Large Scale Deployment of Economic Instruments and Leveraging Finance

For

Low Carbon & Sustainable Mobility in India
(Decarbonisation of Indian Transport Sector)

Lead

FICCI

Knowledge Partners

IPPMG

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PREFACE

To move down the path of reduced emissions from the Indian transport sector and provide direction to low carbon and sustainable mobility for India, FICCI embarked on the initiative for Developing an **India Roadmap** for Low Carbon and Sustainable Mobility with thrust on decarbonisation of the Indian transport sector. FICCI is supported in this initiative by knowledge partners, WWF-India, Paris Process on Mobility and Climate (PPMC) and Shakti Sustainable Energy Foundation (SSEF). The India Roadmap has eight distinct components outlined below.

1. Urban transformation for healthier, inclusive lifestyles and efficient, resilient, prosperous cities
2. Low-carbon energy supply strategy
3. Improve intermodal and mode-wise system efficiencies
4. Optimise supply chains to manage freight transport emissions
5. Avoid vehicle kilometres for commuting, shopping and accessing services
6. Provide low-carbon solutions for the rural (non-urban) populations
7. Accelerate action on adaptation in the transport sector
8. Large scale deployment of economic instruments and leveraging finance

Each of these components is covered in detail under individual reports, available separately as Theme Reports. The India Roadmap provides summaries of each component and actionable recommendations for short-term (2020-22), medium-term (2022-30) and long-term (2030-50). For detailed narrative of each component, the reader may refer to the individual theme reports of the respective component. For getting an overview of all components, the India Roadmap provides the complete context for low carbon and sustainable mobility for India.

This report covers the eighth component on "Large Scale Deployment of Economic Instruments and Leveraging Finance".

The work on the India Roadmap has been guided by the FICCI Core Group on Sustainable Mobility consisting of eight working groups, each of which has worked on the eight components. The components are based on the Global Macro-Roadmap developed by PPMC. This methodological approach developed by PPMC is at the heart of the India Roadmap, with components of the India Roadmap being customised to Indian context and circumstances.

INTRODUCTION

A sustainable transport system is at the heart of the India of tomorrow. To enable that, long term funding will need to allow for planned improvements in service offerings, as well as the expansion of existing infrastructure. Gaps and challenges in financing and deployment of various economic instruments need to be addressed. This will enable viable solutions for sustainable mobility to emerge and become "mainstream" alternatives. Eventually, this will offer economic benefits, through LCCA (Life Cycle Cost Analysis), apart from addressing environmental and ecological issues.

The transport sector has been one of the major contributors to the growth in GHGs (greenhouse gases). An increase in economic growth and consequently per capita incomes in the future are expected to drive the demand for transport further. This trend is expected to result in an increased share of energy demand and Greenhouse Gases as well as particulate emissions from the transport sector.

Going by the current trends, the high dependence on fossil fuels, now and in the future, is poised to pose challenges for energy security, air pollution in cities, and climate.

India is moving toward cleaner energy fuels, however to limit Greenhouse Gases as well as particulate emissions from the transport sector and improve the mobility scenario, there is a need to innovate and embrace some of the many secondary funding tools successfully used in cities, states, and countries around the world. These include incentives for low carbon transport solutions as well alternate revenue-raising tools which facilitate transit-oriented developments e.g. congestion charge, vehicle tax/registration fees, fuel taxes, etc. Furthermore, superannuation and pension funds have been dedicated funding sources for transport operations, expansions & transitions around the globe for years.

It is crucial to capitalise on the broad benefits provided by a sustainable transport system. It is also important to continue to improve India's transport scenario, so that sustainable, long term funding can allow for planned technology transitions as well as improvements in service offerings. The expansion of existing infrastructure is vital too. Under this scenario, this report highlights existing gaps and challenges in financing and deployment of various economic instruments, and potential solutions to channel financing towards sustainable mobility.

CHAPTER 1

HEART OF THE PROBLEM

At the end of every problem, lies a world of possibilities.

Fiscal disincentives (including non-viable fare structure) has retarded growth of public transportation compared to private vehicles in India have led to rising private vehicle ownership. This has resulted in declining air quality, increased pollution and congestion in the cities, decreasing share of public transportation, and resulting externalities such as air pollution, congestion, and increased health costs.

An urgent push towards clean public transport is required to avoid the increasing vehicle density from turning into a public health catastrophe.

Innovative solutions have to be continuously implemented to finance public transport into an integrated, sustainable, and attractive local transport system. In doing so, the following needs to be considered:

- Global scenario of emerging sustainable mobility systems.
- Local constraints: legal, political, social, physical, economics.
- Includes all economics actors who are concerned directly and indirectly by sustainable mobility system.
- Business models, which could be adopted by the PTA (public transportation authority), who is financially autonomous.

Experts have been pitching for EVs (electric vehicles) as the perfect solution. But as per the studies, if production standards are poor, EVs could be more polluting than their conventional IC (internal combustion) peers. Chinese manufacturing of EVs, including batteries (and ELV recycling), as well as GHG emissions linked to power source/battery charging, could result in up to 60% more CO_2 compared to IC vehicle production & usage. However, EU manufacturers claim that emissions can be cut by up to 66% . Though no such study has been conducted in India, it is likely that Indian scenario will be more similar to the Chinese one, as India is a very cost conscious market. Also, since the source for electricity to power EVs in India will be from carbon intensive grid, with significant share of coal power. On a positive note, EVs powered by renewable energy sources could soon become a reality, with the country setting a target of increasing renewables in the energy mix of 40% by 2030. As of date, over 80% EVs on the roads are e-rickshaws or e-scooters. Indian cities are also buying e-buses with the assistance of German, Chinese and Japanese technologies. Ola and Uber have begun inducting EVs into their fleet.

MoP&NG (Ministry of Petroleum & Natural Gas), Govt. of India, has set target of enhancing share of Natural Gas, within total energy mix, from existing 6.7% to 15% by 2030. To facilitate this investment of about USD 17 billion in envisaged in establishing CGD (City Gas Distribution) Networks in 300 Districts of India, by 2030. CNG (compressed natural gas), for transport application, is a key component for economic viability of CGD networks; hence CNG Retailing stations are to be expanded from current 1,769 to 10,000 by 2030. Consequently, CNG-run vehicles are expected to cross 20 million, from about 3.4 million, enabling CNG vehicles to be an intermediate stage between Diesel/ Petrol Vehicles and EVs. Furthermore, MoP&NG has also target of 15 million tonnes bio-CBG from farm waste (after meeting needs for other advanced biofuels and biomass Power), thereby enabling decarbonisation of CNG by bio-CNG.

To achieve sustainable mobility, investments in the general transport sector and more energy-efficient modes, in particular, railways, inland waterways and coastal waterways, is a critical factor. But a dearth of financing options (such as low penetration of green bonds), high cost of capital and absence of priority sector ending for sustainable mobility are limiting growth. Public funding alone cannot address the issue of lack of resources to finance the existing gaps in infrastructure capacity as well as in anticipation of future demand. The role of private investment would be imperative.

The economic policy has to not only adopt a holistic, technology agnostic approach, but it should be based on in-depth analysis of carbon footprint, encompassing all elements of the value chain, including materials, manufacturing, operations and end of life recycling.

CHAPTER 2

IN RESPONSE

The response often determines the resolution.

2.1 Decarbonising Current Transport Fuels with Biofuels

Transportation is a highly carbon-intensive industry, and it urgently needs to pursue ways to cut emissions and reduce its carbon footprint. For achieving sustainable transportation, the government, as well as industry players need to work together to make way for alternative energy fuels.

GHG emissions can be successfully and incrementally decreased by blending fossils fuels with biofuels.

Biofuels are an integral component of farm-based bio-economy, which not only addresses environment and climate change issues but has a major impact on socio-economic development of rural areas through:

- enhancing clean energy access in rural areas.
- creating rural jobs along with enhancing the net income of farm households
- stimulating growth in food processing/preservation as well as creating an eco-system for other non-farm economic activities, apart from growth in services sector linked to consumption-led demand, driven by enhanced incomes of farm households.

***ALONG** THE ROAD*



Initiatives taken to Incentivise the Production of Biofuels

- Pradhan Mantri JI-VAN (Jaiv Indhan-Vatavaran Anukool Fasal Awashesh Nivaran) Yojana' for providing financial support to integrated bioethanol projects.
- Soft loans of INR 61.39 billion are being extended by the Government through banks to the sugar mills for setting up new distilleries and installation of incineration boilers to augment ethanol production capacity for which Government will bear interest subvention of INR 13.32 billion
- MNRE (Ministry of New and Renewable Energy) has notified Central Financial Assistance (CFA) of INR 0.04 billion per 4800 kg of CBG (Bio-CNG) per day with a maximum of INR 0.1 billion per project

[11] *NITI Aayog and Rocky Mountain Institute (2017). India Leaps Ahead: Transformative Mobility Solutions for All.

Along with GHG mitigation, multiple Sustainable Development Goals (SDGs) would also be met with the use of biofuels. Hence, biofuels projects are an appropriate case for climate financing under Article 6.4 of the Paris Agreement. There should also be possibilities to access specific financing instruments, e.g. SIFF (Sustainable India Finance Facility) and climate bonds. However, for this to happen, it is necessary to create enabling eco-system by having:

- standard, long term (20 years), Offtake Agreement for biofuels (including CBG), in similar lines to PPAs (power purchase agreements) for solar & wind power projects, which are developed in consultation with banks & DFIs (development finance institutions).

- government policies for the extending capacity building and project financing support to 'green entrepreneurs', who would collect and aggregate bio-waste (farm as well as urban),

Biofuels, however, face the issue of perceived risks related to 'bio-resources supply chain'. Advancements in bio-chemical and thermo-chemical technologies are inadequately appreciated. These technologies can enable the adoption of decentralised facilities for biofuels production, in proximity to sources of generation of bio-wastes. Bio-waste, untreated, is as much an environmental hazard as particulate emissions from IC (internal combustion) engines. Hence, its management needs to be equally prioritised. By enabling policies and fiscal instruments for bio-waste management, the risks related to the 'bio-waste supply chain' will be mitigated. They will also enable bio-waste collection & aggregation to be managed as a 'green business'.

CHAPTER 3

CHALLENGES ALONG THE WAY

Every challenge makes the journey more meaningful.

3.1 Farm Waste to Energy

Farm waste (crop residue and manure) is a renewable energy resource, with reasonably assured availability, as it has a direct correlation to food production. India has 141 million hectares of net cropped land, which generates significant agriculture output and commensurate farm waste. It's forecasted that, by 2030, agriculture residues, not having alternative productive use, will grow to 280 million (dry) tonnes. Manure potential is even higher.

The commercialised technologies for processing agriculture residues (including stubble of paddy crop) relate to the production of biogas and ethanol and, when produced from ligno-cellulosic biomass, are referred to as advanced biofuels.

3.2 Bioethanol

OMCs (oil marketing companies) have announced 12 Commercial Scale projects, each having the production capacity of 30 million litres/year of 2G Ethanol (from a feedstock of 120,000 tonnes agriculture residue). This represented a cumulative capacity of 360 million litres of 2G Ethanol, from processing about 1.5 million tonnes agriculture residues, which are all based on indigenous technology. Central Finance Assistance was provided @INR 1.5 billion per Plant, under the JI-VAN scheme. However, in spite of the Foundation Stone Laying ceremony held for above 12 plants on 25 December, 2016, there has been negligible progress in construction of plants, essentially due to lack of techno-economic viability as well as project financing issues.

1G Ethanol is produced essentially from molasses and the estimated availability of molasses ranges from 13 to 15 million tonnes @5% of sugarcane. Presently, most of the distilleries produce ethanol using final molasses of sugarcane industry (final molasses is mother liquor/residue left over after economical extraction of the sugar from sugar cane juice) @230 litres/tonne of molasses. However, if intermediate of the sugar production (termed as B-Heavy molasses), is used as feedstock for ethanol production, the much higher quantum of bio-ethanol can be produced @300-325 litres per tonne of B-Heavy Molasses. Consequently, the Government of India is incentivising the production of 1G Ethanol from B-Heavy Molasses by offering a price of INR 54 per litre, essentially as a benefit to sugarcane farmers. Hence, there would be potential of producing 5,000 million litres of bio-ethanol from Molasses. The National Policy on Biofuels, 2018, permits the use of spoilt grains/ potatoes and similar starch bio-waste to produce bio-ethanol. This would also add to the availability of 1G Ethanol.

3.3 Biogas, Bio-CNG (CBG) & Bio-LNG

India has established technologies for household & community scale biogas plants based on feedstock of food waste and manure. But its experience in industrial scale biogas plants has not met the same success, for variety of reasons, primarily due to inadequate focus being given to biological engineering & pre-treatment technologies when dealing with ligno-cellulosic feedstocks along with complexities of co-digesting multiple feedstocks, as would be required for Industrial scale plants of capacity 12,000 or 24,000 Cubic Metre of biogas per day. Comparatively, international experience in agriculture biogas plants is good with thousands of operational plants and Biogas Plant with PLF > 90%.

Biogas & Bio-CNG Potential (Rural): Farm waste can be processed to biogas (deploying appropriate pre-treatment & fermentation technologies) and the biogas can then be upgraded to Bio-CNG to replace petroleum products in transport & industrial heating applications. The potential is very high, as may be noted from quantum of farm waste availability. Each dry tonne of agriculture residues would produce about 200 kg of CBG. Each dry tonne of manure would produce about 135 kg of CBG. Consequently, Ministry of Petroleum & Natural Gas (MoP&NG) announced target, in October 2018 under SATAT initiative, of 15 million tonnes Bio-CNG (from 5,000 plants on pan India basis) could be achievable from farm waste (even after addressing needs of biomass power & other advanced biofuels).

CROSSROADS OF CHANGE



SATAT Initiative to Promote CBG

Launched in October 2018, SATAT is aimed at providing a Sustainable Alternative Towards Affordable Transportation (SATAT) as a developmental effort that would benefit both vehicle-users as well as farmers and entrepreneurs. Under the scheme, CBG production plants will be set up by potential entrepreneurs. It has the potential to boost availability of more affordable transport fuels, better use of agricultural residue, cattle dung and municipal solid waste, as well as to provide an additional revenue source to farmers.

Biogas & Bio-CNG Potential (Urban): Biogas produced from organic MSW (municipal solid waste) and sewage (or STP sludge) also has significant potential. Organic MSW (@50% of MSW and 30% dry matter) is estimated to be 28 million (dry) tonnes by 2030. Each dry tonne would produce 250 to 300 kg of CBG. Sewage (@ 50 billion litres/day or 18.25 billion kL/year) is estimated to generate significant amount of sewage sludge, from which biogas could be produced, with yields optimised through adopting thermal hydrolysis as pre-treatment.

For ensuring high plant efficiency and optimal Bio-CNG output, as well as value realisation from co-products, it is important to deploy “best in class” technologies, which are field proven at comparable ratings.

There is definite lacuna in this area, as is evident from negligible progress made under the SATAT initiative, in spite of hundreds of LOIs being issued by OMCs. There are further lacuna in SATAT scheme, viz low offtake price, fixed @ INR 46/- per kg, much lower than fixed @ INR 54 per kg Ethanol from B-Heavy molasses (in spite of 1 kg Bio-CNG having nearly double the heating value of 1 litre Bio-Ethanol) & offtake agreement for only 5 years, as against minimum 15 years that Lenders seek. With OMCs being privatised, efficacy of implementation of SATAT scheme may get further impacted, necessitating an alternative ‘financing instrument’.

Bio-LNG is finding application, in Europe, for long distance freight transport (road & rail) as well as Marine transport. Similar potential exists in Indian market.

[1] https://pib.gov.in/newsite/PrintRelease.aspx?relid=183787

3.4 Biodiesel

Indian government, in its 2006 Biofuels Policy set a very ambitious target of 20% Biodiesel blending in diesel by 2017. Feedstocks envisaged were palm stearin (imported palm oil residues), UCO (used cooking oil), non-edible oilseeds (with initial focus on Jatropha). The programme did not take off, primarily from feedstock considerations, resulting in bulk of capacity of over 1 million tonnes remained largely unutilised. However, in recent times, production of Biodiesel from UCO is being scaled up, facilitated by FSSAI regulations on used cooking oil. KSBDB (Karnataka State Bio Energy Development Board), from 2008 onwards, has carried out significant field work on TBO (Tree Based Oilseeds), non-edible varieties, viz., Pongamia, Mahua, Neem, Simuruba, etc). This included establishment of clonal orchards as well as cultivation under Agro-Forestry model as well as under TBO Plantations model, with large scale community development. Furthermore, the use of DOC (De-Oiled Cake) as Bio-Fertiliser & Bio-Pesticide was successfully propagated, leading to high value realization for DOC and correspondingly for the Oilseeds. However, the sector has not grown, as anticpated. Non-edible oilseeds take over 6 years to give yields which make harvesting an economically viable activity, which farmers are not inclined to take up. Accessing land in Forest areas face challenges. Funding support, for initial 6 years, is not available either from CAMPA or as was (earlier) envisaged under NCEF (National Clean Environment Fund). Climate Finance also faces many challenges, as it involves methodologies for sustainable forestry.

CHAPTER 4

ROUTES TO CHANGE

Change is the beginning of a revolution.

4.1 Railways and the Alternate Fuel Options

The CNG experiment (from 2015)

Theoretically, the use of CNG resulted in 8-11% savings against a similar train running on diesel. However, in CNG-based trains, the railways have fitted cascades, a group of cylinders, with storage space for CNG that takes away the space equivalent to a third of a full coach. Replacing the energy storages with seats would have resulted in extra revenue for the railways. A decision on scaling up CNG train-run experiment depends on scaling up of CNG refuelling stations as well as local production of Type IV Composite Cylinders.

The LNG Option

After a successful experimental run with CNG, Indian Railways has set its eyes on LNG (liquified natural gas) as an alternative fuel option and wants to estimate the savings it can make.

Compared to CNG, LNG requires less storage space which makes it a more efficient and convenient option. According to the experts, by storing LNG in the same space as CNG, trains can run for three times the distance. LNG is already being tried out in other countries, including Russia, North America, and Spain. Due to the lack of regulatory mechanisms, the Indian Railways is however unable to conduct trials. It also requires a network of LNG fuelling points to ensure refuelling capacity.

Based on early estimates, the running cost of LNG will be cheaper by about 40% Compared to CNG in Type I Carbon Steel Cylinders.

The biggest expenditure will be on Bio-CNG/Bio-LNG refuelling infrastructure, which will have to be decided at a national level. The refuelling infrastructure requires points for storage, retail, decantation, and filling the tanks.

Biodiesel

"The Indian Railways have tested the biodiesel of different feed stock (Jatropha, Mahua, pongamia, waste cotton seed, Fish Oil, Soyabean oil, Palm stearin etc.) in the different blending ratio such as B5, B10, B20, B50 and B 100 on its 16-cylinder ALCO and EMD engine test beds. The power performance of the engine has been found satisfactory without any adverse impact on engine working."[2]

Though railways had increased adoption of biodiesel during the fiscal 2015-16 and 2016-17, the same dropped in 2017-18. The main reason for this fall can be attributed to GST implementation which impacted biodiesel makers. Biodiesel became more expensive than diesel.

[2] https://pib.gov.in/newsite/PrintRelease.aspx?relid=175264

Solar Power

Another alternative energy that railways have started adopting is solar, both at stations and on trains. Flexi-solar panels for trains, developed by a public sector unit Central Electronics Limited, are able to generate enough power to meet light and fan requirements of coaches.

CROSSROADS OF CHANGE



The State-owned natural gas transmission utility GAIL (India) has signed an MoU (memorandum of understanding) with Indian railways to create infrastructure for supplying CNG, piped natural gas (PNG) and LNG to the transporter's workshops, production units, depots, and residential colonies. The agreement would help replace industrial gases—dissolved acetylene, LPG (liquefied petroleum gas), BMCG (Bharat Metal Cutting Gas), furnace oil, and HSD (high-speed diesel)—with natural gas.

Out of 54 workshops and production units, 23 workshops had been identified in the first phase for replacing industrial gases with natural gas. As per Indian Railways, workshops would start using natural gas by 31 December 2018, adding the remaining workshops, PUs, railway establishments and Indian Railways Catering and Tourism Corporation's base kitchens would start using gas by 30 June 2019.

According to the official sources, natural gas has the potential to replace about 8,44,027 cubic metre of acetylene, 2,35,4425 kg of LPG, 1,40,991 kg of BMCG and 5,500 kl of HSD or furnace oil worth INR 0.7 billion per annum.

4.2 Renewable Energy - A Change in Perspective

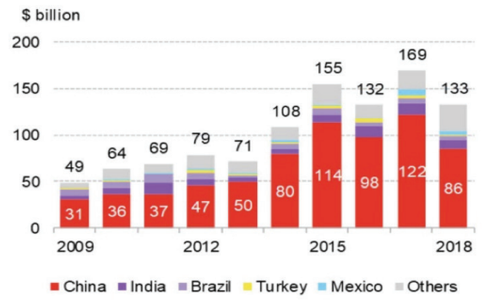
New investment during 2018: In wind, solar, and other clean energy projects in developing nations dropped sharply in 2018, largely due to a slowdown in China is needed. While the number of new clean power-generating plants completed stayed flat year-to-year, the volume of power derived from coal surged to a new high, according to Climatescope (www.global-climatescope.org), an annual survey of 104 emerging markets conducted by research firm BloombergNEF (BNEF).

The findings suggest that developing nations are moving toward cleaner power but not nearly fast enough to limit global CO_2 emissions or the consequences of climate change. The majority of new power-generating capacity added in developing nations in 2018 came from wind and solar, for instance. But the majority of power to be produced from the overall fleet of power plants added in 2018 will come from fossil sources and emit CO_2. This is due to wind and solar projects generating only when natural resources are available while oil, coal, and gas plants can potentially produce around the clock.

China's impact: Both the world's largest CO_2 emitter and largest market for clean energy production as well as consumption, played a crucial role in this. Investment in new wind, solar, and other non-large hydro renewables projects in the country fell to $86 billion in 2018 from $122 billion in 2017. That net decline mirrored a $36 billion drop in emerging markets' clean energy investment figures, the largest ever tracked by Climatescope.

The decline was not confined to China, however, across all emerging markets surveyed, 2018 investment fell to $133 billion, lower than not just the 2017 total but the 2015 figure as well. Overall, declining costs for solar and wind power played a considerable factor in the fall in absolute dollar investment in emerging economies.

Figure 1
Emerging market clean energy project investment



Source: BloombergNEF. Notes: Includes 104 non-OECD markets plus Chile, Turkey, and Mexico. Clean energy includes investment in wind, solar, and other renewable technologies. Not included: large hydro, nuclear, or natural gas.

However, excluding China, India and Brazil, clean energy investment jumped to $34 billion in 2018 from $30 billion in 2017. Most notably, Vietnam, South Africa, Mexico and Morocco led the rankings with a combined investment of $16 billion in 2018. Excluding China alone, new clean energy installations in emerging markets grew 21% to achieve a new record, with 36 GW commissioned in 2018, up from 30 GW in 2017.

Issue of Financing: This year's Climatescope results suggest substantial additional work will be required to meet the global demand, despite some progress. Of the total $133 billion in asset finance that flowed to supporting development of new clean energy projects in the markets in developing nations, just $24.4 billion or 18% came from sources outside those countries.

Of that total, the large majority came from private sources of capital, such as international project developers, commercial banks, and private equity funds.

Inflows from development banks funded largely with OECD government funds did rise to $6.5 billion in 2018. However, there is little to suggest the overall goal of $100 billion per year in support for a variety of climate-related activities will be met anytime soon, however.

In addition to presenting macro trends on clean energy in developing countries, Climatescope scores and ranks individual markets on their overall potential for clean energy development. As per the survey in 2014, India was the highest-scoring nation, due to a variety of factors, including supportive policies. The rest of the top five included Chile, Brazil, China, and Kenya, in that order.

4.3 FAME[3] II Scheme

Department of Heavy Industries (DHI), Government of India sanctioned INR 4.37 billion (US$ 67 million) for the procurement of electric buses, e-taxis and e-autos in December 2017. The department has selected 11 cities with one million-plus population for the procurement of 390 electric buses and is providing funds to the tune of INR 10 million (US$ 150,000) per bus.

The department has sanctioned 40 buses for every city under the pilot project, except 15 buses each for Guwahati and Jammu. However, Bengaluru Metropolitan Transport Corporation (BMTC) in Bengaluru is considering 150 buses and Telangana State Road Transport Corporation (TSRTC) in Hyderabad has decided to take 100 buses. 10 out of 11 cities floated the tender within 15 days, except Delhi which is planning to procure 700 e-buses separately using state budget. Interestingly, all 10 cities completed the tender process within one month and received a good response from the industry. The department allowed the cities to choose the procurement method from the options of Outright Purchase or Gross Cost Contract (GCC). The details of the same being:

- In the case of outright purchase, DHI provides 60%% subsidy and the rest is provided by the State road transport corporations. Five cities (Indore, Lucknow, Kolkata, Jammu and Guwahati) released tenders under the outright purchase model.

- On the other hand, the buses would be operated and maintained by the supplier at a fixed cost per km under GCC. Under the FAME Scheme, the city expects to receive a subsidy of up to 60% of the capital cost of an electric bus over a period of 3 years in three instalments of 20% each in each fiscal starting from the fiscal year of 2017-18. Five cities (Bangalore, Mumbai, Hyderabad, Ahmedabad, and Jaipur) have decided to invite bids under GCC.

Key Lessons

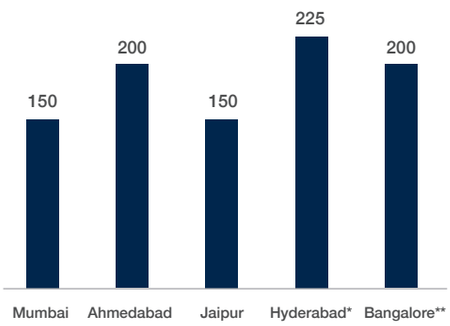
- Length agnostic subsidy resulted in STU preference for buses that are 9 metres long. The subsidy was based on the localisation components, rather than on the bus size. The government should also encourage the procurement of buses that are 12 long as they can be used on truck routes.

Percentage of Localisation	Level-1 (Minimum 15% Localisation	Level-2 (Minimum 35% Localisation
Subsidy available	60% of puchase cost of INR 8.5 million (whichever is lower)	60% of puchase cost of INR 0.01 billion (whichever is lower)

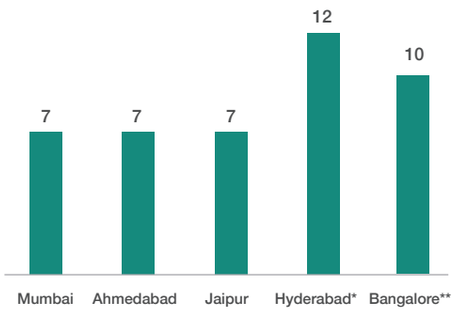
[3] Department of Heavy Industries, Government of India, launched in March 2015, the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) with an aim to promote electric and hybrid vehicles.

- All cities completed the bidding process within one month to avail of the subsidy under FAME-I Scheme. Most of the cities are procuring or renting buses without a detailed operation plan. The authority and the manufacturer/operator will need to work closely to ensure the deployment of e-buses on city routes.
- There is a huge variation in tender conditions in different cities which results in big variation in price for both GCC and outright purchase contracts.

Minimum Assured Kilometres – Per Bus Per Day (Figures in Km per day)



Contract Period for the Bus Operation (Figures in Years)



* Hyderabad – Initial contract will be for 6 years and can be extended to 4 more years
** Bangalore – Initial contract will be for 7 years and can be extended to 3 more years

- The bidding round experienced very aggressive pricing from limited players to crowd out markets. The authority should evaluate the bid price logically to find out the long- term sustainability of the project.

- Timely execution is essential, given only two bidders have won all the tenders and will have a great advantage over other players. Further, the technical capability of bidders also needs to be ascertained to ensure the successful execution of contracts.

- Deploying electric buses is an opportunity for cities to introduce new technology and change the face of public transport. Unfortunately, cities have not planned any special marketing efforts to popularise the use of electric buses.

CROSSROADS OF CHANGE



Procurement of E-Buses: City-wise Price Analysis

BENGALURU, KARNATAKA: Bengaluru received the approval for the procurement of 40 electric buses. However, the city planned to procure 150 buses on gross cost. The tender was released by BMTC for the hiring of 150 AC electric buses along with charging stations. The city has not finalised the ratio of 9 metres non air-conditioned e-buses and 12 metres air-conditioned e-buses. BMTC agreed to consider the experience of bus operation outside the country. BMTC has proposed a contract period of 10 years, which will be reviewed after 7 years. The assured average km is 200 km per day per bus. The cost of electricity for the charging of the buses will be borne by BMTC.

MUMBAI, MAHARASHTRA: Mumbai received the approval for the procurement of 40 electric buses from DHI. The city is already running 5 electric buses (Midi) for the last 3 months, financed by Bombay Municipal Corporation

(BMC). The tender was released by BEST Undertakings for the hiring of 40 electric buses under GCC. The city decided to hire 20 AC and 20 Non-AC buses. BEST has proposed a contract period of 7 years. The assured average km is 4,000 km per month per bus (i.e. 150 km per day). The operator is responsible for the electricity and charging of the buses.

HYDERABAD, TELANGANA: Hyderabad received the approval for the procurement of 40 electric buses from DHI. However, the city planned to procure 100 buses on gross cost. In Phase-I, the city will procure 40 buses and will procure remaining buses in Phase-II. The tender was released by TSRTC for the hiring of 40 AC electric buses. The city has not finalised the ratio of 9 metres and 12 metres air-conditioned e-buses. TSRTC has proposed a contract period of 6 years initially and extendable for further 6 years in two spells 7-9th year and 10-12th year of agreement period subject to satisfactory performance and fitness of the vehicle. The assured average km is 225 km per day per bus. The cost of electricity for the charging of the buses will be borne by TSRTC.

AHMEDABAD, GUJARAT: Ahmedabad received the approval for the procurement of 40 electric buses from DHI. The tender was released by Ahmedabad Janmarg Limited (AJL) for the hiring of 40 AC Midi electric buses under GCC. AJL has proposed a contract period of 7 years. The assured average km is 72,000 km per bus per year (i.e. 200 km per day). The operator is responsible for the electricity and charging of the buses. The city conducted its first bidding round, where Tata Motors Limited emerged as the lowest bidder for 9 metres AC e-bus and quoted INR 59 per km. Initially, the authority disqualified Goldstone Infratech Limited for the lack of technical experience. However, the city decided to cancel the full process and invite fresh bids. Ashok Leyland emerged as the lowest bidder with INR 48 per km.

JAIPUR, RAJASTHAN: Jaipur received the approval for the procurement of 40 electric buses from DHI. The tender was released by Jaipur City Transport Services Limited (JCTSL) for the hiring of 40 AC Midi electric buses under GCC. AJL has proposed a contract period of 7 years. The assured average km is 54,000 km per bus per year (i.e. 150 km per day). The operator is responsible for the electricity and charging of the buses.

INDORE, MADHYA PRADESH: Indore received the approval for the procurement of 40 electric buses. The tender was released by Atal Indore City Transport System Limited (AICTSL) for the procurement of 40 Non-AC electric buses along with charging stations. The city decided to opt for 9 metres air-conditioned e-buses. Tata Motors Limited emerged as the lowest bidder to supply 40 electric buses. The price includes the FAME Subsidy component.

LUCKNOW, UTTAR PRADESH: Lucknow received the approval for the procurement of 40 electric buses. The tender was released by Lucknow City Transport Services Limited (LCTSL) for the procurement of 40 AC midi (9 metres) electric buses along with provisioning and installation of charging stations. LCTSL decided to procure the buses with 10 years of AMC (annual maintenance contract) with battery replacement. Further, E-Bus should consume less than 175 kWh energy per 100 Km. Tata Motors Limited emerged as the lowest bidder to supply 40 electric buses. The price includes the FAME Subsidy component.

KOLKATA, WEST BENGAL: Kolkata received the approval for the procurement of 40 electric buses. The tender was released by West Bengal Transport Corporation Limited (WBTCL) for the procurement of 20 AC midi e-buses and 20 AC standard e-buses, with 7 years warranty. The seating capacity of 26 and 31 passengers was fixed for midi and standard bus respectively. The authority asked for supplying, installing and commissioning 30 slow-charging and 10 fast-charging facilities stations for midi and standard buses. The minimum range of the vehicle with battery should not be less than 150 km per charge. Tata Motors Limited emerged as the lowest bidder to supply 40 electric buses. The price includes the FAME Subsidy component. The price of chargers will be paid separately by the authority.

4.4 Hydrogen-CNG (H-CNG)

H-CNG is a blend of hydrogen and CNG, the ideal hydrogen concentration being 18%. Tests by the Automotive Research Association of India and Indian Oil Corporation Ltd (IOCL) have found that compared to conventional CNG, the use of H-CNG can reduce the emission of carbon monoxide up to 70%, besides enabling up to 5% savings in fuel. The Supreme Court of India has requested the Central Government to conduct a feasibility study to review how hydrogen-based automotive fuel, can improve the 'severely dangerous' smog situation prevalent in the country today.

ALONG THE ROAD



Technology Breakthrough: Hydrogen Production from Sea Water

In Texas, Researchers from the University of Houston have developed a new oxygen evolution catalyst that allows for low voltage seawater electrolysis, a process that was previously impossible as no known catalyst prior to the study was able to produce hydrogen from seawater without also setting free ions of sodium, chlorine, calcium, and other problematic ions.

In the past, these ions would settle on the catalyst and render it inactive, which is why the use of freshwater for hydrogen production was seen as more viable than saltwater. But freshwater resources are limited, which enhances the gravity of this breakthrough.

The researchers claim that their catalyst would also work with wastewater, which would be another major source of hydrogen from water that is otherwise unusable without expensive and resource-intensive treatments.

Environment Pollution Prevention and Control Authority (EPCA) Recommendations

The Environment Pollution Prevention and Control Authority (EPCA) recently recommended to the Supreme Court that Delhi's buses switch to H-CNG within the next two or three years to reduce dangerously high air pollution in the city. MoP&NG has also issued a draft notification, following a NITI Aayog proposal, for H-CNG as an automotive fuel. In its report to the Supreme Court, the EPCA has estimated that to fuel Delhi's 5,500 buses, about 400 tonnes H-CNG would be needed per day. Setting up four fuel-dispensing facilities would cost Rs 3.3 billion, which can be funded from the Environment Compensation Charge (ECC) fund made up of cess on commercial vehicles entering Delhi. The costs are not prohibitive and if further work can be done to reduce NOx (oxides of nitrogen) then this approach can be scaled up and implemented across the full bus fleet in the city within 2-3 years, the report says.

The EPCA report says Delhi is well placed for a transition to H-CNG for its buses as its public transport system already runs on CNG.

> "The most promising aspect of this technology is that it will allow for the utilisation of the existing infrastructure of CNG—buses as well as the piping network and dispensing station".

Delhi's public transport heavily relies on autos, which too run on CNG, but researchers believe that these are not yet ready for a switch. The tests so far have been conducted on heavy-duty engines. Also, the physical blending of CNG and hydrogen involves a series of energy-intensive steps that would make H-CNG more expensive than CNG.

A positive is that IOCL's research & development wing has developed a technology that does away with the need for physical blending. Its 'compact reforming process' directly produces a hydrogen-CNG mixture from natural gas, using a single step. The cost of production is significantly lower than physical blending,

4.5 Scrappage Policy for Old (> 15 years) Commercial Vehicles from 2020 Onwards

Ministry of Road Transport & Highways (MoRTH) has moved policy to scrap CVs (commercial vehicles: buses, trucks, LCVs) which are more than 15 years old. This will open up a huge 2020 demand (replacement market for CVs) of vintage 2005 or earlier, estimated to be > 1.2 million. Thereafter, there would be recurring annual demand of the order of 0.1 million. An incentive scheme is anticipated to be approved soon, which will act as a catalyst for STUs (State Transport Undertakings) as well as Private Fleet Owners (Buses & Trucks) to scrap (> 15 years old) inefficient diesel vehicles and buy new EVs/CNG & Bio-CNG Vehicles (with latter being 'default' choice in rural areas). Subsequently, incentives could be extended to other Vehicles, estimated to be 20 million of vintage earlier than 2005. Fuel savings and reduced import of Crude Oil justifies such incentives (apart from the reduction in particulate/GHG emissions).

S.No.	Date	What it states	Reference
1	July 24, 2018	Retirement age for commercial vehicles may be fixed at 20 years.	//economictimes.indiatimes.com/articleshow/65111688.cms?from=mdr&utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst
2	June 13, 2019	An integrated policy to scrap commercial vehicles that are more than 10 years is currently in Government's pipeline aimed at keeping a check on air pollution. However, Union Minister Nitin Gadkari confirmed that there were no immediate plans of banning trucks and buses over 15 years.	https://www.news18.com/news/auto/commercial-vehicles-older-than-10-years-to-be-scrapped-union-minister-nitin-gadkari-2185207.html
3	Sep 19, 2019	The government could offer tax incentives for discarding vehicles older than 15 years under the proposed scrappage policy, apart from other measures to disincentivise plying of vehicles older than 15 years. Minister Gadkari signed the file for Cabinet note of Scrappage Policy. The note has already been approved by Finance Ministry. Now it will be circulated to concerned ministries.	//economictimes.indiatimes.com/articleshow/71206673.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst
4	October 15.2019	The scrappage scheme, which was first mooted by Nitin Gadkari, the minister for road transport and highways in August 2015, is currently with the Union Cabinet for its approval. As per the note, approximately, 1.2 million registered CVs would be equal to or older than the age of 15 years by 2020, constituting about 16 % of the total on-road CVs. As per estimates, there are about 20 million pre-2005 built vehicles that are plying on Indian roads and the move is aimed at de- incentivising such vehicles in view of about 10 to 25 times higher pollution emission by them under the new emission norms.	//economictimes.indiatimes.com/articleshow/71599409.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst

4.6 Financial Planning for Urban Mobility Projects

Indian cities are witnessing tremendous urban growth which has resulted in a generation of high-level of travel demands. Therefore, in order to support such high travel demand, there is a need to develop sustainable mass transit systems in cities. Investing in large metro projects reaps huge benefits like significant travel time savings, environmental benefits, social benefits etc.

However, to provide adequate transit facilities and to operate and maintain the same, large scale investment is needed. With billions of dollars to be spent on various urban transit projects in the country, it is necessary to use innovative financing mechanisms capturing the gains from various ancillary infrastructures associated with it. The financial sustainability of these systems needs to be studied in detail to opt for better and viable alternative. The trends in the past have been to rely on the budgetary support from Government organisations and loans from multilateral/financial institutions. With investment requirements being so enormous, the public sector will fall short. It is necessary to attract private capital to meet the resource deficit. PPP (public private partnerships) need to be encouraged for infrastructure investment as also for the execution and operation of infrastructure projects.

Carbon finance provides a significant influx in funds and has emerged as an alternative to the traditional funding criteria adopted for Government-run projects. It can be sought for a time period of five to seven years and is applicable to all Government schemes such as FAME, Smart city, Green Mobility etc.

The Case of Bangalore Metro

In Bangalore, most of the roads are over-saturated, low speeds cause heavy pollution and huge loss of precious man-hours. Further, road space cannot be increased any further. These problems have compelled authorities to target a mass transit system in the metro as a possible solution.

Bangalore Metro (or Namma Metro) is expected to save 50% to 75% of the commute time for the city dwellers. Other social benefits such as reliability, reduction in accidents, reduced VOC, increased average speed will also accrue from this initiative.

In the Namma Metro regenerative brakes reduce 1/5th energy per passenger kilometres, in comparison to road transport. The system boasts 99% efficiency in terms of punctuality. The city has largely reduced the amount of CO_2 production along with lesser noise and air pollution.

BMTC is determined to integrate this new metro rail with other existing modes of transit in the city, to provide a holistic service to the city.

The metro rail had a surge of 58% in fare box revenue in the year 2015-16 from the year 2014-15. The revenue increased to 30% and the expenditure increased to 46% from the previous year.

The Case of Maharashtra Metro (MAHA-Metro)

The consolidated project cost of Maha Metro is INR 86.8 billion and expected project FIRR of 10.35% with non-fare box revenue. It has deciphered the following possible sources of non-fare box revenues:

- Collection of additional taxes in the form of 1% additional surcharge on Stamp Duty.
- Transit-Oriented Development along the NOIDA Metro Rail Corridor (NMRC)
- Property development along the NMRC.
- Advertisement (including wrapping and station naming).

Government of Maharashtra vide notification in the Gazette, allowed for recovery of 1% of additional surcharge on the stamp duty, and has resulted in non-fare box revenue of INR 0.06 billion to date.

An additional FSI has been permitted at four for plot size >2000 sq. m, three for plot sizes between 1000 and 2000 sq. m. and two for plot size less than 1000 sq. m. The organisation has also allowed for various types of property development viz., property development spaces, property business spaces, advertisement spaces etc.

CROSSROADS OF CHANGE



Innovative Funding for Urban Mobility: Case Study of Paris

In the city of Paris, over 60% of the trips are by public transport. However, cars are more common from suburb to suburb around Paris and accounts for about 80% of trips. In Paris, mobility is managed by Île-de-France Mobility Transport Authority.

Since 2006, the current annual budget, excluding development investments, increased by € 1 billion (INR 75 billion) to reach the sum of € 9 billion (INR 675 billion) in 2016 out of which 47% of income is provided by special tax paid by companies (tax on gross salary).

RATP Group created in 1949 is a leading multimodal operator in Île-de-France and has experience in all fields of transport service i.e. metro, buses, trams, trains and cable cars with an expertise in designing, operating, upgrading and deploying.

Revenue from non-transport sources is part of the RATP business model. Financial risk is borne by the operator. In Île-de-France revenue from non-transport sources is high but not significant. It is only 2% of the total revenue. Similarly, digital, advertising and other additional non-transport sources must contribute to financing the public transport system. For this updated and adequate data on mobility is essential.

Public authorities place pressure on operators so that they give free access to their data.

Four major French operating companies (KEOLIS, RATP, TRANSDEV, SNCR) decided to gather their data in a common database for developing special apps for mobility users.

CHAPTER 5

DESTINATION LEVERAGING FINANCE

Success is a journey that begins after reaching the destination.

ACTIONABLE RECOMMENDATIONS

This theme report captures the proposed solutions of other components and makes recommendations of required Economic Policies and Financing Instruments. This component has not made recommendations related to Freight Transport. These are specifically covered under the recommendations of the Working Group for Component 4, namely 'Optimise supply chains to manage freight transport emissions'.

The recommendations have been grouped as follows:

Urban Planning & Infrastructure for Sustainable Mobility
Incentivising & Enhancing Public Transport
Decarbonizing current (fossil) Transport Fuels
Creating Enabling Eco-System & Economic Instruments
Project Financing Issues
Taxation Issues

5.1 Urban Planning and Infrastructure for Sustainable Mobility

Passenger Mobility: Having been neglected for the last several decades, Government focus has largely been on STUs to provide affordable Public Transport. This has created a huge demand and supply gap, which is being filled up by unorganized Private players. The biggest lacuna of the system has been the availability of required funds to develop Public Transport infrastructure such as Terminals, Parking and Pick up, drop points, highway amenity centres, common charging infrastructure funds to develop mass transit systems like City buses, BRTS, METRO, MONORAIL, etc. IT infrastructure to have central depository and monitoring systems, etc. for which the following has been suggested:

- All cities to have a mandatory budget for providing better passenger mobility including pedestrian and NMT (non-motorised transport) infrastructure, mass transit systems, multi or bus terminals, technology platform to monitor and integrate all services, and common electric charging stations.

Cities should be funded for holistic, sustainable mobility programmes, rather than funding a specific project like Metro or BRT or City Bus projects.

- Funds should be planned to provide integrated transport systems.
- Funds should be managed and disbursed only through single SPV (special purpose vehicle), which shall fund the projects on the basis of a plan; a priority shall be given to a plan which will carry more people per rupee spent.

Accelerate de-carbonisation of current City transport systems (through large-scale adoption of EVs and Bio-CNG/ Advanced Biofuels Vehicles), with subsidy and viability gap-funding schemes that facilitate scale-up, having defined duration and budgets for financial assistance.

5.2 Incentivising and Enhancing Public Transport

Fiscal measures should be taken to increase cost of private vehicle ownership and usage in terms of higher Motor Vehicle tax, fuel taxes, and road user charges. The revenue gained from increased taxation should be used to fund public transport. On-street parking should be priced at a rate high enough to discourage improper parking & usage of pedestrian/ road space. This revenue can further be used to fund public transport.

5.3 Decarbonising Current (Fossil) Transport Fuels

This would relate to displacement of Diesel, Petrol/ Auto LPG/ CNG, ATF and Marine fuels. In the short term, this could be done through incentivising EVs and scale up of production and retailing of Bio-CNG (up to 15 million tons/year from Farm Waste, as per target set by Minister MoP&NG, while announcing the SATAT scheme). In the medium to long term, it would be through mass production of EV's & Batteries in India as well as large volume production and retailing of the entire spectrum of Advanced Biofuels, as defined in "National Policy on Biofuels 2018".

Electric Vehicles - It is anticipated that growth of EVs would be driven by market dynamics, subject to appropriate financing instruments (correlated to LCCA) as well as initial support under the FAME scheme. Hence, recommendations are made with a focus on EV Charging Infrastructure.

Suggestions on EVSE (electric vehicle supply equipment) Business Models in India

- Electric utilities may be mandated to setup EVSE networks in strategic locations in their service area under CAPEX for grid upgrades.
- City governments/municipalities and Highway Authorities may be mandated to allot space for EVSE networks on a long lease at concessional rates.
- Bundle EVSE as mandatory in new buildings through Building Codes for a category of buildings exceeding certain built area.
- EV manufacturers to contribute a certain % of the vehicle cost towards EVSE fund utilised to build EVSE network in respective cities/states.
- EVSE infrastructure may be clubbed with Highway Construction cost—have a negligible impact on per kilometre cost of highways.
- In commercial centres, tourist and religious places, shop owners may be encouraged to invest in EVSE infrastructure and entry of diesel/petrol vehicles may be limited.
- Allot land and licences to set up large EVSE stations at strategic locations which will have: cafes/ATMs, gyms, air/tyre changing stations.
- PSUs and large private companies may be mandated to set up EVSE infrastructure in their area of operation.
- Oil distribution companies may be encouraged to create EVSE infrastructure nearer to their retail outlets on highways.
- EV manufacturer consortiums may promote EVSE networks and collect monthly subscription from EV owners and pay to the EVSE owners and operators.
- Fleet operators and car rental companies may be allowed to set up EVSE networks.
- Other incentives like tax concessions, free or concessional land on long term lease and transparent allocation of EVSE locations preventing the formation of monopolies could be included.

In case there are no fiscal incentives provided by the Government, growth should be through market-driven competitive forces, without the involvement of Government, except for statutory clearances

Suggestions on Bio-CNG (CBG)/ Advance Bio-fuels for Sustainable Rural Mobility

- Inclusion of CBG in priority sector lending with interest subvention scheme.
- Financial institutions and rural banks should come up with various incentives like low interest on loans, single-window clearance, rebates on interest etc. to promote production of Bio-CNG & more usage of Bio-CNG Vehicles in the rural areas.
- Agricultural loan-providing institutions for rural people can include the component of Bio-CNG for tractors to promote environment-friendly solutions for farming.

There is no constraint on manufacturing of vehicles from a technology perspective or manufacturing facilities.

Biofuels would be blended with Diesel or Petrol and, up to 2030 scenario, there should be no constraints over use of currently manufactured (ICE) based vehicles.

Bio-CNG would be fired in CNG Vehicles, for which there are existing manufacturing facilities, which are likely to be scaled up in line with MoP&NG plans to enhance CGD (City Gas Distribution Networks) and CNG Retailing outlets.

MoP&NG's new "Fuel Retail Policy", allows all Companies (with net worth of INR 250 crores) to establish Retail Fuel Outlets, with proviso that such Retailers should install one new generation alternate fuel, viz CNG. LNG, Biofuels or EV Charging. In rural areas, advanced Biofuels would be the preferred choice (from perspective of resource availability) and, in the short term, Bio CNG would be the default choice (from the perspective of commercialised technology).

The focus of recommendations is on scaling up production of Bio CNG (from Farm Waste) and thereby facilitating large scale adoption as Sustainable Mobility in rural areas (where CGD networks and CNG retailing outlets penetration is unlikely, in large scale).

These recommendations would also be valid for advanced Biofuels, as and when they reach commercial production, at large scale.

i. Institutionalise the more-appropriate term Bio-CNG rather than CBG (Compressed Bio-Gas)": While doing so, incorporate Bio-CNG and Bio-CNG manufacturing plants within appropriate GST category. Currently, only Biogas and Biogas Plants are covered under GST, which probably is the reason why the term CBG is used.

ii. Include Bio-CNG Plants (with feedstock of Agriculture Residues and Manure) within priority sector lending: With long tenor and low interest loans (akin to Solar sector), in view of the significant mitigation of environment pollution and GHG emissions that take place from processing of Farm Waste, apart for the CO2 emissions mitigation by replacing Petroleum fuels by Bio-CNG.

iii. DFIs (Development Financial Institutions) and NABARD-supported RRBs (Regional Rural Banks) & Co-operative Banks to provide special financing packages: For Farm Waste Supply Chain (collection, aggregation, pre-processing, storage and transport). This could be in the form of lower equity requirement, interest subvention, minimal collateral requirement (backed by Credit Guarantee schemes), etc. to ensure the "bankability" of Feedstock Supply Chain and thereby, Bio-CNG Projects.

iv. RRBs (Regional Rural Banks) and Co-operative Banks to devise special schemes: These must incentivise farmers to adopt Bio-CNG Tractors (instead of Diesel Tractors). While the Central and State Financial Assistance will be designed for specific application, in concept, it is like the KUSUM scheme, which has goal of displacing diesel/ grid power usage in Irrigation Pump sets.

v. NABARD & SIDBI to develop Carbon Finance-supported schemes for financing of Bio-CNG Retailing outlets in rural areas. FICCI would be available to present a paper on feasibility & economic viability of such schemes.

vi. Bio-CNG program, with feedstock of Farm waste: This needs to be driven by the Private sector, governed by market dynamics and not be OMC centric (as is the case with, current, SATAT scheme is.

The negligible commissioned plants capacity creation, till date, under the SATAT scheme emphasizes the need for such transition. This is all the more necessary in the future scenario, which requires significant investments in rural India to address economic distress in farmer households as well as to provide non agriculture livelihoods, in particular, to migrant labour who have recently returned to villages.

5.4 Creating Enabling Eco-System & Economic Instruments

i. Creation of a nodal DFI (Development Finance Institution) for Sustainable Mobility: The financing required to scale-up various low carbon and sustainable transport systems in India exceeds the available traditional financing sources through Banks/NBFCs. To meet the large-scale investment requirements for sustainable mobility, Multilaterals/DFIs which have domain competences and can also access Climate/ ESG Finance (with the aid of conventional financers such as public sector banks) should fund such projects indirectly by providing Green Credit facilities to Banks/NBFCs, which then lend to Green Businesses.

ii. Establishing a green taxonomy: Formulating green investment strategies, priority sector lending for sustainable mobility, and patient capital from pension and sovereign wealth funds into green bonds would require the establishment of a green taxonomy for a country.

iii. ABS (asset backed securitised) deals: These have a strong case for uptake and add to the diversification of

green bonds into sectors like EVs and Bio-CNG/LNG production as well as related Vehicles deployment.

iv. Having credible pipelines of projects across sectors: To be created through systemic policy and market interventions. This entails regulatory push or support, in the form of mandates for sustainable modes of transportation

v. Incentivise Domestic Manufacturing of Sustainable Mobility Vehicles: To facilitate Technology Transfer and Investments, it will be necessary to incentivise domestic manufacturing, via low-cost financing, committed off-takes, subsidy for import of machinery and tax incentives for manufacturing units.

vi. Incentivise Demand and Use: Subsidies, tax benefits, advocacy and reduction in import duties to reduce the cost for the ultimate user and increase demand.

vii. Regulatory Push: Mandate environment and ecologically friendly transport solutions, supported with advocacy and strategic roadmap for driving up demand and reducing cost to ultimate user, through economies of scale. Once a reasonable scale has been achieved for domestic demand and and manufacturing, incentives can be withdrawn and government to facilitate growth, through gradually increasing the requirement for carbon-efficient vehicles as % of the total fleet for the transportation sector.

viii. Capacity-building: Among borrowers, financiers, and even policy makers and regulators; on commercially-viable sustainable mobility solutions as well as the opportunities presented by climate bonds. The opportunities for such investments that exist in India need to be made more visible domestically and internationally.

5.5 Project Financing Issues

i. Provide Long Tenor Project Financing: To make Sustainable Mobility solutions affordable, it's necessary to provide long tenor loans (as illustration, Solar Tariffs came down when term loans up to 20 years were allowed. This led to greater demand and reduction in costs of construction through economies of scale).

ii. Remove Inequities in Financing: Bus Fleet Operators, going for Sustainable Mobility Solutions, should be eligible for long term Project Financing, which covers cost of not only vehicles but also Depots and EV Charging/ Bio CNG Dispensing Infrastructure. Currently, they can only access, relatively short tenure vehicle finance.

iii. Adopt appropriate Risk Distribution Mechanisms: Infrastructure for Sustainable Mobility solutions (eg EV Charging/ Bio CNG Dispensing) needs to precede large scale adoption of such solutions, by Fleet owners or private Vehicle owners.

Hence, financing instruments will have to be appropriately designed, with initial moratorium and then gradual scale up of principal repayment. Otherwise, the facility will become insolvent just as demand picks up. Lenders may be appropriately protected as per some of the recommendations that follow.

- **Capital Subsidy/Viability Gap Funding:** in the initial phase, to mitigate risks for early stage investors in sustainable transportation projects, the disbursement can be linked to project achieving certain measurable outcomes, to ensure that there is productive utilization of funds and weed out speculative investments.

- **Using Partial Risk Sharing Facility (PRSF):** The Financial Institution reimburses the public or private financial entity for a portion of the principal losses incurred on a portfolio of eligible projects as per the proposal.

- **Refinance scheme for loans:** Public financial institution, which shall act as the IA (implementing agency) for this fund. The lending bank/NBFC can refinance a part of its existing loan portfolio of sustainable mobility projects, post commencement of their commercial operations, to the IA and thereby have the funds to finance further sustainable mobility projects. The concept resembles NABARD refinancing for Agriculture and allied activities. However, the refinancing schemes shall be formulated by IA with the approval of appointed government agency.

5.6 Taxation Issues

i. Tax Rationalisation: The way taxes are levied needs to change. Presently, personal vehicles are taxed less whereas taxation on public vehicles is more which is making public transport expensive for users and unsustainable for operators.

Taxes being a state subject, all State Governments look upon public vehicles as a source of revenue and keep on burdening it with heavy taxation.

For long-distance interstate buses, taxes are levied by multiple states simultaneously, making the journey very expensive because of which people prefer to use their own vehicles. Public transport should be treated as a basic community need which also addresses environment and ecological issues, hence should be eligible for nil or concessional taxes and toll. If taxes and toll are made zero, long-distance service ticket rates would come down by at least 10 to 15% if not more. This can be achieved by taking the following measures:

- To introduce uniform nominal taxes on passenger transport throughout India
- To make public transport toll free
- To provide renewable electricity at a subsidised rate to promote usage of EVs

To incentivise production of Bio-CNG/Bio-LNG as well as establish large number of retail outlets (especially in rural areas) and thereby promote use of Bio-CNG/Bio-LNG vehicles.

ii. Remove Punitive tax policies towards public transport operations: Unlike the goods segment, there is no uniformity of tax structure among states. In some states, the taxes are charged on per trip basis and in others on a per annum basis. Bus operators have to bear a disproportionately high tax burden which increases the cost of travel for all. Available data from states and cities suggest that annual one-time road-tax on a bus is far higher than the one-time road tax a car pays in any given year.

iii. Preferential GST: This should apply to all technology options and be uniform to all sustainable mobility solutions.

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The formation of working groups was preceded by a brainstorming session of experts in May 2018, thereafter the working groups after being formed met numerous times in the 20 months that followed. A joint workshop of the working groups took place in May 2019 to assess the development of the theme reports and Roadmap halfway through the project. Thereafter, extensive deliberations of the working groups were held alongside stakeholder consultations until the culmination of the final eight theme reports and the India Roadmap. The 8 Leads of the working groups met numerous times through the project period. The joint meetings of the working groups and frequent meetings of the Leads ensured there was no silo in the deliberations or formulation of the eight components of the Roadmap. We are thankful to all of them for devoting their time and energy in this manner.

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We acknowledge the inputs, feedback and experience sharing by international stakeholders who participated in the events organised by FICCI on the development of the India Roadmap at the Movin'On – World Summit on Sustainable Mobility in Montreal, Canada in 2018 and 2019 and the side events organised by FICCI in UNFCCC COP-24 in Katowice, Poland in December 2018 and UNFCCC COP-25 in Madrid, Spain in December 2019.

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WORKING GROUP

Working Group 8 on "Large Scale Deployment of Economic Instruments and Leveraging Finance"



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ACRONYMS

ABS: asset backed securities
AICTSL: Atal Indore City Transport System Limited
AJL: Ahmedabad Janmarg Limited
AMC: annual maintenance contract
BMC: Bombay Municipal Corporation
BMCG: bharat metal cutting gas
BMTC: Bengaluru Metropolitan Transport Corporation
CFA: Central Finance Assistance
CBG: Bio-CNG
CNG: compressed natural gas
CO2: carbon dioxide
CVs: commercial vehicles
DFIs: development finance institutions
DHI: Department of Heavy Industries
EPC: Environment Compensation Charge
EPCA: Environment Pollution Prevention and Control Authority
EVs: electric vehicles
EVSE: electric vehicle supply equipment
FAME India: Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India
GCC: Gross Cost Contract
GHG: greenhouse gas
H-CNG: Hydrogen-CNG
HSD: high speed diesel
IA: implementing agency
IC: internal combustion
IOCL: India and Indian Oil Corporation Ltd
JCTSL: Jaipur City Transport Services Limited
LCTSL: Lucknow City Transport Services Limited
LPG: liquefied petroleum gas
LNG: liquefied natural gas
MoP&NG: Ministry of Petroleum & Natural Gas
MoRTH: Ministry of Road Transport & Highways
MoU: memorandum of understanding
MSW: municipal solid waste
NMRC: NOIDA Metro Rail Corridor
NMT: non-motorised transport
NOx: oxides of nitrogen
OMCs: oil marketing companies
PNG: piped natural gas
PPAs: power purchase agreements
PPP: public private partnerships
PRSF: Partial Risk Sharing Facility
PTA: public transportation authority
SATAT: Sustainable Alternative Towards Affordable Transportation
SDGs: Sustainable Development Goals
SIFF: Sustainable India Finance Facility
SPV: special purpose vehicle
STUs: State Transport Undertakings
TSRTC: Telangana State Road Transport Corporation
WBTCL: West Bengal Transport Corporation Limited

SOURCES/ REFERENCES

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[3] Department of Heavy Industries, Government of India, launched in March 2015, the Faster Adoption and Manufacturing of (Hybrid &) Electric Vehicles in India (FAME India) with an aim to promote electric and hybrid vehicles.

ABOUT PARTNERS

FICCI

Established in 1927, FICCI is the largest and oldest apex business organisation in India. Its history is closely interwoven with India's struggle for independence, its industrialisation, and its emergence as one of the most rapidly growing global economies.

A non-government, not-for-profit organisation, FICCI is the voice of India's business and industry. From influencing policy to encouraging debate, engaging with policy makers and civil society, FICCI articulates the views and concerns of industry. It serves its members from the Indian Private and public corporate sectors and multinational companies, drawing its strength from diverse regional chambers of commerce and industry across states, reaching out to over 2,50,000 companies.

FICCI provides a platform for networking and consensus building within and across sectors and is the first port of call for Indian industry, policy makers and the international business community.

PPMC

The PPMC is an open and inclusive platform that actively invites all organisations and initiatives that support effective action on transport and climate change to join in the process. The PPMC is created to strengthen the voice of the sustainable transport community in the UNFCCC process, especially with a view to the upcoming Conference of Parties (COP21) in December 2015 in Paris. COP21 is expected to result in a new global agreement on climate change, which will shape climate policy in the years to come at a global, regional and national level. By bringing together different actors and stakeholders in the sustainable transport community it will be possible for the transport sector to have its voice heard and speak with one voice on the important contribution that sustainable mobility can make to the mitigation of, and adaptation to climate change.

The PPMC contributes to realising a Global Agreement on Climate Change that empowers transport sector to take action on climate change. The realisation of this objective requires an active engagement of the PPMC before, during and after COP21. It will be equally important to advocate for an agreement that incentivises the transport sector as well as work with the transport and climate community on the implementation of a new global agreement on climate change at the global, regional, national and local levels.

WWF-India

WWF-India is one of the leading conservation organizations in the country. It is a science-based organization that addresses issues such as the conservation of species and its habitats, climate change, water, and environmental education, among many others. Over the years, its perspective has broadened to reflect a more holistic understanding of the various conservation issues facing the country and seeks to proactively encourage environmental conservation by working with different stakeholders- Governments, NGOs, schools and colleges, corporates, students and other individuals.

Shakti Sustainable Energy Foundation

Shakti Sustainable Energy Foundation (Shakti) seeks to facilitate India's transition to a sustainable energy future by aiding the design and implementation of policies in the following areas: clean power, energy efficiency, sustainable urban transport, climate change mitigation and clean energy finance.

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