Bus Rapid Transport Development in Greater Jakarta (Jabodetabek)

Finance-Ready Proposal

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ADB	Asian Development Bank
AFD	Agence Française de Développement
APBD	Anggaran Pendapatan dan Belanja Daerah - Regional Government Budget
APBN	Anggaran Pendapatan dan Belanja Negara – State Budget
BAPPENAS	Badan Perencanaan Pembangunan Nasional - National Development Planning Agency
BRT	Bus Rapid Transit
CCPL	Climate Change Programme Loan
CDM	Clean Development Mechanism
COP	Conference of Parties
DKI	Daerah Khusus Ibukota – Special Capital Region
DNPI	Dewan Nasional Perubahan Iklim- National Council on Climate Change
EIRR	Economic Internal Rate of Return
ER	Emissions Reduction
FPA	Fiscal Policy Agency
GFC	Global Financial Crisis
GHG	Greenhouse Gas
ICCTF	Indonesia Climate Change Trust Fund
IGIF	Indonesian Green Investment Fund
IRR	Internal Rate of Return
JICA	Japan International Cooperation Agency
LoI	Letter of Intent
MRU	Mobile Refueling Units
MRV	Measuring, Reporting & Verification
NAMA	Nationally Appropriate Mitigation Action
NAP	National Action Plan
OMS	Operational & Maintenance Services
PES	Payment for Ecosystem Services
PIP	Pusat Investasi Pemerintah – Government Investment Unit of Indonesia
RAD GRK	Local Mitigation Action Plan for Greenhouse Gas Emission Reduction
RAN GRK	Rencana Aksi Nasional Penurunan Emisi Gas Rumah Kaca - National Action Plan for Green House Gas Emission Reduction
REDD	Reducing Emissions from Deforestation and Degradation
RPJMD	Rencana Pembangunan Jangka Menengah Nasional - Regional Midterm Development Plan

SPBG	Stasiun Pengisian Bahan Bakar Gas – Special Stations for selling CNG products
UNFCCC	United Nations Framework Convention on Climate Change
WB	World Bank

1. Background

Indonesia is a tropical archipelago comprising of about 17,000 islands. With an estimated population of 240.8 million, Indonesia is the fourth most populous nation in the world after China, India, and the USA. About 44% of the population of Indonesia resides in urban areas, with the annual rate of urbanization estimated at 1.7% over 2010-15, and land transport plays a major role in fuel consumption. Land transport consumes nearly 50% of the total fuel consumption in Indonesia, of which nearly 90% is consumed by road transport. With the country's population expected to grow by 2.5 million people per year through to 2015, car ownership is growing at about 12%/year, bus and lorry ownership by about 11%/year, and motorcycle ownership by 17%/year. This rate of growth is expected despite the roads in cities growing at less than 1%/year. These trends have led to increased traffic congestion and air pollution, with the transport sector contributing 60% to 80% of all air pollution.

As an emerging economy in the dynamic Asia-Pacific region and one of the world's fastest growing economies, Indonesia's gross domestic product has grown 5.7% on average for the past 20 years. Sustainable planning may not always be aligned with accelerated development, however, and Indonesia is marred by failing infrastructure, especially regarding present traffic conditions. Indonesia is particularly susceptible to non-sustainable practices as the country ranks first in global marine biodiversity and second in terrestrial biodiversity.

In September 2009, during the G20 Summit meeting in Pittsburgh in the USA, Indonesia committed to establish policies and measures along with related instruments (Situmeang and Lubis, 2009). Indonesia's President Yudhoyono pledged to cut emissions by 26% by 2020 using the state budget and by 41% if financial support was received from developed nations compared to a business as usual scenario. Following this announcement, in December 2009, Indonesia subscribed to the Copenhagen Accord. The National Council on Climate Change (DNPI) - the responsible body for policy co-ordination to address climate change - reported its NAMA ambitions as a follow-up to the Copenhagen Accord to achieve national targets, notably including the following seven major focus areas[1].

1. Sustainable Peat Land management
2. Reduction in Rate of Deforestation and Land Degradation
3. Development of Carbon Sequestration Projects in Forestry and Agriculture
4. Promotion of Energy Efficiency
5. Development of Alternative and Renewable Energy Sources
6. Reduction in Solid and Liquid Waste
7. Shifting to low-E mission Transportation mode.

Under the aegis of the Indonesian Ministry of Transport, the NAMA program in the transportation sector promotes sustainable urban transport in Indonesian Cities by implementing and monitoring measures in order to halt the increasing motorization and reduce externalities of transportation. For example, the country is implementing a NAMA in the transportation sector named Sustainable Urban Transport Programme (NAMA SUTRI). The scope of this project largely covers:

- Public Transport system improvements (system reform, network, management, operation)

[1] http://unfccc.int/resource/docs/2011/awglca14/eng/inf01.pdf

- Investment in energy efficient vehicles (buses)
- Investment in infrastructure (e.g., bus stops, pedestrian infrastructure, parking meters)
- Integrated planning, parking management, informal bus-system / private vehicle regulation

The pilot phase of NAMA SUTRI, which has successfully applied for and was selected to receive financial support for implementation through the NAMA Facility, does not include large infrastructure projects e.g., rail projects, bridges, or road construction for road network extension. To complement NAMA SUTRI, this NAMA concept note describes a second NAMA concept that elaborates construction of a bus rapid transit (BRT) system in greater Jakarta. Implementing this BRT NAMA, officially entitled "Bus Rapid Transport Development in Greater Jakarta (Jabodetabek)", is envisaged to bring a considerable mode shift from the private to public system, thereby substantially reducing GHG emissions. Jabodetabek is the name formed by combining initial syllables for the five Greater Jakarta regions, Jakarta, Bogor, Depok, Tangerang, and Bekasi.

NAMAs are crucial for the implementation of various climate action plans that are part of the National Action Plan for Green House Gas Emission Reduction (RAN-GRK) and Local Mitigation Action Plan for Greenhouse Gas Emission Reduction (RAD GRK) in Indonesia. This is because:

(i) NAMAs are meant to provide important means for operationalizing the RAN-GRK;
(ii) NAMAs can help Indonesia to tap the Green Climate Fund and other international funds; and
(iii) NAMAs should enable Indonesia to obtain UNFCCC recognition for its mitigation efforts.

Jabodetabek is a large-scale metropolitan area with a population of 21 million that consists of Daerah Khusus Ibukota/DKI (Capital Special Region) Jakarta, as the capital city of Indonesia and center of politics, economy and social activities, and seven local governments (Bodetabek) in the surrounding areas: Kota (municipality) Bogor, Kabupaten (regency/district) Bogor, Kota Depok, Kota Bekasi, Kabupaten Bekasi, Kota Tangerang, and Kabupaten Tangerang. Traffic congestion is a chronic problem faced in the Jabodetabek region and the situation is expected to worsen should there be no improvement on the existing transportation system. At present, the economic loss caused by traffic congestion in the region is estimated as much as USD 68 million per year and this estimate excludes the impacts of traffic congestion and pollution on human health (Asri and Hidayat, 2005).

The Transjakarta BRT was launched in 2004 to provide a way for Jakarta's citizens to get through the city's notorious congestion and to reduce greenhouse gas (GHG) emissions. The environmental objective of this project has been to reduce GHG emissions from urban transportation by improving a BRT system and its related facilities. The overall objective of the Bus Rapid Transport Development in Greater Jakarta (Jabodetabek) NAMA project is to maximize the effectiveness of Jakarta's BRT system and use it as a catalyst for urban transport reform in Jakarta and other key Indonesian cities. This NAMA concept has been developed by conducting numerous interviews and in-country missions to interview local experts, including Ministry of Transportation, Environmental Agency, Transjakarta, DNPI and the former President's Delivery Unit for Development Monitoring and Oversight (UKP4). Ernst & Young consultants were provided a NAMA report for review and as a reference during the inception phase of the NAMA development project that was developed by local consultants, Institut Teknologi Bandung.

In Jakarta, the primary policy for improving transport and reducing congestion and emissions has been through supporting the Transjakarta Busway, which currently has 12 corridors. A corridor is defined as a separate pathway along which only the BRT buses travel, separate from other vehicular movement on the road. The Transjakarta Busway has seen a steadily increasing mode shift of users from cars to the busway. Other policies that have been introduced include restricting lanes to cars with at least three passengers and the introduction of road pricing. The government is also considering supporting energy

diversification in transport (including biofuels and liquefied petroleum gas or LPG), encouraging the use of cycles and improving traffic safety.

The benefits of the Bus Rapid Transport Development in Greater Jakarta (Jabodetabek) NAMA are to be evaluated in terms of annual GHG emission reductions and travel time savings. The NAMA achieves these targets by improving the performance of the BRT by maximizing ridership and utilizing the BRT to build the image of public transport, improving pedestrian facilities, improving transport demand management and scaling up non-motorized transport.

Increasing demand for personal mobility as a consequence of ever-increasing economic activity in Greater Jakarta (Jabodetabek) requires the availability of an efficient transportation system. In this regard, quality mass public transport is considered the most suitable transportation system as it will facilitate a modal shift from personal to mass transport and therefore reduce traffic congestion, improve transport energy efficiency, and reduce GHG emissions and air pollution. Keeping this in mind, the proposed NAMA project that is described in detail in Section 3 is being implemented to upgrade the existing BRT system in DKI Jakarta.

The NAMA is largely unilateral or funded from national sources; however, there exists gaps in finance so there is potential for scaling up of the NAMA activities. This finance-ready proposal can be utilized to avail funding for this NAMA project to complement the unilateral component. Originally, this NAMA project was proposed to be a unilateral NAMA, funded using a domestic budget, namely from the APBN/APBD (central/local government budget), private sector, and other sources (the Central Government Investment Agency known as Pusat Investasi Pemerintah or PIP, the Indonesia Climate Change Trust Fund or ICCTF, etc.). The possibility of international funding is now being evaluated because there exists gaps in finance. Therefore, this finance-ready proposal can be utilized to avail funding for this NAMA project as needed.

In a mega city and economic center like DKI Jakarta where many of the workers commute daily from its surrounding cities, reduced traffic congestion will reduce commuting time and eventually will improve the productivity of the workers. Modal shift from personal to mass public transport will therefore reduce transport cost and lead to time saving benefit for the workers.

2. Introduction

The main objective of the Bus Rapid Transport Development in Greater Jakarta (Jabodetabek) NAMA is to further develop the BRT system in Jakarta in order to reduce traffic congestion, increase energy efficiency in transport, improve urban air quality, and reduce GHG emissions from urban transport. As noted in the National Action Plan to Reduce Greenhouse Gas Emissions or RAN-GRK, transport is one of the five mitigation priority areas. This NAMA is aimed at infrastructure development for facilitating public transportation for commuters from outside and within DKI Jakarta. Administratively, the main proponent of the NAMA project is the government of DKI Jakarta. The project is expected to encourage traffic mode share shift from private to public transportation.

This NAMA report was developed under the UNDP Low Emission Capacity Building (LECB) Programme, a global initiative in 25 countries to build capacities to design and implement low emission development. The LECB Programme is supported through generous contributions from the European Commission, the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (BMUB), and the Government of Australia. More information can be found at www.lowemissiondevelopment.org.

The NAMA includes three main components, notably the procurement of gas-fueled buses for Transjakarta busway, construction of bus lanes, bus stops, and gas refueling stations as per the following specifications:

- Procurement of 380 natural gas-fueled buses in 2015 – 2017
- Construction of three new corridors – No. 13, 14 & 15 (bus lanes) that span 49.3 km in 2016-2017
- Construction of five gas refueling stations in 2015 - 2017

The new buses procured will cater to all the 15 corridors, however the five new gas stations will cater to the new bus corridors 13 to 15. The implementation phase of the project will span for three years and after the buses and new corridors are operational, the buses will be replaced every 10 years.

In conjunction with NAMA design and implementation, several measures are being undertaken to scale up the modal shift in transportation to BRT, and this is anticipated to support issues that have thus far limited widespread growth in BRT use. Notably, there has been a lack of busses on the road, non-compliance of bus procurement contracts, lack of strict regulation on traffic lane violations in Jakarta, fossil fuel subsidies that incentivize ownership of personal vehicles, and lack of capacity to monitor the Transjakarta network in real time.

In Jakarta city, fuel used by buses is natural gas while cars and motorcycles use diesel. Hence, the pollution index of the buses (1.73kg/L) is much lower in comparison to cars (2.42kg/L) and motorcycles (2.42kg/L). Currently, the buses is less in comparison to private modes of transport. Hence, the project scenarios for the NAMA intervention has been considered to have shift of passengers from high emission inducing mode of transport to lower emission inducing mode of transport. This will moreover, help to introduce more natural gas buses into the system.

The above project is in line with RPJMD (Regional Midterm Development Plan) and RAD (Regional Mitigation Action Plan) of the region. The BRT Jabodetabek, started in 2004 in DKI Jakarta, was funded using APBD (regional government budget). This NAMA project for DKI Jakarta is expected to lead to GHG emission reduction of 0.443 million-ton CO_2 starting in 2018. It should be noted that between 2019 and 2030, some of the buses that will have already passed their technical life expectancy and will have to be replaced. The RAD target of Jakarta is to achieve GHG emission reduction estimated to around 60 Mton

CO_2eq (CER Indonesia, 2011). The largest source to reduction is expected to come from transportation with 57% contribution, followed by electricity. Therefore, the implementation of this NAMA project can help meet the RAD target in DKI Jakarta.

This finance-ready NAMA proposal evaluates the present climate change finance landscape in Indonesia and the policy and regulatory framework conducive to financing such NAMA projects in Indonesia, and also discusses the potential barriers envisaged for project implementation. The possible financial instruments have also been identified to scrutinize the accessibility of finances for the defined NAMA and the current capabilities of delivering finance in Indonesia.

By studying the NAMA technical requirements, available data of the existing corridors and national environmental policies, by analyzing all driving factors, forecasting the national economic priorities, and illustrating alternative scenarios of the planned measure, a cost benefit analysis of the project case was developed. The cost benefit analysis that was conducted as a part of the IRR and EIRR calculation depicts the total costs of implementation of the planned measures and indicates the direct emission reduction benefits of the NAMA project. The project is analyzed as compared to a Baseline/No Build BRT scenario, Business As Usual scenario (BAU), and three possible project scenarios in consultation with UKP4, UNDP-LECB, Institut Teknologi Bandung, Transjakarta, Ministry of Transportation, and Environment Agency.

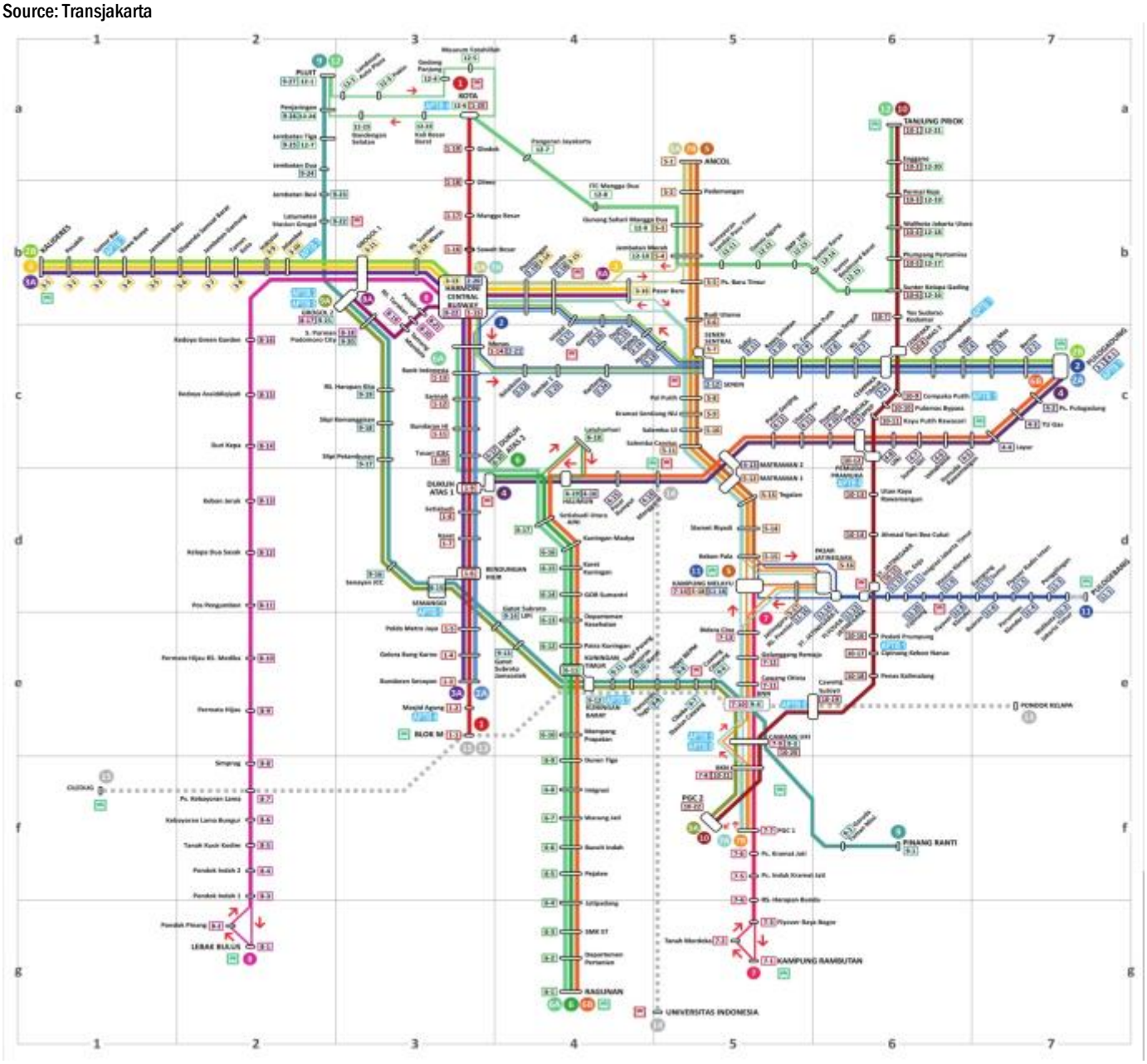
The three possible NAMA project scenarios considered and analyzed are as follows:

- Reduction of 25% of cars and motorcycles from the Baseline scenario
- Reduction of 35% of cars and motorcycles from the Baseline scenario
- Reduction of 45% of cars and motorcycles from the Baseline scenario

The map of Transjakarta provided in Figure 1 depicts the existing and proposed corridors. The proposed corridors are marked using dotted grey lines.

Figure 1 - Map of Transjakarta

Source: Transjakarta



This NAMA proposal has been prepared on behalf of the Government of Indonesia to upgrade the Transjakarta BRT. This proposal summarizes the main objectives of the NAMA project, costs, projected GHG emissions, internal return on investment, the need for the project, the current status of climate finance in the country, and the institutional, policy and legal frameworks that could be supportive of the project.

In addition, a detailed investment analysis has been done through cash flow calculation, financial flow requirements and estimating the project internal rate of return (IRR), and economic internal rate of return (EIRR). The Sensitivity Analysis that was performed (see Section 7) shows how the values of IRR, EIRR, and expected emissions reduction change for each of the three alternative scenarios as input parameters change, therefore analysing the risk of investing in the project. The proposal concludes with an analysis

of the possible barriers to project implementation and the project management capabilities in Indonesia. This proposal therefore presents a viable business case for this project.

MRV system development is not incorporated into this report. The MRV system for the NAMA was developed separately by the LECB-Indonesia team. Aside from being an international requirement under the UNFCCC, MRV of mitigation actions is also an important management tool for countries to use to track their progress in moving to a low-emission development path and in achieving sustainable development goals. In this way, MRV becomes an important GHG management tool, since it enables monitoring of the implementation and effectiveness of mitigation actions.

The measurement component of MRV enables assessment of the implementation of plans, the achievement of objectives/goals and the taking any necessary corrective steps that may be required. Reporting and verification ensure communication of consistent and reliable information to appropriate authorities in order to facilitate assessment.

Communication and information strategies:

In Indonesia, there are already existing BRT corridors (e.g., in Jakarta and Yogyakarta) and the Indonesian Government has already started implementing various instruments like regulatory, planning, fiscal, Investment, communication and information to bring about transformational changes to the sector. Going forward, it is recommended a comprehensive BRT communication and information strategy is developed that may include:

1. **Developing vehicle fuel-efficiency standards (national)**: Ministry of Energy and Mineral Resources (MEMR) and Ministry of Transport are the key ministries which should be involved in developing vehicle fuel-efficiency standards. A recent study sponsored by Ministry of Finance, Government of Indonesia recommended introduction of vehicle efficiency standards along with measures to reduce congestion (like BRT). [2]
2. **Driver training**: To make the BRT successful in terms of emission reduction, the Indonesia Ministry of Transport has to mandate special bus driver training programs. Transjakarta may acquire support from external agencies or use internal expertise for developing the training modules for the drivers who will be employed in the BRT corridor.
3. **Information campaigns (local, regional, national):** BRT system was introduced in Jakarta in 2004 and is already a popular mode of transport. The peak throughput (passengers/hr/direction) for the existing BRT system is 3,400 passengers (as of 15 May 2012) for the south of Tosari station (line 1). The number of system passenger-trips per day for the BRT in Indonesia are around 350,000 (Dec-12).[3] Hence, the Ministry of Transport and Transjakarta are not new to the concept of information campaigns required to encourage widespread use and ridership of BRT. To promote the new BRT lines, sustained communication, education, marketing and advocacy activities may be carried out. This may include advertisements on electronic and traditional billboards in key areas, prime time airing of television and radio spots advertisements, and newspaper advertisements. Further, Transjakarta may carry out systematic public relations initiatives to guarantee continued media coverage on the progress of the new BRT project. Such media coverage should illustrate success stories showcasing the benefits of the BRT for passengers. Posters, flyers, etc. should be developed for information dissemination, and displays at prominent transport hubs like airport and railway stations.

[2] http://www.vivideconomics.com/wp-content/uploads/2015/10/34a-Final-Report-Consolidated-Renewable-Energy-and-Energy-Efficiency-English.pdf
[3] http://www.worldbrt.net/en/cities/jakarta.aspx

Transjakarta already has a BRT website and a mobile based application system to support ease of access to information. After seeking passenger input, the mobile app based system should be regularly updated to make the Mobile App more interactive as well as user friendly.

4. **Multimodal journey planners (local)**: To create a transformational change in how people travel in Jakarta, Transjakarta along with City Administration of Jakarta has to invest in developing an intelligent transport system (ITS). The ITS would provide travelers with comprehensive micro level information allowing traveler to make well informed decisions. The proposed ITS would need to efficiently integrate information for different transport modes based on the pillar of rail and BRT. The main objective of the ITS action plan should be to optimally use travel and traffic information to encourage multimodal travel.

All the assumptions made for the purpose of the model calculations are based on stakeholder consultations, a summary of which has been attached in Annexure A.

3. Climate Finance in Indonesia

This section details the current climate finance climate in Indonesia. The sub-sections provide an overview of domestic and international climate finance available in the country that is contributing to meet emission reduction targets and therefore provides clarity on the need for further climate funding.

At least IDR 8,377 billion (USD 640 million)[4] of climate finance from public sources was disbursed in Indonesia in 2011. This figure of 2011 expenditure falls below Indonesian government estimates of the level of annual finance required by 2020 to meet emission reduction targets. However, both domestic and international public flows are expected to grow in the next few years as comprehensive national policies on climate change mitigation (RAN-GRK) and adaptation (RAN-API) are fully implemented (Ministry of Finance & Climate Policy Initiative, 2014).

3.1 Domestic Climate Finance

Mitigation projects can directly or indirectly reduce GHG emissions. Direct mitigation activities are GHG reductions that occur directly because of the investment made. For example, investment in RE generation, waste management projects, etc. Indirect mitigation results in GHG emission reduction as an indirect effect of investment made such as investment in manufacture of energy efficient products, projects to improve fuel efficiency of cars, etc.

National public resources are at the center of Indonesia's climate finance landscape. Based on 2011 data, the bulk of domestic climate finance supported essential indirect activities, such as policy development, research and development, establishment of measuring, reporting and verification systems, and other enabling environments. These activities are expected to drive the future scale up and effective allocation of finance by laying the foundation for direct mitigation projects. The Government of Indonesia's focus on indirect activities was so directed because of its role in developing and implementing policies and frameworks to stimulate direct investments (Ministry of Finance & Climate Policy Initiative, 2014).

In terms of indirect activities, most support was targeted at the forestry sector (73%), with another 10% targeted at agriculture and 7% focused on energy. This focus aligns with the fact that a high percentage of Indonesia's emissions come from the land sector. Finance for direct mitigation in Indonesia was targeted at transport (35%), waste and waste-water (26%), agriculture and livestock management (27%), and energy (10%).

In 2011, central budget expenditure of IDR 5,975 billion or USD 460 million was used for climate financing in Indonesia. This amount included international money received by the central government and channeled directly into the state budget. These flows were disbursed mainly to central government ministries and agencies (97%), with expenditures to local governments making up the very small remaining portion (Ministry of Finance & Climate Policy Initiative, 2014).

In addition to budget transfers in 2011, the central government made investments (a total of IDR 1,266 billion or USD 100 million), mostly through equity participation in state-owned enterprises and revolving funds to support projects and activities that generated revenues. However, of the total investments, only

[4] All the conversions in this report from IDR to USD have been made on the basis of exchange rate as on April 27, 2015.

IDR 30 billion were disbursed through the revolving funds to project activities in 2011 (Ministry of Finance & Climate Policy Initiative, 2014).

3.2 International Climate Finance

International development partners have added significantly to domestic public resources by contributing an estimated IDR 2,851 billion (USD 220 million) to public climate finance flows in 2011. In this year, the majority (68%) of international climate finance went directly to fund mitigation and adaptation projects happening on the ground. A large share of this (55%) went directly to state-owned enterprises and the private sector (mostly in the form of loans). The remaining 32% of international public climate finance went to support indirect activities by central and local governments (e.g., policy development) and organizations involved in capacity and knowledge building, including private consultancies, international organizations and NGOs (Ministry of Finance & Climate Policy Initiative, 2014).

In 2011, international resources were split almost evenly between grants and loans in support of climate change projects. Loans went to support infrastructure projects with direct mitigation and adaptation benefits (e.g., a geothermal power plant, and a drainage rehabilitation project), while grants were directed to building enabling environments and other forms of readiness.

The *Climate Change Programme Loan (CCPL)*, managed by the Ministry of Finance, was a concessional loan provided by international donor agencies (JICA, AFD, ADB, and WB) to support efforts to develop a lower carbon and more climate resilient growth path. This policy loan[5] was incorporated into the general budget and was not attached to any specific programme of a line ministry. The loan disbursements were governed by a policy action framework agreed in advance with the Government.

The Indonesia Climate Change Trust Fund (ICCTF), established in 2009, is managed by the National Development Planning Agency known as Bappenas. This is a national fund that coordinates sources of climate finance and aligns them with national development priorities. The ICCTF acts as a vehicle for donors making financial pledges to pool resources for efficiency gains by reducing transaction costs.

CCPL and ICCTF are examples of successful disbursements of international climate finance that show that development partners operating in Indonesia and the Government of Indonesia are equipped to absorb significant climate change-directed resources at scale or pace. This proposal reflects the viability of the BRT up-gradation project to be funded using international grants.

[5] Here, policy loan refers to CCPL. This loan supports the policies for lower carbon and more climate resilient growth path.

4. Institutional Framework in Indonesia

This section identifies the institutional framework in Indonesia that governs the development and implementation of NAMAs for the transport sector.

In 2008, the National Council on Climate Change, or Dewan Nasional Perubahan Iklim (DNPI) in Indonesian, was established by Presidential Decree No. 48/2008 as the primary body for policy coordination on climate change.

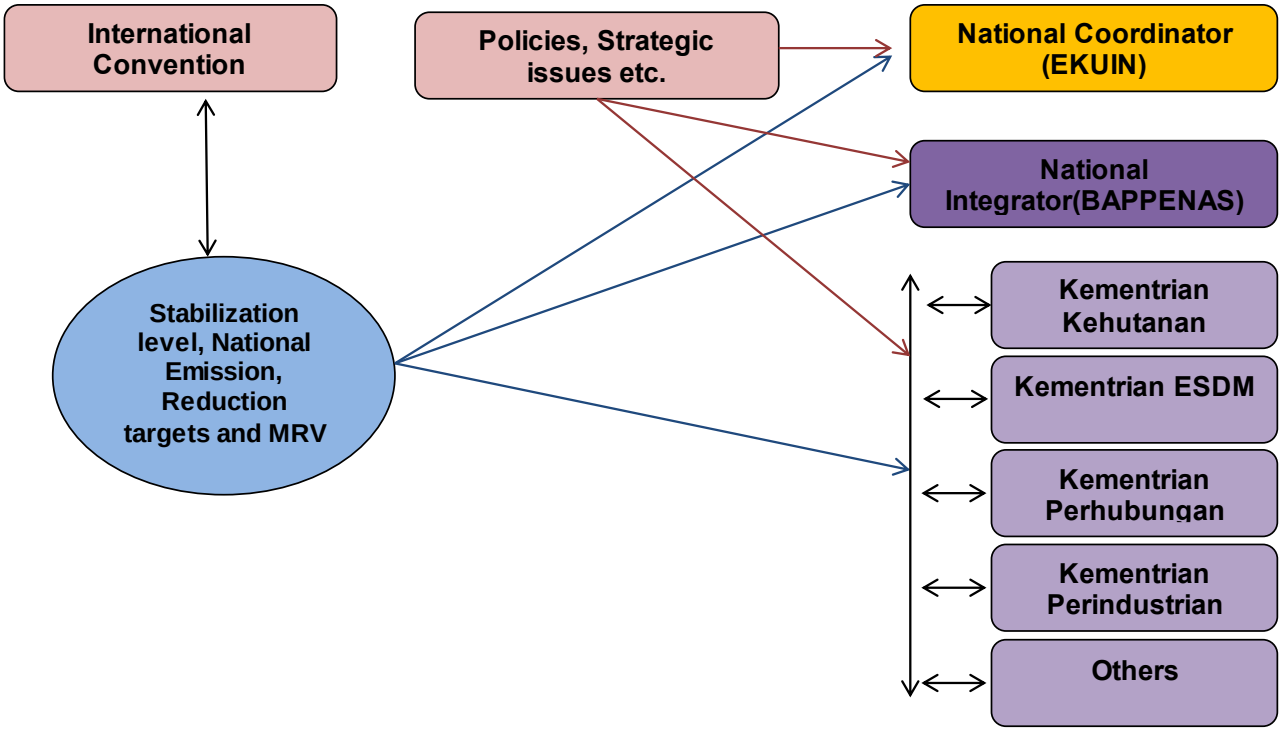
The Ministry of Finance established the Centre for Climate Change Financing and Multilateral Policy at the Fiscal Policy Agency (FPA) in 2011 to perform such functions as formulating policy recommendations, and analyzing, evaluating, coordinating, implementing and monitoring climate change financing-related issues. This Centre also deals with economic and financial cooperation within the G20 and other multilateral forums. In addition, the Ministry of Finance has a Technical Assistance Team on Climate Change Policy (soon to be renamed The Technical Assistance Team on Green Economy) reporting directly to the Finance Minister. The Ministry of Finance authorizes the PIP (the Indonesia Investment Agency), which is a part of the Ministry of Finance, to invest and finance low carbon investments in partnership with the private sector. The PIP is planning to form the Indonesian Green Investment Fund (IGIF), a pooling fund with participation from government, multilateral agencies, donors, and private sources, with the purpose to finance environmental friendly investments through public private partnership (PPP) schemes.

The National Development Planning Agency (Bappenas) performs many roles related to mapping direction for Indonesia's mitigation activities. Based on cost effectiveness and implementability, Bappenas establishes a national priority list of potential mitigation actions to establish NAMAs in meeting the national emission reduction target, aggregating mitigation actions into NAMAs where appropriate. Bappenas's tasks include:

- Setting medium and long-term goals;
- Constructing a national BAU baseline based on an aggregated sector data, and analyzing trajectories for national emission reduction;
- Identifying potential mitigation actions, and their aggregate mitigation potential;
- Establishment of carbon budgets for each sector (i.e., sectoral GHG emissions);
- Assessing investment and mitigation costs, system abatement costs, financing and support requirements and lead time for implementation and impact; and
- Providing assistance with design and implementation of policies, measures and instruments.

The Coordinating Ministry of Economic Affairs deals with matching economic policies with climate change and vice versa, coordinating sectorial/line-ministries with Bappenas. In addition, relevant line ministries and agencies are in charge of managing climate finance in their respective areas, in particular Forestry, Agriculture, Environment, Energy and Mining, Trade, Industry, Transportation, Public Works, and others. The following figure gives a description of the institutional framework that handle climate finance in Indonesia.

Figure 2 - Institutional Framework



Under the decentralization law in Indonesia[6], local governments decide independently on certain political, fiscal, and administration aspects of governance and have the option to follow or to not follow central policies. This has implications for the planning and delivery of climate finance sources and strategies. Given Indonesia's high degree of decentralization, district and provincial government play a vital role in accessing and managing climate finance, mostly channeled through transfer from the central government. The Ministry of Home Affairs plays a key role in ensuring the coordination with sub-national actors in line with national policies.

Many sub-national governments suffer from capacity constraints that need to be addressed but some regardless are already taking mitigation into account when preparing sectorial plans. From the perspective of economic agencies such as the Ministry of Finance, the inclusion of climate change priorities into the fiscal transfer system is a necessary pre-condition to successful financial planning, management and accountability.

Based on stakeholder consultations with the Ministry of Finance in Indonesia, it is understood that the Ministry of Finance is piloting a system for providing additional grants to those provinces that have demonstrated an ability to address mitigation, but this is still at an early stage.

The private sector has an important role to play in implementing climate policy as a potential source of investment in forestry, peat lands, energy and transportation. Civil Society Organizations (CSOs) are involved in investment as well. The media are important in promoting public awareness, public understanding and public interest in mitigation and in contributing to transparency. Parliamentarians also have an important role in raising the importance of climate change, both as representatives of wider public interest and as leaders of public attitudes.

[6] Indonesia introduced decentralization guidance in 2001 under Law 22/1999 on regional governments and Law 25/1999 on fiscal balance between the central and regional governments. In 2004, they were replaced by Law 32/2004 and Law 33/2004. http://www.oecd.org/indonesia/45362389.pdf

The Jakarta Municipal Government is the main implementation body for Transjakarta while the operational activities are carried out by BLU Transjakarta. BLU Transjakarta is a public authority under the transportation agency of the Jakarta Municipal Government. BLU Transjakarta manages the operation of the Transjakarta system. It oversees bus operations run by nine different bus companies. Some of these bus operators are existing bus companies whose routes overlap with Transjakarta corridors, while the others are individual operators selected from a competitive tendering process. Typically, buses are purchased and owned by the bus operators. Operators are paid per bus kilometer travelled throughout their seven years' operating contract period thus passing the financial and revenue risks to the municipality (New York City Global Partners, 2012).

The local government in Jabodetabek is the main implementing party for the Bus Rapid Transport Development in Greater Jakarta (Jabodetabek) NAMA project. The Ministry of Transportation will serve as the coordinator of transportation NAMA at the national level. The Ministry of Finance is expected to assist in the provisions of the necessary funding (PIP, ICCTF, APBN/APBD).

5. Policy and Legal Framework

In 2009, Indonesia's Climate Change Sectorial Roadmap set a strategic vision for responding to emerging climate challenges in important sectors of the economy. In the same year, the Ministry of Finance's Green Paper set out concrete fiscal and economic strategies for mitigating climate change in Indonesia. In October 2009 at the G20 summit, President Susilo Bambang Yudhoyono committed to reducing Indonesia's CO_2 emissions by 26% against a business-as-usual trajectory using domestic resources, and by 41% if developed nations give financial support, by 2020 (Brown and Peskett, 2011). This would be the largest absolute reduction commitment made by any developing country. The Government of Indonesia then declared the Presidential Decree in response to this announcement, known as the Decree for GHG Emission Reduction (RAN GRK). The Decree is coordinated and written by Bappenas. Indonesia's NAMAs, a set of planned policies and actions to reduce GHG emissions, are being developed within the framework of the Decree.

Indonesia is not only taking steps to reduce emissions, but it is also paving the way to address climate change adaptation through its National Climate Change Adaptation Action Plan (RAN-API) that is currently being finalized and will help build resilience to climate impacts across the country.

Building resilience and decoupling GHG emissions from economic growth requires mobilization of public and private climate finance from key actors to deliver significant expenditure and investment to support development of a more sustainable economy. Various fiscal policy measures have been regulated to facilitate the transition towards a more sustainable production system in forestry, energy, industry and transport.

Indonesia's desire to drive economic growth and reduce climate risk is reflected in the sweeping policy reforms it has introduced in recent years to meet targets announced in 2009 to reduce GHG emissions. Public policy and finance will play a crucial role in meeting these targets. International and domestic public actors are now scaling up investment, and different levels of Indonesian government are setting up frameworks to incentivize the private finance that will undoubtedly also be required.

Indonesian cities, including Jakarta, plan to implement environmentally and climate-friendly, energy efficient urban transport programs that introduce transport demand management measures. An expert panel from Directorate of Transportation (central and provincial level) will be trained on the subject of sustainable transport. The Directorate of Transportation within the Ministry of National Development Planning (Bappenas) will be the nodal agency for programs instituted by this expert panel. These programs will include the following parameters:

- Adoption of national sustainable urban transport policy. The activities already initiated by Indonesian Government are:
    - During Jan. 2013, Indonesia developed the "Sustainable Urban Transport Initiative (SUTRI)" as a NAMA, seeking support for implementation. The SUTRI links to existing policies like Relevant National Policies National Development Plan, National Transport Master Plan (Land, Railways, Maritime, and Aviation), RAN-GRK (National Mitigation Actions), and RAD-GRK (Local Government Mitigation Actions)].[7]

[7] Source: http://climate-l.iisd.org/news/indonesia-submits-sustainable-transport-nama/

- Adoption of the Sustainable Urban Mobility Plan Guideline (Indonesian version is available on www.sutip.org).
- Preparation and adoption of action plans on sustainable transport development (already adopted in few Indonesian cities).
- Toolkit for Sustainable Urban Transport Improvement (under development).
- Elaboration of a BRT concept. Currently, the BRT system is available in two cities, Jakarta and Yogyakarta.

The following figure summarizes chronologically the recent significant policy measures undertaken in Indonesia that support climate change mitigation.

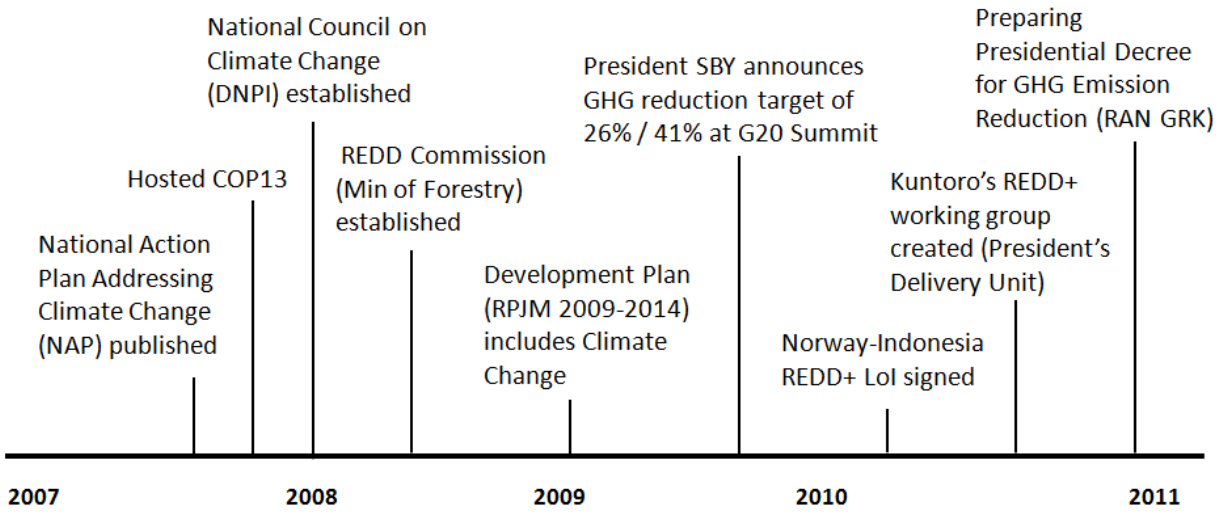


Figure 3- Policy measures for Climate Change mitigation undertaken in Indonesia

***Source**: Climate Finance in Indonesia: Lessons for the Future of Public Finance for Climate Change Mitigation, Jessica Brown and Leo Peskett, Overseas Development Institute, 2011*

A country's national and local action plans serve as starting points for the development of NAMAs. Indonesia's commitment to reduce GHG emissions is codified in the National Action Plan on GHG Emission Reduction (or RAN-GRK), regulated under Presidential Regulation No.61/2011 (Brown and Peskett, 2011). The Local Action Plan on GHG Emission Reduction (RAD-GRK), launched in late 2012, lays out provincial contributions to these targets, including provincial baselines and emission reduction targets. The Government of Indonesia has signed and ratified a number of international and regional conventions which are relevant to the mitigation of GHG emissions. The country hosted the UNFCCC 13th Conference of the Parties in Bali and a high level meeting of Finance Ministers and published its National Action Plan Addressing Climate Change (NAP)[8] that includes regulatory efforts to be implemented for tackling climate change across sectors for both short and long term implementation.

The Government of Indonesia has implemented a range of climate change programs. Some of these have been funded by loans, which are considered as domestic financing. The CCPL and ICCTF illustrate possible modalities for domestic funding. Other climate change programs have been funded by grants from international partners.

[8] http://www.unep.org/transport/pcfv/PDF/pathumbai_ESTinIndonesia.pdf

Efforts are being made to integrate climate change into the Indonesian national policy processes. The role of decentralization in the government, where district and provincial government have increased power and autonomy in decision making, has added to the complexities of coordination and leadership. Having long term clarity on national targets should promote local governments to align their targets with national policies.

5.1 Presidential Decrees

The following are some of the presidential decrees that support national emission reduction targets.

1. Presidential Decree No.19/2010 followed by Presidential Decree No. 25/2011 on The Establishment of Task Force for the Preparation of REDD+ (Reducing Emissions from Deforestation and Forest Degradation, including conservation, sustainable management of forests, and enhancement of forest carbon stocks) Institution, June 2010 and June 2011.
2. Presidential Regulation No. 61/2011 on National Action Plan on Greenhouse Gases Emission Reduction (Perpres RAN GRK), September 2011.
3. Presidential Regulation No. 71/2011 on the Administration of National Inventory for Greenhouse Gas (Perpres Penyelenggaraan Inventarisasi Gas Rumah Kaca Nasional), October 2011.
4. Presidential Instruction No. 13/2011 on Energy Efficiency and Water Conservation. August 2011.
5. Presidential Regulation no. 80/2011 on Trust Fund (Perpres tentang Dana Perwalian), November 2011.
6. Joint Ministerial Decree of Home Affairs Minister, Minister of Development Planning/Chair of Bappenas and Minister of the Environment on the Regional Action Plan for Greenhouse Gases Emission Reduction (RAD GRK), January 2012.

The above decrees set targets for GHG emission reduction in Indonesia and therefore support the development of NAMAs in the country.

5.2 Policy Instruments

Climate change mitigation policy involves a wide range of instruments. In Indonesia, a range of revenue measures have an impact on mitigation, including taxes, fees, charges, royalties, and rents. Subsidies and tax concessions are also used, notably the subsidies involved in fuel and in public transport. Other elements of pricing policy may also be important, including energy pricing and the implications of this for poverty reduction[9]. These revenue generation measures are often combined with regulations that complement fiscal measures, including administering licenses to cut forests, land use planning, especially by local governments, and environmental impact regulations.

For example, public transport is subsidized by many city governments in Indonesia. There is no central record of the value of these subsidies, but unofficial reports suggests that the subsidy to Transjakarta was IDR 333 billion in 2011 (UBS Indonesia Conference, March 2011).

In addition, over the last two years, the Government of Indonesia has spent over IDR 120 trillion / year on fuel subsidies from the state budget, with the objective of promoting economic growth and avoiding

[9] Currently, energy pricing in Indonesia is under government control. Hence, any subsidy or cross subsidy reform on transport fuel can support or deter sustainable transport. For example, subsidized natural gas prices (as part of pricing policy) may promote the use of gas as opposed to diesel. This will provide cheaper clean fuel options.

inflation. The subsidy typically amounts to about half of the full cost of the 40 billion liters/year of petrol and diesel consumed. As noted in the Indonesia First Mitigation Fiscal Framework, the short run price elasticity of demand for fuel is about 0.1. Thus, halving the subsidy and raising prices by 50% could reduce consumption of fuel by 5% and reduce emissions by about 5M tCO_2e (Ministry of Finance, 2012).

In Section 7.6.4, further discussion is provided on possible areas of policy revision associated with the Bus Rapid Transport Development in Greater Jakarta (Jabodetabek) NAMA.

6. Costs and benefits of NAMA Intervention

This section explores the trade-offs between the costs and benefits (emission reduction and travel time reduction) by performing an investment analysis for setting up new Bus Rapid Transit (BRT) corridors for Transjakarta. BRT has emerged as a viable option to enhance transportation capacity and provide increased levels of mobility and accessibility in Indonesia. BRT lines can transport large numbers of people efficiently and cost-effectively and is an attractive way to get drivers out of their cars and into mass transit. BRT helps improve transit speed and reliability on urban streets. The BRT system is particularly effective and reliable when the buses operate in conditions that are free from delays caused by other vehicles.

The benefits and cost of adding new BRT corridors to the existing Transjakarta system will depend heavily on how such a project affects traffic speed, time delay, and vehicle miles travelled. The benefit will depend on the extent to which the addition of corridors results in mode shift to BRT. Thus, a critical part of this section is the description of the analytical methods and assumptions used for these calculations.

This analysis involves identifying and quantifying benefits and costs that will accrue if a project is undertaken. Therefore, it will help to determine economically efficient investment alternatives, i.e., one that maximizes the net benefit to society from allocation of resources. For transportation projects, this involves estimating a dollar value for benefits to users of the facility, a value for social benefits, and comparing these benefits to project capital and operations and maintenance costs.

Transportation agencies are typically required to do a detailed cost benefit analysis to justify investment in a particular project. Such an analysis compares project alternatives with the 'no build' base case, to determine a locally preferred alternative. To enable comparison of alternatives, it is necessary to standardize the categories of benefits and costs that are considered and the methodology that is used to calculate them.

Direct benefits to users of the upgraded BRT system include travel time savings, fewer vehicle operating expenses such as fuel purchases and out-of-pocket vehicle ownership expenses, and reduced costs associated with vehicle accidents. Other direct benefits can accrue to users and non-users, such as reductions in emissions and noise. For the purpose of this evaluation, only the benefits arising from emission reduction and travel time savings have been considered. This is because these two benefits have significant direct benefits that can be quantified. While these impacts can be relatively simple to estimate, much variation exists in how benefits are monetized. The construction, operation, and maintenance costs of the project are used for this analysis. The two benefits considered in this evaluation are sufficient to develop a business case.

Indirect benefits from the Bus Rapid Transport Development in Greater Jakarta (Jabodetabek) NAMA can also arise from increased economic development and land development. Ease of commuting travel enables employment opportunities from farther distances. Other co-benefits include health benefits, less air pollution, job creation for the operations & maintenance, and in introducing new technology. These co-benefits are however omitted in this analysis as these are difficult to estimate owing to limited data availability. The costs against which these benefits are weighed are also very varied.

The most critical component of an investment analysis for a BRT project is likely to be the estimation of impacts on vehicle delay and transit ridership. The investment analysis for this project is conducted by using plausible ranges for key parameters (such as traffic volume and transit ridership) so as to illustrate how these parameters influence the outcome. This NAMA report utilizes extensive data compiled during desktop research and stakeholder consultations. In this report, key pieces of data are presented; however, the complete compilation of compiled data, assumptions, and calculations are available upon request from the NAMA developer.

6.1 Input Parameter Selection

Since benefits and costs often occur at different times over the lifespan of the project, they have been adjusted according to when they occur. For the purpose of this assessment, the duration is taken to be 10 years. Because most costs occur in the early stages of a project, while benefits are spread out over the 10 years, discounting has been used to bring all monetary streams (both costs and benefits) to a present value. Due to the time cost of money and the value placed on immediate consumption, future benefits and costs are worth less than those incurred immediately. The discount rate is applied to the benefits and costs incurred in each year of the project's life cycle.

To determine the discount rate to be assumed for calculations, typical government approaches were considered in terms of the rate of return of the investment. Governments around the world are increasingly concerned that using 10% as the target IRR tends to favor short-term investments and would exclude approval of longer term investments, and especially those associated with climate change. Some countries have adopted 6% as an alternative target and the UK treasury recommends using 3.5% for shorter term programs and that the rate should decline to 1% for benefits and costs that are more than 30 years into the future (Ministry of Finance, 2012). The use of 5% in this NAMA was therefore determined as a compromise rate reflecting the range of alternative approaches used domestically and internationally. This is substantially below the opportunity cost of capital to the private sector. It is also below the 10% that is often as a minimum requirement for the IRR of public investment.

In this analysis, other input parameters that were selected for the investment analysis include reasonable values for transit and auto modes shares, travel speeds, and vehicle occupancies on the corridor, and average values for traveler wage rates, bus transit fares, and other conditions required to set up the baseline scenario.

Net benefits and costs were calculated on an annual basis over 10 years from baseline for each of the three possible project scenarios (discussed in detail in Section 7.4.2). The three scenarios were developed using a sensitivity analysis that shows how the net benefits, costs, and IRR of the project vary when the assumed values are altered. Additionally, the sensitivity analysis shows the conditions under which this BRT up gradation may be a highly favorable proposition.

After consultation with Transjakarta, a Business As Usual (BAU) scenario was developed to reflect the current status of mode share of the existing 12 corridors as compared to the 'no build' or baseline scenario that assumes no BRT is currently in use. The BAU scenario is indicative of the actual mode shift of the passengers from the baseline scenario, caused by the existing BRT.

Despite its many advantages, there are limitations to conducting such an analysis in the context of BRT projects. Transit projects often have several indirect as well as direct impacts (e.g., indirect benefits like savings in parking cost, reduction in crash costs, etc.) that cannot be easily measured or expressed in currency and are thus, omitted from the analysis. Additionally, the distribution of benefits may sometimes

be as or more important than the actual values of calculated benefits. For example, transit projects often bring benefits by improving mobility to people with low incomes, disabilities, or with otherwise limited access to transportation options. The benefits to these groups may be as important to consider as GHG emissions reduction.

6.2 Indicators for Investment Analysis

There are several measures or indicators to compare benefits to costs in this investment analysis. Internal Rate of Return (IRR) and Economic Internal rate of Return (EIRR) are the indicators used here.

The IRR calculates the discount rate at which discounted benefits equal discounted costs. The IRR is therefore useful for comparing programs of different size and has the attraction of being equal to the rate of interest that the programme could afford to pay, if the social value of all costs and benefits was equal to the market price.

The EIRR provides a similar decision factor to the financial IRR. The EIRR indicates the rate of return at which the present value of the economic costs and benefits of the project are equal. In other words, it is the discount rate for which the net present value is zero. The EIRR is compared with the socially required rate of return. Projects that are found to have an EIRR that is higher than the socially required rate of return are considered to be potentially financially viable.

6.3 Assumptions and Data Requirements

The analysis was conducted for the additional three corridors being constructed to the existing 12 corridor Transjakarta system. The analysis considered emissions reduction and travel time savings incurred from the project (its main benefit) and assumed the new corridors have all connected lanes, which is consistent with the latest BRT map showing existing and new corridors (Figure 1). For the calculations, Corridor 13 is taken to be 14.6 km long, Corridor 14 is taken to be 17 km long and Corridor 15 is taken to be 17.7 km long. The data for the length of each corridor was taken from the NAMA proposal provided by UNDP Indonesia. The average bus speed is considered 15-25 km/hr.

In the baseline scenario, the analysis assumed the number of passengers per year on each of the corridors as an average of the total number of passengers per year travelling on the existing corridors. Passengers travelling on the corridor in the baseline scenario implies passenger traffic in the route through alternate modes of transport in the absence of BRT. Average bus occupancy was taken to be 40 passengers, car occupancy was 1.8, and motorcycle/auto (three-wheeled tuk tuks) occupancy was 1.3. This data was extracted from transportation data provided by Transjakarta during stakeholder consultations (Annexure B). The passenger growth in the baseline scenario is assumed to be 5% per year. Details of stakeholder consultations have been provided in the annexure.

On the basis of the data provided by Transjakarta, a reduction of 9.33% of car and 21.73% motorcycles from the baseline mode share was considered to develop the BAU scenario. For the baseline analysis, the pre-project car, motorcycle, and bus mode shares on the upcoming corridors are assumed to be 38%, 42%, and 15%, respectively[10].

[10] https://rully02.files.wordpress.com/2010/11/jakartas-traffic-congestion.pdf

The amount of fuel consumed per vehicle per km is taken from Indonesian standard values and the 'annual technology improvement factor' for each of the modes of transport considered is taken to be 0.99 for the purpose of emission reduction calculation. The 0.99 annual technology improvement factor refers to emissions over a year from a particular mode of transport being 99% of the emissions over the previous year. These data for individual vehicle types were based on stakeholder consultations with Transjakarta provided in supporting calculations, not incorporated this NAMA report but rather available for reference. The pollution index is taken from data also provided by Transjakarta as 1.73 kg/L for buses and 2.42 kg/L for cars, motorcycles and autos.

For the purpose of the cash flow calculation, it was noted that the cost of construction per corridor would be IDR 500 billion, the cost of constructing each SPBG would be IDR 50 billion and IDR 20 billion for constructing each Mobile Refueling Units (MRU), and the total cost of procurement of buses to be deployed in the three corridors is taken to be IDR 740 billion (Presidential Working Unit for Supervision and Control, 2014). An MRU stores natural gas and can refuel vehicles "wherever and whenever, including at natural gas stations, on toll roads or on the side of the road."[11]

The Operations and Maintenance costs were derived from assumptions made on the basis of a detailed analysis of Indonesian transportation data. The bus maintenance cost is taken to be 0.5% of the bus procurement cost, the cost of overheads and infrastructure maintenance of the new corridors of the BRT are taken to be 3% and 0.5% of the construction cost, respectively. The year on year percentage increase in overheads of the BRT and bus maintenance costs are assumed to be 3% each. The year on year increase of infrastructure maintenance cost is assumed to not be statistically significant for the purpose of this calculation.

Over an insurance period of 15 years, the insurance charges for buses are assumed to be 1% of their procurement cost. The analysis assumes the fuel rate in Indonesia to be IDR 3,100 per liter of fuel. The price escalation for fuel is estimated to be about 2% every three years. The depreciation on buses and civil works is taken to be 10% and 5%, respectively. The cash flows are calculated by taking the 25% income tax rate and 5.36% Operation and Maintenance Services (OMS) in Indonesia (Deloitte, 2014). For a loan repayment period of 10 years, the interest on debts is taken to be 7.5%. It is assumed that 70% of the finance in Indonesia is available in the form of term loans while 30% is procured from equity. This data is extracted from EY Global experience in the transport sector and experience working in Indonesia.

The average wage rate[12] was taken to be IDR 62,000 per day on the basis of consultations with the Indonesian Ministry of Transport. Assumptions were made for percentage of gross hourly wage loss for passengers during time spent traveling according to the occupancy of each mode of transport. The assumption made here is that people may work while sitting when they don't have to drive. The wage loss during travel is assumed be 100% for car and motorcycle users, 70% for users of autos[13], 30% for bus users and 50% for other modes of transport based on stakeholder consultations with transportation experts with Transjakarta. The percentage of wage loss is taken to be less for auto and bus users as they are seated and do not have to drive. The total number of trips taken by a passenger per day is assumed to be three for motorcycles and four for other modes of transport. The vehicle speed is taken to be 20 km/hr for cars and motorcycles, 15km/hr for buses, 18km/hr for autos, and 5km/hr for other modes of transport.

[11] http://gnvmagazine.com/eng/noticia-pgn_launches_mobile_units_for_natural_gas_refueling_in_indonesia-3092

[12] Wage rate refers to base wage given to a worker in a specified amount of time.

13 An auto is considered a three-wheeler motorized vehicle used as a taxi.

6.4 Scenario Description

6.4.1 BAU Scenario

From the historical data provided by Transjakarta, we observed that between 2007 and 2012 the implementation of the existing 12 corridors led to an average mode share shift of 9.33% cars and 21.73% motorcycles to the BRT from the then current situation of mode share on the roads of Jakarta.

BAU SCENARIO	Average mode share shift of 9.33% cars and 21.73% motorcycles to the BRT

This data has been used to develop the BAU scenario for the purpose of this analysis. Using the value of mode share in the BAU scenario, we conclude that adding one BRT bus can displace 13.2 cars and 12.6 motorcycles off the roads during the course of the day. Introduction of the new BRT corridors will therefore result in a mode share shift to BRT from other types of vehicles.

6.4.2 Project Scenarios

In the NAMA project case, three possible scenarios were envisaged on the basis of expected percentage of shift of mode share from cars and motorcycles to the BRT if the new corridors are constructed. Income groups of people travelling, average trip length per passenger, trip frequency, average daily compulsory trips, travel time, travel cost, and accident rates along the new corridor routes are the factors that have been considered to evaluate mode share shift in the project case. These scenarios have been developed by Ernst & Young in consultation with stakeholders including UKP4, UNDP Indonesia, Transjakarta, Institut Teknologi Bandung, Department of Transport, Bappenas, and the Ministry of Environment.

SCENARIO 1	Reduction of 25% of Cars and Motorcycles from the baseline mode share

Scenario 1 is highly probable if the three new corridors are located in the routes taken by people belonging to high income groups and if the number of average compulsory trips taken along the new routes is low.

SCENARIO 2	Reduction of 35% of Cars and Motorcycles from the baseline mode share

Scenario 2 is highly probable if the new corridors are located in the routes taken by people belonging to middle income groups and if traffic congestion along the routes is more than in Scenario 1.

SCENARIO 3	Reduction of 45% of Cars and Motorcycles from the baseline mode share

Scenario 3 is highly probable if the new corridors are located in the routes taken by people belonging to low income groups, if traffic congestion along the routes is more than in Scenario 2 giving passengers more travel time benefit, and if the average trip length and accident rates are high along the routes as compared to the other two scenarios.

6.5 Factors Affecting Mode Share Shift

Based on stakeholder consultations with Transjakarta, the need of improved service levels, lack of sufficient buses being deployed, operational inefficiencies, BRT lane congestion due to mixed traffic, and fuel subsidies were identified as the main factors that have led to the meager mode share shift to date in the BAU scenario as compared to the no build baseline case.

FACTORS FOR TRANSPORTATION MODE SHIFT	
Legal Issues	At present, out of the 800 BRT buses available, only 428 are in operation. Of the buses not in operation, 150 buses cannot be used owing to legal issues as noted below.
Lane Congestion	Mixed traffic on BRT lanes owing to lane violation leads to traffic congestion along BRT lanes.
Operational Inefficiencies & Poor Service Levels	At present, Transjakarta is unable to identify the appropriate frequency with which buses should be circulated and reasons for points of congestion along each corridor. The buses are relatively inefficiently managed and there is no mechanism in place to control how often the buses are refueled.
Fuel Subsidy	Current level of fuel subsidy encourages people to purchase their own vehicle for transport and not use public transport.

Consultations with Transjakarta have led to the understanding that there are certain impending legal issues relating to availability of buses. There has been non-compliance of contracts in procurement of buses. However it is understood that these issues can be addressed in the near future to increase the number of buses plying on the BRT corridors. The increase in the number of buses plying on the BRT corridor to meet the actual requirement will lead to mode share shift as envisaged in the above scenarios. Presently, there is a USD 50[14] fine for lane violations in Jakarta. The problem of lane congestion owing to mixed traffic can only be tackled through stricter enforcement of lane regulation laws.

An improved service level of the BRT system can be achieved through better management of buses to increase operational efficiency and increasing the number of SPBGs to enable refueling of buses, twice a day. In order to improve operational efficiency, a control system is being developed to monitor the Transjakarta network in real time. With such a system in place, areas of maximum congestion, peak hours of maximum throughput, cause of delay, etc., can be identified in real time and more buses can be deployed in the identified areas to reduce travel time and improve efficiency of operation.

From discussions with Transjakarta, it was also understood that subsidies are slowly phasing out in the region. This could be an incentive that could induce people to use BRT as opposed to using their personal vehicles. However, the impact of removal/reduction of fuel subsidy on the mode share shift will depend

[14] USD 50 is a sizeable amount when compared to the average wage rate in Indonesia.

on the relative rise in BRT fare prices. If the rise in fare price is less than the rise in fuel prices, more people would shift to the BRT from other modes of transport.

6.6 Calculation

6.6.1 Emission Reduction Calculation

Emission Reductions (ER) for the no build baseline scenario (i.e., without any BRT corridors), the BAU scenario, and the three possible scenarios considered in the NAMA project case were calculated on the basis of the data provided by Transjakarta and the assumptions as summarized in the previous section.

From the data provided on the length of the existing corridors and average distance travelled by each passenger on the existing corridors, the average number of trips per length of each the corridor was calculated to be 0.85 trips per km using this value, the average trip length per corridor is calculated for each of the three new corridors. This average trip length and number of passengers expected to travel on each new corridor in both directions, is used to estimate Passenger Kilometer per Year (PKM/year) for corridors 13, 14, and 15. Similarly, the PKM/year for each corridor is calculated for 10 years starting from the first baseline year assuming a 5% increase in number of passengers per year.

Using the assumptions on mode share in the baseline scenario, the PKM/year for each mode of transport was estimated. The vehicle kilometers travelled per year was calculated from the PKM/year for each mode of transport considered and the vehicle occupancy of each mode. The fuel consumption rate (Liters/Vehicle-km) assumed was then used to calculate the total tons of CO_2 emitted per year, using a pollutant index for each mode. The total baseline emission of CO_2 per year was calculated to be 71,029 tCO_2 per year. An Emission Reduction Calculation Sheet was developed that shows the detailed ER calculations done for this analysis. Due to the large size of the Calculation Sheet, it is not provided as part of this NAMA report; however, it was developed with support by and submitted to the local Indonesia LECB team and are available upon request from the NAMA developer.

Similarly, the emissions for the subsequent years in the baseline scenario are calculated taking into account emission factors for the subsequent years. The emission factors have been calculated using the pollution index for each mode of transport, fuel consumption rate, and considering a default technology improvement factor of 1% per year.

Table 1 summarizes the expected ER over 10 years following the base year in each of the project scenarios discussed above.

Table 1 - Emission Reduction Savings

	YEAR	1	2	3	4	5	6	7	8	9	10
BAU Scenario	Baseline Emission (Thousand tCO_2 per year)	71.03	73.83	76.75	79.78	82.93	86.21	89.62	93.15	96.83	100.66
	Project Emission - BAU (Thousand tCO_2 per year)	64.50	63.85	63.21	62.58	61.96	61.34	60.72	60.12	59.51	58.92
	Emission Reduction (Thousand tCO_2 per year)	6.53	9.98	13.54	17.20	20.98	24.87	28.89	33.04	37.32	41.74

	YEAR	1	2	3	4	5	6	7	8	9	10
Scenario 1	Baseline Emission (Thousand tCO_2 per year)	71.03	73.83	76.75	79.78	82.93	86.21	89.62	93.15	96.83	100.66
	Project Emission – S1 (Thousand tCO_2 per year)	57.89	57.31	56.73	56.17	55.60	55.05	54.50	53.95	53.41	52.88
	Emission Reduction (Thousand tCO_2 per year)	13.14	16.53	20.02	23.62	27.33	31.16	35.12	39.20	43.42	47.78
	YEAR	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Scenario 2	Baseline Emission (Thousand tCO_2 per year)	71.03	73.83	76.75	79.78	82.93	86.21	89.62	93.15	96.83	100.66
	Project Emission – S2 (Thousand tCO_2 per year)	52.59	52.06	51.54	51.03	50.52	50.01	49.51	49.02	48.53	48.04
	Emission Reduction (Thousand tCO_2 per year)	18.44	21.77	25.21	28.76	32.42	36.20	40.10	44.14	48.31	52.62
	YEAR	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Scenario 3	Baseline Emission (Thousand tCO_2 per year)	71.03	73.83	76.75	79.78	82.93	86.21	89.62	93.15	96.83	100.66
	Project Emission – S3 (Thousand tCO_2 per year)	47.29	46.82	46.35	45.89	45.43	44.97	44.53	44.08	43.64	43.20
	Emission Reduction (Thousand tCO_2 per year)	23.74	27.01	30.40	33.89	37.50	41.23	45.09	49.08	53.20	57.46

6.6.2 Travel Time Reduction Calculation

The assumed monthly wage rate and percentage of wage loss were calculated for each mode of transport. These values were used to estimate the value of travel time in monetary terms. The passenger km/year and assumed vehicle speed were used to estimate the time taken per trip per corridor. This value, along with the assumed number of trips/ passenger/ day, was used to calculate the total travel time by each mode of transport per year. Assuming a 5% rise in number of passengers/ year, the overall time taken by all modes of transport in all the three new corridors was calculated for the baseline case for up to 10 years.

The travel time reduction calculation was conducted for the BAU and three project case scenarios. The travel time savings of each scenario was calculated as a difference of time taken in the baseline case and the scenario. Travel time savings was also calculated in monetary terms from the monetary value of travel time calculated above for each mode of transport.

The difference between the travel time calculated for each project scenario and the baseline case was the estimated travel time reduction benefit of this NAMA project. This benefit was represented in the following table for 10 years after the base year.

Table 2 – Accumulated Travel Time Savings

BAU SCENARIO

Billion Minutes/Year	1	2	3	4	5	6	7	8	9	10
Baseline	10.16	10.67	11.20	11.76	12.35	12.97	13.62	14.30	15.02	15.77
Project Case - BAU	9.05	9.50	9.98	10.48	11.00	11.55	12.13	12.73	13.37	14.04
Reduction	1.11	1.17	1.23	1.29	1.35	1.42	1.49	1.57	1.65	1,73

SCENARIO 1

Billion Minutes/Year	1	2	3	4	5	6	7	8	9	10
Baseline	10.16	10.67	11.20	11.76	12.35	12.97	13.62	14.30	15.02	15.77
Project Case – S1	8.85	9.29	9.76	10.25	10.76	11.30	11.86	12.45	13.08	13.73
Reduction	1.31	1.38	1.45	1.52	1.59	1.67	1.76	1.85	1.94	2.03

SCENARIO 2

Billion Minutes/Year	1	2	3	4	5	6	7	8	9	10
Baseline	10.16	10.67	11.20	11.76	12.35	12.97	13.62	14.30	15.02	15.77
Project Case – S2	8.70	9.13	9.59	10.07	10.57	11.10	11.66	12.24	12.85	13.49
Reduction	1.46	1.54	1.61	1.69	1.78	1.87	1.96	2.06	2.16	2.27

SCENARIO 3

Billion Minutes/Year	1	2	3	4	5	6	7	8	9	10
Baseline	10.16	10.67	11.20	11.76	12.35	12.97	13.62	14.30	15.02	15.77
Project Case – S3	8.55	8.97	9.42	9.89	10.39	10.91	11.45	12.03	12.63	13.26
Reduction	1.62	1.70	1.78	1.87	1.96	2.06	2.17	2.27	2.39	2.51

6.6.3 Detailed IRR and EIRR calculation

As part of the cost and benefits analysis of NAMA intervention, cash flows have been determined for 30 years for each NAMA scenario after the project implementation stage is completed. 2015 has been considered to be the base year and the project construction and bus deployment activities are expected to be complete by 2018 (Presidential Working Unit for Supervision and Control, 2014).

The expenses considered in this analysis include the cost of construction of the corridors, the SPBGs, and MRUs, cost of procurement of the buses, bus maintenance cost, overhead costs of the BRT, fuel cost of each project scenario considered, and the infrastructure maintenance costs as per the assumptions mentioned in Section 6.3. The fuel expense incurred from BRT operation is calculated for each of the NAMA scenarios according to the expected number of passengers traveling in the new corridors per year.

The total estimated capital expenditure on this NAMA project is estimated to be IDR 2,400 billion. Assuming 70% financing available on the total cost of the project at an interest rate of 7.5% per annum, the total interest to be paid is approximately IDR 570 billion over 30 years. The depreciation of assets has been calculated for 30 years at rate of 10% per year for buses and 5% per year for civil works.

For each of the project scenarios considered, the IRR has been calculated from the cash flow statement for each scenario. The current passenger fare is IDR 3,500 for BRT as noted during stakeholder consultations. The revenue from BRT fare is taken to be the cash inflow for the 30 years following the completion of the project implementation. Total expenses incurred include O&M expenses, tax on OMS, yearly loan installments payable, interest on debt, and insurance expenses apart from the total capital expenditure.

Project Scenario 3 has the highest calculated IRR of about 5%. The IRR for project Scenario 1 is 1.1% and for project Scenario 2 is 3.13% owing to the lower passenger mode shift assumed in these two scenarios.

The EIRR for the three project scenarios has been calculated by adding the benefit of time value savings to the cash flow statement. The EIRR for project Scenario 3 is 15.84% making it the most favorable project scenario. The EIRR for project Scenario 1 is 8.93% and for project Scenario 2 is 12.67% owing to the lower passenger mode shift assumed in these two scenarios.

The detailed IRR and EIRR calculations with the related cash flow statements were provided separately in the *Manual for Preparing a Finance-Ready Proposal for Bus Rapid Transit in Jakarta* as part of the UNDP LECB Programme and developed with support from the local NAMA development team.

6.6.4 Policy suggestions that can help accelerate mode shift from private to public transport

Mode choice and usage of public or private transport generally depends on various aspects including socio-demographic characteristics of travelers, trip purpose, and time of day, access and frequency of public transport, parking, travel time, convenience, and cost. An in-depth study is recommended before devising any policy to accelerate usage of public vehicles and encourage mode shift. This section, notably the following table, shares broad level ideas that have been successful in promoting mode shift (Ministry of Environment, 2010).

Policy No.	Policy	Description
Policy 1	Public transport frequency improvement	1. Improving frequency of public transport will reduce waiting time in bus/ train stations. Comfortable waiting time increases mode shift to public transport. 2. Trip frequency linked to time of day. 3. While designing the frequency of new public transport, policy makers should also consider the passenger pressure (number of passengers per bus) on each route. Reducing over-crowding of public transport will improve comfort level and encourage mode shift.
Policy 2	Public transport services improvement	To encourage use of public transport, the following parameters may be considered: 1. Sitting comfort 2. Ride safety 3. Comfortable and safe waiting stations 4. Increased number of direct routes
Policy 3	Travel time reduction	Uninterrupted corridors like BRT to reduce travel time. Reduction in travel time can accelerate usage of public transport.
Policy 4	Park and ride facilities at major stations	The expected chances of mode shift from private vehicles to public transport may increase if there is: 1. Reduction in commuting distance from home to public transport, and from public transport to place of work. 2. Availability of parking facilities near major public transport facilities.
Policy 5	Raise minimum legal age of driving	Increasing minimum legal age of driving will encourage younger traveler to use public transport. For example, if minimum age of driving is increased from 18 years to 21 years, the citizens within this age bracket may avail public transport more.
Policy 6	Make travel by public transport relatively cheaper	The cost of travel via public transport can be made relatively cheaper than other mode of transport by implementing the following measures: 1. Minimize subsidy on fuels used by private transport. 2. Increase toll on private vehicles entering central business districts and routes with higher congestions. 3. Higher parking charges for private vehicles parked within central business districts. 4. Low cost parking facilities at major public transport stations.

In addition to the above policy measures, certain awareness strategies can be employed to encourage the use of BRT among the passengers in Jabodetabek. The following suggested measures, if implemented, can help achieve a greater mode shift to the Transjakarta.

- **Public awareness campaigns, banners and signs** – To make passengers aware of the direct and indirect benefits of using the BRT system by representing in qualitative and qualitative manner.
- **Radio and television advertisement** – To promote the greater use of BRT system among the masses.
- **Promoting the message in the BRT system** – To encourage greater use of BRT among existing Transjakarta passengers. This can be done through advertisements in ticket counters, including texts behind the tickets, fuel refilling stations, and announcement on PA system.

The above measures should focus on highlighting travel time reduction caused by the use of Transjakarta. While travel time reduction will be a greater incentive to passengers, emission reduction benefits can also be advertised.

7. Sensitivity Analysis

The parameter values and assumptions of any model are subject to change and error. A sensitivity analysis is the investigation of these potential changes and errors and their impacts on conclusions to be drawn from the model. It is the study of how the uncertainty in the output of a model can be apportioned to different sources of uncertainty in its inputs. A good business case analysis requires assessing uncertainty about the results of business decision and a sensitivity analysis helps achieving this objective.

The investment analysis done here depends on certain assumptions for which justifiable alternative assumptions are always possible. This may lead the final results to sometimes vary substantially. A sensitivity analysis was therefore performed here to illustrate the change in results with alternative values of inputs and assumptions.

The @Risk analysis tool was used to conduct the sensitivity analysis. @RISK performs risk analysis using the Monte Carlo simulation to show possible outcomes in a spreadsheet model and how likely the outcomes are to occur. It mathematically and objectively computes and tracks many different possible future scenarios, then estimates the probabilities and risks associated with each different one. @RISK can perform sensitivity analysis to identify the key input variables and determine how they affect the output. It achieves this by performing statistical analysis on data that has been generated from input @RISK distributions and data calculated for the selected output.

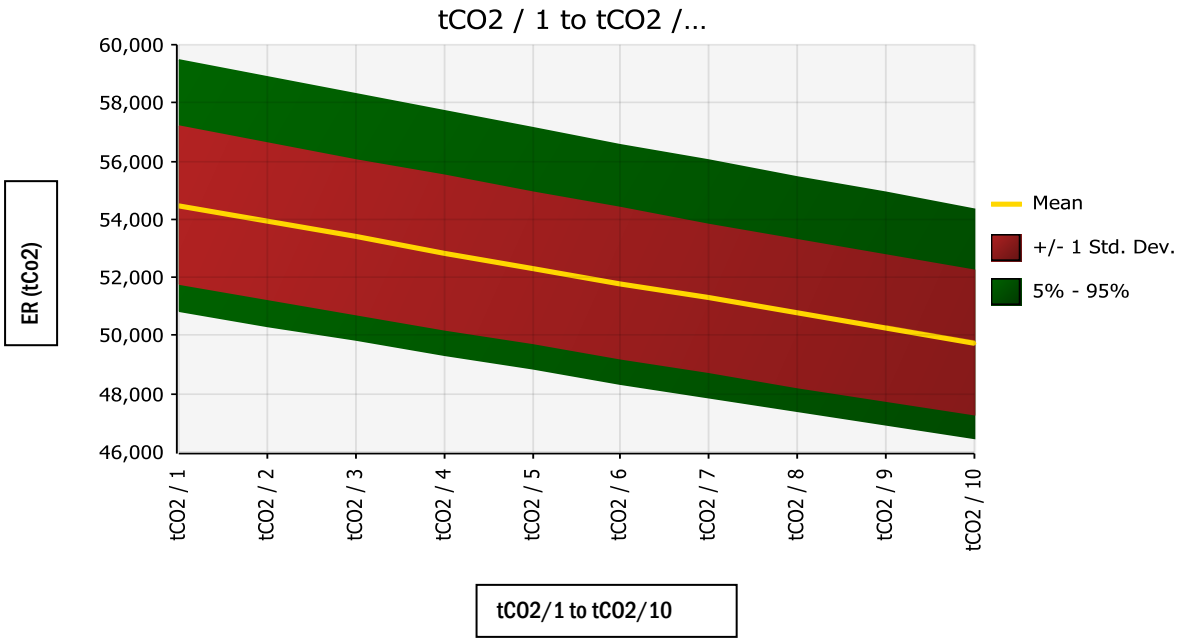
The sensitivity analysis was conducted for final values of Emission Reduction (ER) and IRR calculated and percentage change in key input variable for IRR and EIRR as described in the following sections.

7.1 Sensitivity Analysis of Emissions Reduction

The @Risk tool has been used to understand how the ER values vary about their mean, as the values of key inputs are changed. The analysis has been performed for each project scenario for 10 years. The following figures show the sensitivity of the ER values to change in values of share of vehicles on the affected lanes, total passengers travelling on the corridors per year, and average number of trips per length of the corridor.

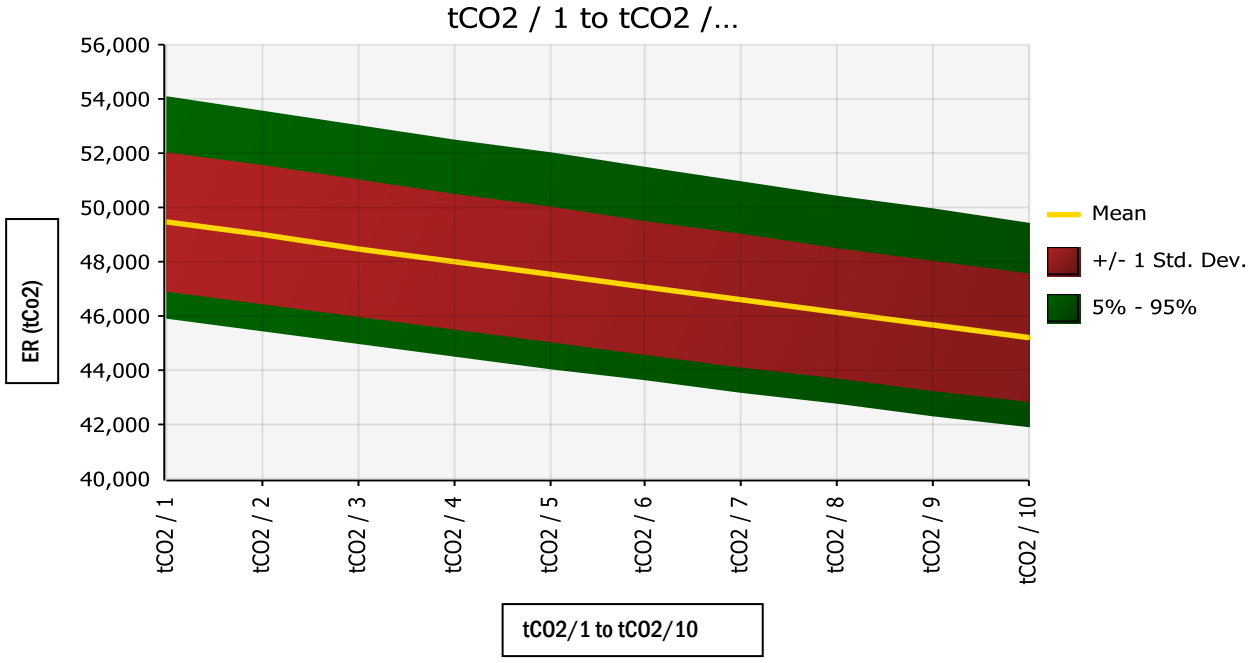
The graphs are downward sloping, which indicates that the ER values reduce in subsequent years. The yellow lines depict the mean value of ER, the red zone shows the region of standard deviation about the mean, and the green zone depicts the ER values with 5% - 95% certainties as the variables considered are changed. This analysis shows by how much the project objective of ER is affected with change in the factors considered; therefore, it can be used to understand which project scenario may be most beneficial to meet the targets.

Figure 4 – ER (tCO_2) in Year 1 to ER (tCO_2) in Year 10 in Scenario 1



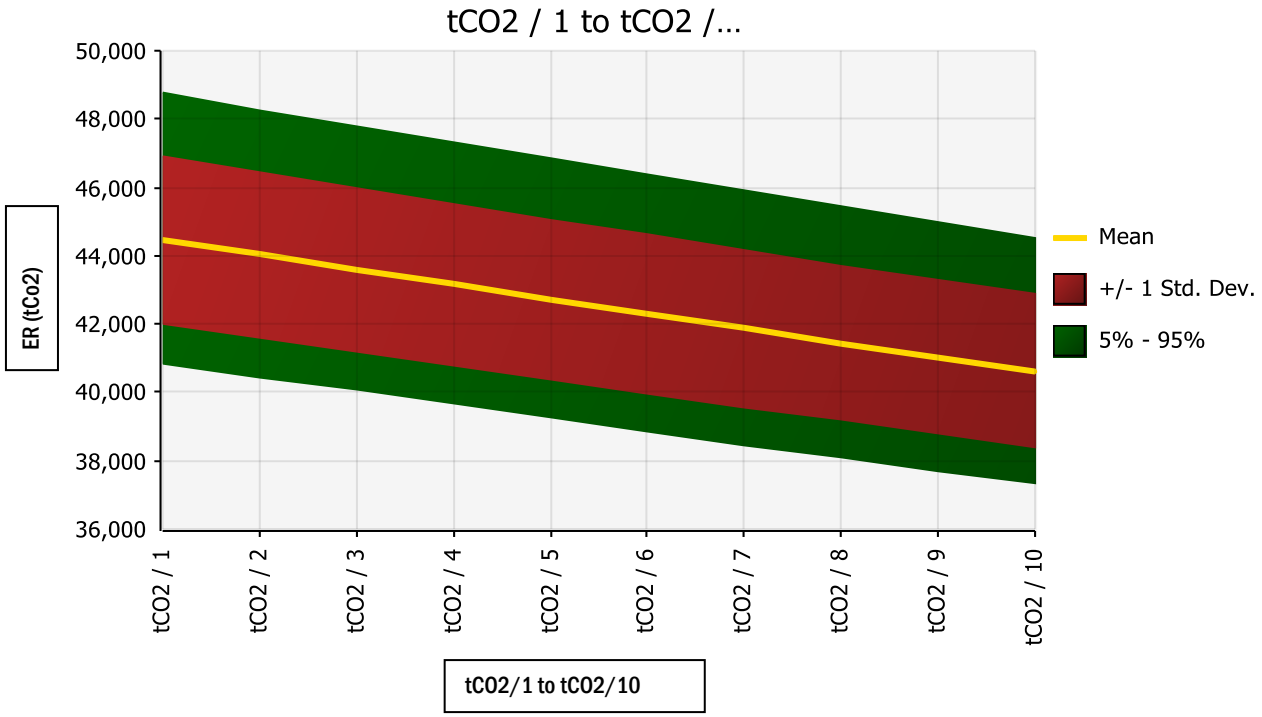
The above graph depicts the sensitivity of ER in project Scenario 1. Here the mean value of ER in Year 1 is estimated to be just more than 54,000 tCO_2. The red and green regions of the graph show that the value of ER in this scenario may range from 51,000 tCO_2 to a maximum of 59,000 tCO_2 in year 1.

Figure 5 - ER (tCO_2) in Year 1 to ER (tCO_2) in Year 10 in Scenario 2



The above graph depicts the sensitivity of ER in project Scenario 2. Here the mean value of ER in Year 1 is estimated to be just less than 50,000 tCO_2. The red and green regions of the graph show that the value of ER in this scenario may range from 46,000 tCO_2 to a maximum of 54,000 tCO_2 in year 1. This scenario has overall ER values less than project Scenario 1.

Figure 6 - ER (tCO_2) in Year 1 to ER (tCO_2) in Year 10 in Scenario 3



The above graph depicts the sensitivity of ER in project Scenario 3. Here the mean value of ER in Year 1 is estimated to be just more than 44,000 tCO_2. The red and green regions of the graph show that the value of ER in this scenario may range from 41,000 tCO_2 to a maximum of 49,000 tCO_2 in the first year. This scenario has overall ER values less than project Scenario 2.

7.2 Sensitivity Analysis of IRR

The @Risk analysis tool was also used to evaluate the minimum, maximum, and mean values of PKM/year. It was also used to generate the PKM/ year values that could occur with 5% confidence and the value that could occur with 95% confidence. Accordingly, the minimum, maximum, mean, and 5% and 95% confidence values of the final expected IRR for each scenario were generated by the tool. The resulting values are depicted in the following table.

Table 3 - Sensitivity of final IRR values

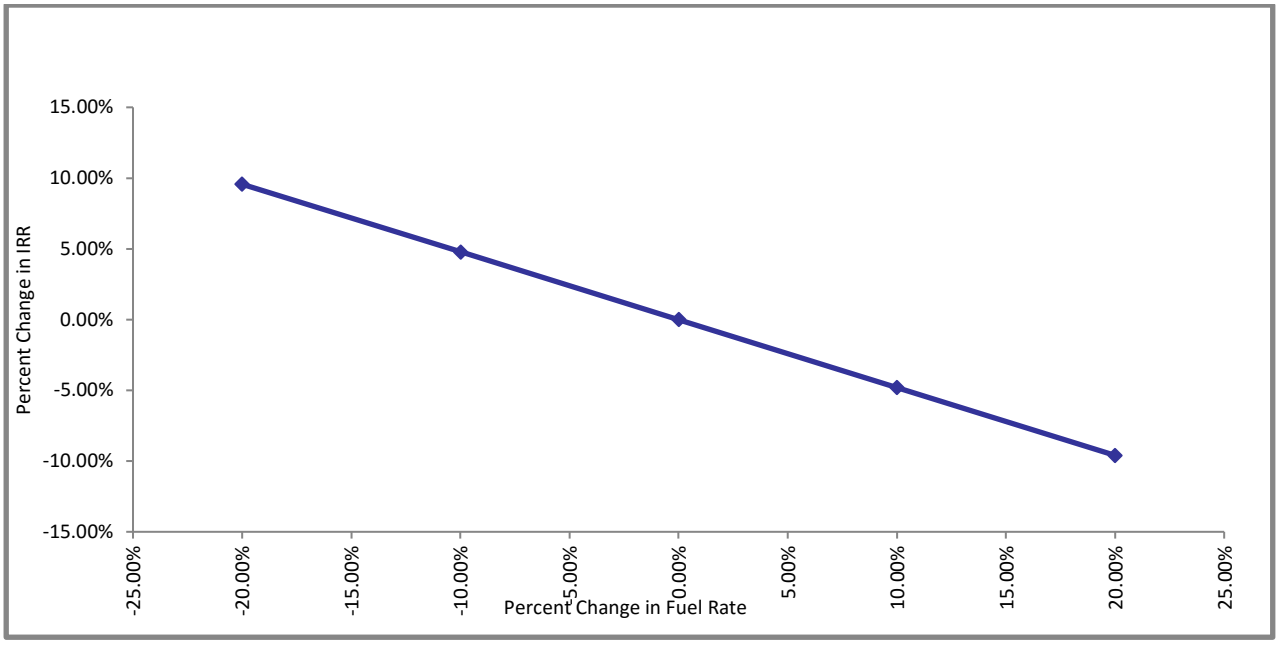
IRR FOR SCENARIO	MINIMUM VALUE	MEAN VALUE	MAXIMUM VALUE	5% CONFIDENCE VALUE	95% CONFIDENCE VALUE
IRR-1	0.18%	1.50%	4.53%	0.84%	2.34%
IRR-2	2.41%	3.43%	6.44%	2.91%	4.14%
IRR-3	4.34%	5.16%	8.24%	4.71%	5.81%

7.3 Percentage Change in IRR/EIRR

The percentage change in IRR values due to changes in input factors has been simulated using the @Risk analysis tool in the BAU and the three NAMA project scenarios. Fuel price, total fuel consumption, number of passengers travelling per year, total project cost incurred in the three years of project implementation, bus replacement cost incurred 10 years after project operation starts, bus replacement cost incurred 20 years after project operation starts, fare rate, and depreciation on buses and civil works were taken to be the variable input factors for this simulation.

The following illustrations depict the percentage change in IRR as the above factors change in the Project Scenario 1 - Reduction of 25% of cars and motorcycles from the baseline mode share. The percentage variation of each of the above inputs was assumed to be -20% <X<+20% about the value assumed in the cash flow analysis.

Figure 7 - Percent Change in IRR vs Percent Change in Fuel Rate (Price of fuel per litre) - Project Scenario 1



From the above graph, it is observed that with a 20% increase/ decrease in fuel rate[15], the project IRR will correspondingly decrease/increase by 9.6%. The total fuel consumption that is a function of fuel price has the same impact on IRR.

[15] Fuel rate refers to price of fuel per litre.

Figure 8 - Percent Change in IRR vs Percent Change in Total Fuel Consumption - Project Scenario 1

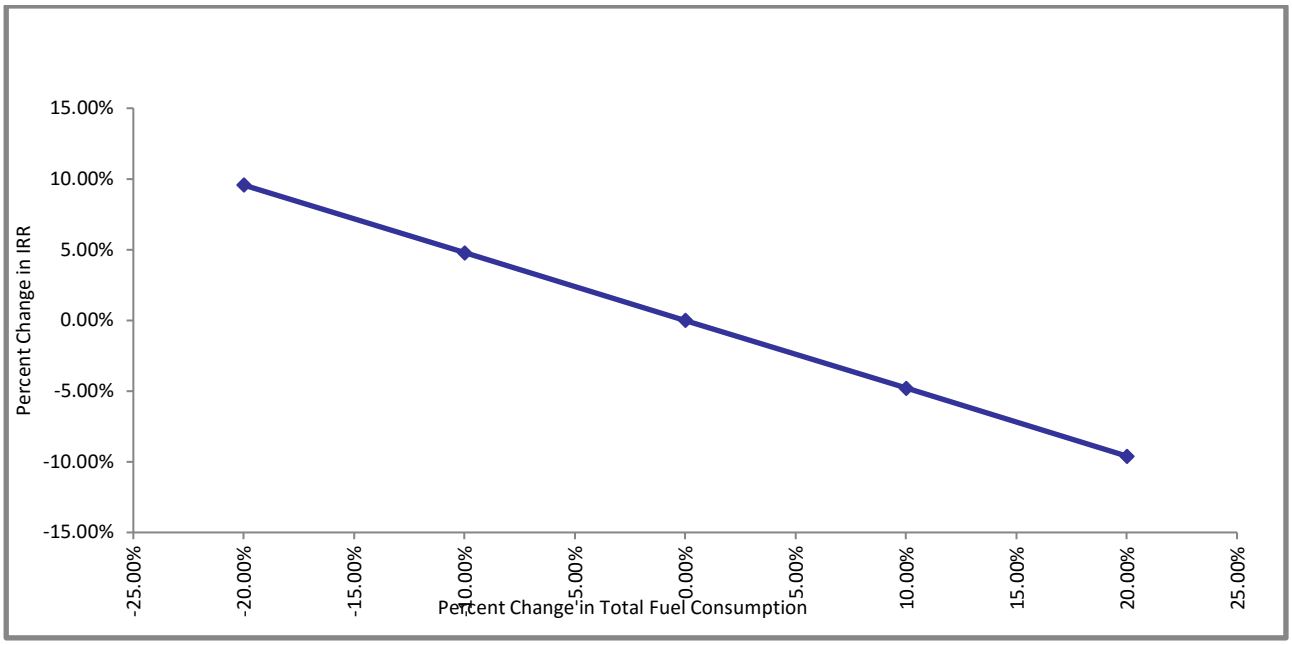


Figure 8 shows that with a 20% increase/ decrease in total fuel consumption, the project IRR will correspondingly decrease/increase by 9.6%. We conclude that changes in fuel consumption have an inverse effect on the project IRR. Therefore removal of fuel subsidy may lower the project IRR.

Figure 9 – Percent Change in IRR vs Percent Change in Passengers/yr. - Project Scenario 1

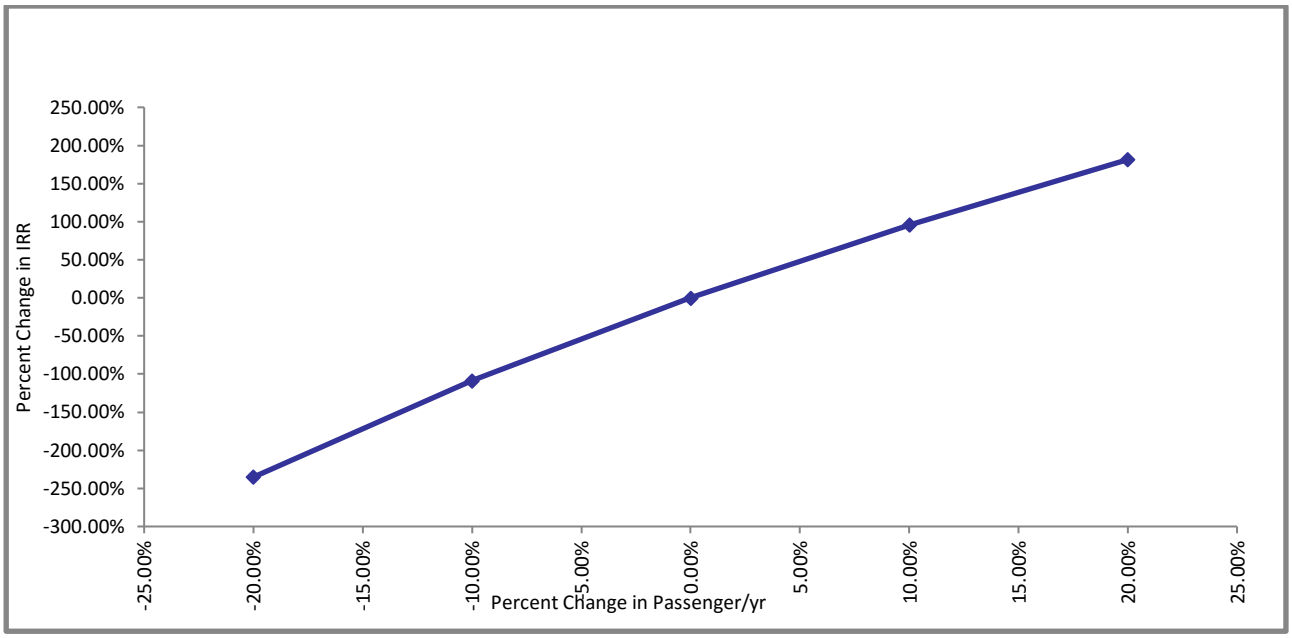


Figure 9 shows the percentage variation in IRR with change in the total number of passengers travelling per year. With a 20% rise in number of passengers/yr., the IRR increases by 180% and with a 20% decrease in number of passengers/yr., the IRR falls steeply by 235%. The following Figure 10 depicts the trend followed by percentage change in IRR as the fare price is changed. The change in fare price has the same effect on the project IRR as the change in number of passengers/yr. This trend is expected in both these cases as the

number of passengers travelling per year and the fare price are directly correlated to the revenue of the BRT.

Figure 10 - Percent Change in IRR vs Percent Change in Fare Rate - Project Scenario 1

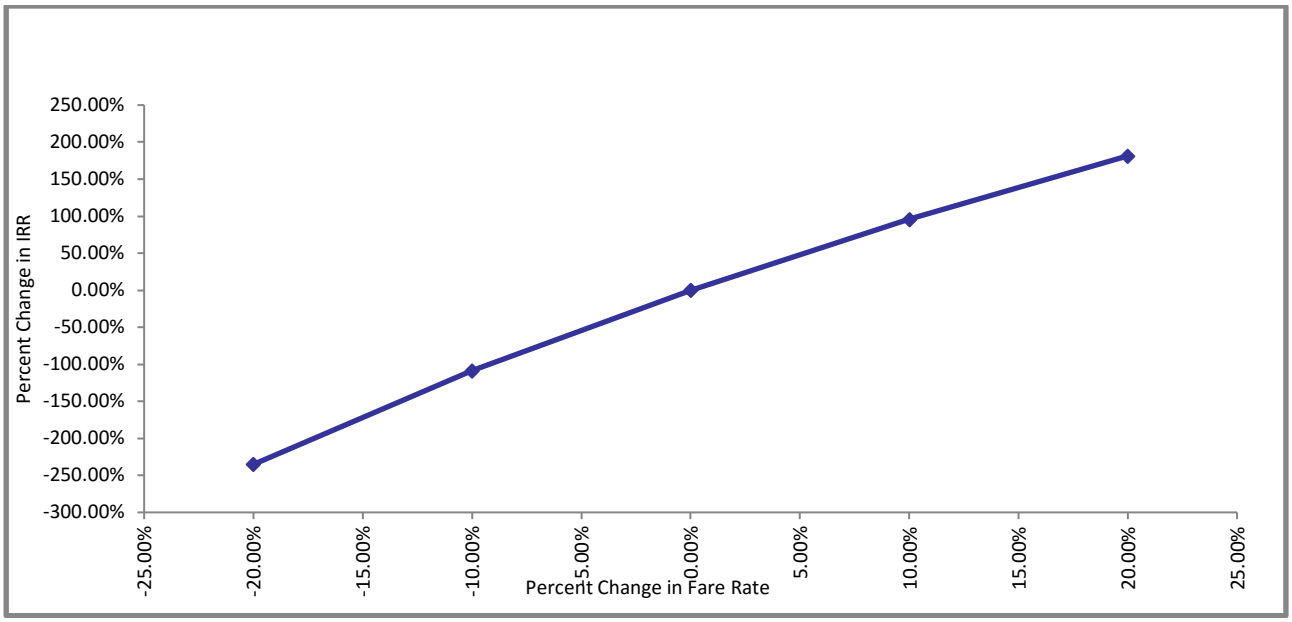
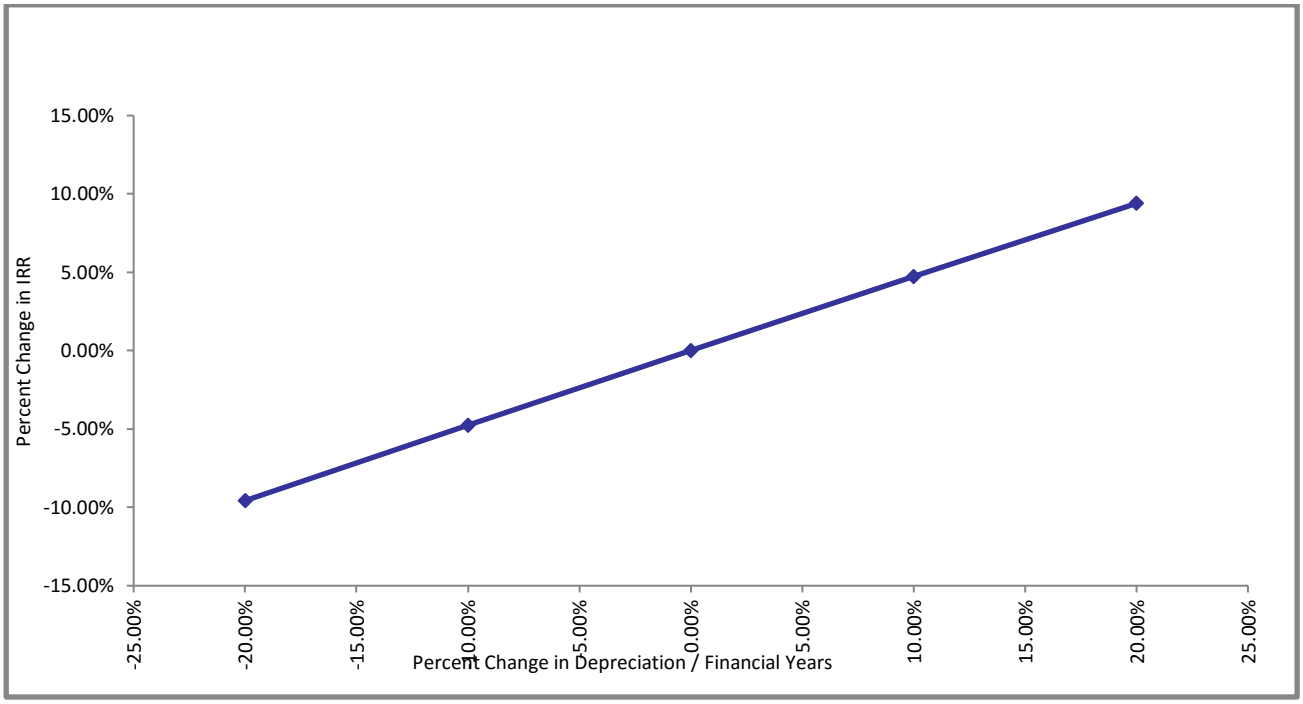
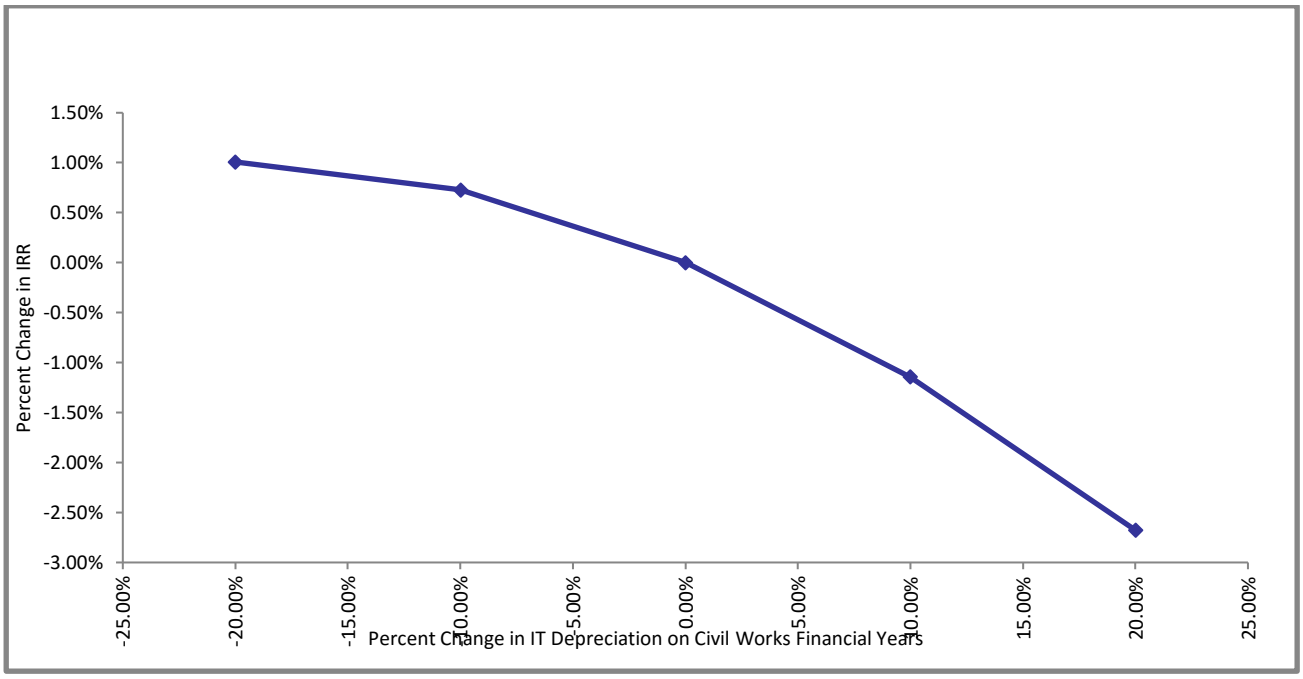


Figure 11 - Percent Change in IRR vs Percent Change in Depreciation on assets - Project Scenario 1



The above graph in Figure 11 shows that the change in project IRR is positively correlated to the value of depreciation on assets/financial assumed. A 20% rise in the assumed depreciation on the buses leads to a 9.4% rise in project IRR. The depreciation on civil works/ financial year is negatively correlated to the change in value of the project IRR; however the impact of this factor is negligible. A 20% fall in depreciation on civil works raises the project IRR by only 1%. This trend is depicted in the following graph in Figure 12.

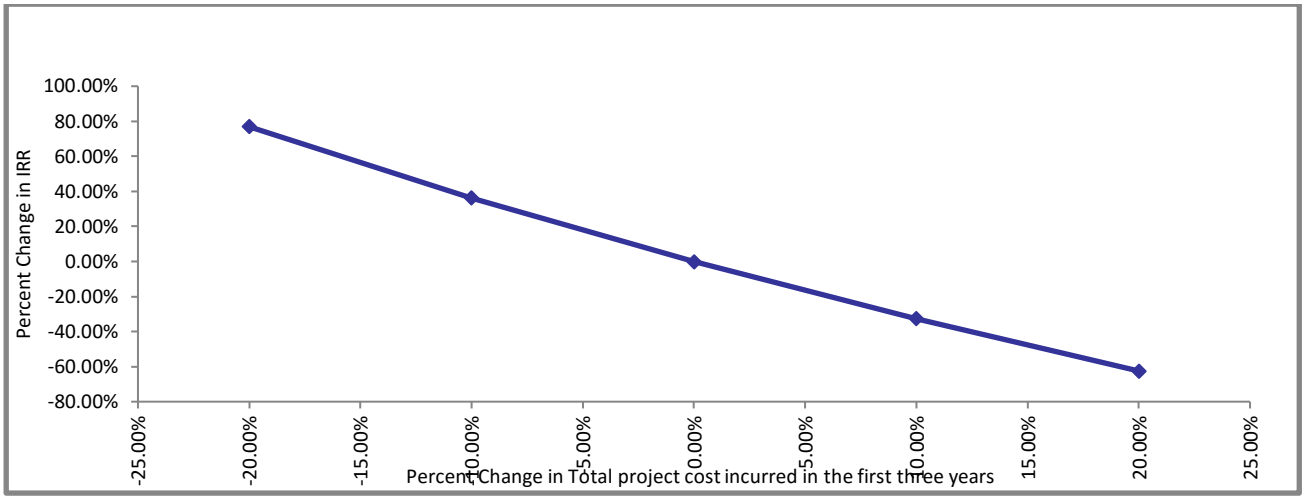
Figure 12 - Percent Change in IRR vs Percent Change in Depreciation on Civil Works - Project Scenario 1



The total project cost is incurred in the first three years during which the project is implemented. The project operation starts in the fourth year. After every 10 years from the beginning of operation, the buses are expected to be replaced.

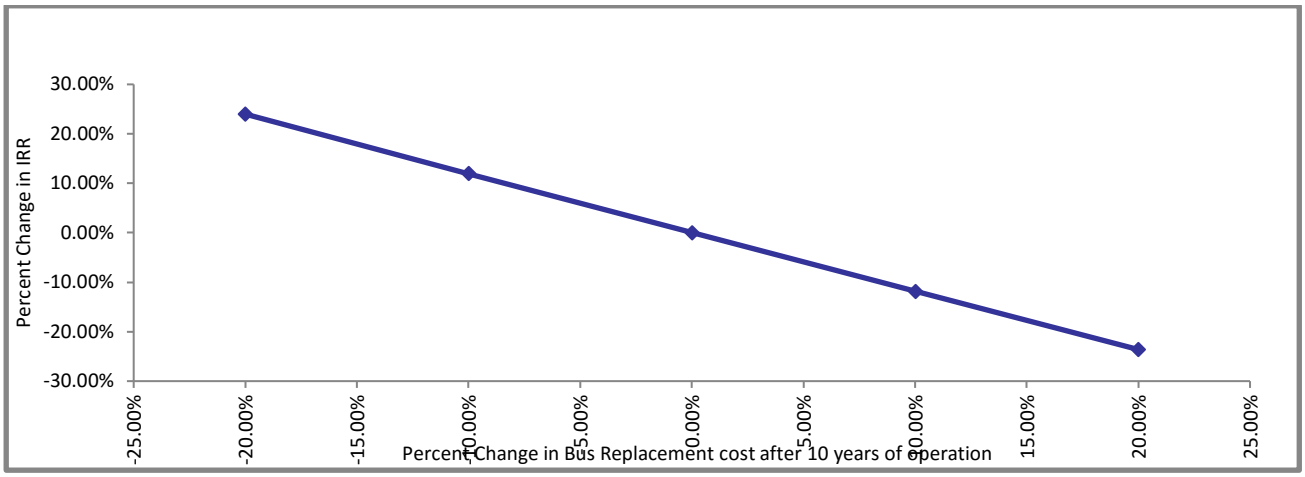
The following Figure 13 indicates the sensitivity of change in IRR to the change in total project cost incurred in the first three years of project implementation.

Figure 13 - Percent Change in IRR vs Percent Change in Total project cost incurred in the first three years - Project Scenario 1



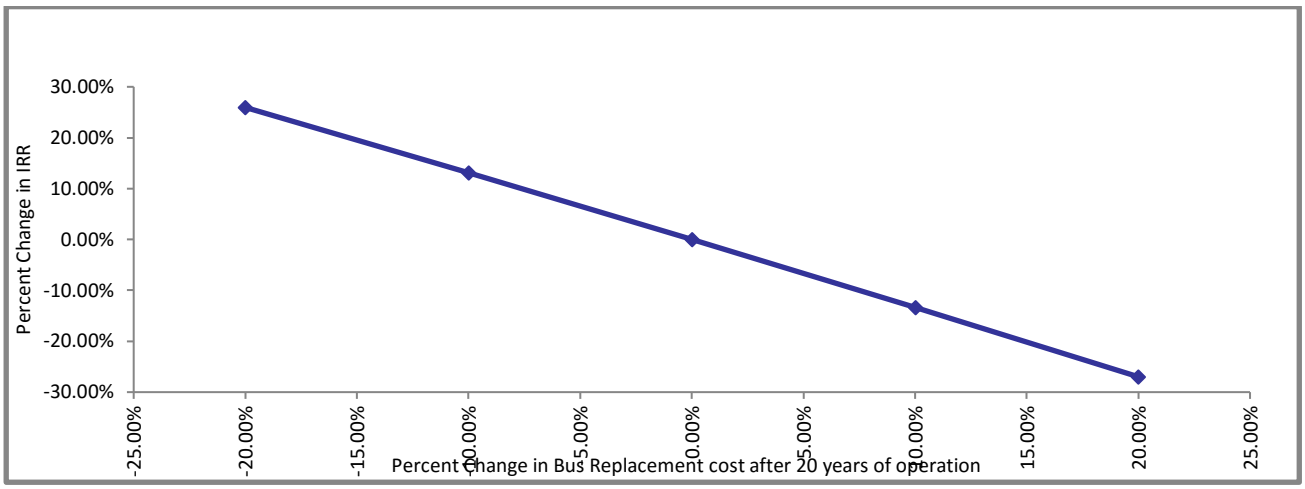
The following Figure 14 indicates the sensitivity of change in IRR to the change in total bus replacement cost incurred 10 years after operation starts.

Figure 14 - Percent Change in IRR vs Percent Change in Bus Replacement Cost after 10 years of operation- Project Scenario 1



The following Figure 15 indicates the sensitivity of change in IRR to the change in total bus replacement cost incurred 20 years after operation starts.

Figure 15 - Percent Change in IRR vs Percent Change in Bus Replacement Cost after 20 years of operation - Project Scenario 1

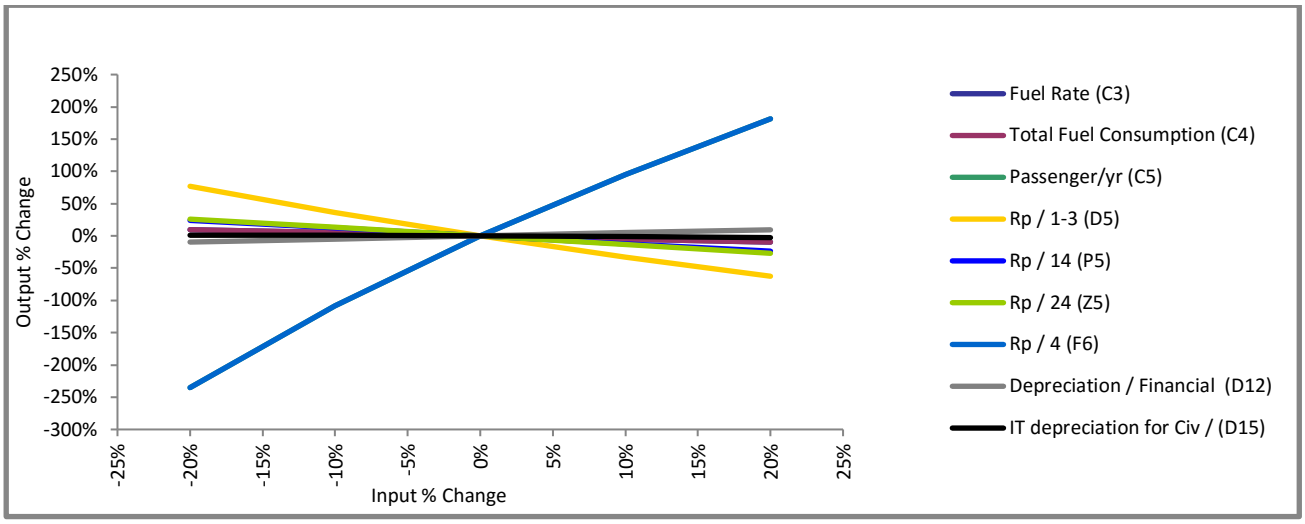


While the previous three graphs follow the same trend and the change in cost incurred is negatively correlated to the change in project IRR, the impact of change in cost incurred during the first three years of implementation on the change in IRR is greater than in the other two cases of cost incurred due to bus replacement. This is evidenced by the fact that a 20% fall in cost incurred in the first three years of implementation causes a rise of 77% in the project IRR, however in the other two cases, a fall in cost incurred by 20% results in increase in project IRR by 24%.

The following spider graph in Figure 16 summarizes the effect of changes in the factors considered above, on the change in the project IRR for Project Scenario 1. The change in fare rate has the strongest impact in change in the project IRR as it directly affects the project revenue. The cost of project implementation i.e. the main project cost is the most negatively correlated factor of all the factors considered. The other factors considered have a relatively small impact on the project IRR.

For the following graphs - Rp/1-3 represents project cost, Rp/14 represents cost of buses replaced after 10 years, Rp/24 refers cost of buses in the second replacement after the next 10 years, and Rp/4 refers to the fare rate.

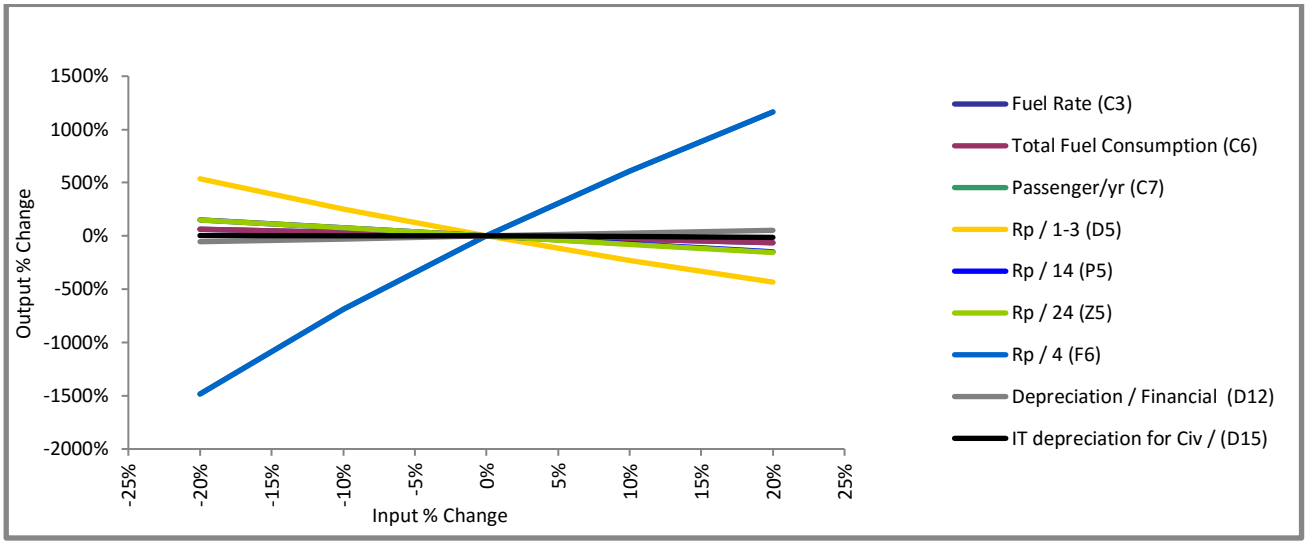
Figure 16 - Spider Graph of Percent Change in IRR - Project Scenario 1



Since similar analyses were conducted to generate individual outputs for each scenario, instead of putting individual graphs for each scenario, a final spider graph output has been put for Scenarios 2 and 3.

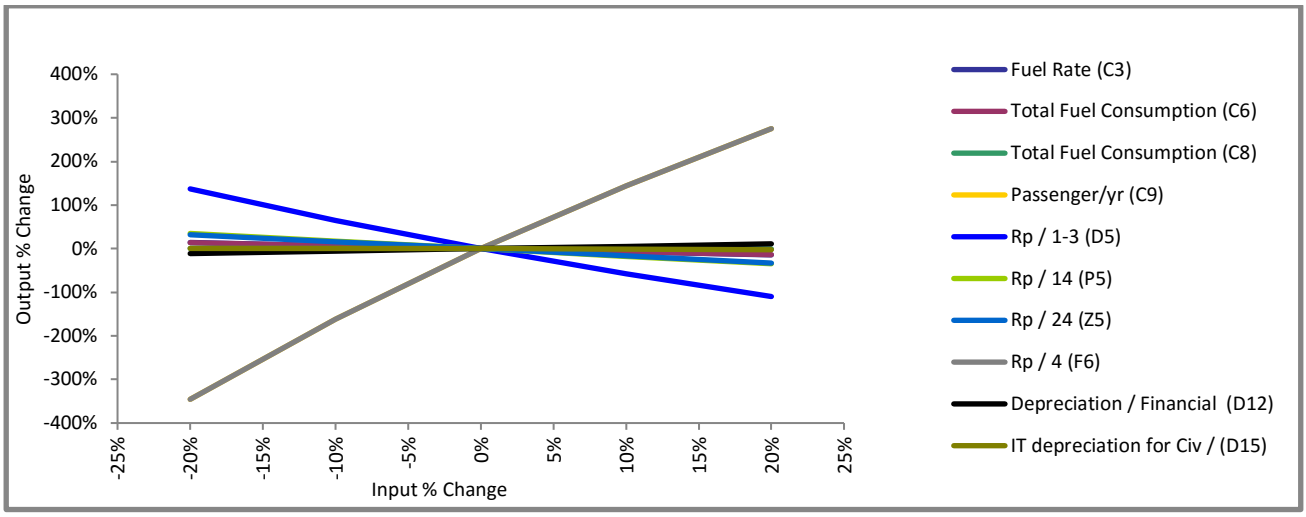
The following spider graph in Figure 17 summarizes the effect of changes in the factors considered above, on the change in the project IRR for Project Scenario 2. Similar to Project Scenario 1, change in fare rate is directly correlated to the change in project IRR. Fare rate and project cost have maximum impact on the project IRR as depicted in the spider graph.

Figure 17 - Spider Graph of Percent Change in IRR - Project Scenario 2



The following spider graph in Figure 17 summarizes the effect of changes in the factors considered above, on the change in the project IRR for Project Scenario 3. Similar to Project Scenarios 1 and 2, change in fare rate is directly correlated to the change in project IRR. Fare rate and project cost have maximum impact on the project IRR as depicted in the spider graph.

Figure 18 - Spider Graph of Percent Change in IRR - Project Scenario 3

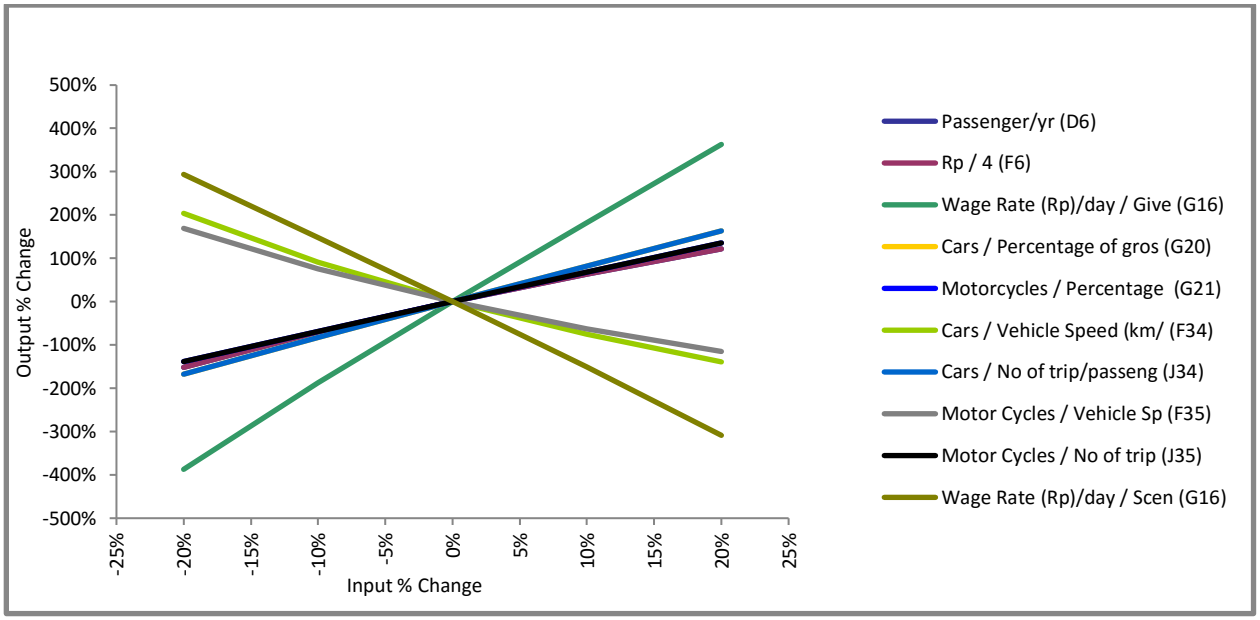


Similarly, this simulation has also been performed for EIRR values in the three project scenarios. For this analysis, total project cost incurred in the three years of project implementation, wage rate, percentage of gross hourly wage loss for passengers travelling in cars and motorcycles, vehicle speed for cars and motorcycles, and number of passenger trips in a day for motorcycles and cars are the variable input values taken from the baseline case.

Wage rate and speed of cars are the variable input values taken from the considered project scenario and they have the maximum impact on the value of EIRR in all the three scenarios. The change in other factors considered, has a very little impact on the value of EIRR. The same trend is followed in all the three scenarios as depicted in the following spider graphs.

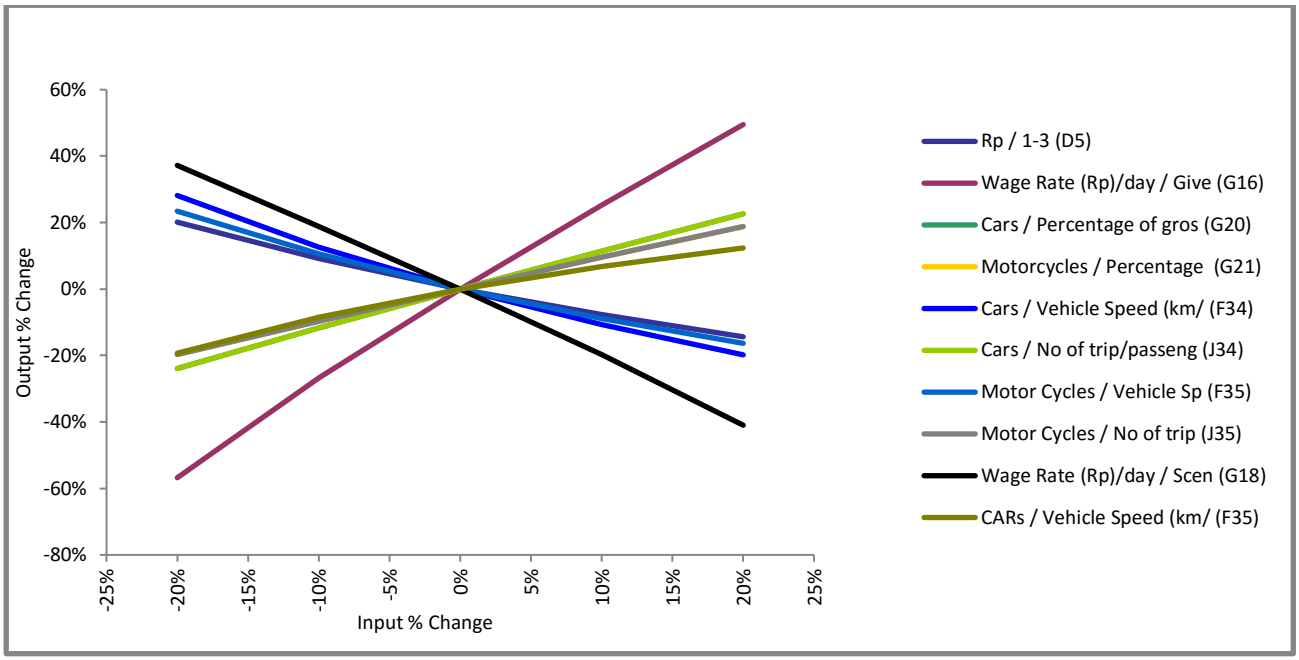
The percentage variation of each of the above inputs is taken to be -20% <X<+20% about the value assumed in the cash flow analysis.

Figure 19 – Spider Graph of Percent Change in EIRR in Project Scenario 1



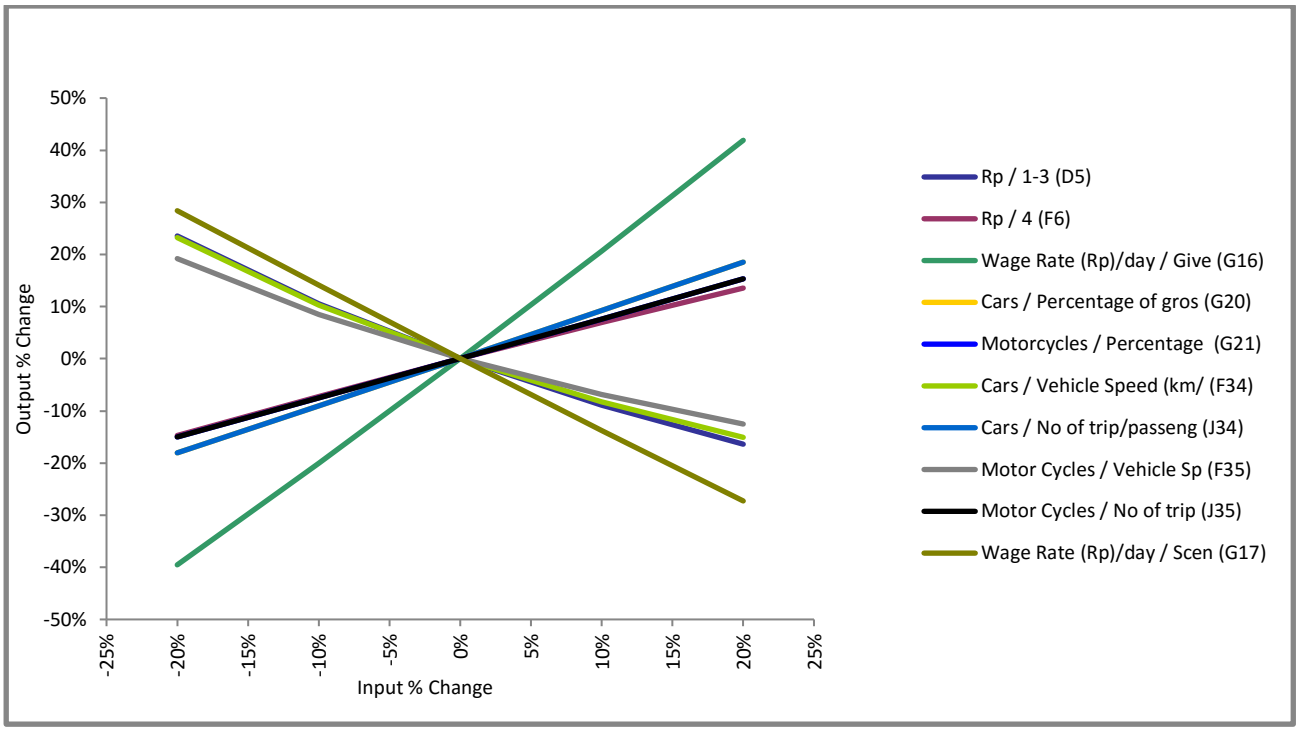
In Project Scenario 1, change in wage rate has a strong positive correlation to change in EIRR value. A decline in wage rate by 20% results in about 300% fall in the project EIRR. Vehicle speed has a strong negative correlation. A decline in vehicle speed by 20% results in a 200% fall in the project EIRR.

Figure 20 - Spider Graph of Percent Change in EIRR in Project Scenario 2



In Project Scenario 2, change in wage rate has a strong positive correlation to change in EIRR value. A decline in wage rate by 20% results in about 55% fall in the project EIRR. Vehicle speed has a strong negative correlation. A decline in vehicle speed by 20% results in a 28% fall in the project EIRR.

Figure 21 - Spider Graph of Percent Change in EIRR in Project Scenario 3



In Project Scenario 3, change in wage rate has a strong positive correlation to change in EIRR value. A decline in wage rate by 20% results in about 40% fall in the project EIRR. Vehicle speed has a strong negative correlation. A decline in vehicle speed by 20% results in a 20% fall in the project EIRR.

7.4 Summary

The above sensitivity analyses brings us to the conclusion that Project Scenario 3 is the more favorable scenario as the percentage change in EIRR with the change in factors considered is the least for this scenario. From this simulation we understand that as the mode share shift to BRT increases (maximum in Project Scenario 3), the dependence of the EIRR on the factors considered here decreases. Therefore Project Scenario 3 is understood to be the more financially viable investment option.

8. Potential Barriers for Project Implementation

Climate change mitigation measures in Indonesia face potential financial, legal, institutional/ organizational, technological, economic, political, informational, and behavioral barriers. This section identifies possible barriers related to the transport sector that could hinder the implementation of this NAMA project and the policy measures that have helped combat these barriers.

8.1 Financial Barriers

The high cost of new technologies and lack of affordable investment capital and suitable financing instruments hinder implementation of transport sector mitigation activities. In the case of the Bus Rapid Transport Development in Greater Jakarta (Jabodetabek) NAMA, the capital cost of procuring new buses and construction of new corridors and supporting infrastructure represent financial barriers to project implementation. The policies identified above are projected to generate reductions of about 589 m tCO_2e by 2020, leaving 121 million tCO_2e to be generated by new initiatives as noted in the 2012 Indonesia First Mitigation Fiscal Framework. If the gap in emissions were bridged simply by increasing budget allocation to RAN GRK, it would require spending to be increased by an additional IDR 17 trillion by 2020 (in 2020 prices), above the increase from IDR 15.2 trillion to IDR 19.1 trillion that is foreseen if spending maintains a constant share of GDP. Up to IDR 2 trillion of this could be covered by an increase in forestry royalties and other fees, designed to reduce concessions. However, the funding gap would still increase the budget deficit by about 0.25% of GDP, or require major cuts from other spending programs (Ministry of Finance, 2012).

Costly fossil fuel subsidies in Indonesia are another major fiscal barrier. Finding the ideal means to phase out fossil fuel subsidy is difficult in terms of the consequential socio-economic costs and in light of the simultaneously increasing cost of oil.

Predominantly, climate funding in Indonesia has till now been used in successful implementation of REDD+ activities. This is indicative of Indonesia's capability to successfully implement climate mitigation projects with sufficient funding. As noted earlier, this NAMA is considered to be unilateral or funded from national sources. Since the government is unable to accommodate large increase in funding needs, new initiatives such as scaling up Transjakarta require coordination with international donors to solve the major problem of lack of funding in Indonesia. This finance-ready NAMA proposal can be utilized to mobilize funding to complement the unilateral component.

8.2 Institutional/Regulatory Barriers

Based on stakeholder consultations, a general lack of legal and regulatory framework, weak collaboration between different stakeholders, and limited institutional capacity, management, and organizational experience have challenged climate change mitigation-related project implementation in Indonesia. Recent policy reforms such as those noted in Section 5 have helped develop best practice legal and regulatory frameworks, increase cooperation among different stakeholders through mutual understanding, frequent meetings and communication to achieve the national goals and increased institutional capacity, and improve managerial and organizational efficiency and experience through cooperation with international donors.

8.3 Technological Barriers

Low technical capabilities and lack of technology knowledge base, inability to assess, select, and adapt appropriate technologies, lack of infrastructure (e.g., without properly planned transport infrastructure, there is less opportunity to improve operational efficiency and fuel conservation), and institutions for supporting the standards, inflation, economic instability, and disturbed or non-transparent markets are technological barriers to project implementation. To tackle the technological barriers, Indonesia has moved to identify specific areas of climate change mitigation that need to be focused upon to meet ER targets as noted earlier.. NAMA technologies are well-known in Indonesia as the existing BRT system has been in operation since 2004. Further, the government has developed technical and safety standards in the transport sector through cooperation between the Agency for National Standard and international agencies.

8.4 Behavioral/Informational Barriers

Lack of awareness and social acceptance, insufficient understanding of the advantages of new technologies, social biases, lack of confidence in the economic, commercial and technical viability of clean technologies, consumer preference, lack of technical information and lack of demonstrated track records for environmental sustainable technologies (EST) have been prevalent barriers for all climate change mitigation activities. These barriers need to be considered during future BRT system development, and they are likely to be overcome with the NAMA awareness campaign, the cost of which could be incurred by the NAMA. Increased awareness about importance of public transport in Indonesia is evidenced by the successful implementation of Transjakarta (Ministry of Environment, 2010).

9. Capacities of Delivering Finance

Successful project execution and the ability to ensure the supply of necessary expertise and skills at local and sectorial levels are the supporting pillars that enable the delivery of national climate change strategies and funds. There is a wide range of possible delivery mechanisms that are used in channeling public funds to recipients, including through the annual government budget, direct access (e.g., grants, loans, and investments), export credits, debt swaps, and many others. Mechanisms for channeling private sources of finance in Indonesia include direct investment, commercial bank loans, asset financing, forward contracts, carbon credit, and payment for environmental services. Ensuring an appropriate level of climate finance expertise and skills across relevant sectors and sub-national government is the key to successful policy delivery in Indonesia, especially given the leading role of provincial and local governments in developing and implementing provincial GHG reduction proposals (RAD-GRK).

Fiscal decentralization in Indonesia has resulted in the delegation of expenditures and revenue to sub-national governance tiers, notably the right to regulate local taxes and retributions. Therefore in Indonesia, local actors have moved to build institutional capacities to improve the uptake and implementation of climate finance policies. The sub-national government and concerned stakeholders possess the competence to assess and articulate funding needs in preparing and delivering locally-proposed GHG emission reduction and climate change adaptation initiatives, in addition to possessing skills in climate finance management, tracking, and reporting.

Indonesia has moved to develop a pipeline of bankable projects, such as this NAMA project, with local and national stakeholders to improve climate finance absorption potential. In addition to technical assistance and training, this objective is supported by more scoping and research into mitigation and adaptation investment opportunities at the sub-national level and sectorial level, and identification of appropriate financing instruments to facilitate these.

Indonesia's central bank is currently drafting a regulation on green banking and financing, expected to be issued by the newly established Financial Services Authority. The regulation will require lenders to assess potential borrowers not only on financial, but also social and environmental sustainability standards, and can help encourage investments in green sectors[16].

Indonesia has completed a project entitled Climate Public Expenditure and Institutional Review (CPEIR) that reviewed the climate expenditures from both domestic and external sources of finance and identified ways in which climate related expenditures can be tracked. CPEIR maps the government's response to climate change and is a key building block for developing a comprehensive climate fiscal framework for climate change expenditure in Indonesia. However, some challenges remain in essential areas of climate finance delivery such as engaging stakeholders from sub-national government and the private sector, and tracking the flow and impact of climate finance expenditures and strategies.

16 http://cdkn.org/wp-content/uploads/2012/05/INDONESIA-Country-Report_3Dec2013.pdf

10. The case for NAMA financing of the proposed BRT projects

Converting the three corridors to BRT lanes for Transjakarta can result in positive net benefits under certain conditions. The calculations of ER and travel time reduction under this analysis include all the three activities envisaged under this NAMA. The net benefits of this project are highly sensitive to the input assumptions. There are trade-offs between the variables that affect the estimated net emission reduction benefits. For instance, a higher trip length may be favorable even with relatively lower passenger throughput, but if transit mode share is low, even a high BRT speed may not result in a favorable project case. The sensitivity analysis depicts the range of ER values in each scenario, with change of input parameters.

PROJECT CAPEX	**IDR 2,400 Billion**
REQUIRED PROJECT FINANCE	**IDR 1,680 Billion**

	EXPECTED IRR	EXPECTED EIRR
PROJECT SCENARIO 1	1.10%	8.93%
PROJECT SCENARIO 2	3.13%	12.67%
PROJECT SCENARIO 3	4.94%	15.84%

The cost noted above considers one-time lump sum capital expenditures or CAPEX, and such recurring expenses as operations & maintenance, insurance, fuel cost, and tax are provided separately (e.g., for use with IRR and EIRR calculations) with supporting calculations available upon request from the NAMA developer. The estimate of required project finance is assumed to be 70% as per industry standards. In consultation with Transjakarta and from the sensitivity analysis conducted (see Section 7), it is understood that removal and reduction of the fossil fuel subsidy is essential to encourage mode share shift from other vehicles to the BRT and that the fare rate needs to be rationalized as per actual operational cost incurred. Removal or reduction in fuel subsidy will result higher fuel prices. This will thereby increase the operational expenses of BRT, thereby lowering the IRR. At present, the passenger fare for BRT is IDR 3,500 as understood from stakeholder consultations. As shown in the IRR/EIRR calculations, an increase in passenger fare to IDR 5,000 would lead to favorable IRR/EIRR values in all the project scenarios. Currently the city has a flat rate irrespective of the distance. If the rate is made sensitive to the distance travelled, then average tariff of IDR 5,000 can be achieved.

Project Scenario 3 presents the best possible project case for this NAMA project. This scenario meets the set emission reduction targets within 10 years of project implementation with an IRR of approximately 6% calculated for a 95% certainty. At this IRR, the project case is most suitable for funding through international grants as this scenario provides the most favorable returns for the investor. This scenario also has the highest calculated EIRR.

It should be noted that some benefits of a BRT project were not incorporated into this analysis because they are difficult to quantify. These include indirect positive impacts on land and economic development and savings associated with use and supply of parking for auto drivers and accident rate reduction. If these types of benefits were included, more scenarios analyzed in this study would produce a more favorable project case.

References

Anggraini, Syahrina D., Boer, Rizaldi, Dewi, Retno Gumilang, Hidayat, Arief and Suharto, Ari, 2011. *Study on Carbon Governance at Sub-national Level in Indonesia – Case Study Jakarta Province*. CER Indonesia. Jakarta.

Ang-Olson, Jeffrey and Mahendra, Anjali, 2011. *Cost/Benefit Analysis Of Converting A Lane For Bus Rapid Transit—Phase Ii Evaluation And Methodology*. National Cooperative Highway Research Program. ICF International Washington DC.

Asri and Hidayat 2005. *Current Transportation Issues in Jakarta and its Impacts on Environment*. National Development Planning Agency, Republic of Indonesia. Jakarta.

Brown and Peskett, 2011. *Climate Finance in Indonesia: Lessons for the Future of Public Finance for Climate Change Mitigation*. EDC 2020. Overseas Development Institute. London.

Deloitte Touche Tohmatsu Limited, 2014. *Indonesia Taxation and Investment 2014*.

Ministry of Environment, 2010.*Indonesia's Technology Needs Assessment on Climate Change Mitigation.* Jakarta.

Ministry of Finance, Government of Indonesia, 2012. *Indonesia's First Mitigation Fiscal Framework*. Jakarta.

Ministry of Finance & Climate Policy Initiative, 2014. *Landscape of Public Climate Finance in Indonesia*. Jakarta.

New York City Global Partners, 2012. *Best Practice: Bus Rapid Transit (BRT) System - City: Jakarta*. New York City.

Presidential Working Unit for Supervision and Control, 2014. *NAMA Proposal - Bus Rapid Transport*. LECB Indonesia. Jakarta.

Siddharta and Widjaja, 2013. *Investing in Indonesia*. KPMG Hadibroto and KPMG Siddharta Advisory. Jakarta.

Situmeang, Hardiv H. and Lubis, Saut M., 2009.*Development of the Indonesian NAMAs Framework: A Final Draft*. Bappenas and GIZ.

UNDP, UNFCCC and UNEP. 2013. *Guidance for NAMA Design – Building on Country Experiences*.

Annexures

Annexure A - Minutes of the Meeting

Place: UKP4, Jakarta, Indonesia

Date: 16.12.2014

Name of Organization	No of Members	Name of Representatives
EY India	2	Shubhashis & Vinod
UKP4/ NPD- LECB Indonesia	1	Pak Koni
LECB - UNDP Indonesia	1	Puspa
Transjakarta	2	Pak Bagus, Pak Bano
Institut Teknologi Bandung (LECB National consultant)	1	Dr. Retno
Ministry of Transportation (Dishub Jakarta)	1	Pak Fathur
Environmental Agency (BPLHD Jakarta)	1	Ibu Fitri
Green Building Council Indonesia (GBCI)	3	Pak Teja, Ibu Yeni

No.	Activity Performed By	Description of Activities	Reaction/Suggestion of Stakeholders & UNDP Indonesia	Key Action Points to be performed	Remarks
1	EY India	(i) Finance-ready BRT NAMA proposal framework was presented and discussed (ii) Importance of each critical sections that make the body of the proposal was also explained in detailed	UNDP and all the relevant stakeholders have acknowledged the importance of critical sections that make the finance-ready proposal as a tool to seek funding from international sources	This finance-ready BRT NAMA proposal document is a step ahead of what is prepared by the ITB (LECB, Nat. consultant) and will act as template for the Govt. Of Indonesia while seeking finance from international sources	
2	EY India	Key Areas Presented: (i) Finance-ready BRT project report (ii) Baseline scenario and 3 Project	(i) UNDP and all the relevant stakeholders have acknowledged the reports and spreadsheets presented (ii) Ministry of Environment	(i) EY team will meet Transjakarta on 17.12.2014 to collect, analyse the historical passenger shift	(i) The spreadsheet will be modified only on the availability

No.	Activity Performed By	Description of Activities	Reaction/Suggestion of Stakeholders & UNDP Indonesia	Key Action Points to be performed	Remarks
		Case scenarios (iii) All the spreadsheet modelling/back end calculations that include the Emission reduction, Time Travel reduction, Cash Flow statements, IRRs, EIRRs, Sensitivity analysis outputs conducted in our simulation software named @Risk (iv)Key assumptions taken to develop the report	representative has suggested that Transjakarta may have some historical data on the passenger shift pattern from the private vehicles to BRT buses in the prevailing corridors and further added that this data could help fine tune the project scenario assumption (iii) NPD-LECB had suggested to add more factors that can help achieve the three project case scenarios developed	pattern data(i.e. from private vehicles to BRT buses in the existing 12 corridors) and gauge possible incorporation of the data in the report and spreadsheet calculation (ii) EY would add additional factors to help achieve the three project case scenarios developed (ii) EY to submit the two final NAMA concepts	of suitable historical information from Transjakarta.
3	EY India	Key Areas Presented: (i) Green Building Finance report (ii) The significance of the report and how this report can add value to the current Green Building concepts and Indonesia overall (iii) Current status of green buildings and growth prospects of green buildings concepts in Indonesia, need for Green building financing instruments, need for global practices of the Green building financing mechanisms (iv) EY presented	UNDP and all the relevant stakeholders have acknowledged the significance of the report and how it could act as a guide book to drive the green building finances	EY to submit the two final NAMA concepts	

No.	Activity Performed By	Description of Activities	Reaction/Suggestion of Stakeholders & UNDP Indonesia	Key Action Points to be performed	Remarks
		recommendations and how to incorporate recommendations			
4	EY India	Discussed with UNDP and Institut of Bandung to share the already developed MCA tools developed by the local LECB team as this MCA would be used as a part of our training module to be developed	Institute Technology of Bandung have accepted to share the MCA tools developed by local LECB team	EY to submit the final training module on MCA	

Annexure B

Record of Stakeholder Consultations – From Gap Analysis Report

Stakeholder. No.	Stakeholder Involved	Summary of Discussion	Key Takeaway
1	Liliek Sofitri (UNDP) & Local Consultant (ITB)	EY elucidated its four-pillared approach & methodology for the assignment and shared the data point templates for the BRT & Green Building NAMAs. During the deliberation, it was mutually agreed that consolidation of required information may take considerable time for the Indonesian counterparts and therefore we have highlighted the data on a priority basis which we need urgently. As an overview, an energy audit is required to be carried out for buildings which are operational and inhabited. EY was expecting to have access to an energy audit report for review, however during the visit was informed none is yet available although the building is currently under planning & construction. It is unclear if such a report will be made available.	We obtained the major contact points at each concerned department associated with the LECB project and requests were made to identify contact persons in positions to provide the data that we have asked for. We received contact points for the following: - Green Building Council - Transjakarta company - Jakarta city administration officials overseeing transport issues
2	Verania Andria (UNDP)	It was mutually agreed that the green building proposal would be generalized to the level of a technological-financial template which can be replicated as and when required for any of the commercial buildings (not residential) in and around Jakarta. For the BRT proposal it was understood that EY would be initially developing the proposal as a domestically supported NAMA (for National bank investment & for use with a public-private	Access to four energy audit reports for the commercial buildings was provided. It was agreed that we should be more focused on some particular segment of commercial building (like government & private offices,

Stakeholder. No.	Stakeholder Involved	Summary of Discussion	Key Takeaway
		partnership or PPP model) and subsequently align the proposal for international grants.	hotels, hospitals, etc.) rather than addressing all of them at a macro level.
3	Pak Tedja (Green Building Council) & Affan Irfan Fauziawan (Institut Teknologi Bandung)	Discussions focused on prevailing building norms & rating codes for all new constructions (which encompasses 6 categories namely water, energy, building management, materials, and health & safety) and the regulations for retrofitting existing buildings which is on a voluntary basis. One of the impediments identified in its broader acceptance is the additional capital cost incurred for complying with the voluntary code requirements. It was also noted that there are separate building regulations for the residential & commercial buildings in Jakarta and the scope is expected to be extended by the government to include adjoining cities although no clear estimate on when this could occur was provided. The Green Building Council recommended that EY should endeavor to dovetail the solar installation feasibility in the EY deliverable termed as Green Building NAMA Report / Template since the technology[17] market penetration and adoption has been limited.	The Green Building sector is not a high NAMA priority in Indonesia. The main reasons for this is the relatively low cost of upgrading to green buildings (additional 5-7% of total building development costs) and because most of the commercial buildings are privately owned (Government has limited influence on making private buildings green and high energy efficient beyond the scope of regulation). In Jakarta, all new buildings are supposed to be green buildings and this has become a [18]regular practice. It was also agreed that EY should develop financial

[17] The Green Building Council (GBC) suggested that the building template being prepared by EY should touch upon the financial mechanisms to promote and catalyse the adoption of solar technology as well. This is not any separate report which seems to be the case because the word “template” has been wrongly punched as “report”.

[18] Commercial buildings are a broad category which entails government buildings, offices, shopping malls, hospitals, hotels, etc. During the discussions with UNDP Indonesia it was agreed that for the commercial space we need to develop the financial options for specific category rather than preparing something too generic or broad touching upon all. Henceforth, it was discussed to prepare the building template for government & privately owned office building only. (ii) This point is not very clear to me so will try to answer as per my understanding. The law has been

Stakeholder. No.	Stakeholder Involved	Summary of Discussion	Key Takeaway
		The Environment Ministry and Dinas Pengawasan dan Penertiban Bangunan (DPPB) officials in Indonesia indicated the additional cost for constructing a green building for conventional building will be an extra 5-7%. It is mandatory that new buildings in Jakarta are constructed as per Green Building code specifications. Similarly, for existing buildings, the retrofitting cost was determined by the Environmental Ministry and DPPB to not be a major expenditure. However, EY considers that there can be a substantial cost impact and opportunities for financial mechanisms to support green building construction.	options for the building NAMA for specific categories rather than an overly broad approach, and EY should develop a building NAMA report template that only covers government and privately owned office buildings.
4	Bano Yogaswara (Transjakarta), Wisnu (DPPB), Pandita (DPPB), Efni A (BPLHD), Rita Rahadiatin (BPLHD), E.P. Fitratunnisa (BPLHD), Susi Andrizini (BPLHD), Affan Irfan (ITB), Liliek Sofitri (UNDP)	The meeting was chaired by the Director General, Ministry of Environment who shared useful insights about the BRT & building sector in Indonesia. Amidst the discussion, it was also understood that the green building costs in Jakarta is only 6 to 9% higher than conventional buildings.	BRT & Green Building data point templates were shared with different government department officials who will be populating the template and sharing the data with us

mandated for Jakarta only and not for rest of Indonesia. So the relevance of this template is to assist the green building adoption and acceptance by suggesting financial levers which can accessed.

Stakeholder. No.	Stakeholder Involved	Summary of Discussion	Key Takeaway
5	Melnay (Representative of Ministry of Finance)	The teleconference was postponed and couldn't be arranged later because of the Ministry's scheduling conflicts.	The query was shared with her over the email and we are still awaiting a reply

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