



VIRTUAL MEETING  
TRANSIT WORKING GROUP

# MPO Transit Working Group Coffee Chat: Fleet Electrification

February 28, 2022



# Notice of Nondiscrimination

You are invited to participate in our transportation planning process, regardless of your race, color, national origin (including limited English proficiency), religion, creed, gender, ancestry, ethnicity, disability, age, sex, sexual orientation, gender identity or expression, veteran's status, or background.

## 简体中文 (Simplified Chinese)

如果需要使用其它语言了解信息，请联系波士顿大都会规划组织 (Boston Region MPO) 《民权法案》第六章专员，电话 857.702.3700。

## 繁體中文 (Traditional Chinese)

如果需要使用其他語言瞭解資訊，請聯繫波士頓大都會規劃組織 (Boston Region MPO) 《民權法案》第六章專員，電話 857.702.3700。

## Kreyòl Ayisyen (Haitian Creole)

Si yon moun vle genyen enfòmasyon sa yo nan yon lòt lang, tanpri kontakte Espesyalis Boston Region MPO Title VI la nan nimewo 857.702.3700.

## Español (Spanish)

Si necesita esta información en otro idioma, por favor contacte la Boston Region MPO al 857.702.3700.

## Português (Portuguese)

Caso estas informações sejam necessárias em outro idioma, por favor, contate o MPO da Região de Boston pelo telefone 857.702.3700.

## Tiếng Việt (Vietnamese)

Nếu quý vị cần thông tin này bằng một ngôn ngữ khác, vui lòng liên lạc Boston Region MPO theo số 857.702.3700.

Read the full notice of your rights and protections at [www.bostonmpo.org/mpo\\_non\\_discrimination](http://www.bostonmpo.org/mpo_non_discrimination).



TRANSIT  
WORKING  
GROUP

VIRTUAL MEETING

# Guidelines

1. All participants will join the meeting with muted microphones.
2. Please rename yourself to include your first name, last name and affiliation.
3. To participate in the discussion, please select the “raise hand” function. Find this by clicking either on the “Participants” button at the bottom of the screen, and a window will pop up with a “Raise Hand” button at the bottom, or the “Reactions” button in the toolbar. Staff will then call on participants.
4. If you are on the phone, you can use \*9 to raise your hand.
5. If you have any technical difficulties, please contact Stella Jordan via the chat box, [sjordan@ctps.org](mailto:sjordan@ctps.org) or 857.702.3675.



TRANSIT  
WORKING  
GROUP

VIRTUAL MEETING

## Accessibility Statement

This meeting is accessible to people with disabilities. Zoom products are compliant, with exceptions, with the following standards: Web Content Accessibility Guidelines 2.1 Level AA Standards and Revised Section 508 Standards.

If you require any additional accommodations in order to participate fully in this meeting, please contact Stella Jordan, MPO staff, at [sjordan@ctps.org](mailto:sjordan@ctps.org) or 857.702.3675.

February 28, 2022

## AGENDA

1. Welcome
2. RIPTA Electrification Program
3. Discussion
4. Closing and Next Steps

# Introduce yourself in the chat!

- Name
- Affiliation
- Location or transit service area

*Technical difficulties? Call Stella Jordan at 857.702.3675 or email [sjordan@ctps.org](mailto:sjordan@ctps.org).*



February 28, 2022

## AGENDA

1. Welcome
2. RIPTA Electrification Program
3. Discussion
4. Closing and Next Steps

# Today's Meeting

- Welcome
- RIPTA Electrification Program
- Discussion
- Closing and Next Steps

*Technical difficulties? Call Stella Jordan at 857.702.3675 or email [sjordan@ctps.org](mailto:sjordan@ctps.org).*





# **RIPTA's Current Electrification Program**

## Phase I. Demonstration

- *Testing Vehicle Performance, Energy Usage, and Infrastructure Requirements*

## Phase II. Broader Adoption

- *Introduce Fully Battery-Electric Service on the R-Line*

## Phase III. Sustainable and Resilient Deployment

- *Begin Electrification of Newport-based Services*
- *Completion of Action Plan for Electrification and Service Growth to guide Full Deployment System-wide*

- RIPTA leased three 40' Proterra Catalyst E2 buses in Fall 2018.
- Entered service in September 2019 following extensive vehicle compliance and operational review.
- All 3 are charged overnight by depot chargers installed at 265 Melrose Street.
- Equipped with 440 kWh batteries.
- Vehicle performance testing has evolved over time.



# ZEV Phase I: Testing

- To ensure increased deployment success, R-Line blocks were restructured to match average electric bus range of +/- 70 miles.
- Despite redirection in pilot, electric bus performance trends match peer experience through remainder of 2020 and into 2021.
- During summer and fall, staff undertook energy and vehicle modeling on the R-Line blocks operated by the electric buses and validate the criticality of on-route charging for successful deployment.
- Pilot buses showed month-over-month improvement in performance during spring/summer, but some issues persist.

<b>R-Line Blocks prior to Pilot Ph. 1</b>			
<u>Block</u>	<u>Vehicles Req.</u>	<u>Vehicle Type</u>	<u>Distance</u>
11-1	1	Diesel	136.53
11-11	1	Diesel	118.69
11-12	1	Diesel	103.29
<b>Totals</b>	<b>3</b>		<b>358.51</b>

<b>R-Line Blocks during Pilot, Ph. 1</b>			
<u>Block</u>	<u>Vehicles Req.</u>	<u>Vehicle Type</u>	<u>Distance</u>
11-1	1	Diesel	69.86
<b>11-13</b>	<b>1</b>	<b>Electric</b>	<b>69.96</b>
<b>11-11</b>	<b>1</b>	<b>Electric</b>	<b>69.96</b>
11-15	1	Diesel	52.02
<b>11-12</b>	<b>1</b>	<b>Electric</b>	<b>69.96</b>
11-16	1	Diesel	36.63
<b>Totals</b>	<b>6</b>		<b>368.39</b>

# ZEV Phase II: Expansion

- 14 40-foot New Flyer Xcelerator XE40 buses.
- Scheduled for delivery in Fall 2022. Alignment with infrastructure is paramount.
- Will operate exclusively on the R-Line. Every 1 in 5 RIPTA passenger trips zero-emissions.
- On-route charging will occur at Broad/Montgomery.
  - Construction bid has been awarded, anticipated to begin this Spring.



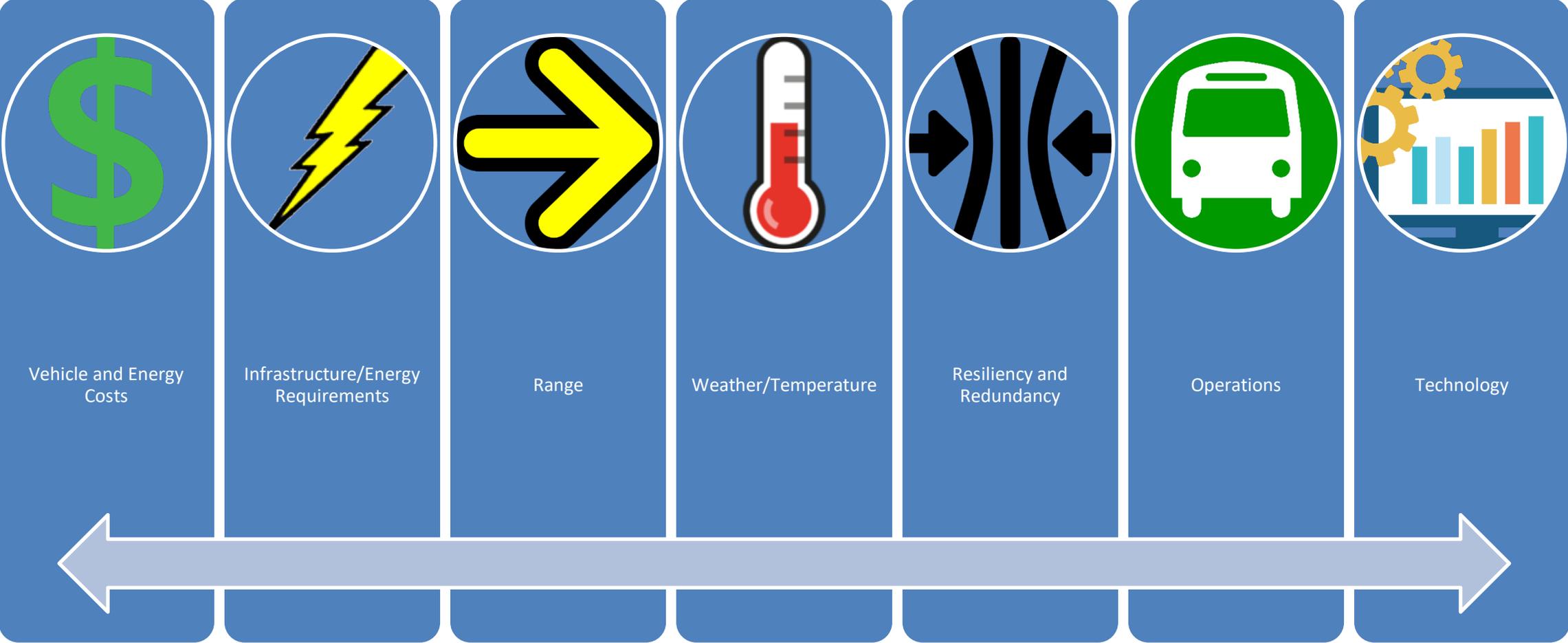
# ZEV Phase II: Newport

- This phase includes:
  - Procurement of up to **40** battery-electric buses to be operated on **6** routes based in Newport.
  - Facility improvements and charging infrastructure at Newport Gateway Center and RIPTA's Garage in neighboring Middletown.
  - Technical assistance and installation of resiliency (i.e. battery storage) demonstration.
- Sources of funding include:
  - FTA's Low/No Emissions Vehicle Program
  - State of Rhode Island
  - Office of Energy Resources
  - RIPTA Capital Budget
  - Federal earmarks



# What We're Learning

# What We're Learning

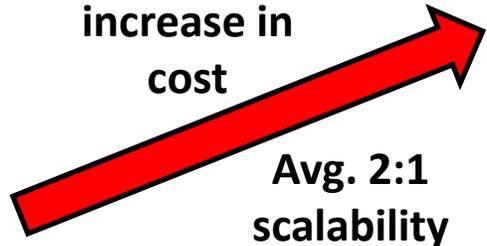


# Vehicle Price and Scalability



Standard diesel bus

40%  
increase in  
cost



Avg. 2:1  
scalability



Battery electric bus

- RIPTA is a commercial utility ratepayer. We do **not** have a special rate.
- Electricity usage estimated to increase by a third above current levels upon operation of Phase II.
- RIPTA and National Grid are working on securing a short-term discount on demand charges to the extent possible under the existing rate case.
- More electric buses = increase in electricity usage = increased electricity costs = increased OpEx



# Energy Requirements



**14 battery electric buses**



**1.2 MW**



**+/- 1000 houses**



## Multiple Charging Options / Rapidly Evolving Technology:



Depot (slow) charging

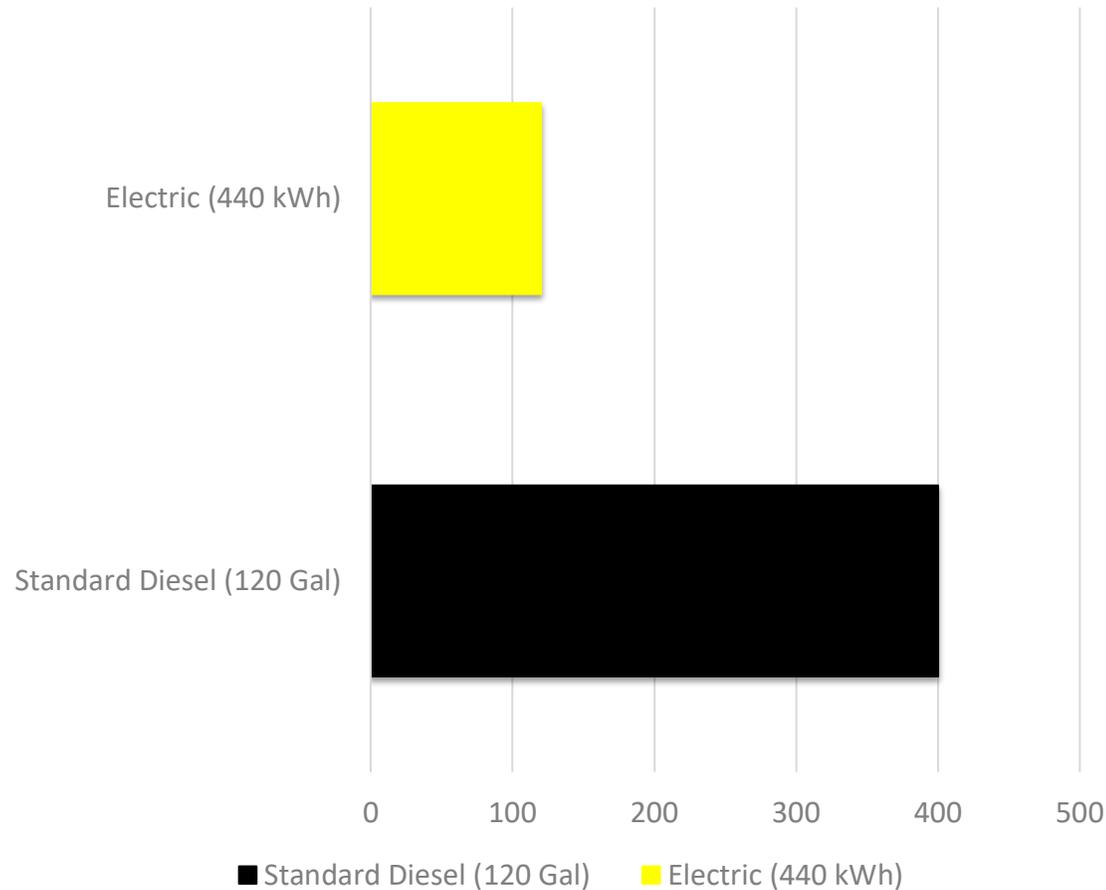


Pantograph (fast) charging



Wireless/induction (fast) charging

## Current range experience



- Bus manufacturers claim their vehicles can run between 200-300 miles/day (under ideal conditions).
  - Major divergence between ideal and real-life operation.
- 50% of RIPTA's service is above 140 miles/day.
- Due to unique service profile, we have higher than average service blocks than compared to our peers.
- If we were to transition the fleet using existing service design, there would be an increase in OpEx and CapEx
- Charging strategy is key to offsetting range limitations on some routes.

# Weather/Temperature Impacts

- Research by the Zero Emission Bus Resource Alliance (ZEBRA) finds that below 40 or above 90°F, state of charge and effective range decline by 30%. RIPTA's own experience validates this finding.
- Use of heating and cooling during respective seasons increase energy consumption on HVAC and reduce available energy for propulsion.
- On very cold winter mornings, buses of any propulsion type need to be pre-heated to ensure key systems are safe and operable. Immediately running a BEB with a cold battery results in short duration of service.
- RIPTA has seen higher than average kWh/mi energy consumption on very cold and very hot days. This translates to higher electricity costs.



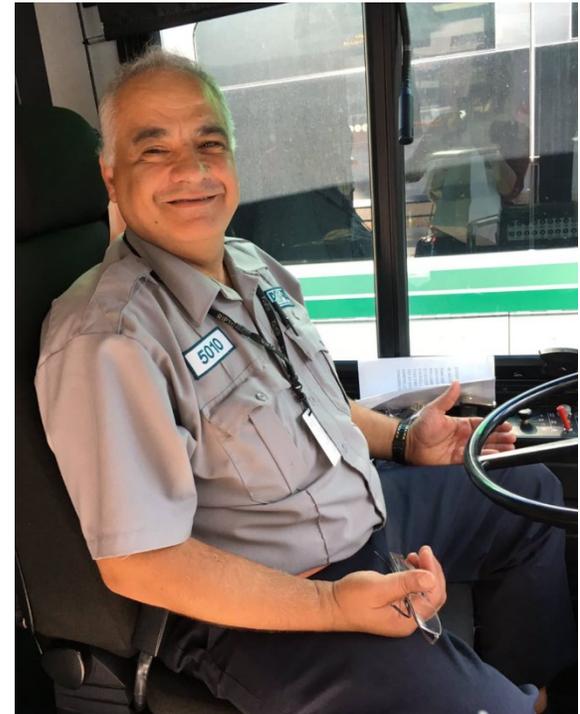
# Resiliency and Redundancy

- Fleet transition requires contingency planning for continuity of service.
  - Imperative that infrastructure projects by RIDOT and municipalities align with fleet transition in the future.
- Ever-worsening conditions caused by climate change suggest that research into resilient infrastructure and redundancy measures is advisable.
- Potential areas to explore include:
  - Renewable energy solutions
  - Battery storage technology
  - Micro grid technology
- RIPTA's Newport Electrification Project incorporates a battery storage demonstration in partnership with the Office of Energy Resources.



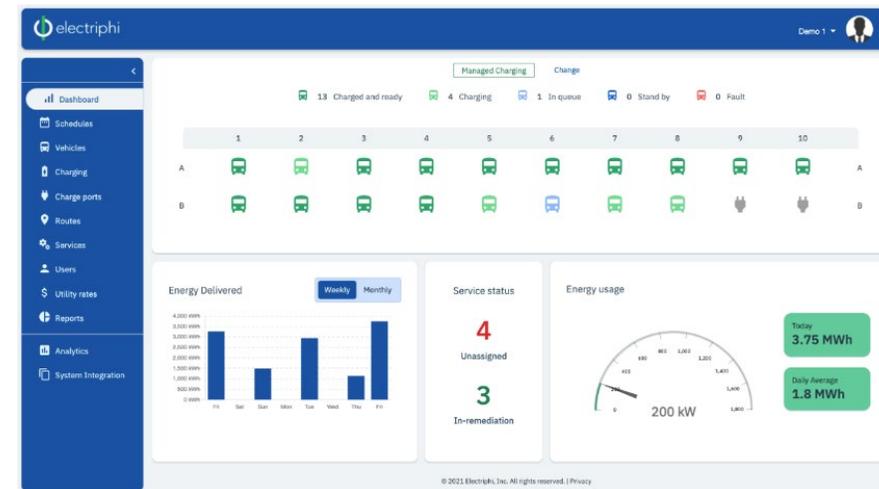
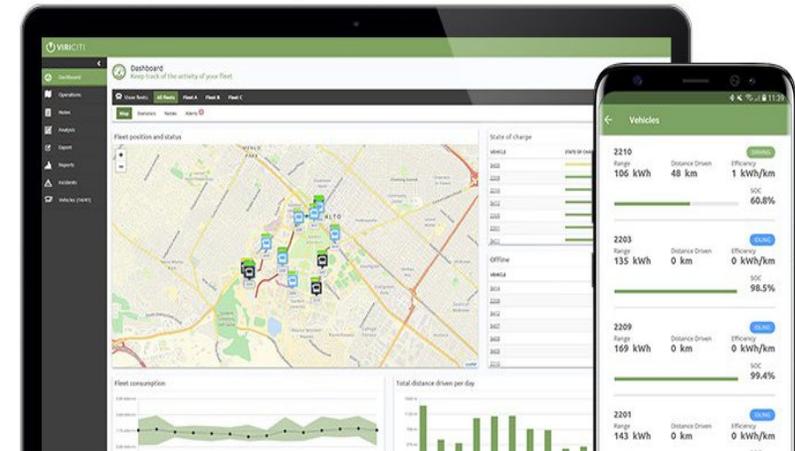
# Impacts on Transportation Operations

- Driver Training:
  - Use of on-route charging equipment
  - Regenerative braking and acceleration
  - Cognizance of battery state-of-charge
- Maintenance Training and Processes
- Vehicle Storage and Staging
- Impacts of Range on Scheduling and Vehicle Requirements
- Different Approach to Procurement



# Supportive Technology

- Real-Time Vehicle Performance Monitoring
- Real-Time Charging Infrastructure Monitoring
- Smart Charge and Power Management Systems
- Ongoing Data Collection and KPI Analysis
- Integration with Scheduling Software
- Service Modeling and Optimization of Service Functionality



# Next Steps

- Integrate fleet electrification & Transit Master Plan implementation
- Continue to strengthen partnerships with DEM, OER, National Grid, City of Providence, and others
- Support implementation of the Act on Climate
- Leverage federal infrastructure investment

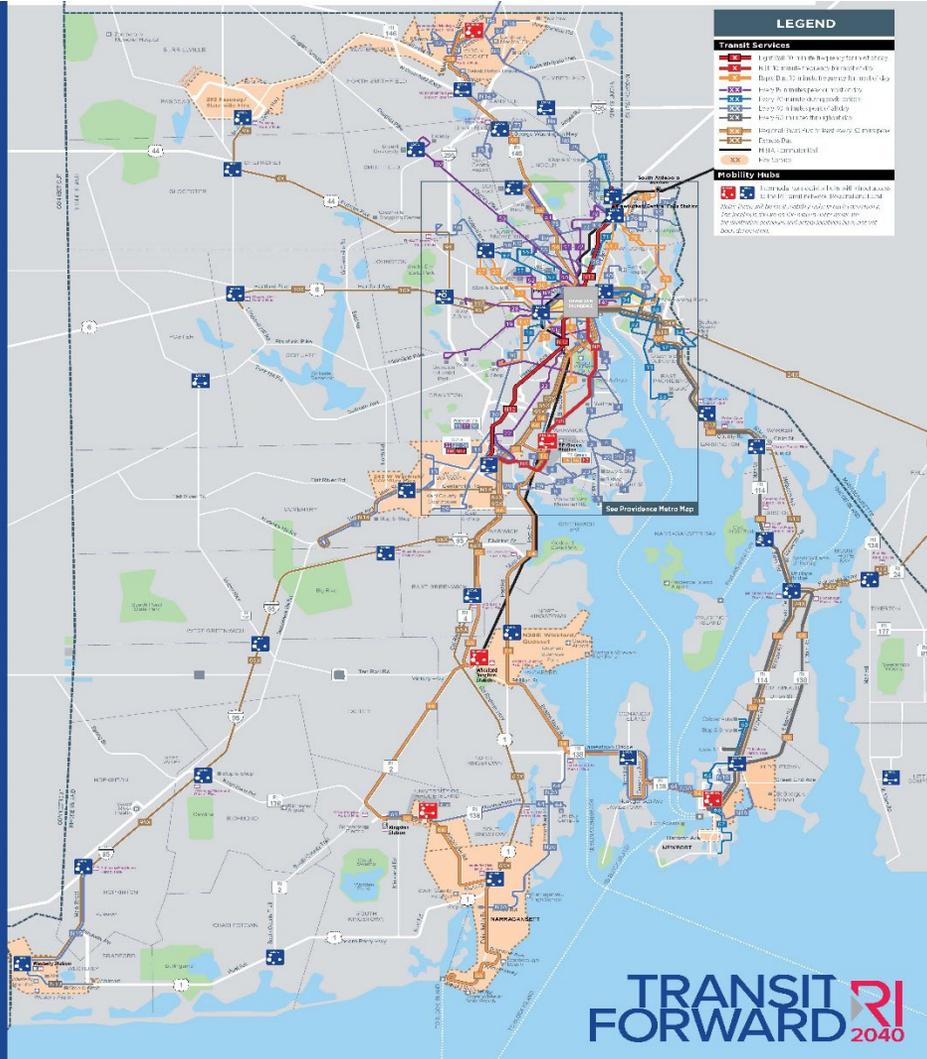
-  **Improve existing services**
-  **Expand service to new areas**
-  **Develop High Capacity Transit**
-  **Improve access to transit**
-  **Make service easier to use**



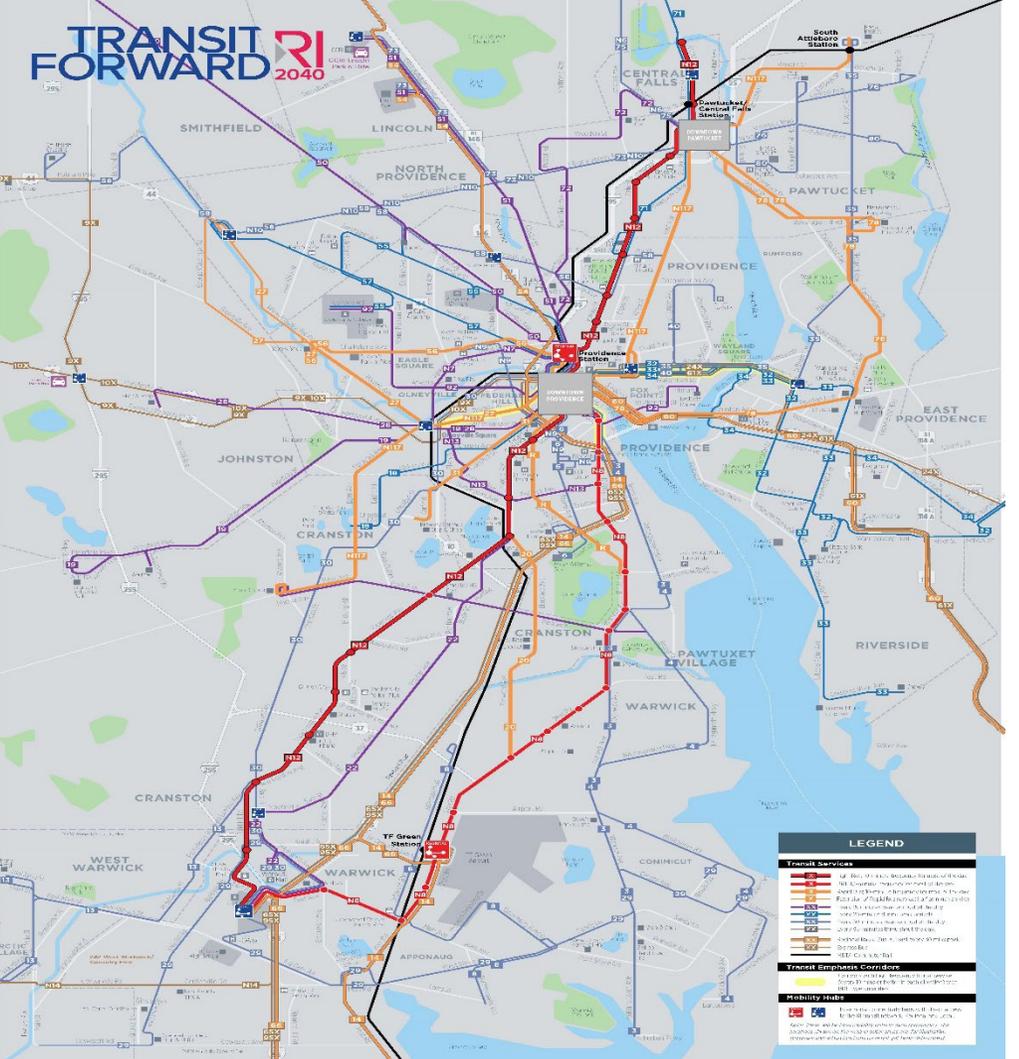
*Adopted December 2020*

# Transit Forward RI 2040

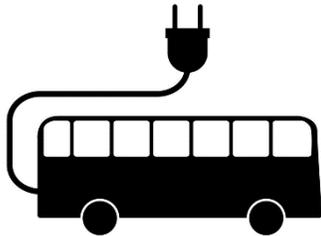
## TRANSIT FORWARD RI SERVICES STATEWIDE



## TRANSIT FORWARD RI SERVICES PROVIDENCE METRO AREA



ZEV Implementation



TMP Implementation



Action Plan  
for  
Electrification  
and Service  
Growth

*Thank You!*



*ZEV Program Contacts:*

Zachary Agush  
Principal Planner  
[zagush@ripta.com](mailto:zagush@ripta.com)

Sarah Ingle  
Director of Long Range Planning  
[ingle@ripta.com](mailto:ingle@ripta.com)

Greg Nordin  
Chief of Strategic Advancement  
[gnordin@ripta.com](mailto:gnordin@ripta.com)

February 28, 2022

## AGENDA

1. Welcome
2. RIPTA Electrification Program
- 3. Discussion**
4. Closing and Next Steps

# Discussion Questions

1. What are your plans for fleet electrification?
2. How do your experiences with preparing for electrification resemble RIPTA's, or not?
3. What planning needs do you have around electrification?
4. What capital investments do you anticipate making as part of the transition to an electric fleet?

*Technical difficulties? Call Stella Jordan at 857.702.3675 or email [sjordan@ctps.org](mailto:sjordan@ctps.org).*



# Closing and Next Steps

AGENDA

1. Welcome
2. RIPTA Electrification Program
3. Discussion
4. Closing and Next Steps

# Closing and Next Steps: Upcoming Coffee Chats

## 1. Human Services Transportation with special guest Vera Kirrane, EOHHS

- Thursday, March 10, 4:00 PM
- Register:  
<https://tinyurl.com/ye28223m>

## 2. Confronting the Driver Recruitment Shortfall with the Transit Workforce Center

- 🍷 **Newly announced!** 🍷
- Wednesday, April 6, 4:00 PM
- Register:  
<https://tinyurl.com/2p9acxrf>

## 3. Stay tuned for more!



February 28, 2022

## AGENDA

1. Welcome
2. RIPTA Electrification Program
3. Discussion
4. Closing and Next Steps

# MPO Staff Contact Information

**Sandy Johnston, Senior Transportation Planner**  
[sjohnston@ctps.org](mailto:sjohnston@ctps.org) 857.702.3710

*Technical difficulties? Call Stella Jordan at 857.702.3675 or email [sjordan@ctps.org](mailto:sjordan@ctps.org).*

