

A Proposal for Establishing a Plastic Waste Material Recycling system in Metro Cebu

BEETLE Nishihara Shoji Co., Kitakyushu City

Establishment of Plastic Waste Recycling system in Metro Cebu

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KITAKYUSHU-CITY

Material recycle system for non-rigid plastic wastes (e.g. plastic bags) (preliminary survey.)

Kitakyushu City

Nishihara Recycling Company

Institute for Global Environmental Strategies (IGES)

Kitakyushu International Techno-cooperative Association (KITA)

↓ Preliminary survey ↓

【Recyclable conditions (※material recycle)】

① Clean plastic waste → landfilled solid waste (dirty plastic waste needs to wash) - out of scope

② Vinyl chloride plastic and biodegradable plastic : low mix rate ※ other plastic : No problem

↓ Fetch a higher price compare to plastic fluff fuel (use cement plant) / Reducing GHG emission ↓

2013.06 : Selecting research project from Ministry of the Environment of Japan

Nishihara corp. in Kitakyushu developed a new plastic waste recycling loop

Beetle-Group Total Capital on Groups 8.74 million PHP

Management	Beetlemanagement (Co.,Ltd)	18	Business Service on management information
Recycle	Nishihara Shoji (Co.,Ltd)	55	Business on collection/transportation and processing waste and industrial waste
Resource	Clp (Co.,Ltd)	20	Business on sales resource and recruitment

Amount of sales : 7.33 billion PHP employee

Nishihara corp. in Kitakyushu developed a new plastic waste recycling loop

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Target

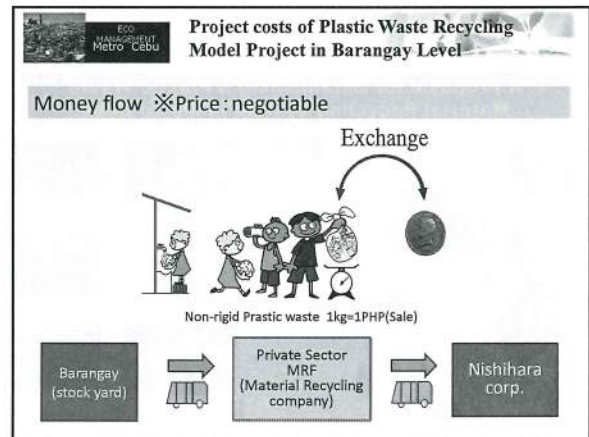
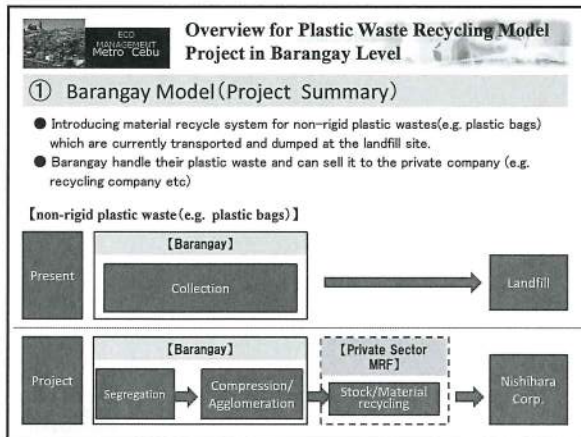
Generation

↓ Segregation

Treatment

↓ Segregation

Final disposal



Benefits of Plastic Waste Recycling Model Project in Barangay Level

Benefits of the project

		Effects
Environmental protection effect		1. Reduction of final disposal waste 2. Reduction of greenhouse gas emission 3. Promotion of effective utilization of resources
Economical effect	Municipality	Reduction of solid waste transport and disposal cost
	Citizen	Increase in income
	Barangay	Increase in income
Citizen edification effect		Awareness on waste separation and recycling (RA 9003)
Others		1. Implementation of RA9003 2. Application as "Environmental education hub" 3. Promotion of urban beautification 4. Image enhancement as "Environmentally friendly city"

Role of key players of Plastic Waste Recycling Model Project in Barangay Level

Key players and their roles

		Main role
Philippines	Municipality	1. Financial support to Model Barangay (e.g. purchase of press machine/aggglomerated machine) 2. Publicity about model project to citizens 3. Institution building of the plastic waste recycling system 4. Strictly enforce the RA9003
	Model Barangay	1. Purchase of collect/purchase plastic waste (e.g. plastic bag) from citizens 2. Stock yard operation (※Need to secure about product quality standard) 3. Transport of plastic wastes to recycling company
	Citizen	1. Segregation / Washing (plastic waste)
Japan	Kitakyusyu city	1. Support of Nishihara corp.'s overseas development
	Nishihara corp.	1. Support of plastic waste sales making a business loop



Establishment of Plastic Waste Recycling Model Project in Metro Cebu

Recycle process

- Upgrading of existing recycling process (segregation, crushing)
- High value-added products (add to washing/dewatering and agglomeration)

segregation	crushing	washing	dewatering	agglomeration
Employee deployed sorting conveyor separate non-rigid plastic waste (e.g. plastic bags)	Single shaft shredders: crush under 20 mm	Washing pool: Wash and simplified dewatering	Centrifugal dehydrator: moisture content: under 15%	Agglomerated machine: machine time (1 batch) about 15~20minutes Drying by friction/agglomeration

Establishment of Plastic Waste Recycling Model Project in Metro Cebu

Recycle technology

Dehydrator	Agglomerated machine
<ul style="list-style-type: none"> • Simple dewatering machine making use of centrifugal dehydration • Simple mechanism ⇒ cheap to running cost / low failure frequency 	<ul style="list-style-type: none"> • Not manufacture finished product like a plastic pellet • low cost compare to product pellet • Only friction heat ⇒ suitable for disposing mix plastic

Establishment of Plastic Waste Recycling Model Project in Metro Cebu

Products (use to recycling plastics raw material)

Material input	Recycled plastic board
Production process	Recycled plastic board

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Establishment of Plastic Waste Recycling Model Project in Metro Cebu

Key players and their roles

	Main role
Private sector (Recycling company)	<ol style="list-style-type: none"> 1. Construction waste recycling plant 2. Plant operation <ol style="list-style-type: none"> ① Stable production ② Need to secure about product quality standard ③. Delivery of products (agglomerated plastics)
Nishihara corp.	<ol style="list-style-type: none"> 1. Technical support of recycling plant (set up/operation) 2. Purchase of products (agglomerated plastics)

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Establishment of Plastic Waste Recycling Model Project in Metro Cebu

Future development of business

- Business model in Cebu city expands to Metro Cebu.
- Customization according to the needs of each municipality (e.g. Need to set up central MRF)
- Consideration of extensive disposal in order to reduce of solid waste disposal cost
- Consideration of [Plastics raw material's local production for local consumption] (advanced material recycling loop)

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City to City cooperation between Kitakyushu City and Cebu



Kitakyushu City Hall

Kitakyushu

Dr. Ken-ichi Fujimoto
Kitakyushu International Techno-cooperative Association
Managing Director of the Board of Directors

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Kitakyushu International Techno-cooperative Association (KITA)



Date of Establishment : July, 1980

KITA has welcomed more than 7,000 participants coming from 146 countries.

KITA is aiming to promote international technical cooperation with the intention of maintaining harmony between industrial development and environmental conservation.

KITA has transferred Cleaner Production (CP) to developing countries through training of personal or dispatch of experts.

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Kitakyushu City overview



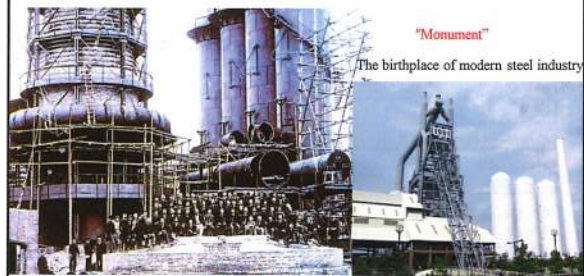
- Western part of Japanese archipelago, northern tip of Kyushu → Gateway to Asia
- Manufacturing city with industrial and technical capacity → Steel, chemical, machinery, ceramic, IC
- Rich, natural surroundings → 210km coastline, ~40% of city area is forests

Basic Data
Area: 459km²
Population: 988,000
Ave temp: 16°C
Ave rainfall: 1,600mm
GDP: 4.5 trillion yen



Modern industrialization in Kitakyushu

The first city in Japan with a modern steelworks (1901)



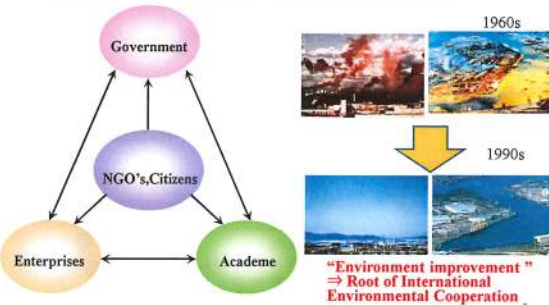
Developed as a heavy industrial city with focus on steel and chemicals

Led Japan's period of high economic growth

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History of overcoming pollution in Kitakyushu

Kitakyushu City ⇒ achieving "Environmental reclamation"



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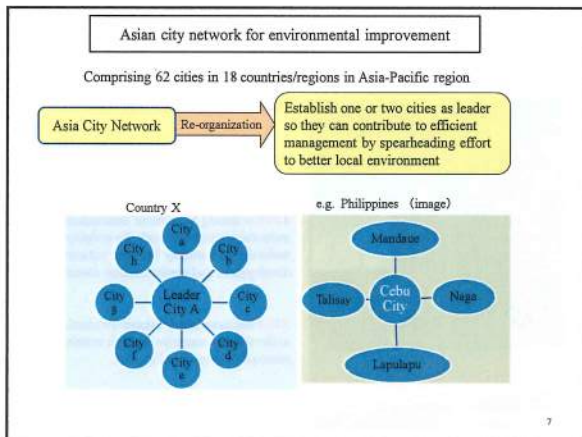
Environmental cooperation network

Environmental Cooperation Network of Asian Cities (1997~)



- Seven Cities
- Kitakyushu (Japan)
 - Batangas (Philippines)
 - Cebu (Philippines)
 - Ho-Chi-Minh (Vietnam)
 - Penang (Malaysia)
 - Semarang (Indonesia)
 - Surabaya (Indonesia)

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Field cooperated by Kitakyushu City

Cooperated Field		Fiscal Year
CP	Intro-Study, Model Project, Expert dispatch	2000-2002
River	Cleaning, Seminar	2001-2002
Monitoring	Expert dispatch	2001-2004
Domestic WW	WWTP Basic Study, Built & Operate	2003-2004
Afforestation	River side and reservoir periphery	2005-2008
Solis Waste	Expert dispatch, Workshop, Garbage truck Community-based SW management	2001-2003 2010-2012

CP : Cleaner Production
 WWTP : Waste Water Treatment Plant
 WW : Waste Water

Example : Cleaner Production

Items	Before	After	Environmental achievement	Economical achievement
Product (pcs./day)	60,000	60,000	—	—
Water consumption (peso/month)	9,148	998	Reduction of pollutants	8,151 peso/month

Example : River Clean-up activities

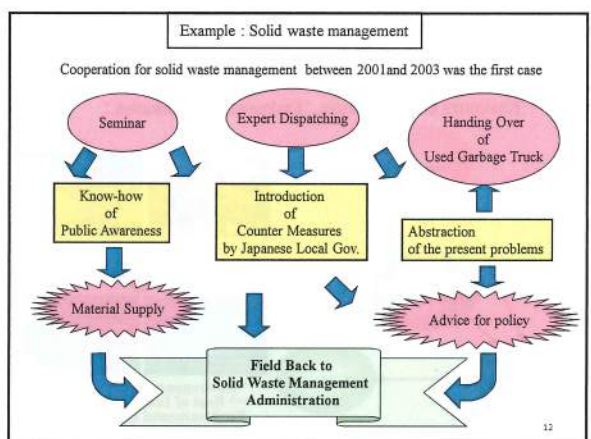
Activities in Cebu (2001)

River environmental restoration project

River	Location	Year
Managa River	Talisay	1997
Cotcot River	Liloan	1997
Cansaga River	Consolacion	1999
Guadalupe	Cebu	1999
Buntuanon	Mandaue	2000
Guadalupe River	Cebu	2003

Butuanon River Clean up Activity

River Cleaning up activity by citizens, lead by university students in Kitakyushu City and Metro-Cebu Region



Improving SW management system in Cebu -1st stage 2001-2003

Wastes Collection in Cebu City (Wastes Loading)

Study Team for Solid Wastes Management from Kitakyushu City

Seminar for Solid Waste Management in Cebu City (Feb, 2003)

Seminar by JICA Experts (March, 2003)

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Improving SW management system in Cebu -2nd stage 2010-2012

Year	Activities
2010	<ul style="list-style-type: none"> Takakura Compost Seminars in model Barangays Technical Seminar in Takakura Composting for private sectors (enterprises, academies, NGOs, etc.)
2011	<ul style="list-style-type: none"> Trainers' Training for Takakura composting Distribution of Home method Basket Facilitation of composting Activities in Private sectors
2013	<ul style="list-style-type: none"> Technical Transfer to other cities Region Seminar on Community-Based Solid Waste Management

This project was financially supported by "the Japan Fund for Global Environment" (JFGE)

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Improving SW management system in Cebu -2nd stage

Capacity building in implementing RA9003
【Technical Seminar and Trainer's Training】

Capacity Building for Takakura Method

Distribution of Takakura Home Method (Basket)

Academy • Companies • NGOs
19 organizations,
50 person more

Trainer's training 2011.11.22

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Improving SW management system in Cebu -2nd stage

【Achievement】

- Community Level
 - Brgy. Compost Center
 - Brgy. Talamban, Luz / Brgy etc.
- Private Sectors
 - Bio Nutrient Waste Management Inc.
- Composting activities of University
- Other cities in Metro Cebu

Total wastes transported to landfill (ton/day)

Seed compost make demo Technical assist of Cebu

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Improving SW management system in Cebu -2nd stage

A Regional Seminar on Community-Based Solid Waste Management in Cebu(2012.12.3-4)

【Feedback】

- Steady progress for achieving 「No Segregation No collection」
- Importance of waste reduction, specially organic waste through composting (Expansion of composting in other Barangays)
- Increasing importance of new waste segregation action in addition to organic waste and finding new business opportunities (plastic waste and e-waste recycling)

【Former】

【Present】

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Thank you very much
for your attention

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Improving Waste Management to Address Climate Change and Protect Human Health

The transport and trade (TCT) sector is a key contributor to emissions of short-lived climate pollutants (SLCPs) which contribute to global warming, air pollution, and a number of other adverse climate change (CC) impacts and are a major driver for climate change. CCAC is a global coalition of governments, industry, academia, and the private sector working together to reduce SLCP emissions. CCAC is supported by the Global and Clean Air Coalition (GCAC), based in Copenhagen, Denmark, which supports CCAC to carry out its work on waste management and other SLCP initiatives.

Regional Workshop - Municipal Solid Waste Management & Plastic Waste Recycling Cebu City January 28, 2014

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The Climate and Clean Air Coalition
to reduce Short-Lived Climate Pollutants

- **Political leadership to address Short-lived Climate Pollutants (SLCPs) as a global and collective challenge** to protect the environment and public health, promote food and energy security, and address near term climate change
- **Voluntary, partner led - Coalition of the willing and working!**
Feb 2012 → 6 Partners
Nov 2013 → 75 Partners: 34 States, IGOs, NGOs and private sector
- **Science driven, action-oriented**
- **Building on and bringing together existing efforts**
- **Complementary to global efforts to reduce CO₂ in particular under UNFCCC**

CCAC Structure – Partner Driven

- High Level Assembly**
 - High Level meeting of all the Partners (co-chairs Achim Steiner & host Minister)
- Working Group**
 - All Partners (34 States, 8 IGOs, 33 NGOs) - Oversees the activities, main decision making body
- Steering Committee**
 - New composition Canada, Jordan, Mexico, Nigeria, Sweden, U.S., IGSD, WB.
 - Oversight support and recommendations to the Working Group and High Level Assembly
- Scientific Advisory Panel**
 - Keep abreast of changes in knowledge, respond to targeted questions, and inform policy discussions – Now 13 members
- Secretariat**
 - Head – Helena Molin Valdés
 - Oversee and coordinate overall action, supports Partners and supports development and monitoring of initiatives
 - Hosted by UNEP in Paris, also manages the Coalition Trust Fund
- Initiatives, Lead Partners**
 - Coordinate and oversee the development, Implementation and reporting of their respective initiatives in accordance with WG and HLA decisions

CCAC Initiatives

Catalysing Action: 10 Initiatives underway 2013

Heavy Duty Diesel Vehicles and Engines	Municipal Solid Waste Sector	Brick Production	Promoting HFC Alternative Technology and Standards	Oil And Natural Gas Production
Household Cooking and Domestic Heating	Financing Mitigation of SLCPs	Supporting National Planning for Action on SLCPs (SNAP)	SLCPs Regional Assessments	Agriculture

What are Short-Lived Climate Pollutants (SLCPs)?

SLCPs	ANTHROPOGENIC SOURCES	IMPACTS/MITIGATION RESPONSE	LIFETIME IN ATMOSPHERE	CLIMATE CHANGE FORCING
Black Carbon (BC)	Industrial, residential, biomass, diesel, ships, aircraft	More thermal radiation is captured. Has sunlight is reflected.	days	0.94 Wm ⁻²
Methane (CH₄)	Enteric fermentation, rice, landfills, oil and gas, coal, biomass	A flux and several partners are affected.	12 years	0.48 Wm ⁻²
Tropospheric Ozone (O₃)	Industrial, biomass, diesel, ships, aircraft	Sea levels and sea level rise.	weeks	0.40 Wm ⁻²
Hydrofluorocarbons (HFCs)	Refrigeration, air conditioning, foam blowing, fire suppression	Increases heat absorbed by the Earth.	15 years (range through 100)	0.02 Wm ⁻²
Carbon Dioxide (CO₂)	Power generation, industry, transport, buildings, land use change, forestry	Deep and persistent cuts in CO ₂ , and other long-lived greenhouse gases are necessary to achieve global temperature rise through 2100 and beyond.	100+ years	1.82 Wm ⁻²

IMPACTS

Atmosphere: less radiation to warm up the ocean.

More thermal radiation is captured. Has sunlight is reflected.

A flux and several partners are affected.

Increases heat absorbed by the Earth.

Sea levels and sea level rise.

Harm public health.

Harm food security.

Benefits of SLCP Mitigation

Avoided global warming

Rapid reduction of SLCPs, especially methane and black carbon, would likely slow down global warming by 0.5°C by year 2050.

Rapid implementation of SLCP mitigation measures, together with measures to reduce CO₂ emissions, would greatly improve the chances of keeping the Earth's temperature increase to less than 2°C relative to pre-industrial levels.

Simulated temperature change under various climate change scenarios: CO₂, BC, CH₄, HFCs.

Temperatures projected by 2050:

- CO₂ + CH₄: 0.9°C
- CO₂: 0.5°C
- HFCs: 0.1°C

BAU reference (Business As Usual): 2.6°C

Full Mitigation CO₂ + SLCPs: 0.5°C

CCAC **MOTIVATION- Triple Imperative**
Reducing short-lived climate pollutants

Health benefits

SLCPs affect human health - premature deaths

- By indoor air pollution 3.5 million annually
- By outdoor particulate pollution 3.2 million annually

Agriculture benefits


SLCPs affect ecosystems

Loss of crop yields from ground level ozone exposure: wheat, soybean, rice, maize etc. Up to 50 million tonnes lost

Climate benefits

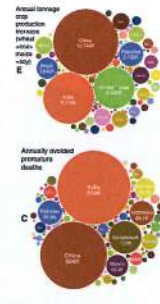
SLCPs contribute to near term global and regional climate change

- BC and O₃ disturb rainfall and regional circulation patterns
- BC darkens snow and ice, exacerbating melting

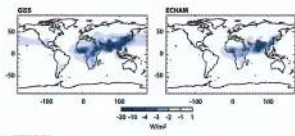


Midstream Climate Protection and Clean Air Benefits: Actions for Controlling Short-Lived Climate Forcers

CCAC **Asia is a pioneer on these issues and one of the regions that could most benefit from SLCP mitigation**



- 1.9 million premature deaths from outdoor air pollution could be prevented each year
- Achieve significant crop benefits
- Slow the melting of glaciers in the Himalayas and support the South Asian monsoon to return to a less disturbed state



Source: UNEP/WHO, 2011

CCAC **SLCPs from the solid waste management sector**

Methane (gas)

- Landfill gas comprises ~50% methane and ~50% CO₂
- Global warming potential of 25 (100-year time horizon), relative to CO₂
- Anthropogenic – formed as a result of management of waste from humans

Black Carbon (fine particles in aerosol form)

- Most strongly light-absorbing component of particulate matter
- Formed by the incomplete combustion of fossil fuels, biofuels, and biomass
- Emissions patterns and trends vary significantly across regions, countries and sources
- An aerosol (not a greenhouse gas)
- Remains in the atmosphere for as little as a few days to a week before falling to the surface


• Black carbon and methane are the **second and third largest contributors** to global warming after carbon dioxide

• Because of their short lifetimes (e.g. days to weeks for black carbon), **reducing emissions now can result in near-term climate benefits**



CCAC **How do we reduce SLCPs in the solid waste management sector?**

1. Reduce waste generation
2. Address open burning
3. Promote organic diversion programs: composting and anaerobic digestion
4. Use landfills as final disposal options and enhance landfill operations - promote methane recovery
5. Institute recycling programs
6. Improve waste collection
7. Implement sustainable financing systems



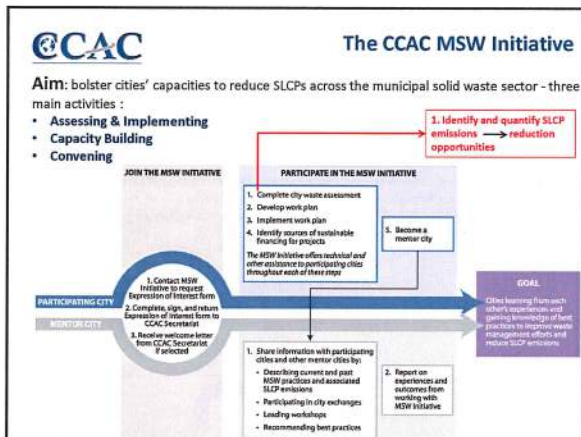
CCAC **Municipal Solid Waste Initiative**

Long-term goal
Reduce emissions in participating cities and replicate and scale up through national policies



CCAC **Joining the Initiative**

	PARTICIPATING CITY	MENTOR CITY
WHO CAN JOIN THE MSW INITIATIVE?	Cities in developing CCAC or non-CCAC partner countries that are interested in gaining access to resources that can help them improve their waste management practices and reduce SLCP emissions	Cities that are advanced in waste management and are interested in exchanging information about improving waste management practices and reducing SLCP emissions
WHAT ARE THE BENEFITS OF JOINING?	<ul style="list-style-type: none"> • Access to an expert network • Access to information on best practices • Capacity building (e.g. trainings and events) • Potential support in identifying sources of sustainable financing of MSW Initiative-related projects • Potential technical advice* (e.g. feasibility assessments) <small>*Assistance does not include support for establishment of infrastructure or capital investments.</small>	<ul style="list-style-type: none"> • Opportunity to share know-how and promote successful MSW management experiences • Recognition as a leader and expert in MSW management • Access to information on best practices and lessons learned from other mentor cities • Access to an expert network



First Success

- Around 20 cities are implementing actions and more are joining
- Mentoring partnerships established
- Knowledge platform launched
- Emissions quantification tool under development
- Financing models under development

Success Story 2 – Santiago de Cali, Colombia

- February 2013: completed **City Waste Assessment and Action Plan**
- March 2013: **participated in initiative workshop** in Vancouver to share experiences and learn from other cities
- April-September 2013:
 - ✓ Undertook initial studies such as a census of informal recyclers
 - ✓ Developed city plans, coordinated with relevant city entities and attempted to gather funds from diverse sources
 - ✓ **Designed a Work Plan** for CCAC support
- October 2013: **Established a mentor partnership** with San Diego, U.S. during Initiative workshop in Vienna
- October-April 2014: **Implement the CCAC Work Plan**, undertake feasibility studies and integrate CCAC work into Cali's overall city plans. Become a mentor city?

CCAC Support

- Development of an analytical model** to assess the following for solid waste (both dry recyclables and organic waste from households and large generators)
 - Quantification of GHG reductions, social impact and economic benefits
- Design of source separation & collection** for large generators of organic waste.
 - Mapping of large generators** of organic waste
 - Logistics of pickup, revenue opportunities**
- Market study** for compost produced in Cali (both high and low quality compost).
 - Identification of potential buyers**
 - Analysis of current demand and supply**

Impact of the CCAC MSW Initiative

- Methane emissions will be decreased drastically with this policy by the following:
 - Diversion from landfill of paper and cardboard generated from households
 - Diversion from landfill of organic waste from large generators and in a later phase, from households.
- Significant CO₂ reductions will also be achieved through the following:
 - Less transport of waste to the landfill (located 62 km outside of Cali)
 - Increased recycling rates that reincorporate materials for productive purposes and displace virgin materials.

Success Story 2 – Viña-Stockholm partnership

In March 2013, during the CCAC meeting in Vancouver, Sweden EPA, Chilean Ministry of Environment, City of Stockholm and City of Viña del Mar, agreed to collaborate at national and local level.

During the following months, an MOU was prepared between the parties.

Viña del Mar will develop an Integrated Solid Waste Management plan under the CCAC Initiative, with the technical guidance of the Swedish EPA and the City of Stockholm

"The city exchange is important as it allows waste officials in Chile to practically apply the lessons learned through Stockholm's experience to a developing country context"

CCAC HOME EXCHANGE PLATFORM RESOURCES OUR WORK LOGIN

MITIGATING SLPCs

Reduce the carbon footprint of MSW by recovering organic energy from MSW.

Welcome to the CCAC MSW Knowledge Platform: a tool to share and exchange information and provide outreach resources to support cities and governments to reduce short lived climate pollutants

<http://waste.ccac-knowledge.net/>

CCAC Municipal solid Waste management in Cebu City

- The second largest city in the Philippines
- Population of 1 million
- Produces about 450 tonnes of MSW per day

Current MSW management

- Establishment of material recovery facilities (MRF) in Barangays aiming to reduce organic waste through composting and material recovery
- A central MRF operates near the landfill based on a public/private partnership to treat 50 tons of MSW per day.
- The only landfill in the city has reached its maximum capacity

Challenge: finding a new suitable landfill site within city-limits at current disposal rates

Aims:

- Achieving zero-waste landfill in 2025
- Implementing a RDF from plastics?
- Expanding the number of MRFs in the city?

CCAC Cebu City and the CCAC MSW Initiative

CCAC involvement and how this aligns with the city's objectives:

- Firstly undertake a **City Assessment** to identify emissions reduction opportunities
- Subsequently develop an **Action Plan** of waste management activities to enhance waste utilisation and reduce SLPC emissions

First Rapid Results:

- Completed City Assessment
- Action Plan with concrete activities and programmes to improve waste management and reduce SLPCs

Next Steps:

- Develop detailed Work Plan for the city's MSW
- Implement Work Plan activities → City-to-City mentor partnership?
- Enhance waste utilisation
- Reduce SLPC emissions
- Achieve other benefits - increased public health, job creation, reduced air pollution etc.
- Become a Mentor City and replicate the efforts?

CCAC More info - new website <http://www.unep.org/ccac/>

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