IMT-GT

INDONESIA–MALAYSIA–THAILAND
GROWTH TRIANGLE

GREEN CITY ACTION PLAN 2035

CITY OF MEDAN

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Contents

Abbreviations

ADB	–	Asian Development Bank
APBN	–	Anggaran Pendapatan dan Belanja Negara (National Budget)
APBD	–	Anggaran Pendapatan, dan Belanja Daerah (Regional Budget)
BAPPEDA	–	Badan Perencana Pembangunan Daerah (Regional body for planning and development)
BAPPENAS	–	Badan Perencanaan Pembangunan Nasional (Ministry of National Development Planning)
BIMP-EAGA	–	Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area
BLH	–	Badan Lingkungan Hidup (environment agency)
BOT	–	build–operate–transfer
BNPB	–	National Agency for Regional Disaster Prevention
BPBD	–	Badan Penanggulangan Bencana Daerah (Disaster Management Agency)
BPP-SPAM	–	Badan Pendukung Pengembangan Sistem Penyediaan Air Minum (National agency for supporting the development of water supply systems– Public Works)
BRT	–	bus rapid transport
BUMD	–	Medan Public Transport Company
CSR	–	corporate social responsibility
DKP	–	Dinas Kebersihan dan Pertamanan (Municipal Sanitation Agency)
DPRD	–	Dewan Perwakilan Rakyat Daerah (Regional People's Representatives Assembly)
EIA	–	environmental impact assessment
FIT	–	feed-in tariff
GCAP	–	Green City Action Plan
GCP	–	Green Cities Program
GIS	–	geographic information system
GWh	–	gigawatt-hour
ha	–	hectare
IMT-GT	–	Indonesia-Malaysia-Thailand Growth Triangle
IPLT	–	Instalasi Pengolahan Lumpur Tinja (Sludge Treatment Plant)
ITS	–	Intelligent Transport System
km	–	kilometer
km^2	–	square kilometer

lps	–	liters per second
LPJU	–	Lampu Penerangan Jalan Umum (public street lighting)
LLTT	–	Layanan Lumpur Tinja Terjadwal (regular desludging service)
MCA	–	Multi-Criteria Analysis
m^2	–	square meter
m^3	–	cubic meter
MPTC	–	Medan Public Transport Company
MSW	–	municipal solid waste
MW	–	megawatt
NRW	–	nonrevenue water
NMT	–	nonmotorized transport
NUDPS	–	National Urban Development Policy and Strategy
OBA	–	output-based aid
O&M	–	operation and maintenance
PAD	–	pendapatan asli daerah (local revenue)
PDAM	–	Perusahaan Daerah Air Minum (Provincial Water Supply Utility)
PIP	–	project implementation plan
PJPK	–	Penanggung Jawab Proyek Kerjasama (government contracting agency)
PLN	–	Perusahaan Listrik Negara (National Electric Company)
PPP	–	public–private partnership
PMU	–	project management unit
PT PLN	–	Perusahaan Terbatas Perusahaan Listrik Negara (national electricity company)
RPJMD	–	Rencana Pembangunan Jangka Menengah Daerah (Regional Medium-Term Development Plan)
RPJMN	–	Rencana Pembangunan Jangka Menengah Nasional (National Medium-Term Development Plan)
RTH	–	Ruang Terbuka Hijau (Green Open Space)
RTRW	–	Rencana Tata Ruang Wilayah Kota (Spatial Development Plan)
SKPD	–	Satuan Kerja Perangkat Daerah (local public works unit)
SPC	–	special purpose company
SWM	–	solid waste management
TBD	–	to be determined
TOR	–	terms of reference
TPA	–	Tempat Pembuangan Akhir (sanitary landfill site)
WTE	–	waste-to-energy
WWTP	–	wastewater treatment plant

Foreword by the Mayor

Assalamuallaikum, Wr. Wb.

The City of Medan's *Green City Action Plan* (GCAP) is an initiative that serves as a "road map" towards improving the quality of life in the city by applying "green attributes" generally known as *green planning and design, green open space, green building, green energy, green transportation, green waste, green water, and green industry and commerce,* which are all significantly based on and supported by a *green community*.

The basic reason for the City of Medan to prepare a GCAP is to help achieve a development that is sustainable, fair, and profitable at the same time because we are convinced that green development can facilitate economic and social equity as it will be able to avoid and manage conflicts between economic interests on the one side and the need for environmental preservation on the other side.

The GCAP clearly describes our priority programs which can be used as reference for citizens who want to understand our framework for aspiring to become a Green City, including external parties interested in participating in our Green City development.

The government of the City of Medan commits itself to continuing the process of capacity development for greening the city through a multi-year and multi-stakeholder rolling green action planning process led by the "Green Team." This is to strengthen the city's Medium Term Development Plan (RPJMD). The Green City Action Planning process is supported by an appropriate resource allocation based on a Mayoral Decision.

Hopefully we will all be blessed with the help of the Almighty God in transforming the City of Medan into a Green City. Aamiin.

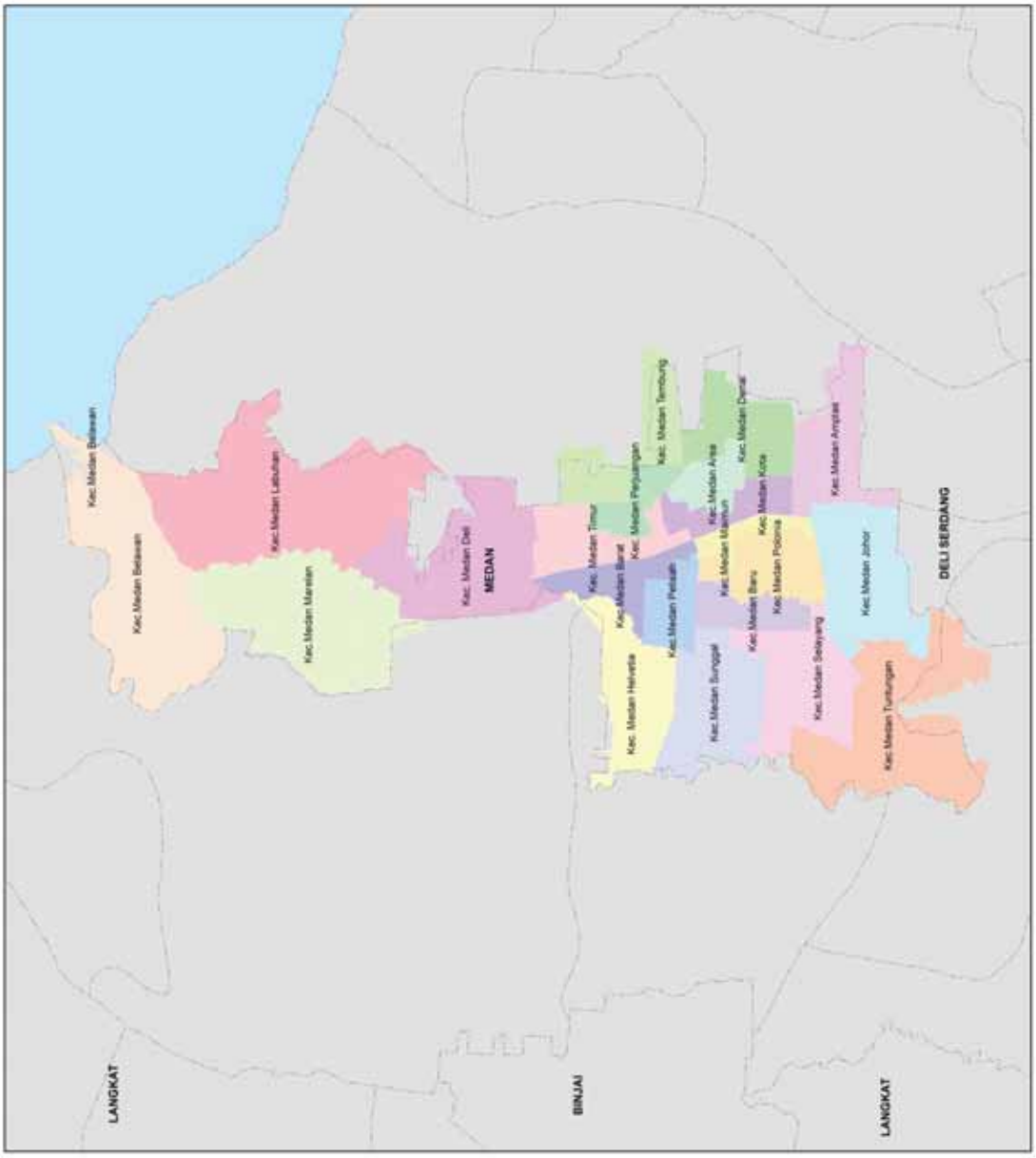
Wassalam,
Medan, May 2016

Drs. H. Dzulmi Eldin, S, Msi
Walikota Medan

Acknowledgments

The Green City Action Plan for Medan was developed by the Green Team (PokJa Hijau) of the City of Medan, Batam, and Kendari under the guidance of Badan Perencana Pembangunan Daerah (BAPPEDA) and the City Mayor's Office. The Action Planning process was supported by technical assistance from the Asian Development Bank (ADB) through RETA 8518 INO: Green Cities: A Sustainable Urban Future in Indonesia 2—Capacity Development, and facilitated by Mohamad Yagi (city facilitator, PT Ciriajasa Rancangbangun Mandiri, Indonesia), Robert van der Hoff (team leader, Urban Solutions), and Eko Delianto (deputy team leader, PT Ciriajasa Rancangbangun Mandiri, Indonesia). The prioritization and development of programs was supported by Dr. Ramon Abracosa (environmental engineer, Urban Solutions), the financing aspects were supported by Gideon van Toledo (urban finance specialist, Urban Solutions), and the development of actions supported by John Sutton (Urban Solutions). The support and inputs from the Government of Indonesia through Kementerian Perencanaan Pembangunan Nasional/Badan Perencanaan Pembangunan Nasional (BAPPENAS), and Julian Syah (ADB consultant, Indonesia Resident Mission) are also greatly appreciated.

The Urban Development and Water Division (SEUW) and the Regional Cooperation and Operations Coordination Division (SERC) of the Southeast Asia Department of ADB are also in collaboration with the Coordinating Ministry of Economic Affairs (CMEA) in possibly expanding the GCAP for Indonesia and in other cities, under the Indonesia-Malaysia-Thailand Growth Triangle (IMT-GT) and Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA) programs. The Green Cities Initiative for Indonesia will be a priority program under the IMT-GT Implementation Blueprint, 2017–2021 and BIMP-EAGA Vision 2025.


GREEN CITY
ADMINISTRATIVE MAP
MEDAN CITY
Legend:
Kec. Medan Deli
Kec. Medan Helvetia
Kec. Medan Perjuangan
Kec. Medan Tembung
Kec. Medan Timur
Kec.Medan Amplas
Kec.Medan Area
Kec.Medan Barat
Kec.Medan Baru
Kec.Medan Belawan
Kec.Medan Denai
Kec.Medan Johor
Kec.Medan Kota
Kec.Medan Labuhan
Kec.Medan Maimun
Kec.Medan Marelan
Kec.Medan Petisah
Kec.Medan Polonia
Kec.Medan Selayang
Kec.Medan Sunggal
Kec.Medan Tuntungan
Source:
1. Spatial Plans 2010-2030 Medan City;
Agency Planning and Regional Development
(Bappeda) Medan City
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Scale 1:140.000
Projection : WGS84
Medan City
LANGKAT
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Kec.Medan Johor
Kec.Medan Selayang
Kec.Medan Tuntungan

Introduction

This Green City Action Plan (GCAP) supports the National Urban Development Policy and Strategy (NUDPS) for the period 2015-2045. The long-term vision is to realize sustainable and competitive cities for people's prosperity based on physical characteristics, economic advantages, and local culture by 2045. This vision will be achieved in three phases by (i) creating a national urban system; (ii) having urban areas meet national service standards and creating sustainable cities that are green, livable, smart, and competitive; and (iii) strengthening governance and government institutions.

In addition, the GCAP is based on the "Green Vision" of the mayor of Medan as stated below:

> *"The City of Medan Will Become a Competitive, Comfortable, Caring and Prosperous Metropolitan Area"*

This vision is a broad statement, consistent with national urban development policies and strategies, and able to accommodate a number of green development goals.

One of the pillars for implementing the NUDPS is the Green Cities Program (GCP),[1] which is implemented with the National Development Planning Board (BAPPENAS) as the executing agency, and the Directorate General of Human Settlements in the Ministry of Public Works and Housing (MPWH) as the implementing agency. The City of Medan has been participating in the GCP since 2010. It focused primarily on the implementation of three 'attributes' (Green Planning and Design, Green Open Space, and Green Community). With the new national development plan period that started in 2015, the City of Medan endeavored to scale up its GCP by promoting some of the 'heavier' green attributes, such as Green Water, Green Waste, and others by preparing a GCAP with technical assistance from the Asian Development Bank (ADB).[2]

[1] Program Pengembangan Kota Hijau (P2KH).
[2] TA-8518 INO: Green Cities: A Sustainable Urban Future in Indonesia - 2 Capacity Development (46380-005).

What is a GCAP?

A GCAP is a time-scaled green investment plan for a city. It includes specific actions for preparing and implementing prioritized investments over short to medium term, which covers urban management and institutional aspects, capacity development, and financing. Where appropriate, performance indicators are provided to enable monitoring and updating. While 'actions' focus on the short to medium term, it also provides a strategy for achieving the City of Medan's green vision over longer-term timescales. This integrated action plan complements the City of Medan's statutory planning process, notably the Medium-Term Development Plan (RPJMD). Successful implementation of the GCAP would allow the City of Medan to become a 'champion' for green cities in Indonesia.

The GCAP uses the term 'green' as a metaphor for cities that are clean, healthy, safe, and energy-efficient so as to become liveable and sustainable. It also reflects efforts to balance the economy and the environment with social inclusiveness.

Summary of the GCAP Preparation Process

In 2015, the mayor of Medan issued a Decision (SK 800/449.k/2015) to create an interdisciplinary municipal 'Green Team' that would become responsible for preparing the Green City Action Plan (GCAP) and allocated a budget for its operations. The "Green Team" was chaired by the head of the Municipal Development Planning Agency (BAPPEDA) and intermittently facilitiated by ADB consultants.

To realize this GCAP, it was essential to start with a vision for green development to guide the development of priority programs, projects, and manageable actions. The GCAP is the result of a process of identifying city development aspirations through a "green lens" to formulate a framework for sustainable development, and subsequently narrowing it down through a process of further analysis and selection. This resulted in the formulation of several priority programs, which were then developed into detailed program briefs.

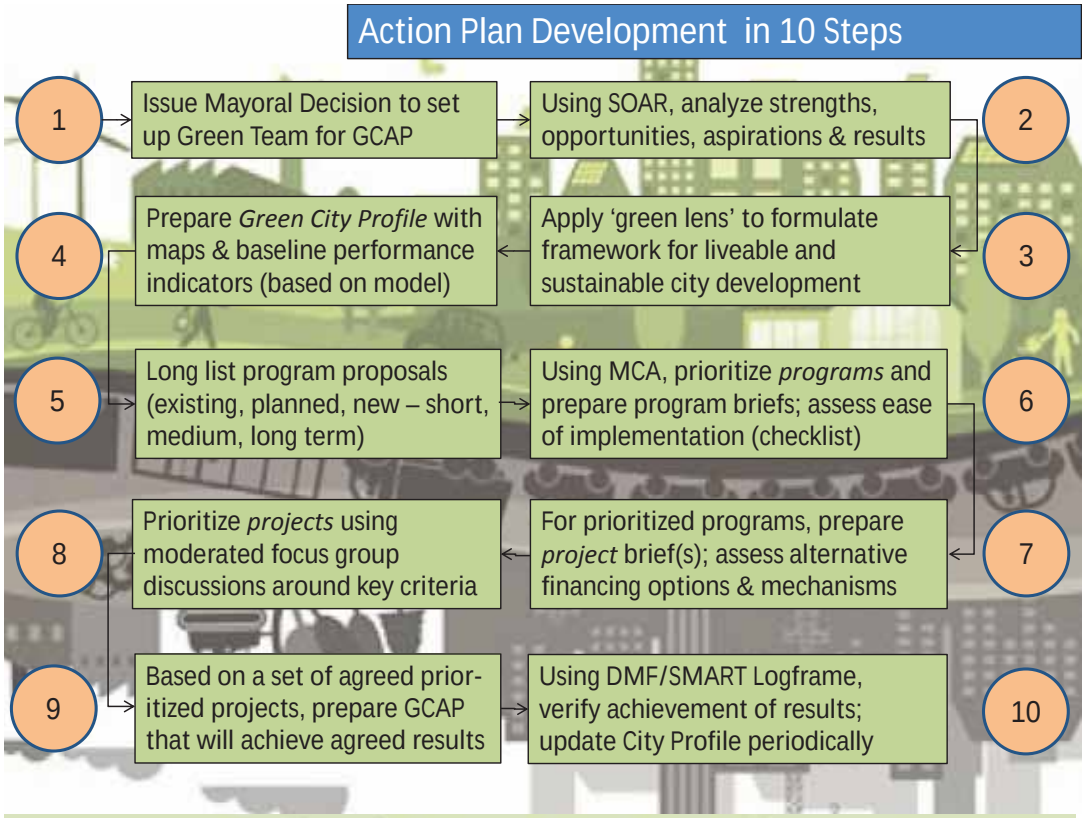
The programs that will help the city achieve its vision for green development are shown in the "Green Development Strategy 2035" (p. 15). Based on further considerations of implementability including current capacity limitations, the Green Team shortened the list to focus on four priority programs (*Water Supply, Waste-to-Energy, Public Transportation, and On-Site Sanitation*) for the short term, and on four secondary priority programs (*Drainage & Flood Control, Green Open Space, Urban Forests, and a Central Sewerage System*) for the medium-to-long term. Green Education (*Sekolah Adiwiyata*) is included as a continuous program. Since the GCAP is a rolling plan, programs, projects, and actions may be added and modified periodically.

The four Priority Programs were used to prepare a list of actions in the form of a spreadsheet as shown in "The Next Five Years – Programs, Projects and Actions" section.

The City of Medan's Green Team will prepare annual updates of the GCAPs as a rolling plan by adding new green project proposals in order to 'green up' the city's future medium-term and annual development plans.

To clarify the GCAP formulation process, the two tables below show the "10-step approach" and "toolbox" used by the Green Team to systematically prepare its GCAP. This section serves to explain the intermediate steps and products that led to the GCAP formulation.

The first (administrative) step was to establish a multi-stakeholder Green Team by Mayoral Decision. The Green Team then started visioning a green future, and used the tools from the 'Toolbox' diagram to proceed from vision to aspirations and expected results.



Toolbox for Green City Action Planning

	Tool	Format	Purpose
1	**'Green Team'** supported by Mayoral Decision, potentially to evolve into UMP	Multi-stakeholder, multi-year cross-sector working group	Prepare a GCAP in 10 Steps, and update it annually
2	**SOAR** (analysis of Strengths, Weaknesses, Aspirations, Results)	Powerpoint + FGD	Green City visioning as a basis for formulating SMART objectives
3	**Green City Profile** (Baseline, Index, Fiscal Profile, Performance Indicators, Road Map)	Template with Excel spreadsheets, Word files, and GIS thematic maps	Provide the city with a baseline, indicators, and road map to green development
4	**LCF + MCA** (Liveable City Framework & Multi Criteria Analysis)	Excel spreadsheets	Identify and rank priority programs
5	**Program & Project Brief** (template)	Word file	Formulate priority programs & projects
6	**Fiscal Capacity Analysis & Options for Alternative Modes of Financing**	Word file	For each brief, formulate modes of financing, CAPEX & OPEX as input for GCAP
7	**GCAP** template	Excel spreadsheet, Word file	Produce Action Plan
8	**SMART Logframe**	Powerpoint + accessoriess	Verify SMART greening targets as part of GCAP & rollover

Once the Green Team completed the SOAR (Step 2), it proceeded to 'greening up' the city's existing Medium-Term Development Plan (RPJMD) by applying a 'green lens' using the Livable Cities Framework Multi Criteria Analysis (MCA) to develop and prioritize programs (Step 3). The purpose of this exercise was to identify where existing and planned infrastructure developments fell short of achieving green objectives, and could be improved by adding components that would increase their green development content. This process will be repeated to inform the next RPJMDs to sensitize decision makers and gradually strengthen the green value or 'greenness' of development plans. Although the Green Team was free to introduce new ideas (for example, MRT for Green Transportation, and LED street lighting for Green Energy), it opted not to do so because of other more pressing needs that needed to be addressed first. This was a deliberate strategy because existing plans already proposed in municipal plans should have priority.

At the same time, the Green Team started working on a "Green City Profile" (Step 4) with the aim of developing a baseline for performance measurement. The Green City Profile includes the results of Steps 2 and 3. It also includes a "road map" spreadsheet for green development, an environmental profile with thematic GIS maps used for integrated 'rolling' plan development, as well as an inventory of current and planned green initiatives. The Green Team used the road map to rate the city's green performance and progress towards green development objectives as part of a rolling plan process. The road map uses generic green performance indicators that the Green Team can use to formulate the short- (2015-2019), medium- (2020-2034), and long-term (2035-2045) targets toward sustainable development. The road map's aggregate score for all indicators combined can be red, yellow, or green. By objectively rating the road map using 2015 as the baseline, the Green Team concluded that Medan's aggregate score was still in the "red" zone. The section below is a summary version of the city's environmental profile taken from the Green City Profile, including current and planned initiatives from the Green City Profile. The full Green City Profile is attached to the GCAP.

In line with Steps 5, 6, 7, the Green Team prepared a number of Program Briefs, undertook a fiscal capacity analysis for green infrastructure investment, and scoped options for alternative modes of financing. As all four programs were adopted for action, there was no need anymore for prioritizing projects (Step 8). Step 9 has resulted in this GCAP, while Step 10 will be done to monitor performance when the next update of the GCAP is due.

Green City Profile

This section is a summary of the full Green City Profile developed by the Green Team as part of the action planning process, which is appended to the GCAP. It is shortened here to provide a brief introduction.

Medan is the largest metropolitan area outside the island of Java. Due to its strategic location along the Straits of Malaka, the City of Medan is the main port of call for western Indonesia for domestic as well as international trade and industry. Medan has an area of 265 km^2 with a current population of 2,970,032 corresponding with an average population density of 11,200/km.

Medan feels the impact of rapid urbanization. The city is becoming densely populated with newcomers and seasonal workers. On top of that, the city has an average inflow and outflow of 500,000 daily commuters.

Medan's general economic development potential is promising. The city functions as an export hub from Indonesia to South and Southeast Asia, the Middle East, Europe, and Africa. Medan also is a transit point for goods and passengers to those regions from all over Indonesia. The cities of Kuala Lumpur, Penang, and Singapore are within an hour's air travel from Medan's Kuala Namu International Airport.

On the downside, urbanization has caused a shortage of land to build on, and a corresponding rise in land prices, which in turn has had a negative effect on economic growth and on environmental preservation.

The City of Medan also suffers from environmental problems such as insufficient waste management, traffic congestion, and pollution of air and ground-water. The city has a program for the improvement of water and air quality, named the Clean River Program and the Blue Sky Program, respectively. The city also initiated an action plan for Climate Change Mitigation and Adaptation, even though the scale of activities implemented by the Environmental Agency (BLH) is still limited. The National Agency for Regional Disaster Prevention (BNPB) has introduced a Disaster Reduction and Management Program for the city's Disaster Management Agency (BPBD) to help the city prevent and respond to emergency disasters. These activities are still being developed.

Spatial Development

Medan's spatial development is still uneven. There is a development gap between the city's northern and southern parts caused by the general lack of public services and infrastructure in the northern part. As an example, there are only few roads to the northern area (Jl. Yos Sudarso, and Jalan Tol Balmera) while the southern part is better served. This is influenced by the fact that the south is closer to the city center, and therefore, more attractive to investors. Among others, the city aims to address this imbalance through its Spatial Development Plan until 2030.

Green Open Space

Green open space (RTH) is also part of the city's Spatial Development Plan until 2030, although there is constant pressure on available green open space that is needed for environmental protection.

According to Law No. 26 Year 2007 on Spatial Planning, ideally, open space in Medan City (21 subdistricts, total area 26,510 hectare [ha]) shall be 30% of the total area or equal to 7,953 ha—consisting of 20% public open space (5,302 ha) and 10% private open space (2,651 ha).

However, according to the Municipal Sanitation Agency (DKP) data for 2015, the public open space managed by DKP was 86 ha, river corridors were 866 ha, mangrove forest at 1,029 ha, and paddy field at 4,304 ha, while no data were available for private open space.

According to the Ministry of Public Works Regulation No. 5/PRT/2008, the city shall provide an open space of 250 m^2 at neighborhood level (RT) (= 1 m^2/capita), 1,250 m^2 at community level (RW) (= 0.5 m^2/capita), 9,000 m^2 at village level (Kelurahan) (= 0.3 m^2/capita), and 24,000 m^2 at subdistrict level (Kecamatan) (= 0.2 m^2/capita).

The overall target of the Medan Green Community is to achieve 30% green open space (20% public and 10% private). Presently, its primary concern is to ensure that green open area is not further reduced. It advocates for making good use of the open space for a number of social and small economic activities to reduce the chances of a possible change in function.

Green Energy

The electrical system in North Sumatra is experiencing a power deficit caused by an imbalance in plant additions, load growth, and generation deficiency. Rolling blackouts imposed by the state power company PT PLN have increased in frequency, disrupting daily economic and social activities. Taking place three times a day, the blackouts have also contributed to the rising number of fires in the city. Medan City is the largest load center in North Sumatra (almost 60% of total demand) with a high growth rate.

Electricity supply to Medan City is provided by interconnection of several plants. According to the PLN' business plan 2015-2024 (RUPTL), the existing power plants in both Belawan area (15 plants; PLTU-PLTGU-PLTG-PLTD) and Medan area (12 plants; PLTG, PLTD) are interconnected. Belawan' power plants have installed capacity of 1,527.3 MW and operation of 1,092.4 MW (72%), and Medan' power plants have installed capacity of 225.8 MW and operation of 192.2 MW (85%) respectively. The year 2015 peak load for Medan City was 1,415 MW, and projected for year 2020 will be 1,740 MW, and year 2024 will be 2,805 MW respectively.

In October 2015, the Indonesian state energy company Pertamina has signed with Japanese trading group Sojitz and North Sumatra local government firm Pembangunan Prasarana Sumatera Utara to build a US$250 million gas-fired power plant in Medan by 2019. North Sumatra needs an additional 700–800 MW of capacity to avoid rolling blackouts. The planned Medan plant will have an output of 250 MW.

According to one energy study,[3] there is potential to produce an additional 72 gigawatt-hour (GWh) of electricity per annum from biomass (organic waste) that is expected to reach 1,190 tons/day by 2025.

As energy supply currently is beyond municipal authority and its statutory development planning process, this GCAP has not yet attempted to specify actions to provide greener energy and reduce consumption. It is expected to become an important component of the next GCAP.

Baseline	Installed Capacity (MW)	% Supply Ability
2015	1,753.1 MW	1,284.6 MW (73%)

Source: PLN Business Plan 2015-2024.

Green Water: Drinking Water Supply

Medan is situated between 37.5 and 2.5 meters above sea level in an area sloping off toward the north coast. Four rivers cross the city, which are Sungai Belawan, Sungai Kera, Sungai Deli, and Sungai Percut. River water is taken upstream for water supply.

In addition, there are one natural water source and one deep well, with a total capacity of 5,247 liters per second (lps). In December 2014, production was measured at 4,947 lps.

The Provincial Water Supply Utility (PDAM) Tirtanadi serves around 70% of the Medan area with a piped water system. In 2014, the number of connections stood at 415,000. Areas not served by the PDAM get their water from the ground through wells.

Current water production is 178 metric cubic meters (MCM) per annum, 130 MCM of which is sold to customers, leaving 48 MCM per annum unsold, corresponding to approximately 27% nonrevenue water (NRW). Even though performance is good compared to the majority of other Indonesian PDAMs, NRW should be further reduced to counter continuously rising demand.

Baseline	Production Capacity	% of Population Served
2015	5,700 lps	70%

Source: PDAM Business Plan 2015-2019.

[3] Kukuh Siwi Kuncoro, Bidang Studi Teknik Sistem Tenaga, Jurusan Teknik Elektro, Fakultas Teknologi Industri, Institut Teknologi Sepuluh Nopember in http://digilib.its.ac.id/public/ITS-Undergraduate-16528-2208100660-Paper.pdf
In Medan, biomass potential from organic waste in 2025 could reach 1,190 tons/day, and could produce 7,242 GWh/year

Green Water: Drainage and Flood Control

Medan's drainage and flood control system has insufficient capacity to handle floods. Substantial flooding regularly affects several subdistricts, engulfing hundreds of houses, and paralyzing traffic along a number of roads. The worst flood-hit areas are Aur subdistrict and Medan Maimun district, where the water can rise to shoulder height. Meanwhile, in other subdistricts such as Padang Bulang subdistrict and Medan Baru subdistrict, water can reach one-meter high.

The previous Medan Flood Control and Urban Drainage Master plan comprised (a) Engineering Service: Medan City Flood Control Plan Study (JICA, 1996) and (b) Master Plan: Medan Urban Drainage Development Program (ADB, 1978).

The Medan floodway was built in 2000 through a JICA loan project with a length of 3.9 km located at Titi Kuning at Deli River to Tembakau area at Percut River, and the Percut River along 28 km from the estuary with the flood control scale of a 25-year return period. Meanwhile, some improvement works of the Deli River have been implemented under the Second Medan Urban Development Project (MMUDP II) funded by an ADB loan (1997–2002).

A flood control system exists in Medan City, as follows:

- Deli River: From river mouth to Babura River (24 km), Q design = 465 m^3/sec (Q_{15})
- Deli River: From intersection with Babura River to upstream at DPRD Office, Q design = 230 m^3/sec (Q_{10})
- Sikambing River (18 km), Q design = 84 m^3/sec (Q_{10})
- Putih River (8 km), Q design = 24 m^3/sec (Q_{10})
- Kera River (4.5 km), Q design = 118 m^3/sec (Q_{10})
- Badera River (17.3km), Q design = 87m^3/sec (Q_{10})
- Serdang River (8.3 km), Q design = 793 m^3/sec (Q_{25})

Green Solid Waste

Since 2004, city government has issued various regulations on solid waste management. Local enterprises have to submit periodical reports on the performance of their solid waste management.

Based on records from the Municipal Sanitation Agency (DKP) for the first quarter of 2015, the average daily volume of solid waste stands at around 1,700 tons. It is estimated that about 82% (1,400 tons/day) is collected and dumped in open dump sites. The city's final disposal site (TPA) at Terjun area located at Medan Marelan subdistrict has an area of 14 ha, of which about 10 ha has been used up. Waste is piling up to 15 meters above ground level, while part of it has sunk underneath ground level.

Approximately 500 scavengers operate at the dump site to collect recyclable plastic and metals.

There are 30 waste banks in Medan. In those waste banks, scavengers can deposit and 'save up' waste for money. However, until now, the city has not enacted a policy to force households to segregate their waste at home, which would greatly increase the effectiveness of the waste banks. According to the Ministry of Environment and Forestry recently, the Government of Indonesia also aims to establish parent waste banks in six cities (i.e., Makassar, Jakarta, Surabaya, Semarang, Surakarta, and Medan) to coordinate all other subordinate banks and waste management services in 2016.

Baseline Tons of Waste	Installed Waste Management Capacity	% of Solid Waste Treated
2015	TPA Terjun (14 ha) 1,400 tons/day	Open dumping

Source: DKP Medan City (2015).

Green Human Waste

Some 11,200 customers are connected to the sewer pipeline system, which is 2.6% of the city's population. Wastewater treatment plant (WWTP) and sewer systems are designed for 60,000 m^3/day or 30,000 customers.

Currently, wastewater is treated at a rate of 16,000 m^3/day or 27% of the capacity. This means that only 33% of the sewer system is used and 67% is idle. The sewer system covers an area of 520 ha, which is also about 2% of the city area. PDAM Tirtanadi has around 300,000 customers for clean water and only 3% of these customers discharge their wastewater to the sewer.

Medan City is currently estimated to have about 400,000 septic tank units for domestic wastewater treatment (bathrooms/water closets/outhouses). There is currently no effective regulation in place to ensure that sludge is siphoned at regular intervals in accordance with proper waste management standards.

Based on the "Study on Septage Management in Asia" by USAID (2010), it was found that about 16% of septic tanks in the city of Medan do not have a watertight base (open bottom), and 40% of septic tanks are less than 10 meters from a well or pumped ground water, which are used for drinking. It is also estimated that about 70% of septic tanks have contaminated the ground water. The Indonesian Urban Water, Sanitation and Hygiene Project (IUWASH - USAID) built around 2,000 "SANIMAS" communal systems of communal bio-filter septic tanks in 2012 and another 4,000 units in 2013.

For a long-term program, it also plans to build a central WWTP for 17,000 customers with a daily capacity of 60,000 m^3/day that will be managed by PDAM Tirtanadi. In addition, Medan wants to expand on-site sanitation by building 280 modular human waste management units (*IPAL Komunal*) designed to group householders into clusters. Each module will be

connected to a disposal pipe for a cluster of around 100 households. The contents of the modular septic tanks will be collected by a desludging truck to be transported to the WWTP. With this system, it is hoped that access to sanitation will increase to 60% by 2019 by serving around 60,000 households.

Baseline	Daily Volume of Human Waste (est.)	% Access to Sanitation
2015	1,930 ton/day	(no data available)

Source: Green Team/Mayor's Office.

Green Buildings

Green buildings have not yet become an important attribute for green development in Medan, but that is likely to change in the future because of its potentially significant contribution to saving energy (see section on Green Energy) and other resources, such as water, as well as in improving environmental health, thus providing a safer, environmentally friendly, and a more productive environment. Initially, public buildings can acquire green certification provided by third parties to help make the concept familiar. In the future, certification should become a prerequisite for issuing building permits for any type of construction. The province of DKI Jakarta has issued Governor Regulation No. 38 Year 2012 on The Green Buildings that can be used as an example for Medan City. So far, Medan City has no green building regulations.

Green Transport

In 2014, there were 5,531,777 registered motorized vehicles in Medan, almost five times the number registered in 2000. During the past 14 years, the average annual increase has been about 12%, with the annual increase between 4% and 17%.

Baseline	Number of Motorized Vehicles	Citizens Using Public Transport (%)
2015	5,531,777	3.0

Source: BPS Statistics 2015.

Green Community

Medan's Green Community was established in 2013 in line with the government's Green City Program (P2KH). Its forum undertook a series of promotional activities that were packaged under the theme of Green Festival. It stimulated 30 green communities to participate in green planning and design, and to create green open spaces in their communities. Several other initiatives promoting resilient communities are ongoing including PROKLIM, Sekolah Adiwiyata, Medan Berhias, Medan Berkebun, and Komunitas Taman.

Resources

The city of Medan currently does not have all human, financial, institutional, regulatory, and other resources needed to simultaneously address all of its green development challenges, but hopes that this GCAP will adequately address some of the urgent issues that hamper sustainable development. The main resource issues are summarized below.

FISCAL RESOURCES

Medan is still highly dependent on high-level government transfers to its city's budget. Of its total budget, 63% came from transfers between 2011 and 2014. Medan spends only a little over 20% of the budgets available for capital investments.

Currently, Medan's yearly budgets are not enough to finance the preparation of green capital projects such as bus rapid transport (BRT) dedicated busway infrastructure, waste-to-energy (WTE), and others. For illustration, Medan's budget available for capital expenditures in 2014 was Rp784 billion (US$60 million). Little over 8% of this budget was allocated to transport (Rp64.2 billion or US$4.9 million). Estimated CAPEX for the first phase of BRT is estimated to be Rp668 billion (US$51 million) or 85% of CAPEX available in 2014. In other words, Medan would need to spend 10 times its allocated budget for 2014 to realize the BRT.

As part of this, GCAP Medan has looked into ways to improve this situation by

- Increasing own local revenue;
- Attracting loans (municipal lending);
- Using available funds more efficiently toward green capital projects; and
- Attracting alternative sources to finance projects, for example, by setting up joint ventures with the private sector, build–operate–transfer (BOT) contracts, involving communities through cooperatives, and others.

INSTITUTIONAL RESOURCES

On attracting alternative sources of finance, Medan has experience with specific projects (water supply, early 2000s) but did not yet use this experience to further expand the gained knowledge and experience, for example, by setting up a dedicated unit to advise city sector departments on opportunities and ways to apply such mechanisms. While the knowledge and experience in Medan is considerably higher than in many other cities, Medan faces the danger of losing this experience over time after preparation of specific projects has been completed.

REGULATORY RESOURCES

Medan still needs regulations that will allow it to effectively implement and enforce the environmental issues it wants to address, such as regulations on water management, transport management, and waste management. These will be part of the GCAP.

Conclusion

Based on the City Profile, and on agreed priorities based on existing situation and capabilities, the City of Medan has defined actions related to prioritized programs and more generic actions focusing on the short term to make these programs and projects more achievable. In the GCAP, actions are formulated to help improve fiscal and institutional capacity, create more durable partnerships, strengthen the regulatory framework and ability to finance projects, and potentially increase impact of such projects.

The City Profile signals that water supply, sanitation, transport, and waste management are the key focus areas for the city at the moment and justifies selection of these programs. In parallel, Medan should prioritize increasing the budgets it has made available for green capital expenditures and improve its institutional capacity and ability (human resources) to prepare projects so that these can be offered to the private sector and others (such as national government programs and development banks) to finance.

This will be further addressed in the next sections of this GCAP.

Green City Development Strategy to 2035

Medan Green Urban Development Strategy until 2035

After completing the SOAR, and using 'green lensing' process, we selected the priority programs—from a long list to a short list. The matrix below summarizes Medan's green urban development strategy until 2035, showing green attributes and the estimated time frame for realizing them. This GCAP specifies green development actions for the current plan period until 2019, but will be expanded and rolled over to future plan periods.

	GREEN ATTRIBUTES	2015-2019 (this GCAP)	2020-2024	2025-2029	2030-2034	2035-2045
1	Green Planning, Finance, and Implementation Management	Continuous				
2	Green Open Space (RTH) (public parks, burial grounds, water retention areas, greenbelts, etc.)		Program for urban forest development including mangrove areas. Program for acquisition of green open space to meet legal requirements (RTH).			
3	Green Community (Resilient Community) (includes health care and education)	Continuous (including Program for Green Schools (Sekolah Adiwiyata) and resilient *kampungs* (PROKLIM)				
4	Green Transport and Urban Mobility (motorized and nonmotorized)	BRT system development Phase 1 (*)	BRT system development Phase 2 (**)			
5A	Green Waste (sanitation)	On-site sanitation system development	Program for acceleration of house connections to central sewerage system			
5B	**Green Waste** (solid waste)	Waste-to-energy system development				
6A	**Green Water** (water supply)	Water supply system development				
6b	**Green Water** (urban drainage and flood control)		Program for the normalization of streams and drains, enlargement of drainage network, construction of water reservoirs, retention areas, water absorption wells, etc.			
7	**Green Building** (energy efficiency, climate resilience)		Program for the green certification of buildings, including promotion of roof gardens, hanging gardens			
8	**Green Energy** (clean, efficient and renewable)	To be designed in next phase of the CGAP				
9	**Green Industry and Commerce** (sound environmental management)	To be designed in next phase of the GCAP				
10	**Green Air** (Blue Sky) (emission reduction and control)	To be designed in next phase of the GCAP				

(*) Includes bus lanes, bus stations with digital information displays, ITS, pedestrian walkways and bicyle paths, solar cells traffic lights, and solar cell street lighting.
(**) Includes additional bus lanes, bus stations with digital information displays, walkways & bicycle paths, and off-street park-and-ride facilities
Source: Green Team/Mayor's Office.

From Long List to Short List

A long list of proposed programs (Step 5) was given a code number and ranked with the help of a Multi-Criteria Analysis (MCA) (Step 6) based on criteria for liveability and sustainability developed by the Green Team. It subsequently attributed weights to the long list. The result of the weighted MCA scoring provides a ranked list of 23 programs as shown on the table below. Listed programs Nos. 9 to 23 that could not be accommodated in this version of the GCAP will be further specified and incorporated into future versions.

Long List of 23 Ranked Green Programs

Program Code	Program Title	MCA Weight	Ranking
12	On-site sanitation with septic tanks and periodical desludging service	2.84	1
3	Phased conversion to BRT system within 5 years	2.82	2
14	Municipal water supply	2.68	3
1	Pilot project for creating network of pedestrian walksways and bicycle lanes in shopping centers, educational centers, and city tourism areas	2.68	4
7	Development of an urban forest, including coastal mangrove areas	2.65	5
4	Development of an Intelligent Transport System (ITS)	2.61	6
13	Acceleration of house connections to off-site sanitation	2.57	7
11	PPP for conversion of solid waste to energy using appropriate technology	2.49	8
23	Establish and sustain a “People Who Care About the Deli River” movement	2.45	9
15	Normalization of rivers and construction of primary and secondary drains (Medan Flood Control and Urban Drainage System)	2.41	10
10	Construction of integrated temporary waste disposal sites (TPST) applying 3R in each village and subdistrict	2.41	11
5	Public transport revitalization	2.39	12
6	Acquisition of land for public green open space (RTH)	2.35	13
21	Development of climate-resillient *kampungs* (PROKLIM)	2.16	14
9	Green building pilot projects for 10 local government agencies (SKPD) during 5 years	2.07	15
16	Construction of water reservoirs, retention/detention ponds, and rainwater absorption wells	1.94	16

continued on next page

Table continued

2	Advocacy and construction of off-street parking facilities in office centers, hotels, and commercial centers	1.93	17
20	Education, advocacy, and action planning for green communities	1.85	18
8	Education, advocacy, and planning to persuade citizens to build roof gardens and hanging gardens	1.83	19
19	Construction of traffic lights using solar cells	1.83	20
18	Conversion to street lighting (LPJU) using solar cells	1.67	21
17	Advocacy for the construction of an embankment for the Belawan river to prevent water intrusion (ROB)	1.63	22
22	Development of schools that apply a green curriculum (Sekolah Adiwiyata)	1.33	23

Source: Green Team/Mayor's Office.

Priority Green Programs

From the above long list, the top eight priority programs were selected based on their strategic importance to green development (Step 6).

Ranking	Program Selection
1	On-site sanitation with septic tanks and periodical desludging service (LLTT)
2	Phased conversion to a public bus rapid transit (BRT) system within 5 years
3	Municipal water supply
4	Pilot project for creating a network of pedestrian walksways and bicycle lanes in shopping centers, educational centers, and city tourism areas
5	Development of an urban forest, including coastal mangrove areas
6	Development of an Intelligent Transport System (ITS)
7	Acceleration of house connections to off-site sanitation
8	Public–private partnership (PPP) for the conversion of solid waste to energy using appropriate technology

Source: Green Team/Mayor's Office.

1. On-site sanitation with septic tanks and periodical desludging service (LLTT)

   The aim of this program is to respond to an urgent need for better sanitation. One way to protect groundwater from contamination is to free the soil from E. coli bacteria. It is estimated that in Medan, only 2% of all existing septic tanks are watertight while a centralized sewerage system still has very limited coverage, with the result that groundwater is polluted. On-site septic tanks not only need to be made watertight, but their number needs to be greatly increased to provide access to all low-income households. In addition, a regular desludging service needs to be made available to empty septic tanks.

   To achieve this, the community has to be persuaded to install new septic tanks, and repair or replace unsafe septic tanks to meet national health standards (*Standar Nasional Indonesia [SNI])* through advocacy, institutional development, and regulations concerning on-site sanitation management. In addition, on-site sanitation should be developed as a potentially profitable private enterprise. As an initial step, the municipality of Medan will build septic tanks that meet SNI standards in public municipal buildings in Medan as well as in low-income communities (*Masyarakat Berpenghasilan Rendah [MBR]) by* installing 100,000 units in the next 5 years.

2. Phased conversion to a BRT system within 5 years

   The aim of this program is to respond to an urgent need for convenient urban mass transport. The proposed BRT system is more modern, comfortable, and effective compared to existing public transport systems that show continuously decreasing rates of occupancy because of inadequate service quality. This alienates citizens from using public transport, as demonstrated by a modal shift to private motorized vehicles.

If sufficiently attractive, the proposed program is expected to be able to revive and restore citizen's interest in public transport. It is clear that the initiative has to be supported by quality transport services and infrastructure.

3. Municipal water supply

   The aim of this program is to respond to an urgent need for more clean water. Total clean water production in Medan stands at 5,700 liters per second (lps), while the need for the next 5 years is estimated at 7,500 lps. In the next 2 years an additional 700 lps will be produced, but the shortfall will still be 1,100 lps. Thus, water supply needs to be accelerated even though the rivers that cross Medan do not have sufficient debit anymore to be used as raw water sources.

   A new water treatment plant (WTP) is needed outside Medan as part of a regional system—(Sistem Penyediaan Air Minum (SPAM) Regional - MEBIDANG (Medan – Binjai – Deli Serdang) in the Bingei river with a capacity of 2,000 lps, to be shared among the municipality of Medan (1.200 lps), the municipality of Binjai (300 lps), and the district of Deli Serdang (300 lps). A cooperation agreement needs to be made among the national government, provincial government, the municipality of Medan, the municipality of Binjai, and the district of Deli Serdang (MEBIDANG) that divides responsibilities between the parties, and to strengthen the capacity of the Municipal Water Supply Authority (PDAM). Development of a Regional Water Supply System (SPAM) for MEBIDANG requires an investment of Rp700 billion, which in turn requires the participation of a third party considering that current local capability is insufficient, while citizens' ability and willingness to pay has sufficient elasticity.

4. Pilot project for creating a network of pedestrian walksways and bicycle lanes in shopping centers, educational centers, and city tourism areas

   The aim of this project is to respond to an urgent need for better public transport, and to stimulate the citizens of Medan to use motorized public transport as it becomes more available, as well as nonmotorized transport as an alternative to private motorized vehicles. This will reduce fuel consumption and improve air quality. The pilot project is part of a broad mass transportation program being developed for the city. With the help of IndII Ausaid, the city of Medan will build pedestrian walkways that meet safety standards along main roads such as Jl. Diponegoro, Jl. K.H. Zainul Arifin, Jl. Sudirman, and Jl. Patimura. Next, the city of Medan is going to expand the pedestrian network as specified in its Spatial Development Plan (RTRW).

5. Development of an urban forest, including coastal mangrove areas

   The aim of this program is to respond to an urgent need for more green public open space in the densely built city. Development of green open space (RTH) to meet legal requirements will be done through the creation of urban forest, including 110 ha of mangrove area. The problem will be that a considerable part of that area is in the hands of private enterprises that want to use it for industrial development. There is a need for a clear regulation through a Detailed Spatial Plan and local regulation (*Perda*) to protect mangrove areas as urban forest, combined with a clear road map to develop it. If neglected, the area will gradually be used for other purposes.

6. Development of an Intelligent Transport System

   The aim of this program is to respond to an urgent need to reduce traffic congestion. During the last 5 years, the number of motorized vehicles has grown 15% on average

per year. The problem has now assumed alarming proportions. If there is no significant change in policy and practice, it is estimated that in 2024 traffic will come to a total standstill.

One of the efforts to reduce traffic congestion is to introduce an ITS at intersections. This technology is a continuation and expansion of the Area Traffic Controll System that has already been installed in 50 intersections in Medan, and is expected to make a significant contribution to effective traffic management.

7. Acceleration of house connections to off-site sanitation

   The aim of this program is to respond to an urgent need for improved sanitation. Human waste management in Medan currently serves barely 4% of its population, whereas it endeavors to reach universal access to sanitation. Medan's target is to serve 10% of the population with a piped system by 2019, focusing on the city center and commercial centers. Swift action is required to reach this target.

   Acceleration of service provision is to be achieved by establishing cooperation among the national government, provincial government, and the municipal government to share responsibilities for planning and construction in three areas: Development Area I in East Medan (4 zones from a total of 12 zones), Area II in West Medan (almost 1,200 ha, area based), and Area III in North Medan (community based). Areas to be developed are selected based on their technical feasilbility to add 6% service coverage. There will be capacity development in the areas of agency technical competence in managing sewerage, planning capability, contractor qualifications in system development and maintenance, as well as citizens' interest in getting connected.

8. PPP for the conversion of solid waste to energy using appropriate technology

   The aim of this program is to respond to an urgent need for improved solid waste management. Introduction of new technologies is expected to become a part of effective solutions in reducing waste volumes and keeping the environment safe. A mountain of waste in the Terjun final waste disposal site (TPA Terjun) has reached a height of 15 meters in an area of 10 ha. There is a need for waste destruction in Terjun through incineration, with the additional benefit of creating thermal energy, as sanitary landfill in that location is not a feasible option anymore. The first step to realizing such a solution is a feasibility study, the second step is to prepare a public–private partnership, and the third step is to build an integrated system that ensures sustainable solid waste management based on waste-to-energy technology for Medan.

Final Selection of Priority Programs

After selecting eight priority programs, the Green Team reported the result to the GCAP Steering Committee, including the heads of all local government agencies (SKPD) involved (*Kepala BAPPEDA, Dinas Kebersihan, Dinas Perumahan dan Permukiman, Dinas Pekerjaan Umum, Dinas Tata Ruang and Tata Bangunan, Badan Lingkungan Hidup, the Direksi PDAM Tirtanadi*), and finally had a consultation with the Regional Secretary (*Sekretaris Daerah Kota Medan*) as the representative of the mayor.

After a final consideration of the financial, regulatory, and institutional risks for implementing each project and the interfaces and possible synergies between projects, it was concluded that the four programs listed below were the most likely to be supported with clear and realistic actions, and therefore, should constitute the GCAP. Only a program on urban forests and coastal mangrove areas was not included from the eight programs initially identified. The seven other programs were combined in the four projects (below) because the city acknowledged the synergies between them (between BRT, ITS, and pedestrian walkways; SPAM and off-site sanitation house connections).

Ranking	Program Selection
1	Construction of a domestic human waste management system with on-site septic tanks and periodical desludging by trucks (L2T2)
2	Development of an urban bus rapid transit system (BRT), including the programs for ITS and pedestrian walkways
3	Construction of a solid waste management system using waste-to-energy technology
4	Increase the regional supply of clean water (SPAM Regional Medan – Binjai – Deli Serdang Mebidang

Source: Green Team/Mayor's Office.

The Next Five Years—Priority Programs, Projects, and Actions

Introduction

This section describes the prioritized programs, projects, and actions we will undertake in the next five years. It also describes the institutional set up we will implement to ensure informed and timely decision making and careful management of the interfaces between different projects. To avoid misunderstandings, we include a short list of definitions of key terms used in this section.

Program

This is an initiative for promoting green development having stated goals that match the city's vision and mission. A program normally comprises a number of projects that have clear interfaces, and is formulated in a Program Brief or Digest.

Project

This is an investment in a physical infrastructure project, or the creation of a new organization, or a policy revision, or a local regulation, to be formulated in a Project Brief. If the project (such as establishing a new body or policy) is subsidiary to another project, it is understood to be a subproject or action.

Action

In the context of the GCAP, actions comprise one or more activities required to meet the conditions for project implementation, such as setting up a project management unit (PMU), preparing a project implementation plan (PIP), preparing terms of reference (TOR), identifying sources of financing, acquiring land, and others.

Project Management Unit

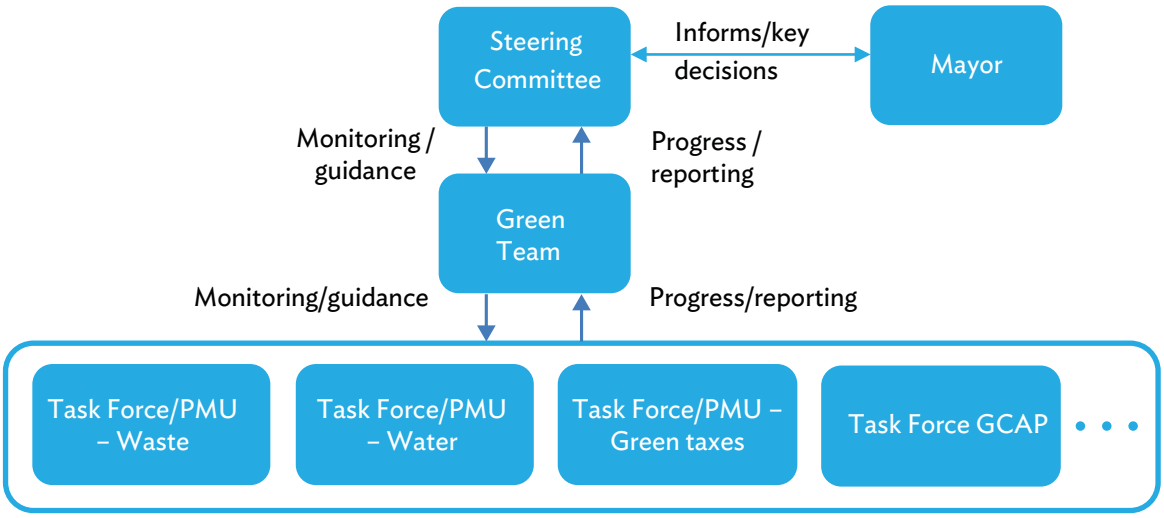
This is a temporary organizational unit created for the purpose of preparing a project implementation plan, and managing the project on a day-to-day basis. A PMU is headed by the agency responsible for the project. An operational budget for the PMU needs to be allocated. Representatives of relevant SKPDs, other agencies, and possibly representatives of the community can also be members of the PMU. The PMU will consider whether or not alternative implementing mechanisms (build–operate–transfer, joint venture, corporate social responsibility, etc.) will be considered in the feasibility study, including the actions related to changing or implementing regulations (*Perda*), issuing permits, and others.

Project Implementation Plan

This is a document that describes in detail the actions needed for implementing the project, including preparatory activities. The PMU should be in charge of preparing and managing it. It covers the project cycle—a sequence of events and activities usually starting with a feasibility study, project design, financing, land acquisition, tendering, procurement, construction supervision, monitoring and evaluation, as well as operation and maintenance. It clearly describes the division of responsibilities, time line, and budgets needed. It specifies what decisions are needed, when, and by whom. A project is normally undertaken by a contractor, government department, a combination of public and private actors, a consortium, etc. Different actors can be responsible for different parts of the project cycle. The PMU will update the PIP over the course of developing the project. At the start, the PIP will focus on the activities to prepare a detailed design, feasibility study, and tender strategy. Based on the choices made related to the implementing mechanisms (traditional, PPP, joint venture, communities, etc.), the PIP can be further detailed for procurement, construction, and operation and maintenance (O&M).

Institutional Enabling Actions for the Green Team and PMUs

We will use the results of the Green Cities Program (ADB, *BAPPENAS, Kementerian PUPR*) as a starting point to further intensify our efforts to transform Medan into one of the greenest city in Indonesia. On top of the specific actions we have formulated for prioritized programs and projects, we intend to further improve the institutional set up needed for a well-informed and timely decision-making process.



Source: Green Team/Mayor's Office.

A steering committee (SC) will monitor and guide the progress on GCAP and actions on a quarterly basis. The mayor will chair the steering committee that further consists of heads of *SKPDs* in the field of green attributes, and other stakeholders. As chair of the Green Team, the head of *BAPPEDA* will keep the mayor informed about the progress to enable the mayor to make decisions when needed.

The Green Team will coordinate programs and projects and the interfaces between programs and projects. They will also update the GCAP every 2 years. The Green Team will meet bi-weekly to monitor progress on specific projects and actions. Those in charge of specific programs and projects will inform the Green Team about their progress and specific issues, decisions, or guidance they need. The Green Team will determine the agenda for meetings with the steering committee and prepare these meetings. Specific task forces (PMU) will be set up to drive the implementation of programs and projects on a day-to-day basis. The task forces will be made up of representatives of relevant *SKPDs* and other agencies and led by the agency/body responsible for the sector.

Institutional Enabling Actions

What	Who	When
Mayoral Decree on the setting up and installation of a steering committee and Green Team including description of roles, SOP, membership, and budgets.	Mayor	Update in 2106
Continuation of mayor's decree including budget allocation	Head of BAPPEDA	Annually
Work plan for the Green Team, including initiating the setting up of specific task forces and/or PMUs for agreed projects.	Green Team	As and when required
Evaluation of the performance of Green Team	Steering Committee	Bi-yearly

Source: Green Team/Mayor's Office.

Green Waste—Action Plan Program: Improvement of On-Site Sanitation System

Why?

It is estimated that our city currently has 400,000 septic tanks for domestic wastewater treatment. However, based on the "Study on Septage Management in Asia" by USAID (2010), it was found that around 16% of septic tanks in the city are not properly constructed (and are essentially acting as soak-pits), and 40% of septic tanks are less than 10 meters from a well or pumped ground water, which are used for drinking. Currently, there is no effective regulation in place to ensure that sludge (or septage) is removed (pumped) at regular intervals, and the operation of tankers for septage pumping is not well managed. As a result of both poor construction and operation, it is also estimated that about 70% of septic tanks have contaminated the ground water. The direct relationship between diseases, such as cholera, hepatitis and dysentery, and the unrestricted discharges of residential sewage is well documented, and therefore, this program aims to improve a citywide system for management of on-site sanitation.

Current Status

To increase coverage, the city government of Medan has already decided to develop a new citywide sanitation strategy, and will reactivate its Sanitation Working Group that has existed since 2010. It is planned that in 2016, the responsibility for septage pumping is transferred from the City Cleaning and Landscaping Agency (DKP) to the provincial water supply company, PDAM Tirtanadi, in order to improve management by combining the collection of drinking water and wastewater (sewerage system) and septage management (regular septic tank desludging management).

Goal

The main objective of this program is to provide by 2020 regular services to desludge human waste (septage) from individual septic tanks and improve facilities for individual household and communal septic tanks that are viable to meet technical and environmental requirements. A number of parallel activities are required to support this main goal, including the passage of a septage management law, provision of a fleet of septage pumping trucks, construction of a new septage treatment plant, some restructuring of institutional responsibilities, and capacity development. A further objective is to provide full cost recovery of staff and operational expenses.

Results

1. A sanitation baseline and monitoring plan for Medan City formulated to evaluate on-site sanitation services and other environmental conditions.
2. Some 100,000 impermeable septic tanks provided in 5 years.
3. PDAM Tirtanadi's organization strengthened (i.e., Directorate of Wastewater) to implement regular desludging management system for the entire city.
4. The population of Medan educated through social media to use, and pay for, the septage desludging services.
5. A new septage treatment facility has been set up to receive pumped septage.

Benefits

1. Reduces the sanitation impact on both groundwater and surface water and, thus, on human health.
2. Strengthens resistance to ecological hazards.
3. Provides a public service that is efficient and reliable.
4. Provides regulatory and management oversight for the septic tank design, construction, and use of septic tanks as well as septage transport, treatment, and disposal.

Success Indicators (targets)

Unsealed Septic Tanks	
2010	16%
2020	0%
Septage Pumping Customers	
2015	9,000
2020	40,000

Source: Green Team/Mayor's Office.

Key Risks

Even though the projects are relatively well defined, the technology is straightforward, and the capacity is there to deliver them, the key risks are as follows:

1. Delayed approval of the regulation and law governing off-site sanitation.
2. Cooperation between the city, PDAM and the provincial government of North Sumatra is not guaranteed yet.
3. Low interest of the community on aspects of septic tank sanitation is not easily improved and may slow down implementation.

4. Potential displacement of trained staff from one unit to another unit or moving to another department may slow down implementation. The process for training staff members is very slow.

Risk Mitigation

These risks can be mitigated to the extent possible by prioritizing the following measures and allocating sufficient resources for their implementation:

1. Implement regulatory updates as soon as possible while local political will is present (before policy/regime changes occur).
2. Establish a working group to coordinate this program and other sanitary activities.
3. Undertake a social marketing strategy to engage citizens in environmental aspects of sanitation and disseminate information.

Project SAN1: Prepare a Sanitation Baseline, Monitoring Plan, and Establish a Sanitation Working Group to Coordinate Monitoring and Related Projects

It is necessary to create and establish a sanitation baseline for the city to help evaluate progress under this program and develop projects to address specific issues that may become apparent to reduce the environmental impact on the city and help achieve our Green Vision.

This project will be led by BAPPEDA and future annual monitoring will be implemented according to an agreed monitoring plan.

The indicators under this program (% of sealed septage tanks, and number of septage desludging customers) will be included, and the following indicators may also be established:

- Number of households using flush toilets
- Connections to piped sewerage
- Number and construction type of septic tanks
- Water quality (biological and chemical) monitoring at selected indicator wells/boreholes and/or streams
- Occurrence of waterborne diseases among residents

It is important that a realistic plan is developed that can be coordinated and monitored easily within existing budgets and monitoring strategies of BAPPEDA, the City environment agency (BLH), and PDAM.

Beyond technology and financing consideration of the projects under this program, the involvement of and collaboration among various stakeholders (e.g., DPRD as policymakers, regulatory agencies, BAPPEDA, housing agency, household users, society groups, private collection and transport companies, PDAM Tirtanadi as the operators of clean water, regular desludging septage management and both sewerage system wastewater treatment plants and the end-user of treated sludge), it is also crucial to move toward a functioning citywide sanitation management system. Engaging stakeholders from the beginning of project development helps in determining the actual sanitation needs, information and capacity gaps, as well as their perception toward the project. It is also proven to be effective in designing tools for raising awareness, ensuring public acceptability, tariff setting, and easing project implementation. The Sanitation Working Group established in 2010 needs to assist in coordinating this aspect and other related projects.

Action	Description and Responsibilities	Time Frame
SAN1.1	A Sanitation Working Group established in 2010 needs to be reactivated and to coordinate monitoring and related projects, and promote the advocacy of good sanitation practices among residents. The working group comprises members from all relevant stakeholders, including BAPPEDA, the cleaning and landscaping agency, environment agency, health agency, PDAM, and the provincial government. This working group coordinates with the Green Team on the implementation of this program and projects 1, 2, 3, and 4 within it.	2016
SAN1.2	BAPPEDA, in cooperation with PDAM Tirtanadi, will prepare a robust annual monitoring plan to evaluate progress and guide development projects in sanitation service provision and infrastructure investment.	2016 (annual)
SAN1.3	BAPPEDA, in cooperation with PDAM Tirtanadi, has to conduct an on-site baseline survey in line with the approved monitoring plan.	2017
Responsible agency (PMU)	PDAM Tirtanadi	
Estimated costs (budget needs)	**Preparation (design, procure):** Rp1.45 billion Realization (CAPEX): None **Maintenance and operation:** To be determined	
Implementing mechanism, funding and financing	• Not applicable	
Other partners	Medan: BAPPEDA and BLH Provincial: PDAM Tirtanadi National government: Ministry of Public Works and Ministry of Health Social/communities: Sanitation Working Group and green communities	

Project SAN2: Provision of Impermeable Septic Tanks

Medan City plans to distribute around 100,000 septic tanks to low-income households during 2016-2020 in order to support the national flagship policy: "100% (safe water access) : 0% (slum areas) : 100% (sanitation)." The national scheme is operated as an output-based aid (OBA), which ties the disbursement of public funding (in the form of grants) to the achievement of clearly specified results that directly support improved access to basic sanitation services. The implementation of this project, therefore, has to be clearly coordinated to ensure successful implementation and continued funding.

Septic tanks provided need to be properly designed and constructed, including
- Proper sizing for appropriate detention time and volume,
- Suitable elevation above groundwater level,
- Suitable inlet and outlet structures,
- At least one baffle separating the tank into multiple compartments, and
- Sealed tanks with access to each compartment to allow for inspection and pumping.

Action	Description and Responsibilities	Time Frame
SAN2.1	Establish a project management unit (PMU) within the housing agency to coordinate the project and work with BAPPEDA to secure OBA central government funding for the project (i.e., sources from APBN and DFAT [Indii-Ausaid])	2016
SAN2.2	The housing agency (with support from BAPPEDA) to prepare TOR for a study that will design appropriate impermeable septic tanks.	2017
SAN2.3	Tender and appoint a specialist consultant to develop appropriate generic designs for a variety of real situations. Consultant to work with relevant city stakeholders in developing designs, including the environment agency, highways agency, social groups, and others.	2017
SAN2.4	The housing agency to hire a specialist contractor to fabricate 100,000 impermeable septic tank units following SNI Number: 03-2398-2002.	2017
SAN2.5	Achieve construction permits and install 20,000 septic tanks per year, with an initial focus on poor and vulnerable households.	2017-2020
Responsible agency	Medan housing agency	
Estimated costs (budget needs)	**Preparation (design):** Rp1.75 billion **Realization (construction):** Rp5 billion **Maintenance and operation:** See Project SAN3	
Implementing mechanism, funding and financing	• Traditional procurement • Funding by APBD I and APBD II	
Other partners	**Medan**: BAPPEDA, Sanitation Working Group **Private sector**: Design consultants, fabrication company **Provincial**: PDAM, regarding design for pumping access **Social/communities**: Poor communities and households, regarding appropriate design	

Source: Green Team/Mayor's Office.

Project SAN3: Establish Regular Septage Pumping (Desludging) and Management System

The provision of regular septage desludging management services is one of the development challenges in achieving the 2017 Sustainable Development Goals and the 2020 Indonesia's national flagship 100%–0%–100%. In the short term, septic tanks will remain the principal form of urban sanitation in Medan as the sewer network is not extensive. Septic tanks require regular removal of septage. Without coordinated septage management, Project 2 (provision of improved tanks), will not result in improved sanitation, health, and environmental protection—as monitored under Project 1.

It is important that these services are implemented in a coordinated and holistic way, including institutional and cost recovery aspects, to provide a sustainable service to the residents of Medan City. The city plans to transfer the responsibility for the collection and disposal of waste to PDAM, as they are best placed to manage such operational activities from a technical perspective.

Action	Description and Responsibilities	Time Frame
SAN3.1	To promote sustained operation and enable this off-site sanitation program, Medan City government will draft and adopt, through its legislative body (DPRD), a local regulation (*Perda*) detailing Medan City's Septage Management System. The regulation will state the rationale, user fees, operation, management (roles and responsibilities), and penalties. Unless otherwise repealed or amended, the septage management ordinance remains valid, thereby ensuring sustained operation.	2016
SAN3.2	Establish a Memorandum of Agreement between the city and PDAM, which states that future septage pumping (collection) and management will be undertaken by PDAM Tirtanadi.	2016
SAN3.3	In 2016, the City Cleaning and Landscaping Agency (DKP) will transfer responsibilities for the management of domestic septage waste to PDAM Tirtanadi, which currently manages off-site sanitation (centralized sewage). This includes the transfer of its existing septage pumping trucks to PDAM.	2016
SAN3.4	The city government will acquire additional septage pumping trucks (2 per year) from the Ministry of Public Works under a grant to the city, which will then hand these over to PDAM Tirtanadi.	2017 (annual)
SAN3.5	PDAM Tirtanadi will establish an internal operation unit to manage and conduct septage collection (every 2 years) and disposal.	2017
SAN3.6	PDAM will prepare and approve standard operational procedures (SOP) in PDAM for septage management.	2017
SAN3.7	PDAM will train staff in latest septage management and disposal options, including developing managerial capacity particularly on asset management, cost recovery, and efficient service delivery according to performance targets and in responding to customer concerns. Technical training will also be given to the operation unit for the physical operation of the truck and ancillary equipment (valves, pumps, etc).	2017
SAN3.8	The Sanitation Working Group, established under Project 1, will coordinate a social marketing and public awareness campaign with PDAM to raise awareness on the benefits of improved sanitation, ensure public acceptability of regulations and tariffs, and ease project implementation.	2017
SAN3.9	PDAM will coordinate with the city government to review and set tariffs (including for adjoining municipalities) and establish a system to recover operational costs from user fees (septage pumping).	2017
SAN3.10	Explore the opportunity to establish household sanitation revolving funds for low-cost septic tank and the construction of public toilets.	2017
SAN3.11	Consider utilizing private sector companies to provide efficient septage collection and transport services.	2018
SAN3.12	PDAM Tirtanadi will establish wastewater and septage quality testing facilities and provide trained staff.	2018

SAN3.13	It is planned that the Province of North Sumatra will develop a new independent septage treatment facility (project 4) at the Cemara area. In the interim, PDAM will utilize Cemara WWTP for septage disposal, which has been using only ±30 % of its design capacity of 60,000 m^3 per day.	2017
Responsible agency	PDAM Tirtanadi	
Estimated costs	**Preparation (design):** Rp1.65 billion **Realization (construction):** Rp6 billion	
Implementing mechanism, funding, and financing	• OBA (government grant) for equipment • Improved cost recovery for financing operational improvements • International Technical Assistance for Capacity Development and Training • Private sector contractors to provide efficient septage pumping and transport services	
Other partners	**Medan:** Sanitation Working Group, BAPPEDA, DKP (transfer of vehicles and responsibilities), environment agency (regarding advocacy) **Regional:** Other municipalities (regarding tariff setting) **Social/communities:** Green communities, social groups such as the Lions Club and AKKOPSI, users, poor households **Private sector:** For septage collection and transport. **International:** Technical assistance for capacity development and training	

Source: Green Team/Mayor's Office.

Project SAN4: Build a New Septage Treatment Facility and Disposal

An independently managed septage treatment plant will be designed and built by Dinas Tarukim of the province of North Sumatera. Factors influencing the design include climate, septic tank size, design, user habits, pumping frequency, water supply characteristics, piping material, and the use of water-conservation fixtures, garbage disposals, and household chemicals.

By liaising with BAPPEDA to ensure this project is in the medium-term development plan (RPJMD) for the city, national (APBN) government funding can be obtained if a feasible project proposal is prepared. Collaboration among the provincial government, the city government, and PDAM is therefore necessary.

The normal project cycle including feasibility study, design, securing of permits, procurement and construction processes should be followed in implementing this project.

Environmental impact of outflows shall be mitigated through thorough environmental impact assessment (EIA) and design, and land acquisition and social impact should be considered in early project development.

Action	Description and Responsibilities	Time Frame
SAN4.1	Establish a PMU to prepare a project implementation plan and coordinate with city agencies and other stakeholders.	2016
SAN4.2	PMU to draft the specific requirements of the facility and TOR for undertaking a feasibility study, including outline design and cost estimates.	2017
SAN4.3	PMU to commission the conduct of a feasibility study including outline design and cost estimates. The feasibility study will include consideration of tipping fees (for disposal of septage through PDAM, and potentially future private operators) as well as EIA and social impact assessments.	2017
SAN4.4	Obtain approval of the project and APBN grant funding in coordination with Medan BAPPEDA.	2017
SAN4.5	Provincial government will implement land acquisition and clearance.	2017
SAN4.6	Preparation, tendering, and awarding of design and build contract.	2018
SAN4.7	Endorsement of construction permits.	2018
SAN4.8	Construction management and commissioning of new septage treatment facility.	2018-2020
Responsible agency	Dinas Tarukim of the province of North Sumatera	
Estimated costs (budget needs)	**Preparation (design):** Rp1.5 billion **Realization (construction):** Rp15 billion **Maintenance and operation:** To be determined	
Implementing mechanism, funding and financing	• Traditional procurement • Funding by APBN	
Other partners	**Medan:** Medan BAPPEDA **Regional:** PDAM Tirtanadi **Private sector:** Design consultants and construction contractors **Social/communities:** Landowners	

Source: Green Team/Mayor's Office.

Green Transport—Action Plan Program: Development of Medan's Bus Rapid Transit System

Why?

Our city is facing the challenge of a growing traffic congestion and air pollution. This is caused by the rapid increase of motorized vehicles (currently over 5 million, fivefold in comparison to 2000) and a low share of public transport (1.3% of total vehicles). The situation is urgent given the expected population growth from 2.76 million in 2015 to 4 million in 2025.

Medan City does not have a public transport company. Small buses (*angkots*), motor and car taxis are owned by small companies and individuals. This decentralized system makes it impossible to work on solutions that can improve the public transport system in a structural way. A solution is needed that will improve traffic conditions and allow our citizens to travel comfortably, safely, and reliably.

Continued reliance on private motorized transport is deemed unsustainable. The SOAR analysis done as part of GCAP preparation concluded that citizens want clean, safe, and healthy public transport as part of local economic and social development as well as environmental sustainability. The green benefits include reduced congestion, reduced pollution, improved road safety, and improved mobility.

Current Status of Planning and Decision-Making

We prepared a "Mass Rapid Transport System (SAUM) for Medan City" in 2010, and a transport master plan "Sustainable Urban Transport Improvement Project (SUTIP)" in 2014. The master plan showed that a citywide BRT system is an important pillar to structurally improve traffic conditions. It enables citizens to reach key destinations by means of airconditioned buses that use dedicated bus lanes and have traffic light priority (ITS system) thus allowing comfortable and reliable travel. The master plan contains a layout for the citywide BRT that can serve as a blueprint for its phased implementation.

Goal

Based on the master plan, we decided to prepare the implementation of the first phases of the BRT system in the coming years. In parallel, we want to set up a public transport company that will manage and operate the BRT as well as the fleet of buses.

Expected Results

When the program is completed, comprising Phases 1 and 2, the proposed BRT will have three main components: (i) physical infrastructure, (ii) a BRT management body, and (iii) an operational fleet of buses.

1. Infrastructure with the following components:
    a. Phase 1: The corridor Masjid Raya – Carrefour (12 km of bus lanes); Phase 2: expansion from Masjid Raya to Amplas (6 km) and from Carrefour to Pinang Baris section (5 km).
    b. Pedestrian paths along the BRT corridor that provide easy access to the stations (around 46 km of new walkways for Phases 1 and 2).
    c. Phase 1: 32 bus stations with digital public information displays for corridor Masjid Raya – Carrefour; Phase 2: 22 additional bus stops with digital public information displays.
    d. An automated "smart" traffic light system (ITS) prioritizing buses to ensure reliable travel times for Phases 1 and 2.
    e. Off-street Park and Ride facilities that will allow citizens and commuters to continue their journey by BRT and reach their destination quicker (a pilot project in Amplas and Pinang Baris will be part of Phase 2).

2. Public transport organization with the following components:
    a. A business plan based on the "Direct Service" system.
    b. An electronic ticketing system (smart payment system) based on the Direct Service system to optimize service efficiency.
    c. A company (Medan Public Transport Company or MPTC) will be responsible for operating the bus services and marketing with the aim of optimizing service levels and use of the system. The existing Medan Municipal Enterprise (BUMD) "PD Pembangunan" is a possible candidate because it already has experience in managing two stations in Amplas and Pinang Baris (1970-1991). If ticket sales revenues allow, responsibilities might include maintenance of stations and bus lanes.

3 Efficient bus fleet and unified operating system operated by the MPTC, with the intention of modernizing and increasing the fleet over time, and gradually replacing diesel-fueled buses with hybrid ones or buses running on electricity or gas only. Current operators of smaller vehicles (*angkot*, *becak bermotor*, and *taksi*) will be incentivized (and regulated) to join the new public transport company. They should benefit from this change, for example by a financing mechanism that would make it possible for small operators to join forces and jointly operate new bigger buses on the dedicated lanes.

Expected Benefits

1. Improved urban mobility both for long distances (buses) and short distances (pedestrian walkways) for citizens. This will shorten the time spent on travel, and improve access to places of employment. There are 600,000 commuters per day to Medan City from surrounding cities that can be considered as potential BRT customers.

2. Improved road safety and security for passengers and pedestrians alike with a positive impact on the quality of life.
3. Reduced air pollution with a positive impact on the quality of life and citizens' health.
4. Reduced carbon emissions contributing to Indonesia's commitment to the United Nations Framework Convention on Climate Change (UNFCCC).
5. Economic opportunities for lower and middle class citizens, for example, better business outlooks for current operators of *angkot* and *taksi* as well as economic activities around stations in transit-oriented development.

Key Risks and Mitigation

An initial risk assessment informed us about the key risks of introducing the BRT in Medan, as follows:

1. BRT is new for Medan. Limited knowledge and capacity to implement a BRT can result in delays, cost overruns, and poor implementation. To mitigate this risk, the management needs to interface between different technical projects and between infrastructure delivery. Setting up the transport company deserves special attention. The need for capacity building and consultant assistance will be further detailed in the PIP.
2. The BRT has significant impact on Medan's communities, especially current operators of smaller vehicles (*angkot*, *taksi*) that has the potential to cause considerable resistance. To mitigate this risk, the PIP for the Medan Public Transport Company needs to involve them in designing appropriate mechanisms for association and/or integration into the BRT system.

Investment Summary (2016 estimates)

Project	Description	Time line	Preparation (Rp billion)	CAPEX (once)	OPEX (annual)	Finance
I	BRT infrastructure	2016–2020	27	638	TBD	Public
II	Medan Public Transport Company (BUMD)	2016–2019	3.2	30	TBD	PPP
II	BRT bus fleet	2019	TBD	TBD	TBD	PPP

Source: Green Team/Mayor's Office.

Success Indicators (targets)

Public Transport Share	
2015	1.3%
2020	10%

Targets are indicative and will be determined in detail based on detailed design for Phase 1 and business plan for the new transport company.
Source: Green Team/Mayor's Office.

Project TRAN1: Build BRT Infrastructure (Phases 1 and 2)

Based on the Program Brief, this project includes the following sub-projects: (i) construction of bus lanes, (ii) pedestrian sidewalks, (iii) bus stations with digital information displays; (iv) ITS traffic light system. These sub-projects have their own lists of actions.

The PMU will prepare a project implementation plan (PIP). It will specify more detailed choices to be made. It will be considered to bundle the detailed design of all related infrastructure, even in cases where different government departments will become responsible for funding and tendering different infrastructure (tender strategy). A tender strategy will be prepared that will take into account the division of responsibilities for operation and maintenance among stakeholders such as the Medan Department of Public Works (Bina Marga), the Medan Department of Transport, the new Medan Public Transport Company and private companies/investors.

Action	Description and Responsibilities	Time Frame
TRAN1.1	Se up a project management unit (PMU)	2016
TRAN1.2	Prepare a PIP including detailed activities, responsibilities, time line, identification of qualified consultants, and budget	2016
TRAN1.3	Approve the PIP and budget	2016
TRAN1.4	Commission a feasibility study on BRT system, including preparation of TOR, identification and recruitment of qualified consultants, and FS implementation	2016
TRAN1.5	Prepare detailed design (including cost estimates)	2017
TRAN1.6	Prepare tender strategy	2017
TRAN1.7	Arrange funding for infrastructure	2017
TRAN1.8	Arrange permits, land rights, and any other regulations needed to realize infrastructure	2017
TRAN1.9	Tender project(s), select contractor(s), award contract(s)	2017
TRAN1.10	Oversee construction until completion of Phase 1 (July 2019) and expansion (July 2020)	2017–2020
Responsible agency (PMU)	**Medan Department of Public Works (Bina Marga):** A,B **Medan Department of Transport:** C,D	
Estimated costs (budget needs)	**Preparation (design, procure):** ~ Rp27 billion **Realization (CAPEX):** ~ Rp638 billion **Maintenance and operation:** To be determined	
Impl. mechanisms, funding and finance	Traditional procurement (no alternative mechanism) Public funding by APBN, AusAid (Indii, for pedestrian walkways) and APBD II	
Other partners	**Medan:** Medan BAPPEDA, Office of Bina Marga, Office of Perkim, Department of Housing and Settlement (builds park & ride facilities), Department of Parks (prunes the trees along the BRT corridor), environmental agency (environmental documents and environmental permits) **Central government:** National Transport Authority, Department of Land Transportation (Ministry of Transportation), Organda (Land Transport Organization) **Private sector/government enterprises:** Newly formed Medan public transport organization (BUMD PD Pembangunan), private operators (BRT bus manager, parking management) **Social/communities:** Citizens of Medan (transport master plan and detailed design of Phase 1 infrastructure)	

Source: Green Team/Mayor's Office.

Project TRAN2: Establish Medan Public Transport Company (BUMD)

Based on the Program Brief (attached), this Project includes the following sub-projects: (i) Medan Public Transport Company (MPTC); (ii) Business Plan for BRT 'Direct Service' system (expanded in Project 3); (iii) 'Smart Payment' system to implement the 'Direct Service' system; and (iv) Public Relations & Information system. These sub-projects have their own lists of actions.

The MPTC will manage, operate, promote, and market the BRT service and bus fleet. The business plan for the company will include details about the goals, responsibilities, management structure and operating procedures including possibly managing, maintaining and operating bus stations and bus lanes. The smart payment system will optimize service efficiency and effectiveness. Choices made by the PMU have a direct relation with the tender strategy for infrastructure (Project 1) and buses (Project 3) and will be monitored by the Green Team for consistency.

Action	Description and Responsibilities	Time Frame
TRAN2.1	Set up a project management unit (PMU).	2016
TRAN2.2	Prepare project implementation plan (PIP) for preparing (a) business plan based on 'direct service' model, ;(b) smart payment system, public relations and information system, ;and (d) creating a transport company including detailed activities, responsibilities, time line, need for consultants, and budget.	2016
TRAN2.3	Approve PIP and budget.	2016
TRAN2.4	As far as not yet done (see GIZ support below), commission the preparation of a business plan for the MPTC including preparation of TOR, identification and recruitment of qualified consultants, and implementation of FS.	2016-2017
TRAN2.5	Commission the drafting of an academic paper as the basis for drafting a local regulation on BRT and the MPTC.	2017
TRAN2.6	Get local regulation on BRT and the MPTC approved by City Council.	2017
TRAN2.7	Prepare selection mechanisms for operating a transport company	2017
TRAN2.8	Arrange funding for the MPTC *(both upfront investments for set up, office infrastructure, as well as electronic ticketing system for operational budgets; funding requirement is subject to results of the business plan; possibly MPTC will be responsible for maintaining infrastructure as well).*	2017
TRAN2.9	Undertake a public tender and selection of MPTC operator.	2018
TRAN2.10	Set up the MPTC so that it is able to manage and operate the BRT system Phase 1 in July 2019.	2018-2019
Responsible agency	**Medan Department of Transportation**: Prepare business plan and select operating entity **(Director of newly formed Medan Public Transport Company (BUMD PD Pembangunan):** Set up Medan Public Transport Company, including operating procedures with other stakeholders involved (Public Transport Department Bina Marga, private sector bus operators, etc.)	
Estimated costs (budget needs)	**Preparation (business plan, selection):** ~ Rp3.2 billion **Realization (start-up capital for Transport Company):** ~ Rp30 billion **Maintenance and operation:** To be determined	
Implementing mechanisms, funding, and finance	• GIZ is supporting the preparation of the business plan for the BUMD • Local government enterprise: BUMD (alternative mechanism) • Funding by APBN, and APBD II. Business plan will be used to do research if private sector investments in buses and stations are possible	
Other partners	**Medan**: BAPPEDA of Medan City, Dinas Perhubungan(Transport Department) of Medan City **Central government**: Directorate General of Land Transportation **Private sector/government enterprises**: Private operators (BRT bus manager, parking management) **Social/communities**: Citizens of Medan (market research)	

QUERY: WHY THE QUESTION MARK HERE?

Source: Green Team/Mayor's Office.

Project TRAN3: Manage BRT Fleet as a Unified System

Based on the Program Brief (attached), this Project includes the following sub-projects: (i) bus fleet management by the MPTC); (ii) engagement of private sector partners/operators; and (iii) investments in new technology (clean propulsion, digital information). These sub-projects have their own lists of actions.

This project is an integral part of the business plan for the MPTC described in Project 2, and part of its responsibility is to manage the bus fleet. We include this as a separate project to emphasize its importance. We aim to increase profitability of the fleet, as well as the number of green buses (running on electricity or gas) over time as part of our continuous effort to improve fleet management.

Action	Description and Responsibilities	Time Frame
TRAN3.1	As part of the business plan, the MPTC sets up a project management unit (PMU) to develop a unified fleet operation system for the BRT.	2016-2017
TRAN3.2	Approve project implementation plan (PIP) and budget.	2017
TRAN3.3	Identify and hire consultants to design a system for unifying existing formal and informal operators within the overall public transport system.	2017
TRAN3.4	Negotiate with, and prepare interested informal smaller operators to join the MPTC to become part of the BRT system under MPTC management.	2017-2018
TRAN3.5	Create a network of feeder buses for informal operators who do not want to join the BRT system, and regulate these operators through a system of incentives and disincentives to bind them contractually into the overall public transport system.	2018-2019
TRAN3.6	Commission the drafting of an academic paper as the basis for drafting a local regulation on unified bus fleet operation.	2017
TRAN3.7	Get local regulation on unified bus fleet operation approved by the City Council.	2018
TRAN3.8	Promote engagement of new qualified private sector operators interested in operating buses or managing other parts of the BRT system.	2018-2019
TRAN3.9	Acquire buses as needed on a grant basis from the Ministry of Transportation, BPJS and Medan City.	2018-2020
TRAN3.10	Renew and expand the bus fleet as required, and invest in new technology, such as clean engines and smart digital systems to keep the fleet clean, safe, and healthy.	2019-2020
Responsible agency	**Medan Department of Transportation**: Prepare this project as an integral part of the business plan for the Public Transport Company and select operating entity. **(Director of newly formed Medan Public Transport Company (BUMD PD Pembangunan):** Set up the Medan Public Transport Company including expansion strategy, mechanisms, regulations and procedures for bus fleet	
Estimated costs (budget)	• See Project 2 (Medan Public Transport Company)	
Implementation mechanisms, funding and finance	• GIZ is supporting the preparation of the business plan for the BUMD. • Local government enterprise: BUMD (alternative mechanism) • Funding by APBN, and APBD II. Business plan will be used to do research if private sector investments in buses and stations are possible	
Other partners	**Medan**: Dinas Perhubungan(Transport Department) of Medan City **Central government**: Directorate General of Land Transportation **Private sector/ government enterprises:** Private operators (BRT bus manager, parking management) **Social/communities:** Citizens of Medan (market research)	

Source: Green Team/Mayor's Office.

Green Water—Action Plan Program: Waste-to-Energy Plant

Why?

Medan's landfills are now at a critical point and it is estimated that within 5 years, there will be no more space for Medan City to dump its waste. Therefore, a solution is needed so that our city's solid waste disposal needs can continue to be met. As the amount of waste in Medan has grown to an almost unmanageable level, it is believed that the investment costs of such a project is feasible and can be offset through revenue.

Utilization of urban waste is one of the national priorities in the new and renewable energy area as stipulated in the National Research Agenda 2010-2014. Municipal solid waste can potentially be converted to electricity through a waste-to-energy (WTE) plant. Such an approach would decrease the future demand for extra landfills and contribute to the national priorities for utilization of urban waste. WTE is especially interesting for Medan City in view of its commercial and industrial base that has a high energy use (energy intensity).

Current Status

A series of legislations and policies has been enacted in Indonesia in order to effectively manage municipal solid waste (MSW), promote its utilization as a source of energy, and protect the environment. The City of Medan, supported by the central government, has identified the investment in a WTE plant as an option. No feasibility study has been conducted yet.

Goals

The objective is to realize a WTE plant that maximizes the useful utilization of MSW in Medan/greater Medan. The WTE plant will produce clean energy from waste and reduce the pressure on Medan's landfills.

Medan would like to explore if a cooperation with the private sector can be beneficial. WTE technology has hardly been applied in Indonesia so the private sector is needed to contribute technological knowledge and experience. Depending on the local context, the kind of waste flows, and the wishes and conditions of Medan City, the private sector can advise on the appropriate WTE technology to be applied. No single technology dominates—there is no "one size fits all" solution. The ongoing WTE projects worldwide have shown various technological approaches based on varying criteria, needs, limitations, opportunities, and public acceptability.

The private sector could also invest in a WTE plant if the investments can be earned back from the sale of electricity and possibly a tipping fee (paid by the city per ton waste accepted).

For the sale of electricity, a subsidized feed-in tariff (FIT) applies. A condition to qualify for the FIT is that the landfills are environmentally sound (sanitary landfills).

The city of Medan needs to prepare a local regulation (*Perda*) to make a tipping fee possible. It is important that a maximum tipping fee is set before starting the tender for the selection of the private sector developer.

Results

The program is expected to have the following results:

1. Terjun landfill: Upgrade of existing open dump landfill to sanitary landfill (10 ha) and expansion with 4 ha of extra sanitary landfill.
2. An operational WTE plant.
3. *Perda* for tipping fee as a condition for the private sector to invest in WTE and landfill upgrade.

Benefits

1. Less pollution from landfills because of the conversion of existing landfills to sanitary landfills and suppressed waste supply because of improved plant.
1. Contributes to Indonesia's commitments to increase the use of clean, renewable natural resources.
2. Reduces greenhouse gas emissions by as much as 1,792,625 tons of CO_2.

Success Indicators (targets)

Electricity Produced from Waste	
2015	-
2020	60 GWh per year
Reduction Greenhouse Gas Emissions	
2015	-
2020	1,792,625 tons of CO_2
Environment	
2015	Polluted open dump landfills (Terjun)
2020	Clean sanitary landfills

Source: Green Team/Mayor's Office.

Key Risks and Mitigation

An initial risk assessment identified the key risks of introducing the WTE in Medan as follows:

1. Sanitary landfill is not realized. FIT only applies if existing open dump landfills are upgraded to sanitary landfills (financial risk for WTE plant).
2. *Perda* about tipping fee and maximum tariff is not set. The private sector will not be willing to bid.
3. Selected private sector is unexperienced, risking the WTE plant to fail from a technological point of view.
4. Available MSW (and its characteristics) does not match the WTE technology.
5. Supply of MSW is unreliable (quantity/quality).

Actions

Actions have been identified to achieve the three key results. It is advisable to manage the realization of the results as one integrated package because the successful realization of the WTE plant is dependent on the other key results (sanitary landfill and *Perda* for tipping fee). The preparation of an integrated project like this is challenging. The Green Team realizes that significant investments in the PMU and external consultants are conditions that must be met to be successful.

Project WTE1: Expansion of Sanitary Landfill System in Terjun Landfill Site and Upgrade of Existing Terjun Landfill Site

This activity is considered urgent because the Terjun landfill site needs to be expanded by 4 ha. A detailed design (4 ha) has been prepared in 2012 that can serve as a starting point. The scope needs to be expanded to include an upgrade of the existing 10 ha. Maintenance and operation of the sanitary landfill needs to be considered, also as part of the implementing mechanisms and tender strategy.

A sanitary landfill is a condition to qualify for a FIT for the WTE plant. If the private sector will invest in and operate the WTE plant, it can be considered to include the upgrade of the landfill in their scope (to be further examined as part of the feasibility study).

A *Perda* (local regulation) is required as a basis for PJPK about the Environmentally Friendly Technology-Based Waste Processing Service Expenses through the Mechanism of Local Government Cooperation with Business Entities. The regulation needs to mention that for the next 20-25 years, Medan will spend its APBD (2018-2038) for the "tipping fee" of the private sector that manages PLTSa (WTE) Plant. The value of the tipping fee will be calculated in the feasibility study.

Action	Description and Responsibilities	Time Frame
WTE1.1	Set up a project management unit (PMU).	2016
WTE1.2	Prepare a project implementation plan (PIP) including detailed activities, responsibilities, time line, identification of qualified consultants, and budget.	2016
WTE1.3	Approve the PIP and budget.	2016
WTE1.4	Commission feasibility Study on WTE and landfill including preparation of TOR, identification and recruitment of qualified consultants, and FS implementation.	2017
WTE1.5	Prepare detailed design (cost estimates) including environmental impact assessment (EIA).	2017
WTE1.6	Prepare tender strategy.	2017
WTE1.7	Arrange permits, land rights, and any other regulations needed to realize infrastructure.	2018
WTE1.8	Prepare and draft tipping fee *Perda* as a result of financial analysis in the feasibility study, through relevant working groups including BAPPEDA, finance, Dinas DKP, and other relevant stakeholders.	2017-2018
WTE1.9	Tender project(s), select contractor(s), award contract(s).	2018
WTE1.10	Oversee construction until completion of Phase 1 (July 2019) and expansion (July 2020).	2018-2020
Responsible agency (PMU)	Dinas Kebersihan dan Pertamanan (DKP)	
Estimated costs (budget needs)	**Preparation (design, procure):** Rp2.9 billion **Realization (CAPEX):** Rp121.25 billion **Maintenance and operation:** Rp28.25 billion	
Implementing mechanism, funding, and financing	Options: • Traditional procurement and APBN budgets • BOT contracts with private sector where possible (combined with WTE plant)	
Other partners	**Medan:** Medan BAPPEDA, environmental agency (reviews environmental documents and issues the environmental permit) **Provincial:** Provincial Government of North Sumatra **National Government:** Ministry of Public Works, BAPPENAS (PPP book), PT SMI **Social/communities:** Existing landowners	

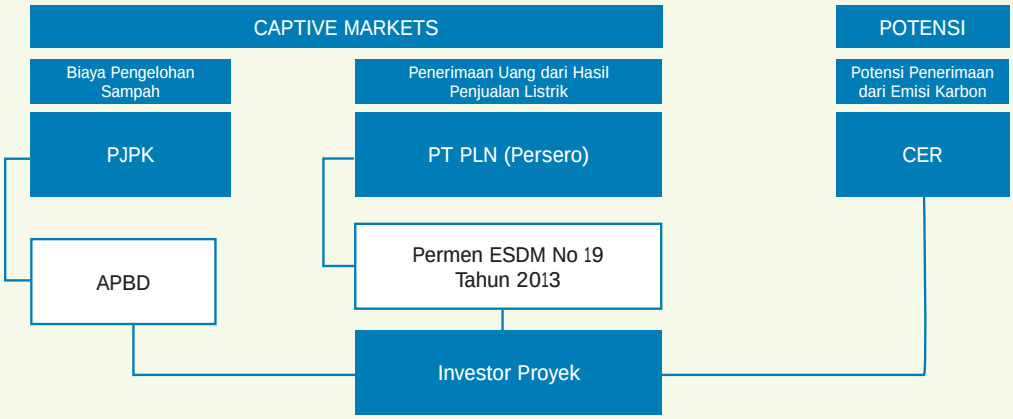
Source: Green Team/Mayor's Office.

Project WTE2: Waste-to-Energy Plant

Feasibility study has to be started in order to examine the feasibility of the WTE plant within the framework of commercial business. Based on the results, Medan City can start the tender and select the best bidding private sector partner. The pre-feasibility study can be done by the Government of Medan (*solicited proposals*) or by private company (*unsolicited proposals*). The tender will follow the procedures and rules laid down in Presidential Decree No. 38/2015.

It is essential that the maximum tipping fee is laid down in a local regulation (*Perda*) before the start of the tender. Typical model of PLTSa is presented in figure below.

PLTSa, within the framework of the commercial business:



Source: Green Team/Mayor's Office.

PLTSa within the framework of the commercial business

- Investor of PLTSa Project is generally required to provide a minimum equity of 20% from the estimated value of the project;
- The project is guaranteed by the government, in order to earn revenue from at least two main sources, which are (a) Waste Management Services Fee (Tipping Fee) from the local government; and (b) Purchases of electricity by PT PLN. From PLTSa in Bandung experience, SPC income from the tipping fee covers 44% and from the sale of electricity to PLN covers 56%.
- Local government ensures a minimum supply of garbage per day is ready to be processed by the Investor of the Project;

The power generation can be done by combustion / thermal or biological method. The conversion process through thermal methods can be achieved through several means of generation, namely by the method of pyrolysis, combustion, Plasma Arc Gasification, and thermal gasification.

Action	Description and Responsibilities	Time Frame
WTE2.1-10	Actions and planning same with actions WTE1. Feasibility study will show the advantages and conditions (tipping fee, contract duration, etc.) of combining this project with WTE1 and tendering WTE1 and WTE2 as one package to private developers/operators.	See above
Responsible agency	Dinas Kebersihan dan Pertamanan (DKP)	
Estimated costs (budget needs)	**Preparation (design):** Rp4.85 billion **Realization (construction):** Rp1,500 trillion **Maintenance and operation:** To be determined	
Implementing mechanism, funding and financing	Options: Traditional procurement and APBN budgets BOT contracts with private sector where possible (combined with sanitary landfill)	
Other partners	**Medan:** BAPPEDA **Regional:** PDAM **Social/communities:** Affected communities	

Source: Green Team/Mayor's Office.

Green Water—Action Plan Program: Increasing the Efficiency and Supply of Drinking Water

Why?

Due to population growth in our city and lack of recent investment in water supply infrastructure, particularly in distribution (very little investment since 1995), there are large unserviced areas within the city. The current service coverage provides drinking water to 73% (2015) of the total population. If not addressed now, further population growth will result in an estimated 5,000 liters per second (lps) shortfall in water supply by 2020. Currently, maintenance of systems is restricted by a lack of funding and approximately 26% of water treated is nonrevenue water (NRW).

Current Status

PDAM Tirtanadi (the provincial water supply company – North Sumatra) prepared a water supply master plan for Medan 2015-2035 and a business plan for 2015-2019, which outline many of the issues covered in this program. Some feasibility studies exist, and some of this work is underway already, but a coordinated approach is required for a successful citywide implementation. For this, PDAM requires support from a number of city stakeholders, hence, its inclusion in this GCAP to allow for better management of institutional partnerships for implementation, particularly coordination among BAPPEDA, Department of Housing, and PDAM. It is also necessary for PDAM to coordinate with surrounding municipalities, provincial, and central government stakeholders.

Goal

The objective of the program is to implement all planned raw water development and water treatment projects to meet projected demand, in combination with improved water distribution and household connections to keep up with the supply side (water treatment), which has historically been an issue in the Medan area. New customers will be added to increase revenues and operational efficiencies are proposed to further improve the sustainability of the system and provide an additional ‘greening’ element to this program.

Results

1. Expanded raw water production and treatment capacity from 5,700 lps in 2014 to 7,600 lps in 2020.
2. New distribution pipelines of 95 km rehabilitated and installed.

3. Increased household connections and enhanced marketing to increase PDAM customers to 500,000 by 2020.
4. Improved energy efficiency of the water supply system and reduced NRW from 26% in 2014 to 22% in 2020.

Benefits

1. An improvement of public service infrastructure in water supply.
2. Improvement of the health and hygiene of residents, and productivity and liveability in the city.
3. Access to drinking water for the urban poor.
4. Promotion of energy efficiency.
5. Better revenue generation to improve the financial performance of PDAM.

Success Indicators (targets)

Treated Water Production	
2015	5,700 lps
2020	7,600 lps
Water Supply to Residents	
2015	73%
2020	82%
Reduction in Nonrevenue Water	
2015	26%
2020	22%
Increased Customers	
2015	415,200
2020	500,000

Source: Green Team/Mayor's Office.

Key Risks

The projects are relatively well defined, the technology is straightforward, and the capacity is there to deliver them, but the key risks are as follows:

1. Funding availability.
2. Providing sufficient distribution infrastructure in line with increased water production capacity. As PDAM Tirtanadi is under the provincial government of North Sumatra, historically there has been limited engagement with the Medan City government.
3. Private sector agreements may be difficult to finalize.

Risk Mitigation

1. Involve the private sector where possible (in water treatment plant design, construction, finance, and operation).
2. Institutional coordination between the city government and PDAM (through the Green Team) in implementing network expansions in line with treated water supply increases.
3. Medan is a pioneer in water PPPs and have a track record since 1996, however risks still exist and technical assistance from Jakarta to assist in arrangements with private sector can be sought.

Project WAT1: Increase Raw Water Production and Treatment Capacity

PDAM Tirtanadi has limited capital budget for investment, however, the company has been a pioneer in PPP contracts in Indonesia and there is an ongoing BOT contract with PT TLM since 2001. This BOT approach and their experience with these mechanismss, along with APBN (central government) budgets is expected to mobilize the necessary funding and project finance.

By liaising with BAPPEDA to ensure expansion projects are in the medium-term development plan (RPJMN), government funding can be maximized. Collaboration between the city government and PDAM is therefore important, and presenting projects in an integrated manner (i.e., with the necessary upgrades to water distribution) will improve the probability of APBN funding.

All of the subprojects below are included in the PDAM business plan and their feasibility has been established, and will provide an additional 2,700 lps of treated water. PDAM will liaise closely with BAPPEDA and continue to deliver these water supply upgrades in line with its business plan. The existing management team within PDAM can develop projects in enough detail to engage the private sector and obtain funding where necessary. Treatment plants can be packaged together if this makes it more attractive for private sector investments, in this sense, a tender strategy will need to be developed.

Environmental impact of water abstraction shall be mitigated through thorough EIA, and land aquisition should be considered in early project development as this is a significant risk to the private sector. The provincial government of North Sumatra can support land aquisition.

Proposed subprojects include:
- WTP Martubung (additional 200 lps)—project ongoing
- WTP Sunggal (additional 500 lps) ABPN budget—project ongoing
- WTP Belumai (BOT contract)—project commencing
- New WTP Mebidang 1,500 lps (Raw water source: Bingei River in Binjai area)—expected to be BOT contract

Action	Description and Responsibilities	Time Frame
WAT1.1	Engage key contacts in BAPPEDA and the Provincial Government of North Sumatra.	2016
WAT1.2	Prepare project plan for all subprojects until realization including detailed activities, responsibilities, time line, need for external assistance (consultants), budget, funding sources, and implementation mechanism.	2016
WAT1.3	Approve project plan and budget estimates.	2016
WAT1.4	Undertake EIA, arrange permits, land rights, and any other regulation needed to realize the subprojects.	2017
WAT1.5	Prepare designs/specifications (including cost estimates), and technical options (sale purchase agreements, etc.) in sufficient detail for tendering (through various mechanisms).	2017
WAT1.6	Prepare tender strategy for design/construction and private sector engagement (tender) strategy (including risk minimization). Undertake market sounding and meeting with potential bidders. Establish a government contracting agency (GCA) and procurement committee.	2017

WAT1.7	Competitively tender and select contractor(s) or BOT firms.	2018
WAT1.8	Oversee construction of WTPs.	2018-2020
Responsible agency (PMU)	**PDAM Tirtanadi**	
Estimated costs (budget needs)	**Preparation (design, procure):** Rp50 billion **Realization (CAPEX):** Rp616 billion **Maintenance and operation:** To be determined	
Implementing mechanism, funding and financing	• Traditional procurement and APBN budgets • BOT (design) contracts with private sector	
Other partners	**Medan:** Medan BAPPEDA, environmental agency (reviews environmental documents and issues the environmental permit) **Regional:** Regional Government of Binjai and Deli Serdang **Provincial:** Provincial Government of North Sumatra **Central government:** Ministry of Public Works, BAPPENAS (PPP book), PT SMI. BBWS (River Basin Management Authority) to issue abstraction license (SIPPA) **Social/communities:** Existing landowners	

Source: Green Team/Mayor's Office.

Project WAT2: Rehabilitation and Extension of Distribution Networks

To meet targets, as well as increase raw and treated water supply, the Medan City housing agency (Dinas Perkim), in partnership with PDAM Tirtanadi, will improve/upgrade existing networks where capacity is insufficient due to increased population in those areas, and provide new distribution networks in un-serviced areas.

BAPPEDA of Medan City should coordinate the planning of this action as it requires a number of inputs, surveys, and social data. The housing agency and PDAM will evaluate existing networks, and a staged plan to implement these improvements will be developed. PDAM will evaluate the existing conveyance of water transmission pipelines and propose upgrades necessary to meet future requirements in all water supply zones, and specify the necessary improvements. The housing agency is responsible for the design and construction. Operation and maintenance responsibilities are transferred to PDAM on completion.

Action	Description and Responsibilities	Time Frame
WAT2.1	Green Team to set up a project management unit (PMU) to be led by BAPPEDA, including the housing agency and PDAM.	2017
WAT2.2	Prepare project plan including detailed activities, responsibilities, time line, need for external assistance (consultants), budget, etc.	2018
WAT2.3	Approve project implementation plan and budget.	2017
WAT2.4	BAPPEDA to coordinate the evaluation of existing networks and development planning.	2017
WAT2.5	Detailed consultation phase with all relevant stakeholders, city agencies—housing, environment, highways—and communities and landowners affected by easements and construction.	2018
WAT2.6	Procurement of detailed design and cost estimates by engineering consultants by Dinas Perkim (housing agency).	2018
WAT2.7	Excavation permits issued by highways agency and EIA approved by environment agency (BLH).	2019
WAT2.8	Construction supervision (tendered by housing agency) and project completion and transfer to PDAM.	2019-2020
Responsible agency	**Medan Housing Agency**: Responsible for the construction of water distribution networks	
Estimated costs (budget needs)	**Preparation (design):** Rp1.2 billion **Realization (construction):** Rp144 billion **Maintenance and operation:** To be determined	
Implementing mechanism, funding and financing	• Traditional procurement • Funding by APBD I and APBD II	
Other partners	**Medan:** BAPPEDA, Police department and transportation agency (for mitigating construction impacts on traffic), in partnership with other utilities to improve efficiency in utility communication network expansions **Regional:** PDAM **Social/communities:** Affected communities, businesses, social services (schools, hospitals, etc.)	

Source: Green Team/Mayor's Office.

Project WAT3: Increased household connections and PDAM customers

This project aims to supply 400,000 new residents, through 75,000 new household customers within the existing and expanded networks. This also requires a social marketing program. This is under the existing business plan of PDAM. Housing Department will provide non- piped water 'kiosks' to remote, low density, low income areas.

The project will be managed and implemented by PDAM through existing expansion management structure. It will be delivered in close coordination with Project 2. The City of Medan, through BAPPEDA, has a responsibility to agree final plans, facilitate consultations and construction permits.

Action	Description and Responsibilities	Time Frame
WAT3.1	PDAM to establish a project plan in coordination with Project 2 teams. Coordinate with BAPPEDA to integrate spatial data in order to discuss existing situation and future spatial planning.	2017
WAT3.2	Socialization and advocacy of the project in coordination with community groups, particularly low-income groups and to include female voices—especially for planning water kiosks.	2017
WAT3.3	PDAM to establish final designs, and finalize required permits.	2018
WAT3.4	PDAM to procure materials and construct new metered household connections in coordination with new customers. Establish new customers in existing billing register/ database, and integrate with GIS system.	2020
WAT3.5	Department of Housing to install water kiosks for low-income communities in coordination with PDAM.	2020
Responsible agency	PDAM Tirtanadi	
Estimated costs (budget)	**Preparation (design):** Rp5 billion **Realization (construction):** Rp60.7 billion **Maintenance and operation:** To be determined	
Implementing mechanism, funding and financing	• Traditional project mechanisms	
Other partners	**Medan:** BAPPEDA, housing agency **Social/communities:** RW (hamlet), RT (ward), *Kelurahan* (village) leaders and committees Female heads of household Other community groups Consider potential partnerships with NGOs working in urban water supply and sanitation	

Source: Green Team/Mayor's Office.

Project WAT4: Nonrevenue Water Reduction and Energy Efficiency Improvement

Reducing nonrevenue water and energy efficiency in water treatment and distribution will increase available budgets for operation and maintenance, supporting a sustainable water operator (PDAM) supply for the residents of Medan.

This project should be coordinated/integrated with Project 1 because new treatment plants should consider energy efficient technology; Project 2 because rehabilitating and expanding networks should consider leakage reduction and metering/zoning; and Project 3 because new household connections should be metered and affordable tariffs set and collected.

The project includes an energy efficiency audit, detection and reduction of leakage, gradually introducing improved district metering areas and data-basing to evaluate losses, installation of pressure reduction valves, replacement or re-specification of inefficient pumps, and continual replacement of customer water meters.

Action	Description and Responsibilities	Time Frame
WAT4.1	PDAM to prepare detailed project plan, including coordination strategy with Projects 1, 2, and 3. Green teams and BAPPEDA can act in a coordinating role. Initial consultation with specialist energy efficiency companies should be undertaken.	2018
WAT4.2	Energy efficiency audit and updated NRW baseline. This can be undertaken by a specialist consulting firm.	2018
WAT4.3	Procurement of leak detection equipment, if necessary.	2018
WAT4.4	Gradual phasing of district metered areas in coordination with Project 2.	2019
WAT4.5	Evaluation of excessive pressure and procurement and installation of approximately 100 pressure reduction valves. Replacement of inefficient pumps.	2019
WAT4.6	Installation of up to 36,000 replacement customer meters per year. Calibration of existing meters.	2020
WAT4.7	Socialization of payment for water to reduce illegal connections and prosecutions.	2020
Responsible agency	**PDAM**: Responsible for delivering NRW reductions and energy efficiency improvements	
Estimated costs (budget needs)	**Preparation (design):** Rp3 billion **Realization (construction):** Rp25 billion **Maintenance and operation:** To be determined	
Implementing mechanism, funding and financing	• Performance-based contract	
Other partners	**Social/communities:** PDAM customers	

Source: Green Team/Mayor's Office.

Finance Actions

Fiscal Capacity

The Green Team concluded that there are possibilities to further increase own local income (PAD). Possible specific actions to increase PAD that were brought up by the Green Team are the following:

- Introduce electronic tax collection system. This will increase collection rates, for example, for restaurant tax and entertainment tax.
- Improve database for IMB (building permits) and PBB (property tax).

The Green Team intends to develop a revenues improvement action plan to further explore these and other options and to formulate specific actions to achieve this.

To improve budgets available for capital expenditures, the Green Team sees opportunities to decrease annual unused cash balances by improving procurement and planning. This could partly free up funds for capital projects. Possible specific actions identified are

- Advanced procurement: Medan can start procurement procedures before the local budget (APBD) is officially formalized. By this, Medan can avoid delays.
- Medan is already making use of E-procurement system (electronic).

An initial analysis of the potential borrowing capacity showed that Medan could potentially borrow over Rp3,000 billion (US$230 million) in 2016 and over Rp5,000 trillion (US$424 million) between 2016 and 2020. The Green Team indicates that this looks promising. The Green Team will discuss with high-level decision makers the possibility of attracting loans for green actions and projects that do add value to Medan's economy and liveability but for which no budgets are currently available and actions to further explore this opportunity. The city will put special attention to its low classification (score 0.25) according to MoF Regulation no.33/PMK.07/2015 on Map of Local Government Fiscal Capacity.

The following pages show the result of the Fiscal Analysis and Financial Assessment Report.

Alternative Mechanisms to Attract Financing

The table below summarizes the result of exploring the potential for applying alternative mechanisms to priority programs. The Green Team learned that alternative mechanisms can be applied to WTE and BRT. Actions aimed at further exploring and applying these models have been incorporated in the action plans for these priority programs.

Table 1 – Summary of Medan Action Plans

Project and Owner (rows)/Financing Options (columns)	(A) Financing	(B) Funding	(C) Implementing Mechanism	(D) Financing Sources (options)	(E) Funding Sources (options)
Human Waste Management		✔	**Medan City:** septic tanks **PDAM Tirtanadi:** trucks	No	**Medan City:** Septic tanks **PDAM Tirtanadi:** trucks
Bus Rapid Transit	✔	✔	BUMD/BLUD (own company)	**Private sector:** buses and possibly stations **International**	**National and city budgets:** dedicated bus lines **National budgets**: buses **Development institutes:** business plan BUMD (GiZ), detailed design bus lanes (ITDP)
Waste-to-Energy	✔	✔	BOT (contract); (ii) BU joint venture (company public and private)	Not yet explored	Tipping fee: no number mentioned
Water Supply		✔	**PDAM Tirtanadi**	Significant availability payments could attract private sector investments. Lessons learned from ATB-(Batam) and BOT contract with PT Tirta Lyonnaise Medan, a joint venture between the Suez Group of France (85%) and PDAM Tirtanadi (15%).	PDAM Tirtanadi, making use of city budgets