



# Transit Advisory Committee

Arlington Transit Updates

Battery Electric Bus Pilot

ART Satisfaction Survey

Winter Weather Response

Microtransit

STAR Audit



# ART Battery Electric Bus

## ART Zero Emission Goals

- Arlington County aims community-wide net zero carbon reduction by 2050.
- 2023 ART Zero-Emissions Bus Study recommends deployment of a 100% fleet by 2038
- Establish workforce training program (2024)
- Pilot BEBs (2025-26)
- Replace aging CNG buses (2023 - 2036)
- Commence RNG fueling (2025-26)
- Complete ART Operations and Maintenance Facility (AOMF) electrification upgrades (2025-28)



# Arlington Transit Battery Electric Bus Pilot Approach

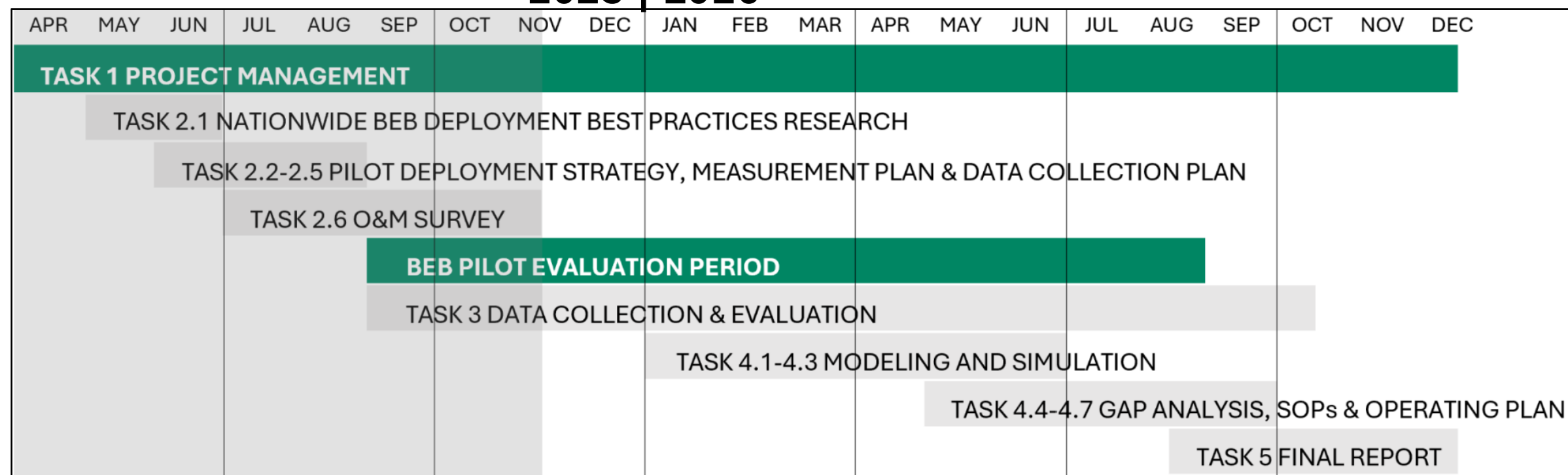
## Purpose:

- Evaluation across real world operations: Energy use, Range capability, Reliability and maintenance, replacement ratios and cost, as compared to CNG/RNG buses over a 1-year BEB pilot period (September '25-26)
- Establish transition requirements for a full BEB fleet

## Upcoming Milestones:

- 4 GILLIG BEBs began service in August 2025 – Eight more BEBs go into production in May 2026
- Current charging: Two 80 kW chargers at Trades and two 60 kW portable chargers in the maintenance shop
- 4 plug-in chargers and 13 pantograph (including one super fast 400 kWh charger) will be in operation by May

2025 | 2026



# Data Collection & Evaluation Cont.

KPIs	
<b>Safety</b>	Accidents per 100k mi
<b>Service Reliability and Efficiency</b>	Vehicle Availability
	Abandoned Block Rate
	Mean Distance Between Failures
	Avg Service Hours and Miles per Day
	Avg Non-Service Hours and Miles per Day
	Emission Net Reduction (CO <sub>2</sub> & NO <sub>x</sub> )
	Avg. Daily Speed
<b>Cost and Resource Management</b>	Avg. Energy Cost per mi (BEB/CNG)
	Maintenance Cost
<b>Energy and Fuel Performance</b>	Avg Energy Use per mi
	Avg Regen. Energy per mile
	Avg Start/End SOC
	% Energy Used Idling/In-Service
	Avg Range
	Avg. CNG per mile
	HVAC Average Load

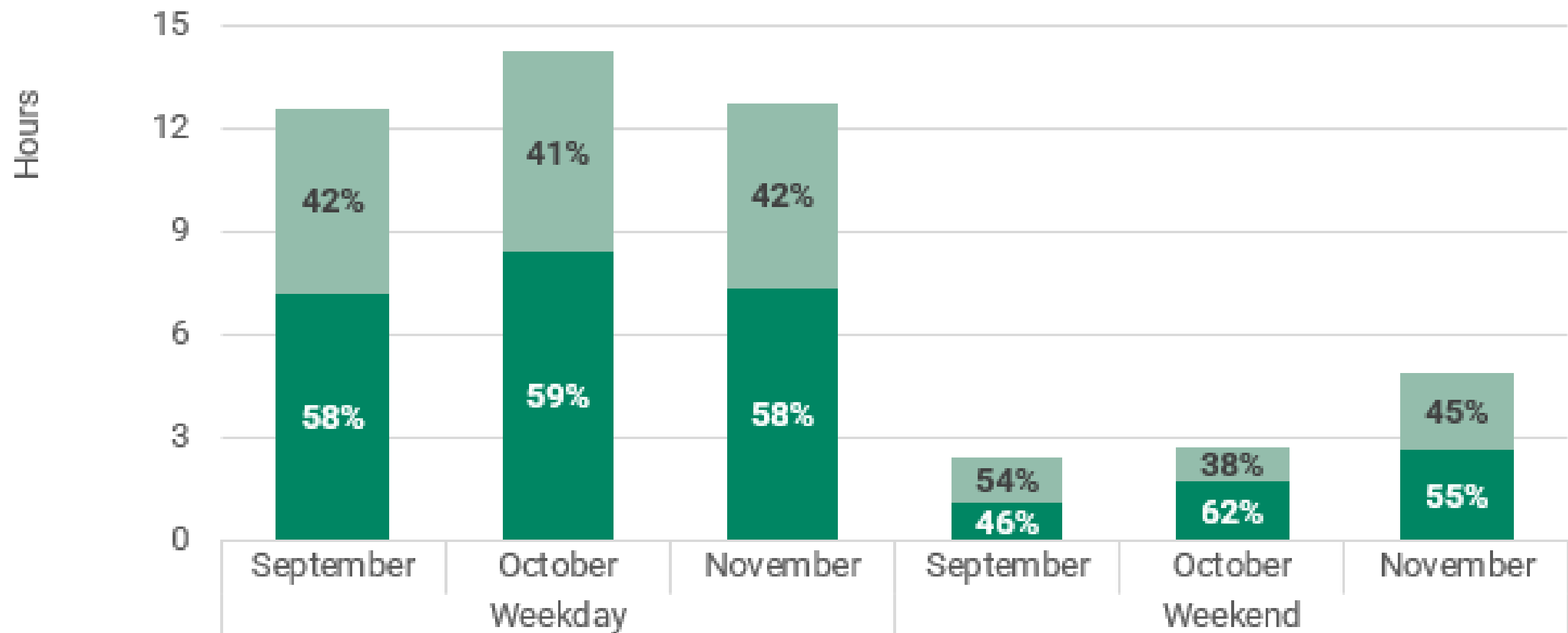
These are the most important factors in determining the replacement ratio of CNG to BEB buses.

Data Source		Data Elements
<b>Clever Reports</b>	Bus Maintenance & Service	Miles between failures Blocks completed/abandoned Route assignment Vehicle availability
<b>INFOR</b>	Bus Maintenance	Warranty status Issue description Labor & parts cost Work order
<b>Viriciti</b>	Bus Service & Charger	Energy use (propulsion, HVAC) SOC details Miles/time not in service Charging session
<b>DOR Reports</b>	Bus Service	Ambient temperature, Accidents/incidents Road call reasons
<b>ChargePoint</b>	Charger In-Service	Charging session SOC Duration Energy delivered

# Data Collection & Evaluation Cont..

## Preliminary Analysis: Utilization

Average Time of Charging, Driving and Idling



■ Average of time idling [hours]	5.3	5.9	5.4	1.3	1.0	2.2
■ Average of time driving [hours]	7.2	8.4	7.3	1.1	1.7	2.7

# Data Collection & Evaluation

## Average speed and total distance for BEBs

	AVG. SPEED IN SERVICE [MPH]	AVERAGE OF DAILY DISTANCE DRIVEN (MILES)	TOTAL DISTANCE DRIVEN (MILES)
5329	9.1	95	7,802
5420	8.9	82	2,043
5421	9.0	96	7,775
5422	9.0	96	7,946
<b>Total</b>	<b>9.0</b>	<b>94</b>	<b>25,566</b>

## Monthly mileages for BEB and CNG (control) fleets

	BEB				CNG			
	5329	5420	5421	5422	5325	5326	5327	5328
<b>September</b>	2,279	2,043	2,486	2,416	3,694	3,714	3,920	4,304
<b>October</b>	3,172	0	3,001	2,899	3,789	3,704	3,823	4,296
<b>November</b>	2,350	0	2,288	2,630	3,534	562	3,023	2,373

## Charging details

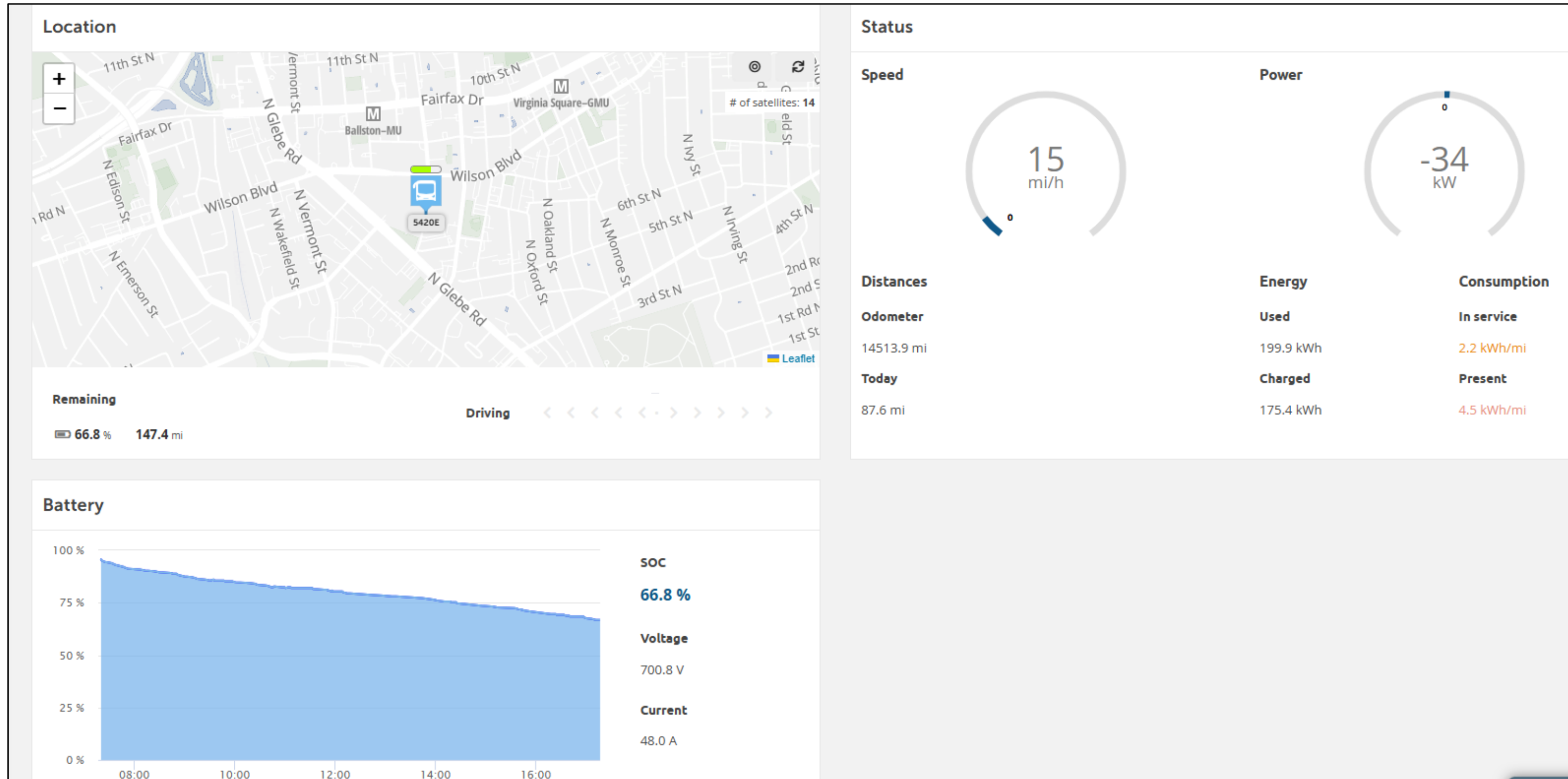
	MIN START SOC	AVERAGE OF START SOC BEFORE CHARGE	AVERAGE OF END SOC	AVERAGE DURATION PLUGGED IN	AVERAGE DURATION CHARGING TIME	AVERAGE ENERGY INPUT (KWH)	AVERAGE CHARGING RATE (KW)
<b>Sep</b>	19%	55%	80%	3:38	1:23	127	91.41
<b>Oct</b>	20%	47%	89%	6:44	2:09	239	110.35
<b>Nov</b>	18%	44%	95%	5:40	3:23	298	87.72
<b>Total</b>	<b>18%</b>	<b>51%</b>	<b>86%</b>	<b>4:50</b>	<b>1:50</b>	<b>176</b>	<b>95.09</b>

## Utilization compared to sub-fleet averages

- 3,405 Average Distance Traveled in November for 15 GILLIG CNG buses
- 2,159 Average Distance Traveled in November for the 47 New Flyer CNG buses
- 2,460 Average Distance Traveled in November by all the New Flyer and GILLIG CNG buses
- 2,402 Average Distance Traveled in November for GILLIG BEB buses (except 5420E)**
  
- 8,977 **Daily Weekday Platform Miles**
- 51 176 Platform Miles per Bus with 51 buses pulling out
- 55 163 Platform Miles per Bus with 55 buses pulling out

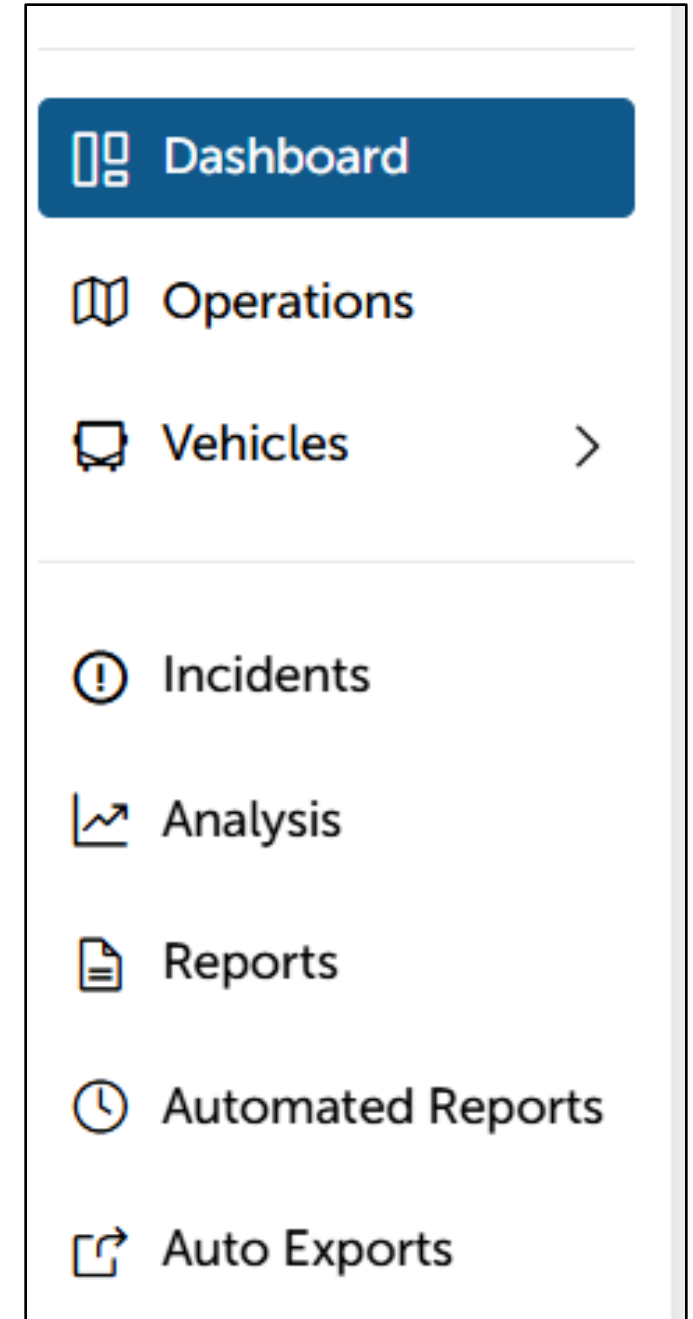
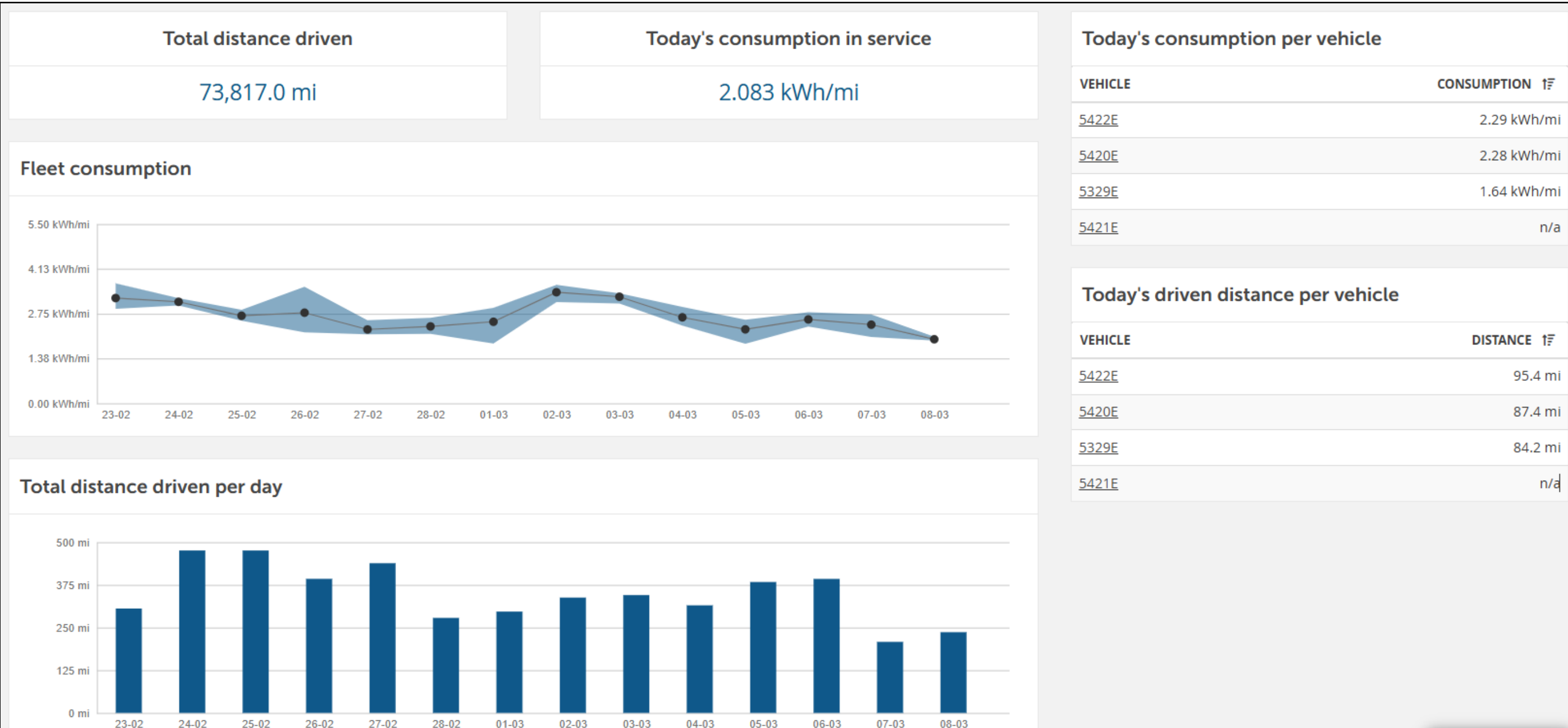
# Data Collection & Evaluation

## Real-time telematics with the ChargePoint Viriciti program



# Data Collection & Evaluation

## Real-time telematics with the ChargePoint Viriciti program



# Extreme Conditions Performance



Bus Num	ALL DATA				Only Days w/ > 10 miles							
	Total Miles	AVG Speed (MPH)	AVG TEMP °F	AVG kWh/mi	50th% kWh/mi	75th% kWh/mi	95th% kWh/mi	Days >75 °F		Days <30 °F		
								Total Miles	AVG kWh/mi	Total Miles	AVG kWh/mi	
5329	12,856	15.2	51.2	2.61	2.52	3.55	3.55	509	2.07	633	3.42	
5420	6,471	14.7	47.3	2.92	2.89	4.81	4.81	604	1.43	812	4.18	
5421	13,236	14.9	50.9	2.78	2.72	3.76	3.76	701	2.10	785	3.93	
5422	12,377	14.9	52.4	2.70	2.57	3.91	3.91	429	2.47	365	3.47	
<b>TOTAL</b>	<b>44,940</b>	<b>15.0</b>	<b>50.9</b>	<b>2.73</b>	<b>2.65</b>	<b>3.89</b>	<b>3.89</b>	<b>2,242</b>	<b>1.98</b>	<b>2,595</b>	<b>3.82</b>	

5.0%  
of miles

5.8%  
of miles

## Observed “worst case” for real world ART service energy consumption

DateTime	5420E - Route	5420E - Block	5420E - Average Temp	5420E - kWh/mi	5420E - Average Speed	5420E - Energy used	5420E - Distance driven	5420E - Regeneration rate	5420E - SOC used	5420E - SOC used idling	5420E - Time driving	5420E - Time idling	5420E - Time in service	5420E - Time not in service
1/29/2026	41	4103,4111	17	4.31	13.58	452.10	104.85	15.98	67.60	15.88	7.72	6.30	13.29	0.75
1/30/2026	77	7703	17	5.11	15.10	308.21	60.27	13.36	40.80	13.90	3.99	6.08	6.53	3.55

# Extreme Conditions Performance Cont.

## Range estimation tool for Block/Route Assignment of the BEBs

	Base Average	2.4	kWh/mi.	588kWh	80% of with 20% recharge remaining	Max Range before Recharge with 20% remaining
Mild Weather (60-75 degrees)	-0.25	2.15	470	219		
Hot Weather (75+ degrees)	0.25	2.65	470	178		
Hills (Route 77)	0.25	2.65	470	178		
Cold Weather (Less than 50 degrees)	0.75	3.15	470	149		
High Passenger Load (Route 41, 45, 55)	0.5	2.9	470	162		
Coldest Weather (Less than 30 degrees)	1.3	3.7	470	129		
<b>Combined Worst Case (Cold, High Pass, Hills)</b>	<b>1.75</b>	<b>4.15</b>	<b>470</b>	<b>113</b>		
Observed worst case		5.00	470	94		

## Block-pairing for optimal utilization

ART WEEKDAY SERVICE (GTFS January 2026)

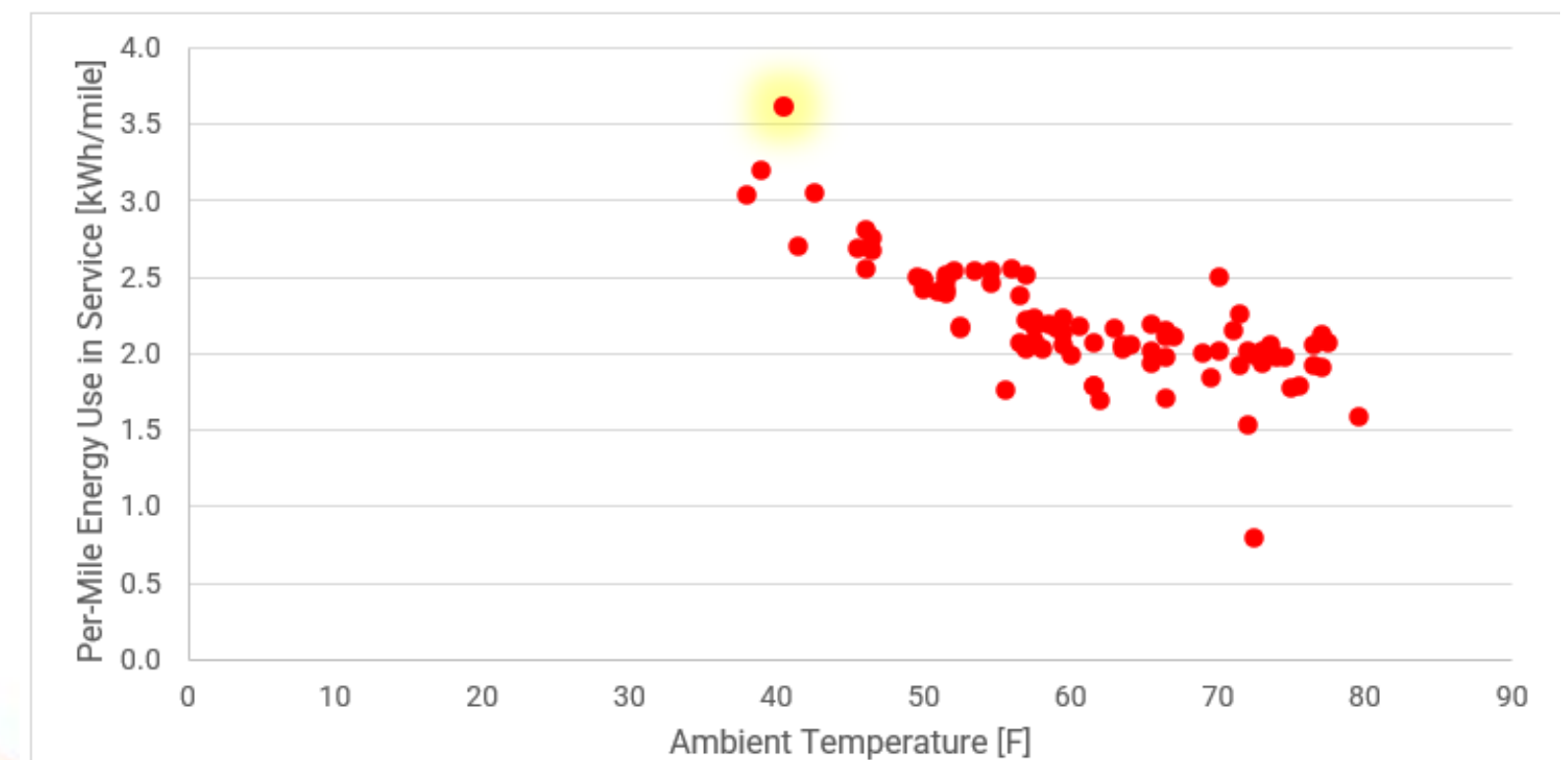
Route	Weekday Blocks	AVG Speed [MPH]	Block Distance [mi]		Block Duration [hr]	
			AVG	MAX	AVG	MAX
41	14	10.0	69.0	82.6	7.8	9.5
41, 75		11.2	76.6	76.6	8.5	8.5
42	10	11.5	64.5	83.1	6.4	8.9
43	4	17.5	112.4	116.4	8.9	9.2
45	12	10.9	73.5	88.9	7.4	9.1
51	3	12.3	67.1	67.1	6.7	6.8
52	5	11.9	78.2	99.2	6.8	8.5
52, 56	1	12.3	63.9	63.9	5.7	5.7
52, 75	1	10.7	19.7	19.7	1.8	1.8
52, 87	1	15.0	48.2	48.2	4.0	4.0
55	12	14.1	83.8	98.0	7.0	8.2
56	5	11.8	62.0	65.0	5.2	5.6
72	6	11.2	69.1	76.1	7.0	7.6
74	2	13.0	51.2	58.0	4.1	4.7
75	9	11.0	64.1	89.9	6.4	9.3
77	6	12.4	68.4	93.0	6.5	8.5
84	4	13.2	50.2	50.9	3.9	4.1
87	10	14.7	68.9	106.3	5.6	8.5
<b>TOTAL</b>	<b>106</b>	<b>12.2</b>	<b>70.3</b>	<b>116.4</b>	<b>6.6</b>	<b>9.5</b>

# Extreme Conditions Performance Cont..

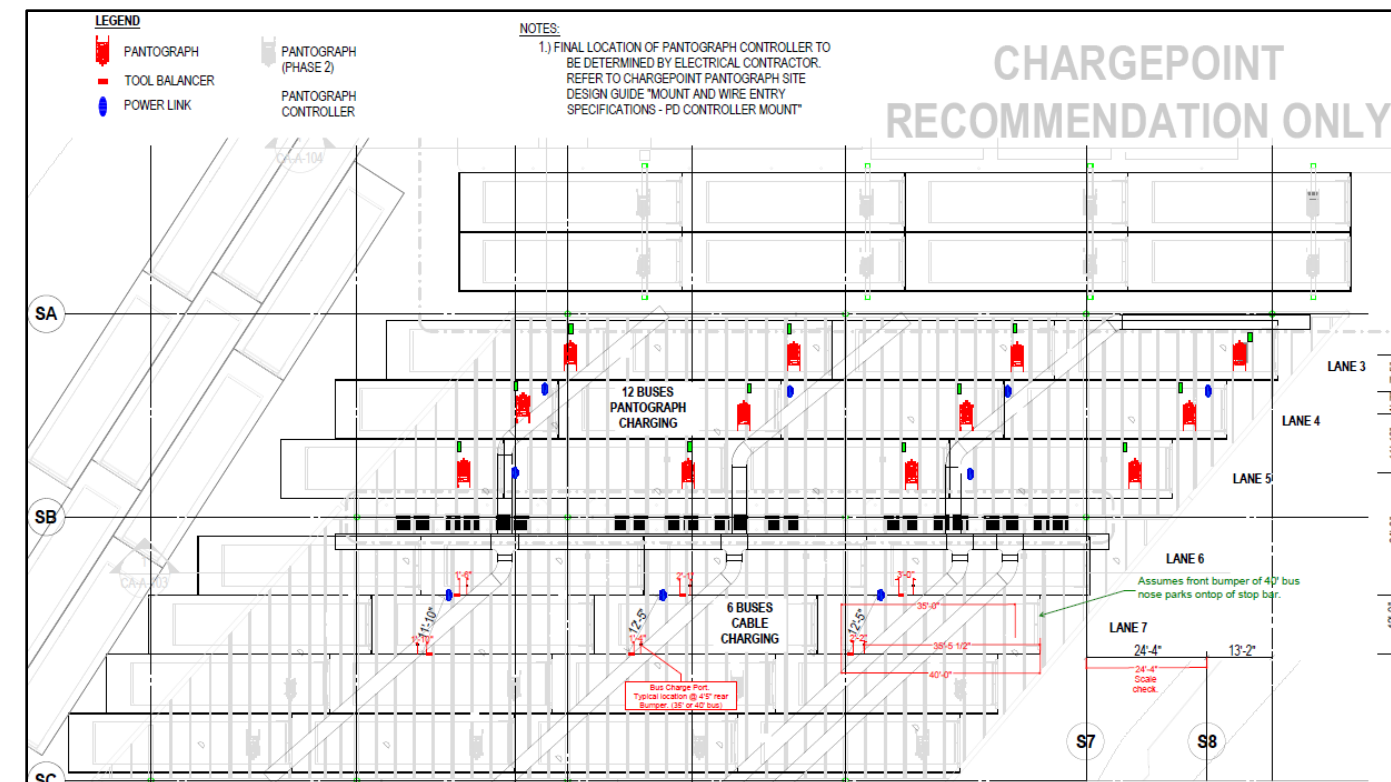
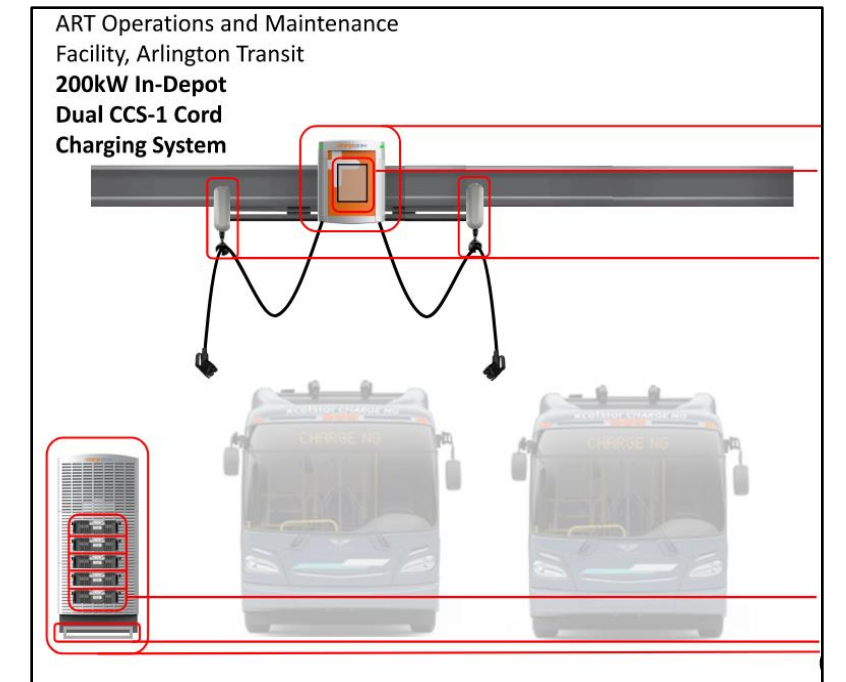
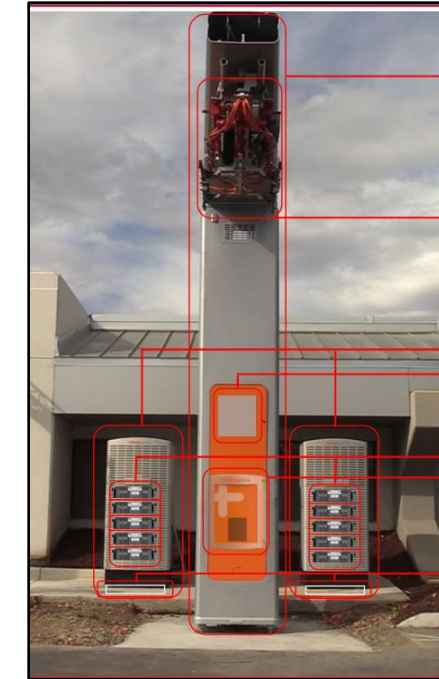
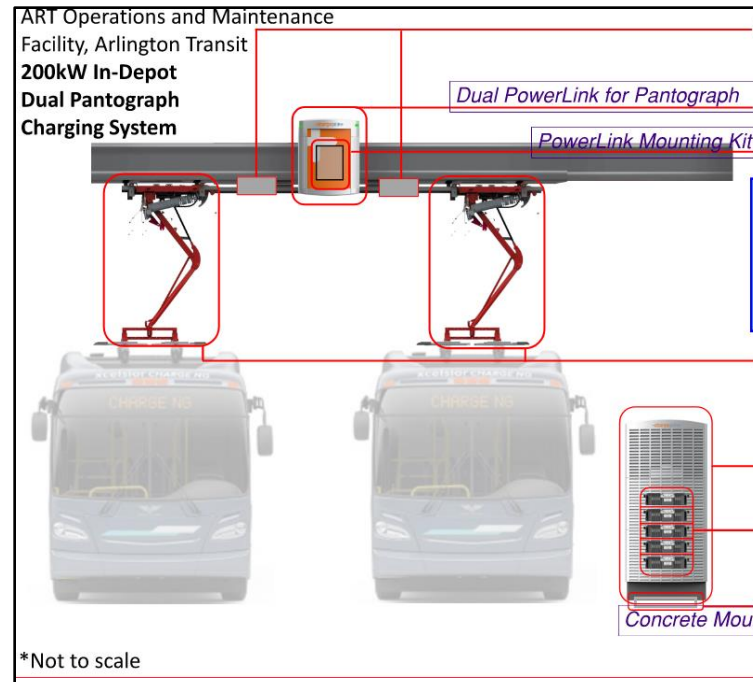
Buses in Service



Ambient temperature [F] and in-service efficiency [kWh/mile]



# Next Steps



# Q&A / Discussion

