

Transitioning to a Zero-Emission Fleet: King County Metro Transit



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Bus & Paratransit Conference



Agenda

- Why zero-emissions? Is it feasible?
- News
- Our fleet
- Our experience and near term plan
- Analysis process
- Roadmap to zero-emissions



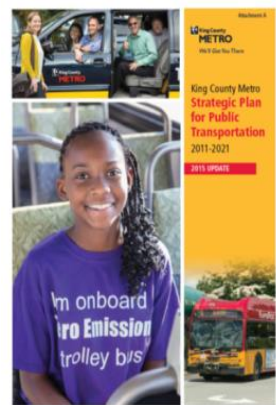
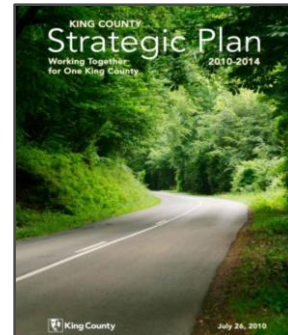
Feasibility of Achieving a Carbon-Neutral Zero-Emission Fleet

Recommendation

- Transition to a zero-emission fleet powered by renewable energy

Evaluation criteria

- Environment
- Social equity
- Service and fleet needs
- Cost
- Supporting systems



King County Metro

Battery Electric Bus Mission Statement

In fall 2016 Metro will recommend a quantity of 40' zero-emission buses for the existing procurement order, including specifics on service deployment, infrastructure, and other considerations based on a consensus decision. By March 1, 2017, Metro will transmit a report to Council that describes an industry leading and innovative roadmap to deliver zero-emission, world-class service to our customers. This report will be data-driven, reflect employee and stakeholder input, address equity and social justice, and will be practical, logical, and implementable.

Recent Announcement and News

Announcement

King County Executive announces purchases of battery buses, challenges industry to build next-generation transit

January 10, 2017

Summary

King County Executive Dow Constantine announced that King County Metro Transit will acquire 120 all-electric battery buses by 2020. As part of this commitment, Metro will purchase up to 73 battery buses from Burlingame, Calif.-based Proterra. The first 20 are scheduled to go into service this year and 2019.

Story

Fulfilling his commitment to the greening of King County's fleets, King County Executive Dow Constantine announced today that King County Metro will purchase up to 73 all-electric battery buses from Proterra at a cost of up to \$55 million, starting with 20 buses totaling \$15.12 million. Charging stations to support the initial orders of those buses will range from \$5.5 million to \$6.6 million.

Federal funding often helps pay for Metro's new bus purchases. Last year, King County Metro received a \$3.3 million grant from the Federal Transit Administration's Low-or No-Emission Vehicle Deployment Program to help fund some new battery buses and charging stations for three buses that are in operations on the eastside of King County.



The Seattle Times

Coming soon to a Metro transit route near your: battery-powered electric buses

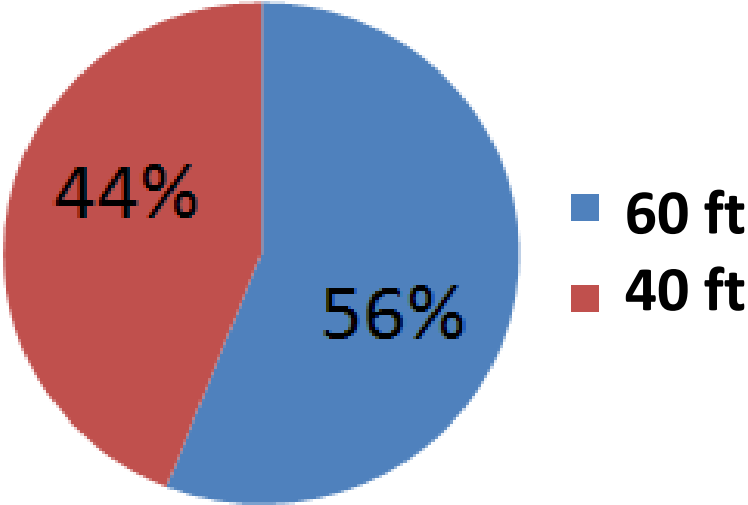
Originally published January 9, 2017 at 12:08 pm | Updated January 18, 2017 at 10:31 am



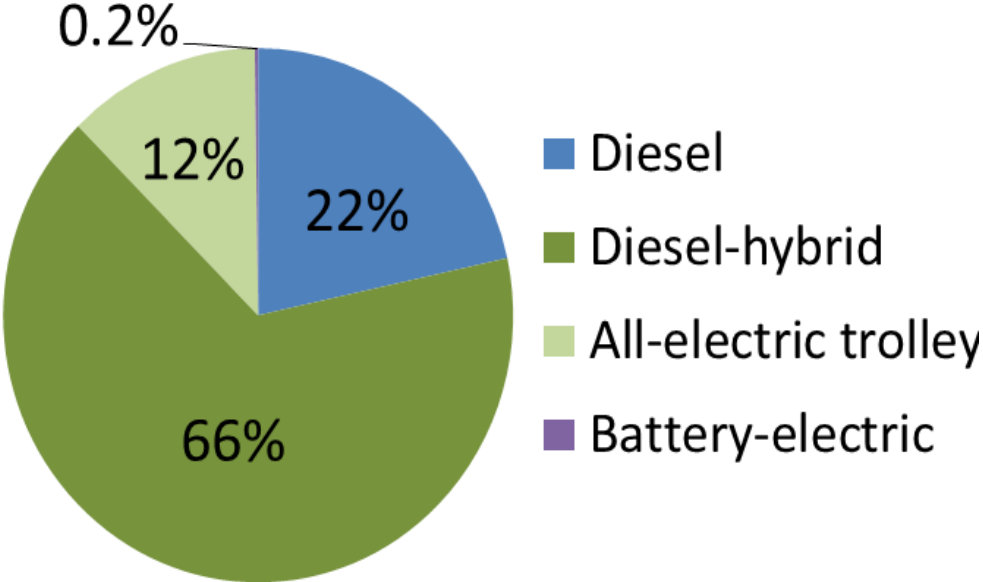
Our Bus Fleet today

- 1,419 buses
 - Diesels, Hybrids, Trolleys, Battery-electric-bus (BEB)
 - Mix of <40', 40', 60'
- All electric and hybrid fleet by 2018-19

By length



By fleet type



- Consume > 10 mil gallons of diesel annually
- Goal: Buses delivered in 2020 to be battery electric

Our Experience: Zero-emission battery-electric bus technology

Slow-charge



- Charges at base
- Range of 140 miles
- ~2 to 5 hours to charge midday or overnight
- Charger cost is \$34k per bus

Fast-charge



- Charges at bus layover
- Range of 25 miles
- 10 minutes to charge
- Charger cost is \$144k per bus

Our Experience: Performance Metrics

BATTERY-ELECTRIC BUS FLEET Data

Fleet
Size
3

Data
Since
1/1/2016

Last
Updated
04/25/2017



1 0 7 , 3 0 6

Fleet Miles
Driven To Date



1 7 , 0 3 2

Diesel Gallons
Saved To Date



2 4 3 , 8 6 6

Fleet Electricity
Consumed To Date (kWh)



3 8 1 , 5 3 5

Pounds of CO2 Tailpipe Emissions
Saved To Date

Our Experience and Near Term Plan

- Current Experience: 3 Proterra fast-charge buses
 - ☑ At least 23 miles range
 - ☑ Charge time less than 10 min
 - ☑ Capability on county terrain
- Near term bus plan: 120 more battery-electric buses by 2020

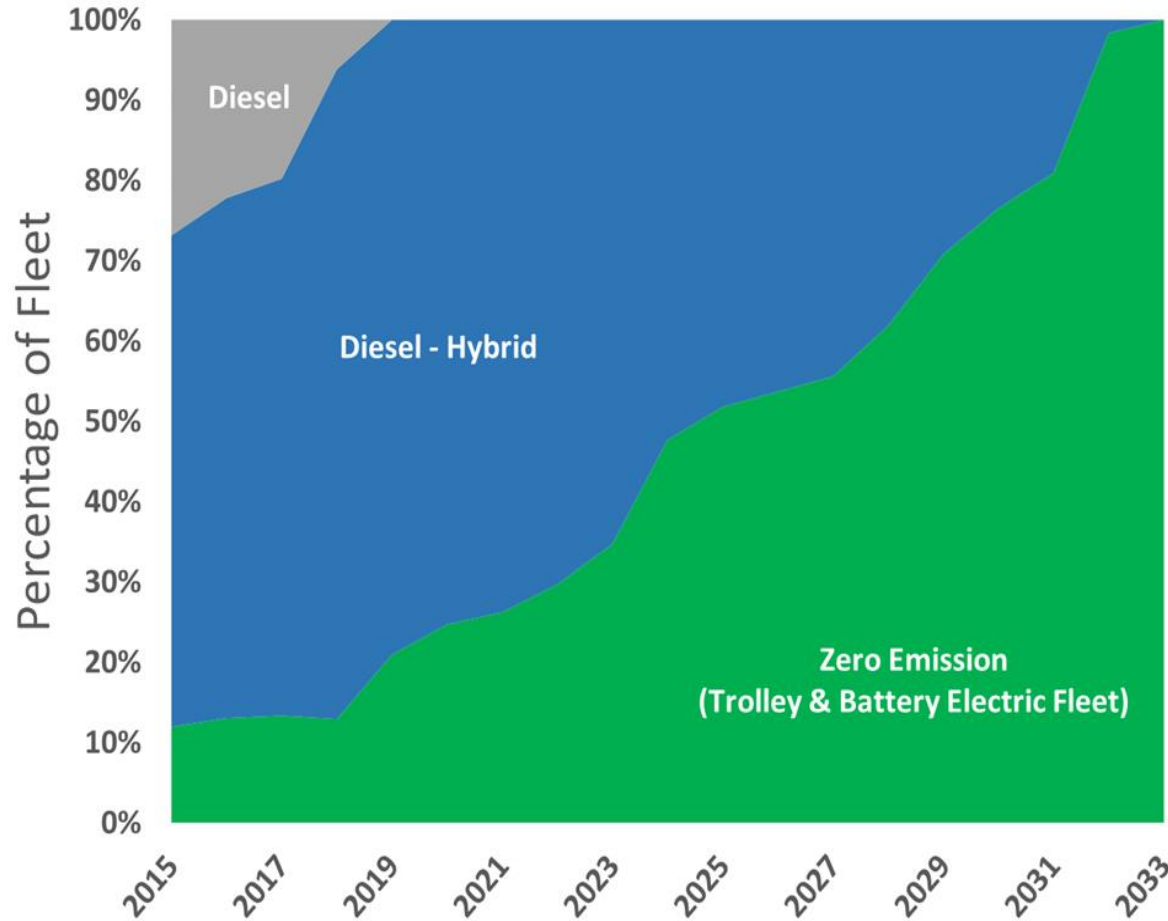


Electric Bus Testing and In Service Dates

Routes	Base	Bus Charge Type	2016	2017	2018	2019	2020
226, 241	Bellevue Base	3 Fast	Begin				
221	Bellevue Base	8 Fast		Begin			
Rtes Undetermined	South Base	12 Slow		Test		Begin	
245, 246	Bellevue Base	12 Fast			Begin		
Rtes Undetermined	South Base*	85 Undetermined				Begin	

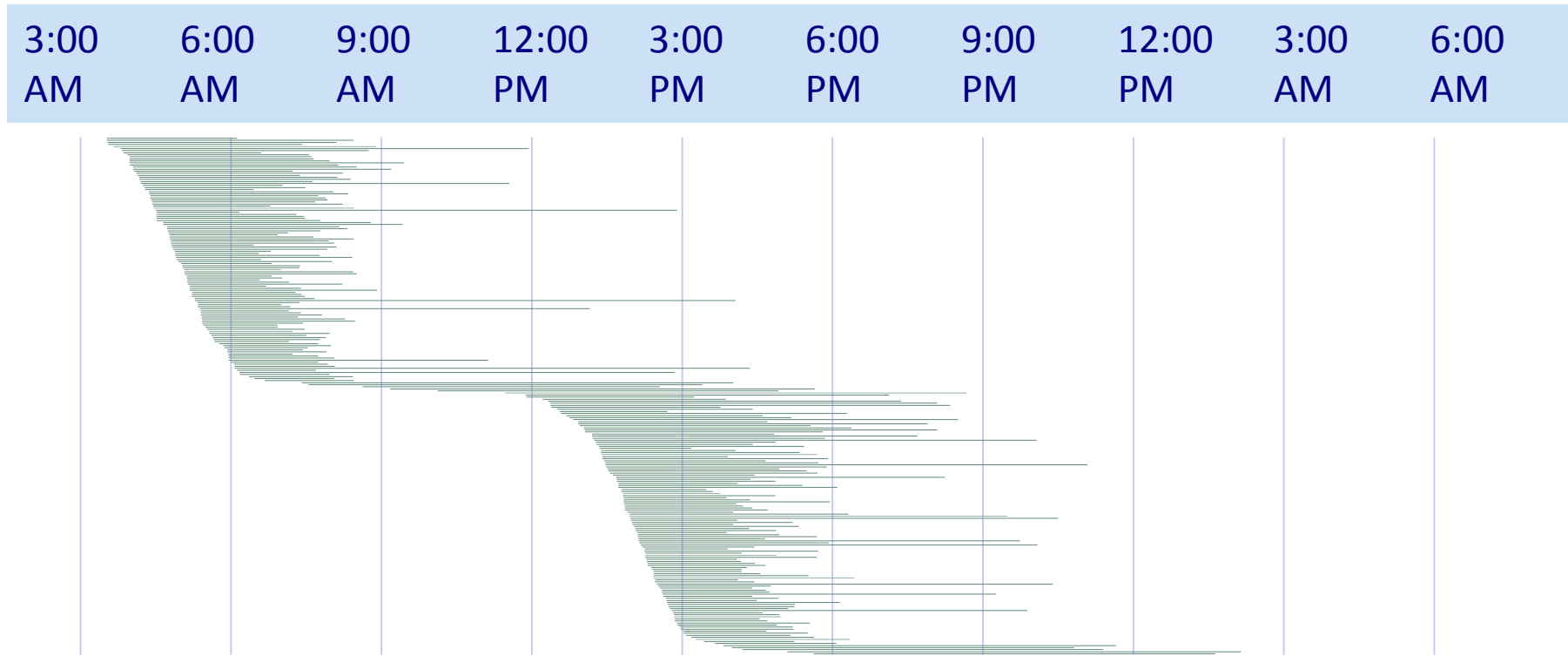
* One additional base under consideration based on testing a future need

Quality of life improvements for King County residents as we get greener

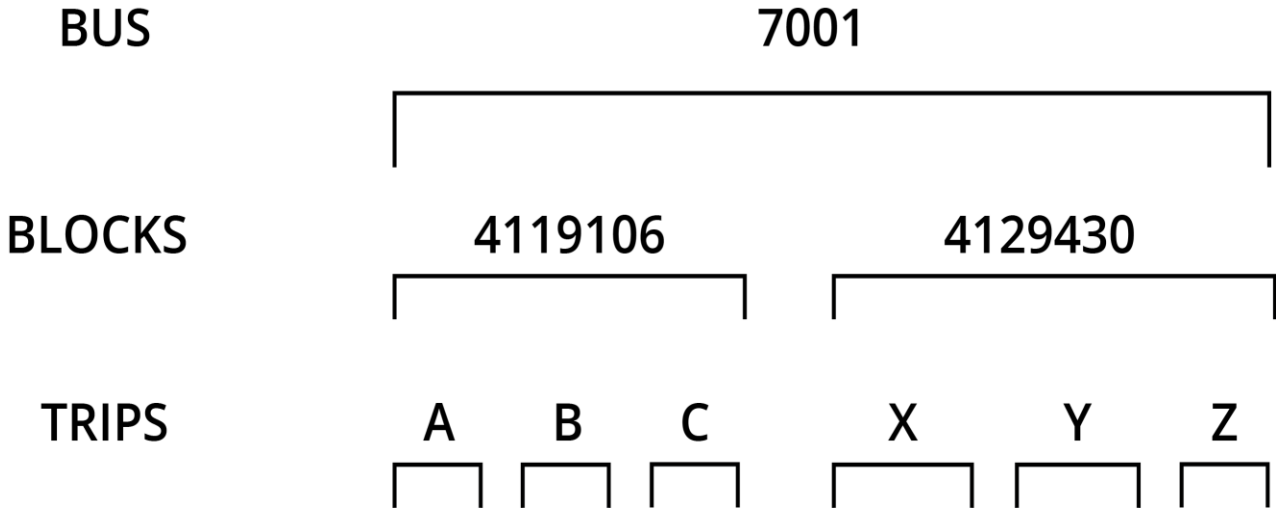


- Eliminate GHG emissions from fleet operations
- Eliminate tailpipe air pollution emissions
- Reduce noise to levels equivalent to a passenger car

Matching to buses

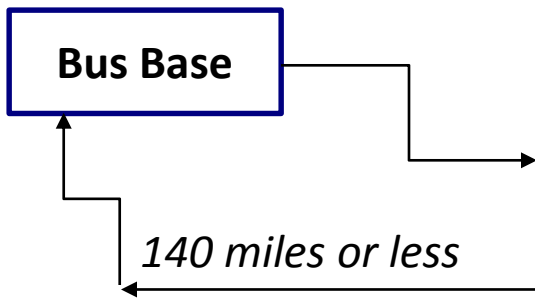


Calculating buses from vehicle blocks



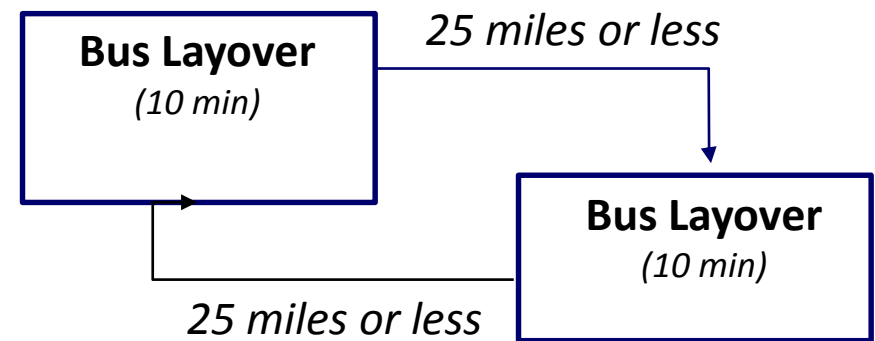
Matching bus performance to service needs

Slow-charge



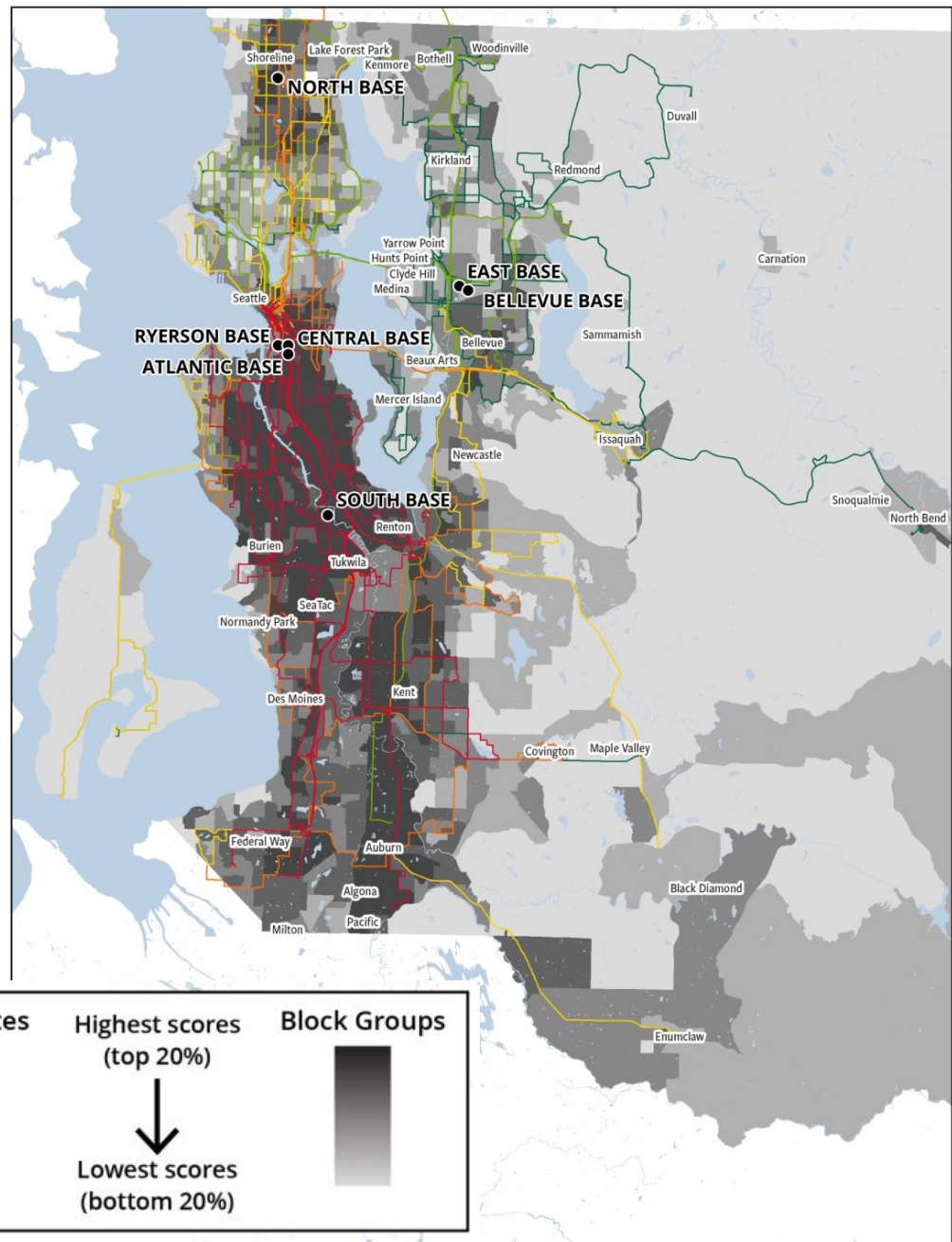
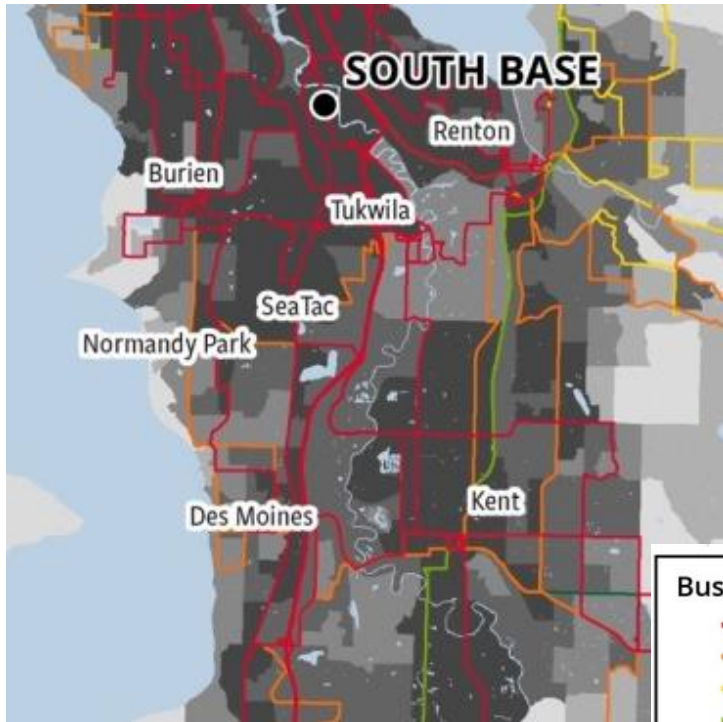
- Current battery range sufficient to serve 70 percent of our bus trips
- 90 percent could be served by next generation battery range

Fast-charge



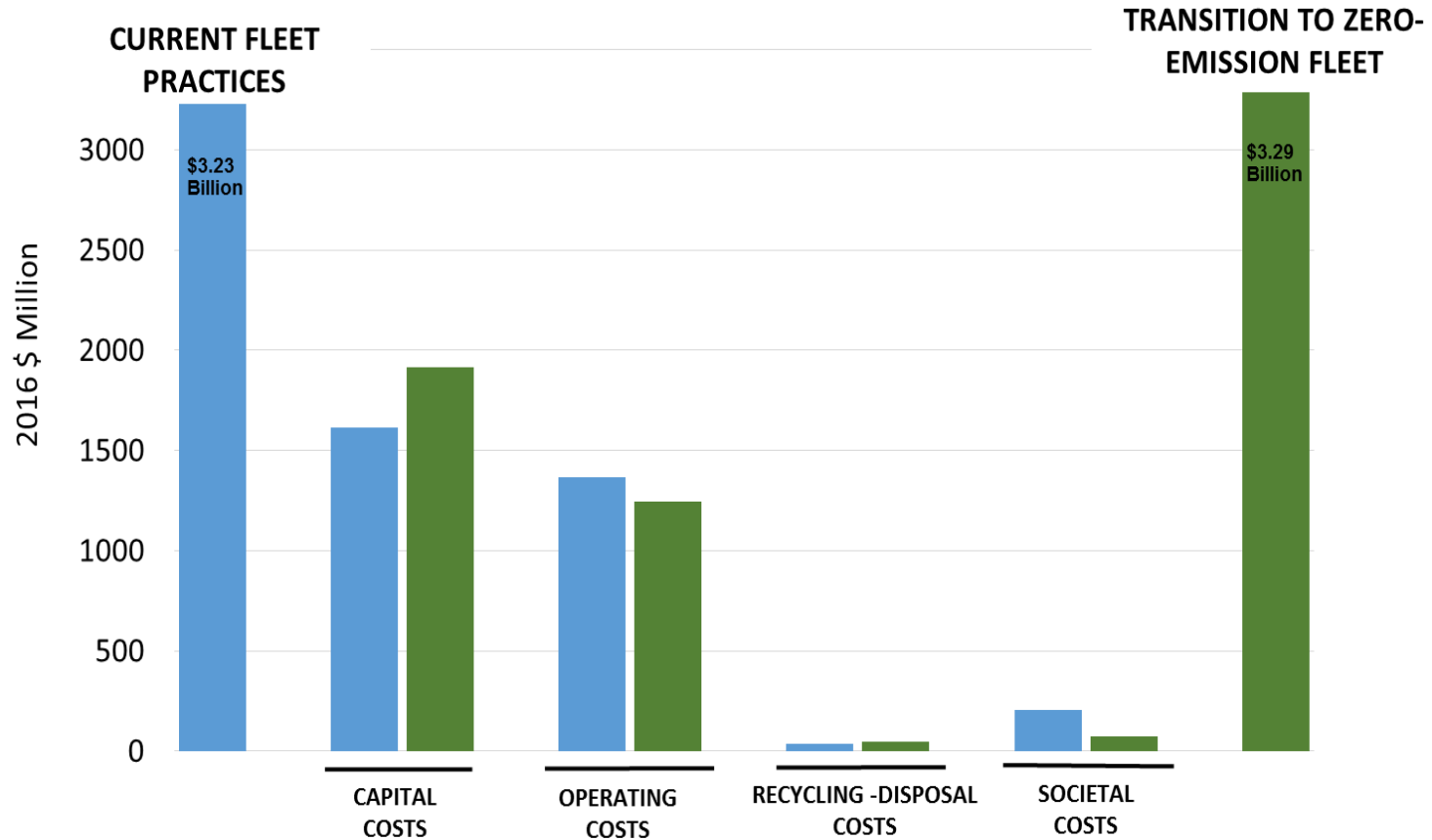
- 35 to 47 percent of our service meets fast-charge criteria
- Growing confidence technology will be available to meet our service needs

Ensuring an equitable approach



Cost of transitioning is comparable

(Costs over a 30 year fleet replacement period)



- Preliminary cost estimates based on pilot programs
- Societal costs depending on \$/ton of pollutants

Future State: *Challenges-Lessons*

- Plan, Plan, Plan
- Involve the right people and collaborate
- Take the time to educate and inform
- Charging infrastructure and scale-up challenges
- Operator acceptance
- Work-flow and training considerations
- Emergency preparedness

Summary

- **Committed:** Transition to zero-emissions vehicles powered by clean electricity. Zero-emissions needed to achieve climate goals.
- **Team Effort:** Big challenge. We'll need support with vehicles and charging infrastructure. We will succeed by pulling together.
- **Challenging and achievable:** Success depends on partners, stakeholders, and technology advances. We aren't afraid to learn as we go.

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