

APPENDIX

Testimony of Janna Chernetz
Deputy Director & Director of NJ Policy
Tri-State Transportation Campaign
Senate Select Committee on NJ Transit
December 12, 2019

Good afternoon Senate President Sweeney, Majority Leader Weinberg. Thank you for your continued leadership and determination to fix NJTransit. This is no small task. It was almost exactly 3 years ago today that I appeared before the Joint Legislative Oversight Committee which paved the way for the effort to reform the agency and ultimately S630 to which Senator Weinberg and Senator Gordon poured their heart and soul into detailed legislation serving as a catalyst for future reform efforts. But we still have a long way to go. The agency didn't crumble during one administration nor will it be totally fixed in one. But there are critical and necessary changes that need to occur now, or should have already occurred, that are standing in the way. In the interest of brevity and getting down to business I will focus my testimony on those.

Nothing that is spoken about or discussed here today will be possible without adequate and sustainable dedicated funding for NJT.

[SLIDE]

NJT's lack of dedicated operating funding is the biggest problem and nothing will get better if this is not fixed.

Funding priorities:

[SLIDE]

Dedicated Operating Revenue – NJT's operating budget has become a highly volatile and political. While the Administration has been focusing on reducing the diversions from clean energy and NJ Turnpike, offsetting those diversion with more general fund money/direct state subsidy is not fixing the problem but only shifting the problem. As history has shown the amount of direct state subsidy given to the agency fluctuates not only with budget year but from administration to administration. This includes the acknowledgement of the increase in funding given by this legislature in the current fiscal year of \$50M. However there is nothing locking this funding in place and the more heavily that operating budget relies on GF revenue the more unstable it becomes from year to year.

On capital side, funding is locked in with the constitutional dedication of revenues to the TTF to assure that money is not diverted and a level of funding can be expected in out-years – NJT operating needs the same dedication.

[SLIDE]

Which brings me to the TTF. While the intention is for TTF funding to go to capital projects, in reality, it is not. NJT transferred \$460 million to operating. 20% of the operating budget. While this is permissible use as previous NJT agency leaders have pointed out is something other agencies do, it is not a sustainable funding mechanism and when relied upon heavily, as NJ does, serves as a detriment to the agency and the state. When I sat here 3 years ago, I explained that both SEPTA and CTA admitted that the C2O transfer were problematic. CTA was concerned that over the span of a few years, it had transfer just north of \$300m and were

concerned about the lasting effects on the agency should this continue. NJ doesn't even bat an eye of almost doubling that in one year.

To put this in perspective, NJT continues to transfer annual from its capital budget to operating an amount equivalent to:

61% of the TTF money allocated to NJT; or

76% Federal money allocated to NJT

What does this mean to riders?

- Reduced quality of commute (more breakdowns - late trains and buses, trains and buses in poor condition, reduced, vulnerable fares which are already among the highest in the nation, delayed needed expansion projects, etc) Let me repeat.....NO MONEY FOR NEEDED EXPANSION PROJECTS. These are not warnings. This is what's happening today. We are seeing and experiencing the effects of poor funding practices now.
- Access to jobs, education, healthcare (especially for those in underserved communities)

What does this mean to the state?

- Stifled economic growth, reduced property values, loss of talent, loss of business, increased debt

NJT needs NOW, dedicated operating funding and a plan to wean off capital to operating transfers to keep capital in capital.

Need to change up revenue sources SLIDE with Value Capture and Sources

HBLR extension, Camden Glassboro LR, BRT, Bergen Loop, other capacity increasing projects not only rail but bus as well. There's been increased advocacy and need to electrify NJT's bus fleets which you will be hearing about from my colleague TSTC ED Nick Sifuentes (I won't steal his thunder but I can tell you with 100% certainty, NJ is NOT a leader) and Kevin Garcia, TSTC's Campaign Manager who will discuss intra state bus service.

[SLIDES TO SHOW THE OTHER AGENCIES AND THEN LOOK AT POSSIBLE FUNDING SOURCES NJ IS LEAVING ON THE TABLE]

NJT Talent –

No surprise here that talent drain and lack of employee morale has plagued the agency. This was unveiled during the 2016/2017 hearings and highlighted in the North Highland Audit.

In the Spring, NJT identified a \$136M budget deficit going into the next FY. It is my understanding that that is now \$86M given the \$50m increase during budget negotiations for this year. Regardless, in anticipation of contract negotiations for existing transit workers, there is an increased need for operating funding for the next FY and beyond

NJT must remain competitive among regional transit agencies such as MTA, LIRR and Amtrak in terms of salary and benefits so that it does not find itself with attrition rates and low incoming classes. Another issue brought to the attention of leadership during the 2016/2017 hearings. I know the administration and agency have been working hard to remedy the shortfall however this is going to be an ongoing issue not a one time fix.

Competitive Salaries to attract top talent – various levels of management need to offer competitive salaries and there needs to be clear line of advancement. This includes talent to advance the technology something NJT has been called out as being deficient in.

Which brings me back to the audit -

Funding aside, the two other major deficiencies identified were a lack of Strategic Plan and Technology Road Map. Not surprising coming from an agency spends its days putting out fires and moving from one catastrophe to the next. (this is not just mine words but an observation by North Highland alone).

Overall Strategic Plan and long-term vision is lacking and unpredictable funding is a major impediment. NJ does not have a State Transportation Master Plan. Sure there are pieces of such embedded in other plans such as the EMP but not one dedicated solely to Transportation. This is problematic especially here in NJ where residents have some of the longest commutes in the nation (mega commutes) Residents spend a lot of their time driving/taking public transit yet the state does not have a master plan. – Office of Strategic Planning

TECHNOLOGY ROADMAP NJ Transit has made investments in technology to improve the customer experience focusing on mobile devices. But the audit pointed out it has not advanced technology internally on par with that of “world-class transportation entities.” The report pointed out that this limits the ability to understand and improve operations. Technology advancement were also noted to be deficient in Human Resources, Procurement, and Asset Management solutions and technology solutions to enhance the customer experience, available in the marketplace, have not been implemented. Lack of use of technology appears to be running rampant in multiple facets of the agency.

S630 –

In Dec 2018, the governor signed the historic legislation S630 championed by Senator Weinberg and Senator Gordon. As eloquently stated by Sen Weinberg, it was not a “panacea” for all that ails transit but provided for the necessary foundational changes to continue to facilitate the on-going reform efforts. One of the major reform efforts was to review and strengthen the Board of directors for the agency. Last year TSTC released a report highlighting the need for the restructuring of NJT’s board of directors. What TSTC found was that NJT was once again an outlier in terms of members and required background expertise. No agency can be truly effective at delivering high-quality service for riders and managing capital and operating costs efficiently without an active board of directors composed of highly qualified members who can oversee the agency’s finances, help set direction, and ask the right questions of executive staff. When boards are weak, agencies act without scrutiny nor oversight, allowing mismanagement and poor fiscal planning to undermine the agency’s goal of serving riders. S630 strengthened the board in terms of member number, expertise areas and most importantly added two riders. The bill as required that the new board be set within 90 days. We

are now about to hit the 1 year anniversary of the signing of the bill and no new board has been sat. At bare minimum the riders need to be added. Look, in order to fix the agency, you need people who have intimate knowledge of what is wrong. You need to come at it from all sides not just the inside. Riders provide that critical angle. Those who are in the best position to fix it are those who know what's wrong with it. And those people are the riders.

Conclusion -

When asked during last year's budget hearings if NJT had enough money, President Kevin Corbett responded by saying every head of a transit agency wants more money but he will do his best with what it's been given. Unfortunately best with what's given is no longer good enough. As a state, we can't continue to shortchange an agency in terms of funding and talent and expect a miracle even if it is the holiday season.

I will leave you with this. TSTC is non-partisan. We don't follow any political party ideology. We are here to advocate for what is best for riders and what is best for NJ. Collectively, we all have been talking about change. However, those with the power to effectuate change have yet to make a move. You cannot expect change unless you make change. Whether it is the revenue sources for NJT's operating budget or the Board of directors. NJ has yet to make the changes that matter.

Thank you for your time and look forward to our continued work together to bring NJT back to the leading national transit agency it once was.

[FIRST SLIDE]

- Good afternoon, committee members. Thank you for the opportunity to speak here today. My name is Kevin Garcia and I am the Campaign Manager for Tri-State Transportation Campaign.
- In my role, I focus on capturing New Jersey Transit bus riders' voices and highlighting their experiences in our work and in front of stakeholders.
- With the launch of our "A New Ride for New Jersey" campaign, we released a report, by the same name, in late September that detailed the shortcomings of New Jersey Transit's bus service and a set of recommendations to improve service.
- Our report highlighted six major recommendations:
 - Making using the bus easy and intuitive,
 - Designing streets to prioritize buses,
 - Redesigning the bus network,
 - Modernizing fares,
 - Better data collection and transparency, and
 - Increasing funding.

- Based on NJ Transit's 2017 annual report, more than half of all NJ Transit trips, 58% to be exact, are made by bus.
- Bus service remains the most affordable transportation option in many communities, and for neighborhoods without access to commuter rail or light rail, it is often the only public transit option.
- And this is why we decided to focus on bus riders in Newark and Elizabeth, NJ.

[NEXT SLIDE]

- We surveyed 250 bus riders and found many issues that riders deal with on a regular basis.
- The first question we asked riders is where they travel to when using the bus.
- From the survey results, we were able to see that 73% of surveyed riders use the bus for their work commute.
- A closer look at the data shows that at least 40% of surveyed riders use the bus to commute to other destinations including to go shopping, go to school, visit family and friends, and go to doctor appointments.
- The implicit finding here is that frequent service must extend well beyond standard peak hour usage: many trips occur during off-peak hours and involve commutes to medical and commercial centers as well as employment hubs.

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- The next set of questions asked riders about service quality indicators, including bus arrival time, what factors they see that cause delays in bus service, and bus stop features like shelters and benches.
- When we asked bus riders about the reliability of buses, many riders recounted the same stories. Long wait periods, buses not arriving on time, and sometimes buses not even showing up.
- Over 60% of bus riders claimed that their bus arrived late three (3) or more times on average per week.
- This includes 21%, or nearly one out of every five, who claimed that their bus arrives on average seven (7) or more times late per week.
- Riders feel this way because when using the pre-printed paper schedule or mobile-planning route apps, buses are arriving 15 or more minutes after scheduled arrival time.
- This leaves riders to wait long periods of time, often in unfavorable weather, spend additional money on cabs or ride sharing apps after already purchasing a monthly bus pass, or walk to their destination.

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- When asked about the causes of bus delays, riders listed several different reasons they believe led to delays.
- Over 74% of bus riders surveyed listed traffic as being the cause of their bus delay.
- About 33% of bus riders stated that slow on-boarding causes slow buses.

[NEXT SLIDE]

- In regards to bus stops, many bus riders noted that their bus stop is nothing more than a simple sign stuck in the ground and were looking for stops to be more substantial.
- 53% of bus riders claimed that their bus stops do not have any shelters or benches. This means that on top of long wait times, one out of every two rider is waiting outside in the cold, heat, rain, snow, or under a store awning for their bus.
- Riders remarked that lack of shelters and benches makes the bus wait unpleasant and uncomfortable which makes the bus waits feel even longer.

[NEXT SLIDE]

- In New Jersey, the bulk of carbon emissions is generated by diesel-powered vehicles. So, we asked riders if they worry about air pollution from buses in their neighborhood.
- 43% of riders are concerned about air pollution and the health impact caused by carbon emissions from buses in their neighborhood.
- Our executive director will speak more to this, but it's clear that riders want to see New Jersey Transit invest in cleaner bus technologies.

- The legislature should supply adequate funding for NJT to purchase electric vehicles.
- One way to arrive at that funding--and double down on reducing vehicular pollution and meeting our climate goals--would be to sign on to the Transportation and Climate Initiative.

[NEXT SLIDE]

- In response to the deficiencies riders noted, they then listed several requests for improvements that they would like to see enacted immediately.
- Consistent with complaints of overcrowding, lack of sufficient buses, lack of late service on weekdays, and limited or no weekend service, 64% of surveyed riders stated that more buses and buses with expanded capacity (articulated buses) are needed on their routes.
- Additionally, 46% of bus riders claimed that prioritizing buses on streets with dedicated bus lanes would improve travel time. Riders noted that beyond cars illegally parked in bus stops, their buses are constantly fighting with other vehicles to get back into traffic.
- All of this causes greater traffic congestion and further slows down buses.

[LAST SLIDE]

- This is no surprise as the state of New Jersey has merely eight miles of dedicated bus lanes which include Raymond Boulevard in Newark, Sip Avenue in Jersey City, Route 9 in Middlesex County, and the express bus lane for buses traveling on I-495 through the Lincoln Tunnel.
- By contrast, New York City alone has over 120 miles of bus lanes.

- The survey underscores the importance of the bus network.
- We know that NJ Transit has heard our call for better service and that the bus system redesign efforts are on the way.
- We applaud NJT for taking the first steps towards improving bus service.
- There's a lot more work to be done at NJ Transit to improve bus service--but they also need the support of lawmakers to make it happen.
- To that end, we are calling on Trenton for funding and for local municipalities to improve street designs including bus lanes to help move buses faster through traffic.

Thank you again for your time.

BUS RIDER SURVEY

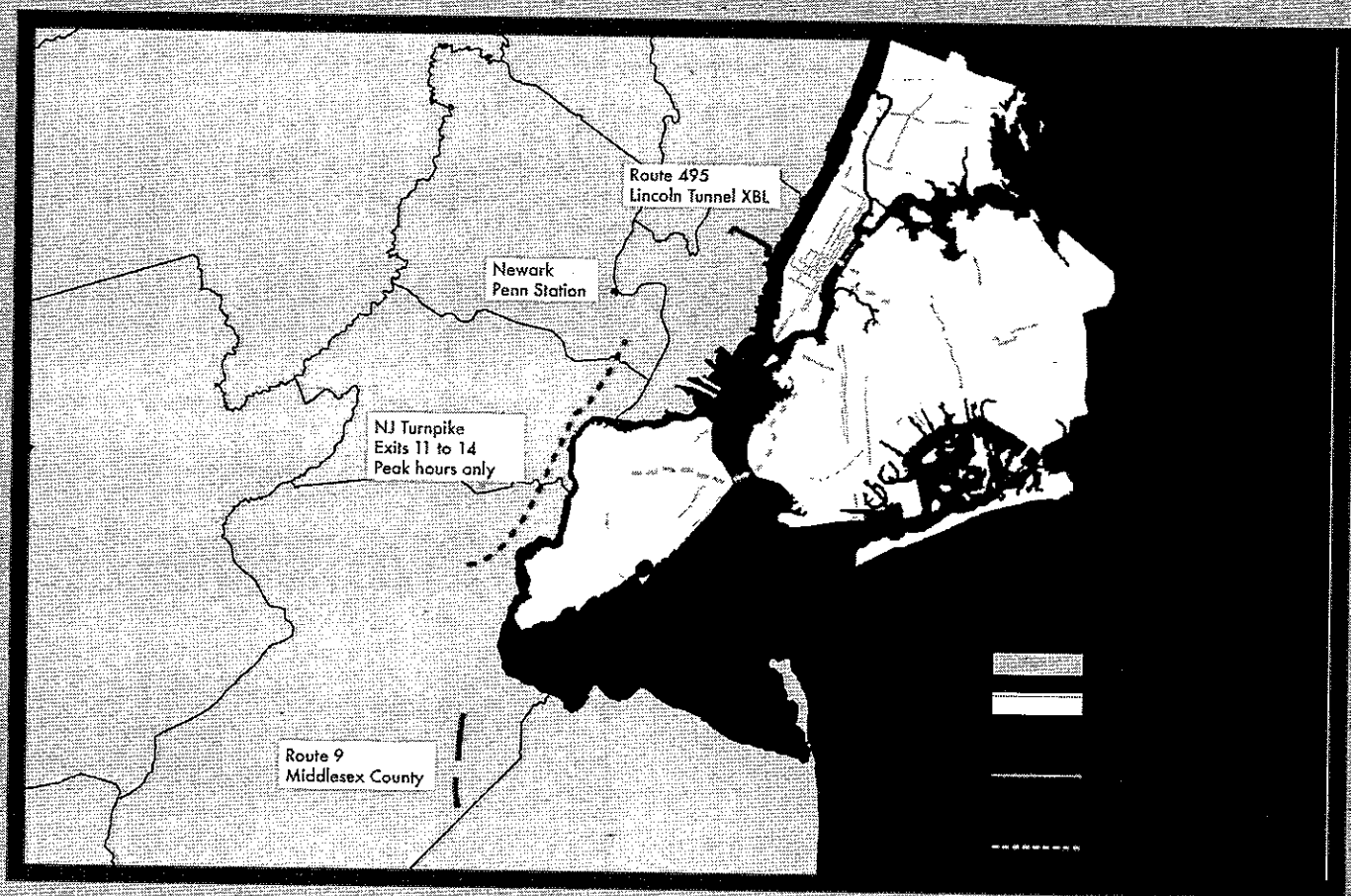
What do riders think of NJ Transit buses? TSTC asked.

Over the course of three months, we surveyed 250 bus riders at bus stops in Newark, NJ near the intersection of Broad St. and Market St. and in Elizabeth, NJ on Broad St.

TRI-STATE TRANSPORTATION CAMPAIGN



Bus lanes in NJ vs NYC



Testimony before the Senate Select Committee on New Jersey Transit

Nickolas Sifuentes, Executive Director, Tri-State Transportation Campaign

December 12, 2019

[TITLE SLIDE]

Good afternoon. I am Nick Sifuentes, Executive Director of Tri-State Transportation Campaign. Thank you for the opportunity to address the committee today.

You've already heard Janna address fundamental concerns with the operations of NJ Transit, including the consistent and debilitating lack of state funding that has brought the agency--and our transit system--to its dire state, and have heard Kevin discuss the results of our survey of hundreds of NJ Transit bus riders and the importance of improving bus service statewide.

I want to highlight one important survey result: the 43% of riders who identified road pollution from buses as a core concern. I would preface my remarks with the important caveat that buses are inherently more climate-friendly than single-occupancy vehicles. That being said, NJ Transit's aging fleet of buses contribute unduly to diesel pollution and inhibit New Jersey's ability to meet its climate goals and protect residents from unhealthy air that can lead to asthma, heart disease, and other pulmonary illnesses. This is especially true in frontline communities that are already overburdened by pollution and the resulting illnesses caused by a completely preventable health hazard.

[FIRST SLIDE]

You likely know that across the Hudson in New York City, the Metropolitan Transportation Authority, or MTA, just released its five-year, 2020-2024 Capital Program. In that program, the authority has dramatically leapfrogged NJ Transit in committing to full electrification of its fleet of nearly 6,000 buses by 2040, with a significant ramp-up in electric bus procurement in the 2020-2024 plan.

Specifically, the MTA is committing to "transitioning to a zero-emissions all-electric fleet by 2040 to improve air quality and reduce greenhouse gas emissions." Not coincidentally, with this year's passage of the Climate Leadership and Community Protection Act, or the CLCPA, New York is now a leading state in the fight against climate change, and the MTA's commitment to a clean fleet is in line with the state's new legislative mandate to reach 85% emissions reductions from a 1990 baseline by 2050, with a goal of going fully zero-emissions beyond that.

The MTA's timeline is aggressive: it plans to purchase the last internal combustion engine bus no later than 2029, with all polluting buses retired from service by 2040. In order to meet that goal, the MTA will invest not only in electric buses themselves, but in the underlying bus depot electrification and power upgrades necessary to ensure its fleet can be adequately charged.

[NEXT SLIDE]

To that end, the MTA has made significant financial commitments to bus operations. You'll see here that in this capital plan the MTA is investing over \$3.5 billion in buses alone in the next five years, including beginning the electrification process at eight depots across the city. Note that while every agency's electrification process varies--this is a bespoke process, not off-the-shelf--the massive limitations of space and infrastructure in New York City mean the MTA's depot electrification will likely be the most complex in the nation. And yet the authority is still making the commitment, because it, and the state leadership that oversees it, knows that it's the right thing to do.

[NEXT SLIDE]

All told, the MTA is purchasing 500 buses through the 2020-2024 period, in addition to 15 electric buses already operated on three routes in New York City and an additional 90 buses coming online in the current capital plan timeline. While this represents slightly more than 10% of the overall fleet, the MTA's procurement timelines call for a dramatic ramp-up in the subsequent 2025-2029 capital program in order to meet the deadline for final internal combustion engine bus purchases in 2029. The impact is clear: 37,000 tons of carbon emissions will be entirely prevented, and diesel pollution from public transit buses will of course fall to zero.

[NEXT SLIDE]

By contrast, let's examine NJ Transit's commitment to electrification. Now, we all know that the agency has been hamstrung by a decade of neglect and underfunding. The end result of that process is that NJ Transit is often left to cobble together service on a shoestring budget and a skeleton crew.

But there are some positive signs at the agency: PTC installation is finally nearing completion. Cancellations, while still too frequent, are down from last year. And the agency is beginning the process of improving the bus network. But one area where the agency has been absent is electrification. Compared not only to New York City, but the 60-plus agencies around the country that have made massive strides toward deployment of non-polluting, zero-emissions buses, the agency's lack of progress is an embarrassment, and the victims of this failure are the 478,000 daily riders and millions of residents living along corridors of carbon emissions.

So here's what we have: NJ Transit's electric bus commitment, if one can be so generous as to call it that, consists primarily of a \$10 million dollar pilot project in Camden that will deploy a meager 8 buses. By the same target date--mid-2021--the MTA will be operating over 100 buses on a variety of routes citywide, and rapidly scaling up to its goal of over 600 buses by the end of 2025.

Ax

[LAST SLIDE]

Here you can see the commitments on both banks of the Hudson side-by-side. The point I want to underscore here is that with 5,725 buses, the MTA is the single largest purchaser of buses in the North American market every year, buying as much as 10% of all buses sold. They are very much in the driver's seat when it comes to shaping the future of the bus industry writ large--and if NJ Transit doesn't step up, that means the agency will be left in the dust despite having one of the largest bus fleets in the nation. In Los Angeles, another major purchaser of buses that has already made its own commitments to electrification, bus manufacturers like BYD and ProTerra are opening up electric bus factories and are providing valuable manufacturing jobs to local residents. New York is poised to take advantage of the same ability to shift the market. New Jersey is about to miss out not only on the climate and health benefits of bus electrification, but on the ability to help shape the future of the bus market and dictate the agency's needs clearly to eager manufacturers--and we're about to miss out on good manufacturing jobs in places that need them too.

Senate Bill 2252, which is before you now, offers a clear path toward electrification. While the timeline for public transit electrification will likely need modification, there should be no compromise on the end goal: full electrification of NJ Transit's entire bus fleet by 2040. But in order to see that commitment through, NJ Transit will also need significant funding--likely in the billions over the next two decades--to make the fleet and infrastructure needs a reality. Some of that investment should come from utilities, which must also negotiate rate agreements with the agency. But the lion's share should come from the state.

A clear source of funding is the Transportation and Climate Initiative, the regional effort comprising 11 states and Washington DC to appropriately price transportation's contribution to climate change by creating a cap-and-invest program for fuel products. With a memorandum of understanding from the states coming in roughly five days' time, it is time for New Jersey to play a lead role in the design of the program. For too long, New Jersey has taken a backseat as other states, like Massachusetts and Maryland, dictate program development. Furthermore, revenues from that program must be dedicated to transit infrastructure improvements and electrification. If we are truly going to see the full extent of the virtuous cycle that TC1 could present, we have to use the revenues to improve transit and transportation options for all.

I want to close by thanking you for the opportunity to testify before you today. We are at a critical juncture in New Jersey's transportation future. With thoughtful planning and leadership, we can chart a course toward becoming what our state and our country needs at this moment, a "greenest generation" that is committed to a clean, effective, efficient transportation network--or we could double down on the decisions that will leave us with a state choking on congestion and pollution. That this committee exists is a strong indication that we will choose the right path. We look forward to continuing to work with you as you make New Jersey a leader on transit and climate change solutions once more. Thank you.

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BUS ELECTRIFICATION IN NEW JERSEY & NEW YORK

TRI-STATE TRANSPORTATION CAMPAIGN



Comparison

NJT

Fleet size: 3,052 buses

Mid-2021:

8 zero-emission buses

Bus charging stations

No commitment to fully
electrify fleet

\$10 million investment

MTA

Fleet size: 5,725 buses

2020-2024:

500 zero-emission buses

Modification of 7 bus depots

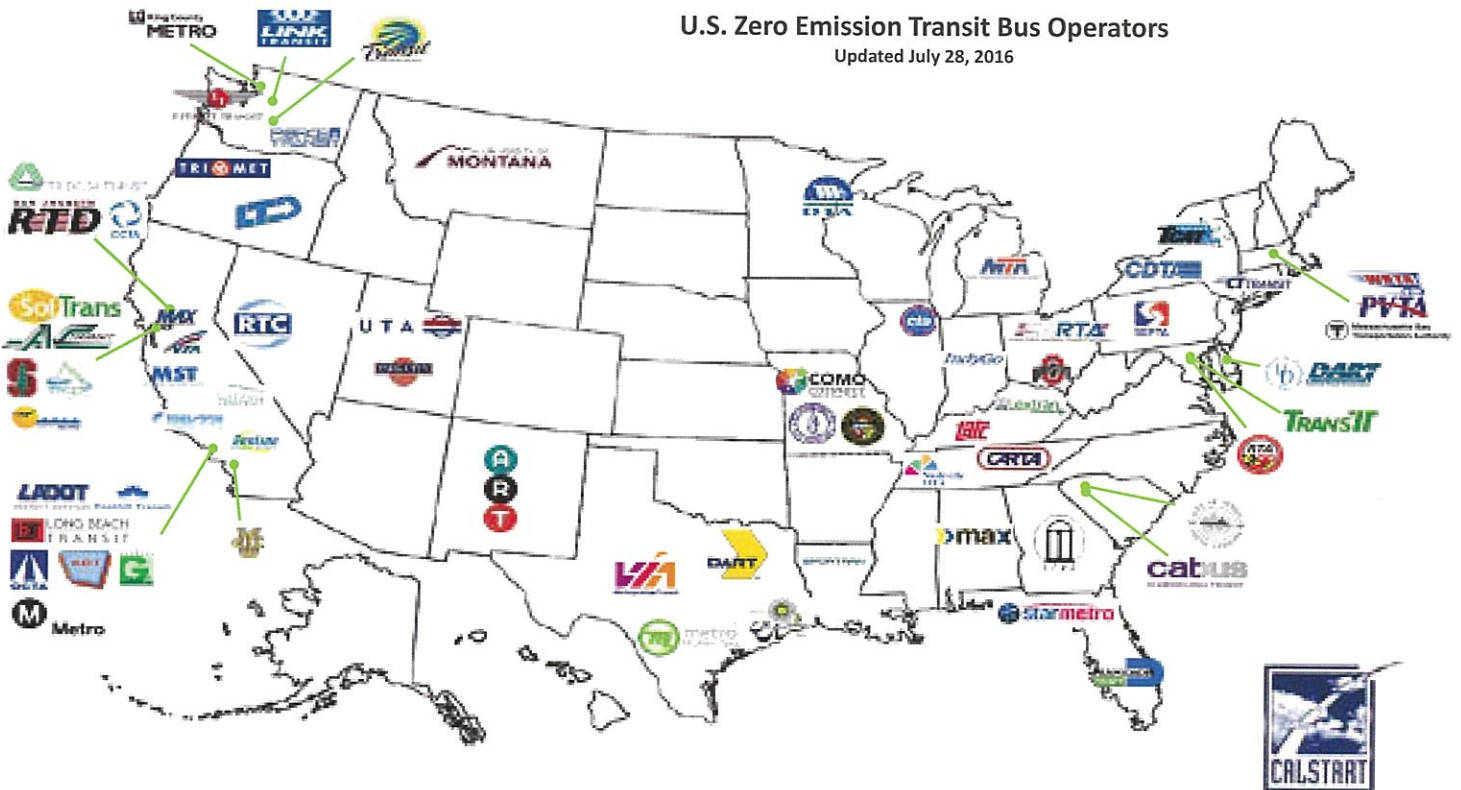
Commitment to fully electrify
fleet by 2040

Cost TBD

Sources: NJ Department of Environmental Protection, 2019
MTA 2020-2024 Capital Program, 2019

U.S. Zero Emission Transit Bus Operators

Updated July 28, 2016



MINNESOTA

Metro Transit plans to introduce 125 electric buses onto the city's streets by 2022.[13] The first bus will debut in June 2019.[14] Eight electric buses will serve a new \$37 million C Line rapid bus route - a nine mile line connecting the Brooklyn Town Center with downtown Minneapolis, through the city's north side.

NEW YORK

The **Metropolitan Transit Authority (MTA)** in New York City is the nation's largest municipal bus network and aims to transition it's 5,700 buses to electric by 2040.[15] The MTA is testing 10 buses and has plans to purchase 60 more by 2019. The MTA is also working on a system-wide redesign to increase ridership.

OREGON

TriMet, owner of the nation's 11th largest bus fleet, committed to converting its entire bus fleet from diesel fuel to battery-electric or other non-diesel vehicles by or before 2040[16]. In September 2018, the board of directors unanimously approved the plan, which calls for spending \$53 million over the next five years to buy 80 battery-electric buses.

TEXAS

Capital Metro announced its vision for Project Connect—the regional transit plan that has been in the works since 2013—will include autonomous vehicles, more connected bus routes and a fully electric fleet.[17]

WASHINGTON

In 2017, **King County Metro**[18] announced plans to purchase 120 all-electric buses to be added to their existing fleet of roughly 1,400 buses—most of which are hybrids that rely on both diesel and electrical power—by 2020. The county also has a goal of electrifying its entire bus fleet by 2040.



NEW JERSEY SHOULD BE NEXT TO COMMIT TO A 100% ELECTRIFIED BUS FLEET

SOURCES FOR THE ABOVE CAN BE FOUND AT WWW.TSTC.ORG/CONSECTETUREXERCITATION

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Tri-State Transportation Campaign



ELECTRIFY NJ TRANSIT'S BUS FLEET NOW!

August, 2019

NJ TRANSIT MUST COMMIT TO A 100% BUS FLEET ELECTRIFICATION BY 2040

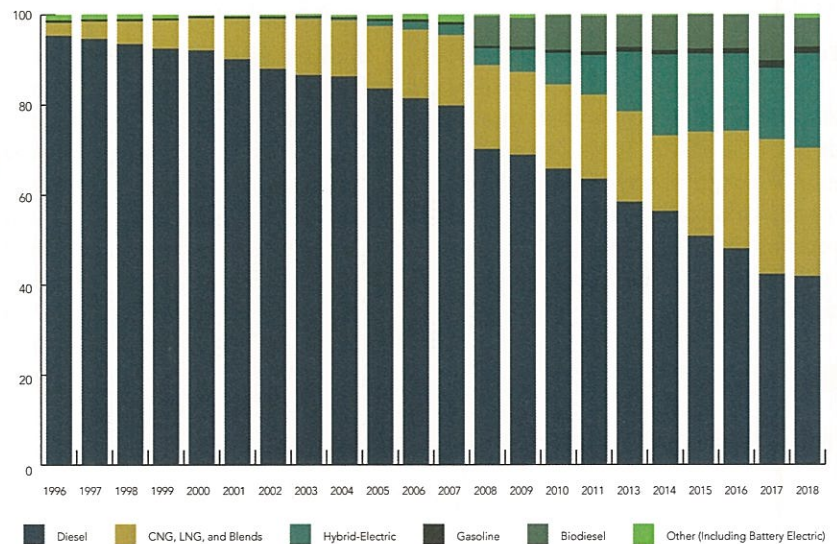
In Oct. 2017, the mayors of 12 major cities, including Los Angeles, Seattle, London, Paris and Mexico City, announced[1] they would purchase only zero-emissions buses by 2025. Already, more than 60 agencies[2] have demonstrated a commitment to electrifying bus fleets resulting in over 5,000 electric bus purchases annually. U.S. investments in electric buses are expected to rise 18.5% to \$1.948 billion from \$745 million[3] in 2018. By 2025, 33% of the country's buses will be zero emission thanks to pledges made by transit agencies.[4]

The transportation sector is responsible for contributing one-third of the nation's harmful GHG emissions. In New Jersey, that share jumps to nearly half. States nationwide are keeping this in mind as they make important decisions about the future of their transportation infrastructure. From buses to trains to shared rides, transit officials are transitioning to electric modes of transportation that are cleaner, cheaper to maintain, and save money on fuel.

In New Jersey, however, NJ Transit has not made a commitment to electrifying their fleet.

**MORE THAN 60
TRANSIT AGENCIES
NATIONWIDE
HAVE DEPLOYED
ELECTRIC BUSES**

Percentage of Transit Buses by Fuel Type



CALIFORNIA

In 2016, the Board of Directors for the **Antelope Valley Transit Authority**[5] set a goal of becoming the nation's first fully electric fleet[6] by the end of 2018, "100% Green by 2018," and plans to convert all of the agency's aging diesel buses to a 100% battery electric bus fleet with up to 85 new all-electric buses.

The **Los Angeles Department of Transportation** will receive a shipment of 25 electric buses in 2019 as it transitions to an all-electric bus fleet by 2030. Other transportation agencies

in the area are switching their fleets as well, including the **Los Angeles County Metro Transportation Authority's** 2,200 bus fleet (the largest in the state).

Foothill Transit (West Covina, CA) committed to go all electric by 2030[7].

San Francisco Municipal Transportation Agency (SFMTA) committed to purchasing all-electric buses by 2025 in order to have a 100% electric bus fleet by 2035.[8] This is a critical component to the City's commitment to a net-zero carbon footprint by 2050.



ILLINOIS

In 2014, the **Chicago Transit Authority** (CTA) purchased two buses as part of a pilot program to test the buses' ability to handle the extreme weather during the summer and winter. Based on the success of the pilot program, CTA requested proposals for 20-30 more[9] buses in 2018.[10] CTA's entire bus fleet is comprised of roughly 1,800 buses.

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New Jersey State Senate Select Committee on New Jersey Transit Hearing

Testimony of Kate Slevin

**Senior Vice President, State Programs and Advocacy
Regional Plan Association**

December 12, 2019

[TITLE SLIDE]

Good afternoon. My name is Kate Slevin, Senior Vice President of State Programs and Advocacy at Regional Plan Association and I am joined today by my colleague Nat Bottigheimer, RPA's New Jersey Director.

[WHERE WE WORK]

RPA is a non-profit civic organization that conducts research, planning and advocacy to improve economic opportunity, mobility, environmental sustainability and the quality of life for those who live and work in New Jersey and the rest of the New York City metropolitan region.

Thank you, Senate President Sweeney and Senate Majority Leader Weinberg, for convening this Select Committee and for holding these hearings, and for your strong leadership on transportation issues.

[SLIDE FOR GHG STAT/ECON STAT]

Improving and expanding New Jersey Transit service throughout the state is vitally important to New Jersey's economy, environment, and to the hundreds of thousands of people who use it and rely on it daily. Using transit produces 50% less carbon per mile compared to automobiles, and is a necessary component of a state climate strategy when transportation represents the single largest component of greenhouse gas emissions.

[FOUR RECS FOR TODAY SLIDE]

To make progress on this critically important mission, RPA makes the following four recommendations which we will discuss in detail today.

1. **Provide reliable, increased funding for transit, especially transit operations**
2. **Prepare for a shutdown of the Hudson River tunnel**
3. **Improve the bus system, especially in New Jersey's cities**
4. **Work with NJ Transit to develop a strategic plan with clear reporting requirements, and connect it to a long-term vision**

Provide reliable, increased funding for transit

[TITLE SLIDE]

For too long, New Jersey Transit has suffered unpredictable funding, especially for day-to-day transit operations.

Annual uncertainty about resources available has a paralyzing effect on transit agencies. This hampers not just the ability to meet basic needs, but also the ability to plan strategically for the future. This diagnosis of funding came through loud and clear in last year's North Highlands Audit: funding is inadequate, uncertain, and unsustainable.

Every year, the agency is forced to transfer at least \$400M from its capital budget to meet basic operating needs. New Jersey Transit's operational and maintenance costs have risen nearly 30 percent in the past 10 years while subsidies have declined, forcing the agency to fund operations through dollars intended for capital projects to meet rising ridership demands. *We likened this process last year to using the college fund to pay for groceries.*

Fares have risen during this time, and now cover 60% of operations for NJT's rail service operating costs, a percentage that ranks among the highest in the nation.

While state support has grown somewhat over the past few years, anyone who consistently rides NJ Transit will tell you that the existing level of support allows only basic and unreliable level of service. Service is infrequent and trains and buses are overcrowded. Again, the North Highland report underscored this: on-time performance

was found to be highly variable, a key indicator that physical assets are in dire need of repair, upgrade, or replacement.

While New Jersey Transit's on-time performance for rail was around 91 percent (2017), the main commuter service line (NEC) stands at 85 percent. The reliability of the assets is getting worse with a six percent decrease in mean distance between failures, or the distance between breakdowns, for the rail cars in the last two years. The operation of the assets (dwell times, dispatch delays, and delays caused by other operators) contributes to over 50 percent of the total delays on average. And cancellations are frequent due to undersupply of engineers and other staff.

NJ Transit has started working on these issues, but without more reliable funding along with reforms within the agency that I will speak to in a moment, success will be limited.

The Legislature and Governor must identify new, dedicated sources of funds, that NJ Transit can count on for the long-term. These funds must be sufficient to end the cannibalization of capital funds to meet annual operating requirements and to allow for an EXPANSION of bus and rail services to meet the growing demands of New Jersey's economy and residents.

At a bare minimum, you can estimate about \$60 million increase for labor contractual obligations annually, so if the state wants to see substantial improvement on the service side, state allocations will have to grow at an even faster pace.

To end the diversion of capital funds for operations -- -- and to provide a stable foundation for strategic planning and strategic behavior, we recommend two specific actions.

First, identify a regular, forecastable source of NEW revenue dedicated to supporting transit operations. There are any number of potential sources for such revenues that have been discussed, including restoration of sales taxes to past levels, permanent extensions of business income tax surcharges, and establishment of a so-called "Millionaire's Tax."

RPA also supports generating revenue from new fees established by the Transportation Climate Initiative. The Transportation and Climate Initiative (TCI) is a regional cap-and-invest program for transportation emissions across 12 Northeast and Mid-Atlantic states. Participating states have formally agreed to move forward with a policy to reduce transportation emissions, and help address carbon emissions.

The system would work by setting a ceiling on the amount of carbon dioxide emissions in the 12-state region that stem from combustion of fossil fuels used in transportation. Wholesalers and distributors of motor fuels throughout the region would bid against one another in an auction of "carbon allowances" for the right to generate emissions. The payments received by the participating states would be shared and made available for other productive uses. California has adopted such a system, and 25% of revenues are dedicated to California transportation.

RPA recommends that the Legislature support New Jersey's participation in the TCI, and should advocate for the dedication of TCI-generated funds for transit-operations, system reinvestment, and transit network expansion.

Because TCI-generated revenue may not be available for several years, RPA also recommends that the legislature identify other funding sources that could be tapped in the near-term to meet the needs of transit operations, investment, and system growth.

For example, we continue to be strong supporters in NJ, NY and CT for new fees on busy highways to manage traffic and raise revenue for transportation. NYC's new congestion pricing program will result in \$15 billion into the next capital program of the MTA, all dedicated to fixing subways, buses and commuter rails. In CT, we supported new tolls to fund the transportation capital program.

Longer term, in our Fourth Regional Plan, we called for bolder strategies, such as the replacement of the gas tax with a fee per mile driven over the next few decades.

Whatever the funding approach, a capital investment strategy to fix the system will not come cheap.

Prepare for a shutdown of the Hudson River tunnel

[TITLE SLIDE]

Every day that passes without Federal funding and a firm schedule to build and repair rail tunnels under the Hudson River is a day closer to a long-term closure - planned or unplanned - of rail tunnels for NJ Transit and Amtrak.

Let us be clear, this shutdown would be an economic calamity for which we are woefully unprepared. The possibility that a tunnel closure would coincide with disruptions related to the rebuilding of the Port Authority Bus Terminal in New York is truly frightening.

[PICTURE OF OUR REPORT]

Our *Preventable Crisis* report which we released earlier this year, looked at the effect of a possible shutdown of the existing Hudson Tunnel for four years. The report underscored this need.

[40% of NEW JERSEY HOMES AND THOUSANDS OF NYERS... SLIDE]

We estimated that travel delays resulting from even a partial closure of the Hudson rail tunnels to Penn Station would result in a cost to the national economy of \$16 billion in direct impacts; \$7 billion in tax revenue across the region, with the largest portion of those costs impacting New Jersey; and a \$22 billion reduction in real estate value in New Jersey.

[A TUNNEL SHUTDOWN WOULD IMPACT THE ENTIRE TRANSPORTATION NETWORK SLIDE]

RPA's Hudson Tunnel closure study showed how riders displaced from New Jersey Transit trains would filter on to other systems like PATH and commuter buses. It also showed that the new drivers on the road displaced from transit in the peak period would cause travel delays for 250,000 New Jersey motorists of 10 minutes or more, and delays of 60 minutes or more for 100,000 motorists. *A failure in the rail infrastructure is not just an inconvenience to rail riders....it is a threat to everyone in the transportation network.*

New Jersey's and New York's future success becomes increasingly intertwined every year. The importance of New York City jobs for New Jersey's economy -- and of New Jersey housing and residents for New York's labor market -- has grown significantly in the past 20 years.

Every day, 424,000 New Jerseyans commute to jobs in New York City, or 1 out of every 8 employed residents of Northern New Jersey.

[COMPLETE REVERSAL OF GROWTH PATTERNS]

[JOB GROWTH 2000-2015]

Since 2005, 85% of new jobs created in the region were created *IN* New York City. As a result, the City's economy is growing in regional significance.

Reflecting that change, there has been major growth in travel to New York for employment since 2000, with 119,000 more New Jerseyans making a daily trip since then.

The jobs that New Jerseyans commute to in New York tend to be high-wage jobs, providing an outsize positive impact on New Jersey's economy and to state and local budgets.

The value of transit connectivity to New York is reflected in New Jersey's real estate values. RPA research has shown that for homes within two miles of a rail station, for every minute of travel time savings to the city a home will increase an average of almost \$2,000.

[CROSSINGS INTO MANHATTAN]

These numbers combined with the existing vulnerability of the system are worrisome. Consider that:

- The Port Authority Bus Terminal badly needs reconstruction, as does the Helix structure that leads to the Lincoln Tunnel.
- 60% of train delays in the Hudson River Amtrak rail tunnel are due to signal malfunctions directly attributable to saltwater intrusion during Superstorm Sandy, and there are regular delays due to spalling concrete and catenary structure falling from the tunnel roof.
- The Portal Bridge needs replacement and, like the rail tunnel, is stuck in the doldrums at the Federal level. The Herculean efforts that have been made to fund a replacement bridge, a new tunnel, and tunnel repairs are almost entirely dedicated to repair existing infrastructure, very little will be used to add critical capacity.
- PATH trains are full to the brim during commute hours, and mid-day repairs make service unpredictable at other hours; many stations are not long enough to accommodate 10-car trains, are not fully accessible, and need major investment to accommodate current and forecast future ridership.
- Ferry service offers a glimmer of hope, but ferries require dock space on an increasingly crowded Hudson River waterfront, and new transit systems are needed to get people to and from docks on both sides of the river and make ferry service viable for large numbers of new commuters

- All this to say that there are only 6 Hudson River crossings, this is woefully inadequate especially when compared with the 18 East River and 15 Harlem River crossings.

The legislature and governor must task an organization with responsibility for coordinating Trans-Hudson transportation well in advance of a disaster; to share that plan with the public, and to invest ahead of time in actions that support continuous connection between New Jersey's and New York's tightly linked economies.

The degree to which these systems are each operating "in the red zone" -- not the NFL red zone that means close to touchdown, the performance red zone that means close to meltdown -- means that a failure in any one system will put an almost unsupportable burden on the others. We cannot afford a cascade of infrastructure failures.

Improve the bus system, especially in New Jersey's cities

[TITLE SLIDE]

More than half the transit trips made each day in New Jersey are on a bus, but buses get much less than half the attention and investment.

NJ Transit has more than 3,000 buses operating on more than 250 routes and almost 6,300 route miles. These buses make more than 15,000 trips each day, serve more than 16,000 bus stops, and carry about 33 people per trip on average—and many more on high ridership routes.

Despite the importance of bus travel to so many New Jersey residents, buses remain second-class citizens on New Jersey's roads. A bus with 25 passengers on it is given as much opportunity to get through a traffic light as a car with one occupant. Bus trips typically take much longer than the comparable car trip, and very little is done on our roads to move people on a bus past congestion caused by individuals in cars.

While there have been strides in making information available about bus arrival times, compared to rail riders the State's bus passengers have access to much less extensive information about routes, schedules, and other information. In fact, there is no NJTransit bus map.

Improving the quality of bus service is not just important for the 478,000 trips per day made in the State, it's also important as an investment in the places that will be powering our growth for the coming decades.

Focusing more attention and resources on buses is important to support the lives of those who depend on bus transit and, increasingly, those who choose not to own cars. As communities around the State make good on their commitments to deliver more housing, and as cities around the State grow and revitalize, bus service is a strategic element that can reduce traffic impacts, support health and safety, and accelerate community reinvestment.

These improvements can also be made faster and at a lower cost than rail improvements. Buses offer the greatest potential in the near term to increase the transit system's reach, to connect affordable communities with employment centers, and to support equitable growth in New Jersey's established urban centers.

The legislature should demand, and support, NJ Transit and NJ DOT investments that: a) speed buses along their way; b) provide better information to riders about their travel options; c) integrate bus and rail trips more seamlessly; d) update transit routes to match today's travel patterns; e) provide safer routes to, and more comfortable facilities at bus stops; and f) leverage technology advances in ride-share and micro-mobility services.

New businesses increasingly want to locate in established urban centers, in large part because the workforce they depend on has voted with its feet and gravitated to those places. The growth of employment in New York City compared to the region's suburbs makes that point.

For a city like Newark, better bus service is a crucial element of an economic development strategy that attracts business, encourages growth, and ensures that city residents will have access to, and will be able to participate in, a strengthened urban economy.

Today, people who commute to work in Newark travel predominantly by car, whether they are located in Newark or outside of the City. Of the travelers to Newark's 120,000 jobs, 22 percent -- about 26,000 -- take some form of transit. Of Newark residents who work in Newark, almost 60% of those 15,000 residents drive to work, a serious indictment of the quality of transit within the City.

Businesses seeking to locate in downtown Newark face a quandary: to have access to employees, they need either a walkable city and quality transit -- the kind of amenity they get in New York City -- or they need parking structures and roads that will get commuters to their jobs in cars.

Relying on auto access and parking structures makes development more expensive and the city less attractive, so new a business dependent on parking will spin off less benefits to its city neighbors and also degrade the environment it's moving in to.

By contrast, a transportation network that prioritizes transit and walkable streets to link businesses with workers means lower costs to businesses; fewer state subsidies required to make new investment economically feasible; and economic opportunity more available to city residents, not only those who already live there but those who increasingly want to make cities their homes.

We are pleased to be up here with Tri-State Transportation Campaign, an organization that shares many of these same goals.

Work with NJTransit to develop a strategic plan with clear reporting requirements, and connect it to a long-term vision

[TITLE SLIDE]

The legislature must demand, and support, articulation by NJ Transit and NJDOT, of a transit vision for New Jersey's future as part of a comprehensive economic development and mobility plan.

This vision should clearly acknowledge the importance of the economic growth of walkable, transit-accessible places that affordably house the workforce of the future. It should acknowledge the reality of climate change, sea level rise, and electrification as companion issues that must be addressed systemically. The vision should also adapt the models of past transit service delivery to the opportunities presented by new ride-share and micro-mobility technologies.

To start, New Jersey Transit should prepare a comprehensive statement of transit system capital and operating needs for the coming decade. The inventory of needs should be accompanied by funding needs and recommended implementation strategies and schedules.

Similarly, the agency desperately needs a five year strategic plan that includes clear benchmarks for things such as agency governance reform, transit service delivery, and customer communications. Such a plan permits the public to track and follow improvements. We are pleased to hear the agency is moving forward to advance a 2020 strategic plan, but that document needs near-term benchmarks.

For example, we know the agency has increased the number of locomotive engineer classes and hired more than 600 new bus operators over the past year. We know they have more than tripled construction contract awards to help rebuild infrastructure. We know they have launched a new app for fare purchases, schedules, and real time information

But absent a comprehensive five year plan, with a list of annual benchmarks the agency can publicly track and report, it is hard for elected officials and the public to believe the agency is on track to fix the system.

For the longer term, the Governor's office, New Jersey Transit and NJDOT must paint a detailed picture of an expanded statewide transit network and how it supports broader economic growth, environmental, health and housing affordability goals. Such a long term picture would include strategies for how to fund and deliver system extensions throughout the state that have already been planned, including light rail system expansions, new bus rapid transit routes, and the PATH extension to Newark Airport; and promote and encourage other low carbon transportation options like bike share, protected bike lanes and electric bicycle adoption in cities and downtowns throughout the state.

Thank you for your time today, and we continue to be here as a resource and partner for you and the entire Legislature.

[END SLIDE WITH KATE AND NAT CONTACT INFO]

New Jersey State Senate Select Committee on Transit

Kate Slevin

Senior Vice President, State Programs & Advocacy

Nat Bottigheimer

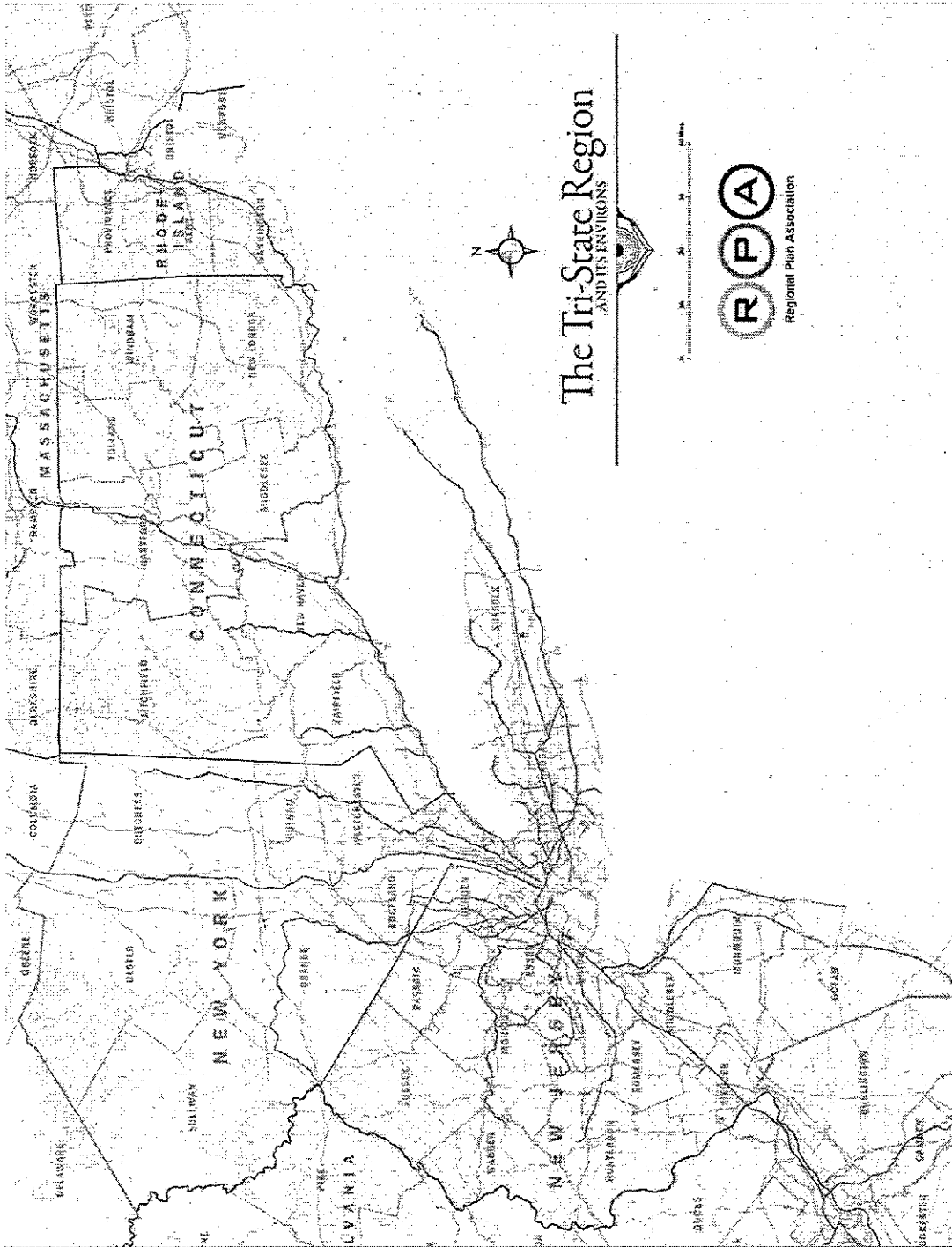
New Jersey Director



Regional Plan Association

3 states
31 counties
782 towns
23M residents

40x



The Tri-State Region
AND ITS ENVIRONS



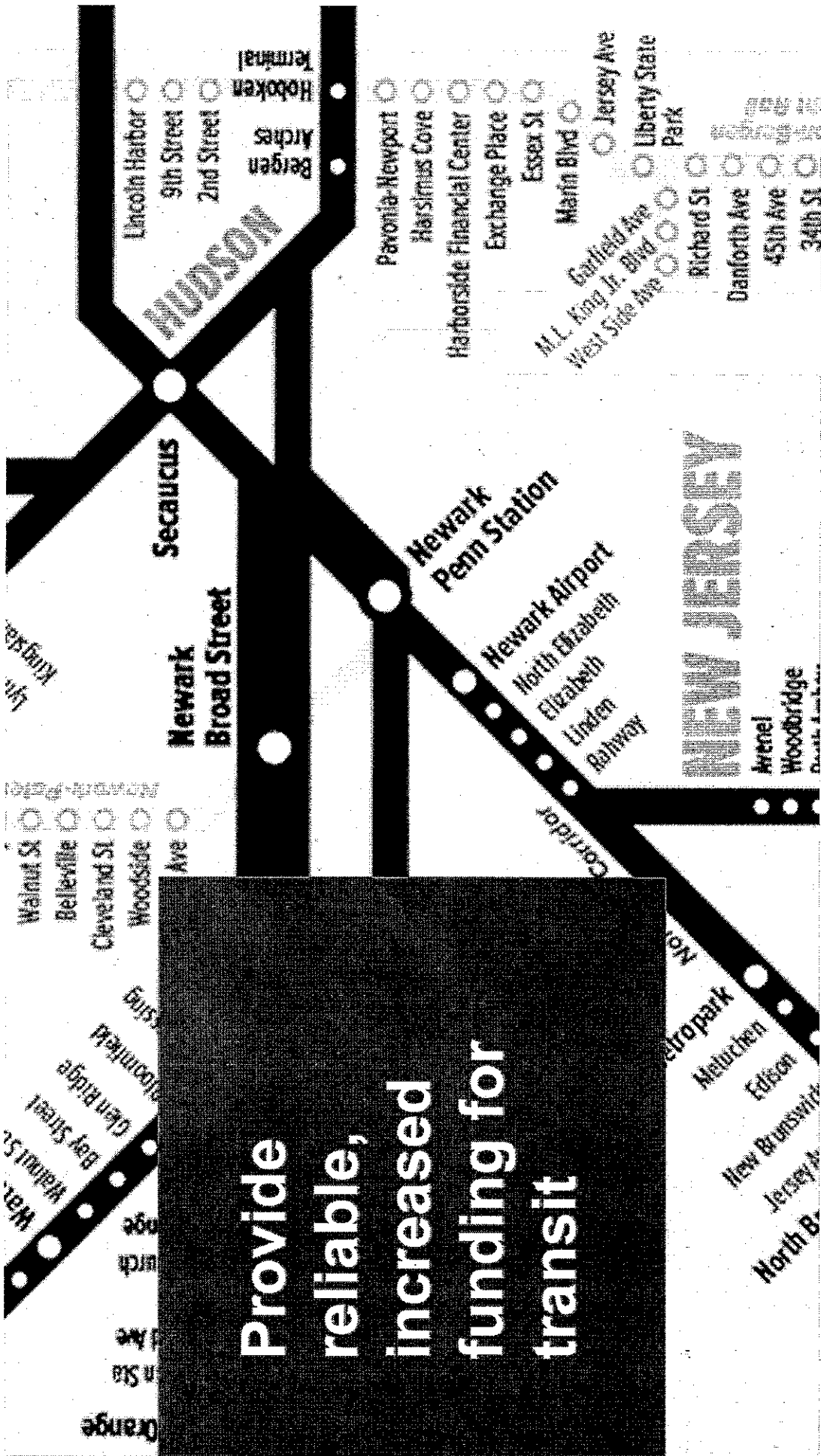
Regional Plan Association

Climate and Environment

1. Transit produces half the carbon per mile compared to car travel
2. Transportation the single largest contributor to greenhouse gas emissions

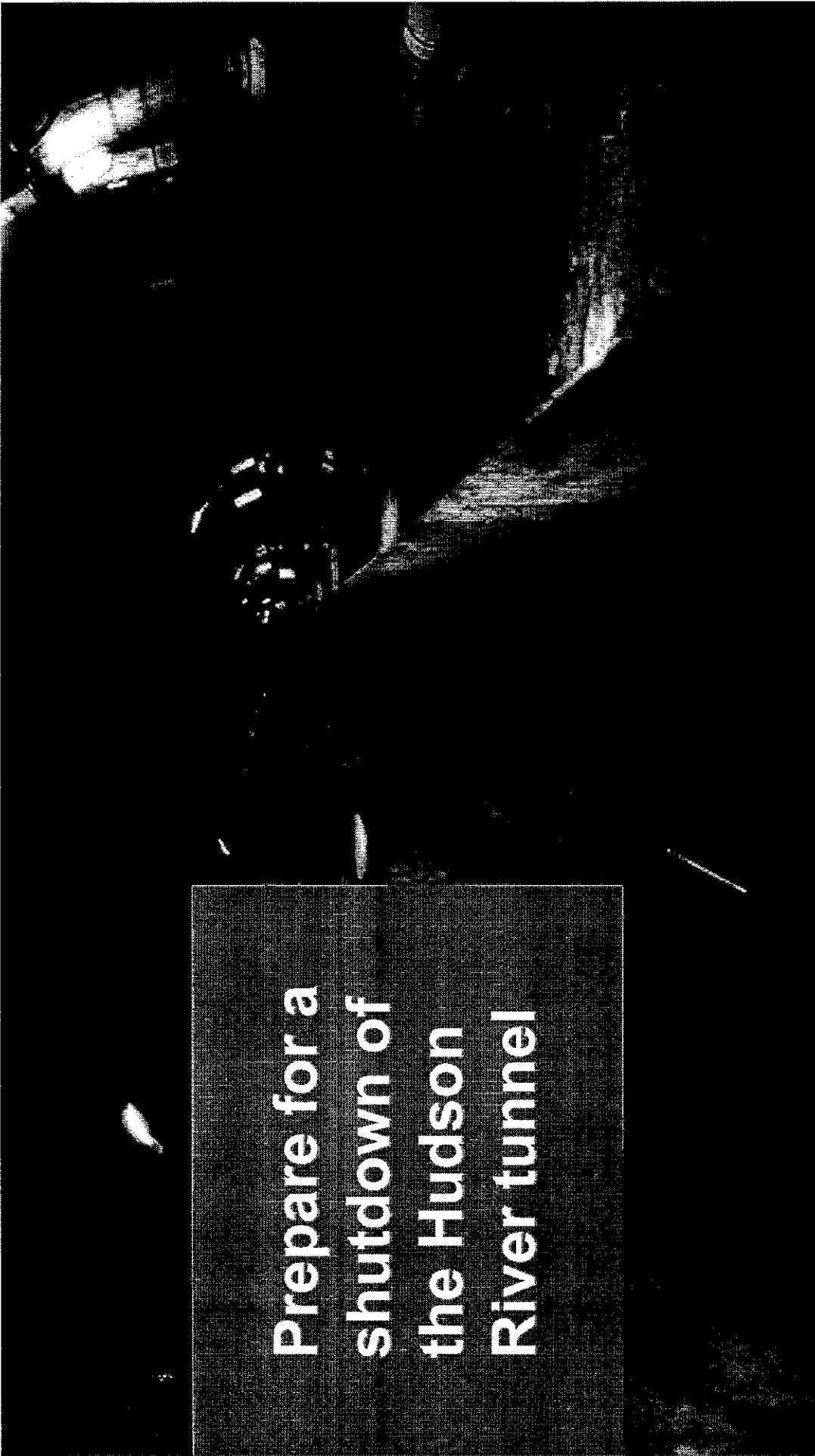
RPA's Recommendations

1. Provide reliable, increased funding for transit, especially transit operations
2. Prepare for a shutdown of the Hudson River tunnels
3. Improve the bus system, especially in NJ's cities
4. Work with NJ Transit to develop a strategic plan with clear reporting requirements, and connect it to a long-term vision



**Provide
reliable,
increased
funding for
transit**

43x



**Prepare for a
shutdown of
the Hudson
River tunnel**

44x

A Preventable Crisis

The Economic and Human Costs of
a Hudson River Rail Tunnel Shutdown



February
2018

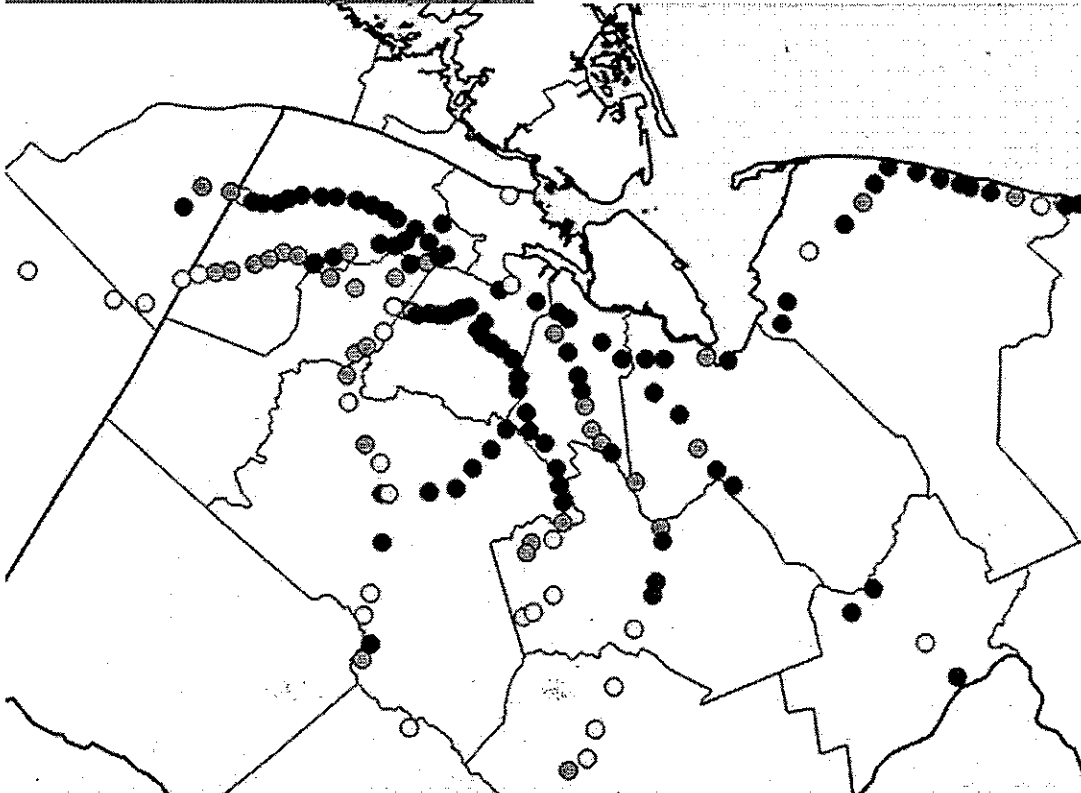
ARUP

Regional Plan Association



45x

40% of New Jersey homes and thousands of New York homes near train stations would lose ~\$22B in value



- Average home value reduction by station**
- <\$5,000
 - \$5,000 – \$10,000
 - \$10,000 - \$20,000
 - \$20,000 - \$30,000
 - >\$30,000

SOURCE: NJTPA model, U.S. Census, Experian, State of NJ Open Data, ARC Effect

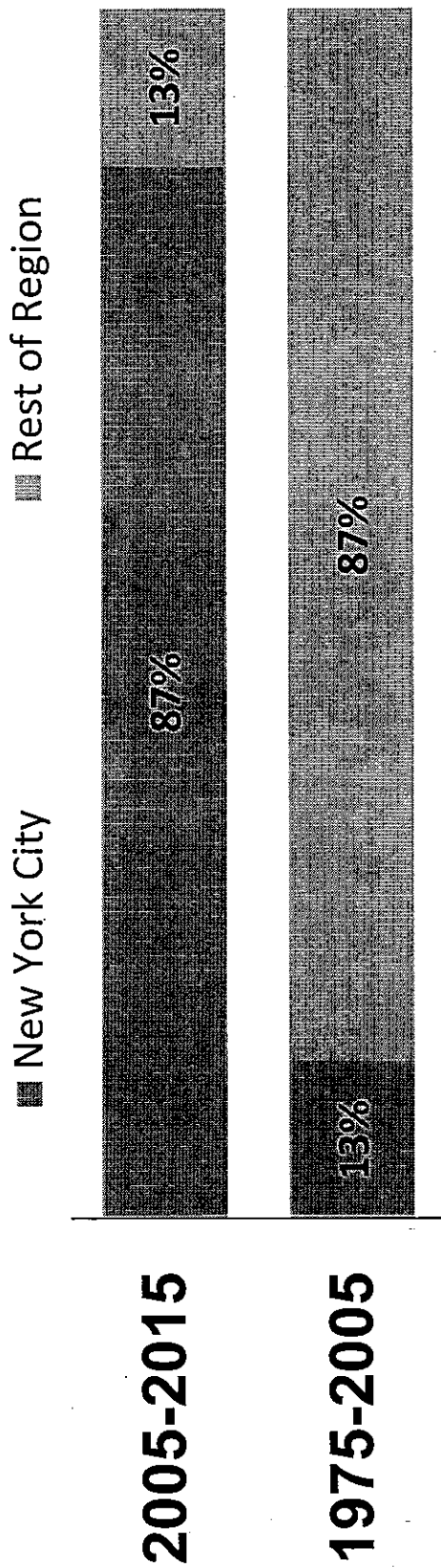
46x

**A tunnel
shutdown
would impact
the entire
transportation
network**

- **170,000** PATH and bus riders would experience more crowding and delays
- **245,000** drivers will see their commutes increase by at least 10 minutes
- **100,000** drivers will see their commutes increase by more than an hour a day

Complete Reversal of Growth Patterns

Percentage of Net New Jobs



48x

Job Growth: 2000-2015

■ New York City ■ Northern New Jersey ■ Long Island ■ Hudson Valley ■ Southern Connecticut



49x

Crossings into Manhattan

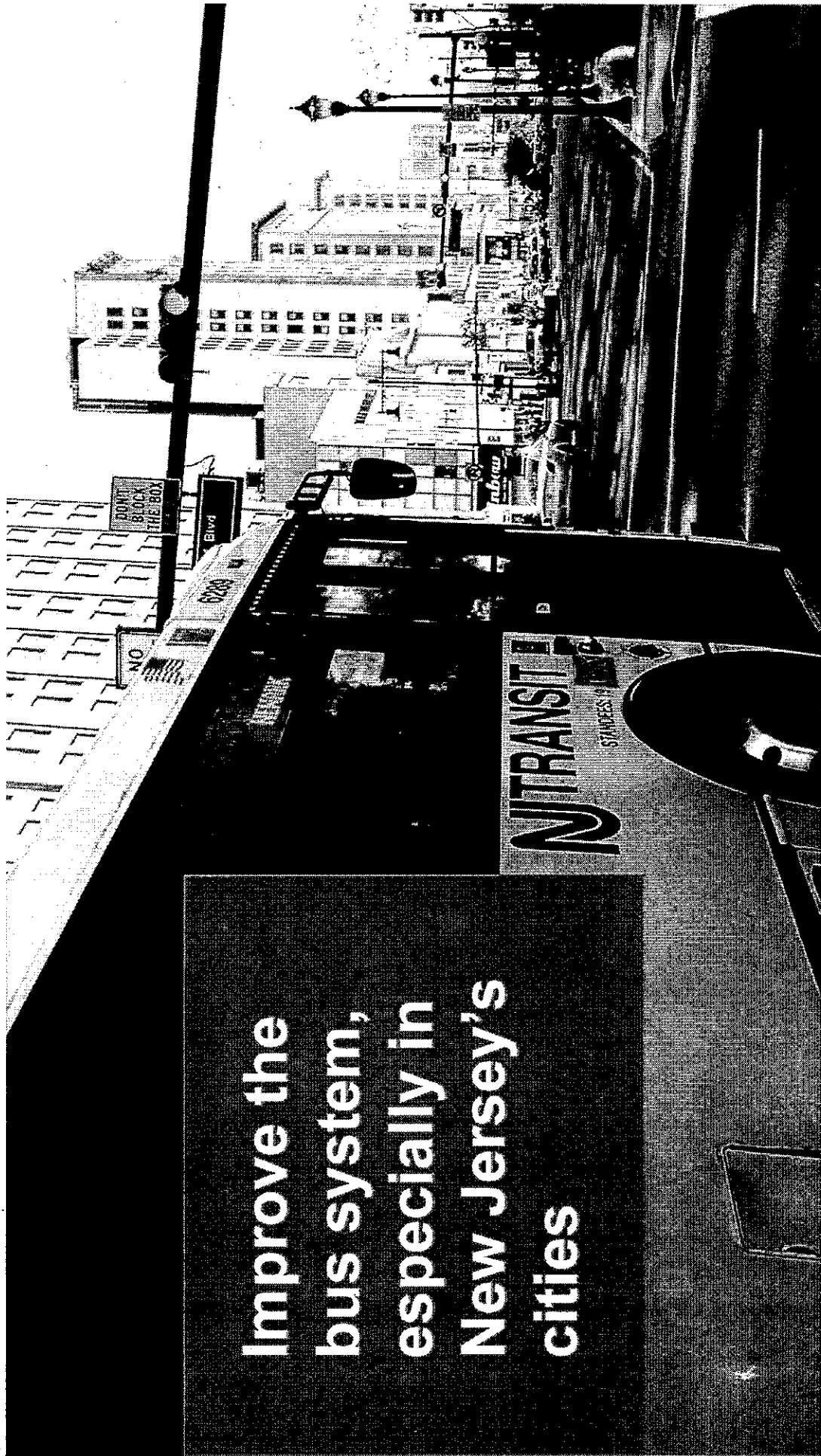
6 Hudson
River
1 Bridge / 5 Tunnels

15 Harlem
River
12 Bridges / 3 Tunnels

18 East
River
5 Bridges / 13 Tunnels

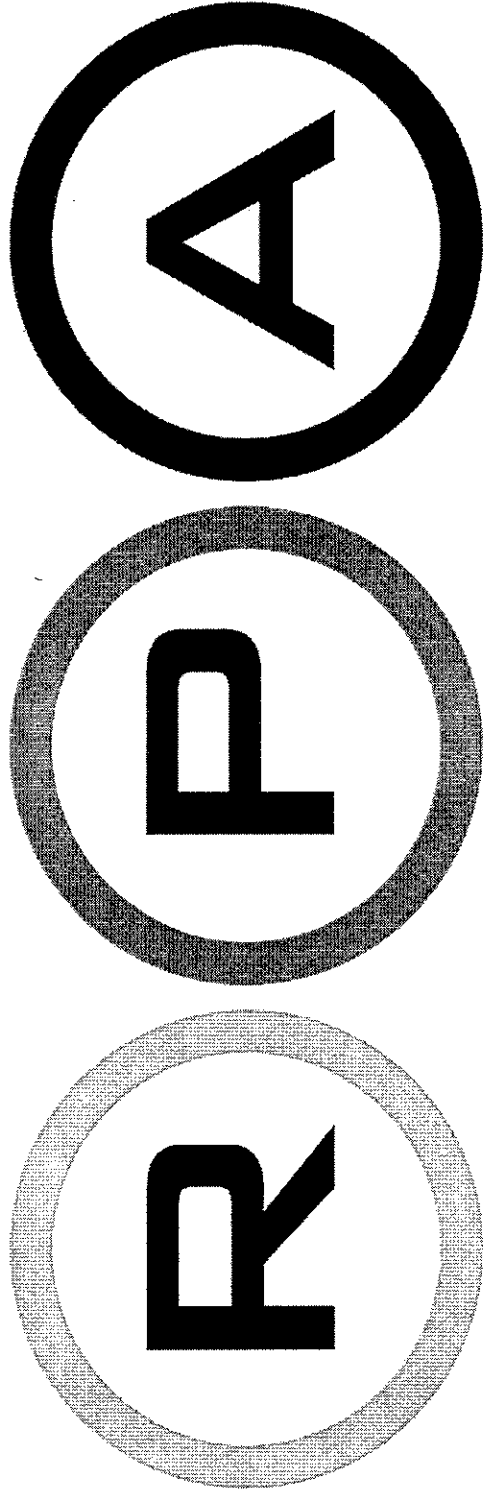
**Improve the
bus system,
especially in
New Jersey's
cities**

NJ TRANSIT
STAMPES



**Work with
NJTransit to
develop a
strategic plan with
clear reporting
requirements, and
connect it to a
long-term vision**





53x

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New Jersey Director

A Preventable Crisis

The Economic and Human Costs of
a Hudson River Rail Tunnel Shutdown



Regional Plan Association

ARUP

February
2019

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This report was prepared under the direction of Christopher Jones, senior vice president and chief planner at Regional Plan Association, and Trent Lethco, Arup's leader of Americas Integrated Planning team. Transportation modeling was led by Joshua Curley, senior transportation planner at Arup, with assistance from Stump/Hausman Partnership. The report was designed by Dave Zackin, RPA's graphic designer.

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A Preventable Crisis:

The Economic and Human Costs of a Hudson River Rail Tunnel Shutdown

What Would Happen If We Lost One of the Two Rail Tracks Under the Hudson River?

Every day, 200,000 passengers ride an Amtrak or New Jersey Transit train through a 110-year old, two-track tunnel under the Hudson River that was badly damaged by Superstorm Sandy. The tunnel is the only passenger rail link that connects Manhattan, the nation's largest job center, with its western suburbs. It is also a bottleneck for the Northeast Corridor running from Washington, DC to Boston, by far the most heavily used intercity rail line in the United States. The number of passengers served by this tunnel has grown rapidly over the last two decades, and is expected to continue growing as the economy expands.

Because the damage from Sandy cannot be fully repaired without closing down each of the two tubes in the tunnel, the only way to avoid several years of sharply reduced service is to build a second tunnel that could keep full service running while

the existing tunnel is repaired. But it will take several years to construct a new tunnel, and full construction cannot start until funding is secured. Each day that passes without agreement on funding for a new tunnel makes it more likely that a tunnel shutdown will happen first.

This would place enormous stress on the already overburdened transportation network in the Northeast, from interstate highways to international airports. Because passengers who would no longer be able to take a New Jersey Transit (NJT) or Amtrak train would spill over into already crowded trains, buses, highways and planes, the entire transportation network would become more congested. Employees would be late to work and more stressed when they arrive. Meetings would be missed. Family dinners would be late. Both residential and commercial property values would decline as prime locations served by rail become less desirable.

The shutdown would cost the national economy \$16 billion over four years.

More than half of this cost would come from the time lost by workers from longer daily commutes. These wage costs alone are the **equivalent to the loss of 33,000 jobs per year**. Added auto costs for those needing to drive, higher air fares, higher freight

Estimated four year costs of a partial shutdown of the Hudson River rail tunnel



delivery costs, and costs associated with health and safety risks also contribute. The impacts would be greatest in New Jersey and New York, but they would reverberate throughout the Northeast and the U.S. **This estimate does NOT include several costs that were not calculated due to insufficient data:**

- ▶ Buffer times that people would build into their travel times because service would be too inadequate or unreliable to consistently arrive at work, meetings or other destinations on time
- ▶ Bus trips that would be longer and less reliable due to traffic congestion
- ▶ Additional wear and tear on roads and other infrastructure
- ▶ Compound impacts if other transit links (PATH, Port Authority Bus Terminal, subways), Northeast airports or interstate highways experience disruptions
- ▶ Health and productivity impacts of increased mental and physical stress caused by congested and unreliable travel
- ▶ Delays in ambulance, police, fire and other emergency response vehicles

Nearly half a million people would have longer, less reliable and more crowded commutes, losing hours of productive, personal and family time and often putting their jobs at risk:

- ▶ 38,000 New Jersey Transit riders would need to find other ways to get to work.
- ▶ As many as 170,000 PATH and bus riders would be delayed by more crowded trains and congested roadways.
- ▶ 245,000 drivers, nearly half of whom drive to locations outside of Manhattan, would have longer commutes. More than half of these would see their daily commutes increase by more than 30 minutes.

Displaced Amtrak riders would further crowd airports, increasing DC to NYC air fares by as much as 65% and potentially doubling fares between Baltimore and New York.

Most business travelers would choose to fly if they can't get on a train that would get them to their destination on time. Because there is a cap on the number of flights in and out of New York's airports, the increased demand would push up ticket prices, with few seats left for those unable or unwilling to pay the higher fare.

Truck delays would cost the Northeast economy over \$1 billion.

Congested highways would create longer trips, many of which originate in Pennsylvania, central New Jersey or upstate New York. The added costs of delivering goods would be passed onto consumers.

Home owners would see their property values dip by \$22 billion.

Homes with better access to jobs are worth more. In fact, fully 40% of homes in New Jersey are within two miles of a train sta-

tion. These homes would decline in value, just as values increased when service was added to NJT in the last two decades. These would be most heavily concentrated in northern New Jersey counties such as Essex, Union and Middlesex, and the towns and school districts where these homes are located would experience a drop in tax revenue.

Owners of commercial property—offices, stores, health and education facilities, factories and warehouses—would also see a decline in property values.

This is more difficult to calculate than changes in homeowner values, and beyond the scope of this study to calculate. However, businesses that rely on workers, clients, tourists or other customers who would be affected by the shutdown would absorb some of the costs, putting downward pressure on commercial property values. This would be most acute in Manhattan, but would affect other locations as well, leading to a decline in local tax revenues.

38,000 additional car crashes and more air pollution could result in 90-100 additional deaths.

Because more people would be spending more time on the road, the number of auto and truck accidents would rise, along with pollutants that increase premature deaths. The two million additional tons of carbon dioxide that would be produced over four years is the equivalent of flying 2.6 million people from New York to San Francisco.

Federal, state and local governments would lose \$7 billion in tax revenue.

This includes \$1.5 billion in federal taxes and over \$1 billion in states outside of New York and New Jersey.

Both regional and national global standing as a place to live and work would suffer an incalculable loss.

Business surveys that rank cities such as New York and Washington as attractive locations to do business routinely list poor quality infrastructure as their Achilles heel. The deterioration of rail, subways, bridges and tunnels in these cities and across the U.S. adds to this perception and is already one of the greatest risks to continued economic growth. A partial shutdown of the Northeast's main artery would be a dramatic event that could solidify the perception and worsen the global position of some of the nation's most productive regional economies.

Besides preventing this crisis, building a new tunnel would provide enormous long-term benefits to the nation and the Northeast.

It would vastly improve both commuter and intercity travel, make it possible to add new rail service, and greatly expand growth in jobs and incomes while improving energy efficiency.



Photo: Amtrak

How a Tunnel Shutdown Would Impact the Entire Transportation Network

The aging Trans-Hudson rail tunnel is a key part of the network of interdependent tunnels, bridges, highways, subways, ferries and airports that serves the most densely populated core of the Northeast. Just as a recent shutdown of LaGuardia Airport caused flights to be cancelled as far away as Atlanta and Chicago, the all-too-frequent disruptions in New Jersey Transit and Amtrak service contribute to traffic jams at the Lincoln and Holland Tunnel and congestion on the I-95 Interstate highway.

As frustrating and costly as these service interruptions are already, they would become far worse in the event of a tunnel shutdown. Even before Sandy, transportation agencies and planners have long known that additional capacity was needed to handle growing passenger volumes and to make it easier to reroute service, and have spent years developing and promoting plans for a new tunnel that would double train capacity and provide vastly expanded service. New Jersey Transit's Access to the Region's Core (ARC) project was nearly approved in 2010, and Amtrak's proposed Gateway project has received initial funding and has the strong support of New York's and New Jersey's transportation agencies and political and business leaders.

Amtrak, which owns the existing tunnel, is maintaining the tunnel to ensure safe operations following the damage from Superstorm Sandy. But eventually, each tube of the tunnel will need to be taken out of service for an estimated two years at a time. In a best case scenario, this can be deferred until new tunnels are built. However, there is a real possibility that the condition of the tubes will deteriorate to the point where they need to be closed before new service is on line, especially if funding and approvals are delayed or denied. In a worst case scenario, an intense storm

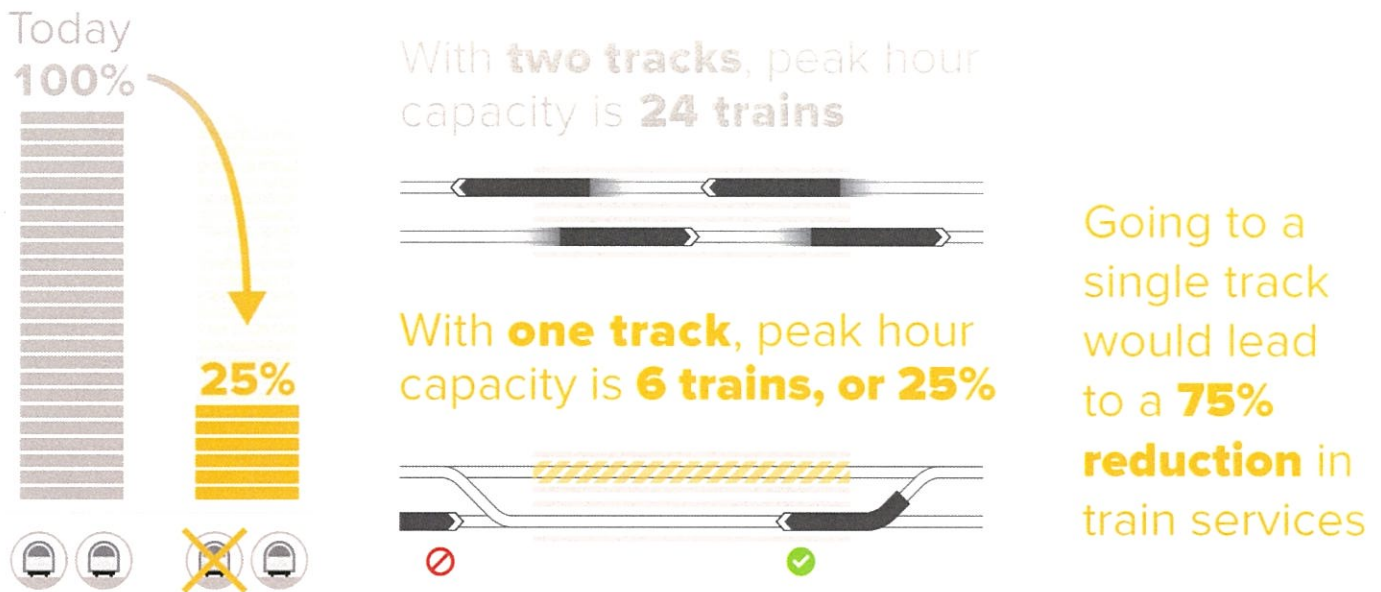
This report looks at the impacts of a potential partial shutdown of the Hudson River rail tunnel. While a shutdown is not planned right now, the possibility is becoming increasingly likely.

or other calamity would cause an emergency shutdown with little or no time to prepare. At a minimum, we are likely to see an ever increasing number of unplanned outages such as the failure of power cables in the summer of 2015, triggering temporary but multiple impacts similar to those described in this report.

This report takes a rigorous look at what would be likely to happen if one of the two tracks needs to be taken out of service before a new tunnel is built. It examines both the human and economic toll that it would take, and not just on those who rely on trains to get in and out of New York City. It shows how the ripple effect of a tunnel closure will affect hundreds of thousands of individuals and tens of thousands of businesses, from New Jersey homeowners to Pennsylvania trucking companies to air passengers living in Virginia or Maryland. It breaks down the costs in terms of time, wages, productivity, travel costs, property values and health and safety.

The numbers cannot fully capture either the stress that this would place on people's lives, or the damage that it would do to the economic competitiveness of the region and the country, both of which already suffer from a reputation for failing and outmoded infrastructure. To help convey what this would mean in human and business terms, the report uses stories of hypothetical characters that are representative of thousands of real people and based on available data and realistic assumptions.

It is hoped that this report will contribute to a rational discussion of what is perhaps the most serious infrastructure problem in the United States today.



Baseline Assumptions

The results presented here are based on an analysis of a **hypothetical planned shutdown** of each tube of the existing tunnel. It does not attempt to predict when a shutdown might occur, although for analytic purposes it uses the most current available data to approximate what would happen if the shutdown started in 2019. This would be less severe than an emergency shutdown that could affect both tubes at once and allow little time for providers, customers and employers to prepare. Key assumptions include the following:

- ▶ Using existing Amtrak estimates, each tube would be closed for a period of two years, resulting in four years in which only one track would be available to take trains from the western side of the Hudson River in and out of Penn Station. The actual time could be shorter or longer. An 18-month estimate was used for the project's environmental impact statement, but construction delays could extend the shutdown for more than four years.
- ▶ Because trains would have to wait for trains to pass in the opposite direction, the maximum number of trains that could be run would be reduced from 24 trains per hour to 6 trains per hour, as determined by Amtrak and described in RPA's *Tunnel Trouble* video.
- ▶ Of the six trains, the scenario assumes that five would be New Jersey Transit (NJT) trains that largely serve commuters and one Amtrak train serving intercity passengers. The actual mix of NJT and Amtrak service in the event of a shutdown could be different.
- ▶ Other existing transportation services—PATH, bus, ferries, roadways, bridges, tunnels and airports—would be available for diverted passengers up to the limits of their existing service levels.

- ▶ Travelers will adjust their trips based on the best available service options and best available information on flexibility and preferences for traveling on different modes or at different times.

The analysis does not include any new services or policies on the part of transportation providers to mitigate the effects, such as running new PATH, bus or ferry services, increasing tolls at peak periods, or restricting vehicles to those with more than one passenger. In reality, agencies, service providers and governments are likely to either add services or implement policies to manage demand. However, it is impossible to predict what these will be, and each would impose its own set of impacts and costs. The options are also limited by road space, terminal and parking capacity, and available labor.

Using these parameters, the project team constructed what it determined was the most likely scenario for travel behavior based on extensive research into what is known about job requirements, travel expenses, and how people have behaved in similar circumstances. This involved making decisions about how different types of commuters, business and leisure travelers, trucking companies and others would weigh their choices in terms of total time, cost of travel, time of travel, comfort, convenience and other factors. Some will be able to take an earlier or later train, but many have jobs that require them to be at work at a specific time or personal responsibilities that limit when they can leave. Others will try to get on congested highways to get to work on time, or take an expensive, less convenient flight for a work or business trip. Some have the ability to work from home, but presumably anyone commuting to work already sees a cost to not coming into work.

More details on findings, assumptions and methodology can be found in Findings and Methodology for Hudson River Tunnel Shutdown Assessment.

Getting to Work

People traveling to work in the New York metropolitan region, which includes two-thirds of New Jersey and parts of Connecticut and Pennsylvania, already have the longest commutes in the United States. And they are getting longer. The number of people and jobs has outgrown a transportation system that was largely built in the early and mid-20th century, and decades of underinvestment have led to disrepair and deteriorating service.

A partial closure of the Hudson River tubes would remove a critical link in the region's transportation network, putting more people on other types of transit and more cars on the already congested roads, bridges and tunnels. While there is enough room to absorb these diverted passengers at most hours of the day, there is little space for them during rush hours. This analysis looks at the 7-10 AM morning peak period when most people are trying to get to work. It shows what is likely to happen if one of the two tubes of the Hudson River tunnel is closed over a period of four years and passengers divert to the region's existing infrastructure and transportation services.

Because there is so little capacity in the transportation network at rush hour, even small numbers of additional passengers or cars can have big impacts on everyone who uses these services. For some, the effects will be relatively small, adding several minutes and more uncertainty to the trip they are making today. For many, however, commuting times could increase by more than an hour, force them to take other means of transportation, and cause major disruptions in work and family life.

Today, some 67,000 people take New Jersey Transit trains to get to work in New York City in the morning. As shown in the chart below and discussed in the detailed supplement to this report, there will only be enough room for 29,000 of these commuters during a shutdown, leaving 38,000 who need to find a different

way to get to work. There is room for about 20-25,000 to take another form of transit—and it is expected that a little more than half of those who are able would take a PATH train and the rest would take a bus or ferry. Many of these diverted transit riders will need to travel early or later than they do now, and most would have longer, more crowded commutes.

Of the remaining 15,000, about 10-12,000 would be expected to drive because there just isn't enough room on transit to allow them to get to work on time. For these workers, driving would introduce a major change to their commute. Instead of sitting on a train where they could work or rest, they would spend as much as two or more hours behind the wheel, much of it in heavy traffic, and bear the costs of parking, gas and tolls and auto maintenance.

How NJ Transit train commuters would be diverted in the event of a partial tunnel shutdown

In thousands of commuters

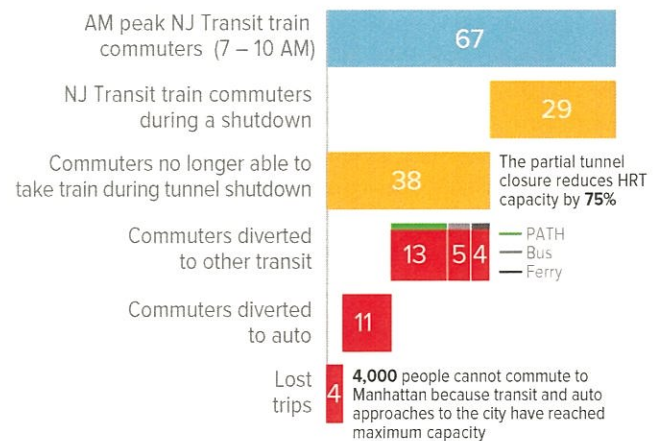
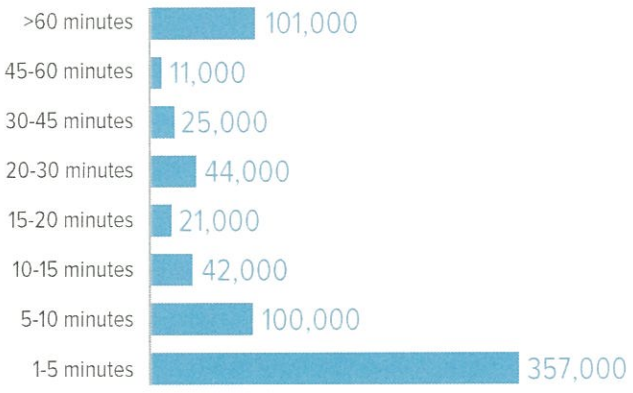




Photo: Shutterstock

Because the roads are so crowded at rush hour already, even these few thousand additional drivers will cause major delays at certain points, particularly the approaches to the Lincoln and Holland tunnels and George Washington Bridge. In fact, an estimated 245,000 drivers would be likely to see their commutes increased by 10 minutes or more. 135-140,000 of these drivers would see their commutes increase by at least 30 minutes, and of these approximately 100,000 would have to travel more than an hour longer.

Number of commuters by minute increase in two-way commutes in the event of a partial tunnel shutdown



Even people who don't have to get into Manhattan will experience major delays because of this congestion. About one of every four commuters who will be delayed at least 20 minutes are travelling to destinations outside of New York City, most to locations in northern New Jersey.

This would still leave about 3-4,000 people who wouldn't make the trip at all. At first, most of these would work from home. Not everyone has that option, but there would certainly be more who would do so if they can. But since they are not choosing to do this today, it's safe to assume that this is not their preferred option. Over time, most of these workers would likely move or get a different job, often at a lower wage.

In monetary terms, the costs of these changes and delays are estimated to cost nearly \$13 billion over four years. About \$9 billion would be the equivalent of wages for the amount of extra time people would be commuting. Nearly \$1 billion would be for parking and other auto related costs. Over \$2 billion would be for additional delays that can be expected whenever there is bad weather or other disruptions. With more people driving and more on PATH, buses and ferries, there is less flexibility to accommodate frequently occurring disruptions, creating more delay than there would be otherwise.

In human terms, this would take a significant toll on the work, personal and family life of thousands of people. Two typical examples of how this would affect commutes and lives are illustrated here. While these are not actual people, their stories are representative of thousands of individuals in similar circumstances.

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Meet Shayna

Who Shayna Represents

- ▶ Managers of the 28,000 facilities workers in the New York region
- ▶ 3,200 companies that employ those workers, disrupting services and creating 70,000 hours of additional work for those who manage these workers

Location: Midtown, NYC

Occupation: HR Manager

Income: \$48,000/year

Transit: Bus and train

Age: 36 years old

Current Journey

Shayna is a manager at ABC Industries, an employer of 7,000 maintenance and facility service workers in New York. She oversees 70+ office buildings in Manhattan and ensures that they receive daily janitorial, electrical, HVAC/mechanical, engineering, parking, and landscaping services. Many of the workers Shayna is responsible for do not have cars and take the bus or train into Manhattan from New Jersey and the outer boroughs.

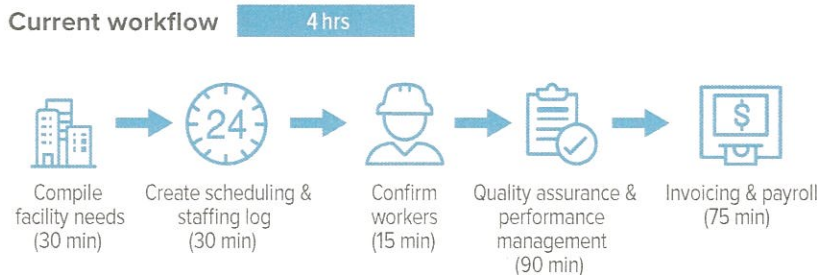
What Might Happen

- ▶ A tunnel shutdown would impact hundreds of the facilities workers that Shayna manages, causing lateness, absenteeism, and turnover.
- ▶ Gaps in service coverage have particularly costly consequences for certain functions (e.g. security, cleaning, electrical work, etc.) causing customer complaints.
- ▶ Shayna spends 17+ hours per week on additional administrative work (e.g. backfilling employees) that could have been spent on other business priorities.



Photo: Getty

Shayna's workflow before and after shutdown



63x

Meet Diana



Photo: Getty

Who Diana Represents

- ▶ 90 people who take transit during peak hours from Oradell, NJ to the Herald Square area
- ▶ 15 people who would be diverted to cars on this particular route, part of the 11,000 who would be diverted to cars in total by the shutdown
- ▶ Each diverted person on this route could be delayed up to 100 minutes roundtrip each day, totaling 95 hours for all diverted commuters

Current Journey

Diana is a working mother who travels to New York City every day to work as an Executive Assistant at an insurance company. She's extremely detail oriented and committed to being on-time both to work and getting back home to her family. Currently, from her home in Oradell she takes a quick walk to the train station and then departs at New York Penn Station which is walking distance from her office.

What Might Happen

- ▶ Diana needs to show up before her boss arrives, and as a result has to travel during the peak, or wake up unreasonably early and waste morning hours in the office.
- ▶ Shutdown service reductions on NJ Transit force Diana to shift to car. The family is forced to buy a new car, a \$13.5K/yr expense. Diana's total daily commuting expenses increase by \$73 per day including vehicle cost, tolls, and parking.
- ▶ Delays getting home in the evening preclude Diana from picking up her children from sports practice; she incurs additional childcare costs.
- ▶ Shutdown decreases home value by \$25K, frustrating family's interest in selling home. Simultaneously, local schools limit services (e.g. AP classes) as municipal budgets are reduced by up to 15% due to depressed property tax revenue.

Location: Oradell, NJ

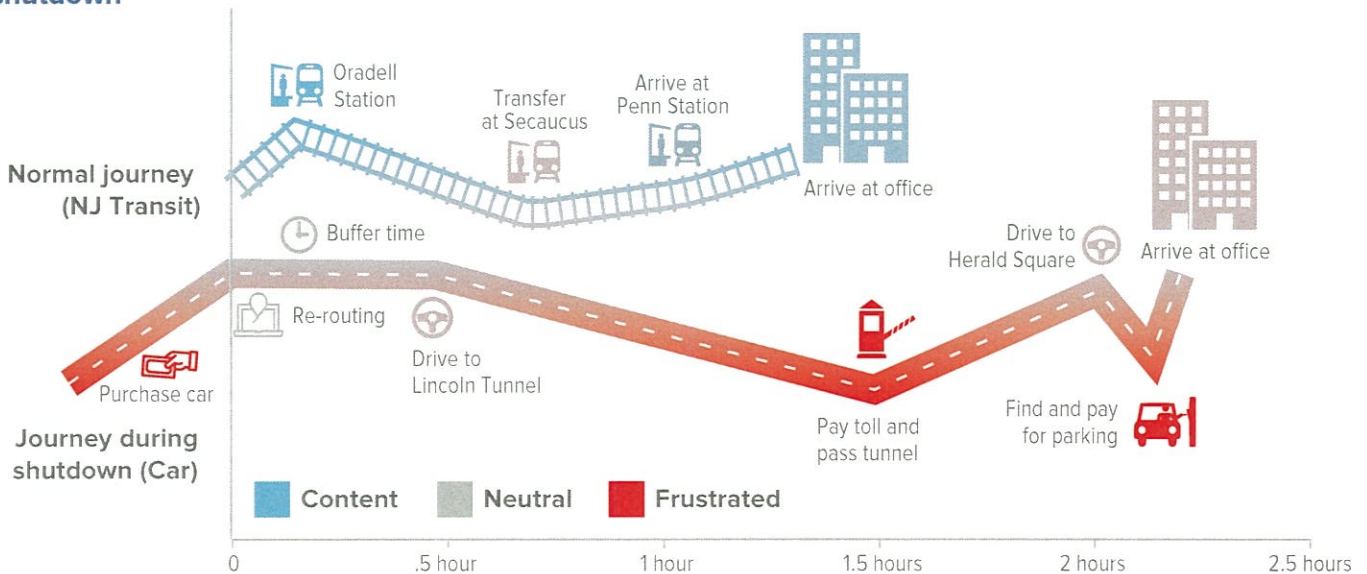
Occupation: Executive Assistant

Income: \$68,000/year

Transit: NJ Transit

Age: 51 years old

Diana's commute before and after shutdown



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Traveling in the Washington to Boston Corridor

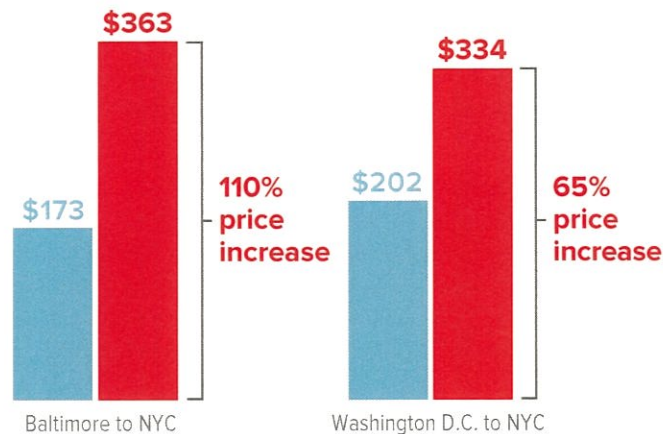
The northeastern United States is the most densely populated and economically productive part of the country, accounting for one-fifth of the national economy. Being able to travel between cities in the Northeast—New York, Baltimore, Wilmington, Philadelphia, Newark, New York, New Haven, Providence and Boston within hours by air, rail, bus or car gives these metropolitan economies an advantage that helps them compete with similarly connected regions in Europe and Asia. Amtrak’s Northeast Corridor service provides an option preferred by many business and leisure travelers, allowing comfortable trips directly into city centers. Without intercity rail, air fares would be higher, airports would be more crowded, and roadways, particularly Interstate 95 (I-95), would be more congested.

A tunnel shutdown would have little impact on New York to Boston service, but could cut service in half between Washington and New York. Today, Amtrak’s Acela and regional trains transport 22,000 passengers between Washington and New York daily. This analysis assumes the Amtrak service would be cut from two trains per hour to one in the event of a partial tunnel shutdown. Although it would be possible to maintain both hourly trains, this would further curtail the already limited NJT service described above.

This reduced service would only have capacity for 14,000 passengers per day. For the remaining 6,000, some would drive or take the bus, and some leisure travelers would choose not to travel. But the largest group—business travelers going between Washington or Baltimore and New York, would likely fly instead. The New York region’s airports—LaGuardia, Kennedy and Newark

—already suffer from some of the longest delays in the U.S. Because of this, the Federal Aviation Administration (FAA) has capped the number of flights that can arrive or depart from these airports. So diverted Amtrak passengers who want to fly at peak periods would have to get tickets on the limited number of remaining seats.

Average plane ticket price before and after a partial tunnel shutdown



This additional demand for seats would likely induce airlines to raise airfares, potentially by as much as 65% between Washington and New York’s airports at peak times, and could double prices between Baltimore and New York. This means that those least able or willing to pay would stay home. Most business travelers would pay the price, but many leisure travelers, small business owners or non-profit employees would not. The costs from both increased ticket prices and lost economic activity from those who don’t travel would total an estimated \$1.7 billion. The state with that would feel the largest impact is New York, but New Jersey, Maryland, Virginia and Connecticut residents and businesses would also have significant costs.



Photo: Amtrak

Meet Jerome

Who Jerome Represents

- ▶ 3,000 passengers who travel between DC/Baltimore and NYC
- ▶ Of these, 1,300 are price elastic business or leisure travelers who may be priced out of train and air options and forced to take the bus.
- ▶ These travelers will incur increased travel time of up to two hours each way, totaling up to 4,000 roundtrip hours.

Current Journey

Jerome is the Northeast Program Director at a non-profit organization focused on U.S. healthcare. The organization is based in Washington and he travels to New York and other cities several times per month to coordinate with funders and partners. Jerome is responsible for advocacy and fundraising, requiring significant face time. He typically drops his son off at daycare early in the morning before catching a train. He works on the Amtrak and enjoys the calm and comfortable journey.



Photo: Getty

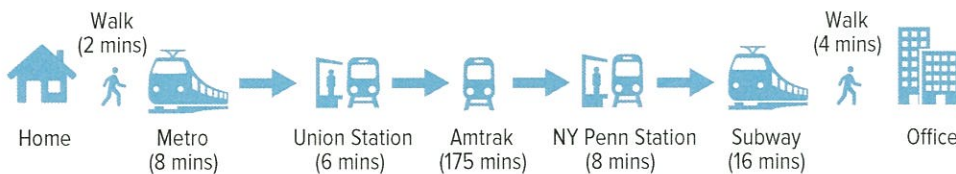
What Might Happen

- ▶ The bus is a less productive work environment, reducing the amount of work that Jerome can do while travelling.
- ▶ The bus is less reliable than the train, forcing travelers to budget 30 minutes of buffer time into journeys in which they are already leaving earlier and/or arriving later.
- ▶ Jerome's new travel schedule is outside the hours that he can drop his son off at daycare in the morning and return in time for bedtime.

Location: Washington, DC
Occupation: Program Director
Income: \$75,000/year
Transit: Amtrak
Age: 46 years old

Jerome's commute from Washington, D.C. to New York City before and after shutdown

Current mode: Amtrak **3 hr 39 min**



Alternative mode under shutdown: Bus **5 hr 46 min**



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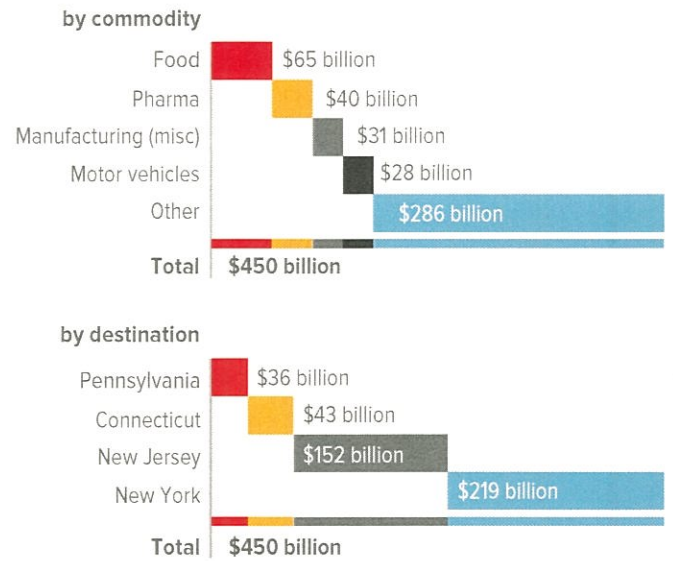
Moving Freight

Moving goods from producers to distribution centers to consumers is an essential function of the transportation network. Most of the freight in the region is transported by truck, a condition that is compounded by the region's limited rail freight network. Whether food, furniture or pharmaceuticals, most of the goods traveling in the region are destined for consumers in this large metropolitan area, and the costs of shipping them are largely passed on to these consumers.

The logistics chain for transporting goods is even more complicated and covers a wider area than the labor market within which people commute to work. Most goods that are consumed here are shipped in from other parts of the country or the world by ship, plane, train or truck, and much of what is produced here is shipped out to consumers elsewhere. Along the way, most freight is stored in one or more warehouse or distribution center until it is ready to be shipped to a retail store or consumer. While the ports of entry are concentrated in the core of the region—seaports in Newark, Elizabeth, Staten Island and elsewhere and airports, especially Kennedy and Newark, distribution centers are often located in central or south New Jersey, upstate New York, Long Island and Pennsylvania where land is cheaper.

The highway congestion that would be caused by a tunnel shutdown would affect the time and cost of delivering goods as well as moving people. Regional trucks make 147,000 daily trips in the region, and the extra traffic could make their trips 1.5% longer, on average. Delays getting in and out of the region's ports and airports, where many trucks originate from or are destined for, could be nearly three times the regional average. These trucks carry \$450 billion worth of goods, and the added costs of delay could cost the economy over \$1 billion.

Value of truck freight



Sources: BTS Freight Analysis Framework



Photo: Shutterstock

Meet David

Who David Represents

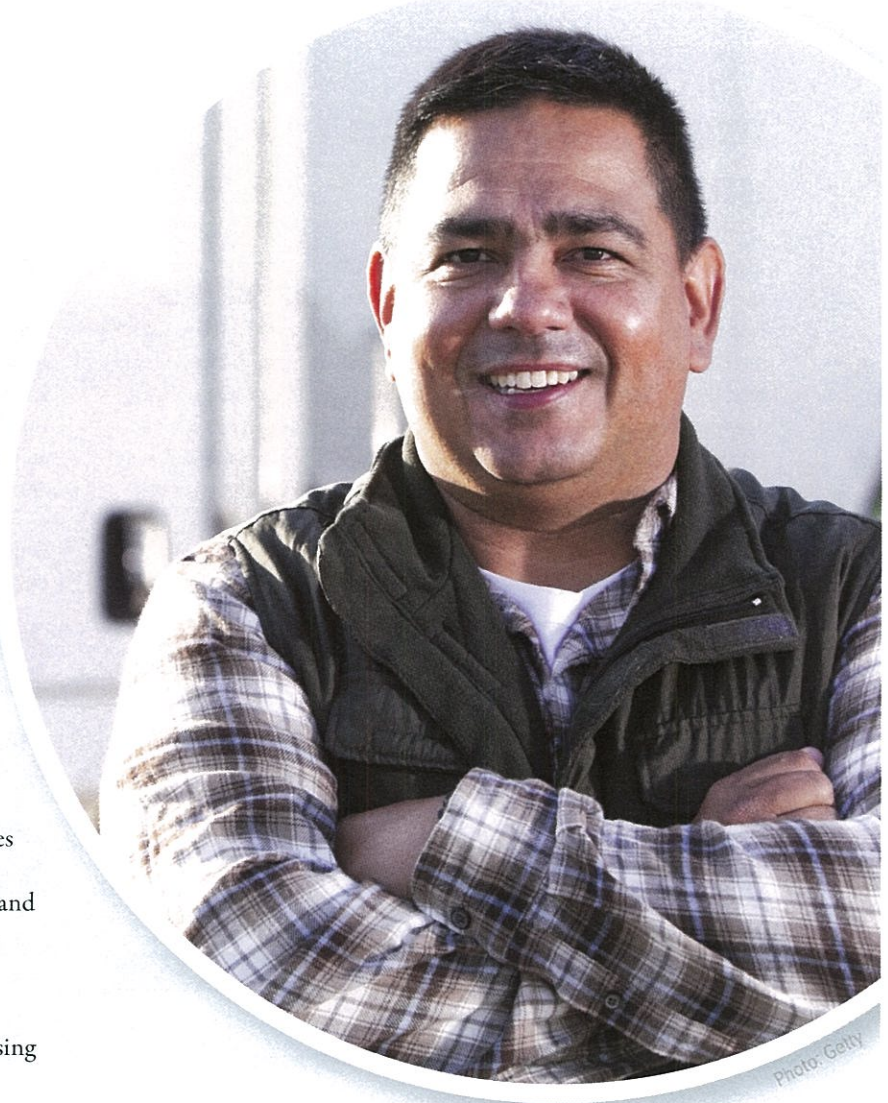
- ▶ 105 companies truck freight from Fogelsville, PA to Queens during peak hours may be impacted by the shutdown. The shutdown will impact a total of 147,000 trucks per day.
- ▶ The full journey (requiring re-routing and refueling) can be nearly three hours longer roundtrip, totaling 290 hours for all trucks.
- ▶ Driving time can be extended by 100 minutes roundtrip, totaling 175 hours for all trucks.

Current Journey

David runs a family-owned, mid-size trucking company based outside Allentown, Pennsylvania that is known for reliability and customer service. A significant portion of David's customers depend on him to deliver freight to the New York area. Most of these routes run over the George Washington Bridge and Verrazano-Narrows Bridge. The company uses several types of trucks and trailers, depending on the type of cargo being transported.

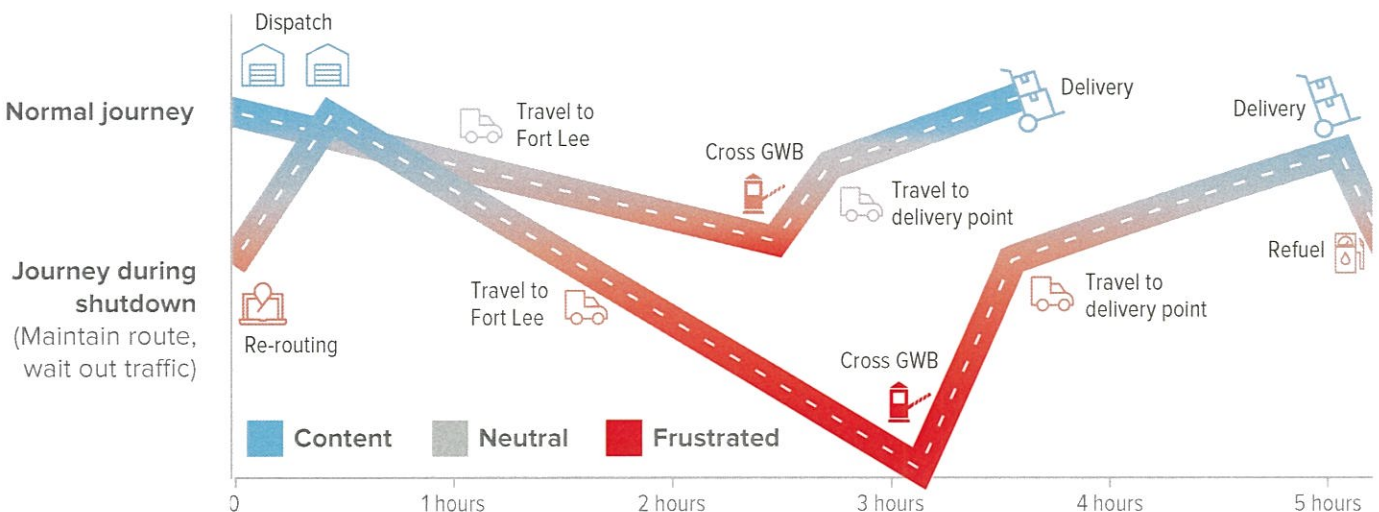
What Might Happen

- ▶ Increased traffic creates higher fuel and labor costs, causing David to raise prices.
- ▶ This causes David to lose some customers.
- ▶ Other customers pass on price increases to their buyers, lowering the total amount bought and sold.
- ▶ Simultaneously, it becomes harder for David to plan and execute timely deliveries, frustrating customers who need their goods on-time.



Location: Allentown, PA area	Income: \$140,000/year	Age: 42 years old
Occupation: Freight Operator	Transit: Regional highway network	Transportation mode: truck

Journey before and after shutdown

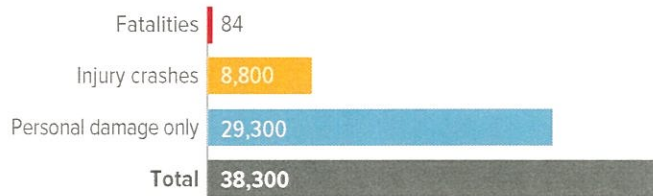


Impact on Health and Safety

The physical and mental stress of more difficult and less predictable commutes and intercity travel would have a negative impact on public health. While the health impacts of stress are well documented, it is difficult to calculate the specific impacts that would result from a tunnel shutdown. By contrast, there is accepted methodology for estimating the increase in vehicle accidents and air pollution that would result from increased highway congestion, and how these would result in injuries, illnesses and premature deaths.

Over the four years of the shutdown, just having more cars travelling more miles on the road would lead to approximately 38,000 more auto crashes. The large majority of these would result only in personal property damage, but about 9,000 would cause injuries and result in 80-90 fatalities.

Number of auto crashes by type over four years



Cost of auto crashes by type over four years



The environmental damage from increased air pollution will affect the health of people throughout the region, whether they drive or not. There would be about two million additional tons of carbon dioxide (CO₂) in the atmosphere, the equivalent of 2.6 million people flying between New York and San Francisco. Other pollutants (NO_x and PM 2.5) would have a more immediate impact on health resulting in nearly 600 lost work days and approximately 10 premature deaths.

Environmental and health impacts of additional driving and congestion



Cost of emissions over four years



When combined, these health and safety impacts represent a cost of approximately \$550 million.



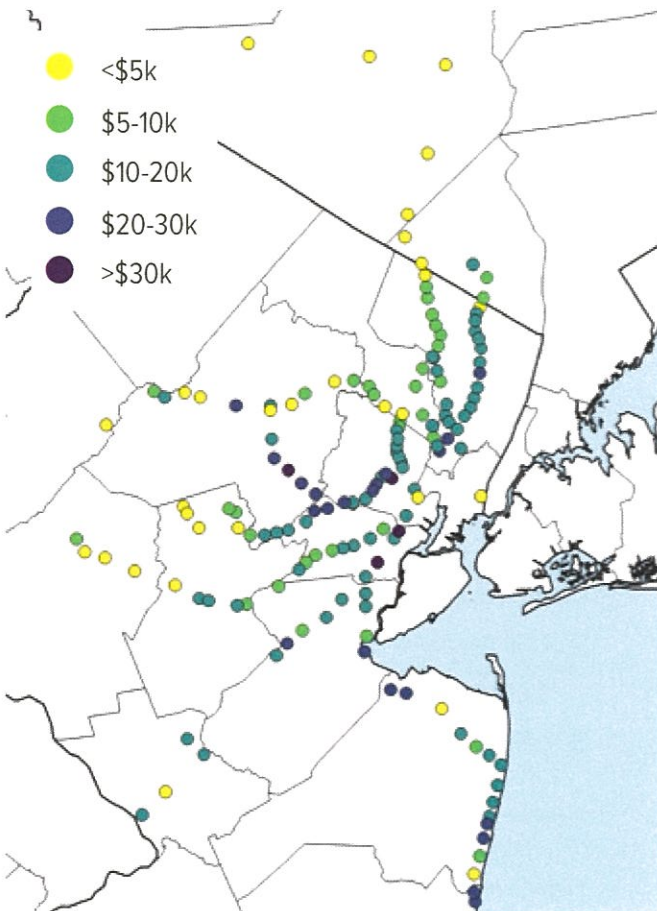
Photo: ssuaphotos

Impact on Homeowners and Local Government

Over the past two decades, increased New Jersey Transit service, such as the introduction of Midtown Direct service that greatly reduced travel times for many NJT riders, has lifted property values for homes near NJT stations. As documented in RPA's report *The ARC Effect*, home values increased by an average of \$33,000 for homes within half a mile of stations once all other factors were accounted for. Even homes as far as two miles away saw an average increase of \$10,000. Cities, towns, school districts and counties also benefited from higher property tax revenues. The benefits were greatest for places that experienced the largest reductions in travel times.

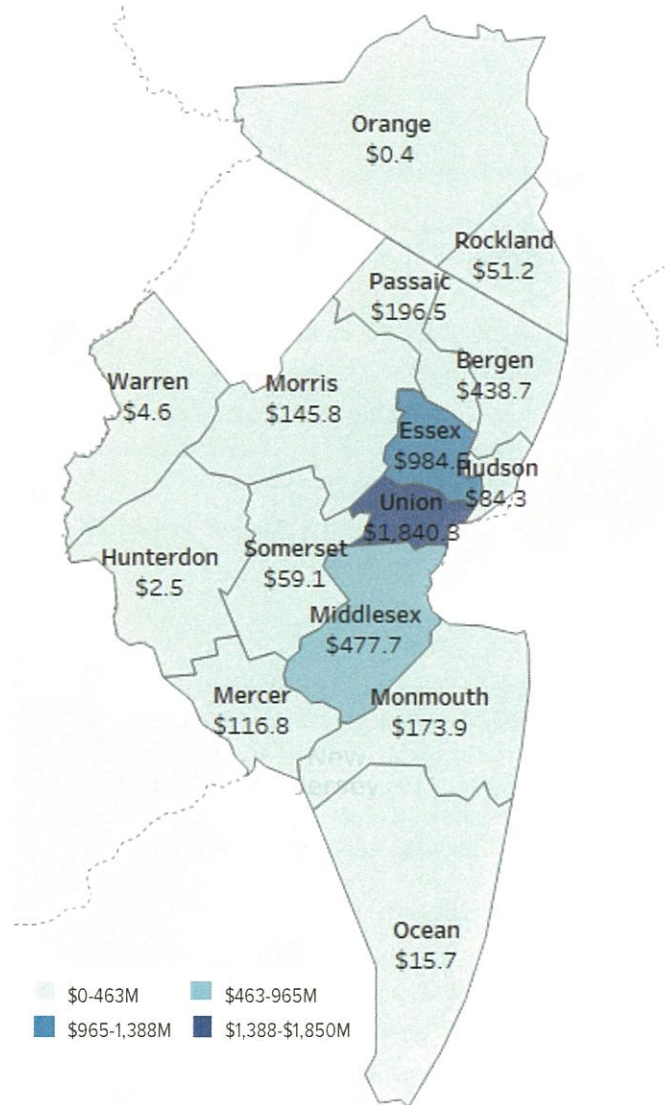
A tunnel shutdown would have the reverse effect. Less service and longer commutes would mean that property values would be likely to decline for the duration of the shutdown. The cumulative loss in home values could be up to \$22 billion. This would equal 6% of the home values in affected station areas and 2.5% of all home values in New Jersey. The average home could lose \$13-14,000 in value, with homes closer to station areas experiencing the greatest losses.

Average home value reduction by station



This \$22 billion dip in home values would mean an estimated \$4.6 billion less in local property taxes that support schools, fire and police departments and municipal services. That would account for roughly 4% of local property tax revenue in New Jersey. Essex and Union counties could each see almost a billion dollars each in lost tax revenue, while Middlesex and Bergen could see losses close to \$500 million.

Four-year lost property tax revenues, in millions



One final vignette shows how the cumulative effect of longer commutes and declining home values could affect thousands of residents. 80 people commute from eastern Monmouth County to East Rutherford each morning. Their trip could be over 30 minutes longer each way, causing them to leave early and incur more in child and elder care expenses. The average home value could decrease by \$23,000 and municipal budgets might have to be scaled back by as much as 25%.

Meet Lailah

Location: Hazlet, NJ

Occupation: Teacher

Income: \$55,000/year

Transit: Car

Age: 37 years old

Who Lailah Represents

- ▶ 80 people drive to East Rutherford from eastern Monmouth County during peak hours.
- ▶ Part of the 100,000 people whose round trip commutes increase by over 60 minutes
- ▶ The full journey (requiring route-finding and adding buffer time for variable delays) can be 90 minutes longer, totaling 120 hours for all drivers.
- ▶ Driving time may be extended by 30 minutes round trip, totaling 45 hours for all drivers.

Current Journey

Lailah is a language teacher at a private school in East Rutherford, NJ. She has taught there for 10 years, and loves her job, making the 1 hour commute worthwhile from her home in Hazlet, NJ. Lailah leaves early and drives her family's Toyota Corolla. She heads home in the evening to care for her elderly mother and spend time with her young children.

What Might Happen

- ▶ Lailah has to shift her wake-up time from 6:00 AM to 5:00 AM to take care of morning responsibilities at home and make it to work on time.
- ▶ Traffic variability requires Lailah to plan for the worst possible delays; otherwise, she risks disappointing her students and school administrators.
- ▶ Lailah incurs \$200 in additional weekly child and elder care expenses, as she cannot be as prompt in picking up her kids and relieving her elderly mother's caretaker.
- ▶ The disruption to her personal life forces her to consider changing jobs or where she lives.
- ▶ Home value decreases by 6%, or \$23,000, as a result of the shutdown. Family decides not to put home on the market. Simultaneously, local school and fire department under pressure to reduce services as decreases in property tax revenue reduces municipal budget by up to 25%.



Photo: Getty

Lailah's Commute During a Shutdown	Aggregate: 80 People Like Lailah are affected
6 hours of sleep; wake up at 5 AM	80 hours of lost sleep
3 hours of family time in evening, caring for children and elderly mother	80 hours of lost family time
0-1 day per week late for school	0-80 late work arrivals per week
0-1 day per week unable to prepare meals for family	0-80 missed meal preparations per week
\$200 in additional weekly child and elder care	\$16K in additional child and elder care
\$12 per day in vehicle traffic/idle time cost, \$3,000 per year	\$900 per day in vehicle traffic/idle time cost, \$240,000 per year
\$23,000 in decreased home value	\$1.8 million in decreased home value
Increased physical risk due to road safety	Increased physical risk due to road safety
High level of stress on commute	High level of stress on commute

7/4

AMTRAK

1041⁺ TRACK
LONG BRANCH 14
Long Branch

DANGER
HIGH VOLTAGE





Regional Plan Association

Regional Plan Association is an independent, not-for-profit civic organization that develops and promotes ideas to improve the economic health, environmental resiliency and quality of life of the New York metropolitan area. We conduct research on transportation, land use, housing, good governance and the environment. We advise cities, communities and public agencies. And we advocate for change that will contribute to the prosperity of all residents of the region. Since the 1920s, RPA has produced four landmark plans for the region, the most recent was released in November 2017. For more information, please visit rpa.org or fourthplan.org.

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**Doug O'Malley, Director
Senate Select Committee on NJ Transit
Testimony In Favor of Electric Buses
December 12, 2019**

The future is now for NJ Transit to commit to electrify their bus fleet over the next two decades. Dirty diesel buses, especially running through our cities and polluting our air and climate, need to be phased out by 2040. NJ Transit should join other major transit agencies to make the commitment to electrification. The Camden electrification pilot is a good start, but NJ Transit needs to aggressively ramp up electric buses in our cities in the early 2020s and to work to electrify all new bus purchases by the end of the next decade.

Battery-powered electric buses can reduce the environmental and health threats posed by diesel buses while also providing a reliable and cost-effective option for cities and school districts. Advances in electric bus technology and a rapid decline in battery costs over recent years have made electric buses an increasingly viable option for many transit agencies.

There are now more than 500 electric buses on America's streets and thousands more worldwide,¹ with more hitting the streets every day. Radical improvements to electric bus technology and a rapid decline in upfront costs are resolving many of the earlier problems with these vehicles, and a growing number of manufacturers are producing high-quality, increasingly affordable electric transit buses.

We recently released a new report called *Electric Buses in America: Lessons from Cities Pioneering Clean Transportation*, which profiles six case studies of electric bus rollouts from across the country. These case studies provide valuable lessons on how to implement electric bus adoption, what challenges to expect, and how to begin to overcome those challenges. That report can be found on our website at www.environmentnewjerseycenter.org

The experience of six early adopters of electric buses illustrates the challenges that agencies have faced, as well as the benefits many have received from their electric bus pilots. To speed up the rollout of electric buses and ensure that cities see the benefits of these vehicles, state and city officials should commit to a transition to electric buses on a specific timeline and create favorable utility rate structures for transit agencies that include reduced off-peak energy rates and limited demand charges.

Electric buses deliver numerous benefits to the communities they serve.

¹ EB Start, *Electric Bus Industry Continues to Make Strides in 2018* (press release) 31 January 2019, archived at <https://web.archive.org/web/20190920232712/https://www.ebstart.co/press-release-1-31-2019>. "Electric Bus Market Size And Forecast, By Product (Purely Electric, Plug-in Hybrid), By Region (China, Europe, U.S.), And Segment Forecast, 2015 – 2025," archived at <https://web.archive.org/web/20190606005806/https://www.hexaresearch.com/research-report/electric-buses-market>.

- By eliminating diesel exhaust emissions, particulate pollution and pollutants that contribute to the formation of ground-level ozone, they improve the air quality in our communities.²
- They produce significantly lower greenhouse gas emissions than diesel, diesel hybrid and natural gas-powered buses. Replacing all of the country's diesel-powered transit buses with electric buses could eliminate more than 2 million tons of greenhouse gas emissions each year.³
- Electric buses can deliver financial benefits, including substantially reduced maintenance costs and, in places where utility rate policies are favorable, reduced fuel costs.
- By reducing air pollution, electric buses can also deliver significant societal benefits, including avoided healthcare expenses resulting from cleaner air.

Electric buses have often performed well in early pilots, and have often been cheaper to fuel and maintain than their diesel counterparts. early adopters have experienced a set of technological and economic challenges that have already informed their current electric bus procurement.

- **Seneca, SC.** In 2014, Seneca became the first city in the world to launch an all-electric bus fleet.⁴ The buses have outperformed their diesel equivalents in fuel and maintenance costs and exceeded expectations regarding charging time, range and battery life. Seneca views its electric buses as a successful, scalable model of full-fleet electrification.⁵
- **Chicago, IL.** The Chicago Transit Authority's rollout of two electric buses in 2014 was one of the first major tests of electric bus technology in a cold winter climate. The vehicles have performed well, have had no difficulty with extreme temperatures, and have saved the CTA more than \$24,000 each year in fuel costs and \$30,000 each year in maintenance costs.⁶ The agency is currently moving forward with its commitment to full-fleet electrification by 2040.⁷
- **King County, WA.** King County Metro Transit has been testing electric buses since 2016. The buses have performed well in a range of weather conditions, but with occasional problems, including issues with battery life and range. Per-mile fuel costs have been higher than for diesel due in part to high electricity demand charges. Taking into account other factors, such as environmental benefits, the agency nonetheless regards its electric buses as providing a good return on investment and plans a large-scale rollout in the coming years.⁸
- **Albuquerque, NM.** Safety and durability issues with its electric buses; as well as subpar battery life, inadequate range and sensitivity to extreme heat, contributed to Albuquerque's electric bus tests in 2018 ending in disappointment. Having incorporated safeguards into its contract with the

² Vermont Energy Investment Corporation, *Electric School Bus Pilot Project Evaluation*, 20 April 2018, archived at http://web.archive.org/web/20190920175702/https://www.mass.gov/files/documents/2018/04/30/Mass%20DOER%20EV%20school%20bus%20pilot%20final%20report_.pdf, 20 September 2019.

³ Emissions savings calculated using Argonne National Laboratory's Heavy-Duty Vehicle Emissions Calculator available at <https://afleet-web.es.anl.gov/hdv-emissions-calculator>.

⁴ Ron Barnett, "S.C. city boasts first battery-operated bus fleet" *USA Today*, 27 February 2015.

⁵ Keith Moody, General Manager, Clemson Area Transit, personal communication, 3 July 2019.

⁶ Chicago Transit Authority, *CTA Expands Electric Bus Fleet*, archived at <https://web.archive.org/web/20190920232250/https://www.transitchicago.com/cta-expands-electric-bus-fleet/>, 15 July 2019

⁷ Global Mass Transit, *Chicago city approves plan to transition to 100 per cent electric bus fleet*, 15 April 2019, archived at <https://web.archive.org/web/20190920234018/https://www.globalmasstransit.net/archive.php?id=33960>.

⁸ Rob Gannon, General Manager, King County Metro, Personal communications, 12 July 2019.

manufacturers to ensure it would lose no money in the event of failure, the city cancelled the contract and returned its buses.⁹ In August 2019, however, the city announced its intention to buy five new 40-foot electric buses.¹⁰

PUBLIC HEALTH:

There is no established safe level of exposure to diesel exhaust for children.¹¹ Research has shown that exposure to hydrocarbons from diesel exhaust in early childhood increases the likelihood of developing asthma.¹² In 2013, researchers looked at the impact of diesel exhaust particles on children in Cincinnati and concluded that diesel exhaust made the children more susceptible to asthma by turning off certain genes.¹³ A 2017 Rutgers University study on asthmatic children living near the Port of New York/New Jersey with heavy diesel truck traffic found that greater exposure to carbon soot coincided with markers for lung inflammation.¹⁴

By limiting emissions of diesel pollution in our city neighborhoods and near schools, electric buses can reduce health risks from air pollution and contribute to healthier communities.

By reducing the amount of harmful pollutants in the air, electric buses also create savings in health care costs.¹⁵ The Chicago Transit Authority, for instance, estimates that a single electric bus saves the city

⁹ Susan Orr, "IndyGo OK so far with electric buses, despite Albuquerque woes", *Indianapolis Business Journal*, 21 November 2018; Martin Salazar, "ART project 'a bit of a lemon,' mayor says as problems mount", *Albuquerque Journal*, 9 January 2018; Steve Knight, "Albuquerque's Electric Buses Grounded After Malfunctions," *Government Technology*, 2 November 2018, archived at <http://web.archive.org/web/20190212085931/http://www.govtech.com:80/fs/transportation/Albuquerque-Electric-Buses-Grounded-After-Malfunctions.html>. Elliott Zaagman, "Briefing: Albuquerque cancels deal with BYD over bus quality issues," *Tech Node*, 19 November 2018, archived at <https://web.archive.org/web/20190925014649/https://technode.com/2018/11/19/briefing-albuquerque-cancels-deal-with-byd-over-bus-quality-issues/>.

¹⁰ Theresa Davis, "City Gets \$2.7 Million Grant for Electric Buses," *Albuquerque Journal*, 7 August 2019.

¹¹ C. Li et al., "School Bus Pollution And Changes in The Air Quality at Schools: A Case Study," *Journal of Environmental Monitoring*, 11, 1037-1042, DOI: 10.1039/B819458K, 2009.

¹² K.J. Brunst, Y. Leung, P. Ryan, G. Hershey, L. Levin, H. Ji, G. LeMasters and S. Ho, 2013, *Journal of Allergy And Clinical Immunology*, "Forkhead box protein 3 (FOXP3) hypermethylation is associated with diesel exhaust exposure and risk for childhood asthma," available at [https://www.jacionline.org/article/S0091-6749\(12\)01763-0/fulltext](https://www.jacionline.org/article/S0091-6749(12)01763-0/fulltext).

¹³ K.J. Brunst, Y. Leung, P. Ryan, G. Hershey, L. Levin, H. Ji, G. LeMasters and S. Ho, 2013, *Journal of Allergy And Clinical Immunology*, "Forkhead box protein 3 (FOXP3) hypermethylation is associated with diesel exhaust exposure and risk for childhood asthma," available at [https://www.jacionline.org/article/S0091-6749\(12\)01763-0/fulltext](https://www.jacionline.org/article/S0091-6749(12)01763-0/fulltext).

¹⁴ N. Ji et al., 2017, *American Journal of Respiratory and Critical Care Medicine*, "Personal Exposure to Black Carbon, Nitrogen Dioxide, and Chronic Psychosocial Stress: Impacts on Childhood Asthma Exacerbation in a Seaport-Adjacent Community," available at <http://www.atsjournals.org/doi/abs/10.1164/ajrccm-conference.2017.195.1.MeetingAbstracts.A4803>.

¹⁵ İbrahim Aslan Reşitoğlu, Kemal Altinişik, and Ali Keskin, "The Pollutant Emissions from Diesel-engine Vehicles and Exhaust Aftertreatment Systems," *Clean Technologies and Environmental Policy*, 17(1):15-27, January 2015.

nearly \$55,000 every year in avoided healthcare expenses resulting from cleaner air.¹⁶ A study conducted by Columbia University for MTA-New York City Transit calculated that electric buses reduced particulate matter emissions by 97.5% compared with diesel buses, producing a healthcare cost savings of approximately \$150,000 per bus per year.¹⁷

Buses are an ESPECIALLY large contributor to criteria pollutants, especially PM2.5 - and that impacts public health. ChargeVC is currently researching the emission implications of bus electrification, and we have discovered that this particular electrification segment creates a huge shift in not just how much air pollution is generated, but WHERE it is generated. And we can quantify those differences, especially for PM2.5. For example, to put a number on it, the new EPA data I am using quantifies the public health impact of a ton of of PM2.5 ON A ROADWAY (i.e. from a bus) at \$118,985/ton. By comparison, the economic impact of that same ton AT A POWERPLANT is \$30,078/ton. Roadway emissions are almost FOUR TIMES more harmful that equivalent pollution at a generation site. So we get a DOUBLE benefit by electrifying buses - it reduces the absolute amount of pollutants that are especially harmful to public health, AND we shift those emissions to areas where they have less impact.

CLIMATE IMPACTS:

A 2018 study by the Union of Concerned Scientists found that electric buses produce significantly lower greenhouse gas emissions than diesel, diesel hybrid and natural gas-powered buses over their entire life cycle, including the process of generating the electricity that powers them, and that there are benefits across the country, even in places where the electric grid is carbon intensive.¹⁸ Buses charged on California's clean electric grid, for example, had 70 percent lower life cycle emissions than diesel or natural gas buses, but the study found that electric buses consistently produce lower emissions than both diesel and natural gas-powered buses in every area of the country.¹⁹ Over its entire lifecycle, an electric bus charged with the national electricity mix produces less than half of the carbon dioxide-equivalent (CO2e) emissions per mile as are produced by natural gas or diesel-hybrid buses.²⁰

¹⁶ Chicago Transit Authority, *Electric Bus*, accessed 6 February 2018, archived at <https://web.archive.org/web/20180206213131/http://www.transitchicago.com/electricbus>.

¹⁷ Judah Aber, Columbia University, *Electric Bus Analysis for New York City Transit*, May 2016.

¹⁸ Jimmy O'Dea, Union of Concerned Scientists, *Electric vs. Diesel vs. Natural Gas: Which Bus is Best for the Climate?* 19 July 2018, archived at <https://web.archive.org/web/20190920232331/https://blog.ucsusa.org/jimmy-odea/electric-vs-diesel-vs-natural-gas-which-bus-is-best-for-the-climate?> 27 July 2019.

¹⁹ Jimmy O'Dea, Union of Concerned Scientists, *Electric vs. Diesel vs. Natural Gas: Which Bus is Best for the Climate?* 19 July 2018, archived at <https://web.archive.org/web/20190920232331/https://blog.ucsusa.org/jimmy-odea/electric-vs-diesel-vs-natural-gas-which-bus-is-best-for-the-climate?> 27 July 2019.

²⁰ A natural gas bus produces 2,364 grams carbon dioxide-equivalent (CO2e) per mile and a diesel-hybrid 2,212 grams CO2e per mile. An electric bus, charged with the national electricity mix, produces 1,078 grams CO2e per mile. Jimmy O'Dea, Union of Concerned Scientists, *Electric vs. Diesel vs. Natural Gas: Which Bus is Best for the Climate?* 19 July 2018, archived at <https://web.archive.org/web/20190920232331/https://blog.ucsusa.org/jimmy-odea/electric-vs-diesel-vs-natural-gas-which-bus-is-best-for-the-climate?> 27 July 2019.

OPERATIONAL COST:

An average diesel transit bus today costs around \$500,000, compared to \$750,000 for an electric bus.²¹ Despite these higher upfront costs, electric buses are often a cost-efficient alternative, producing major savings over the course of their lifetime in significantly lower operating costs from reduced spending on maintenance and fuel, while also providing greater predictability in costs due to the relative stability of electricity prices compared to fossil fuel prices.

Electric bus manufacturers tout the economic benefits of their products to transit agencies and school districts. New Flyer says that its natural gas-powered buses start at around \$450,000 while their electric version starts at \$700,000.²² Over the lifetime of the bus, however, the company estimates the electric bus saves \$400,000 in fuel expenses and \$125,000 in averted maintenance costs, making up for the higher upfront cost.²³ Proterra says its standard electric transit bus costs \$750,000, compared to \$500,000 for a conventional diesel bus.²⁴ The company estimates that its electric buses offer fuel and maintenance savings of up to \$50,000 a year over fossil fuel-powered buses, meaning transit agencies can recoup the extra cost in around five years (depending on the bus's purchase price and operational cost variables),

ELECTRIC BUSES ON THE MARKET NOW:

The electric bus market in the United States has expanded dramatically over the last five years. There are a total of 528 fully electric, battery-driven buses currently in service across the country – an increase of 29 percent in 2018 alone.²⁵ Recent pledges by California, New York City and Seattle to transition to zero-emission fleets mean that 33 percent of all transit buses in the U.S. are now committed to go electric by 2045.²⁶ Roughly 4 percent of all new public transit bus sales in 2018 were electric buses, and 13 percent

²¹ Michael Coren, "An Electric Bus Just Snagged A World Record by Driving 1,100 Miles on A Single Charge," *Quartz*, 19 September 2017, archived at <https://web.archive.org/web/20180215170252/https://qz.com/1078326/an-electric-bus-just-snagged-a-world-record-by-driving-1100-miles-on-a-single-charge>.

²² New Flyer of America, *Country's Largest Transit Bus System on Electric Buying Spree* (press release), 17 October 2017, archived at <https://web.archive.org/web/20180215195104/https://www.newflyer.com/2017/10/countrys-largest-transit-bus-system-electric-buying-spree>.

²³ New Flyer of America, *Country's Largest Transit Bus System on Electric Buying Spree* (press release), 17 October 2017, archived at <https://web.archive.org/web/20180215195104/https://www.newflyer.com/2017/10/countrys-largest-transit-bus-system-electric-buying-spree>.

²⁴ Michael Coren, "An Electric Bus Just Snagged A World Record by Driving 1,100 Miles on A Single Charge," *Quartz*, 19 September 2017, archived at <https://web.archive.org/web/20180215170252/https://qz.com/1078326/an-electric-bus-just-snagged-a-world-record-by-driving-1100-miles-on-a-single-charge>.

²⁵ EB Start, *Electric Bus Industry Continues to Make Strides in 2018* (press release) 31 January 2019, archived at <https://web.archive.org/web/20190920232712/https://www.ebstart.co/press-release-1-31-2019>.

²⁶ EB Start, *Electric Bus Industry Continues to Make Strides in 2018* (press release) 31 January 2019, archived at <https://web.archive.org/web/20190920232712/https://www.ebstart.co/press-release-1-31-2019>.

of the country's transit agencies currently either have electric buses in their fleets or have them on order.²⁷ Taking into account those that have received grant funding for electric buses but not yet placed orders, upwards of 18 percent of U.S. transit agencies are now making moves toward electric buses.²⁸ Major players in the market include manufacturers Proterra, BYD Motors and NFI Group, the parent company of New Flyer of America.

OTHER TRANSIT AGENCY COMMITMENTS:

California has been at the forefront of moves towards bus electrification. In 2018, the California Air Resources Board (CARB) approved a statewide rule committing to shift to 100 percent all-electric transit buses by 2040.²⁹ Large transit agencies in the state will be required to purchase 25 percent electric buses starting in 2023, then 50 percent by 2026, with no new purchases of non-electric buses beginning in 2029.³⁰ In 2017 the Los Angeles Department of Transportation (LADOT) and Los Angeles County Metropolitan Transportation Authority (LA Metro) committed to full-fleet electrification by 2030.³¹ As of 2019, California has 210 electric buses in service and a backlog on order, bringing its total commitment to electric buses to around 450.³²

Other transit agencies have also made large commitments to electrify their fleets:

- New York City's Metropolitan Transportation Authority (MTA), the country's largest transit network, has committed to an all-electric bus fleet by 2040.³³ In 2018, MTA began a pilot project operating 10 electric transit buses throughout the city, and in 2019 added 15 more to its fleet.³⁴

²⁷ EB Start, *Electric Bus Industry Continues to Make Strides in 2018* (press release) 31 January 2019, archived at <https://web.archive.org/web/20190920232712/https://www.ebstart.co/press-release-1-31-2019>.

²⁸ EB Start, *Electric Bus Industry Continues to Make Strides in 2018* (press release) 31 January 2019, archived at <https://web.archive.org/web/20190920232712/https://www.ebstart.co/press-release-1-31-2019>.

²⁹ Sustainable Bus, *US electric bus market to grow 18.5% yearly till 2024*, 28 February 2019, archived at <http://web.archive.org/web/20190711182449/https://www.sustainable-bus.com/news/u-s-electric-bus-market-to-grow-18-5-yearly-till-2024/>.

³⁰ Adele Peters, "California just decided to move to 100% electric city buses," *Fast Company*, 14 December 2018, archived at <https://web.archive.org/web/20190920232846/https://www.fastcompany.com/90281612/california-just-decided-to-move-to-100-electric-city-buses>.

³¹ Joe Linton, "L.A. City Approves Full LADOT Transit Electrification by 2030", *StreetsBlog LA*, 9 November 2017, archived at <http://web.archive.org/web/20190808082601/https://la.streetsblog.org/2017/11/09/l-a-city-approves-full-ladot-transit-electrification-by-2030/>.

³² EB Start, *Electric Bus Industry Continues to Make Strides in 2018* (press release) 31 January 2019, archived at <http://web.archive.org/web/20190920211007/https://www.ebstart.co/press-release-1-31-2019>, 8 July 2019.

³³ Phil McKenna, "New York City Aims for All-Electric Bus Fleet by 2040" *Inside Climate News*, 26 April 2018, archived at <http://web.archive.org/web/20190816110304/https://insideclimatenews.org/news/26042018/nyc-air-pollution-electric-bus-public-transportation-mta-clean-technology>.

³⁴ New York Metropolitan Transportation Authority, "MTA Testing 10 New, All-Electric Buses to Reduce Emissions & Modernize Public Transit Fleet", 8 January 2018, archived at

- The Washington Metropolitan Area Transit Authority (WMATA) in D.C. brought 14 all-electric buses online in 2018.³⁵
- The Southeastern Pennsylvania Transportation Authority (SEPTA) rolled out 25 electric buses in South Philadelphia in 2019 and has another 10 arriving in 2020 for deployment in 2021.³⁶
- The Port Authority of Allegheny County in the Pittsburgh area is testing two electric buses in 2019 ahead of an anticipated deployment of 25 vehicles.³⁷
- Minneapolis Metro Transit debuted its first electric bus in 2019 and aims to deploy another 200 over the next decade.³⁸

IN SUMMARY... WHY ELECTRIC BUSES NOW?

Market penetration of new sales of electric transit buses has exceeded 10%, whereas light duty only recently surpassed 2%:

- Vehicle powertrain technology is undergoing a transformational shift from legacy internal combustion engines to battery electric technology. The transit bus market is ideally positioned to adopt electric powertrains given its unique operational characteristics, including high annual mileage at low fuel economy, predictable routes, depot-based fleets and operation in urban environments.
- Electric buses offer significant benefits, including:
 - **Lower total cost of ownership.** Battery-electric vehicles have the lowest operational lifecycle compared to Diesel, CNG or Hybrid buses. High EV energy efficiency, low electricity rates and high annual vehicle mileage combine to create significant fuel savings. Additionally, electric buses have significantly fewer parts which dramatically reduce maintenance and operating costs.
 - **Superior performance.** An EV bus offers superior performance with nearly twice the horsepower of a standard diesel bus and five times better fuel efficiency.
 - **Preferred Customer Experience.** Customers like the clean, modern look of our buses and the pollution-free experience of riding on them. They are also quiet.

<https://web.archive.org/web/20190701224524/http://www.mta.info/news/2018/01/08/mta-testing-10-new-all-electric-buses-reduce-emissions-modernize-public-transit>; CleanTechnica, *New York City Adds to its Zero-Emission Fleet: 15 New Flyer, Low Floor 60-Foot Xcelsior CHARGE Battery-Electric Transit Buses* (Press Release), 25 March 2019, archived at <https://web.archive.org/web/20190920233010/https://cleantechnica.com/2019/03/25/new-york-city-adds-to-its-zero-emission-fleet-15-new-flyer-low-floor-60-foot-xcelsior-charge-battery-electric-transit-buses/>.

³⁵ Proterra, *Washington D.C. Circulator Deploys Proterra® Battery-Electric Buses Across Nation's Capital* (press release), 20 April 2018.

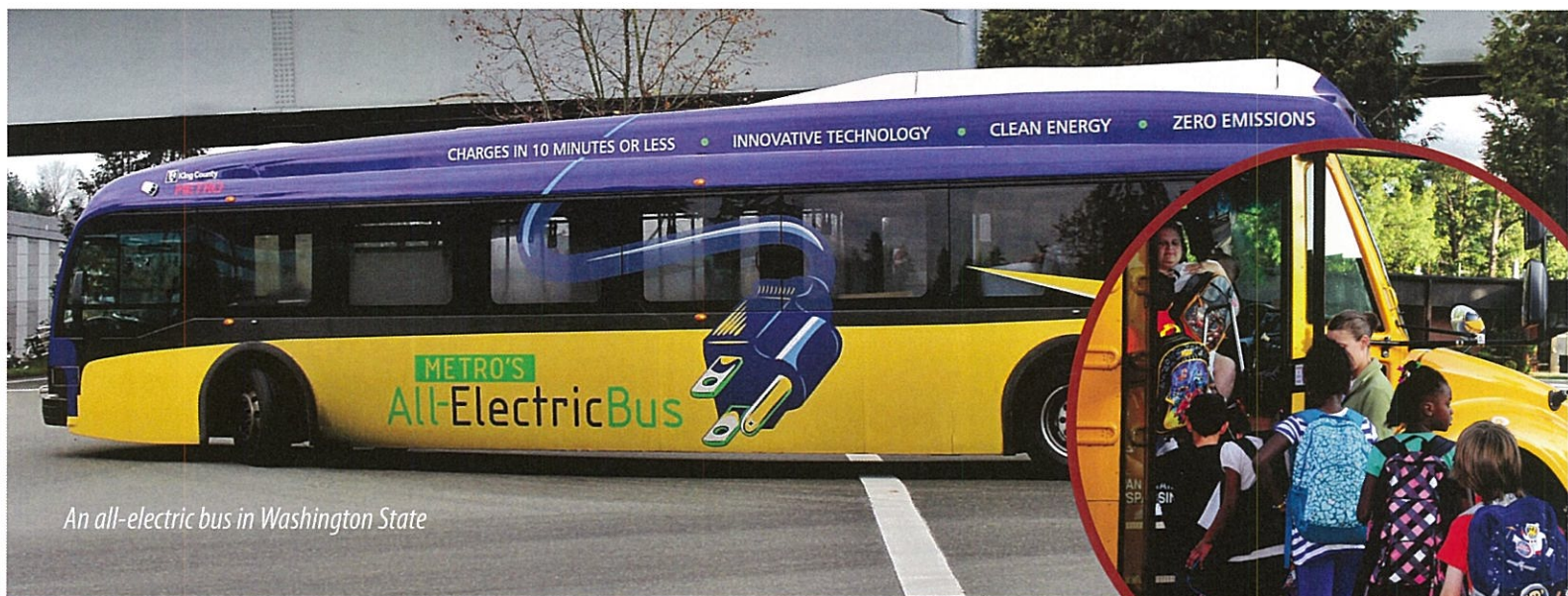
³⁶ Virginia Strevia, "SEPTA releases 25 new electric buses for South Philly routes," *Philly Voice*, 9 June 2019.

³⁷ Ed Blazina, "Port Authority getting first electric buses, considering fleet for Downtown-Oakland rapid transit," *Pittsburgh Post-Gazette*, 17 January 2019.

³⁸ Karen Zamora, "Minneapolis' Metro Transit to Add Electric Buses in 2019," *Minneapolis Star Tribune*, 26 September 2017; KSTP, "Metro Transit puts electric buses into service on new C-Line", 8 June 2019, archived at <https://web.archive.org/web/20190609185929/https://kstp.com/news/metro-transit-new-c-line-buses-fully-electric/5382548/>.

- **Environmental.** Electric buses have zero tailpipe emissions and decrease dependency on fossil fuels. Particulate matter from traditional transit buses contains numerous harmful gases and upwards of 40 cancer-causing substances.
- In addition to the superior performance and benefits of an electric bus, *there are also a number of trends impacting accelerated adoption:*
 - Declining battery costs (less than \$150 kWh now)
 - Tightening emission standards, at least at the state level; increased focus on environmental stewardship
 - Concern over air quality, local health effects, and climate change has really shifted the public's perception of what a modern transit bus needs to do. Government agencies and regulators have also certainly taken notice and are moving in the direction of zero emissions transit. States and transit agencies across the country have adopted regulations and guidelines to adopt a 100% zero emission fleet.
 - Urbanization – more and more people moving into cities (1M new people move to urban areas every week)
 - Health costs associated with fossil fuels
 - Government programs
 - FTA's Low-No Emission Vehicle Program
 - State Voucher Programs (HVIP, NYSERDA, MD's Freedom Fleet Voucher Program, Chicago's Drive Clean Truck Program)
 - VW Settlement funding.
- Communities across the United States struggle to address the harmful effects of air pollution. And disadvantaged communities in particular bear a disproportionate share of the air pollution burden. Exposure to particulate matter is linked to a range of severe health issues, including heart or lung disease, asthma and upper respiratory problems.
- Electric transit buses are currently serving our communities, airports (see Newark) and universities and are making a significant difference in addressing these and other issues. Every time an electric bus with zero tailpipe emissions replaces a diesel bus, greenhouse gas emissions are reduced by approximately 230,000 pounds and noise pollution is lessened. These electric buses have displaced more than 50 million pounds of GHG emissions.

“Cutting vehicle emissions is critical to the fight against climate change,” said Senate Majority Leader Weinberg. “NJ Transit should be in the forefront of the conversion to a zero-emission electric bus fleet that is a priority for forward-looking mass transit agencies across the country. NJ Transit should certainly be able to match the MTA’s 2040 target, but if we’re going to do so, we need to make an increased commitment to electric bus purchases in our next Bus Fleet Plan for 2021 to 2027. This is a critical environmental health issue, particularly in our cities,” she concluded.



An all-electric bus in Washington State

Electric Buses

Clean Transportation for Healthier Neighborhoods and Cleaner Air

Each day, buses carry millions of children to school and move millions of Americans around our cities. But, the majority of America's buses burn fossil fuels like diesel that threaten public health and contribute to global warming. The good news is that all-electric buses are here, and they're cleaner, healthier and often cheaper to run.

Pollution from Diesel Exhaust Threatens Public Health

Diesel exhaust from tailpipes is a dangerous pollutant – one that is common in urban areas and places with frequent truck and bus traffic, including the areas around our schools.

- Exposure to diesel exhaust has been linked to higher rates of mortality and lung cancer, decreased lung function and aggravated asthma symptoms.
- Children are especially vulnerable to diesel air pollution, which can harm their lungs, increase their likelihood of developing asthma, and harm developing fetuses.
- Levels of air pollution are higher near schools when school buses are idling, on buses traveling behind other buses, and near busy roads where buses travel.

Electric Buses Can Help Clean Our Air

Electric buses produce no tailpipe emissions and use energy up to four times more efficiently than diesel or natural gas buses. By expanding transit options and improving bus service, while switching to clean electric buses, cities and schools across the country can help reduce global warming emissions and local air pollution.

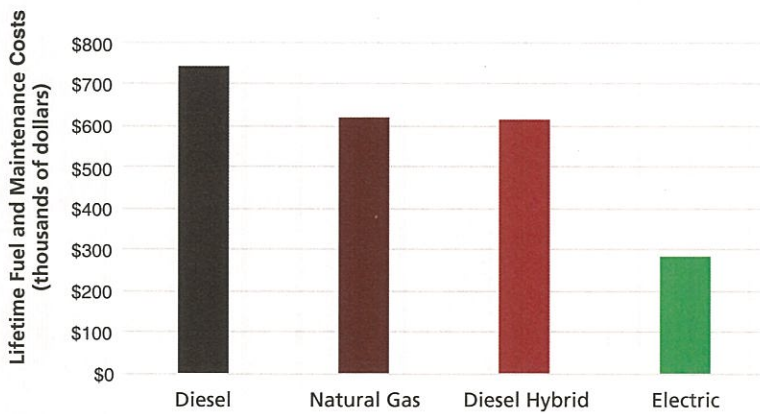
- Replacing all of America's school buses with electric buses could avoid an average of 5.3 million tons of greenhouse gas emissions each year.
- Replacing all of the diesel-powered transit buses with electric buses in the United States could save more than 2 million tons of greenhouse gas emissions each year.

Potential Emissions Savings from Electric Buses for Select Transit Agencies

Agency	Major City Served	GHG Emissions Averted Annually with Electric Buses (short tons)	Equivalent # of Cars Taken Off the Road
City of Phoenix Public Transit Department (Valley Metro)	Phoenix, AZ	9,075	1,752
Denver Regional Transportation District	Denver, CO	46,967	9,067
Metropolitan Atlanta Rapid Transit Authority	Atlanta, GA	10,889	2,102
Chicago Transit Authority	Chicago, IL	54,993	10,616
Massachusetts Bay Transportation Authority	Boston, MA	55,071	10,631

82x

Estimated Lifetime Fuel and Maintenance Costs of Transit Buses, by Fuel Type



Clean, All-Electric Buses Make Economic Sense

All-electric buses can save school districts and transit agencies money in annual operating costs from reduced fuel costs, while also providing more predictability in costs since electricity prices are relatively stable compared to oil prices. Electric buses also save money on maintenance costs since they have fewer parts, no exhaust systems and their breaking systems last longer. For instance:

- An analysis of an electric school bus pilot program found that the electric bus saves nearly \$2,000 a year in fuel and \$4,400 a year in reduced maintenance costs.
- According to the California Air Resources Board, an electric bus can save \$458,000 in fuel and maintenance costs over the bus's lifetime compared to a diesel bus and \$336,000 compared to a natural gas bus. (See chart above.)

Although electric buses today are still more expensive upfront than their diesel or natural gas-powered counterparts, electric buses can pay for themselves over their lifetime.

Recommendations

To support more widespread adoption, state governments should:

- Allocate settlement money from Volkswagen's "Dieselgate" settlement to subsidize the purchase of electric school and transit buses, as well as charging infrastructure.
- Create incentive programs and grants for transit agencies, school districts and bus contractors to help finance the upfront cost of electric buses and charging infrastructure.
- Facilitate the installation of charging infrastructure through programs that help cover the costs.
- Encourage utilities to design their rates in ways that support electric buses.
- Consider low-cost financing programs that help agencies, districts and bus contractors leverage other sources of funding, like Volkswagen settlement money.
- Identify other ways to ensure successful electrification of buses, including technical assistance and research, as well as the publication of data and lessons learned.

Transit agencies, school districts and bus contractors should:

- Replace buses powered by fossil fuels with the cleanest possible technology for the health of future generations: all-electric.
- Consider adopting goals to repower the entire fleet with electric buses over one replacement cycle.
- Ask state governments and beneficiary agencies to dedicate funds from the Volkswagen settlement to electric buses.

For more information and the full report, please visit
www.uspirgedfund.org

