The Lab

India Innovation Lab for Green Finance

The Matchmaker Service

Instrument Analysis

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The India Innovation Lab for Green Finance is a public-private initiative in India that brings together experts from government, financial institutions, renewable energy, and infrastructure development to identify, develop, and accelerate innovative investment vehicles for green growth in India.

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The Matchmaker Service

DESCRIPTION —

The Matchmaker Service is a platform to match investors with a pipeline of climate-related investment opportunities for cities in India and help cities to develop climate-related projects.

GOAL —

To enable cities to develop bankable climate-related projects and access capital from different classes of investors

SECTOR —

Cities, mitigation, solar, water, transit, energy efficiency

PRIVATE FINANCE TARGET —

Institutional investors, banks, climate investment funds, grants and other sources of public capital

2. CONTEXT

Cities in India need to invest heavily in climate mitigation and adaption projects. According to International Finance Corporation (IFC), India's climate-smart urban infrastructure investment requirement will be $1.7 trillion by 2020[1]. However, cities in India face several challenges in raising this massive amount of capital required for these projects.

Central governments, state governments, and city authorities around the world are not in a position to fund the required infrastructure developments through their own financial resources. The central and state government funding for infrastructure financing needs is often restrained by their financial and budget capabilities. It is more problematic in India as municipalities in India have historically been dependent on central and state government's funding to meet their expenditure plan. However, municipalities in India now have ambitious plans to develop infrastructure as part of the central government's Smart Cities Mission, which needs a substantial scale of capital. Hence, cities need to look beyond government funding to fill the infrastructure financing gap, including the gap for climate-related infrastructure.

However, cities in India are also constrained by several direct and indirect factors while raising capital. The key challenges are:

- Cities lack knowledge and/or capacity to prepare bankable climate-related projects.
- In utility services, cities find it difficult to align interests of various parties such as financiers, operator, and users; most of the time it is favorable to users.
- Municipal corporations have limited access to capital market as they have largely relied on funds from central and state governments and not the capital market.
- Municipalities lack a track record and credit worthiness to attract finance for their projects.

In addition, investors may not always have complete knowledge of the green investment opportunities lying within the cities. Moreover, green projects in cities lack bankability due to various reasons such as irrational pricing of services, operational inefficiencies and high cost of capital.

Cities are facing several challenges in raising capital for climate-related infrastructure projects due to their inability to prepare commercially-viable projects and investors' lack of awareness of investment opportunities in cities.

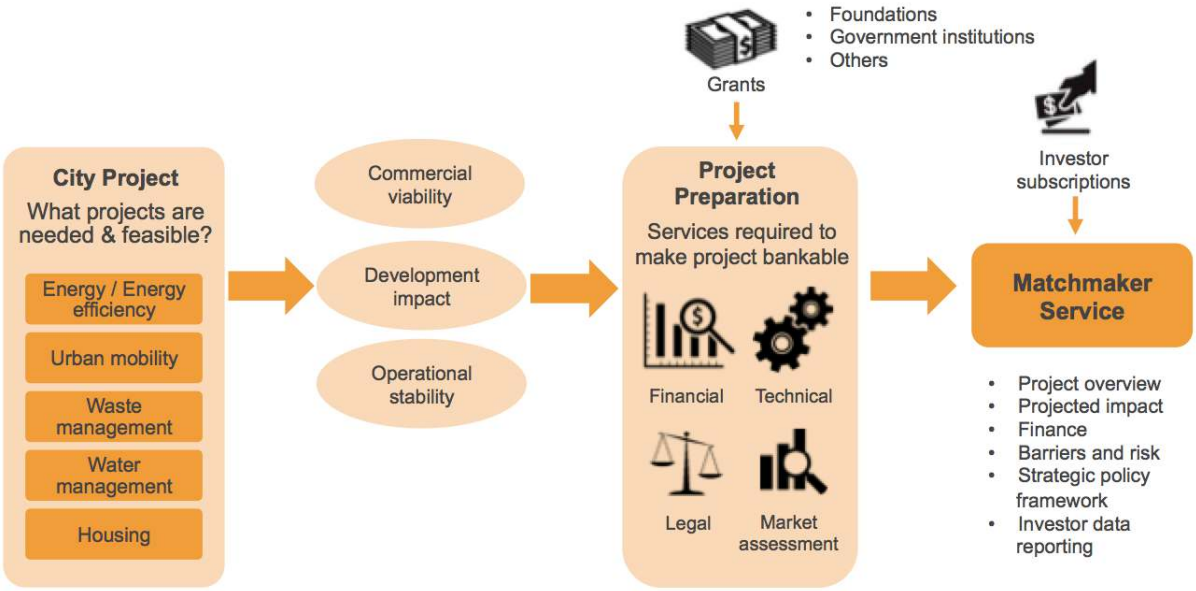
The Matchmaker Service is a platform for several cities' climate-related projects that will help investors to identify climate-related projects, which can meet their risk and return objectives. This instrument will also include a project preparation facility that addresses the barrier of lack of project preparation capacity among cities in India. The project preparation facility of the Matchmaker Service will structure the project to align interests of various parties, so that financers will not be apprehensive about the financial prospects of the project.

[1] Climate Investment Opportunities in Emerging Markets- IFC Analysis

2. INSTRUMENT MECHANICS

The Matchmaker Service aims to connect and match qualified investors across multiple asset classes with a pipeline of climate-related investment opportunities in cities across the world including India. It will also help cities with project preparation capabilities in order to improve the commercial viability and bankability of their climate-related projects.

Figure 1: Instrument mechanics of the Matchmaker Service



The Matchmaker Service instrument will have two levels of service: a) The Matchmaker Service platform and b) a project preparation facility.

2.1 THE MATCHMAKER SERVICE PLATFORM

The Matchmaker Service, developed by CDP, is a platform to provide investors with reliable, unbiased, and timely city-projects, while at the same time providing cities access to the capital market. The platform will host multiple projects on its database in order to create a pool for the subscribed investors to choose from and make an informed decision regarding their investments. The platform provides further details on responsible climate and urban infrastructure projects to financial institutions, and other parties who may use the information for financing transactions. The database will have some have general information like economic opportunities of climate change in the city and the city's strategy to maximize the opportunities.

The platform will also have some specific information and data points about the project[2], which the investors can refer to for preliminary analysis. These include the status of the project (investment requirement, financial leverage, credit worthiness of the project, etc.), expected impact (environmental and social), financial analysis, barriers and risk, and the policy framework pertinent to the project. The figure below presents these parameters in detail.

[2] Detailed onboarding process of projects in the platform is in Appendix 6.1

Figure 2: Parameters to judge feasibility of the project

Project overview	Expected impact	Finance	Barriers and risks	Strategic policy framework	Investor data reporting
•Area •Project status (scoping, pre-feasibility etc.) •Status of financing •Total cost of project •Total investment required •Credit worthiness of the govt.	•Annual GHG emission reduction •Number of people benefitted •Number of jobs created •Additional co-benefits like public health, energy access, improved air quality	•Planned investment capital •Secured investment capital •Capital provider •Cost of capital, expected IRR •Revenue sources	•Technical barriers •Financial barriers •Risk reduction activities and techniques	•Does this project meet a city Renewable Portfolio Standard (RPS) or other emissions or climate-related goal? •Are there other strategic partnerships or goals that this project is a part of meeting?	•Financial feasibility •Impact analysis •Economic, social impact analysis •Contracts, permits, etc.

2.2 THE PROJECT PREPARATION FACILITY

The project preparation facility is designed to shortlist projects based on commercial viability, climate impact and operational stability, and provide project preparatory services such as legal, technical and market viability assistance. The scope of work of the facility can be divided into four broader categories: preliminary needs assessment study, feasibility analysis, strategy, and connecting with investors. The facility will also act an honest broker to bring multiple cities (projects) and various classes of investors together, so that investors can identify the right investment proposition according to their risk and return objectives. The table below provides the scope of work to be performed by the project preparation facility for the implementing city.

Table 1: Scope of work for the project preparation facility

Function	Details
Preliminary needs assessment study	• Assessment of existing status of the project • Preliminary analysis of the project including volume and pricing of user charges • Demand projections of the project's services

Feasibility analysis	• Technical feasibility: Suitability of the project in the city considering environmental and social conditions
	• Legal feasibility
	• Economic feasibility analysis of the project - financial modeling and project evaluation
	  ○ Preparing cash flow projections
	  ○ preparing projected financial statements
	  ○ Investment analysis including upfront investment requirement

Connecting with investors	• Identification of investors • Financing pathways analysis (including green bonds) and suggestions • Development of investment decks/pitches • Development of investment related marketing material

The project preparation facility will help cities develop climate-related bankable projects, facilitate aggregation of these projects to reach a larger scale, and connect cities with investors to attract large scale commercial capital for climate-related projects.

As a pilot project for the platform, we have identified deployment of city electric bus fleets as an investment opportunity with significant potential in India.

2.3 FINANCIAL SUSTAINABILITY

The Matchmaker Service platform can be self-sustainable as it would be a subscription based model operating in a fast growing market with enormous opportunity for investment – USD 1.7 trillion in India by 2017. The subscribers[3] will largely be investors and project management companies who are seeking investment opportunities in city-based climate-related projects. In the initial year, the platform will get funding from Climate KIC (EU's largest climate innovation initiative), but can be self-sustainable quickly. Based on a survey with more than 800 investors, CDP estimates that the platform can add five subscribers in the first year and approximately 75 by the fifth year. There are some institutional investors who have expressed interest in subscription and one commercial bank is willing to pay a subscription fee for the Matchmaker Service. In 2017, 362 cities disclosed more than 1,000 projects to CDP, representing over USD 52 billion. This size of investment opportunity will likely attract investors and project management companies to the Matchmaker Service platform.

The project preparation facility will source funding from, amongst others, foundations and government sources, in the initial years. However, in the long run, the facility aims to become an honest broker, so as to generate revenue via collection of fees through closing deals. The fees can cover operating cost of the facility in the long run and make it a self-sustainable business model.

3. INNOVATION

The Matchmaker Service not only connects urban authorities with new investor classes, but also offers much needed technical support to make city-based climate projects commercially viable.

Existing business and financial databases have helped both investors and corporates make connections and have facilitated capital flows with the aid of information technology. However, the Matchmaker Service is unique as the database specifically constitutes city-based climate projects. This instrument offers an innovative solution that meets the growing capital needs of cities in India for climate-related infrastructure projects. This is in the midst of urban authorities

[3] Potential subscriber segmentation discussed in detail in Appendix 6.2

like municipalities and urban transportations in India finding it difficult to raise much needed long-term commercial capital for their basic infrastructure needs. In addition, the Matchmaker Service also addresses project preparation needs of urban authorities, which can develop these projects and as a result accelerate flows of private capital into cities. The instrument not only aims to connect urban authorities with various investor classes but also offers much needed technical support to make city-based climate projects commercially viable.

3.1 BARRIERS ADDRESSED: BRIDGING THE INFORMATION GAP AMONG CITIES AND INVESTORS, AND HELPING CITIES DEVELOP BANKABLE GREEN PROJECTS

The Matchmaker Service improves access to capital

Urban authorities in India have been historically dependent on government grants for urban development, which has limited their ability to access capital market. However, government grants are inadequate now to meet the growing funding needs of urban infrastructure, including climate infrastructure. This instrument will help urban authorities to connect with different classes of investors having different risk and return objectives. Aggregation of projects through the Matchmaker Service platform will attract investors into the platform, which will result in increased supply of private capital.

The Matchmaker Service enhances project development capabilities of cities

The instrument will offer project preparation support at the early stage of the projects so that cities get guidance in preparing projects and a better understanding of investors' decision making criteria. Through this, the instrument can overcome the capacity barriers of cities.

The Matchmaker Service reduces investment risk through use of an innovative financial structure

There is a limited track record for climate infrastructure, which will make investors averse to invest in these projects. The Matchmaker Service aims to use innovative financial solutions such as blended financing and credit enhancement instruments in the financial structure of projects. The addition of these instruments will address commercial feasibility of these projects.

The Matchmaker Service provides the right contractual structure to reduce investment risk

In utility services, cities find it difficult to align interests of various parties such as financiers, operator, and users; most of the time it is favorable to users. The project preparation facility of the Matchmaker Service aims to structure the project to align interests of various parties, so that financiers will not be apprehensive about the financial prospects of the project.

3.2 CHALLENGES TO INSTRUMENT SUCCESS

Ensuring financial sustainability of the Matchmaker Service platform

The Matchmaker Service needs a huge amount of upfront capital to build the platform and bring projects onto the platform. The platform must justify the subscription fees it charges to investors. Most investors are likely to commit only after successful pilots but the platform needs initial investors to commit in order to complete pilots. It may take many years for the platform to charge a reasonable fee to investors, which makes the financial sustainability of the platform uncertain. Further, due to the specific nature of projects that this instrument deals with, the following issues may create a hurdle in its success.

1. Risk of bringing a bankable project: Many of the infrastructure projects in cities may face difficulties in running in a commercially-viable manner as these projects will be largely public-utility type businesses, the user charges of which are not usually set on economic principles due to political sensitivities. In addition, political sensibility toward these projects increases perceived risks of these projects, which discourages investors from investing.

2. Risk of attracting investors to city-based climate-related projects: The success of the platform depends on willingness of investors to invest in city-based climate-related projects. The perceived risk and the gestation period of climate-related projects is still high, which may discourage investors to invest. Moreover, performance of urban authorities in India has not been encouraging so far to attract private investors.

Requirements of grants for the project preparation facility

The project preparation facility, which is an integral part of the instrument, is still at a conceptual stage. It needs grants to cover its operating cost. In case the project preparation facility is unable to secure grants, the instrument cannot overcome capacity barriers of urban authorities, which limits the effectiveness of the instrument.

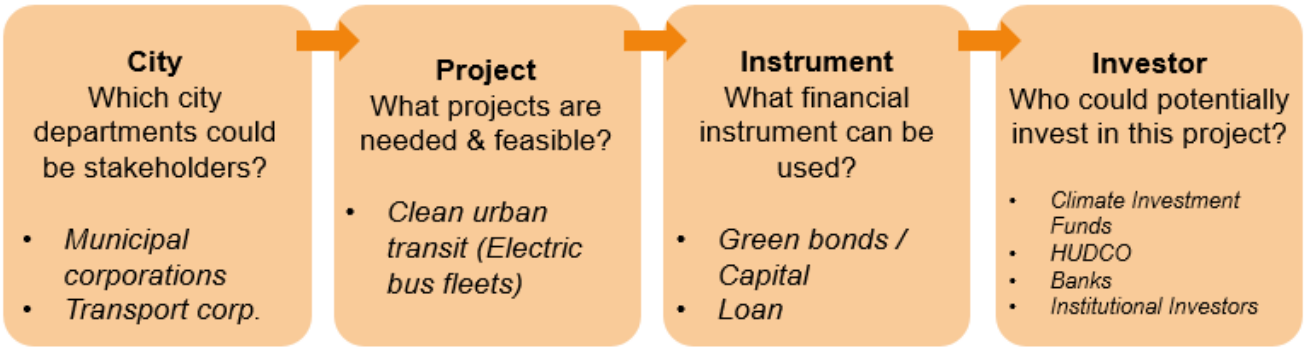
4. PILOT AND BEYOND

4.1 ACTIONABILITY: IMPLEMENTATION PATHWAY AND REPLICATION

As a pilot project for the platform, the Matchmaker Service Lab working group has identified deployment of city electric bus fleets as an investment opportunity with significant potential in India. The working group chose this pilot project on the basis of multiple criteria, including as interest of cities, data availability, commercial viability, and availability of an implementing agency.

The government of India has a target of 100% clean transit by 2030, which will need large scale capital. The top nine cities in India need around USD 8 billion to replace existing buses with electric buses.[4]

Figure 3: Electric bus fleet pilot project



The state of Jammu and Kashmir has expressed interest in being the implementing partner for the pilot project. Under this project, the India Lab in conjunction with CDP, would help Srinagar prepare the project by developing the business plan and project design, while also connecting

[4] CPI calculation

them with suitable investors via the Matchmaker Service platform. The details of the pilot project are discussed in the following sections.

4.2 FINANCING PATHWAY AND IMPLEMENTATION OF AN ELECTRIC BUS FLEET PILOT PROJECT IN SRINAGAR

Urban transportation in many cities including Srinagar is managed either by transport corporations or the municipal corporation. Most of the urban transport businesses run by state owned transport corporation or municipalities including the transport authority in Srinagar are making losses, which does not allow them to procure buses by raising debt. It is difficult for these entities to raise capital at the corporate level. In order to solve this, the transport authority can set up a new special purpose vehicle (SPV) for electric vehicles that doesn't carry the liability of the existing loss making transport entity.

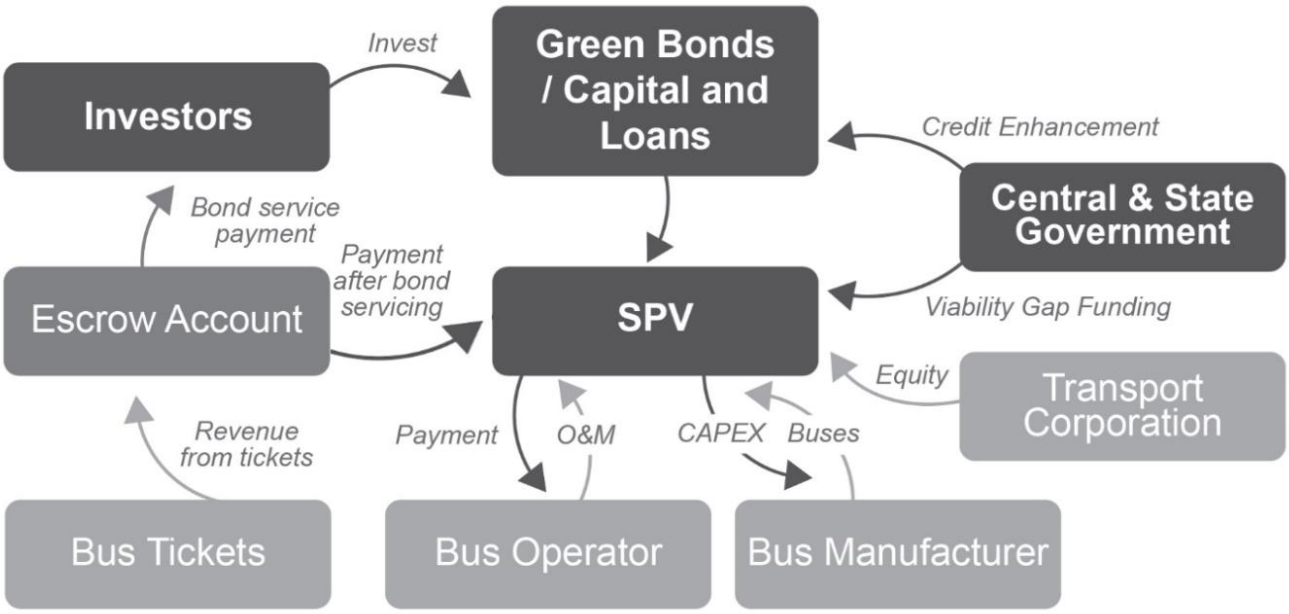
The government-managed urban transportation business does not have enough commercial credentials to raise debt capital from commercial banks at an attractive rate. So, the SPV can raise debt capital from National Urban Mobility Fund, National Clean Environment Fund, Development Financial Institutions (DFIs), and international climate funds (GCF and GEF), banks, and HUDCO. The SPV can also raise financing from banks by offering them a reasonable return and adequate protection. Seniority in the capital structure, third party credit guarantees (revenue assurance by states), and other credit enhancement products (collateralization of buses) would offer banks adequate protection.

Climate finance investment funds such as the Green Urban Mobility Fund can provide financing to this SPV given their commitments to invest in climate sectors. These funds can take more risks than mainstream investors and provide long term loans at a concessional rate to enhance the creditworthiness of the SPV. The cost of financing would be too high to attract project developers if the SPV does not get concessional financing, We have not arrived with a precise capital structure at present as different cities would have different electric bus economics due to different bus tariffs and traffic. Cities with higher ticket price and capacity utilization of buses would need less public capital.

Central and state governments can also provide viability gap funding to the SPV to make electric buses commercially feasible. The SPV can also get incentive from the FAME scheme (Faster Adoption and Manufacturing of Hybrid & Electric Vehicles in India) of the Department of Heavy Industry or from the upcoming green mobility fund to bridge some of the viability gap. State government can also provide some credit enhancement, such as a tariff guarantee, to the SPV.

Blended financing (a mix of viability gap funding and commercial and public capital) with an appropriate contractual structure between the investor, regulator and operator through an SPV can create a sustainable path for driving private capital into India's electric transportation sector.

Figure 3: Instrument mechanics for the pilot project



The cost of funding will be critical for the success of electric bus deployment for cities. Private operators in the urban transport business are struggling to raise debt capital from banks and other financial institutions, as the urban transport business is highly unorganized and revenue is uncertain. Hence, in most cases, private operators would put their own equity capital to procure buses, but at a high cost of capital (18-22%). The high cost of capital makes electric bus operation more expensive when compared to diesel buses, as the former are approximately three times more capital intensive than the latter. In addition, private operators might find it difficult to invest a large scale of capital in the initial years as the commercial feasibility of electric bus is not defined yet.

As the cost of capital will be higher for a private operator, we suggest using blended capital in the initial years to reduce the cost of funding, which could in turn lower the bus tariff. The cost of capital will be lower for an SPV compared to a private operator as they are better suited (better credit worthiness and have access to guarantees) to access finance.

4.3 BUSINESS MODEL

There are number of stakeholders involved in running electric buses: the government (city authority), private operator, and charging infrastructure provider. It is essential to identify the right stakeholders and align the interest of all them in order to run this project successfully. We suggest the government fund the procurement of electric buses in initial years while the operation and maintenance can be handled by the private operator. The charging infrastructure can be provided as a service by a third party.

The government (the SPV) will provide capital investment to make the cost of capital cheaper, resulting in lower cost of servicing, and the city authority (not the SPV) will provide bus terminal services like they provide to bus operators. The SPV will also appoint the bus conductor (to reduce siphoning) and decide the routing and scheduling to optimize bus operation. The private operator will provide drivers, cleaners, and operating and maintenance service as the private operator will be competitive and efficient in providing these services. A third party can supply electricity and provide charging stations. India's private sector companies are keen to set up charging infrastructure. Also, it could be another business opportunity for government owned electric utilities. The SPV can also enter into a long term Power Purchase Agreement (PPA) with charging station operators to reduce volatility in cash flows. It is a win-win situation for both, the charging station operator (stable revenue generation means lower cost of funding) and the bus operator.

As cost of financing is critical for success of electric bus deployment, the transport authority should provide capital, as the cost of capital will be cheaper for a government entity than a private entity in the urban transportation business.

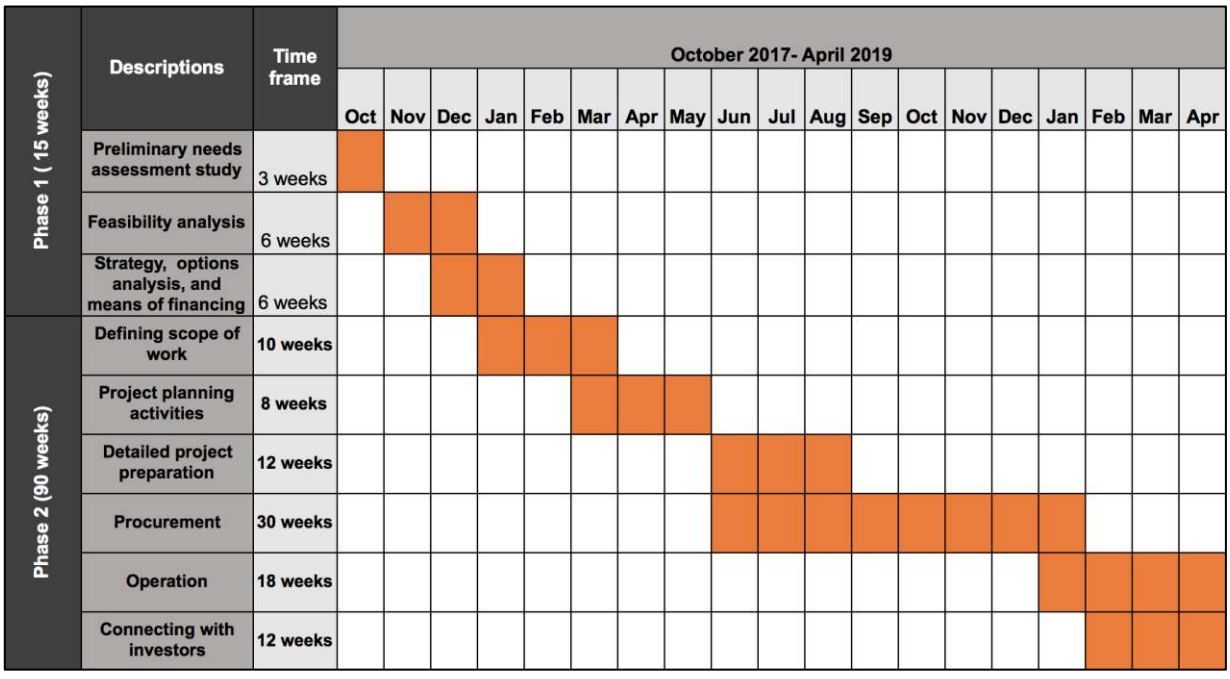
This business model is a scalable model with high catalytic potential that does not require new policy or regulations and can be implemented within the existing legal framework in India. As the Matchmaker Service and the push from the government for electric mobility gain momentum, cities will find the service appealing as most cities have already expressed their interest in shifting from diesel buses to electric buses. Despite the lack of implementers currently, the future for electric buses looks promising. Bangalore Metropolitan Transport Corporation has already submitted a proposal with Department of Heavy Industry (DHI) to procure 150 electric buses in a public-private partnership (PPP) model, Himachal Road Transport Corporation received sanction from DHI to purchase 25 electric buses, and Thane Municipal Transport approved a plan to introduce 100 electric buses in a PPP model. We have explored the possibility of implementing this instrument in several other cities. The Jammu & Kashmir (J&K) Government has shown a keen interest in implementing a pilot project of the Matchmaker Service instrument in the city of Srinagar.

The project preparation facility will provide services such as feasibility analysis, legal assistance, technical assistance etc. to make the electric bus project bankable. After this, the project will be uploaded onto CDP's Matchmaker Service platform for subscribed investors to access.

4.4 IMPLEMENTATION PATHWAY

The implementation of the pilot project is divided in two phases. The first phase which includes preliminary assessment, market evaluations, and feasibility analysis will last for 15 weeks. The second phase where the actual implementation of the project begins would extend till 2019 (approximately 90 weeks). It includes creation of the detailed project report, procurement of buses, operation, connecting with investors etc. The detailed timeline is presented below.

Figure 4: Implementation timeline for the pilot project



4.5 IMPACT

Srinagar can reduce up to 800 tons per year of pollutants by converting a fleet of 800 diesel buses to electric buses.

India has committed to reduce emission intensity of its GDP by 33-35% by 2030, from 2005 levels. Transport accounts for a tenth of India's greenhouse gas emissions, with a 2009 study attributing 95% of these emissions to road transport.

The pilot project in Jammu and Kashmir has a fleet size of 800 intercity buses. We assume 100% electrification of the fleet to calculate the environmental impact, namely abatement of particulate matter (2.5 and 10), nitrous oxide and carbon monoxide per year. By converting the fleet to electric in Srinagar, this instrument can reduce up to 800 tons per year in pollutants.

Table 3: Reduction in pollutants

	Kg/bus (per year)	Reductions over the 10-yr lifetime of the bus fleet (for 800 buses in tonnes)
PM abatement	30	250
SO2 abatement	78	620
NO abatement	657	5,250
CO abatement	197	1,570
HC abatement	48	380
TOTAL		**8,080**

4.6 QUANTITATIVE MODELLING

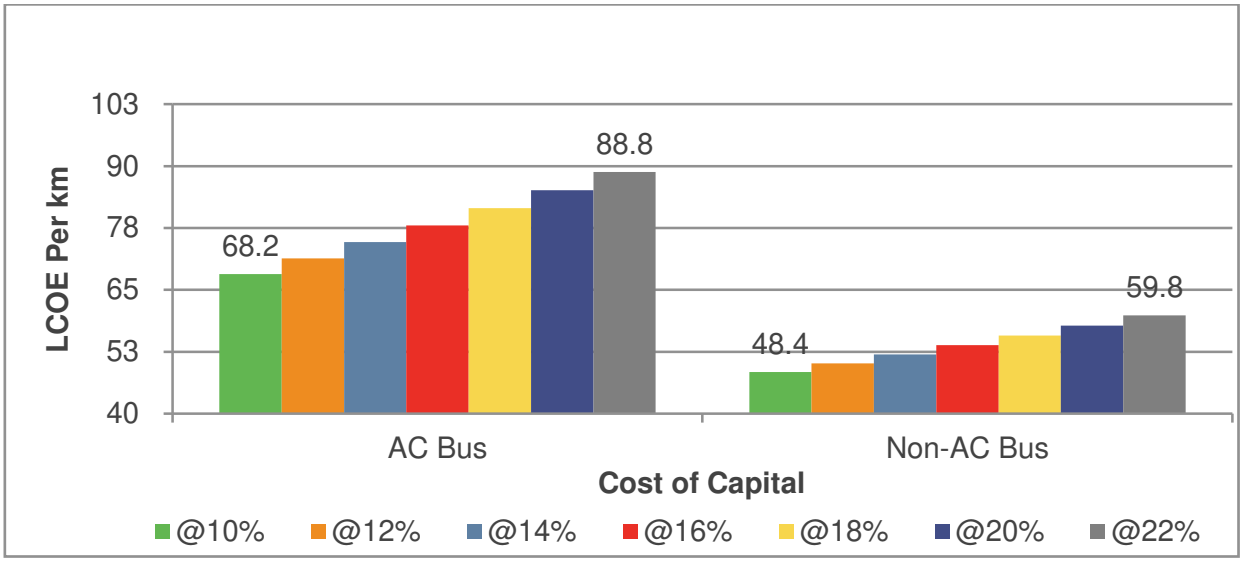
4.6.1 The cost of capital is critical

An electric bus is approximately three times more expensive than its diesel counterpart as the cost of capital is a significant component (in the range of 50%-62%) of cost of operation of an electric bus. Therefore, the cost of capital heavily affects the cost of ownership of electric buses and consequently determines ticket prices. As the urban transportation business is unorganized and private operators have to take a number of risks (even though revenue risk is borne by the government), the cost of capital would be expensive for a private player.

An Indian Ministry of Urban Development report on city private bus operation suggests that private operators expect to receive a return on investment higher than the rate of bank interest, ideally in the range of 15-22%. This cost of capital is high compared to the cost of capital of a state transport corporation or a municipality. Moreover, the cost of capital would be higher for a private operator for running electric buses as there is no track record of running electric buses. Our analysis (as shown in Figure 6 below) suggests that a 1 percentage point decrease in the cost of capital would decrease the cost of ownership by around 2 percentage points for an AC

electric bus. Therefore, the Srinagar Transport authority seems to be more suitable than a private operator to provide capital.

Figure 5: Sensitivity of cost of ownership of electric buses to cost of capital



Key Assumptions: Electric bus: INR 1.8 crore. Fuel cost: INR 56, Electric cost: INR5.5/kwh, Running per day: 150 kms, Cost capital: 12%, Life time of bus: 8 years

4.7 CATALYTIC POTENTIAL: PRIVATE FINANCE MOBILIZATION AND REPLICATION POTENTIAL

The most appropriate business model is: the government funds the procurement of electric buses in the initial years, a private operator provides operation and maintenance services, and a third party (such as a power utility) provides the charging services. The business model for the electric bus fleet pilot project is a scalable model with catalytic potential that does not require new policy or regulations, and can be implemented within the existing legal framework in India. The total number of buses owned by the top nine city transportation authorities is ~24,000.[5] It is noteworthy that the number of diesel buses running in urban areas is far less than the needs of the city. For instance, the number of buses running in Delhi is approximately 4,700 buses, which is grossly inadequate compared to the estimated need in the range of 10-11,000 buses.[6],[7]

Considering that this business model has the potential to finance 20%[8] of these 24,000 buses, the total private finance that can be mobilized is approximately USD 1 billion[9] alone in the top

[5] Shakti Sustainable Energy Report

[6] Shakti Sustainable Energy Report

[7] https://timesofindia.indiatimes.com/city/delhi/1000-new-dtc-buses-on-road-soon/articleshow/58935035.cms

[8] According to Goldman Sachs estimate electric bus will have 20% adoption by 2025

[9] CPI calculations: AC Electric bus price; INR 180mn, Debt / Equity – 70:30, Equity capital to be provided by the Govt.

nine cities. In the case of pilot with the J&K Government, the project could be of USD 100 million[10], and this business model can mobilize USD 33 million of private finance in this pilot project.

5. KEY TAKEAWAYS

The Matchmaker Service platform will help cities connect with appropriate investors and project management companies to develop climate-related projects. The project preparation facilities will help cities to develop bankable climate projects.

The Matchmaker Service meets the four Lab criteria in the following ways:

Innovative: This instrument addresses barriers cities are facing in accessing private finance for climate-related projects which haven't been addressed yet, by making the capital market accessible to the urban transportation sector. The project preparation facility will provide early stage project preparation support, which will facilitate capital flows to cities for climate-related projects. The Matchmaker Service database, combined with the project preparatory facility, makes this instrument innovative.

Financially Sustainable: The subscription-based business model – subscribers that are mostly investors and project management companies, who are seeking investment opportunities in city-based climate-related projects in a large market – can make the Matchmaker Service platform financially sustainable.

Catalytic: The Matchmaker Service is likely to have a catalytic impact by bringing together lenders, project management companies, and cities for development of climate-related projects. The project preparation facility can be catalytic in the early stages as it will help cities develop a number of large-scale climate-related bankable projects. Cities can learn from initial successes and replicate the same for other projects.

Actionable: The Matchmaker Service is actionable as there are no regulatory changes required to implement the instrument. However, there is a need to bring more municipalities and transport corporations on board in India to possibly accelerate the implementation timeline for the pilot project of city electric bus fleets.

[10] CPI Calculations: Non-AC Electric bus price: INR80mn, all the buses will be converted into electric bus

6. APPENDIX

6.1 CDP MATCHMAKER PLATFORM PROCESS

- Use 2017 Cities questionnaire to identify 362 cities with 1,045 projects seeking investment
- Send targeted cities the project intake form for more detailed project information
- Consult with cities to assist filling out the form
- Collect project submissions and upload into the Matchmaker dashboard

6.2 POTENTIAL SUBSCRIBER SEGMENTATION

- **Financers**
  - Broker dealers/banks and fixed income investors
  - Private equity and real estate investors
  - Impact Investors
- **Project developers**
  - Facilitating the progression of projects from inception to construction

7. REFERENCES

Adheesh, S. R., Vasisht, S. M., & Ramasesha, S. K., 2016. Air-pollution and economics: diesel bus versus electric bus. Current Science; http://eprints.library.iisc.ernet.in/53606/

Global Green Growth Institute and Centre for Study of Science, Technology and Policy, 2015, Electric Buses in India: Technology, Policy and Benefits, GGGI, Seoul, Republic of Korea; http://www.cstep.in/uploads/default/files/publications/stuff/CSTEP_Electric_Buses_in_India_Report_2016.pdf

Goldman Sachs (2017), India EV: Leapfrogging from 2-wheelers to E-wheelers

ICF, 2016, Climate Investment Opportunities in Emerging Markets, An IFC Analysis

Ramachandra, T. V., 2009, Emissions from India's transport sector: Statewise synthesis. *Atmospheric Environment*, *43*(34), 5510-5517; http://www.sciencedirect.com/science/article/pii/S1352231009005871

Shakti Sustainable Foundation, 2016, Public Private Partnership Models for Development of Sustainable Urban Transport Systems; http://shaktifoundation.in/initiative/public-private-partnership-ppp-models-development-sustainable-urban-transport-systems/

WRI India, 2014, Bus Karo 2.0 Case Studies from India; http://www.wrirosscities.org/sites/default/files/BusKaro-Dec11.pdf