by improving collection system and segregation program in Barangay.
3. In order that the waste-to-energy rate will be brought up to 30% in 2050, non-recyclables (mainly plastic waste) will be utilized for power generation and alternative fuel.

Benchmark 1 (Major Asian Cities)

A comparative analysis of landfill ratio among major Asian cities was conducted to verify the development targets in waste management sector. The current Landfill ratio in Cebu is about 70% and this is higher than the other major cities. The development target, which is a 20% landfill ratio in 2050, is at the same level as current-day Seoul. Yokohama and Singapore are even lower. The grand target of Metro Cebu, “Cebu will be No1 in Asia except Singapore”, and the target of waste management have consistency. Also in the discussion with LGUs, no objections were raised for the targets, it is thought that the development target is of a proper value.



Source: JICA Study Team

Figure 6-26 Comparison of Landfill Ratio among Major Asian Cities

Benchmark 2 (Yokohama City G30 Plan)

In proportion to the increase in population, the amount of garbage was rapidly increasing in Yokohama. In 2001, Yokohama implemented the G30 plan to reduce the amount of garbage up to 30% by 2010. According to the plan, citizens, business, and government each played a role in the effort. In particular, the advanced garbage separation project was effective. Citizens and the private sector had to segregate for 15 sources, and recycler treated each others.

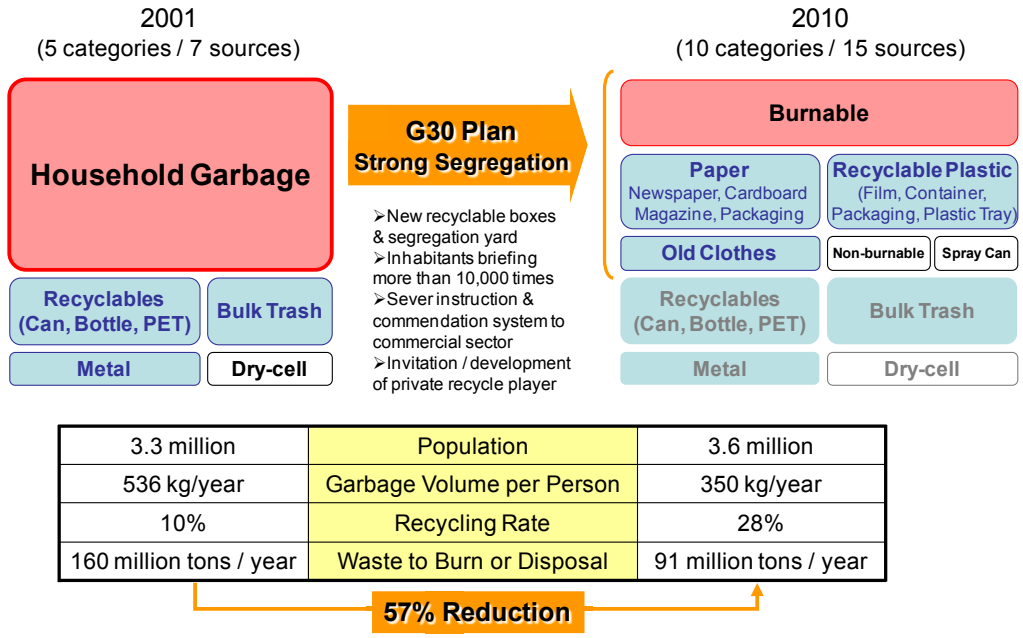
As a result, in 2010, the amount of recycled material doubled. Moreover, it succeeded in reducing 57% of waste-to-burn and landfill in 2001. The recycling rate, based on input base, was 99.3%.

Yokohama G30 plan (2001–2010)

Citizen: implement segregation program, reuse products, and cooperate with home composting projects

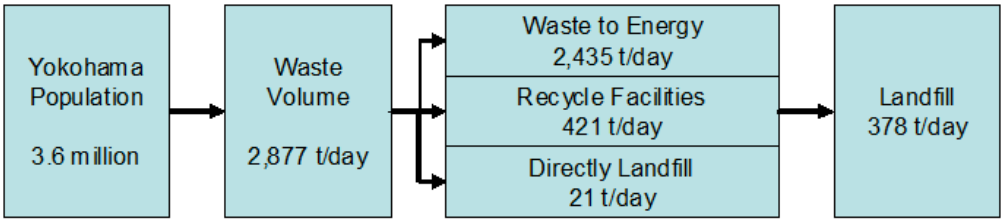
Government: Waste education, Preparing of segregation tool and yard, strengthening of disposal regulation

Business: Installation of recycling business, development of recycling technology, sharing information



Source: Ministry of the Environment of Japan, Report about G30 Plan by Yokohama city

Figure 6-27 Advanced Segregation Program of G30 Plan

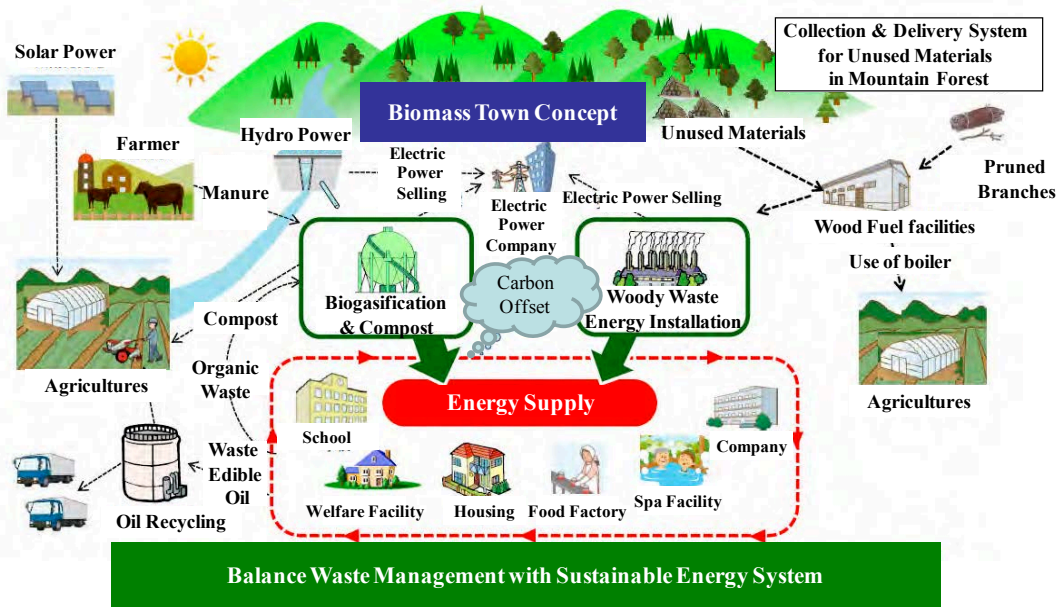


Source: Ministry of the Environment of Japan, Report about G30 Plan by Yokohama city

Figure 6-28 Yokohama City's Recycle Flow in 2011 (after G30 Plan)

Benchmark 3 (Biomass Town Concept)

Biomass Town is one of the smart city concepts in which waste management and local sustainable energy systems are complementing each other, centering on compost or biogas facilities.



Source: Ministry of Agriculture, Forestry and Fisheries

Figure 6-29 Biomass Town Concept

6.4.4 Action Plan

The following actions must be taken to achieve our development targets.

1. **Developing a comprehensive solid waste management plan for Metro Cebu**
   - Clustering of 13 LGUs, and producing a detailed solid waste management plan for each cluster
   - Structure of the budget pool in LGUs for waste management

2. **Implementation of the advanced segregation project by Barangay & building economical recycle model**
   - Joint installation of stock yard to segregate recyclable garbage
   - Implement advanced segregation project at Barangay (more than 10 categories)
   - Implement the educational program about Cebu's environment and waste management
   - Improvement and integration of waste collection system
   - Mechanize composting facilities and develop the purchase scheme of citizens' compost

3. **Introduction of energy conversion institution in a cluster unit**
   - Cooperate with cement industry for alternative plastic fuel
   - Introduction of waste-to-energy facilities using plastic waste
   - Introduction of waste-to-energy facilities using organic waste

4. **Introduction of the biogas equipment according to the treatment of septic tank and sewage disposal**

5. **Making the new budget for environmental restoration**

Table 6-11 Timeline of Solid Waste Management

	Short term (2013–2015)	Medium term (2016–2030)	Long term (2031–2050)
Recycling	**Advanced segregation** - Installation of stock yard for segregation and recyclable boxes at Baranguy* - Implement new segregation for more than 10 sources - Implement the educational program about Cebu's environment and waste management	**Building economical recycling model** - Improvement and integration of waste collection system - Mechanize composting facilities - Development the purchase scheme of citizens' compost and recyclables	
Waste-to-energy	**Planning and Starting from plastic alternative fuel** - Clustering of 13LGUs and making detail introduction plan of waste-to-energy facilities of each cluster* - Cooperate with cement industry for alternative plastic fuel*	**Introduction of energy conversion institution in a cluster unit** - Introduction of waste-to-energy facilities using plastic waste - Introduction of waste-to-energy facilities using organic waste	Introduction of the biogas equipment according to the treatment of septic tank and sewage disposal
Planning & Management	Developing comprehensive solid waste management plan of Metro Cebu	Structure of the budget pool in LGUs for waste management	Making the new budget for environmental restoration

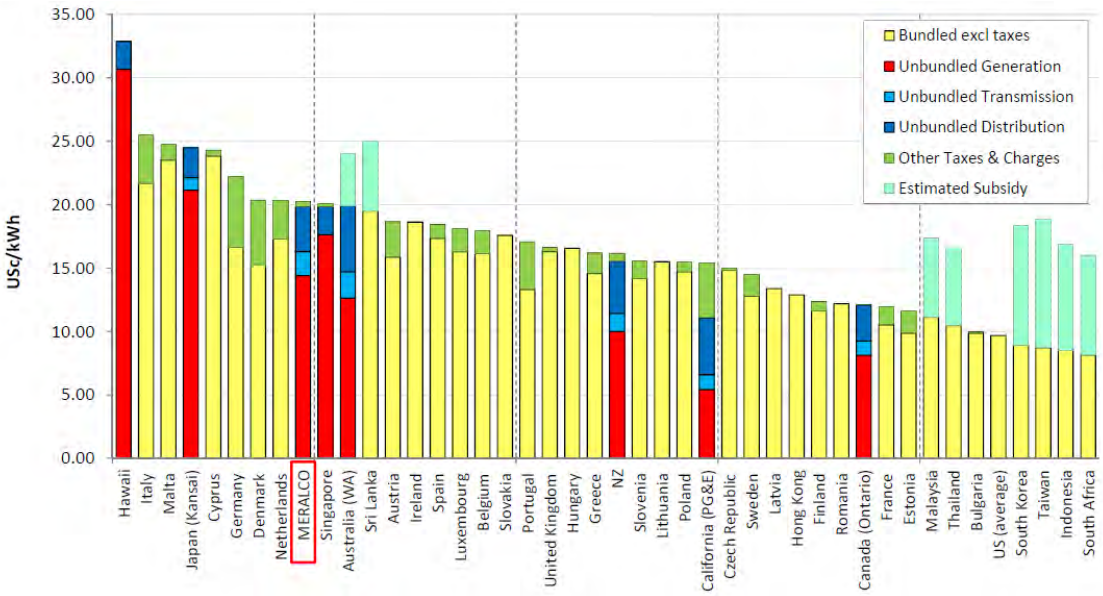
*: Can be implemented immediately

6.5 Power and Smart Technologies

6.5.1 Current Situation and Issues

(1) High Price of Electricity

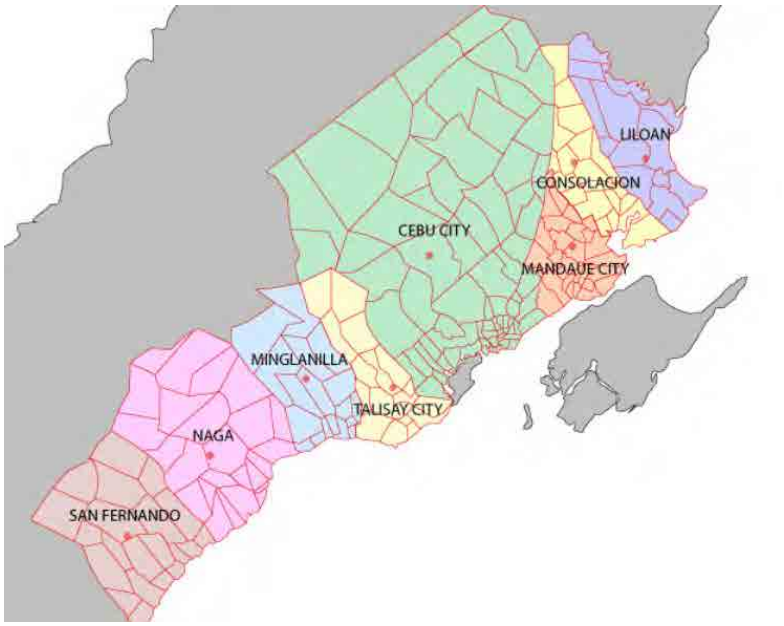
Electric power prices in the Philippines are one of the highest in Southeast Asia. For example, Manila Electric Company (MERALCO), the largest distribution company in the Philippines, ranks ninth in the 44 worldwide markets (Figure 6-30).



Source: MERALCO (2012) Third Quarter Investor's Briefing Reports

Figure 6-30 Average Retail Tariffs

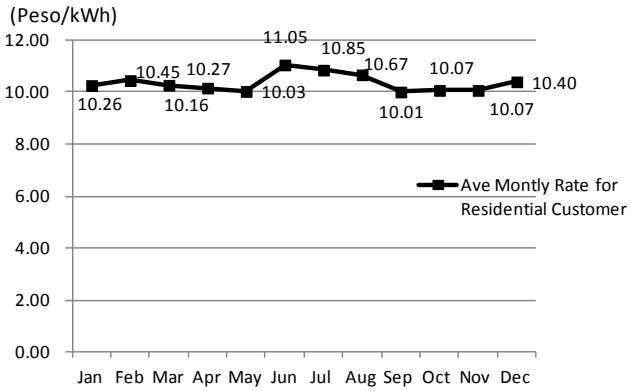
In the case of Metro Cebu, Visayan Electric Company (VECO), the second largest distribution company in the Philippines, supplies power to the cities of Cebu, Mandaue, Naga, and Talisay; and municipalities of Consolacion, Liloan, Minglanillla, and San Fernando (Figure 6-31).



Source: Data provided by VECO

Figure 6-31 Franchise Area of VECO

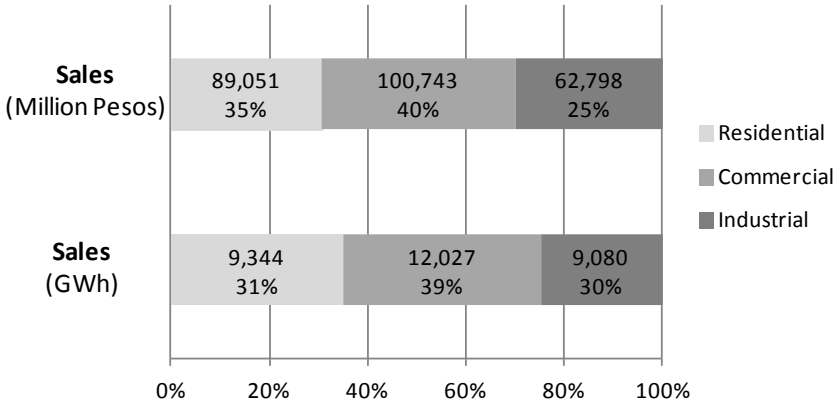
Although power price comparison between MERALCO and VECO is not available during the same period, VECO discloses its average monthly rate by customer category and the rate for residential customer in 2012 ranged from 10.01 to 11.05 peso/kWh (Figure 6-32).



Source: JICA Study Team based on MERALCO (2012) Third Quarter Investor's Briefing Reports

Figure 6-32 Average Monthly Rate for Residential Customers at VECO, 2012

On the other hand, the annual power sales for MERALCO residential customers in 2011 were 89,051 million pesos and 9,344 GWh (Figure 6-33), yielding the average rate per residential customer in MERALCO at 9.53 peso/kWh. Comparing VECO's monthly average rate in 2011 and MERALCO's annual average rate in 2012, VECO's rate is higher than that of MERALCO (Table 6-12). Therefore, under the assumption that the factors affecting power consumption in 2011 and 2012 were the same, the price of electricity in Metro Cebu is one of the highest in the world.



Source: JICA Study Team based on MERALCO (2011) Annual Report

Figure 6-33 Sales Relationship at MERALCO

Table 6-12 Power Price Comparison between VECO and MERALCO

Electric Power Company	Average Power Rate (peso/kWh)
VECO[*1]	10.01–11.05
MERALCO[*2]	9.53

*1: Range in Monthly Average Power Rate in 2012
*2: Annual Average Rate in 2011
Source: JICA Study Team

(2) High Power Price Factors

While most of the Southeast Asian countries subsidize electric power to reduce its price, the Philippines do not. However, even putting this fact aside, the power prices in the Philippines are still high. As the cost of power includes generation, transmission and distribution, the followings are effective technical measures to lower the rates in Metro Cebu.

- Generation Cost:
  This is the only field where competition can exist among power producers. In 2010, the wholesale power market commenced its operation in the Visayas grid. Moreover, open access is scheduled to launch in 2013. Large customers whose demand on a 12 month average basis exceeds or is equal to 1 MW, will be able to make contracts directly with power producers. Through a more competitive environment, generation costs will become more reasonable under a proper deregulated market design. It has not yet been reported that any unjust practices (such as market manipulation) have been conducted.

- Distribution Cost:
  This component is the cost for distribution companies such as VECO. Decreasing its loss is the most effective approach to reducing distribution cost. While the loss has been continuously declining at VECO, the latest data shows 8.85%, which still exceeds the government cap set at 8.5%. Therefore, more efficient operation is needed including the upgrade or replacement to more efficient facilities such as transformers. In case of MERALCO, its distribution loss was 7.35% in 2011.

Table 6-13 System (Transmission + Distribution) Loss Data in the World, 2010

Rank	Country	Electric Power Losses (%)
1	Bangladesh	2.08
2	Slovak Republic	3.12
3	Finland	3.43
4	Korea, Rep.	3.63
5	Spain	3.73
12	Japan	4.45
23	Thailand	6.34
34	Singapore	7.05
49	Indonesia	9.40
57	Vietnam	10.11
73	**Philippines**	**11.52**
84	Sri Lanka	13.81
99	Myanmar	16.61
127	Cambodia	28.77
	World Average	8.31

Source: JICA Study Team based on
http://data.worldbank.org/indicator/EG.ELC.LOSS.ZS

- Transmission Cost:
  Power system (transmission + distribution) loss in the Philippines is 11.52% with 73rd ranking among 133 countries (Table 6-13). Currently, transmission is operated by the national grid cooperation of the Philippines. Transmission loss data in Metro Cebu could not be identified physically; however, taking both national data and VECO's distribution loss into account, transmission loss is deemed to be more than 3%. This is also high, and thus upgrading to efficient facilities should be executed.

6.5.2 Future Perspective

Although numerous rolling brownouts took place in 2008 and 2009 in VECO's service area due to the lack of power generation capacity, the situation has been improved and rolling brownouts have not occurred in 2013. This stable demand and supply situation will be maintained until 2016.

The peak demand was approximately 407 MW at VECO and 59 MW at MECO[1] in 2011 (Table 6-14). It will reach 534 MW and 94 MW in 2020 with high annual average growth rate particularly for MECO. In VECO area, tight power demand and supply situation is forecasted in 2016. To deal with this, new power plant is planned to be constructed in west part of Cebu island according to VECO. CEBECO I [2] and CEBECO II [3] are also power distributors in part of Metro Cebu. However, as their franchise areas cover out of Metro Cebu as well, power demand data only for Metro Cebu could not be obtained.

Table 6-14 Power Peak Demand Forecast at VECO and MECO, 2020

	Peak Demand 2011 (MW)	**Peak Demand 2020** (MW)	**Annual Average Growth Rate** (%)
VECO	407	534	3.5
MECO	59	94	6.6

Source: JICA Study Team based on data provided by DOE

6.5.3 Development Direction and Planning Approach

(1) Renewable Energy

With regard to the utilization of renewable energy, Visayas grid has relied mainly on the geothermal energy (Table 6-15).

Table 6-15 Power Generation by Fuel Type in Visayas Grid

	2009		**2010**		**Difference**	
Fuel Type	(GWh)	(%)	(GWh)	(%)	(GWh)	(%)
Coal	822	9.42	1,529	16.85	707	86.01
Oil-based	1,864	21.37	1,726	19.02	−138	−7.40
Geothermal	5,985	68.60	5,771	63.59	−214	−3.58
Hydro	42	0.48	36	0.40	−6	−14.29
Biomass	11	0.13	13	0.14	2	18.18
Total Generation	8,724	100	9,075	100	351	4.02

Source: Department of Energy (2010) Philippine Power Sector Situationer

Since most of the power plants in the grid which started its operation in recent years are coal-fired plants, the generation share of geothermal energy has been declining. The representative cases are the power plant with 240 MW in Toledo city and 200MW in Naga city. Both plants are coal-fired power generation. As these started operation in 2010 and 2011, the share of coal-fired generation must have been increasing compared with that in 2009. As of February 2013, geothermal, coal and diesel power shares 57%, 33% and 10% respectively on a capacity basis at VECO. It also explained that it uses coal-fired units as base-load generators. Consequently, the current utilization ratio of renewable energy is not as high as it was in the past.

[1] Mactan Electric Company, Franchise coverage; Mactan Island
[2] Cebu I Electric Cooperative, Inc, Franchise coverage; City of Carcar in Metro Cebu
[3] Cebu II Electric Cooperative, Inc, Franchise coverage; City of Danao and municipality of Conpostela

On the other hand, the Philippines has national targets toward the diffusion of renewable energy. As for long term targets, from 2011 to 2030, additional capacity is approx. 9,900MW from renewable energy. According to the Renewable Energy Management Bureau at Department of Energy (DOE), near-term targets for power development by renewable energy sources are shown in Table 6-16.

Table 6-16 Power Development Targets for Renewable Energy, 2013–2015

Type of Energy Source	Power Development Target (MW)
Hydro	250
Biomass	250
Wind	250
Solar	50

Source: JICA Study Team

In 2012, the Energy Regulatory Commission approved the introduction of Feed-In Tariff (FIT) that will apply to renewable energy generation. As of February 2013, the Philippines government is drawing the development plan for renewable energy generation plants. Nevertheless, there is no specific development plan within Metro Cebu though there are some micro-hydro plans in Cebu province.

VECO has made a bilateral contract which is thought to be long with coal-fired plant according to not only the Bureau but VECO as well. It was the only utility in the country who opposed the introduction of FIT among approx. 110 utilities. Its major reason according to VECO is its introduction will result in a rate increase, making power even less affordable to Filipinos[4].

DOE mentions it is difficult to expect rapid diffusion for solar generation because payback year for solar photovoltaic (PV) is generally between 7–12 years - even reasonably priced solar panels made in China. In addition, reverse power flow from residential customers to the grid is not implemented in Metro Cebu yet[5].

The International Energy Agency forecasts that PV's investment costs will be the lowest together with onshore wind among renewable sources in 2020. It anticipates the costs will be reduced by 1/2 to 1/3. VECO also suggests that among various renewable sources, promotion of PV will be the most realistic approach in the light of natural resources in Metro Cebu. That is, both wind and hydro power are not suitable due to the wind condition and shortage of water respectively.

The outlook for further deployment of renewable energy generation within Metro Cebu is not optimistic, in spite of a policy which promotes renewable energy aggressively. Hence, establishment of drastic policy innovation in the area is necessary. One of the ideas is that growing demand including electric vehicles will be covered with renewable energy in the future. Plus, plans of waste power generation are underway in Naga and Carcar cities. It is definitely strong option though power generated from waste is not defined as the utilization of renewable energy sources in the Philippines.

[4] FIT will be applied to large-scale generators such as mega-solar, therefore PVs at residential customers are out of the current FIT scheme.

[5] Some customers have installed roof-top solar panels for self-generation as self-generators.

Setting up numerical target toward 2030 regarding utilization of renewable energy in power is not practical because VECO objects to it. Its assertion that use of renewable sources will cause rate increase is completely correct. The body which will make contracts with power producers from renewable sources and supplies to customers is VECO. Up until its policy changes, creation of numerical target is castle in the sky.

(2) Smart Technologies

Smart technologies are gathering popularity in the Philippines and some proposals to the congress have been made by DOE toward deployment of smart technologies including Supervisory Control And Data Acquisition.

MERALCO is conducting a demonstrative test of a smart meter in part of Luzon Island.

VECO is also planning to launch an advanced metering infrastructure pilot project early in 2013. The project is targeting residential, small-scale commercial and large-scale customers. The following are newly added functions to the smart meter that will be provided by an Italian utility[6]:

- Automatic metering
- Remote control of power shutoff (e.g., applied to unpaid customers)
- Remote control of power supply

The communication system is planned as follows:

- GRPS will be utilized from smart meter to transformer on the poll.
- PLC using power line will be utilized from transformer to distributing substation[7].
- Collected data will be stored at server in distribution substation.

The advanced meter is projected to cost around five times the costs of a conventional one and additional costs will be recovered through rate increase (Figure 6-34).

Source: JICA Study Team

Figure 6-34 Sample of Advanced Meters at VECO

[6] Smart meter in this project will not have remote control function for appliances.
[7] Noise issues occurred with PLC using power line have been already solved according to VECO.

As for electric vehicles, they are regarded as suitable and applicable in Metro Cebu considering that trip lengths can be quite short. VECO suggested that it will be supportive for its promotion once moves toward its diffusion take place in the future.

A Japanese company has started promotional activities for an E-tricycle in Metro Cebu (Figure 6-35). The battery is charged for four hours with 220V electric power[8]. This allows E-tricycle to drive for 40 km. A lot of individual taxi owners have interest, as the payback year is approx. 3–4 years.

Source: JICA Study Team

Figure 6-35 E-tricycle and Manufacturing Site

(3) Energy Conservation

Energy Conservation Act was submitted to the congress and expected to be up for consideration after the general election in May 2013. Some efforts that have been made toward energy conservation in Metro Cebu are as follows:

- Introduction of labeling system that indicate efficiency to appliance consumers (e.g., air-conditioners and refrigerators).
- Shortening AC hour by two hours in national government buildings (e.g., In case that office hour is 9 a.m. – 5 p.m., AC hour is 10 a.m. – 4 p.m.)[9].
- In 2009, VECO introduced the incentive system in which customers who switch from incandescent light bulb to compact fluorescent light (CFL) are reimbursed at 20 pesos in 2009. Most of incandescent light bulbs has been switched to CFLs though this promotion.
- At VECO headquarters, all lights have been switched to light-emitting diodes (LEDs) (from 48 W to 19 W) with its payback year at 1.2 years.

Power demand peak-hour is 5 p.m. – 7 p.m. when AC and lighting demand overlaps. While there is not demand side management program such as promotion of energy storage system, DOE puts it in the hands of (wholesale power) market mechanism. That is, power price rises during peaking hours and drops during off peaking hours, and this functions as demand side management.

[8] Distribution power voltage at VECO; 69 kV, 23 kV, 220 V
[9] In-room temperature is controlled at 25 degree C.

At VECO, as time-of-use (TOU) contracts have not been utilized enough so far, these will be cancelled within this year while only two customers make TOU contracts as of Jan. 2013. Meanwhile, as preparation for power shortage situation, VECO offers special contract with large-scale customers who own self-generators. When power shortage is forecasted, VECO requests those to operate the self-generators based on the contracts. Though these contracts have not been used for last several years, they are still valid as of Jan. 2013.

(4) Strategy and Targets

The most important thing in the power sector is to keep demand and supply stable. As mentioned earlier, the peak demand will reach 534MW for VECO and 94MW for MECO in 2020. Meanwhile, DOE forecasts the annual average growth rate (AAGR) will be 5.6% for Visayas grid from 2021 to 2030 (Figure 6-18).

Table 6-17 Projected AAGR, 2011–2030 (%)

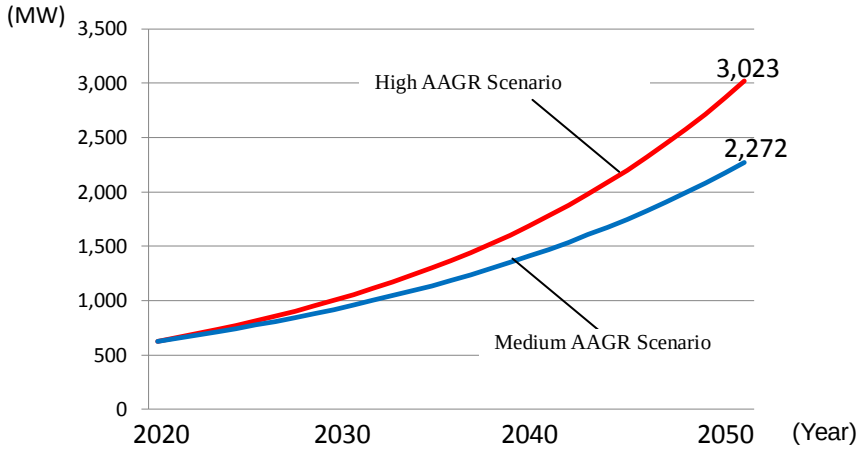
	2011–2020	2021–2030
VECO	3.5	–
MECO	6.6	–
Visayas grid	–	5.6

Source: JICA Study Team based on data provided from DOE

Regarding AAGR between 2031 and 2050, two scenarios are considered here;

- High AAGR scenario with 5% for VECO and 7% for MECO.
- Medium AAGR scenario with 4% for VECO and 6% for MECO.

Based on these scenarios, the peak demand will reach between 2,272 and 3,023 MW in Metro Cebu, 2050 (Figure 6-36). This means additional capacity of 1,800 MW to 2,600 MW will be necessary up to 2050 without taking future retirement plants into accounts.



Source: JICA Study Team

Figure 6-36 Peak Demand Forecast in Metro Cebu, 2050

To realize sustainable society, promotion of energy conservation and further utilization of renewable energy is crucial. In order to reduce peak demand and realize energy conservation, practical smart technologies in Metro Cebu are as follows:

- LED lighting; 70% of energy conservation.
- Efficient air-conditioning system with utilization of inverter, etc;
  30% of energy conservation.
- Other efficient equipment such as motors, transformers, appliances, etc;
  20% of energy conservation.
- Optimal energy management with home energy management system (HEMS) and building and energy management system (BEMS), etc;
  25% of energy conservation.

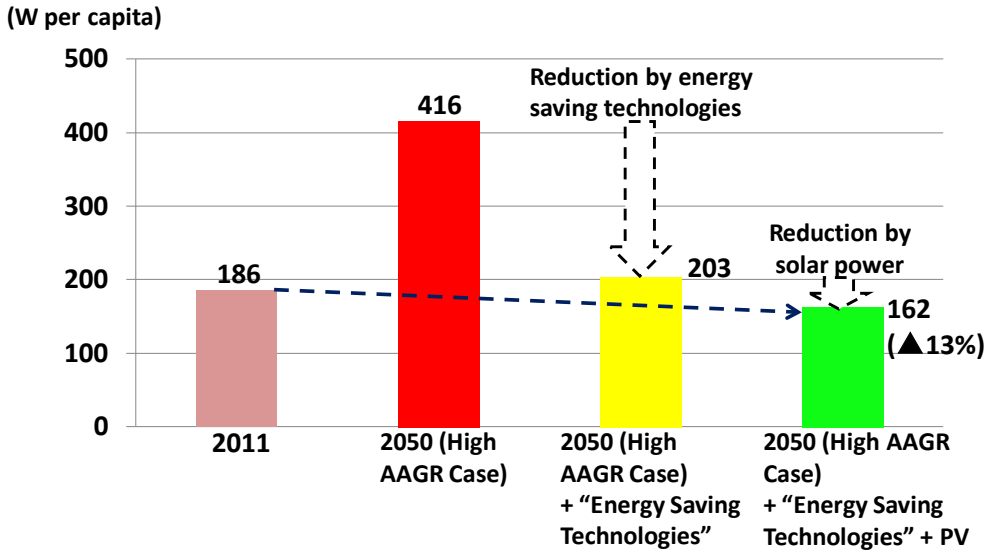
Plus, generators from renewable energy sources such as solar power will be connected to the grid at up to 20% in consideration of system stability.

As a result, additional required generation capacity will be reduced to 713 MW which corresponds to 70% reduction. Peak demand per capita will also be reduced by 13% (Table 6-18, Figure 6-37).

Table 6-18 Smart Technologies toward Sustainable Society

Power Demand	High AAGR Scenario (MW)	After Energy Conservation (MW)	Smart Technologies
Lighting	605	181	LED including street lamp
Air-conditioning	1,512	1,058	Efficient equipment such as an inverter
Others	907	726	High efficiency motor, etc
Sub-total	3,023	1,965	
Total Demand		1,474 (1,965 × 0.75)	Optimal energy management with HEMS, BEMS, etc
Solar Power (PV)		295 (1,474 × 0.2)	
Additional Generation Capacity		713	

Source: JICA Study Team



Source: JICA Study Team

Figure 6-37 Comparison of Energy Consumption per Capita

6.5.4 Action Plan

Table 6-19 shows the timeline of smart technologies up to 2050.

Table 6-19 Timeline of Smart Technologies

	Short term (2013–2015)	Medium term (2016–2030)	Long term (2031–2050)
Lighting (LED)	- Detail investigation including consideration of policy support such as incentives and diffusion planning. - Partial introduction to government building and street lamp, etc - Implementation of capacity building for energy savings	- Phased diffusion - For commercial and industrial customers; 100% - For residential customers; 50%	- 100% for all customers
Efficient air-conditioning system	- Detail investigation including consideration of policy support such as incentives and diffusion planning. - Project planning, F/S	- Phased diffusion - For commercial and industrial customers; 50%	- 100% for commercial and industrial customers
Others (motors, transformers, appliances, etc)	- Detail investigation including consideration of policy support such as incentives and diffusion planning. - Definition of efficient equipment (watching energy conservation law) - Partial introduction to appropriate sites - Implementation of capacity building for energy savings	- Phased diffusion - For commercial and industrial equipment; 80% - For residential customers (appliances): 50%	- 100% for all customers
Optimal energy management (HEMS, BEMS, etc)	- Project planning, F/S - Implementation of capacity building for energy savings	- Detail investigation including consideration of policy support such as incentives and diffusion planning. - Phased diffusion - For commercial and industrial equipment; 80% - For residential customers (appliances); 40%	- 100% for all customers
Renewable energy (Solar, biomass, etc)	- Project planning, F/S	- Implementation of project - Diffusion to 100MW	- Diffusion to 295 MW

Source: JICA Study Team

7. Future Direction for Implementation

7.1 Example Projects

To materialize the formulated vision and development strategies, example projects and programs were identified and listed. In this identification procedure, the discussions with stakeholders at the first workshop and individual consultations with LGUs were taken into consideration to help set out the example projects and programs.

7.1.1 Categorization of Example Projects

(1) Candidate Implementation Agencies

The potential agencies who could implement the example projects and programs have been identified and categorized (Table 7-1). Those identified/listed example projects and programs with assumed potential implementation agencies will be useful bases for the next implementation stage.

Table 7-1 Project Categories and Candidate Implementation Agencies

Project Category	Candidate Implementation Agencies
A	Cebu Provincial Government
B	13 LGUs in Metro Cebu
C	Private companies, universities, NGOs, etc. in the Philippines
D	Private companies, universities, NGOs, etc. in foreign countries
E	Donors in foreign countries

Source: JICA Study Team

(2) Time Line

In general, projects can be classified into immediately feasible projects, long-term projects, etc. according to financial and technological specifications. Table 7-2 classifies the example projects and programs into short-term projects (to be commenced by 2015), medium-term projects (by 2030) and long-term projects (after 2030).

Table 7-2 Project Classification according to Time Line

Time Line	Projects and Programs
Short term	To be commenced immediately (by 2015)
Medium term	To be commenced before long (by 2030)
Long term	To be commenced after lengthy preparation (after 2030)

Source: JICA Study Team

(3) Urgency

The relative urgent of the example projects and programs was taken into account in studying the implementation. On the basis of consultations with LGUs and other stakeholders and discussions at workshops, it was judged that the following kinds of projects were urgent in implementation.

- Flood prevention
- Functional expansion of airport and port
- Measures for traffic congestion
- Water supply and sewerage/drainage
- Waste management

Table 7-3 Categorized Example Projects (1)

Strategies			Example Project Lists	Project Category	Time Line			Urgency
					Short	Medium	Long	
Competitiveness	Tourism	Cultural & Historic	Preparation of historical environment and resource mapping in each LGU	B	○			
			Planning and execution of a “Great Culture Tour” by NGOs/NPOs	BC	○			
			Conservation and use of historical buildings (e.g. gift shops, cafés, etc.)	BC	○	○		
			Refurbishment of historical towns and enacting design guidelines	BC	○	○		
			Exploring historical resources including modernization heritage (e.g., old railway stations)	BC	○	○		
			Holding major annual events in Metro Cebu	B		○		
			Promotion of existing events in LGUs and releasing information through a Metro Cebu web page	B	○			
		Medical & Healthcare	Creation of retirement communities including housing, hospital, shopping mall, etc. in SRP	CD		○		
			Application of accessible for all Universal Design to international airport, public transport stations, main facilities owned by public.	BC	○	○		
		MICE	Formation of MICE hub using international conference center, hotel, shopping mall, etc. in SRP	BC	○	○		
			Consolidation of international convention linked to resort area in Mactan Island	C		○	○	
		Eco-Tourism & Experiential	Promotion of eco-tourism, fruits picking, gourmet tours, etc.	BC	○			
	Education	English and foreign languages	Development of English and foreign languages training industry targeted at East Asian countries including Japan	C	○	○		
		Hospitality	Establishment of a “Hospitality” course in the MBA program of the University of the Philippines in SRP	C	○			
		Skills training	Establishment of a training program linked with business activities, such as manufacturing	CD	○			
			Establishment of programs related to urban issues in cooperation with Yokohama City University, etc.	CD	○			
		K-12 & Higher education	Supply of classrooms & teachers for K-12 & Higher Education	B		○		
		Science & Technology	Development of Science and Technology facilities	BCD		○		
	Enterprise	Eco-Tech	Development of a Research & Development cluster including EV (inc. e-jeepneys and e- tricycles)	BCD		○	○	
		Creative industry	Regeneration of local industries, such as branding of furniture manufacturing	BC	○	○		
			Promotion of folk crafts etc. made of recycling resources in each Barangay	BC	○	○		
		FDI (Foreign Direct Investment)	Attraction of FDI through designation of FEZ with more favorable incentives, etc.	AB		○	○	
	Enablers		Introduction of appropriate utilities (Power, Water, ICT) into business zone	AB		○	○	
			Improvement of BCP (Business Continuity Plan) in business area	BC		○	○	
Mobility	Master Plan and Feasibility Study		Integrated transport and land use spatial plan to identify, develop, evaluate and prioritize projects	BE	○			★
	Public Transport	Mass public transport	Rationalization of public transport routes study	BE	○			★
			Implementation of an integrated Metro Cebu mass public transport system (BRT, LRT, etc.)	BE		○	○	★
			Supporting public transport hierarchy of buses/jeepneys/walking and cycling integrated with the mass public transport network	B		○		★
		Sea-based transport	Development of sea-based transport linking ports of LGUs	BC	○	○		★
		TOD	Encouragement of mixed-use and high density development within walkable distance from a public transport hub	B		○	○	★
			Implementation of integrated interchange/terminal/stop planning, ticketing and information etc across all modes	B		○		★
	Road Network		Redevelopment of the road network with a clear transport network hierarchy based on the new metropolitan structure	BE		○	○	★
			Improvement of existing routes and development of bypass roads to relieve city centers and improve connectivity	BCE		○	○	★
			Reorganization and management of freight and logistics distribution across roads, depots, ports and the airport	BE		○	○	★
	Walking and Cycling Network		Comprehensive pedestrian and cycle infrastructure (e.g. safe and effective street crossing, pedestrian bridge/underpass where appropriate, etc)	B		○		★
			Organization of pedestrian/cycle network from public transport hubs	BC		○	○	★
	Gateway	Airport	Expansion and refurbishment of the international airport (terminal, runways), utilizing the power of private sector for the terminal building	ADE		○		★
			Improvement of accessibility from/to city centers and LGUs, such as through the development of 3rd Mactan Bridge	BE		○		★
		Sea port	Expansion and Relocation of the existing Ports	ABE		○		★
			Redevelopment of empty sites of existing Ports	AB		○	○	★
	Traffic Management		Strategic parking plan and enforcement of regulations	B	○			★
			Improve network efficiency through traffic management measures including 4E (Engineering, Education, Enactment and Enforcement) and ITS	BC	○			★
			Reduction in traffic accidents through a comprehensive package of road safety measures including implementation of the directions and policies of the National Road Safety Action Plan	B	○			★
			Long term plan for demand management and reducing the need to travel (including car sharing, teleworking, teleconference, home shopping, broadband etc.)	B		○	○	★
			Further development of ITS (Intelligent Transport System)	BCD		○	○	★

Source: JICA Study Team

Table 7-4 Categorized Example Projects (2)

Strategies			Example Project Lists	Project Category	Time Line			Urgency
					Short	Medium	Long	
Livability	Basic Services	Housing	Construction of social housing and development of new communities	BC	○	○		
			Development of an informal housing improvement system, such as Community Mortgage Program (CMP)	BC	○			
			Tightening of regulations for to encourage private developers to construct affordable housing in Metro Cebu	B	○			
			Construction of environmental friendly and affordable housing harmonized with the climate in Metro Cebu	BCD		○	○	
		Parks and open space	Realize accessible public amenities (parks, coast, recreation) centering on the importance of walking and cycling linked to greenways, etc.	BC	○	○		
		Drainage	Formation of master plan and feasibility study	BE	○			★
			Scheduled cleanout of existing drainages and waterways	B	○			★
			Rainwater storage, rainfall infiltration	B	○			★
			Construction of trunk drainage facilities	BC		○	○	★
		Waste water treatment	Formation of master plan and feasibility study	BE	○			★
			Thorough maintenance of existing septic tanks	BCD	○	○		★
			Construction of septage treatment facilities	BCD	○	○		★
			Construction of trunk sewage facilities	BC		○	○	★
			Improvement of temporary treatment plant, large scale *Johkasou*	BCD		○		★
			Promotion of use of recycling sludge (construction materials, compost) and treated water	BCD			○	★
		Water supply	Improvement of water supply capacity and expansion of safe water supply coverage areas	BE		○	○	★
	Environment	Waste Management	Developing comprehensive solid waste management plan of Metro Cebu	BE	○			★
			Structure of the budget pool in LGUs for waste management	B		○	○	★
		Recycling	Installation of stock yard for segregation and recyclable boxes at Baranguy	BC	○			★
			Implement new segregation for more than 10 sources	B	○			★
			Implement the educational program and waste management	B	○			★
			Improvement and integration of waste collection system	B		○		★
			Mechanize composting facilities	BCD		○		★
			Development of the purchase scheme of citizen's compost and recyclables	B		○		★
		Waste to Energy	Clustering of 13 LGUs and making detail introduction plan of Waste to Energy facilities of each cluster	BE	○			★
			Cooperate with cement industry for alternative plastic fuel	BCD	○			★
			Introduction of waste to energy facilities using plastic waste and organic waste	BCD		○		★
			Introduction of the biogas equipment according to the treatment of septic tank and sewage disposal	B	○	○		★
			Construction of final disposal plants in Metro Cebu	BE		○	○	★
		Ecological preservation	Designation of the Natural Conservation Area, such as green and sea shore	B	○	○		
			Maximize the arrangement of open space, green space, pedestrian malls etc to help city centers of each LGU be alive with many people and help enhance sense of place	BC		○		
			Providing open spaces and accessible circumference roads along the sea shore	B		○	○	
		Electric vehicles, sustainable transport	Implementation of policies to deliver a shift to electric/sustainable vehicles (e-jeepneys, e-tricycles etc) comprising delivery of subsidies, construction of related infrastructure, and promotion of environmentally friendly industries, etc.	AB	○	○		
			Roll out of “Road Transport Patrol” program to reduce fuel consumption by 10% through better vehicle maintenance, efficient driving through seminars/workshops	B	○			
			Introduction of EV or hybrid vehicles (pilot schemes)	CD	○			
			Shift to sustainable transport modes and low-emission vehicles	BCD		○	○	
		Energy saving and Management	Introduction of alternative energies including solar, wind, biomass, etc.	ABCD	○	○		
			Introduction of untapped energy including sea water, river water, ground-source heat, etc.	ABCD		○	○	
			Implementation of energy demand and supply mitigation by means of electric/thermal storage	BCD		○	○	
			Operation of efficient energy management by means of HEMS/BEMS	BCD		○	○	
			Application of high efficient district cooling system and Co-Generation System in the downtown, SRP, etc.	BCD		○	○	
			Developoment of a best practice energy-efficient community in SRP as a showcase to the world	BCDE		○	○	
	Safety	Peace and Order	Promotion of crime prevention measures including patrol at Barangay	B	○			
			Implementation of comprehensive road safety measures (including education, road safety management and measures, road hierarchy improvements, safer vehicles etc.)	B	○	○		
		Resilience from Natural Disasters (Floods)	Reinforcing hard infrastructure composed of arterial roads, storm-water outflow, etc.	BE		○	○	★
			Preparation of hazard mapping (flooding etc.) in each Barangay	B	○			★
			Planning/design of buildings to protect from flooding	BC		○	○	★
Metropolitan Management	Organization		Organization of an entity to promote the development of Metro Cebu (possibly functional extension of MCDCB)	AB	○	○		
	Planning		Formulation of a comprehensive Sustainable Urban Development Master Plan for Metro Cebu	AB	○	○		
			Clarification and standardization of procedures to formulate each LGU Master Plan	B		○		
	Information		Development of a Regional Control/Command Center	BC	○			
			Development of integrated Metro Cebu Knowledge and Operations Center	BC	○	○		
	Management		Promotion of town management for garbage, water and security, etc. in each Barangay	BC	○			
			Promotion of public-private partnership, business matching opportunities and demonstration experiments of advanced technologies in each LGU	BCD	○	○		
			Promotion of financial support towards NGO/NPO activities in Metro Cebu	AB	○	○		

Source: JICA Study Team

7.1.2 Selection of Essential Projects and Programs

Table 7-3 and Table 7-4 summarized the example projects and programs. These essential projects and programs were selected in consideration of their relative applicability.

(1) Instantaneous Projects

Instantaneous projects can be immediately commenced because implementing agencies are ready and project periods are short. This type of project has two patterns: 1) cooperative promotion by enterprises in the Philippines and Japan and short-term duration; 2) promotion by all 13 LGUs themselves and short-term duration. The former has high instantaneousness because of favorable situation where Filipino and Japanese enterprises are about to commence projects. The latter can be commenced immediately by organizing a positive implementation framework on the public side. The instantaneous projects are listed in Table 7-5.

Table 7-5 Example Instantaneous Projects

Strategies	Category	Example Projects
Competitiveness	Tourism	Preparation of historical environment and resource mapping in each LGU
		Promotion of existing events in LGUs and releasing information through a Metro Cebu web page
Mobility	MP and FS	Integrated transport and land use spatial plan to identify, develop, evaluate and prioritize projects
	Public Transport	Rationalization of public transport routes study
	Traffic Management	Reduction in traffic accidents through a comprehensive package of road safety measures including implementation of the directions and policies of the National Road Safety Action Plan
		Strategic parking plan and enforcement of regulations
Livability	Basic services	Tightening of regulations to encourage private developers to construct affordable housing in Metro Cebu
		Scheduled cleanout of existing drainages and waterways
		Rainwater storage, rainfall infiltration
		Thorough maintenance of existing septic tanks
		Construction of septage treatment facilities
	Environment	Implement new segregation for more than 10 sources
		Implement the educational program and waste management
		Cooperate with cement industry for alternative plastic fuel
		Designation of the Natural Conservation Area, such as green and sea shore
		Roll out of “Road Transport Patrol” program to reduce fuel consumption by 10% through better vehicle maintenance, efficient driving through seminars/workshops
		Introduction of EV or hybrid vehicles (pilot schemes)
		Introduction of alternative energies including solar, wind, biomass, etc.
	Safety	Promotion of crime prevention measures including patrol at Barangay
		Implementation of comprehensive road safety measures (including education, road safety management and measures, road hierarchy improvements, safer vehicles etc.)
		Preparation of hazard mapping (flooding etc.) in each Barangay

Source: JICA Study Team

(2) Pillar Projects

Pillar projects can be immediately commenced with the cooperation of foreign donors with urgency. That is, immediate commencement of the pillar projects is ensured by foreign donors irrespective of medium- or long-term ranged planning scope. The pillar projects are shown in Table 7-6.

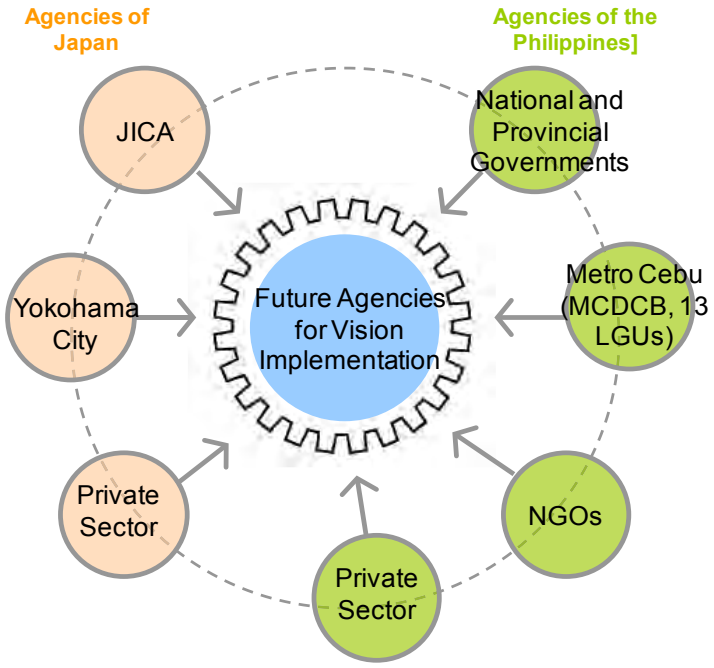
Table 7-6 Example Pillar Projects

Strategies	Category	Example Projects
Mobility	Public Transport	Implementation of an integrated multimodal public transport network including mass transit
		A wider package of public transport measures including seamless and convenient transfer/interchange, stop and terminal infrastructure, ticketing and information and marketing etc
	Road Network	Redevelopment of the road network with a clear transport network hierarchy based on the new metropolitan structure
		Improvement of existing routes and development of bypass roads to relieve city centers and improve connectivity
		Reorganization and management of freight and logistics distribution across roads, depots, ports and the airport
		Development of integrated pedestrian and cycle networks and supporting measures
	Gateway	Expansion and refurbishment of the international airport
		Improvement of accessibility from/to city centers and LGUs, such as through the development of 3rd Mactan Bridge and public transport
Livability	Basic services	Formation of MP and FS of drainage and waste water treatment
		Improvement of water supply capacity and expansion of water supply coverage areas
	Environment	Developing comprehensive solid waste management plan of Metro Cebu
		Construction of final disposal plants in Metro Cebu
		Reinforcing hard infrastructure composed of arterial roads, storm-water outflow, etc.

Source: JICA Study Team

7.2 Philippines and Japan Cooperation for Implementation

The bilateral cooperation between the Philippines and Japan continuously plays an important role in realizing the proposed projects and programs. With this cooperation, potential agencies to implement example projects and programs must be determined. Furthermore, extensive support from both public and private sectors in the two nations is crucial to bring the formulated vision and concepts into effect (Figure 7-1).



Source: JICA Study Team

Figure 7-1 Future Agencies for Implementing Vision