

Clean Fuels / Electric Bus Options and HB 2017 Public Input

TriMet Board Briefing

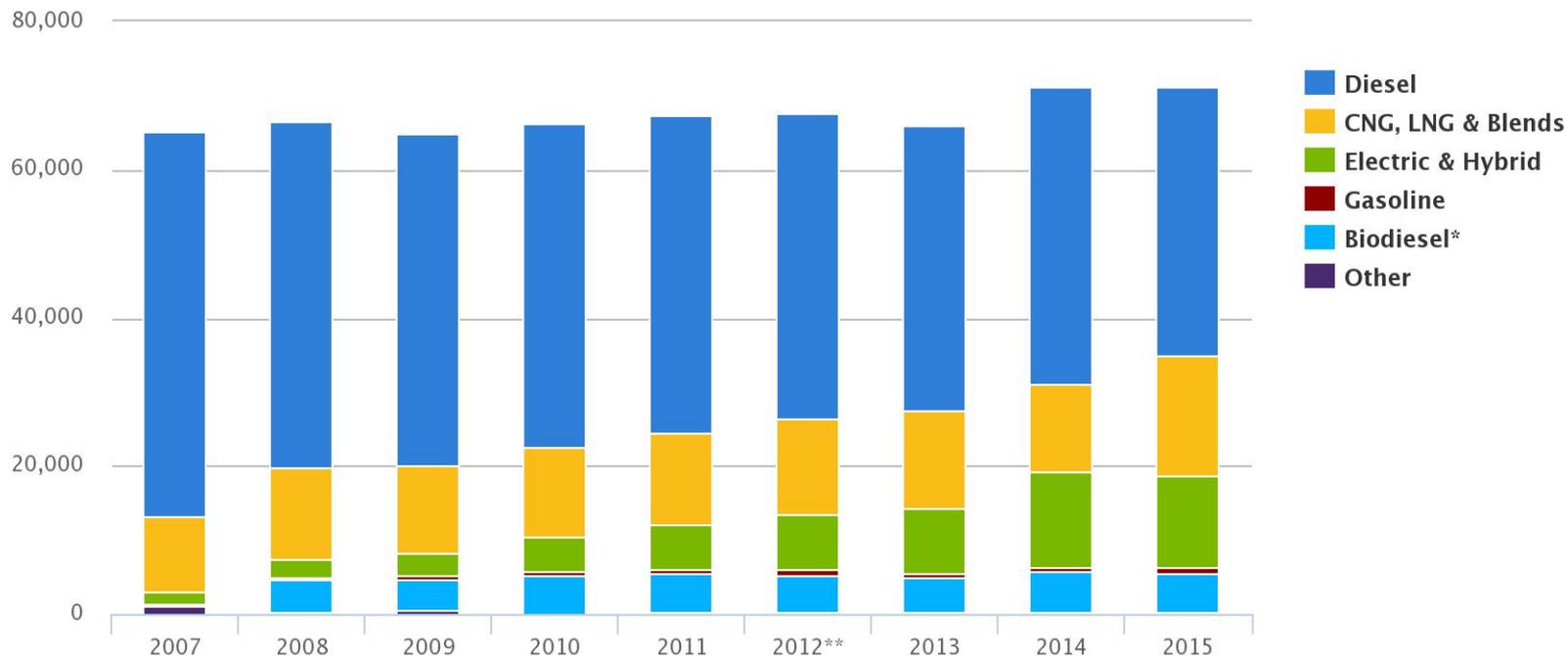
June 27, 2018

Why Zero-Emission Fleet?

- Zero tailpipe emissions
- Quieter
- Lower maintenance costs
- State, regional & local policy for clean energy
- Industry movement
- Battery electric best now, but new technologies on horizon

Growing Alternative Fuels

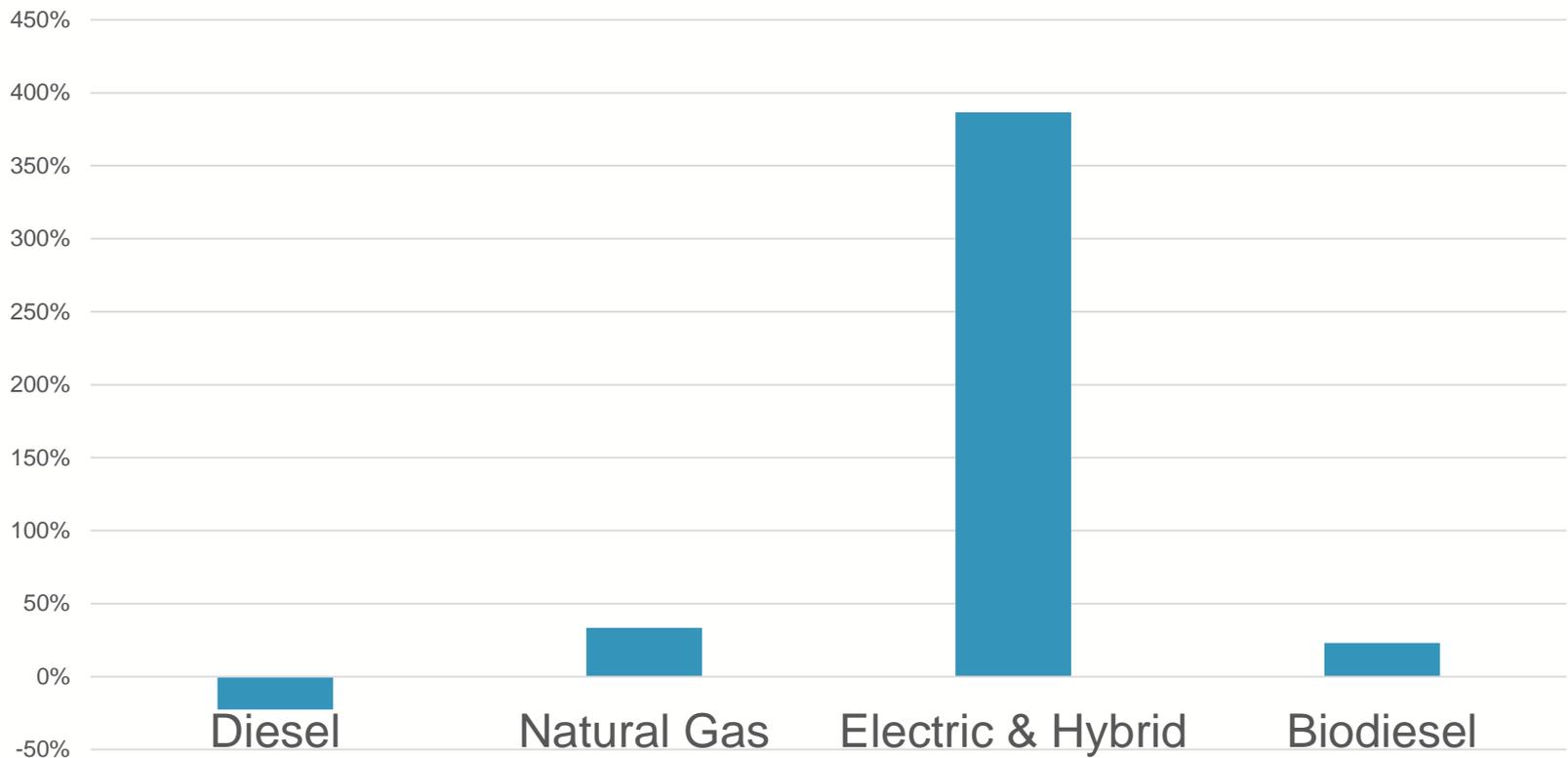
U.S. Transit Buses by Fuel Type



Last updated: August 2016
 Printed on: June 18

Growth in Alternatives

Percent Change 2008-2015



US Transit Agency BEB Experience

- 21 transit agencies in the US with BEB experience – most with less than 10 buses
- Agencies with most experience:
 - Antelope Valley Transportation Authority: 77 buses, full conversion by 2018
 - Foothill Transit: 17 buses, 13 more on order
 - King County Metro: 120 BEBs by 2020
 - IndyGo: 21 buses, 13 more on order

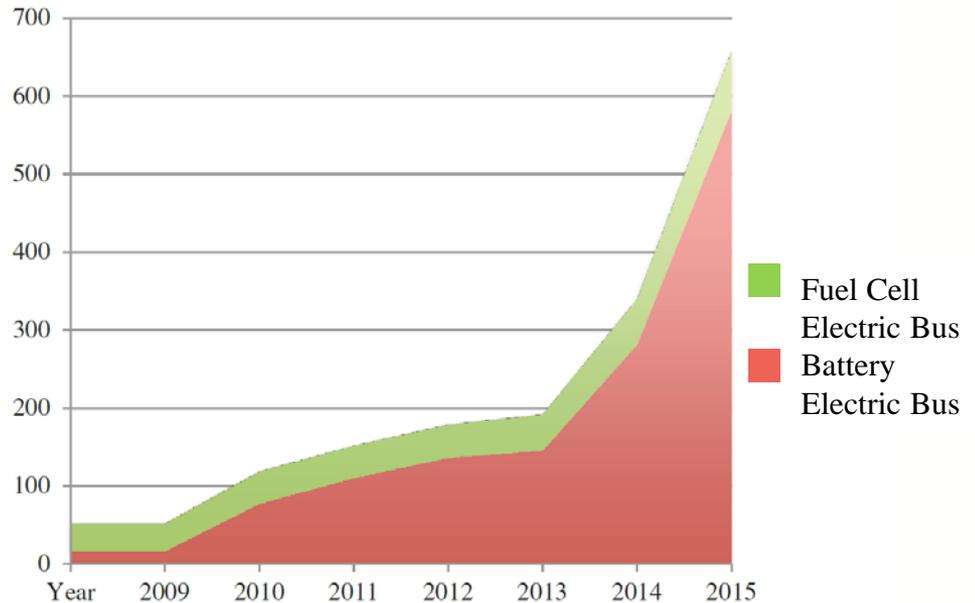


Figure 2. U.S. zero emission bus cumulative sales and awards. Source: Center for Transportation and the Environment.

TriMet Alternative Fuel Plan

- Two pronged strategy:
 - Short term: Apply for federal funding
 - Longer term: Develop comprehensive plan for conversion to non-diesel fleet
- 5 “fast charge” buses arriving this fall
- Application for 5 “slow charge”
- Prepare NRV strategy

Comprehensive Plan

- Consultant report
- HB 2017 opportunity
 - ~\$50-55m per year additional resources
 - Legislative language
- Adopt comprehensive plan this fall
- Build battery electric bus into new/remodeled facilities

Key Considerations

- Short term vs long term
- Experienced vs new manufacturers
- Improving technology & price
- 14 year bus vs 16 year bus
- Fast charge vs slow charge
- Maintenance cost savings
- Space
- Inability to borrow directly against HB2017

Baseline Costs Analysis

Costs and Credits to TriMet

1. Diesel Fuel Costs
2. Electricity Costs
3. Maintenance
4. Vehicle Purchase
5. Charger Infrastructure
6. Clean Fuel Credits
7. Renewable Identification Number (RIN) Credits

Social Costs

1. Emissions (Tailpipe and From Grid)
2. Noise

TriMet Role

Confidence Level Assessment

	PESSIMISTIC	MODERATE	OPTIMISTIC	HIGHEST CONFIDENCE DECISION
ACCOUNTING	\$2018	\$2018	\$2018	\$2018
DISCOUNT RATE	3%	3%	3%	3%
BEB LIFETIME	14 yrs	16 yrs	16 yrs	16 yrs
FINAL FLEET SIZE	981	981	981	981
DIESEL FUEL PRICE TREND	2% annual growth	4.34% annual growth	6.5% annual growth	2.00% annual growth
RINS CREDITS	None	Half value	Full value	None
MAINTENANCE SAVINGS	5%	20%	25%	20%
CHARGER MAINTENANCE (EACH)	\$200/year	\$200/year	\$200/year	\$200/year

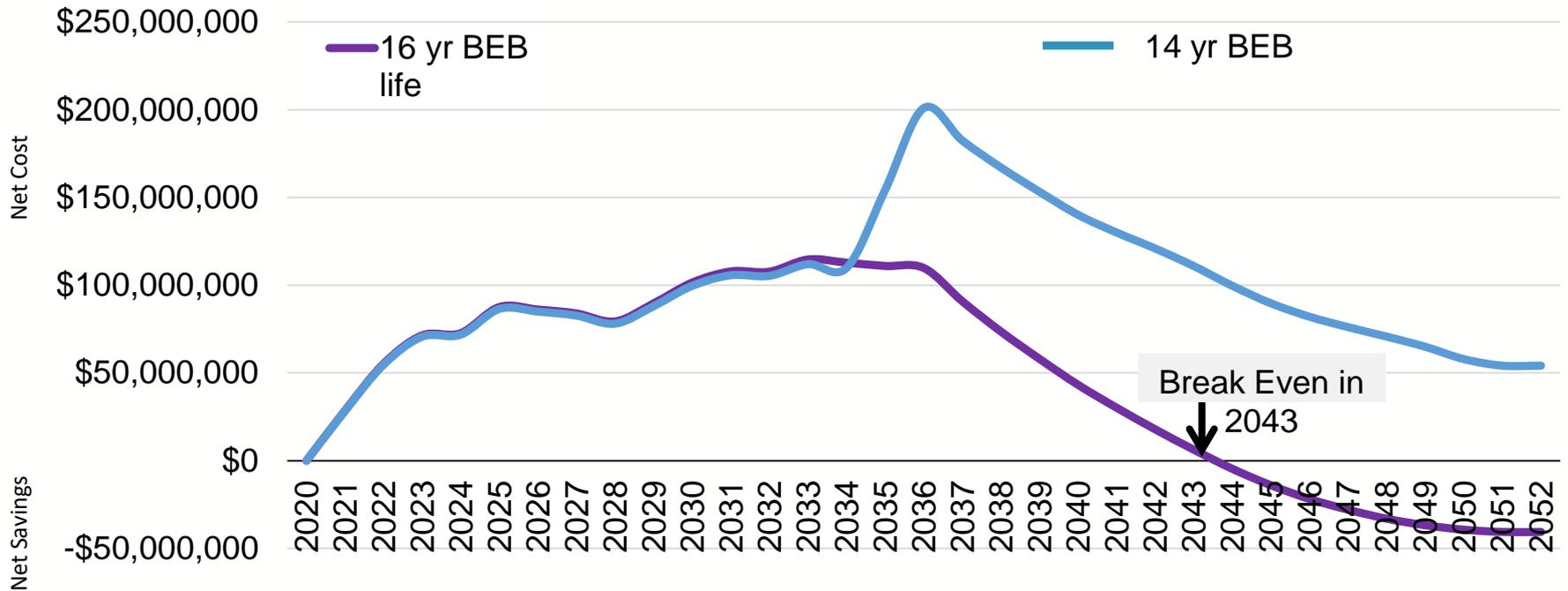
Legend

Very confident	Confident	Less Confident	Very Unconfident
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Confidence Level Assessment

	PESSIMISTIC	MODERATE	OPTIMISTIC	HIGHEST CONFIDENCE DECISION
ELECTRIC BUS PRICE DECLINE	Follows CARB's most pessimistic slow charge bus projection	Follows the average trend of CARB's slow charge bus projections	Follows the trend of the California Air Resources Board's (CARB) most optimistic slow charge bus projection	Follows the average trend of CARB's slow charge bus projections
BUS PURCHASE COST	\$1,087,322	\$1,008,794	\$930,267	\$1,008,794
CHARGER COST (DEPOT)	\$85,122	\$68,909	\$64,855	\$68,909
CHARGER:BUS RATIO	1:2	1:2	1:2	1:2
% PEAK CHARGING	25%	25%	25%	25%
ENERGY PER MILE	2.57 kWh per mi	2.362 kWh per mi	2.20 kWh per mi	2.362 kWh per mi
CLEAN FUEL CREDIT VALUE	\$50 per credit	\$100 per credit	\$150 per credit	\$100 per credit

Cumulative Net Cost or Savings of Choosing Electric Fleet over Diesel Fleet

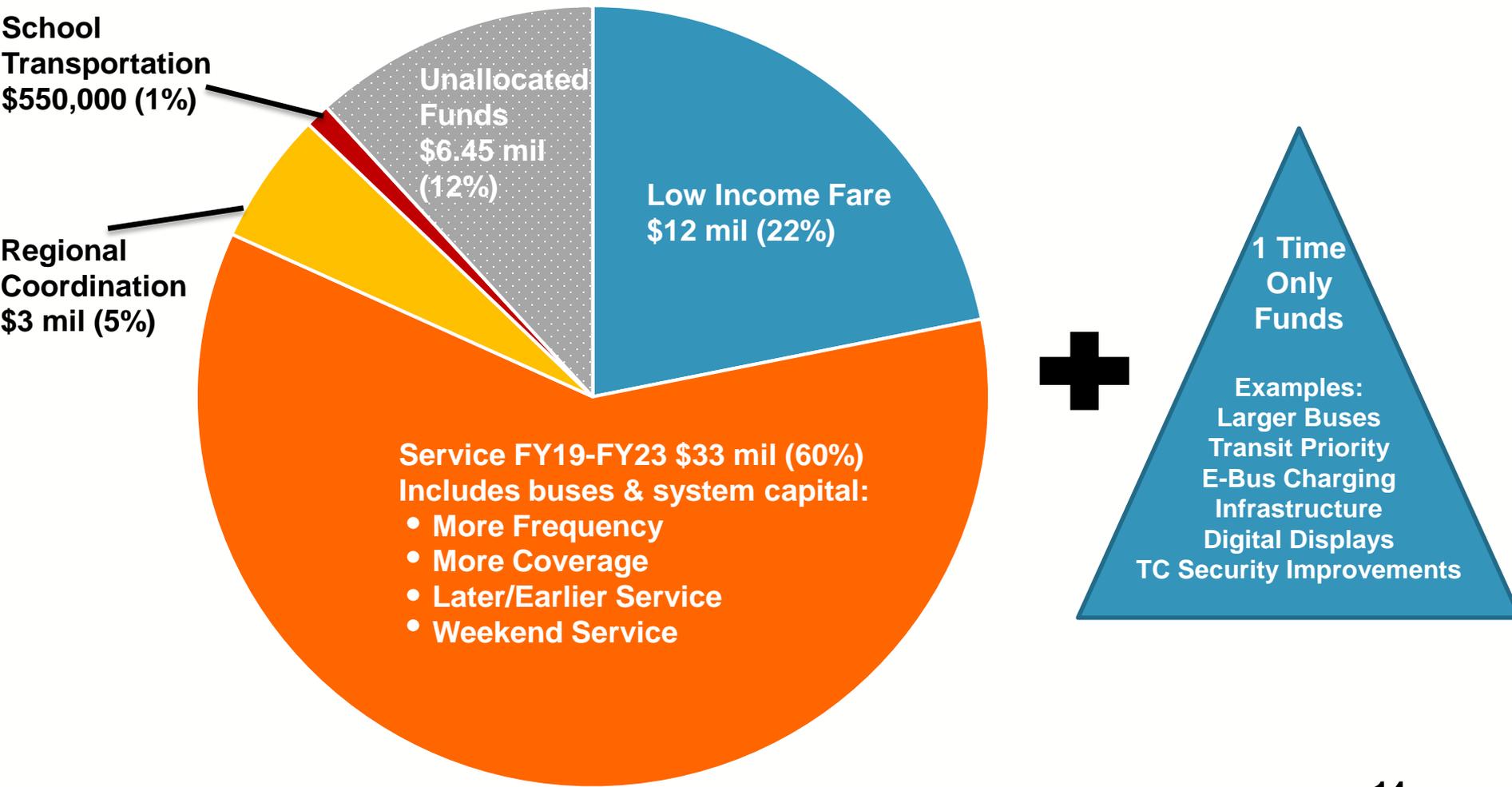


All costs are shown in 2018 dollars.

Near Term Strategy

- 5 fast charge buses on line this fall
- Apply for federal grant for 5 slow charge buses
- Produce alternative fuels strategy
- Work with HB2017 advisory committee to develop funding plan
- Incorporate charging into Powell Garage Plan

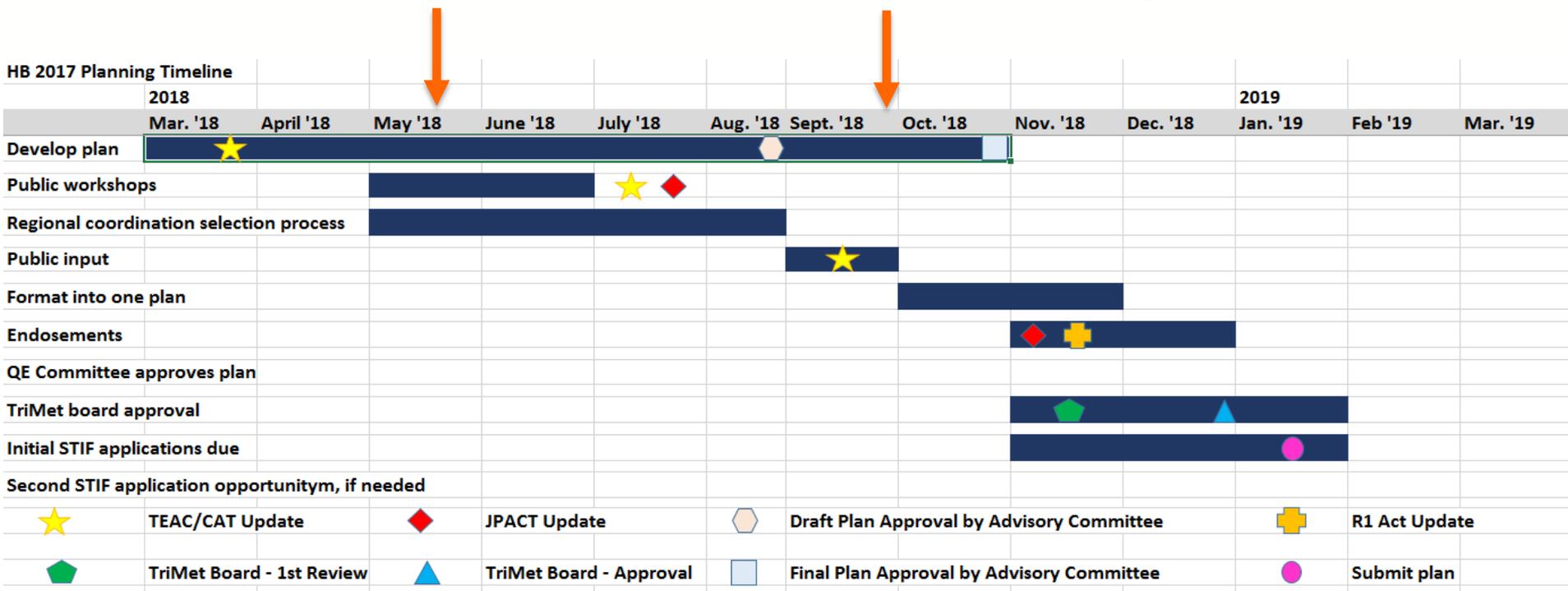
Investment Allocation Proposal



HB2017 Planning Timeline

We are here

Electric Bus Strategy Consideration



New Flyer Fast Charge Bus

