Towards a Green Investment Policy Framework - Case Study Series

MAKING MOBILITY A PART OF THE HOUSING DEVELOPMENT PRACTICE - A MARKET APPROACH

Cases from Ahmedabad and Bangalore, India

Prepared by EMBARQ India

This case study is part of the OECD project on Mobilising Private Investment in Low-Carbon, Climate-Resilient Infrastructure. The aim of the project is to assess and promote good practice policies that help countries encourage private sector investment in low-carbon climate-resilient infrastructure. The present case study, prepared by EMBARQ India, was developed for the OECD Roundtable Discussion on “Mobilising Private Investment in Low-Carbon, Climate-Resilient Infrastructure”, 25 September 2012. It builds on the OECD paper “Towards a Green Investment Policy Framework: The Case of Low-Carbon, Climate-Resilient Infrastructure” (COM/DAF/INV/ENV/EPOC(2011)4/REV2).

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Making Mobility a Part of the Housing Development Practice—A Market Approach
Cases from Ahmedabad and Bangalore, India

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1. Introduction

India is rapidly urbanizing. From 1991 to 2011, the urban population in India has increased from 100 million to 200 million\(^1\). By the year 2041, 50% of India’s population is expected to live in cities\(^2\). On an average, the population of India’s six major metropolises increased 1.9 times during 1981 to 2001, while the number of motor vehicles went up 7.75 times during the same period\(^3\). The lack of adequate infrastructure and services has been recognized as one of the most important roadblocks on the path to rapid, equitable and sustainable growth in Indian cities. Both the local and national governments in India are looking for mechanisms to accelerate the supply of infrastructure and services to cope with the growing needs resulting from fast urbanization and motorization.

This urban growth currently underway, and projected to increase over time, needs to be directed towards sustainable practices, in order to build environments that are climate resilient and culturally inclusive. In an ideal world, during the phase of such massive investments, plans that integrate land use and transport investments need to be developed and implemented to structure sustainable city form. In India, a city “masterplan” is the statutory document that identifies growth perspectives, develops land use plans addressing the urban agglomeration area’s growth, and lays out Development Control Regulations (DCRs) to regulate the city’s development\(^4\). The Master Plan also collates the sectoral plan for urban basic service delivery in the city – addressing service delivery, and associated institutional reforms for services provided by local self-government institutions (LSGIs) in the city. However, the experience of city master plans being implemented has been very poor. Most master plan updates have been more about reflecting what has been built than about regulating what will be built in the future.

In 2005, the Government of India (GoI) launched the Jawaharlal Nehru Urban Renewal Mission (JnNURM) to encourage reforms and fast track planned development of identified cities. An investment of USD 28 billion was earmarked for urban infrastructure in 63 cities across the nation\(^5\). 7 years later, the high powered expert committee (HPEC), formed to review JnNURM is recommending investments of up to USD 780 billion (at 2009-10 prices) for urban infrastructure including USD 484 billion for urban roads and urban transport\(^6\) in the second round of JnNURM.

These growth patterns have created frenzy in the housing sector. It is projected that the Indian real estate market will show a 30% growth in the next decade. The National Urban Housing and Habitat Policy (NUHHP) of 2007 identified a housing shortage of 24.7 million households. The housing sector contributes up to 5-6% of the country’s GDP\(^7\) and this will increase given the shortage of housing.

Urbanization presents a big threat to climate change, and greenhouse gas (GHG) emissions produced by the transport sector are amongst the highest. The McKinsey report, 2009 estimates that in 2030 the transport sector alone, will account for 12% of total emissions in India. The World Bank report, 2009 states that this figure will be 16% by 2031\(^8\). There are various
challenges posed to the Indian urban transport sector over the next 20 years. By integrating transport and land use, the massive scale of urbanization can be seen as an opportunity for climate mitigation and adaptation for climate change.

Conventionally, the conversation of integrated transport and land use has always been at the city level. But there is a need to talk about it at the neighbourhood level. Given the poor experience of integrating transport and land use development, EMBARQ India explores incorporating sustainable mobility in housing projects through a bottom-up approach. We define sustainable mobility as, “the development of infrastructure that enables and promotes travel by walking and bicycling, mixed land uses, public space creation and connectivity to public transport.” Housing projects incorporating principles of sustainable mobility can reduce motorized travel and result in up to 30% reductions in emissions and fatalities. Hence, designing the built environment to incorporate non-motorized transport makes sustainable transport more competitive with individual motorized transport, capitalizing on all the non-work related trips.

It is recognized that this approach captures only a small fraction of the potential opportunity. However, this approach has measurable, real world impacts, and given the extent of on-going housing development, it needs to be capitalized. Also increasingly the urban imagination of residential environments is being promoted through secure gated-communities. Developers cater to these demands, supplying housing that is exclusive, segregated and therefore secure. There is an urgent need to inform, reimagine and build these developments as socially inclusive and accessible living environments.

To ensure climate mitigation efforts are systematized in India, efforts at the National and State level need to be prioritized. However, this report tries to develop ways of thinking about what can be done at the neighbourhood level to integrate housing and non-motorized transport (NMT) as a strategy for climate mitigation; how the private sector can be engaged and influenced into designing for sustainable mobility within private townships; and what kinds of incentives can be institutionalized to create a market for sustainable mobility at neighbourhood levels. The box below details out the methodology followed to engage the private sector and bridge gaps between private and public stakeholders.

**BOX 1.1: Summary of Methodology Applied for a Multi-stakeholder Dialogue**

1. Two pilot projects carried out (detailed in Section 4 of the report) to layout a road map for applying existing technical knowledge.

2. A list of stakeholders including developers, architects, planners, real estate professionals, government officials, civil society groups, climate officials, and rating organizations interviewed. (Responses recorded; refer to Appendix A for the interview questionnaire and Appendix B for the list of interviewees).
3. Stakeholders identified gaps in the system and recommended strategies for mitigation. Responses categorized as ‘Barriers’ and ‘Enablers’. Under barriers: Regulation, Finance, Information, Policy were sub-categories, and under enablers: Regulation, Incentivizing, Capacity Building, Advocacy and Awareness were sub-categories. (Refer to Appendix C for a summary of key interview responses).

4. Organized a multi-stakeholder workshop, inviting various stakeholders, those interviewed and others, to convene on the cause of incorporating sustainable mobility within private townships as a strategy for climate mitigation.

5. Based on OECD’s elements of a Green Investments Policy Framework (GIPF)⁹, a concluding table of enabling strategies organized, to give clear direction for a way forward. (Refer to Section 6 of the report).

6. Additionally a set of long-term, medium-term and short-term strategies identified to capitalize on the momentum and information generated by means of the workshop. (Details included in Section 6 of the report).

Overall, through this work, we aspire to lead the conceptualization & planning of such housing projects and the dissemination of case studies & best practices, though a multi-stakeholder approach including private developers, housing development authorities, architects, planners and various other public and private officials. This report documents our effort so far and our vision of scale up. It is divided into four sections. The first section discusses the policies and incentives to build private residential townships on urban fringes. The second section reviews the extent of opportunity in Ahmedabad and Bangalore to influence private residential townships to include sustainable mobility. The third section documents the two case studies - Godrej Garden City in Ahmedabad and Adarsh Royal Palms in Bangalore. Using OECD’s GPIF the final sections summarize the multi-stakeholder discussion on scaling up this opportunity and identify a way forward.

2. Policies and Incentives to Build Private Townships

This section reviews relevant segments from the NUHHP and highlights how it has triggered development of private townships, state township policies and concepts like the Special Residential Zones (SRZ). Secondly, it reviews climate policies in India and establishes a context for integrating land use and transportation within these new private township or SRZ developments.

2.1. Housing Supply

Based on the 10th year plan, The NUHHP (2007) identified a housing shortage. The mismatch between demand and supply was estimated to be 24.7 million households. The NUHHP also
recommended a regional planning approach. In the regional planning approach – “New Integrated Townships and Greenfield Developments” were identified as opportunities for planning and regulating the large urban growth.

In response to the NUHHP, various regulatory measures, policies, financial arrangements and subsidies are being instituted to explore new models and solutions. Many states have developed state township policies. The Confederation of Real Estate Developers Association of India (CREDAI) conceptualized Special Residential Zones (SRZ) based on the concept of Special Economic Zones (SEZ). “A Special Residential Zone (SRZ) is a notified geographical region that is free of domestic taxes, levies and duties (both for the creation of, operation and maintenance of the SRZ) with special development rules to promote large scale, greenfield, affordable housing projects for the country’s masses. The SRZ would have a prescribed minimum number of dwelling units with a maximum prescribed size, and each SRZ would require adequate social infrastructure including schools, medical facilities etc.”

The NUHHP estimates that 99% of the housing shortage is in the economically weaker section (EWS) and low income group (LIG) sectors. The shortage estimates are made assuming 26.7% of the country’s poor (80.7 million) people live in cities. All though most affordable housing is provided by the city or state governments, the state township policies mandates developers to provide EWS/ LIG housing as part of private townships.

Box 2.1: State Township Policy

The State Township Policy, (or Town Planning (TP) Scheme), is a model designed to facilitate planned urban expansion through Greenfield developments. The Policy sets up basic guidelines to facilitate sustainable integrated developments that promote mixed-use and mixed-income living environments. The concept of integrated townships would theoretically reduce increasing pressure on agricultural land and ease the urban transportation problem. It would facilitate the creation of efficient, equitable and sustainable urban settlements, Public Private Partnership in urban development, and promoting economic development in and around major cities of the state. The government’s role as mentioned in the policy document would be that of a facilitator, providing support to prospective developers for creating external infrastructure (power, roads, water), land purchase, green channel procedures and monitoring mechanisms and is aimed to give a boost to the real estate sector.

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1 Note: TP scheme models were essentially designed for Greenfield developments to ensure informed and strategic planning of peripheral lands. However, Brownfield development of inner city or redevelopment projects are more complicated as they involve multiple stakeholders, propertied citizens, and tenants. In the case of Mumbai, the Mumbai Transformation Support Unit (MTSU) is currently in the process of redefining the TP scheme model for Brownfield developments; this is briefly referred to in the concluding section 6.3.
From a developer’s perspective these townships are much easier to build. The township policies simplify the procedures to acquire land and hence reduce the time required to do so. Land is much cheaper and labour costs for construction are lower. For these reasons the housing produced is relatively more affordable. The private township was thus seen as an approach to address the housing shortage in a short time span.

We recognise that this is an unsustainable model of development. It significantly moves the city away from the integrated land use and transport approach that is required. The lower costs of housing are transferred to significant costs on transportation. Not to mention the social and cultural impacts borne by people and communities and the environmental degradation. Also given that the NUHHP estimates that 99% of the shortage is in EWS and LIG sectors, very little has been constructed in the private townships. The rules and regulations on constructing EWS and LIG homes in these townships aren’t very clear. Most developers are waiting to see how these rules and regulations evolve and have earmarked space for EWS and LIG homes\(^{11}\), but have not started constructing them.

The housing shortage of 1% in the High Income Group (HIG) and Middle Income Group (MIG) sector may appear insignificant at the national scale. However, in terms of absolute numbers – acreage, number of dwelling units – the ongoing and planned township projects are a significant number. Informing these developments to incorporate sustainable mobility principle is essential, since these developers and developments have the potential to influence the development paradigm. The exact numbers for the entire country are difficult to estimate but in the next section we review Ahmedabad and Bangalore to understand the extent of such developments.

### 2.2. Climate Context

The National Mission on Sustainable Habitat\(^{12}\) (NMSH) is one of the eight missions under the National Action Plan on Climate Change\(^{13}\) (NAPCC) that aims to make cities sustainable through improvements in building energy efficiency, urban waste management and shift to public transport. It recommends better planning, promoting a modal shift to public transport. Recommendations include long-term transport plans to regulate the growth in medium and small cities, ensuring efficient and convenient public transport.

The NAPCC only makes recommendations. It recommends that states develop their State Action Plans on Climate Change (SAPCC) to commit to programs and investments that further the goal on climate change. However, there are no clear mandates or financial investments that direct these recommendations towards national investments in cities.

A review of the MEDEC study for Mexico\(^{14}\) conducted by the World Bank identifies ‘urban densification’ and ‘Non-Motorized Transport’ (NMT) as mitigation strategies within the transport sector. While it aims to inform Mexico’s climate change policies, it broadens the
dialogue by highlighting the critical role transportation plays in reducing GHG emissions. Further, it quantifies the need to look at NMT as an important sector for mitigation.

Based on the shortage in housing supply and the need for housing expansion as described in the NUHHP, there is a large opportunity for mitigation within the private housing market. Most climate mitigation and GHG emission reduction efforts are concentrated in the building energy efficiency sector. However, the MEDEC study as well as the NAPCC recommendations, highlights the transportation sector as an important area for mitigation.

This report proposes to incorporate sustainable mobility within private residential townships, thereby making mobility a part of sustainable development practices. The next section establishes the context of two cities—Ahmedabad and Bangalore—to highlight the scale of opportunities for mitigation in the private housing sector in two cities.

3. Extent of Development as Private Townships

This section of the report reviews the City Development Plans (CDPs) and other related documents of two cities, Ahmedabad and Bangalore. By reviewing the projected extent of housing supply, highlighting key numbers within the private housing market, it presents an overview of the scale of opportunities for climate mitigation.

3.1. Ahmedabad

The city of Ahmedabad has a radial city plan, with the old city at the core, and sprawling on the peripheries as the city expands. The area of the Ahmedabad Municipal Corporation (AMC) is spread over 19000 Ha, the Ahmedabad Urban Agglomeration (AUA) area is about 35000 Ha and the Ahmedabad Urban Development Authority (AUD) area is up to 133000 Ha.

<table>
<thead>
<tr>
<th>Urban Boundary</th>
<th>Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmedabad Municipal Corporation</td>
<td>19000 Ha</td>
</tr>
<tr>
<td>Ahmedabad Urban Agglomeration</td>
<td>35000 Ha</td>
</tr>
<tr>
<td>Ahmedabad Urban Development Authority</td>
<td>133000 Ha</td>
</tr>
</tbody>
</table>

In 2001, the population within the AMC was approximately 3.5 mi, that within the AUDA was recorded as approximately 4.7mi people and within the Greater Ahmedabad region was recorded as 5.4mi people. While the population within the city limits (AMC limits) is growing at a moderate rate compared to the peripheries, the population within the region (AUDA limits) is projected to grow from 0.4 mi people to 0.6mi people over the next ten years.15
### Urban Boundary

<table>
<thead>
<tr>
<th>Organization</th>
<th>Population (2001 Census data)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ahmedabad Municipal Corporation</td>
<td>3.5 million people</td>
</tr>
<tr>
<td>Ahmedabad Urban Development Authority</td>
<td>4.7 million people</td>
</tr>
<tr>
<td>Greater Ahmedabad Region</td>
<td>5.4 million people</td>
</tr>
</tbody>
</table>

A review of the CDP for housing area allocations shows 6664 Ha of area (35% of the total AMC area) currently under residential use. The CDP projects an increase to 8340 Ha area (about 43% of the total AMC area) over the next decade. In the AUDA area 9938 Ha is old residential area and 4625 Ha will be new residential. The areas adjoining the AMC limits falling under the AUDA have shown rapid growth\(^{16}\). This is because the city has reached saturation levels in terms of housing development and a lot of new Greenfield developments are coming up along the peripheries and city suburbs.

In this scenario, land use planning efforts, by means of master plan, development plans and town planning schemes have helped curb the extent of sprawl and uncontrolled growth. However a lot more careful planning is required at the Regional level and at township level to ensure new developments are sustainable and accessible for all users. This increase in population and urban growth will not only increase the demand for housing by a significant amount, but also warrant a significant increase in supply of housing within all income groups.

A review of housing trends over the last ten years reveals the following. The total housing produced within AMC is about 25,000 units per year – about 2.5% of the existing stock. About 30% of this is produced as informal units in slum precincts; a quarter is produced in urban

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*Source: Ahmedabad CDP*
villages or gamtals, about 20% is produced through government subsidies and programs (this has increased with increase in subsidy programs) and the remaining quarter is private housing that comprises of both informal and formal housing\textsuperscript{17}.

Gujarat has a functional state township policy. Any private residential development that is more than 100 acres (40.46 Ha) is a residential township. In an interview with Mr. Rajeev Ramprakash, from Godrej Developers, he mentioned that they are currently in the process of building the Garden City project in Ahmedabad and in the process of planning for two or three other projects over the next 2–5 years.

The large area allocations for residential development within the CDP, a trend of 25% housing built by the private sector, a functional state township policy and a positive intent from the developers clearly highlight the extent of opportunity available in Ahmedabad of informing housing supply to incorporate principles of sustainable mobility.

### 3.2. Bangalore

The city of Bangalore is both similar and very different from Ahmedabad. Like Ahmedabad it has a radial city plan. However densities and policy frameworks in Bangalore are very different from those in Ahmedabad. Between 1983 and 1990 the city’s area increased from 20200 Ha to 28400 Ha, whilst by 2003 the urban area had increased up to 56500Ha, indicating an almost 100% increase in 12 years; with an average progression of about 2200 ha/ year and a growth rate of 5.4\%\textsuperscript{18}.

<table>
<thead>
<tr>
<th>Urban Boundary</th>
<th>Area (in Sq. Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bengaluru Mahanagar Palike\textsuperscript{2} (BMP)</td>
<td>22600 Ha</td>
</tr>
<tr>
<td>Bruhat Bengaluru Mahanagar Palike\textsuperscript{3} (BBMP)</td>
<td>80000 Ha</td>
</tr>
<tr>
<td>Bangalore Metropolitan Area (BMA) or Bangalore Development Authority (BDA)</td>
<td>130700 Ha</td>
</tr>
<tr>
<td>Bangalore Metropolitan Region (BMR)</td>
<td>800500 Ha</td>
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</tbody>
</table>

*Note: the above data is sourced from the Bangalore Master plan 2015 and the Bangalore Metropolitan Regional Development Authority website.*

Bangalore city, according to the 2001 census projections, indicates a population of 5.68million people showing an increase of up to 6.1million people, as estimated in the 2015 master plan vision document for the Bangalore Metropolitan Area (BMA). The population within the BMA is estimated to increase up to 9.9million people by 2021 as projected in the CDP.

\textsuperscript{2} Bengaluru Mahanagar Palike refers to the Bangalore Municipal Corporation  
\textsuperscript{3} Bruhat Bengaluru Mahanagar Palike refers to the Greater Bangalore Municipal Corporation
While many main cities in India grew denser over the years, Bangalore grew rapidly outwards, consuming the rural and agricultural hinterlands. The city is essentially a low-density built type, with sporadic developments and extensions along the peripheries. The density in the Central Business District (CBD) is as low as 400 persons/ha (while other cities like Ahmedabad and Hyderabad have densities of 700p/ha and 600 p/ha respectively). However, the overall distribution of density in Bangalore is rather unevenly spaced, with very high densities, up to 600 p/ha, in some neighbourhoods to very low densities, up to 200p/ha, in other neighbourhoods. Areas with low densities therefore have tremendous scope for densification, in an organized and planned manner to restrict the scope of encroachment over natural and agricultural resources.

In terms of land uses, the Bangalore master plan for 2015 proposes an increase in residential use, from 15,976 Ha (37.91% of the distribution, based on 2003 data) to 24,369 Ha (i.e. 43.16% of the distribution, based on 2011 data). The CDP states, within the overall Bangalore Development Authority (BDA), residential use accounts for only 15% (16,042 Ha) of the overall land use, while agricultural use accounts for almost 60% (64,243 Ha) of the overall land use. The housing market shows a drastic shift in the ratio of public to private housing, from 1991 to 2001. In 1991, 43.1% of Bangalore’s housing stock comprised of public housing, whereas in 2001 it decreased to almost half (22.8%). In 1991 informal housing in the form of sites/ plots accounted for 23.5% of the housing stock, whereas in 2001 it rose to about 55.9% of the housing stock. At the same time, the production of housing by private builders increased from 0.8% to 5.2%, accounting for almost 61% of the housing stock produced within the formal sector through government allocations, private or other means.  

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<table>
<thead>
<tr>
<th>Urban Boundary</th>
<th>Population (2001 Census data)</th>
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<tbody>
<tr>
<td>BMP Population by 2001 Census</td>
<td>4.3 million persons</td>
</tr>
<tr>
<td>BBMP Population by 2001 Census</td>
<td>6.17 million persons</td>
</tr>
<tr>
<td>BMA or BDA by 2001 census</td>
<td>6.17 million persons</td>
</tr>
<tr>
<td>BMA Population projection for 2021</td>
<td>9.9 million people</td>
</tr>
<tr>
<td>BMR Population by 2001 Census</td>
<td>8.42 million people</td>
</tr>
</tbody>
</table>

Bangalore: Change in Urban Built-up Area and Land Cover.  
Source: IIHS; Urban India 2011 Report
Bangalore: Bangalore’s Existing Land Use (2003) Source: Bangalore Master Plan

In a conversation with Mr. Ravikumar from Adarsh Group, he mentioned that 75% of the projects developed by Adarsh Group are residential projects, of which 40% are mostly high-end villas built on developments ranging from 25 to 100 acres (10-40 Ha). Most of the housing stock produced in the private market, to match demand is built for the higher middle class, medium-income and low-income groups. He further stated that the Karnataka government doesn’t have a township policy and is extremely hostile towards large scale township developments; hence most developments occur as mini-townships between the ranges of 25-40 acres (10-16 Ha).

The Karnataka Housing Board (KHB) and the Bangalore Development Authority (BDA) are responsible for most sites and plot based housing supply; hence, it is essential to inform the supply at regulation level, in order to integrate mobility and accessibility into district level plans, and the city’s master plan. Informal sites and plot developments are slowly creeping into agricultural and natural resources, hence efforts to inform supply at developer or architect levels to curb lateral expansion, prioritize densification of existing housing stocks and introduce mixed-uses, would be essential. Since the Karnataka government actively regulates the scale of townships and promotes smaller developments, it opens up a need to promote collaborations amidst adjacent developers to maintain continuity of road infrastructure as well as privately run shuttles or para-transit facilities.

The review of Ahmedabad and Bangalore clearly show the extent of opportunity to inform housing supply to integrate principles of sustainable mobility. The next section documents case studies on retrofitting on-going developments to incorporate sustainable mobility.
3.3. Comparison of urban characteristics in Ahmedabad and Bangalore

Ahmedabad and Bangalore are just two cities of similar population, but very different urban characteristics and therefore face different challenges. The table below provides a snapshot of the extent of opportunities available for the two cities based on the projected expansion. The areas and populations referred to in the table below are recorded for the overall metropolitan region. However, additional density calculations given for the Municipal Corporation boundaries help gauge urban densities within the main city. In the present phase of urbanization, Indian cities are constantly redefining their urban jurisdictions hence very clear comparisons are difficult to draw. Based on the table below, the urban density of Ahmedabad city is 184 persons/ Ha (within the AMC) and that of Bangalore is 190 persons/ Ha (within the BMP).

These cities are important cases as they present very different urban forms due to historical geographic, economic and political conditions. Historically, Ahmedabad city has shown precedents of good planning fundamentals and therefore Ahmedabad is more compact and cohesive as compared to Bangalore. Bangalore city grew rapidly at the time of economic boom and continues to grow laterally due to the lack of any physical boundaries or geographic constraints. The area of the BMRDA extends up to 800500 Ha.

Additionally, the state of Gujarat has a well-designed township policy and therefore most growing cities in Gujarat, like Ahmedabad, have managed to control the extent of lateral expansion of the city’s area. Conversely, the state of Karnataka does not have a township policy and restricts permissions to private developments beyond 100acres. Most housing production (55.9% as stated in the previous sub-section) is supplied by the KHB as single plot/site allotments. While this allows the state to control and manage housing supply and therefore maintain levels of affordability, it encourages lateral expansion of the city’s urban area as well as gives way to local-level bureaucracies that facilitate unregulated urban growth.

<table>
<thead>
<tr>
<th></th>
<th>Ahmedabad</th>
<th>Bangalore</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population in the Metropolitan Area</td>
<td>4.7 million people</td>
<td>6.17 million people</td>
</tr>
<tr>
<td>Areas (Includes vast areas of underdeveloped or agricultural land)</td>
<td>133000 Ha</td>
<td>130700 Ha</td>
</tr>
<tr>
<td>Existing Residential Zone</td>
<td>9938 Ha (7.5%)</td>
<td>15976 Ha</td>
</tr>
<tr>
<td>Projected Expansion</td>
<td>14563 Ha (11%)</td>
<td>24369 Ha</td>
</tr>
<tr>
<td>Projected Private Housing Stock</td>
<td>25% of total units produced</td>
<td>5.2% of total units produced(^\text{5})</td>
</tr>
<tr>
<td>Density within Metropolitan Area</td>
<td>35 persons/ Ha</td>
<td>47 persons/ Ha</td>
</tr>
</tbody>
</table>

\(^4\) Data referenced from a personal interview with Adarsh Developers.

\(^5\) In Bangalore the percentage of housing produced by the private sector is relatively small, however 55.9% of the supply is provided by the KHB, which in turn creates a large informal market where developers acquire land from private land owners and then build large developments. (Source: Stakeholder interviews)
These are just two examples of rapidly growing metropolitan cities, presenting the scale of opportunities for climate mitigation within the housing and urbanization sector. The next section details out two pilot projects where existing technical knowledge is applied to retrofit two private townships both 250 acres in area.

### 4. Pilot Projects: Planning on a Sustainable Mobility Platform

Increasingly, the urban imagination of residential environments is being promoted through ‘gated-communities’, as a result of which, the demand for secure living environments within residential enclaves is increasing. Developers therefore cater to these demands, supplying housing that is exclusive, segregated and therefore secure. EMBARQ India has worked with two developers, one in Ahmedabad and the other in Bangalore, to demonstrate the technical know-how required to inform, reimagine and build these developments as socially inclusive and accessible living environments.

Both developments—Godrej Garden City Integrated Residential Township in Ahmedabad and Adarsh Palms Retreat Integrated Residential Township in Bangalore—were retrofit projects, where EMBARQ India inspected the projects and made very basic, cost-effective and achievable recommendations that were taken up by the respective developers. These recommendations are currently in the process of implementation. A post-occupancy analysis could help develop an impact assessment and cost-benefits scenario to highlight costs saved and benefits achieved. These would lead to monetized analyses of implementing sustainable mobility within private residential townships. However, due to a lack of information from the private sector, monetized results for the proposed retrofits have not been determined.

As mentioned in the previous section, private residential townships are guided by State township policies (if any). Gujarat State has a functional township policy; however, the State of Karnataka does not encourage large-scale townships. Hence, in Bangalore, the Karnataka Housing Board (KHB) plans most large housing developments as plot-based developments and fewer large-scale townships like Adarsh are built.

The next two sub-sections, detail out the various retrofits that were recommended in each case and their positive impacts. It also displays the process of applying existing technical knowledge within these residential developments.
4.1. Godrej Garden City, Ahmedabad

Project Brief: Garden city is a mixed-use mixed income development that extends over 250 acres, housing a population of about 60,000 people, in 15,000 dwelling units, amounting to 4000 more cars on the road. However, amenities such as schools and markets will generate more vehicular traffic. The project is located on the outskirts of Ahmedabad city, approximately 2km from the BRT, an estimated 22km of car travel per day, and estimated 650m distance to any amenities (15min walk). The project has only 10% open recreational area, whereas 90% is impervious terrain, which may increase as the master plan is detailed and goes into construction.

The project brief required EMBARQ India to help envision a sustainable mobility plan that significantly improves pedestrian and bicycle mobility within the township, and evaluate the connectivity of the township for trips within and outside. Additionally, the number of vehicular trips should be reduced by improving the pedestrian experience inside the township. However, the developer limited any scope of proposing modifications to the outer perimeter barriers, land parcels, or road networks as well as the central boulevard.

Existing Scenario: The existing master plan defined a clear hierarchical vehicular road network but pedestrian feeder lanes and pedestrian networks remained undefined. The buildings were organized as segregated enclaves connected through vehicular networks, as pedestrian connections would increase travel time. These would result in segregated communities, with very little room for social and economic interaction increasing the potential for crime and other social problems. The distance from the BRT system remains disconnected through any other means except private vehicles.
Proposed Scenario: Larger modifications to the master plan included proposing three new lateral bike pathways to create a stronger bike network along the major vehicular streets. A network of pedestrian connectors is proposed, connecting gateways of adjacent enclaves and maintaining levels of safety while decreasing social segregation and increasing possibilities for social interaction. Some of the other proposed strategies and recommendations were structured based on the following criteria-

a. To promote non-motorized modes of transportation, EMBARQ recommended reducing vehicular speeds, reconfiguring main intersections and junctions, prioritizing existing pedestrian links, and creating new networks and special activity areas that would encourage non-motorized trips.

b. To create more open/public spaces, EMBARQ recommended creating public spaces at different scales—at the local level, the neighbourhood level and at the township level—and promoting a concept of open streets.

c. To promote transit and integration of networks, EMBARQ India recommended better and alternative connectivity to the BRT, integration of different transit modes and better bus stop configurations.
d. To promote mixed use developments, EMBARQ recommended incorporating retail along street fronts; sit out spaces that activate building fronts, and restaurants with open cafes and spill out spaces.

e. To control parking and manage parking demand, EMBARQ recommended significantly reducing the parking ratio in order to inhibit motorized non-work trips, and decrease paved areas, saving on construction costs and benefiting the environment.

<table>
<thead>
<tr>
<th>Existing CAR RATIO: 1.25</th>
<th>Proposed CAR RATIO: 1.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paved Area 55000 SqM</td>
<td>Paved Area 6% REDUCTION</td>
</tr>
</tbody>
</table>

| Cost of pavement construction saved = 55 Lakh | Cost of pavement maintenance saved/per month = 1.5 Lakh | Cost for running a bus/ month 50,000-60,000 |

**Ideal Proposal:** Godrej Garden City was conceived as an affordable housing township with a small proportion of EWS housing. However due to unplanned internal and external connectivity the township remained very dependent on motorized modes of travel. To ensure long-term affordability and sustainability, mixed-use, smart growth models of urban development should have been optimized, creating dense low-rise communities with close proximity to transit, retail and required amenities. However, limitations such as retaining the outer perimeter, land parcels and internal road networks, restricted the creation of smaller more accessible parcels. Smaller parcels would have more easily encouraged mixed land uses, more public spaces for social and cultural interactions and better connectivity to public transport.

In an ideal proposal internal connectivity should primarily cater to non-motorized transport, by minimizing vehicular road widths, further reducing parking and incentivizing public transport and bicycling.
4.2. Adarsh Palms Retreat, Bangalore

**Project Brief:** Palms Retreat is a mixed-use development that extends over 250 acres of land, located on the outskirts of Bangalore city, about 18 km from the main city. The development accommodates 3 Special Economic Zones, a five-star hotel, a municipal lake, high-end villas, luxury apartments, and other required amenities. The project was planned for a high car usage, and very high vehicular movements.

EMBARQ entered the discussion after the first phase of the development had begun. Due to security concerns the development was planned with three entry points which could be easily controlled. However, even during the development phase there were certain intersections experiencing issues of traffic congestion, and the movement of goods and people to and within the development was becoming difficult. The Developers were looking for a smooth mobility plan, which would allow uninterrupted flow of work during the construction phase, while enhancing the quality of life by creating safe, lively and well-connected neighbourhoods. In addition, the overall accessibility within and to the development had to be enhanced while ensuring standards of safety and security during the construction phases.

**Existing scenario:** The existing master plan defined a clear hierarchical road system designed for vehicular or car trips. It defined three clear entry points with restricted movement lines, for issues of safety and control which would segregate users by function creating congestion during peak hours and lengthening travel distances and times. Internal accessibility for pedestrians or bicyclists was not planned for, creating a hostile urban environment that was primarily car friendly. Residual spaces, interfaces with the water’s edge, open recreational spaces, or common waiting areas were not designed for within the master plan - inhibiting the growth of a socially vibrant community. Due to traffic congestions at certain intersections and regressive master planning strategies for pedestrians and bicyclists, personal cars would have been the preferred mode of travel.

**Proposed Scenario:** Basic design changes in the master plan were advised that enabled pedestrian and bicycle travel as preferred modes of travel to enhance social and economic interactions, reduce greenhouse gas emissions, reduce fatalities and increase overall quality of life. A pick-up and drop-off point for auto-rickshaws was provided at the entry points to increase accessibility.

Adjacent and complimentary functions improved using continuous sidewalks, speed

[www.embarqindia.org](http://www.embarqindia.org)
tables and street vegetation to build better linkages. Entry points, intersections with adjacent developments, and common spill-out spaces were re-imagined as nodes to accommodate for conflicting uses, large volumes of users, waiting areas and street retail. These nodes would be integrated with continuous pedestrian pathways making them lively pause-spaces along the main vehicular road.

Widening sidewalks and reducing speeds along the road would help reduce chances of fatality and improve public health within the community. Roundabouts or raised speed tables proposed at large intersections would help incorporate traffic calming measures, pedestrian crossings, reduce road accidents and create an identity for the neighbourhood.

Creating shorter and convenient pedestrian access networks within the development would ensure more people would opt for walking as a travel option. Designing road sections to improve pedestrian experiences along the lake, or playgrounds, puncturing compound walls or fences of individual parcels to incorporate activities (bus stops, waiting areas, collection spaces) and optimizing residual spaces by incorporating them within pedestrian pathways, would encourage more pedestrian activity, improve public health and reduce fatalities.

Existing Scenario:

 Proposed Street Section:

<table>
<thead>
<tr>
<th>Street vegetation as frontage (a), wider sidewalks with planter and street furniture (b), narrower carriageway with bicycle lanes (c) and medians with tree plantations (d)</th>
</tr>
</thead>
</table>

Links:

| a. Pervious sidewalks | b. Raised speed tables | c. Driveway with planting strip |
Nodes:

- **Bus stop nodes**
- **Residual spaces as nodes**
- **Proposed market as node**

Intersections:

- **Roundabouts at intersections**
- **Raised intersections to curb speeds**

Networks:

- **Breaking physical barriers**
- **Proposing new connections along recreational edges**

**Ideal Proposal:** Retrofitting Palms Retreat was envisioned to successfully increase non-motorized networks within the project limits, to reduce trip lengths and number of trips within the development and improve liveability factors for as many households as possible. However, there were limitations such as retaining the outer perimeter, land parcels and internal road networks, which restricted the creation of smaller, accessible parcels, mixed land uses, more public spaces for social and cultural interactions and better connectivity to public transport.

In an ideal proposal internal connectivity should primarily cater to non-motorized transport, by minimizing vehicular road widths, minimizing parking and incentivizing public transport and bicycling.
5. Multi-stakeholder Convening to Strategize Scale-up

The two pilot projects described in the previous section show that the technical knowledge to design for sustainable mobility within private residential townships exists, but the process of application needs to be institutionalized. We conducted a multi-stakeholder convening to identify barriers, envision enablers and create the roadmap to scale-up. The initial process inclusive of the interview questionnaire was based on the elements towards an OECD Green Investment Policy Framework (refer appendix F). Next, a two stepped method was incorporated.

1. Personalised interviews with various stakeholders were conducted, to identify key barriers for private sector engagement in this process.
2. Based on the feedback from the interviews a multi-stakeholder workshop was setup, to bring in various professionals invested in the field.

5.1. Stakeholder Interviews

To survey the existing level of knowledge regarding an integrated approach to sustainable mobility and housing developments, personal interviews (see Appendix A, interview schedule) were conducted with key stakeholders (see Appendix B). The elements towards an OECD Green Investment Policy Framework (GIPF) were used as initial reference points to inform some of the interview questions and shape a relevant dialogue with stakeholders. There was almost unanimous agreement that such an approach was required at this time of rapid urbanization in India. Stakeholders identified specific gaps in information—ranging infrastructure provision, inter-agency miscommunication, available finance and incentives—that may impede such an approach.

Designers and planners stated that there was fair amount of existing technical knowledge on how to initiate an integrated approach but the market demand for such housing was lacking. Government officials showed an equal interest in this approach, but stated some apprehension of working with the private sector alone. Conversely, developers and real-estate professionals showed unanimous willingness for such an approach, although they stated lack of information amongst government agencies and officials as a major barrier. Additionally a lack in incentives, and finance availability were seen as a major barrier that could slow down the demand for such an approach. On the whole, it was clear that a multi-stakeholder convening was required to bring-in key stakeholders into one discussion, and mediate some of the above gaps in information and communication.

Detailed responses from the stakeholder interviews are documented in the Appendix.
5.2. **Key Barriers for Private Sector Engagement**

The key barriers were identified based on stakeholder feedback as the following:

**Regulations:** Regulation was seen as an important instrument to address both public and private spheres, and build long-term and sustainable institutions. They have the potential to inform the supply of housing, as well as catalyze the process of application of existing technical knowledge. Additionally, they can influence demand for sustainable mobility within private residential developments.

**Finance:** The lack of right financial policies and instruments can largely impede the process of application of existing technical knowledge as well as the demand for an integrated approach. Using financial incentives ‘market value’ can be created and significant costs borne by users can be offset. Financial instruments would speed-up the application process by creating a significant market demand.

**Information:** The lack of adequate information was seen as one of the most immediate barriers. Information gaps were classified into two types: One as information required by a developer to plan for sustainable mobility within a township and the other for people who wish to locate and stay in such townships. Adequate information would inform developers to locate developments close to public transit nodes. Instruments such trip-rate analysis and trip-calcualtors would help consumers identify the benefits of such developments. Lastly, developing relevant measurable indicators would help in impact assessments and therefore incentivize these developments.

**Policies:** Policies are important tools to setup long-term goals and plan strategically to influence larger impacts. Policies such as state township policies, state housing policies or national and state level transportation or climate change policies have the potential to introduce sustainable mobility principles as planning mandates. Hence, policies serve as strategic frameworks at State or National level that can drive regulations at city and district level to mandate sustainable practices.

5.3. **Multi-stakeholder Workshop**

The responses and feedback from interviews (refer Appendix C) helped develop the structure of the multi-stakeholder workshop. The workshop was organized to achieve two key goals:

1. To ensure all participants have the same level of information and that they understand the perspective of others in the ecosystem,
2. To facilitate a multi-stakeholder dialogue that could identify gaps in the system and strategize next steps.

Participants included architects, planners, developers, green-building efficiency experts, real-estate professionals, government officials and independent professionals invested in the field.
The feedback from personal interviews was organized under four large problem areas based on the key barriers discussed in the above sub-section: Regulation, Finance, Information and Policy.

The following larger problem areas were identified through interviews: a) Regulation, b) Finance, c) Information and d) Policy, and building bye-laws, market value creation, building information systems and informing township policies, were respectively identified as strategies to positively impact the identified problem areas.

These barriers intuitively aligned well with the OECD’s GIPF, which suggests possible policy recommendations. However, the recommendations communicated in Section 6 of this report have been discussed and conceptualized through multi-stakeholder discussions.

For the Multi-stakeholder strategy session, participants were broken up into four groups under each problem area. Each group constituted of a diverse and well-distributed variety of stakeholders, who were asked to take up a single issue and deliberate possible strategies for the same. For example, within regulation, parking regulation as a building by-law was seen as a tool to propagate sustainable and accessible development. Within finance it was market-value creation, under information, the need to build new information systems was identified, and finally for policy it was the need to inform existing town planning policies that was seen as crucial. The diagram below shows the organizational structure for the multi-stakeholder discussion at the workshop.

### 6. Key Enablers

The discussions on barriers lead us towards key enablers. Based on feedback from interviews and the workshop, literature reviews and professional experience we recommend the following enablers. These enablers align with the OECD GIPF (as seen in the box below). A set of recommendations are stated in the last sub-section.
6.1. Institutional Framework

Interviewees not only identified specific barriers, but also suggested possible enablers and recommended strategies for future intervention. Recommendations were categorized under the following heads: Regulation, Capacity Building, Advocacy and Awareness and Incentivizing. The box below correlates various recommendations under each category of enablers with OECD’s GIPF.

The diagram in the next section on scaling up the market’s approach shows how specific tools under each of the enabling strategies can be used to bridge the gaps in the system. For example, using parking bye-laws as a tool within regulations, one could positively inhibit parking provisions, thereby curtailing the use of cars and providing alternative amenities. Similarly, with constant advocacy a need to build reliable trip-rate analyses, as new information systems to evaluate mobility patterns could be initiated. This would open up new avenues to build capacities to design new information systems. Some other recommendations included, bringing in residents associations, speaking with consumers to better understand their needs and apprehensions, and doing post-occupancy surveys to gauge the level of satisfaction amongst residents’. There was a unanimous agreement that a market approach to integrate sustainable mobility and private residential township developments was essential.
Towards a Green Investment Policy Framework: connecting enablers and framework areas

<table>
<thead>
<tr>
<th>Policy Checklist towards an OECD Green Investment Policy Framework</th>
<th>Corresponding EMBARQ India Enablers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Goal setting and aligning policies across and within levels of government</strong></td>
<td><strong>Advocacy/ Awareness</strong></td>
</tr>
<tr>
<td>Clear, long-term vision and targets for infrastructure and climate change; policy alignment and multilevel governance, including stakeholder engagement</td>
<td>Changes in township policy, through town planning guidelines</td>
</tr>
<tr>
<td></td>
<td>Building new information systems</td>
</tr>
<tr>
<td></td>
<td>Engage stakeholders to design new policies</td>
</tr>
<tr>
<td><strong>2. Enabling policies and incentives for LCR investment</strong></td>
<td><strong>Regulations</strong></td>
</tr>
<tr>
<td>Sound investment policies to create open and competitive markets; market based and regulatory policies to “put a price on carbon”, remove harmful subsidies and correct for environmental externalities</td>
<td>Progressive recommendations to existing regulatory institutions can influence policies and incentives for sustainable mobility</td>
</tr>
<tr>
<td></td>
<td>Influence specific building by-laws, example parking regulations</td>
</tr>
<tr>
<td><strong>3. Financial policies and instruments</strong></td>
<td><strong>Incentivizing</strong></td>
</tr>
<tr>
<td>Financial reforms to support long-term investment and insurance markets; innovative financial mechanisms for risk-sharing such as green bonds; transitional direct support for LCR investment</td>
<td>Add to market value; create a market for this approach.</td>
</tr>
<tr>
<td><strong>4. Harness resources and building capacity for an LCR economy</strong></td>
<td><strong>Capacity building &amp; Advocacy/ Awareness</strong></td>
</tr>
<tr>
<td>R&amp;D, human and institutional capacity building to support LCR innovation, monitoring and enforcement, climate risk and vulnerability assessment capacity</td>
<td>Build new information systems to highlight benefits of sustainable mobility and create demand</td>
</tr>
<tr>
<td></td>
<td>Capitalizing on existing resources and building capacities for sustainable mobility within the diverse stakeholder groups</td>
</tr>
<tr>
<td><strong>5. Promote green business conduct and consumer behaviour</strong></td>
<td><strong>Advocacy/ Awareness</strong></td>
</tr>
<tr>
<td>Corporate and consumer awareness programmes, corporate reporting on climate change, information policies, outreach</td>
<td>Build information systems to influence user choices and consumer behaviour</td>
</tr>
<tr>
<td></td>
<td>Enables the dissemination of information within consumer circles and user groups.</td>
</tr>
</tbody>
</table>

### 6.2. Scaling-up the Market’s Approach

To work with the private sector and inform the existing supply of housing, a market approach needs to be adopted. Sections 1 and 3 of this report show that there is enough new housing being planned for within the private sector, over the next few decades. The pilot projects show that the technical knowledge and expertise is available. However, feedback from interviews and workshop sessions show that the demand for an integrated approach needs to be created. Dr. Sarraf presented a framework (refer Appendix E) used by BEE (Bureau of Energy Efficiency) for energy efficient appliances, as a comprehensive approach to sustainable mobility, identifying the market as one of the fields to work with. Here, demand, supply and technology were seen as pillars to build and scale-up a market approach.
Using the enablers as tools (as illustrated in the previous diagram) an integrated approach can be scaled-up to inform the existing supply of housing within private residential townships, while applying the available technical knowledge. One of the constantly reoccurring concerns, during the workshop and through personal interviews, was, “how do we create a demand for sustainable mobility options within private residential townships?” Since we are limiting the scope of this project to the private housing sector, it would only be feasible to scale-up these efforts to create a significant market demand for an integrated approach. The following diagram illustrates an intervention framework that includes strategies that need to be designed to scale-up the market’s approach.

To inform supply, progressive regulations that can direct existing and proposed investments towards sustainable mobility, are required. Providing incentives to private developers to integrate sustainable mobility principles while planning new residential townships, could further encourage an informed supply. Lastly, building capacities, and therefore professionals trained to incorporate principles of sustainable mobility within residential townships, would support the process. The technical knowledge and expertise for an integrated approach currently exist, and have been illustrated in the two pilot cases. However, to apply this knowledge and build scalable models that can be rated, compared, and prototyped, progressive regulations would be required to mandate the use of certain design elements and sustainable mobility standards. Incentives would encourage users and developers to promote certain new technologies and design standards.

Building capacities to encourage technical advancements in design and planning of sustainable mobility as an integrated approach, would further catalyse the application of existing knowledge. However, the demand for sustainable mobility principles within private residential townships is what is lacking. Most residents’ and users of these townships are unaware of the availability of these options, and the benefits of living in a township designed based on an integrated approach. Progressive regulations would promote informed user choices, incentives would help offset direct or indirect costs, and persistent advocacy and awareness would create a significant demand for this approach. (A detailed workshop review is provided in Appendix D).
**Inform Supply:** Private housing models like integrated residential townships and special residential zones are becoming more common with the increase in housing demand, and lack of affordable housing. Even though the two pilot projects in this report cater to HIG or MIG housing needs, dwelling units are offered at lower rates and with added amenities, hence they feed into the overall idea of affordability. Families investing in second homes or home expansions with more amenities are moving to these peripheral townships.

Cities are going to expand, and that is an expected reality. The challenge is to inform this growth, and curtail its negative externalities as far as possible. During the various outreach sessions (personal interviews, surveys, and workshop discussions) it was learnt that there were significant gaps in information and lack of trained professionals in the field. Hence to inform supply, it was important to simultaneously build reliable information systems that could be used as tools to measure impacts, calculate trip-rates, and guide housing developments. Secondly, professionals invested in the field of housing—developers, real-estate professionals, town planners, and architects—need to be taught the principles of sustainable mobility to plan for it. Here incentives play the role in informing developers about the latent benefits of such an approach—decrease in fatalities, and increase in health and fitness impacts. Adequate information and measurement systems would inform government officials of the positive impacts, and decrease pressure on urban infrastructure. Hence, informing both private and public supply chains is crucial.

The two pilot cases presented in this report are retrofit projects. Based on stakeholder feedback, it was learnt that there is an urgent need to inform the supply of housing at the initial stages of conceptualizing the project. Retrofits can make a huge difference (as seen in section 3 of the paper), but using these principles as a base map would make the process more efficient. However, stakeholder feedback also revealed that the impact of these efforts will be limited to internal mobility within townships, and to make a real impact on the environment, working with public transit agencies and urban mobility plans at district and city levels is important. Long-term recommendations have been made in the last section that engages local and state governments in these discussions to further the positive impacts of this approach.

**Applying Existing Technical Knowledge:** The two pilot projects presented in this report show that the technical knowledge and expertise to promote sustainable mobility within residential townships exists. However, the process of applying this knowledge needs to be institutionalized and facilitated between the various stakeholders. For example the Godrej Garden City project in Ahmedabad is planned across 250 Hectares of land, with 15,000 dwelling units accommodating about 60,000 people (avg. family size of 4 persons). The planning process for retrofitting the existing scheme took approximately 30 days and impacted 60,000 lives. If we were to apply these efforts to impact 1 million lives, we would require approximately 500 working days. If EMBARQ were to set-up trainings and workshops to build capacities, we would have many such professionals applying the existing technical knowledge and expertise, hence catalysing the market’s approach for integrated sustainable mobility and housing developments.
Architect Anup Naik from SpaceMatrix mentioned that mobility is always planned as a horizontal scheme - that is, along the length of a pathway, sidewalk, or as street scape designs. However, to create habitable environments, mobility planning needs to be designed in section as well as in plan. The cross-section of the street and building materials used should create well-shaded and protected environments for pedestrians and cyclists on the street. This is the only way one can ensure that pedestrian infrastructure will be optimally used to bring in an attitudinal shift in choices and behaviour. Architect Diwakar Chintala of Gensler, stated that this project should be used as an opportunity to redefine the “gated community”. What is our imagination? What are the concerns residents have and how can we design communities that are “safe”, yet inclusive?

Through adequate incentives given to developers and private investors, the acceptance for new standards and infrastructure that improves pedestrian and bicycle safety will become more common. Progressive regulations can help redirect costs from auto-mobility and parking towards promoting alternate technologies for internal mobility such as electric shuttles, bicycle sharing systems, and other para-transit facilities. Brigade group in Bangalore, for example, is currently working on a model where all parking is detained at the peripheral ring road around the township, and all internal commuting is carried out through shuttles, bicycles, and pedestrian movement. They have developed it as a “new product” in the market, and based on how it performs in consumer circles, future efforts for scalability will be taken up. The most important piece of the puzzle is the demand, and the question is - how can we create a demand for this approach?

**Create Demand:** Demand creation is where the most work is needed to realize a market approach for sustainable mobility and housing developments. Developers complained that their sales offices often reported to them that there seemed to be a disconnect between the amenities consumers imagined or wanted, and how they used them. If users and residents demand for certain facilities, developers and investors have to comply. Through stakeholder feedback it was learnt that there are significant information gaps and lack of awareness within consumers. Residents’ associations could be engaged in this process through training modules and workshops to increase awareness.

Travel costs are some of the highest expenditures per month, spent by a household on an average. If these costs are significantly reduced by reducing car-trips and increasing walking and cycling trips, residents will be able to clearly visualize the benefits. Redirecting costs saved on parking provision, large vehicular roads and other auto-mobility infrastructure, towards better civic amenities, open spaces, pedestrian infrastructure etc. would immediately influence an increase in demand.

To create a demand, strategies need to be developed in two levels. The first being immediate strategies. These would include (but are not limited to), increasing awareness through cost-benefit analyses and impact measurements, and speeding up the approval process for developments that incorporate sustainable mobility principles. The second being long-term...
strategies. These would include making regulatory changes, creating an advocacy body that could persistently advocate for sustainable mobility, and developing a rating system that could add value to the property and increase awareness regarding sustainable mobility principles. For example, rating systems that rate a neighbourhood’s accessibility for children, or the elderly, or allow for shorter travel distances (in terms of time) to necessary amenities (schools, parks, services etc.).

6.3. Conclusions
From personal stakeholder interviews and the multi-stakeholder convening it was determined that there was a tremendous need and interest in looking at an integrated approach for private housing and NMT as a strategy for climate mitigation. However, there is a lack of institutional setup that can facilitate and direct various agencies and interests towards building housing based on sustainable mobility principles. Hence various short, medium and long-term policy directives need to be put into place to enable a systematic and integrated approach for new housing developments.

At the multi-stakeholder convening we saw interesting relationships being built. Officials from rating organizations like TERI and IGBC proposed to work with EMBARQ India on conducting training modules for architects and master planning firms, to inform their practices. Developers and architects worked together on common concerns like informing consumer demand for sustainable mobility. Questions regarding security and reimagining gated communities were taken up in open sessions where various stakeholders shared their knowledge and experiences with the other participants. It was clear that a multi-stakeholder approach would involve working with various enabling strategies that fall under a larger policy framework.

The table below uses the OECD approach towards a GIPF as a policy framework to structure the various barriers under each policy directive and presents corresponding enabling strategies to meet the gaps identified and incrementally build institutions that promote sustainable mobility.
## Key barriers and potential enablers to incorporate sustainable mobility practices in new housing development in India

<table>
<thead>
<tr>
<th>Barriers</th>
<th>Enablers/ Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Goal setting and aligning policies across and within levels of government</strong></td>
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<tr>
<td><strong>Policies</strong></td>
<td></td>
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<tr>
<td>• Lack of infrastructure provision</td>
<td></td>
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<tr>
<td>• Interagency miscommunication</td>
<td></td>
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<tr>
<td>• Lack of information amongst government agencies and officials</td>
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<tr>
<td>• Absence of sustainable mobility principles as planning mandates in state township policies, state housing policies or national and state level transportation or climate change policies</td>
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<tr>
<td><strong>Advocacy and awareness</strong></td>
<td></td>
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<tr>
<td>• Multi-stakeholder convening.</td>
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<tr>
<td>• Influence State Township planning policies guidelines:</td>
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<tr>
<td>• for Greenfield developments</td>
<td></td>
</tr>
<tr>
<td>• for Brownfield developments and redevelopment projects within old or inner city boundaries</td>
<td></td>
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<tr>
<td>• In the long term, need for a new institutional set up</td>
<td></td>
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<tr>
<td><strong>2. Enabling policies and incentives for LCR investment</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Regulations</strong></td>
<td></td>
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<tr>
<td>• Retrofitting housing development is more difficult than planning upfront</td>
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<tr>
<td><strong>Building bye-laws</strong></td>
<td></td>
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<tr>
<td>• Design progressive regulations that would mandate the use of certain design elements and sustainable mobility standards</td>
<td></td>
</tr>
<tr>
<td>• Progressive regulations can help redirect costs from auto-mobility and parking towards promoting alternate technologies for internal mobility such as electric shuttles, bicycle sharing systems, and other para-transit facilities</td>
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<tr>
<td><strong>3. Financial policies and instruments</strong></td>
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<tr>
<td><strong>Finance</strong></td>
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<tr>
<td>• Lack of incentives</td>
<td></td>
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<tr>
<td>• Lack of financial instruments</td>
<td></td>
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<tr>
<td><strong>Market value creation - Incentivize</strong></td>
<td></td>
</tr>
<tr>
<td>• Use financial incentives to add market value and create demand</td>
<td></td>
</tr>
<tr>
<td>• Providing incentives to private developers to integrate sustainable mobility principles while planning new residential townships</td>
<td></td>
</tr>
<tr>
<td><strong>4. Harness resources and building capacity for an LCR economy</strong></td>
<td></td>
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<tr>
<td><strong>Information</strong></td>
<td></td>
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<tr>
<td>• Lack of information for developer to plan for sustainable mobility</td>
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<tr>
<td><strong>Advocacy and awareness/ Building information systems</strong></td>
<td></td>
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<tr>
<td>• Developers, real-estate professionals, town planners, and architects—need to be taught the principles and benefits of sustainable mobility to plan for it.</td>
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<tr>
<td>• Adequate information would inform developers to locate developments close to public transit nodes</td>
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<tr>
<td>• Developing relevant measurable indicators would help in impact assessments to communicate to policy makers and therefore incentivize these developments</td>
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<tr>
<td>• Developing a rating system that could add value to the property and increase awareness regarding sustainable mobility principles</td>
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<tr>
<td><strong>Building capacities</strong></td>
<td></td>
</tr>
<tr>
<td>• Professionals trained to incorporate principles of sustainable mobility within residential townships</td>
<td></td>
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<tr>
<td>• Speeding up the approval process for developments that incorporate sustainable mobility principles</td>
<td></td>
</tr>
<tr>
<td>Barriers</td>
<td>Enablers/ Recommendations</td>
</tr>
<tr>
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<tr>
<td><strong>5. Promote green business conduct and consumer behaviour</strong></td>
<td><strong>Advocacy and awareness/ Building information systems</strong></td>
</tr>
<tr>
<td>Information</td>
<td></td>
</tr>
<tr>
<td>• Lack of information for potential consumers and settlers</td>
<td>• Instruments such trip-rate analysis and trip-calculators would help consumers identify the benefits of such developments</td>
</tr>
<tr>
<td></td>
<td>• Cost-benefit analyses and impact measurements for the individual fuel savings</td>
</tr>
</tbody>
</table>

It was unanimously agreed upon that in the long-term an institutional setup needs to be developed, to drive the enabling strategies towards a way forward. However, there was no real discussion or agreement as to how to move forward on this.

Secondly, State Township policies\(^6\) were seen as important instruments to guide these developments. However, these would influence only Greenfield developments. Hence in the long-term a set of guidelines must be developed to influence even Brownfield developments and redevelopment projects within old or inner city boundaries.

Based on developer feedback, it was realised that in the medium-term, as an on-going process there is a need to increase awareness and create a demand for sustainable mobility.

1. Organize focused training sessions with future consumers and residents’ welfare associations to opt for homes designed with principles of sustainable mobility.
2. Secondly, to use developer networks and the Confederation of Real Estate Developers’ Association of India (CREDAI) to conduct focus group dialogues identifying specific finance gaps and financial instruments within the green economy.

EMBARQ India committed to a set of immediate-term steps to act on feedback and suggestions that came out of the workshop. These include:

1. Create a few more pilot case studies
2. Conduct capacity-building programs in partnership with IGBC and TERI for developers, master planning and architecture firms.
3. To develop a set of measurables that could be used to assess the costs and benefits of applying principles of sustainable mobility based on post-occupancy household surveys.

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\(^6\) Refer Section 2, Box 2.1 for the definition of state township policies for Greenfield developments.
There was a request from the participants to EMBARQ India to develop an online forum to continue the group dialogue that was initiated at the workshop.
Endnotes

1. IIHS Report, 2011
2. National Urban Housing and Habitat Policy [NUHHP], 2007
5. Jawaharlal Nehru National Urban Renewal Mission [JnNURM], http://jnnurm.nic.in/
6. Report on Indian Urban Infrastructure and Services prepared by High Powered Expert Committee (HPEC) for Planning Commission, 2011
7. Confederation of Real Estate Developers’ Associations of India (CREDAI), http://www.credai.org/
8. Note: Both studies look at emissions from the use of fossil fuels in internal combustion engines i.e. Road Transport only. Both studies include moderate expected increases in vehicle fuel efficiency in their models.
11. Interview with Rajeev Ramprakash, Godrej Developers
12. National Mission on Sustainable Habitat (NMSH); source: http://urbanindia.nic.in/programme/uwss/nmsh.htm
15. Ahmedabad City Development Plan, 2006
16. Ahmedabad City Development Plan, 2006
20. Interview respondent: “most people are investing in second homes or larger homes due to family expansion and are investing in housing along the peripheries”.