

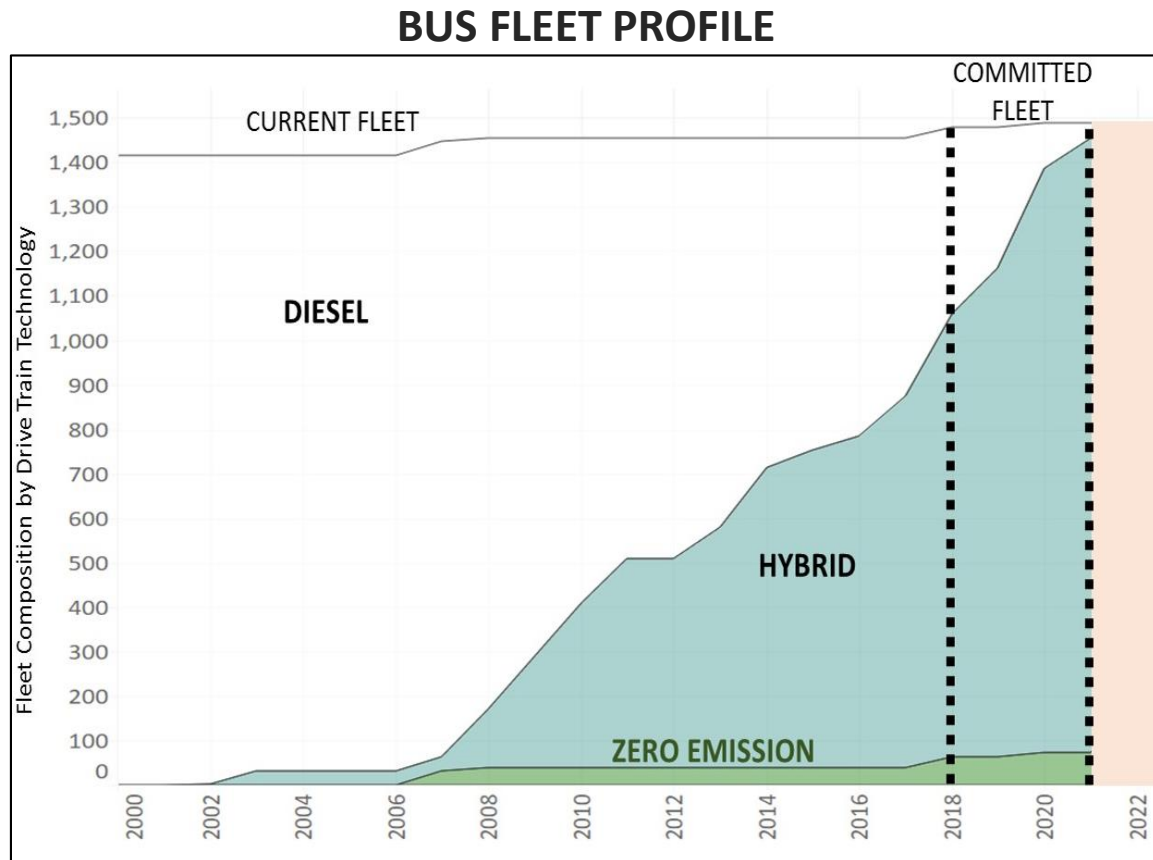


SEPTA'S BATTERY ELECTRIC BUS PROGRAM

Rebecca Collins – Corporate Initiative Manager, Sustainability

SEPTA at a Glance

- Multimodal “Legacy System”
- Created by PA State Legislature in 1964
- 6th Largest in U.S.
- 1 Million Daily Riders (300 Million Annually)
- 2,800 Vehicles
- 9,500 Employees
- \$1.4B Operating Budget
- \$750M Capital Budget



Zero Emission Buses @ SEPTA

- **2007:** 38 Trolley Buses Procured to Serve 3 Routes
- **2012:** CNG Technology Rejected in Favor of Hybrid/Electric
- **2016:** FTA LoNo Grant Received for 25 Battery-Electric Buses (BEB) (Vendor: Proterra)
- **2017:** Change Order to Proterra for “Extended Range”
- **2018 (Spring):** BEB Depot Charging Infrastructure Installed
- **2018 (Summer):** FTA LoNO Grant Received for 10 BEB to Serve 1 Route (Vendor: New Flyer)
- **2018 (Summer/Fall):** BEB Readiness Planning Initiated with PECO + SEPTA Vehicle Engineering, Power Engineering, Facilities, Service Planning, Finance, Operations, Innovation
- **2019 (Summer):** Proterra Buses to be Delivered & Enter Revenue Operation



Primary Considerations

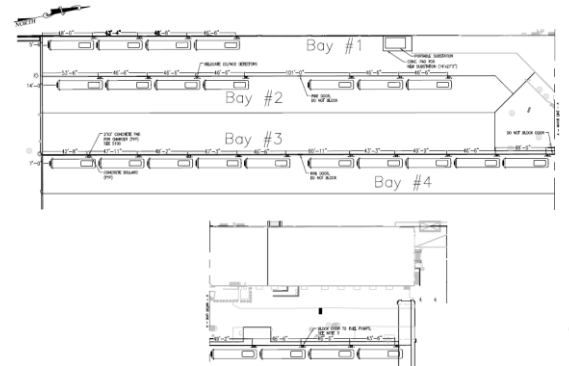
1. Vehicle range & charger technology



3. Electric capacity



2. Facility Operations



4. Data Collection



Battery-Electric Bus Grant

FTA “LoNo” Grant Program

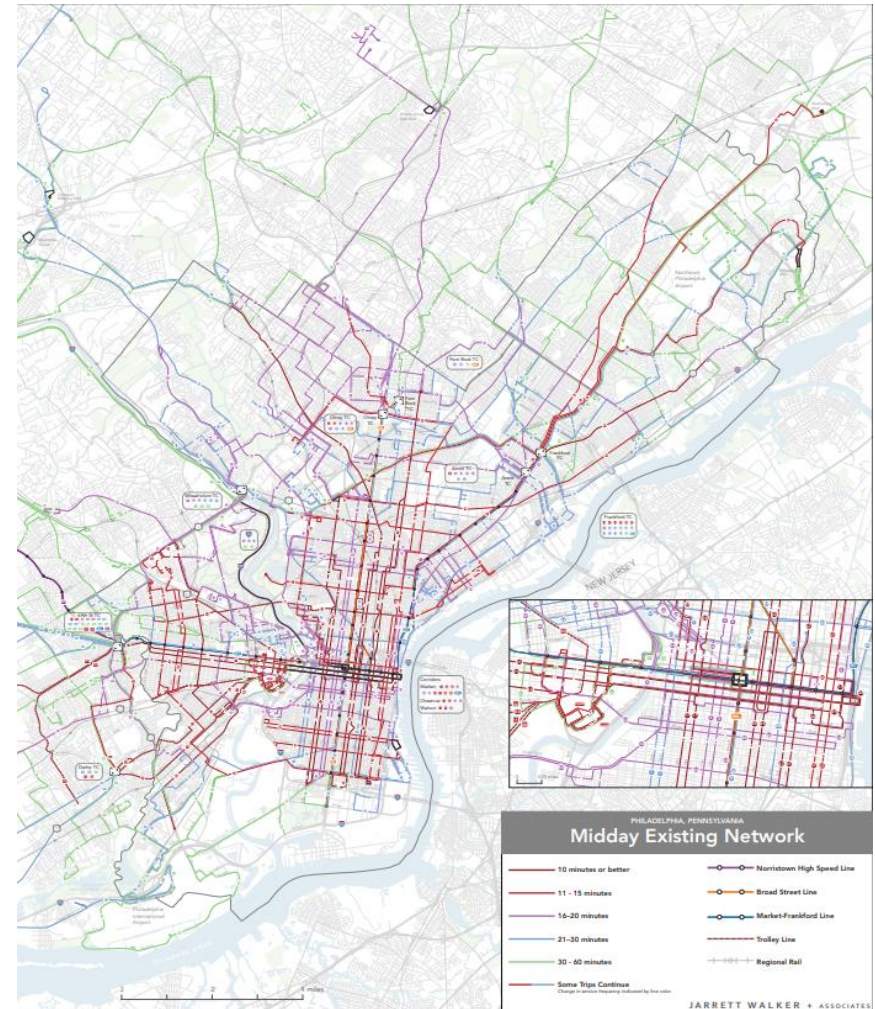
- \$2.6M awarded for incremental cost of 25 Proterra BEBs
- SEPTA One of Seven Selected Grant Recipients
- First Large Urban Agency in Northeast U.S. to Pilot Battery-Electric Technology



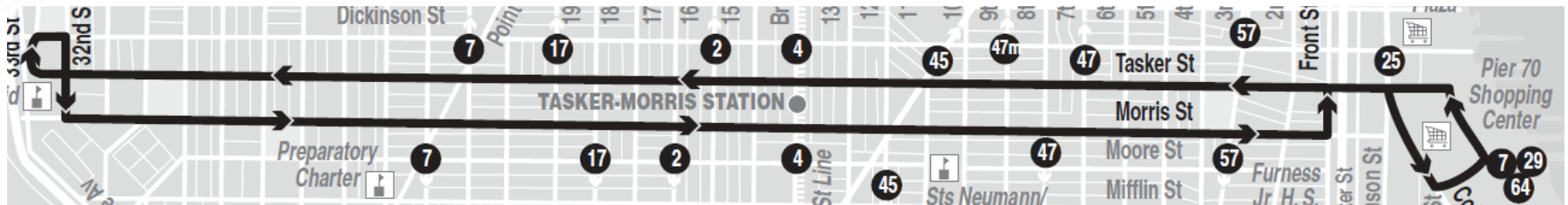
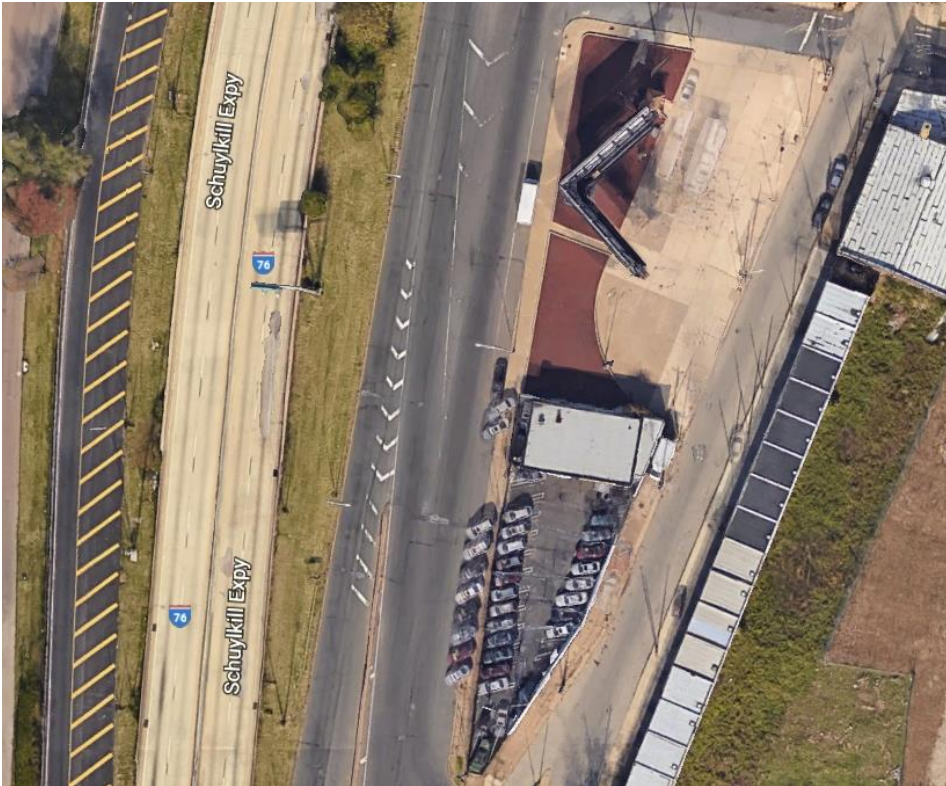
Range and Route Evaluation

Routes 29 and 79 Chosen

- Short (3.5 Miles End-to-End)
- Flat
- Close to depot
- Were once trolley routes



On-Route Fast Charging



In-Depot Slow Charging

Charger Positioning

- Sheltered indoors or under canopy

Future procurements must:

- Have dual-side charging
- Consider different charger types and options (example: hanging chargers)
- Consider “smart charging”
- Account for logistical and operational complexity



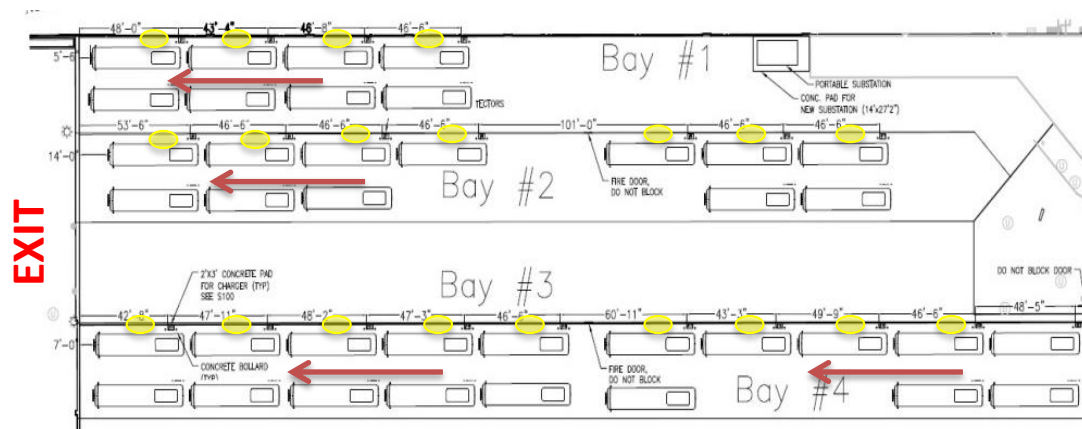
Maintenance and Facility Operations

Parking Protocol

- Accessibility of in-depot charging stations
- Charging and unplugging (overnight and “opportunity”)

Charger Responsibility

- Maintenance, repair, and status monitoring
- Warranty impacts
- Software/ hardware updates



Power Infrastructure



Power

Current capacity could support 105 electric buses of 1,400 bus fleet, less than 10%

Location	# of Buses	Building Transformer (MW)	# of e-buses that could be supported with current capacity	Capacity Needed for Overnight Charge (MW)	Capacity Needed for Next-Gen Overnight Charge (MW)
Allegheny	123	1.500	12	6.69	13.34
Callowhill	193	1.500	13	11.27	22.49
Comly	185	1.000	9	9.95	19.85
Frankford	146	0.750	4	7.79	15.55
Frontier	99	1.500	18	5.47	10.91
Germantown	37	1.000	12	1.93	3.86
Midvale	312	3.765	30	17.24	34.40
Southern	228	2.000	2 (additional)	11.71	23.37
Victory	176	1.000	5	8.29	16.54

Data Collection

Formalize immediate data collection protocol

- Synchronize data deliverables
- Data-viewing (within depot, within BEB) protocol
- Responsibility for collection/ analysis process

Finalize future plans for data collection



Key Takeaways

- Given this is an evolving technology, SEPTA needs to remain nimble and flexible
- Internal and external partnerships are necessary for fleet expansion





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