



## Create jobs

### by reducing greenhouse gas emissions from urban transport

*Benoit Lefevre PhD, Director of Energy, Climate & Finance, WRI Ross Center for Sustainable Cities*

*Katrin Eisenbeiß, Young Professional, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)*

*Neha Yadav, Research Fellow, WRI Ross Center for Sustainable Cities*

*Angela Enriquez, Research Analyst, WRI Ross Center for Sustainable Cities*

## Key messages

- As well as enhancing the climate performance of cities and regions, well designed low carbon transport systems can create employment opportunities—a win-win opportunity.
- There is increasing evidence that investment in low carbon transport creates more jobs than investment that favors cars and other motorized forms of transport.
- Along with the short term employment impact, longer term jobs in these public transport systems tend to be more formalized and secure.
- Investing in low carbon transport solutions is a key area to be tapped, especially in countries facing high unemployment and limited social and economic development.
- For example:
  - Bogota's TransMilenio bus rapid transit system saves almost 250,000 tons of carbon dioxide (CO<sub>2</sub>) each year, and employs 40,000 workers with provision for social security benefits such as pension schemes and healthcare.
  - In Paris the Vélib' bike share program employs 400 people and helps reduce annual greenhouse gas emissions by 32,330 tons of CO<sub>2</sub>.

## Introduction

This paper shares two case studies from cities that have generated employment by implementing low carbon transport projects. Today a third of the world's population live in low income countries. These countries

account for only 3.3% of the global gross domestic product (GDP). The potential economic productivity of this workforce in low income countries has not yet been realized. Instead, high rates of unemployment and underemployment leave one-fifth of the developing country population below the poverty line, with daily earnings of less than US\$1.25 a day.<sup>1</sup>

Developing countries face an average combined unemployment and underemployment rate of 30%.<sup>2</sup> For instance, 8.8% of Colombia's labor force in 2013 remained without work despite being

Also in the LEDS GP series on the benefits of reducing greenhouse gas emissions from urban transport:

- *Make roads safe*
- *Save money and time*
- *Breathe clean*
- *Fight poverty*

This series of short papers aims to demonstrate how low carbon transport options can support national and local development agendas efficiently.

available and seeking employment. Unemployed women are a vulnerable population group, with a much higher unemployment rate of 25.1% compared with just 14.2% among young men.<sup>3</sup> With an annual population growth of 1.3%, the number of young people entering the labor market is increasing, raising the economic development barrier for developing nations.<sup>4</sup>

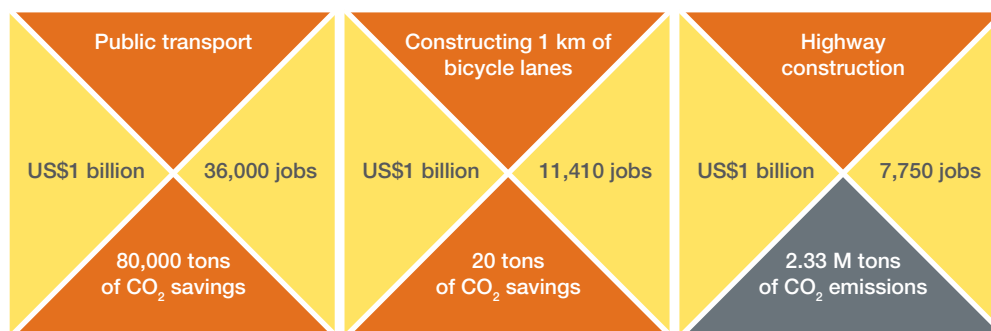
Unemployment affects not only individuals, but also their country's national economy. A family experiencing unemployment will respond to losing income by cutting expenses on basic needs including food, education, and healthcare, leading to further economic and social losses beyond the household. Loss of income results in the depletion of a nation's GDP—for every 1% increase in unemployment rate, GDP falls an additional 2%.<sup>5</sup>

### Low carbon urban transport creates jobs and security

Low carbon transport solutions support cities to combat high unemployment rates by generating a variety of jobs through increasing public transport and nonmotorized transport such as cycling and walking. For instance, building public transport infrastructure creates employment openings in construction, management, services, and sales related fields.<sup>6</sup> Additionally, the promotion of compact urban design combined with public transport and nonmotorized transport options advance mobility through biking and walking for short distance trips.

A 2009 study conducted for the American Public Transportation Association shows that for each US\$1 billion annual spending on public transport in the United States, an average of 36,000 jobs are supported for 1 year<sup>7</sup> and annually 80,000 tons of CO<sub>2</sub> equivalent (CO<sub>2</sub>eq) are saved.<sup>8</sup> Taking the added business output into consideration, those jobs result in approximately US\$1.8 billion of GDP, including \$1.6 billion of labor income, and generate \$490 million in tax revenues throughout the US.<sup>9</sup> In contrast, the same amount of investment spent on highway construction in the US generates only 13,000 jobs on average<sup>10</sup>—and increases CO<sub>2</sub> emissions by 2.33 million tons per year over 50 years' operation of the highway.<sup>11</sup>

Figure 1 Annual employment impact and CO<sub>2</sub> savings per US\$1 billion investment in public transport, bicycle lanes, and highway construction<sup>12</sup>



In 2011, a study by the Political Economy Research Institute of the University of Massachusetts at Amherst analyzed the labor impacts of 58 road infrastructure projects throughout 11 cities in the US. Their findings show that low carbon infrastructure investment in exclusive bicycle or pedestrian infrastructure has the highest employment outcomes and lowest greenhouse gas emissions; the impact decreases for multi-use trails, and is lowest in road infrastructure projects for high carbon vehicles without any cycle or pedestrian elements. For instance, building bike lanes and installing bike share stations—from design through operation, management, and sales—creates a diverse set of employment avenues (Table 1).

Reducing greenhouse gas emissions in the urban transport sector creates a broad array of jobs that boost the local economy and at the same time contributes to reducing emissions. Citizens and the community benefit from declining unemployment rates, more security in household incomes, and improvements in the employment sector itself: adding to the diversity of jobs, from construction to professional management of transport systems,

Table 1 Employment impacts of infrastructure investments in the US<sup>13</sup>

Project type	Road	Bicycle	Pedestrian	Total jobs per million US\$
Bicycle infrastructure only		✓		11.41
Pedestrian infrastructure only			✓	9.91
Road infrastructure with bicycle and pedestrian facilities	✓	✓	✓	8.53
Road infrastructure only (no bike or pedestrian components)	✓			7.75

generates an increase in household income. With half the world’s population living in urban environments, cities are in a unique position to offer leadership in mitigating climate change.<sup>14</sup> Leveraging the synergy between increasing employment rates and decreasing carbon emissions through low carbon transport is likely to be a profitable venture for mayors and local stakeholders investing in sustainable development in their region.

## Case study

### TransMilenio bus rapid transit system in Bogota, Colombia

Bogota’s bus rapid transit (BRT) system exemplifies the win-win effect of reducing greenhouse gas emissions and creating jobs by investment in low carbon transport. In 2009, 9 years after its implementation, TransMilenio created 39,869 direct jobs (positions created by TransMilenio) and 55,817 indirect jobs (positions created by other businesses due to implementation of the BRT system).<sup>15</sup> By 2016, this bus rapid transit system has a total of 112.9 km of dedicated bus lanes within 11 trunk corridors, 112 feeder routes, 134 stations, and 2,187 spots for bicycle parking at nine cycling stations.<sup>16</sup> Not only are those jobs new, they



Photo credit: EMBARQ Brasil, WRI Brasil Cidades Sustentáveis

are an outcome of comprehensive reorganization of the bus companies. This has helped to formalize the sector, and consequently the jobs, replacing informal jobs in the former transport system.

Employees of the new public transport system such as bus drivers now also enjoy social benefits—such as a fixed 8 hour day under their new contract with TransMilenio instead of the informal up to 15 hour days they had to work previously. Reorganization and formalization of the transport system means employees now benefit from health and social security, along with long term contracts with regulated wage levels.<sup>17</sup> TransMilenio has made it a priority to employ persons from vulnerable social groups. In 2009, women made up 24% of the system's total employees, of whom 62% were single mothers.<sup>18</sup>

With 1.4 million passengers commuting on a daily basis, TransMilenio satisfies 27% of Bogota's demand for public transport. Through a comprehensive feeder system, 536 neighborhoods have access to the BRT system, including low income households in the city's periphery.<sup>19</sup> In addition, over 1,500 temporary jobs during construction benefitted unskilled workers from the surrounding communities.<sup>20</sup>

TransMilenio was the world's first mass transit project to be registered with the United Nations Framework Convention on Climate Change (UNFCCC) to receive carbon credits under the Clean Development Mechanism. It was registered in 2006 for its reduction of nearly 246,563 tons CO<sub>2</sub>eq per year, equivalent to a 40% reduction. Between 2006 and 2009, Bogota has generated average revenues of US\$894,737 per year by selling carbon credits to governments of developed countries. These funds are reinvested in the BRT operation as well as in other environmental projects with the potential to generate more jobs.<sup>21</sup>

And from 2006 to 2012, TransMilenio led to a reduction of around 7,000 tons of particulate matter, more than 50,000 tons of mono-nitrogen oxides, and more than 800 tons of sulfur dioxide, the main causes of respiratory diseases and acid rain, due to savings in fuel consumption in the public transport system.<sup>22</sup>

---

## Case study

### Vélib' bike sharing system in Paris, France

Another example of how investment in low carbon urban transport can benefit employment is the Vélib' bike sharing system in Paris, introduced in 2007. Such programs are the type of public transport with the lowest cost per mile; they reduce the number of trips made by car, and can generate jobs in several areas depending on the program size.<sup>23</sup> For example, cycle hire services require both temporary employees in the construction phase of stations, and permanent staff for bicycle and station maintenance, cycle redistribution, and administration and control of the system's computer network.<sup>24</sup>

The Vélib' program in Paris has created over 400 new full time and part time jobs, with a minimum of 20 hours per week. The skills and education required bring in employees with diverse experience—from service and warehouse staff to bicycle mechanics and call center technicians. In response

Photo credit: Jean-François Gornet



to a 6.6% unemployment rate in Paris, especially high among young people, the program operator JCDecaux targeted the employment generated by Vélib' towards young people and other vulnerable population groups.<sup>25</sup>

As a public-private partnership between the municipal government of Paris and the advertising group JCDecaux, initial investment and operation costs for Vélib' have been covered 100% by the private sector. The city, meanwhile, makes about US\$4.6 million annually by selling advertising rights for billboards to JCDecaux, and another US\$45.2 million per year from membership and use fees.<sup>26</sup>

Vélib' members now have access to over 20,600 bicycles at 1,451 stations spread throughout Paris. The massive expansion in Vélib's bike network prompted the city government to double the length of the bicycle infrastructure, with nearly 125 miles of new bike lanes, to make cycling around Paris even more attractive for citizens and visitors.<sup>27</sup> In addition, speed restriction zones, road safety campaigns, and contraflow systems support the goal of a cycle friendly city. Vélib's success is evident in its 100,000 daily users, each travelling 3 km on average. Cycle use in Paris has increased by 70% from the first year of introduction of the bike sharing system. Assuming these journeys would otherwise have been made by car or other motorized vehicle, Vélib' saves 32,330 tons of CO<sub>2</sub>eq per year.<sup>28</sup>

## Conclusion

Low carbon, energy efficient transport solutions that promote a modal shift to public transport and bicycles can have a greater employment impact than solutions that support high dependency on motorized private vehicles. As shown by the examples of Bogota and Paris, reducing greenhouse gas emissions in the urban transport sector can create new jobs and enhance access to the local employment market by increasing the options for affordable and efficient transport when designed in the right ways.

Good governance, public consultation, and compensation schemes are necessary with regard to the implementation of such public transport systems to ensure vulnerable urban residents are able to reap the economic and social benefits of the proposed system. Vulnerable social groups, such as low skilled workers, can find attractive employment conditions in low carbon transport projects and benefit from reduced transport costs. And formalizing jobs in the low carbon transport sector makes the job market more lucrative and productive. Thus investment in urban transport solutions with low greenhouse gas emissions not only reduces unemployment, but also improves the quality of jobs and supports the social and economic development of cities and citizens.

## Notes

1. World Bank (2015a) *World Bank Poverty Overview*. Washington, DC: World Bank.
2. CIA (2015) *The world factbook*. Washington, DC: Central Intelligence Agency.
3. DANE (2013) 'Mercado Laboral de la Juventud (14 a 26 años).' Bogota: Departamento Administrativo Nacional de Estadística [National Administrative Department of Statistics].
4. World Bank (2015b) 'Population growth (annual %): Colombia.' Washington, DC: World Bank.
5. Daly, M. and Hobijn, B. (2010) 'Okun's Law and the unemployment surprise of 2009.' San Francisco, CA: Federal Reserve Bank of San Francisco.
6. Levine, J. (2013) 'Is bus versus rail investment a zero-sum game?' *Journal of the American Planning Association* 79(1): 5-15.
7. Weisbrod, G. and Reno, A. (2009) *Economic impact of public transportation investment*. Washington, DC: American Public Transportation Association.
8. Davis, T. and Hale, M. (2007) *Public transportation's contribution to greenhouse gas*. McLean, VA: Energy Solutions Operations.
9. Weisbrod and Reno (2009) Op. cit.
10. DoT (2014) *Grow America Act: creating a pathway to transportation careers*. Washington, DC: US Department of Transportation.
11. Williams-Derry, C. (2007) 'Does congestion relief equal climate relief?' *GreenBiz* November 5.
12. Garrett-Peltier, H. (2011) *Pedestrian and bicycle infrastructure: A national study of employment impacts*. Amherst, MA: Political Economy Research Institute; Weisbrod and Reno (2009) Op. cit.
13. Garrett-Peltier (2011) Op. cit.

14. UN DESA (2014) *'World's population increasingly urban with more than half living in urban areas.'* New York: United Nations.
15. UNECE (2010) *'BRT Bogotá (Colombia): TransMilenio System.'* Presentation. Geneva: United Nations Economic Commission for Europe.
16. TransMilenio (2016a) *'Historia.'* Bogota, Colombia: TransMilenio S.A. [in Spanish]; TransMilenio (2016b) *'Rutas.'* Bogota, Colombia: TransMilenio S.A. [in Spanish].
17. UNECE (2010) Op. cit.
18. Ibid.
19. Ibid.; C40 Cities (2011a) *'BRT system reduced traveling time 32%, reduced gas emissions 40% and reduced accidents 90%.'* November 3.
20. UNFCC (2012) *'Project Design Document Form – BRT Bogotá, Colombia: TransMilenio Phase II to IV.'* Clean Development Mechanism Executive Board.
21. UNECE (2010) Op. cit.
22. Ibid.
23. Quay Communications (2008) *TransLink Public Bike System Feasibility Study.* Vancouver, Canada: Quay Communications Inc.
24. DCP (2011) *Bike-share opportunities in New York City.* New York: Department of City Planning.
25. Asseraf, A. (2013) *'Vélib' – a success story on bike-sharing in Paris.'* Citi Blog July 22.
26. C40 Cities (2011b) *'Velib – a new Paris love affair.'* November 4.
27. Quay Communications (2008) Op. cit.
28. C40 Cities (2011b) Op. cit.

The **LEDS GP Transport Working Group** provides technical assistance, tools, and training for LEDS in transport systems.

The group works to:

- share approaches and practices for transport and land use planning
- provide transport analysis methods and tools
- offer peer to peer, transport-specific financial training and expert assistance.

Contact: [transport@ledsgp.org](mailto:transport@ledsgp.org)

The **Low Emission Development Strategies Global Partnership (LEDS GP)** was founded in 2011 to enhance coordination, information exchange, and cooperation among countries and international programs working to advance low emission, climate resilient growth. LEDS GP currently brings together LEDS leaders and practitioners from more than 160 countries and international institutions through innovative peer to peer learning and collaboration via forums and networks. For the full list of participants and more information on partnership activities, see [www.ledsgp.org](http://www.ledsgp.org)

This document is from the LEDS GP; a global program for which the United States National Renewable Energy Laboratory (NREL) and the Climate and Development Knowledge Network (CDKN) serve as the Secretariat. NREL is a national laboratory of the U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy, operated by the Alliance for Sustainable Energy LLC. CDKN is a program funded by the UK Department for International Development (DFID) and the Netherlands Directorate-General for International Cooperation (DGIS) for the benefit of developing countries; with further funding from the United States Department of State for the co-management of the Low-Emission Development Strategies Global Partnership (LEDS GP). The views expressed and information contained in it are not necessarily those of, or endorsed by, DFID, DGIS, the US Department of State, NREL, US Department of Energy, or the entities managing the delivery of CDKN, which can accept no responsibility or liability for such views, completeness or accuracy of the information or for any reliance placed on them. This publication has been prepared for general guidance on matters of interest only, and does not constitute professional advice. You should not act upon the information contained in this publication without obtaining specific professional advice. No representation or warranty (express or implied) is given as to the accuracy or completeness of the information contained in this publication, and, to the extent permitted by law, the entities managing the delivery of CDKN and NREL do not accept or assume any liability, responsibility or duty of care for any consequences of you or anyone else acting, or refraining to act, in reliance on the information contained in this publication or for any decision based on it.