



WORLD  
RESOURCES | ROSS  
INSTITUTE | CENTER



# CONNECTING PEOPLE THROUGH TRANSIT

---

MOBILITY AND ACCESSIBILITY  
PROGRAM 2018

Sponsored by **FedEx**<sup>®</sup>

# DRIVING MOBILITY SOLUTIONS ACROSS THE WORLD



Students ride the bus in Rio de Janeiro.

**Since 2010, the collaboration between FedEx and WRI Ross Center for Sustainable Cities has catalyzed clean, sustainable public transit solutions. As urban areas contend with congestion, pollution and sprawl, we're providing new answers, new insights and new technology.**

Our Mobility and Accessibility Program (MAP), sponsored by FedEx, helps public bus systems optimize operations, revolutionize planning and routing, and reduce environmental impacts. Combining the FedEx mastery of transportation logistics with the expert analysis of WRI Ross Center, we are delivering transportation breakthroughs to an avid international audience.

Our impact is far-reaching. Buses are the world's leading mode of public transport. They account for 63 percent of all total public transportation usage – higher than the sum of all other modes combined. By making them an easier, safer, more affordable choice, our collaboration is improving quality of life for millions of people.

To date, we've trained more than 7,000 bus drivers and officials in 50 cities, affecting more than 7 million commuters in the four MAP countries: Mexico, India, China and Brazil. We've helped introduce the first hybrid and electric bus fleets in several Latin American cities. We've supported the launch of new bus networks in India and assisted China's Ministry of Transport with achieving emission reduction goals. Successful projects have gone global, scaling beyond our core countries.

Over the last year, the MAP program made important gains on the ground:

In India, we helped Bangalore restructure its bus fares, a win that lowered customers' costs for shorter trips and increased the system's ridership by 33 percent. In addition, the FedEx-sponsored innovation challenge identified new solutions for the public bus sector, including converting buses from diesel to electric, retrofitting filters to reduce emissions and using technology to help riders reserve seats on high-quality buses.

In China, we helped 25 cities adopt big data to monitor transit quality of service by fostering development of a public-private initiative with the Ministry of Transport, the China Academy of Transport Science and mobile app developers. We also supported Suzhou in developing a system that tracks buses and passengers in real-time, informing distribution and optimization for better service.

In Mexico, drawing on FedEx expertise in electric fleets and asset management, we assembled up-to-the-minute research that complements a new national strategy on electric vehicles. This guide will enable cities everywhere to explore the feasibility of this revolutionary technology.

In Brazil, we convened 10 members to establish the first national forum for transit administrators to collaboratively improve public transit quality and attract riders. We also worked with the city of Uberlandia to launch a bus rapid transit (BRT) route, boost the use of cashless fare cards and expand customer service centers.

We also updated and scaled the Vehicles and Fuels Bus Selection Tool, first developed in 2012, to help transport authorities assess the potential for low-emission bus implementation in new places, including Mexico, India, Indonesia, Chile, Bhutan, Sri Lanka, Thailand, Vietnam and the Philippines.

These results reflect the powerful synergy of our collaboration. Together, FedEx and WRI Ross Center are helping cities create the bus systems of the future and scaling solutions through robust international outreach.

In this annual report, transit planners and administrators share examples of how FedEx and WRI Ross Center are helping them achieve accessible, efficient, low-emission transportation for all. Their enthusiasm is apparent, as is their dedication to this vital mission.

None of our success would be possible without the generous support of FedEx and the many volunteer hours contributed by the 127 leaders and team members who have joined us on this journey. What makes our collaboration unique is the opportunity to have the best people from FedEx working with us. To them, we extend our deepest thanks.



**Ani Dasgupta**  
Global Director  
WRI Ross Center for Sustainable Cities

# DELIVERING OPPORTUNITIES THROUGH HIGH-QUALITY TRANSPORTATION

Over the past three years, FedEx Services Communication Advisor Genie Stevens has visited WRI offices on several continents to support the development of urban transport solutions. One of her most memorable experiences occurred in India in 2017, when a motorized rickshaw ride through the teeming streets of Bangalore illuminated the issues behind the MAP program.

“Driving in the rickshaw on my first morning put it in perspective,” Stevens recalled. “The challenges of an ancient yet emerging country, the meteoric growth, the vibrancy of the people and their culture, all underscored by the state of the traffic. I live in Atlanta and it can be congested, but not by comparison! I’d never experienced anything like that before.”

As they inched through traffic, Stevens said, she was “thinking about the rickshaw driver, sitting behind the wheel for most of his waking hours, breathing in exhaust, hoping not to get into an accident with a pedestrian or a motorcycle or a bus. I wondered about the people on the buses. Were they safe? Were they hot? And I realized there had to be a better way.”

The experience, she said, crystallized how transportation affects people’s everyday lives and deepened her commitment to the project, which she believes ties directly to the FedEx mission. “At its core, FedEx is about connecting people with possibilities,” Stevens said. “The more we can help connect people to possibilities through better transit, the more they will accomplish and help the world and themselves. They’ll be able to prosper, grow and make their families and communities more secure.”

Raj Subramaniam, FedEx President and Chief Operating Officer and President & CEO FedEx Express, agreed. “As I travel around the world, I take pride in seeing FedEx at work in local communities,” Subramaniam said. “I’m especially



Genie Stevens enjoys an auto rickshaw ride in Bangalore.

proud of the work we’re doing with WRI to implement innovative solutions to improve the quality of public transportation in some of the world’s most populated cities. Poor access to transportation reduces productivity and limits opportunity for the people who are most in need. “We work with WRI because we recognize that access to safe, reliable transportation can multiply possibilities for people everywhere.”

WRI and FedEx are supporting teams of innovators, who are currently embedded with bus systems in India. The teams are piloting sustainable transportation innovations that can make bus systems safer, more accessible, more reliable and more efficient.

New solutions, which range from creating mobile apps for bus reservations to converting diesel engines to electric, are coming to life through the Better Bus Challenge, a competition created by FedEx and WRI in 2018. The nationwide quest for new technologies to improve transit attracted more than 80 proposals from entrepreneurs.

“Innovation is in our DNA at FedEx,” Subramaniam said. “So launching this innovation challenge to expand opportunities for both riders and entrepreneurs was a fitting evolution of our work with WRI. We believe great ideas can come from anywhere. Through this process, we’ve identified several exciting innovations that have the potential to drive measurable improvements in local systems.”



Natashia Gregoire shares expertise on storytelling and messaging with Better Bus Challenge innovators.

The FedEx team provided hands-on support to help the entrepreneurs stand out among competitors. Stevens and Natashia Gregoire, Managing Director of Communications, joined the finalists in Bangalore for a three-day boot camp to refine the proposals with input from business experts. The two communicators shared their expertise in storytelling and messaging, leading sessions that the contestants praised as a huge boost to their presentation skills.

“In a pitch competition, it’s important to explain why your idea matters, what impact it will have,” Gregoire said. “We shared some best practices to help the contestants weave narratives about their exciting innovations. Seeing them use those techniques during their pitches was a

personal highlight. Some of the proposals were so compelling, transit officials made on-the-spot offers – a more successful outcome than we had envisioned.”

Stevens and Gregoire also traveled to Mexico and Brazil, advising on an array of WRI mobility and access initiatives that apply new knowledge and transportation tools to public bus networks worldwide.

“By developing and disseminating expertise together, we help to share what FedEx is learning,” Stevens said. “FedEx investment interjects momentum and intellectual capital so that high quality improvements reach farther, faster – particularly in emerging markets.” In turn, WRI

maximizes impact by scaling successful solutions through its global network.

“WRI has built connections with cities and administrators. As a capacity-builder, WRI is not there to force an agenda on cities, but to be a partner and help transit agencies, city officials and administrators reach their goals,” said Stevens.

During her visit to Brazil, Gregoire saw firsthand how WRI’s expertise and influence lead to real world solutions. “Transforming transportation systems can significantly improve quality of life in a city. That became crystal clear to me while I was touring the Bus Rapid Transit network with

the WRI team in Sao Paulo. Our BRT bus zoomed across the city on its elevated, dedicated lane, as we looked down at traffic snarled below. We could have easily spent hours in traffic to travel the same distance that we did in 15 minutes on the BRT.”

Such transformation takes vision. “WRI understands how the future will move and how it needs to move. To get to that level of insight, they have built a multi-disciplinary organization – engineers, urban planners, entrepreneurs,” Stevens said. “By sharing expertise between our institutions and adapting that knowledge for cities, our collaboration is effective and helps make the world a better place.”



FedEx communications specialists Pooja Bahri (fourth from right), Genie Stevens and Natashia Gregoire coach innovators on pitch improvements.

# CHAMPIONING INNOVATIVE IDEAS FOR BETTER BUSES

Entrepreneurs, manufacturers and technology providers are natural partners for public transportation agencies seeking to build efficient, sustainable systems. But in many cities, old ways of contracting and well-established players make it hard for new ideas to gain traction.

In India, WRI Ross Center experts knew there was a new generation of transportation innovators looking to share their solutions. What they needed was a way to connect to decision makers who could put their ideas into action. That became the impetus for the Better Bus Challenge, a professional competition for entrepreneurs that offered cash prizes to develop the most promising transportation concepts.

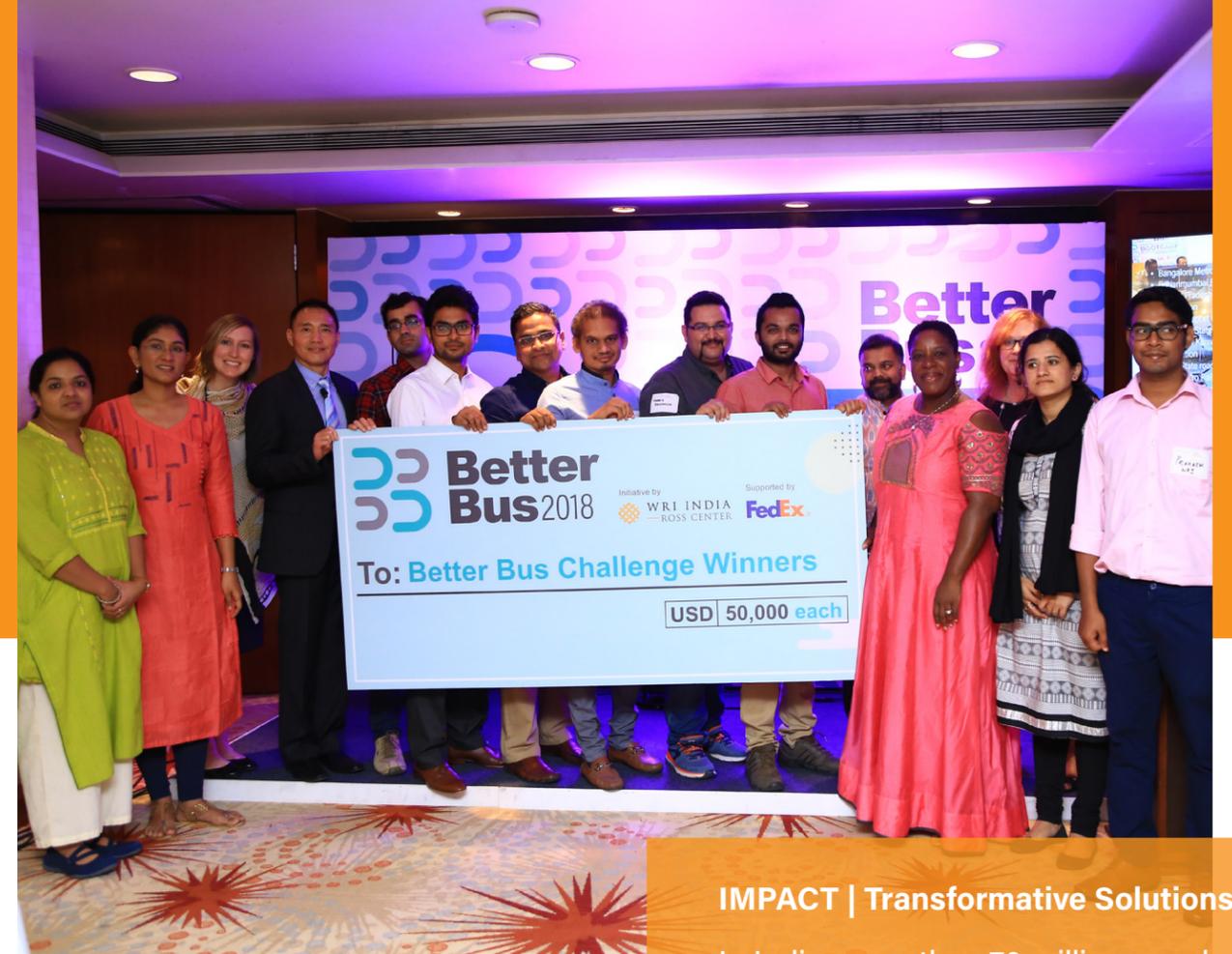
“Our focus was simple: how do we create a platform for transit agencies to engage with new startups?” said Pawan Mulukutla, Head of Urban Innovation and Integrated Transport at WRI India. “We wanted to match the most innovative solutions with the biggest problems.” The Challenge, which earned extensive national media coverage and attracted scores of applicants and agencies, realized those goals.

Launched in April 2018, the competition sought ideas that would enhance service quality for public

transit riders, reduce emissions and increase fuel efficiency.

WRI India laid the groundwork with a series of six introductory workshops for innovators and agencies from cities across the country. Two months later, 12 semi-finalists chosen from 80+ applicants participated in an intensive three-day Boot Camp held in Bangalore. They consulted with more than 20 experts in business, design, marketing, communications, finance and investment, who discussed how to hone the proposals for real-world impact. They also met one-on-one with India’s nine major transit agencies to ensure solutions addressed on-the-ground needs. FedEx communication specialists Natasha Gregoire, Genie Stevens and Pooja Bahri added their expertise through sessions that developed the finalists’ storytelling and presentation skills.

In July, a jury selected three Challenge winners, each of whom received \$50,000 to implement a



Vice President of India Operations Philip Cheng, fourth from left, represented FedEx at the Better Bus Challenge awards.

pilot project. The trio will spend a year testing and demonstrating their solutions in partnership with cities. Cell Propulsion will work with the Bangalore transit system to convert diesel buses into clean electric vehicles; Small Spark Concepts will develop filters that can be retrofitted to existing buses in Karnataka to reduce tailpipe emissions and improve fuel efficiency; Cityflo will increase accessibility in Mumbai, allowing more commuters to reserve seats on air-conditioned buses via their mobile app and helping reduce congestion.

“It was so important for us as a growing startup to get a seat at the table in the public transportation ecosystem in India,” said Rushabh Shah, co-founder of Cityflo. “Through the Challenge, we got a lot of guidance on how to plan potential projects with the government and how to structure our pitch—something that we continue to use today.”

## IMPACT | Transformative Solutions

In India, more than 70 million people – two-thirds of all transit users – travel by bus. The Better Bus Challenge connects innovators and transit agencies to enhance service quality, improve efficiency and reduce emissions.

Leveraging the momentum of the Better Bus Challenge in India, WRI Ross Center is now developing a toolkit for similar competitions in Mexico, Brazil and China. “It’s the need of the hour to make public transportation accessible, affordable and comfortable for the travelers,” noted finalist Mayur Patel, founder of Small Spark Concepts. “The Better Bus Challenge is one of the best platforms to bring innovative ideas and public transport governance together to encourage this.”

# SCALING BEST PRACTICES ACROSS BRAZIL

Many growing cities lack the capacity to track their transportation patterns and needs. It's the biggest problem affecting planning, regulation and decision-making in mobility services. In Uberlandia, Brazil, transit officials knew they needed data to assess the performance of their bus system and guidance on conducting a customer survey, but didn't know where to begin.

City employee Lívia de Oliveira Mamede was helping a colleague search for solutions in 2015 when she Googled “study on customer satisfaction in public transit.” What she found was a wealth of information, freely available, on a user survey tool that WRI Ross Center had developed with FedEx support. She realized immediately it was exactly what the city needed.

“When I downloaded the questionnaire, I got excited, thinking wow, what great material. It was much more than we had imagined,” Lívia recalled. “It's not just a study – it builds up a culture of working with key indicators.”

At the time, conducting a user survey in Uberlandia seemed prohibitively expensive. “So the fact that WRI was offering all this high-quality material at zero cost had a big influence,” Lívia said. “I got in touch to see how they could support us in the implementation and how the relationship would work. We just fell more and more in love with the tool, and we're still liking it today.”

The survey, conducted in 2016, delivered insights that propelled key improvements. “For instance, we learned that about 54 percent of transit users worked for private companies,” said Lívia. “With that information, we were able to work on planning with the companies to incentivize use of a transit card to pay fares. The card provider relied on our data to increase points of sale, and made it possible to recharge the cards in all the stations.” With those changes, the popularity of the cards soared, and 70 percent of riders now use them. That translates into easier access, more efficient fare collection, and lower operational costs for the system.

As Uberlandia prepared to launch its second Bus Rapid Transit (BRT) line, the city turned to its WRI Ross Center partners once again, using the FedEx-funded Day One of Operations tool to trouble-shoot the new corridor. The communications issues the team flagged were successfully resolved before debuting the 6-kilometer route, which serves 6,000 passengers daily.



A bus rider in Brazil participates in the User Satisfaction Survey.

## IMPACT | National Standards

Members of Brazil's QualiOnibus Benchmarking Group are using the Quality Indicators tool, based directly on the FedEx Quality Driven Management process, to establish national benchmarks for clean, efficient public transportation. The Group represents more than 40 million potential transit users.

FedEx support also enabled WRI Brasil to establish a new national forum for transit professionals: the QualiOnibus Benchmarking Group. Launched in 2017, it focuses on incentivizing the use of public transit – what works, how to establish baselines for service, and how to expand best practices across the country – through the use of WRI Ross Center tools like the User Satisfaction Survey and Quality Indicators. With member cities representing more than 40 million Brazilians, the Group's potential impact is enormous.

Using tools like the User Satisfaction Survey and the Quality Indicators, the Benchmarking Group is raising the bar for public transit nationwide. “These quality indicators – the comfort of the trip, the punctuality of the bus – mean so much to customers,” Lívia said, “and customers keep the system running. We need information to improve the system, and we need research to guide us.”

# SHARING HIGH-TECH TRANSIT SOLUTIONS FOR BOOMING CITIES

China is positioning itself for a twenty-first-century leap forward in sustainable bus transportation. To accomplish this, officials have embraced the emergence of big data, new technologies and market forces to upgrade public transit. For the past four years, FedEx and WRI Ross Center have actively collaborated with government ministries as well as private companies to advance urban transportation policies and build on-the-ground solutions.

One example of our impact is visible on the glowing monitors at the Transportation Operation Command Center in Suzhou, a city of nearly 11 million. Here, WRI Ross Center helped administrators develop a new Intelligent Transit System to track the movement of passengers and buses. The three-year-old project uses data from transit smartcards and bus GPS readings to deliver precise numbers on passenger volume, station usage and vehicle headways and speeds—all key indicators for transportation planners. City officials act on the information to make adjustments that improve bus service quality throughout Suzhou.

“Before, when we needed to investigate passenger volume in transportation hubs, we had to conduct surveys to obtain information,” recalled Yao Cheng of the command center. “Today, we can access real-time bus passenger volume and distribution, and the locations of buses are updated every 10 seconds.

These data are very helpful to the design of our bus routes—for example, providing more bus route options at stations with huge passenger volume, which means better services for our passengers.”

In related projects, FedEx and WRI Ross Center assistance has helped Suzhou officials establish regulations for city bus operations, structure subsidies for the local bus company, and develop a smartphone app for customers that shares real-time information on bus locations, routes and schedules. The objective is to increase ridership – beyond the current 1.5 million daily bus passenger trips – and enhance sustainable transit options across the city.

“Like many cities in China, we face major traffic congestion. How to improve this has become an important topic for us,” explained Zheng Binghua, Deputy Director of Suzhou’s Transit Bureau. “Through the support of FedEx and WRI, we’ve



Bus rapid transit (BRT) plays an important role in China, contributing to sustainability in urban transport and beyond.

benefited from international experiences of other transit planners, providing us with new ideas and solutions.”

In the city of Zhuzhou, a thousand kilometers to the southwest, FedEx and WRI Ross Center helped implement the User Satisfaction Survey to guide planning for the city’s first Bus Rapid Transit system. More than 1,000 responses from commuters led to recommendations that were incorporated in the project’s design. Now under construction, the expansive BRT will cover 28 kilometers and carry 400,000 passengers daily. With WRI Ross Center’s input, the fleet will also feature more than 200 clean-running electric buses, directly addressing the city’s air quality issues.

## IMPACT | Lower Emissions

Sustainable transportation innovations in Zhuzhou are expected to reduce the city’s CO2 emissions by half a million tons from current levels by 2030.

Zhuzhou officials credit their relationship with FedEx and WRI Ross Center with widening their perspective on transportation’s role in a growing city. “When building infrastructure, we tend to use conventional methods—we don’t really think about how to innovatively solve urban transportation challenges,” said Wang Shixing, Deputy Secretary General of Zhuzhou Municipal Government. “The next step for us is to translate these ideas into concrete actions.”

# MAKING BUS FARES FAIRER IN INDIA

Buses in India are the main means of public transportation, and decisions on the cost of a fare carry considerable weight. Transit companies know that raising ticket prices can discourage ridership; at the same time, they face soaring fuel costs, higher operating expenses and competition from other transit options as they strive to deliver services.

In 2015, the Bangalore Metropolitan Transportation Corporation (BMTc) approached WRI Ross Center to help it find a way to restructure fares equitably. Its existing fare table, which relied on an outdated zone system, was cumbersome and confusing. Depending on the route, one trip could cost twice as much as another of comparable distance. Riders without exact change were frustrated by long payment transactions, and bus conductors would often round fares down, resulting in losses for the corporation.

“Paying for my ticket was difficult, because the costs were so random,” explained BMTc passenger Alope Mukherjee. “Fares weren’t rounded off to convenient amounts, so making change was

a huge problem. I would end up paying extra at times, especially in crowded buses.” BMTc bus conductor Mr. Somashekar agreed. “I couldn’t make change easily. I needed to carry a lot of coins and often found it very difficult to hand them out. Customers would often get angry and haggle with me to reduce the cost of the ticket.”

To ease commuter woes and capture the correct revenue, BMTc ticket pricing needed an overhaul. WRI Ross Center and FedEx supported a two-year restructuring process that included deploying 28,000 User Satisfaction Surveys, reviewing policies for fare-setting and payment, suggesting ways to correct irregularities and increase revenues, and setting the stage for public buy-in.



A satisfied customer rides the Bangalore Intra-city Grid (BIG) bus network in India.

The new fare structure, adopted in April 2017, is a win for customers as well as the BMTc: a simpler, more equitable payment system that also avoids operational losses for the corporation. It sets fares according to the distance traveled, eliminates extra penalties for transfers, and, in a major change, charges less for shorter rides on heavily-traveled corridors.

For passenger Mukherjee, that means a cheaper commute. “The cost has come down greatly,” he says. “I travel approximately 8 kilometers, and I pay 2 rupees less now than I did before. And I don’t need to haggle with the conductor for my change.”

Now, other regional transportation companies have asked WRI Ross Center for guidance on fare rationalization and restructuring. Pawan

## IMPACT | More Transit Users

A new fare structure for BMTc routes, which carry 4.5 million passengers per day, has increased ridership by 33 percent and revenue by 12 percent on the Vajra route.

Mulukutla, head of Integrated Transport at WRI India, said his team will build on their experience in Bangalore and scale it up for a new project with the North West Karnataka Road Transport Corporation. “We’ll amplify the approach we crafted for BMTc and apply it to a larger target, moving from service within a city to services that connect cities,” he said. It’s an example of how FedEx and WRI Ross Center’s solutions are being expanded to improve transportation for millions.

# MOVING CITIES TOWARD CLEANER TRANSIT CHOICES

Jone Orbea, Economic Mobility Coordinator in WRI's Mexico City office, understands firsthand how unreliable schedules, crowded conditions and safety concerns push many citizens away from public transportation. And she believes that improved options — including electric buses, on which she's an expert — could be a game-changer, easing stressful commutes while they improve air quality.

As a recent graduate of the two-year Transportation Fellowship program supported by FedEx, Jone is leveraging its expertise in electric vehicles to offer new transit solutions at a crucial moment. It's essential, she said, to present agencies with the facts they need.

"Electric buses are a new technology," she explained. "Officials have plenty of excuses not to invest — that electric buses aren't reliable, or too expensive, or difficult to use — so research can help us make the case."

Last year, Jone and five other WRI Ross Center fellows undertook a major analysis of the factors affecting the adoption of e-buses in the United States, Mexico, Brazil, China and India. They zeroed in on asset management, exploring how purchasing, maintenance, energy sources, routing and other factors affect vehicle longevity and service quality. A pivotal experience was the group's one-week visit

to FedEx headquarters in August 2017, where they learned from FedEx team members what it takes to run an electric fleet.

"The biggest takeaway for me was to see how FedEx integrated innovation into the operation of electric vehicles," said Jone. "They looked at all the components and figured out what to do differently. They allowed for charging time, adjusted van capacity, modified routes, and analyzed how it all worked to optimize the system."

Jone and the fellows also traveled to Shenzhen, China, whose 16,359 buses comprise the only 100 percent electric fleet in the world. Visits to a battery manufacturer, a transportation think tank, a technological institute and a city bus operator offered further insights on e-bus operations.

Drawing on these experiences, the WRI Ross Center fellows developed *An Introduction to Asset*



Transportation Fellows (left to right) Hein Tun, Virginia Tavares and Jone Orbea discuss electric vehicle research.

*Management for Electric Buses*, a resource for urban transit agencies across the globe. It focuses on a key aspect of the mobility revolution: the changes required to shift to electric vehicle technology. By comparing the management needs of conventional diesel buses and e-buses, it provides a framework for cities to deliver high-quality transportation while balancing financial, environmental and social costs.

Since June 2018, Jone has applied this new knowledge, working collaboratively with the Mexican government to prepare Mexico's new national strategy on electric vehicles. "There's not a lot of research out there, and electric vehicles are a hot topic," she pointed out. "With support from FedEx, we're providing the information that agencies need to integrate electric vehicles into the fleets of the future."

## IMPACT | Future Leaders

Since 2012, young transportation professionals have completed the Transportation Fellowship Program. Former fellow Marco Priego, now Director of Urban Mobility at WRI Mexico, credits the experience with developing his leadership skills. "Russ Musgrove, Managing Director of FedEx Express, taught me that one of the most difficult things to do professionally is to move from a technical to managerial role, because you need to trust in others' work," he said. Cristina Albuquerque, now Urban Mobility Manager at WRI Brasil, added, "It was so inspiring to have FedEx team members share their knowledge with us so that we, the next generation, could build on that expertise."

# A GLOBAL TOOL FOR FLEET EFFICIENCY

As transportation agencies consider the implications of upgrading their bus fleets with high-performance, low-emission vehicles, they must answer a host of questions: What vehicles are most efficient? Which are cleanest? How can we incorporate new technology into an existing, often outdated, system? And, most importantly, what will it cost?

Until 2013, what was missing from these discussions was a reliable source of accurate, impartial information on vehicle emissions and costs. In the last five years, with support from FedEx, WRI Ross Center mobility experts have responded by developing the Vehicles and Fuels Bus Selection Tool\*, which supplies detailed data on bus equipment, fuel and operating expenses and provides a framework for comparison.

The tool has already gone global, put to use in the cities of Belo Horizonte, Bangalore, Santiago, Sao Paulo, Contagem, Medellín and Monterrey and deployed for national-level analyses in India, Colombia, Mexico, Chile, Turkey, the United States,

Ethiopia and Indonesia. Sebastian Castellanos, who leads the WRI Ross Center team that updated the tool, said it cuts through the difficulties that cities encounter as they consider new bus options. “Many times, data on costs and emissions comes directly from vehicle manufacturers that have done tests under controlled scenarios that don’t represent real-world conditions,” said Castellanos. “Our tool gives cities access to curated, peer-reviewed, trustworthy data that they can use to make decisions based on their unique situations.

“City officials want to innovate and show they are improving the transit system,” Castellanos pointed out. “Their main concern is air quality, and bus



Cities are using the Vehicles and Fuels Bus Selection Tool\* to move their fleets toward cleaner, more efficient performance.

fleets are a way to deal with this issue — cities have direct control over their bus fleets, and buses are disproportionately responsible for local pollutants.”

Although many agencies are now willing to consider cleaner technologies, particularly electric buses, the costs involved in purchasing them remain the biggest barrier to mass adoption. That’s why WRI Ross Center experts recently added data on electric buses to the Vehicles and Fuels Bus Selection Tool\*. “We’ve incorporated bus costs and lifecycle emissions. In the next phase, we’ll cover infrastructure costs. Clearly, the cost data is one of the biggest needs of cities right now,” said Castellanos. In the coming months, the tool will be made available online, delivering information that will impact public transportation decisions for decades to come.

## IMPACT | Fuel-Efficient Buses

- In 2017, the city of Belo Horizonte, Brazil, used the tool to plan its adoption of electric buses; by 2030, 40 percent of the fleet will be electric.
- In 2015, ANPACT, the Mexican association of bus manufacturers, developed a national Fleet Selection Guide using the tool.
- In 2014, the pilot tool was applied in Puebla, Mexico, to improve its fleet procurement process. In Brasilia, Brazil, it was used to establish a baseline for air pollutants and to inventory the city’s GHG emissions from its urban bus fleet emissions.

\*Technical name: Costs and Emissions Appraisal Tool for Transit

# PROVIDING THE RIGHT TOOL FOR THE RIGHT JOB

Cities need the best available data and analytical tools to implement high-quality public transportation systems. FedEx and WRI Ross Center provide these essentials with the Quality of Service Toolkit, which has been utilized in four countries across the world to identify problems and implement solutions.

With these tools, the work of the Mobility and Accessibility Program over the past eight years has scaled to new cities and geographies. The impacts listed on these pages reflect new milestones achieved in 2018.



## VEHICLES AND FUELS BUS SELECTION TOOL\*

FedEx Expertise: Fleet Management

This tool helps government agencies compare the full lifecycle costs and emissions of buses using different technologies and fuel types. It utilizes the latest research to evaluate electric vehicles, assist in fleet planning and provide recommendations for cities in India, Mexico, Brazil and additional countries.

### 2018 Impact:

- Monterrey, Mexico, implemented the tool to assess the introduction of low-carbon technologies in TransMetro, the city's bus rapid transit service, which connects to the metro system and serves more than 516,000 people daily. Based on the data results, Monterrey's transport authority has expressed interest in implementing an electric bus corridor.
- In India, Bangalore's bus operating agency (BMTC) floated a tender for 150 electric buses. Using the tool, WRI Ross Center supported BMTC in developing the project proposal presented to the Government of India and framing the request for proposals.

\*Technical name: Costs and Emissions Appraisal Tool for Transit

## DAY ONE OF OPERATIONS

FedEx Expertise: Operational and Contingency Planning

This tool supports Brazilian cities in achieving maximum responsiveness through operational and contingency plans for bus rapid transit (BRT) systems and high-demand bus corridors, as well as providing technical assistance.

### 2018 Impact:

- In addition to helping Uberlandia, Brazil, apply the tool in 2017, WRI presented the Day One of Operations tool to African city representatives at a workshop in Dar es Salaam, Tanzania, opening opportunities to scale the tool's use in the future.

## QUALITY INDICATORS

FedEx Expertise: Quality Driven Management

This tool establishes a set of about 130 indicators focused on quality, directly applicable to the operation of transport systems. Each was developed based on research and global best practices. WRI Ross Center provides technical assistance to cities to apply the indicators to guide system improvements.

### 2018 Impact:

- The 10 members of the QualiOnibus Benchmarking Group collected Quality Indicator data twice during the year and exchanged results and best practices for system management and operations through regular meetings.



## USER SATISFACTION SURVEY

FedEx Expertise: Customer Satisfaction / Quality Performance Indicators

This tool helps cities in Brazil, Mexico, China and Turkey evaluate bus riders' satisfaction with their transit system's performance. The resulting data informs decisions about where to direct improvements, assists in measuring the impact of changes, and establishes benchmarks for performance. WRI Ross Center provides technical assistance to cities for creating and implementing action plans.

### 2018 Impact:

- In Fortaleza, Brazil, survey results indicated that 77 percent of BRT users consider public transport improved in the last year and 79 percent expect that the transport will improve from now on. ETUFOR, the public transit company, will present the results of the survey to Mayor Roberto Claudio and generate a plan of action with transit operators.
- Six cities in Brazil — Fortaleza, Belo Horizonte, Recife, Uberlandia, Porto Alegre and Teresopolis — applied the survey tool with a total of 6,900 riders. Five of these cities are Benchmarking Group members and also use the Quality Indicators tool.

## SAFETY FIRST

FedEx Expertise: Safety First / Accident Tracking & Analysis

This tool adapts the safety expertise of FedEx to train bus drivers, incentivize driver performance, and measure the impacts of trainings and programs. WRI Ross Center developed a crash data collection methodology and analysis tool, and provided technical assistance to Brazilian cities.

### 2018 Impact:

- Fortaleza, Brazil, has established quality in public transport as a key action area to improve safety for all road users. More than 50 representatives from all Fortaleza bus companies committed to scale up a safety program and bus driver training after attending a workshop held by WRI Ross Center.
- Fortaleza also adopted as formal city procedure WRI Ross Center's new methodology of data collection for traffic accidents involving buses, as well as a formal crash investigation procedure. A WRI workshop trained 24 city staff on the methodology, crash data collection form, handbook and database system.
- In Mexico City, WRI Ross Center's driver training tool was updated in preparation for delivery in 2019, as the new director of Metrobus (the city's BRT system) has prioritized safe driving. Additionally, 150 bus drivers received training in safe driving practices in Guadalajara; to date, more than 4,450 bus drivers have been trained in Mexico and Brazil.

## QUALITY MANAGEMENT DIAGNOSTIC

FedEx Expertise: Quality Management / Operations Planning

This tool provides a comprehensive assessment of a transit project's quality at each phase of its development, evaluating risks and determining areas for improvement.

### 2018 Impact:

- The tool was launched in Mexico as an online web platform and presented to 12 state mobility ministries. It is the only resource providing operations information for Mexico's major transit systems. WRI Ross Center has customized the tool with PROTRAM, Mexico's federal transport agency, making it easier for cities applying for federal funds to plan and evaluate their mobility projects.



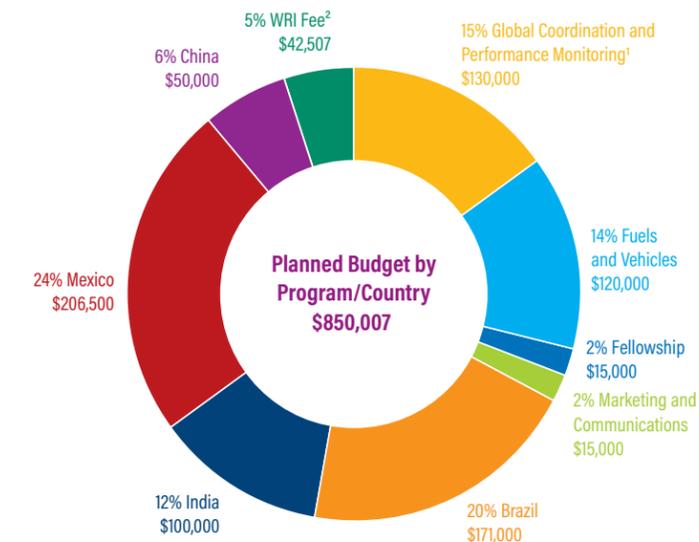
# MEASURING IMPACT AND EFFECTIVENESS

WRI Ross Center for Sustainable Cities uses Key Performance Indicators (KPIs) to accurately track the collective impact of our work. KPIs enable us to measure how our projects have improved human well-being and to encourage a streamlined and effective approach to project planning. The result has been the successful growth of our organization and impact.

Our collaboration with FedEx from 2010 to 2018 has achieved the following milestones for the Mobility and Accessibility Program.

	2010	2011	2012	2013	2014	2015	2016	2017	2018	TOTAL
<b>CO<sub>2</sub> Emissions Avoided (tons)</b>	-	-	10,000	10,000	10,000	10,000	12,574	11,334	10,685	74,593
<b>People Benefitted</b>	-	77	424	920,968	600,665	730,735	950,161	1,749,834	2,349,602	7,302,466
<b>People Trained &amp; Engaged</b>	-	-	138	1,886	3,500	2,524	620	601	594	9,863
<b>FedEx Volunteers</b>	-	5	32	11	35	9	-	29	6	127

# FINANCIAL REPORT 2018



<sup>1</sup> This line includes expenses for the DC-based MAP project management team, which keeps the program on track and works to coordinate the global efforts of the in-country MAP teams.

<sup>2</sup> 5% of the funds received from all corporate grants are used for implementing WRI's core operations which help ensure the success of our overall programs.

<sup>3</sup> Subgrants to WRI Mexico and WRI Brasil.

<sup>4</sup> Includes a small GHG tax from business travel and electricity use.

<sup>5</sup> General and Administrative Expenses: Organization-wide shared costs including senior leadership, accounting, grant and subrecipient management, human resources, web management, audit, and related services.

Expenditure Report October 2017–October 2018	
Salaries	\$169,765
Benefits	\$73,787
Occupancy	\$20,208
Project-Related Office Services & Supplies	\$11,036
Research Expenses	\$45,245
Conference Expenses	\$4,883
Publications	\$10,710
Communications	\$13,483
Travel	\$53,522
Project-Related Electronic Network	\$20,639
Research Materials & Quality Assurance	\$9,712
Subgrants <sup>3</sup>	\$323,259
Other Direct Costs <sup>4</sup>	\$2,168
G & A Expenses <sup>5</sup>	\$58,509
5% WRI Fee <sup>2</sup>	\$42,507
<b>TOTAL</b>	<b>\$859,433</b>



## ABOUT FEDEX

At FedEx, we believe a connected world is a better world. We're also passionate about making connections that improve people's lives and make the world a better place. FedEx links over 90 percent of the global GDP and as our business grows, the link between emerging economies and the global marketplace strengthens. As urban growth continues to explode worldwide, the need for sustainable transit systems and solutions has never been more critical. That's why we value our relationship with WRI Ross Center. Together, we can help address pollution, congestion and driver and pedestrian safety issues. In the process, we can help connect urban residents with greater opportunities. For more information about other environmental and citizenship efforts, download the 2018 FedEx Global Citizenship Report at [csrf.fedex.com](https://www.fedex.com/csrf).



## ABOUT WRI

WRI is a global research organization that spans more than 50 countries, with offices in the United States, Brazil, China, India, Mexico and more. Our more than 550 experts and staff work closely with leaders to turn big ideas into action at the nexus of environment, economic opportunity and human well-being. Learn more at [www.wri.org](https://www.wri.org).



## ABOUT WRI ROSS CENTER FOR SUSTAINABLE CITIES

WRI Ross Center for Sustainable Cities helps create accessible, equitable, healthy and resilient urban areas for people, businesses and the environment to thrive. Together with partners, it enables connected, compact and coordinated cities. WRI Ross Center expands the transport and urban development expertise of the EMBARQ network to catalyze innovative solutions in other sectors, including water, buildings, land use and energy. It combines the research excellence of WRI with over 15 years of on-the-ground impact through a network of more than 250 experts working from Brazil, China, India, Mexico and Turkey to make cities around the world better places to live.

Web: [WRIRossCities.org](https://www.WRIRossCities.org)  
Blog: [TheCityFix.com](https://www.TheCityFix.com)  
Twitter: [Twitter.com/WRIRossCities](https://www.Twitter.com/WRIRossCities)

Learn more about the FedEx and WRI Ross Center Mobility and Accessibility Program at [mobility.embarq.org](https://www.mobility.embarq.org).

## ACKNOWLEDGMENTS

The authors thank the following individuals for their valuable contributions and support: Pawan Mulukutla, Krithi Venkat, Cristina Albuquerque, Mariana Barcelos, Marco Priego, Jone Orbea, Sebastian Castellanos and Lulu Xue. We thank everyone featured in the stories for participating in interviews. Publication and design support were provided by Bill Dugan, Carni Klirs, Billie Kanfer and Romain Warnault. Lastly, the authors thank Carol Denny for writing and editing support.

## ABOUT THE AUTHORS

**Carrie Dellesky** is an Associate, Global Projects & Initiatives, for WRI Ross Center for Sustainable Cities  
Contact: [cdellesky@wri.org](mailto:cdellesky@wri.org)

**Larissa Da Silva** is a Senior Manager, Global Projects & Initiatives, for the WRI Ross Center for Sustainable Cities  
Contact: [ldasilva@wri.org](mailto:ldasilva@wri.org)

**Kerry LePain** is a Program Coordinator, Global Projects & Initiatives, for the WRI Ross Center for Sustainable Cities  
Contact: [klepain@wri.org](mailto:klepain@wri.org)

## PHOTO CREDITS

On the Cover: A passenger on the Via Livre bus system in Recife, Brazil. Cover photo Bruno Campos de Souza/WRI Brasil; pp. 2, 20, 21, 22, 27 Mariana Gil/WRI Brasil Cidades Sustentáveis; pp. 5, 17 Carrie Dellesky/WRI Ross Center for Sustainable Cities; pp. 6, 7, 9 WRI India Ross Center; p. 11 WRI Brasil Cidades Sustentáveis; pp. 13, 15, 19 Benoit Colin/WRI Ross Center for Sustainable Cities; p. 23 Noppasin/Shutterstock; p. 24 Priscila Pacheco/WRI Brasil Cidades Sustentáveis.





WORLD  
RESOURCES | ROSS  
INSTITUTE | CENTER

10 G STREET NE  
SUITE 800  
WASHINGTON, DC 20002, USA  
+1 (202) 729-7600  
[WWW.WRI.ORG](http://WWW.WRI.ORG)