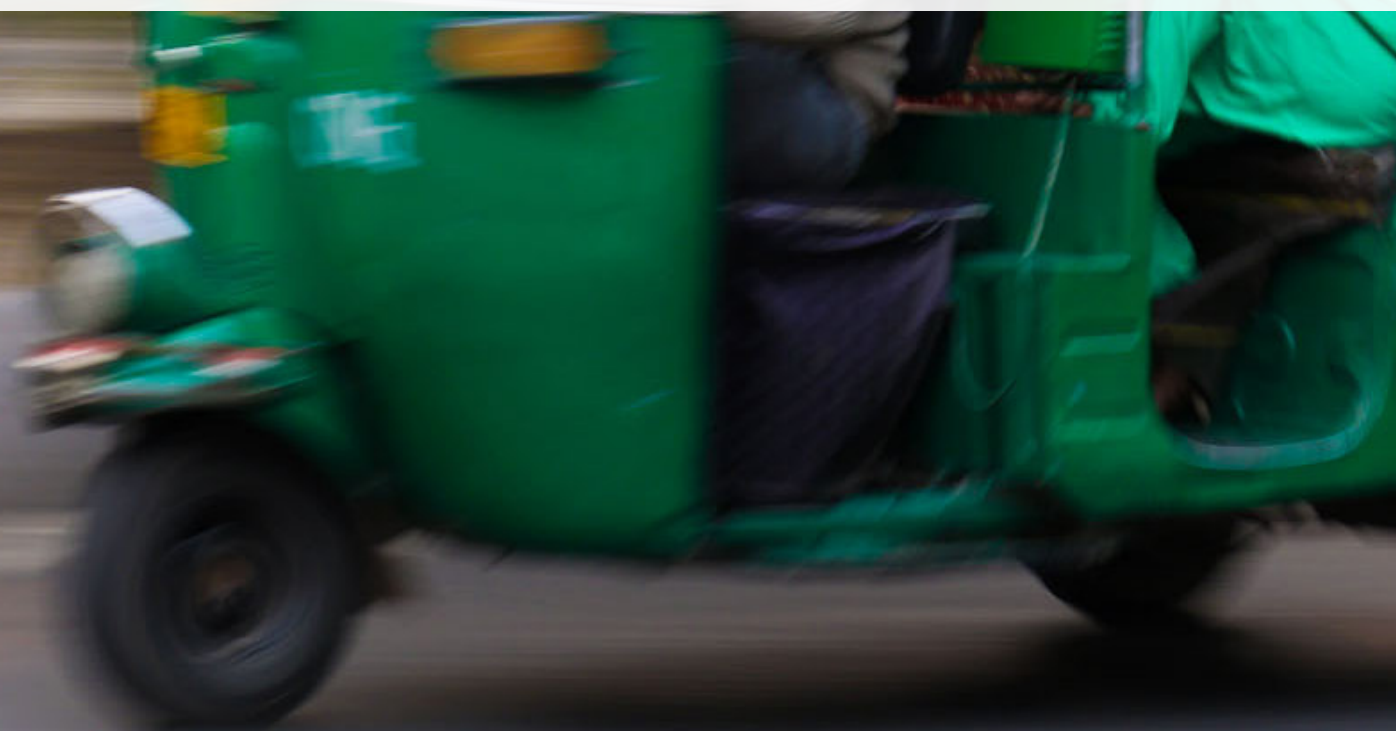




India Innovation Lab
for Green Finance

FINANCING FOR LOW-CARBON AUTO RICKSHAWS

INSTRUMENT ANALYSIS
SEPTEMBER 2018



Financing for Low-Carbon Auto Rickshaws

LAB INSTRUMENT ANALYSIS

September 2018

DESCRIPTION & GOAL —

A loan product to accelerate electric transit adoption in Indian cities by providing loans at lower interest rates to traditionally underserved auto-rickshaw drivers for ownership of electric auto-rickshaws

SECTOR —

Electric vehicles

PRIVATE FINANCE TARGET —

Commercial banks, development financial institutions, impact investors

GEOGRAPHY —

For pilot phase: Bengaluru, Chennai, Chitradurga
In the future: Other Indian cities

The Lab identifies, develops, and launches sustainable finance instruments that can drive billions to a low-carbon economy. It is comprised of three programs: the Global Innovation Lab for Climate Finance, the Brasil Innovation Lab for Climate Finance, and the India Innovation Lab for Green Finance.

AUTHORS AND ACKNOWLEDGEMENTS

The authors of this brief are Vaibhav Pratap Singh and Labanya Prakash Jena.

The authors would like to acknowledge the following professionals for their cooperation and valued contributions including the proponents Cedrick Tandong and Kevin Wervenbos, and the working group members Serres Phillipe (PROPARCO), Jayant Prasad (ckers Finance), Sunil Agarwal (Tata Capital), Vivek Chandaran (Shakti Foundation), Riyaz Bhagat (Trilegal), Kundan Burnwal (GIZ), Clay Stranger(RMI), Anuj (CGM), Venkataraman Rajaraman (India Ratings) & Vijay Nirmal (CPI).

The authors would also like to thank Dr. Gireesh Shrimali, Vivek Sen, Vinit Atal, and Maggie Young for their continuous advice, support, comments, and internal review.

ABOUT THE LAB

The Lab's programs have been funded by Bloomberg Philanthropies, the David and Lucile Packard Foundation, the German Federal Ministry for the Environment, Nature Conservation, and Nuclear Safety (BMU), the Netherlands Ministry for Foreign Affairs, Oak Foundation, the Rockefeller Foundation, Shakti Sustainable Energy Foundation, the UK Department for Business, Energy & Industrial Strategy, and the U.S. Department of State. [Climate Policy Initiative](#) serves as Secretariat and analytical provider.



1. CONTEXT

Auto-rickshaws are a major contributor to harmful emissions in Indian cities. Switching to electric auto-rickshaws would reduce pollution and help meet India's electric transport goals, but current financing options deter auto-rickshaw drivers from purchasing them.

India is home to 9 of 10 most polluted cities in the world (World Health Organization, 2018). Autos-rickshaws – the first and last mile transport connectors in most of these cities – are a major contributor to this pollution, causing about 10% of total carbon emissions. (Palak Thakur, 2018). Replacement of conventional auto-rickshaws with electric auto-rickshaws can significantly reduce carbon emission-related pollution in cities in India. It would also align with India's electric mobility target for electrification of a third of the entire fleet of vehicles by 2030 (Business Standard, 2018).

The current ecosystem of auto-rickshaws in India is composed of about 5 million autos with about 10 million drivers – most auto-rickshaws run on two shifts (Harding, 2016). More than 50% of these drivers operate on a daily rental model instead of ownership, due to the lack of fitting financing options and/or the high cost of financing. Mainstream financiers such as banks and non-banking finance companies (NBFCs) don't provide financing to these drivers as they are unable to meet stringent lending requirements like self-funding for a minimum of 30% of the initial cost of auto-rickshaws (a usual practice in small commercial vehicles loans). Additionally, banks and NBFCs usually require collateral of about 1.5 times the amount financed¹, and auto-rickshaw drivers typically don't have assets to mortgage.

The alternative financing sources for auto-rickshaw drivers are microfinance institutions (MFIs) and informal channels. However, regulation prohibits MFIs to finance more than INR 60,000 in the first loan cycle, which is about one-third of the cost of an electric auto-rickshaw (after government subsidies and other discounts).^{2,3} Informal channels for financing carry predatory interest rates of up to 120% per annum,⁴ which discourages these drivers to buy auto-rickshaws. The lack of financing adversely impacts the saving of drivers as well, as about 25% of gross earnings are used for daily rental payment.

This instrument, Financing for Low-Carbon Auto-Rickshaws, is a loan product that addresses these financing barriers. The loan product will finance up to 100% of the cost of an electric auto-rickshaw, at reasonable rates with a payback period that matches the earning profile of the driver.

Replacing a conventional auto-rickshaw with an electric auto-rickshaw can reduce carbon emissions by about 37 tons/per auto (Thakur, 2018) over its 10-year lifetime.⁵ For the planned pilot of 500 electric auto-rickshaws, carbon emissions could be reduced by 18,500 tons over the lifetime of the vehicles. The expansion of instrument to 5% of the current market – which

¹ As per primary research by Three Wheels United

² The loan amount should not exceed INR. 60,000 in the first cycle and INR. 1,00,000 in subsequent loan cycles for loans from MFIs.

³ The government of India offers subsidies offered under the FAME scheme. This and other discounts cumulatively total to about INR 1 lakh, to help achieve parity in the initial capital cost of electric auto-rickshaws and conventional auto-rickshaws.

⁴ As per primary research by Three Wheels United

would be about 250,000 electric auto-rickshaws – would reduce emissions by 9 million tons over the lifetime of the vehicles. This is equivalent to a quarter of the carbon footprint of Delhi in 2014, one of the most polluted cities in the world. In addition, the instrument will also ensure better livelihoods for auto-rickshaw drivers through ownership instead of rentals.

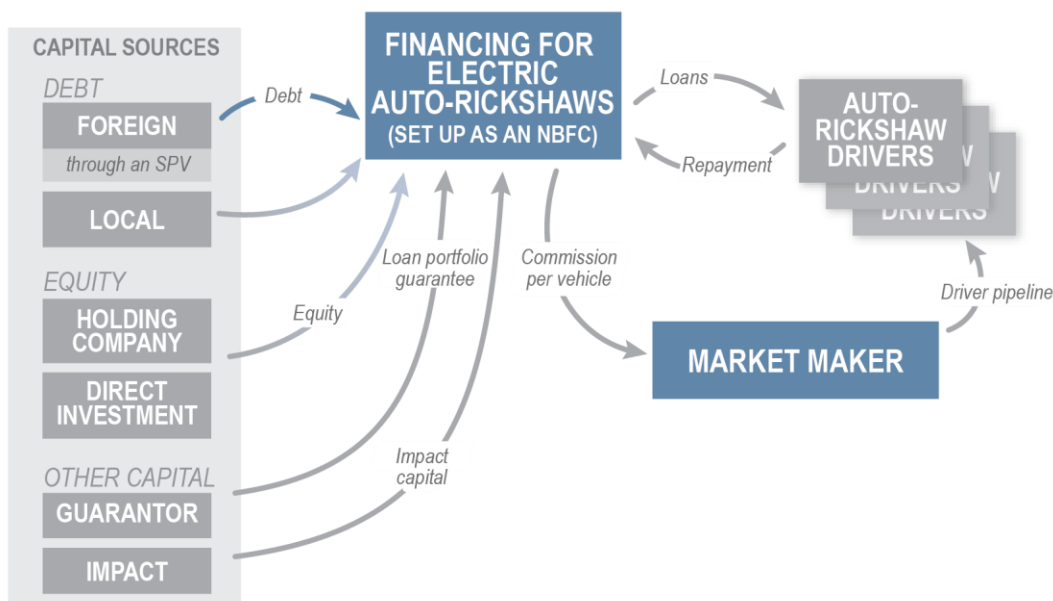
CONCEPT

2. INSTRUMENT MECHANICS

Financing for Low-Carbon Auto-Rickshaws is a loan product that will enable drivers to purchase electric auto-rickshaws by providing debt financing for 100% of the purchase, lower interest rates, and no collateral requirements.

Financing for Low-Carbon Auto-Rickshaws is a loan product that will enable auto-rickshaw drivers to shift from conventional auto-rickshaws to electric auto-rickshaws. It offers debt financing for 100% of the cost of purchasing an electric auto-rickshaw, is collateral free, and has lower interest rates. The instrument helps reduce emissions in Indian cities, while also improving the livelihoods of the drivers through ownership of the vehicles instead of daily rentals with higher savings of about 20% on an average.

Figure 1: Instrument mechanics



2.1 CAPITALIZING THE NBFC

The instrument will be set up as a non-banking financial company (NBFC). The NBFC will pool in different types of capital: equity, commercial debt and concessional finance to lower the cost of loans extended to the auto-rickshaw drivers.

- **Equity:** The equity capital providers would invest at the company level (NBFC) or at the holding company level. The holding company will pool in investment capital from a pool of investors to invest in the NBFC.
- **Debt:** Debt capital can be sourced both from domestic and foreign lenders. Domestic capital providers would lend capital directly to the NBFC, while foreign debt capital providers would lend through an alternative investment vehicle (SPV) as shown in the instrument mechanics.
- **Concessional capital:** Concessional capital – in the form of a partial credit guarantee and/or impact capital – would enable the NBFC to raise additional commercial debt from the market, thus increasing its size of operations. Partial credit guarantees would increase the credit rating of the NBFC, helping to reduce the cost of capital and increase the NBFC's ability to raise debt. Our analysis (Annex 8.1) shows that a 50% credit guarantee support by an AAA rated-entity can help enhance the credit rating of the NBFC to investment-grade. This would result in a substantial reduction of minimum 200 basis points (Annex 8.1) in the cost of debt and also help expand the prospective debt capital providers' base. As per our research the cost of the guarantee from a development finance institution (DFI) will be around 150 to 200 basis points.

2.2 FINANCING OF THE ELECTRIC AUTO-RICKSHAWS

The process for providing loan financing through this instrument for electric auto-rickshaw purchase is as follows:

1. The preferred route for the implementation of instrument is through formulation of a non-banking finance company (NBFC) that will extend loans to the auto-rickshaw drivers. Registration as an NBFC helps to generate interest and confidence among investors, owing to higher disclosure requirements. In this case, the NBFC will be the instrument proponent, Three Wheels United (TWU). Capitalization of the NBFC is discussed in Section 2.2.
2. For the purposes of creating a pipeline of loans, a non-profit arm of the proponent, referred to as the market maker in the instrument mechanics graphic, will run campaigns and programs to approach the communities of drivers and identify potential borrowers.
3. The instrument includes a credit assessment framework to screen loan applicants. The easy replicability of the credit assessment framework at the branch level can help in risk mitigation and allow for the instrument to scale with minimum deviation.⁶
4. The NBFC will be responsible for the disbursement of loans to successful applicants, as well as for collection of the loan repayments (details in Section 3.2).

3. INNOVATION

The loan product has several distinctive features that will address the financial barriers to purchasing electric auto-rickshaws in India – no collateral requirements, debt financing for 100% of the auto-rickshaw cost, and lower interest rates. Another important innovation that

⁶ This helps to standardize the approval process and reduce risks owing to the subjectivity of loan appraiser.

this instrument brings is the community-driven loan collection system that incentivizes timely loan repayments and hence reduce the risks of loan default.

The instrument is innovative in its community-driven loan collection system, along with low-cost, collateral-free debt funding that covers 100% of the cost of an electric auto-rickshaw.

3.1 BARRIERS ADDRESSED: NO COLLATERAL REQUIREMENTS, 100% DEBT FINANCING, AND LOWER INTEREST RATES

Table 1: How the instrument addresses barriers to financing

Barrier	Solution
NBFCs and banks usually require collateral up to 150% of the amount of loan being financed. This amount of collateral is usually difficult for drivers to provide and thus impedes a large population from accessing finance.	This instrument provides loans without any collateral requirements, thereby enabling auto-rickshaw drivers who don't have collateral to purchase electric auto-rickshaws.
Existing loan products only finance up to 70% of the cost of purchasing an electric auto-rickshaw. In addition, microfinance institutions can only offer loans for about a third of the cost of an auto-rickshaw due to regulatory constraints. This requires drivers to pay 30% of the cost of the auto-rickshaw in upfront capital, which many are unable to do.	The instrument can provide debt financing for 100% of the cost of the auto-rickshaw, thereby helping drivers who are unable to provide upfront capital.
Informal channels of financing have predatory interest rates, up to 120% per annum. This further reduces the ability of a driver to purchase an auto-rickshaw instead of rent one.	The instrument provides loans at a lower interest rate – in the range of 22%-24% per annum as compared to traditional lenders.
The low-ticket size and high operational costs of loans have discouraged private and public lending institutions from financing auto rickshaws as an asset class and in particular to auto rickshaw drivers who lack financial history.	The easy replicability of the loan appraisal process at the loan officer level helps to keep the operational cost share per loan low. Further, use of an innovative loan appraisal process that uses an alternative credit scoring approach (details in Section 3.2), can transcend the boundaries of the conventional loan appraisal system. ⁷ This helps to extend the loan to a larger set of customers not covered under the conventional system.

⁷ Conventional loan appraisal systems are financial data input heavy and are suited for large ticket loans or loans to formal sector employees. These appraisal systems in the absence of a financial history track record or other data points, especially in case of lending to people engaged in the informal sector like auto-rickshaw drivers, fail to provide a just evaluation of the credit repayment capacity of the borrowers and thus work as a barrier to lending to such borrowers.

3.2 INNOVATION: COMMUNITY-DRIVEN MODEL REDUCES THE RISKS OF DEFAULT

This loan product is unique in the electric auto-rickshaw market in India as it thrives on a community driven model.

First, the loan appraisal process is directed towards understanding the ecosystem of the drivers – their earning profiles and social norms. This helps to bridge the information gap that may result in loan default.

The major steps of the loan appraisal process are:

- A driver is introduced to the proponent and instrument via other members of the community. Post introduction, the driver is asked to save an agreed amount of money over a period e.g. for 20 days.
- If the driver can save the predetermined amount, then the next step is appraisal of certain parameters such as the number of rooms in the house, number of earning family members and other assessment criteria to adjudge the driver's repayment capacity. This step is like a microfinance loan appraisal process.
- In addition, the NBFC will conduct due diligence with other members of the household and other community members.

Based on the appraisal scores of the above major steps, the NBFC decides on whether to extend a loan or not. This appraisal process is innovative because it doesn't rely on formal financial indicators which drivers may not have, such as income tax return records.

Second, the system for collecting loan repayments also uses a community-based model that incentivizes timely payments.

The instrument has a collection model that puts drivers/borrowers in teams. The teams compete against each other on loan repayment performance for recognition/incentive as the best performing team. This creates an incentive (in the form of social recognition and cash discounts) for teams to outperform other groups, resulting in lower default risk and eventual better loan repayment performance.

Further, the collection system is augmented through real-time online monitoring to flag repayment delays, allowing corrective/ redressal steps to be taken if needed. This system also manages and optimizes the workflow for the field/loan collection agents, prioritizing drivers who require more attention based on the data collected over time on loan repayment performance.

The proponent has demonstrated experience using this collection model. They currently manage a small off-book portfolio of loans to auto-rickshaw drivers, which has a very low default/delay rate of around 1%.⁸

⁸ PAR60: Value of all loans outstanding at the end of the reporting period that have one or more installments of principal past due for more than 60 days

3.3 CHALLENGES TO INSTRUMENT SUCCESS

Risk of mass defaults: High impact, low probability

As small auto loan beneficiaries usually belong to a vulnerable class, events like policy changes and political biases can trigger events of mass payment defaults. For example, microfinance institutions offering loans have experienced cases of mass defaults on account of borrower communities being influenced by political statements by local leaders etc. Even though this a high impact risk, it has a low probability of occurrence. A credit guarantee scheme can partly or fully protect against this risk depending on the design and size of the scheme, especially in the initial stages of operations. The proponents are currently working towards garnering guarantee support from various development finance institutions (DFIs).

Technology risk: High impact, low probability

As electric auto-rickshaws don't have a track record, there is some risk that the performance of the vehicles may be lower than promised - i.e. the number of kilometers covered per charge could be less than envisaged or the life of the battery could be lower than estimated. This may lead to lower than expected cash flows because of lower daily mileage or higher capital expenditure than expected for purchasing replacement batteries and other components. This may affect their ability to repay the loans. Even though this is a high impact risk, it has a low probability of occurrence. To safeguard against this, the proponent has asked the manufacturers supplying the initial batch of electric auto-rickshaws for the pilot phase to also provide performance guarantees. This will help to reduce the financing risk for the NBFC and help improve the confidence of drivers adopting the technology.

MARKET TEST AND BEYOND

4. IMPLEMENTATION PATHWAY AND REPLICATION

The proponent of the instrument, Three Wheels United, has identified cities for a pilot of 500 electric auto-rickshaws, has signed MoUs with city metros to provide supporting charging infrastructure, and has initiated the process of creating an NBFC to extend the loans.

4.1 THE TEAM

The proponent and implementer of the instrument – Three Wheels United (TWU) – has a track record in the conventional auto-rickshaw financing space, as partner to banks and other financing companies that have extended loans to auto-rickshaw drivers. In these partnerships, TWU worked primarily to identify and source potential customers, perform initial screenings of customers, and manage collections for the partner lending institutions. TWU has developed experience and a deep understanding, of the operational process of loan management – sourcing, appraising and managing loan collections – and they are currently working to become a full-fledged lender for the adoption of electric auto-rickshaws.

TWU currently manages a small off-book loan portfolio and has achieved a low default rate of less than 1%. TWU is also currently working on the ground with auto-rickshaw driver communities to generate interest in their loan product and begin to build a pipeline. For example, TWU has developed a community in the city of Bengaluru that extends to over

15,000 drivers and spreads the benefits of loans and self-ownership, provides financial intermediation, organizes drivers into collective federation structures, and provides capacity building trainings to drivers.

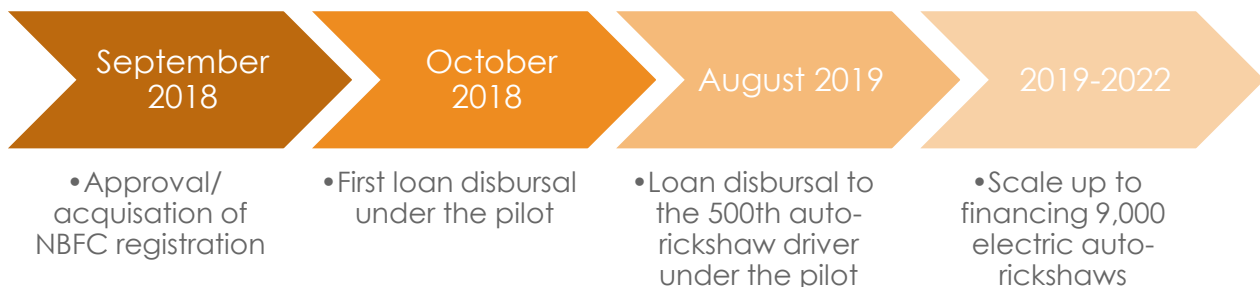
4.2 PILOT, SCOPE & GEOGRAPHY

The target size of the pilot project is to fund 500 electric auto-rickshaws, for the total cost of autos of around USD \$1.15 million, after various subsidies and discounts⁹ that would be, cumulatively around 40% of the original cost of auto-rickshaws.¹⁰

The proponent TWU has already made some progress on implementation of the pilot. They are in the advanced stages of setting up an NBFC which will serve as the lending vehicle. For the pilot, the proponent has selected the cities of Bengaluru, Chennai, and Chitradurga, owing to previous experience there as partners to lending institutions, and to an understanding of the market/community of drivers in these cities. The presence of an existing operational team and a community network of drivers in these cities gives TWU headway to educate and prepare customer drivers to adopt electric autos through their loan product.

Additionally, TWU has signed MOUs with the metro authority of Chennai to provide charging infrastructure for electric auto-rickshaws at the metro stations. Finally, TWU is currently in advanced negotiations with an electric auto-rickshaw manufacturer to supply the initial batch of 500 electric auto-rickshaws.

Figure 2: Likely timeline for implementation



4.3 FUNDING FOR THE PILOT AND BEYOND

The pilot is likely to be funded by approximately US\$ 1 million in equity. In addition, the proponent seeks support of philanthropic capital. Although the idea is predicated on self-sustenance, concessional support during the initial stages can be extremely useful in crowding-in commercial investment, debt capital in particular. Concessional support in the form of a credit guarantee from a DFI or impact capital can make commercial lenders more comfortable with taking an exposure in lending to the NBFC and help it to scale up to the next stages of growth. In the next stage of growth, TWU plans to finance about 9,000 electric auto-rickshaws over the next three years after the pilot. This will require capital funding of US\$ 33 million.

⁹ The government of India offers subsidies offered under the FAME scheme. This and other discounts cumulatively total to about INR 1.2 lakh, to help achieve parity in the initial capital cost of electric auto-rickshaws and conventional auto-rickshaws.

The accumulation of a track record of loan performances and other operational parameters after the pilot will allow for an eventual phasing out of the concessional support over 4 to 5 years.

5. IMPACT

This instrument will incentivize drivers to shift from renting to owning auto-rickshaws, enabling an additional ~20-30% savings for drivers.

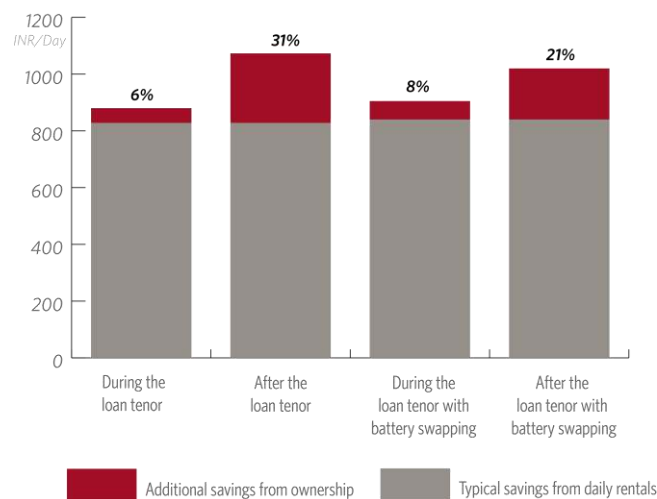
5.1 QUANTITATIVE MODELLING

The instrument provides an avenue for drivers to own electric auto-rickshaws instead of rent them, through offering 100% debt financing at lower terms. Switching from renting to ownership generates savings for the drivers, incentivizing them to switch from conventional auto-rickshaws to electric auto-rickshaws.

According to Lab analysis, ownership via this instrument results in **increased daily savings for the drivers of 6% during the loan tenor, and 31% after the loan tenor** (see Annex 8.2), when compared to the rental model. This ownership will result in total additional savings of ~INR 150,000 over the lifetime of the vehicle, which is same as the cost of an auto.¹¹

There could also be improved savings if the charging stations have battery swapping capabilities, where drivers can quickly swap empty batteries for fully charged batteries. This could save time, leading to possible higher revenue from a higher number of passengers and kilometers and/or possibility for two shifts of operations of the auto-rickshaws. As shown in Figure 3, for a single shift of operations, ownership with battery swapping will result in increased savings of 8% during the loan tenor and 21% after the loan tenor.¹²

Figure 3: Additional driver savings from auto-rickshaw ownership, with and without battery swapping



¹¹ The calculation uses the 22% rate of discount for the net present value of the additional savings being calculated.

¹² Electric auto-rickshaws without battery swapping are comparatively more capital intensive than electric auto-rickshaws with battery swapping, due to additional battery cost. Thus, there are higher savings during the loan period with battery swapping without battery swapping, owing to lower loan repayments. This will reverse after the loan period as the loan would be repaid and the operating cost of battery swapping is higher than without.

5.2 ENVIRONMENTAL AND SOCIAL IMPACT

The initial pilot of 500 electric auto-rickshaws will help avoid 18,500 tons of carbon emissions over 10 years. At scale, with about 5% of the market share, or 250,000 electric auto-rickshaws, the instrument will help avoid about 9 million tons of carbon emissions.

5.2.1 ENVIRONMENTAL IMPACT

As highlighted in Section 4.2, for the pilot the proponent plans to extend loans for 500 electric auto-rickshaws. This would mobilize US\$ 1.1 million in investment and avoid up to 1850 tons of vehicular carbon emission every year, with a total of 18,500 tons of carbon emissions over the 10-year lifetimes of the auto-rickshaws. As the instrument starts to scale up over the next three years, the proponent plans to extend loans to an additional 9,000 auto-rickshaw drivers which will enable mobilization of ~ US\$ 33 million. Additionally, this capital mobilized will help avoid about 33,000 tons of carbon emissions per year over the lifetime of the auto-rickshaws, or 330,000 tons of the 10-year lifetimes.

The impact can be much higher as the instrument scales up. Considering that the instrument can capture 5% of the market or ~250,000 auto-rickshaws, the abatement potential is 900,000 tons per year over the lifetime of the auto-rickshaws. Table 2 below summarizes these impacts.

Table 2: Environmental impact of the instrument

	Pilot phase	Next 3 years	At Scale
No. of autos financed	500	9000	250,000
Capital mobilized (in US\$ millions)	1.1	33	535
Vehicular carbon emission avoided (tons per year)	1850	33,000	900,000

Assumptions: 1. Amount of vehicular carbon emission avoided per electric auto/ per years = 3.7 ton/ year source: Thakur (2018) , 2 : No. of auto financed at scale is assumed at 5% of the current market size of 5 million autos Source:(Harding, 2016,) 3: The cost of the electric auto inclusive of the cost of battery is assumed at INR 1.5 lakh, 4: currency conversion factor of 1US\$= 70 INR used.

5.2.2 SOCIAL IMPACT: FINANCIAL INCLUSION AND EDUCATION

The instrument has other social benefits in addition to the increased savings and improved livelihoods for drivers. This instrument will give ownership rights to the auto-drivers and also help to bring them into the formal financial system in India. Financial inclusion will help drivers access mainstream financiers in the future by establishing a credit history. Exposure to a complete repayment cycle and loan evaluation/ documentation process will also create financial literacy amongst the beneficiary drivers.

5.3 PRIVATE FINANCE MOBILIZATION AND REPLICATION POTENTIAL

For the pilot project of 500 electric auto-rickshaws, the instrument will help to mobilize loans worth about US\$ 1.1 million. After the pilot over the next three years, TWU plans to finance an additional 9000 autos and would require over US\$ 33 million capital.

Additionally, at the scale of 5% of the current market size, or 250,000 auto-rickshaws, the instrument will help mobilize over US\$ 535 million of capital while helping to increase savings by 20% per day for the drivers through self-ownership.

6. KEY TAKEAWAYS

- **Innovative:** The instrument helps to overcome barriers of existing loan products by offering collateral-free debt financing for up to 100% of the cost of purchasing an electric auto-rickshaw, at lower interest rates.
- **Financially Sustainable:** Public finance support in the form of a credit guarantee is recommended during the initial stages of implementation, to help establish a track record of operations. Concessional finance can be phased out over a period of five to seven years.
- **Catalytic:** If successful, the instrument can attract commercial capital. While data is limited at present, it seems likely that the instrument initially will be most attractive for high risk and concessional capital. Additionally, success of this instrument can showcase demonstration and be replicated by other companies, which can further scale up the sector in the geography of its operation.
- **Actionable:** The NBFC can be launched within six months from Lab endorsement. Existing operational infrastructure, customers and MOUs with partners allow the implementer to start the pilot shortly after the formulation of the NBFC. The pilot of 500 electric auto-rickshaws will be complete within the first year of operations.

7. REFERENCES

(Harding, 2016), Auto-rickshaws in Indian cities: Public perceptions and operational realities
<https://www.sciencedirect.com/science/article/pii/S0967070X16301603>

(Thakur, 2018) Estimating vehicular emissions from auto rickshaws plying in Bengaluru
<https://www.ijser.org/researchpaper/Estimating-vehicular-emissions-from-auto-rickshaws-plying-in-Bengaluru.pdf>

(Javid, 2018) Critical appraisal on study of para-transit (auto-rickshaw) mode of urban transportation system under mix traffic conditions, JETIR
<http://www.jetir.org/papers/JETIR1801039.pdf>

Business Standard, May 2018 - Electric vehicles could increase net carbon emissions in India: IEA
https://www.business-standard.com/article/current-affairs/electric-vehicles-could-increase-net-carbon-emissions-in-india-iea-118053000358_1.html

RMI, November 2017- Enabling the transition to electric mobility in India
https://www.rmi.org/wp-content/uploads/2017/11/report_electric_mobility_india_FICCI_RMI.pdf

Niti Ayog, November 2017 – India leaps ahead: transformative mobility solutions for all
http://niti.gov.in/writereaddata/files/document_publication/RMI_India_Report_web.pdf

RBI, April 2015 -Non-Banking Financial Company-Micro Finance Institutions (NBFC-MFIs) – Directions – Modifications
https://rbi.org.in/Scripts/BS_NBFCNotificationView.aspx?id=9651

WHO, 2018- WHO Global Ambient Air Quality Database (update 2018)
<http://www.who.int/airpollution/data/cities/en/>

8. ANNEX

8.1 GUARANTEE CALCULATIONS

Our analysis on capitalizing the NBFC (discussed in Section 2.2.) shows that a 50% credit guarantee support by an AAA rated-entity can help enhance the credit rating of the NBFC to investment-grade. This would result in a substantial reduction in the cost of debt and expand the prospective debt capital providers' base.

The table below shows the RBI guidelines for the Capital Adequacy calculation, the risk weights under different rating categories.

Rating	AAA	AA	A	BBB	BB & below	Unrated
Risk Weight	20%	30%	50%	100%	150%	100%

The above table is used by the banks to ascertain the risk weight and the capital to be maintained against a loan extended as per the capital adequacy norms being followed, e.g. against a loan extended to a AA rated entity of INR 10 million.

Using the above conversion table

Risk weight =30% -----(1)

Total debt exposure of bank to the entity = 10 million -----(2)

Risk weighted asset (RWA) = (1) *(2) = 30% *10 million = 3 million, thus if the capital adequacy requirement is 15% than the bank will have to maintain a total capital = RWA *15% = 3 million *15% = 0.45 million of capital.

Thus, one of the ways for a bank to reduce the capital required to be maintained is a guarantee by a higher rated entity for a portion of the loan.

Impact of 50% guarantee on loan to TWU

As per the table above, with a 50% guarantee by a public sovereign like the DFIs (rated AAA to AA) will attract a risk weight of 20% for the guaranteed portion. This guarantee will help to reduce the risk weight for the loan to TWU as per the following scenarios

Total risk weight = $0.5*20\% + 0.5*100\% = 60\%$ (if TWU remains unrated) ___ (3)

Total risk weight = $0.5*20\% + 0.5*150\% = 85\%$ (if TWU is rated BB and below – the likely scenario) ____ (4)

Thus, as per CRAR requirement against the credit risk, credit enhancement by the guarantee will result in improve in credit rating to ~ BBB credit rating from BB or lower from when mapped to the table above.

Mapping of the credit rating to the rates of interest for as per the NSDL¹³ data until 2018 gives the following table –

Credit Rating	No. of issuances	Average rate of interest
AAA	29	7.97%
AA	44	8.68%

¹³https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=2ahUKewjRzliSh8ncAhUKPY8KHTvhC84QFjAAegQIABAC&url=https%3A%2F%2Fnsdl.co.in%2Fdownloadables%2Fexcel%2Fcp-debt%2FDebt%2520A-B.xls&usq=AOvVaw2u7yWPegMAhkf7Qc_QPC7X

A	2	9.52%
BBB	6	12.18%
BB	0	-
B	1	21%
Unrated	19	13.89%

As seen in the table above for TWU, which is likely to be either unrated or in sub investment grade initially, with a 50% guarantee by a DFI it can save about 200BPs or above on the rate of interest for the debt capital raised.

8.2 SAVINGS COMPARISONS: RENTAL VS OWNERSHIP MODELS

Particulars	Electric auto without battery swapping	Electric auto with battery swapping
Daily revenue (INR)	1,200	1,200
Total expenditure rental model (INR)	372	360
Total expenditure self-ownership (INR)	320	296
Average daily savings rental model (INR)	828	840
Average daily savings self-ownership (during loan tenor) (INR)	880	905
Average daily savings on self-ownership (post loan repayment) (INR)	1,073	1,020
Improved savings by self-ownership during loan tenor (%)	6%	8%
Improved savings by self-ownership during post loan repayment (%)	30%	21%
Improved savings over 10-year period with self-ownership (%)	21%	16%

Assumptions: 1. Average daily run of 120 Km @ INR 10/ KM; 2 Daily rentals of INR 300 for auto and INR 180 for an auto without the battery; 3 Financing for 100% of the cost of auto at 23% rate of interest for 45 months to give the daily loan repayment for 26 work days in a month. 4) INR 55 as the daily cost to be saved by the driver for purchasing battery at the end of 4-year period, 5) Swapping charges and battery rental cost at INR 150 per day: 6) Fixed daily maintenance cost of INR 30: 6) Cost per daily charge of INR 42.