Creating A Clean, Affordable and Resilient Energy Future For the Commonwealth

DOER
Massachusetts Department of Energy Resources

MASSACHUSETTS LEADING BY EXAMPLE PROGRAM
PUBLIC LEADERSHIP, STEWARDSHIP, COMMITMENT

LBE EO: Defining and Achieving New LBE Targets

LBE Executive Order 594

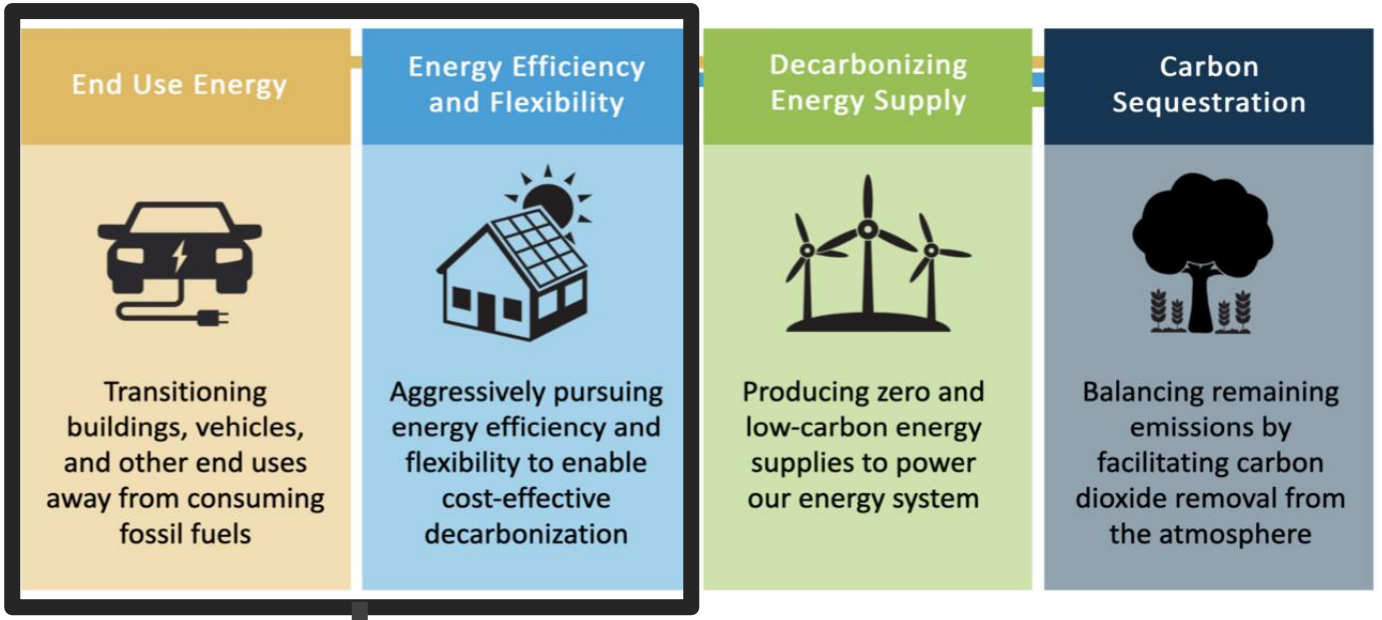
- Signed by Governor Baker on Earth Day 2021
- Effective date: July 1, 2021
- Supersedes LBE Executive Order 484

EO 594 includes sections on:

- Interim and long-term targets
- New construction standard
- Decarbonization of existing buildings
- Fleet electrification and EV charging
- Renewables, other sustainability directives, and more

Supporting Statewide Policy Objectives

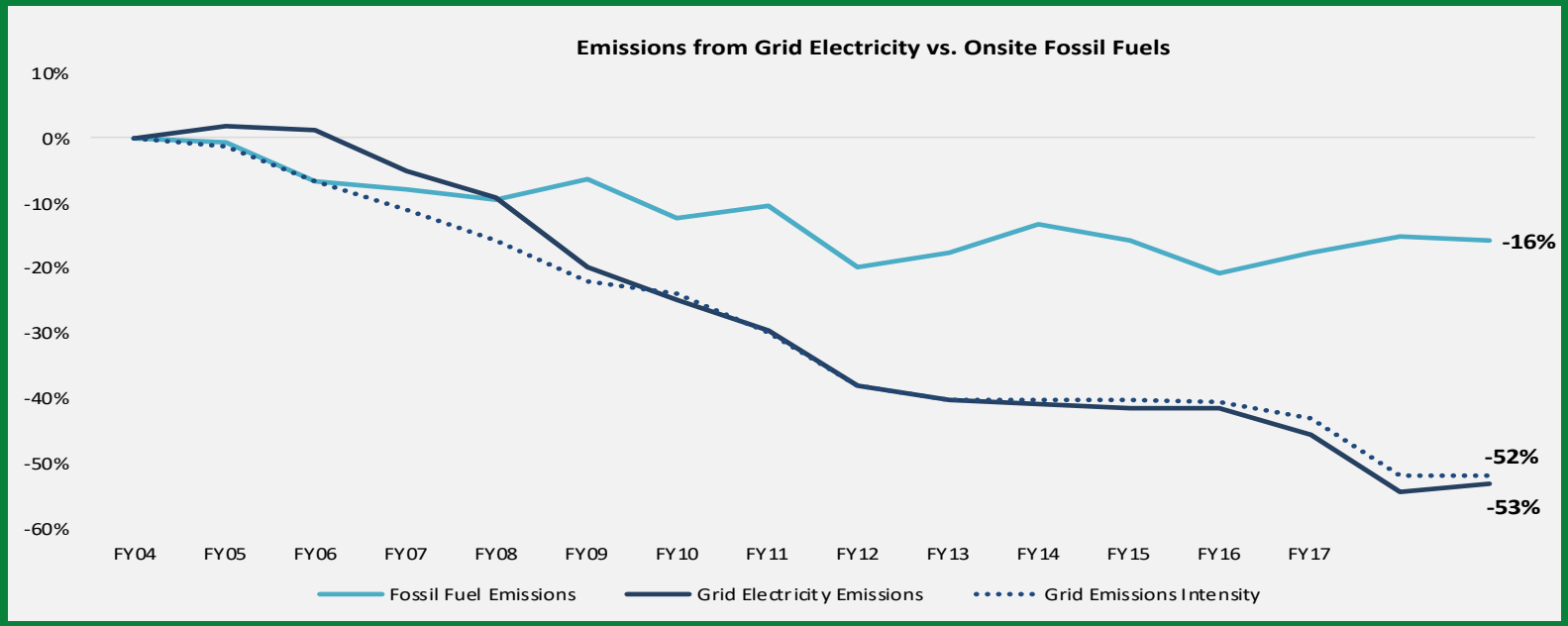
Four key pillars in the MA Decarbonization Roadmap



Focus of EO 594; within the control of state government operations

Setting the Context: EO 594 Focus on Fossil Fuel Emissions

- 75% of current state government emissions reductions can be attributed to changes in the grid emissions intensity
- Fossil fuel emissions are most challenging to address, under the direct control of state action, and constitute the majority (and growing) portion of emissions within the state portfolio



A Challenging LBE Portfolio

Targets largely set to ramp-up over time with significantly more progress expected post-2030

GHG Emissions	***Large facilities, central power plants complex distribution systems, 24/7 operations, variable building age, lots of newer equipment***
Zero Emission Vehicles	***State fleet mostly comprised of pickup trucks and vans with slow vehicle turnover***
Planning	**Long-term horizon for budget and capital planning**

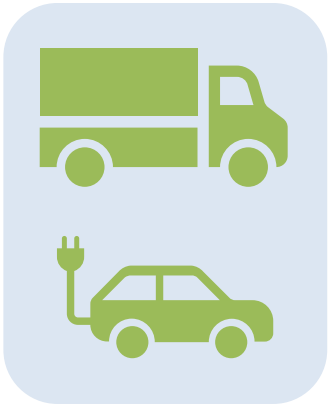
EO 484 vs. EO 594 Targets

Area	EO 484	EO 594
GHG Emissions	✓ Total emissions	✓ Onsite fossil fuel emissions only
% Renewable Generation	✓	X
Energy Use Intensity	✓	✓
Fuel Oil Reduction	X	✓
Zero-emission vehicles	X	✓
EV charging stations	X	✓
	Target intervals 2012, 2020, 2050	**Target intervals 2025, 2030, 2040, 2050**

State Entities Covered by EO 594

Executive Order 594 applies to all "***executive branch agencies and all public institutions of higher education***." The term agency denotes "*all executive offices, boards, commissions, departments, divisions, councils, bureaus, offices, and other state agencies within the Executive Department…*"

Section 5 (Vehicle Efficiency and Fossil Fuel Reduction) requirements "***apply to all vehicles owned or leased and operated by agencies subject to this Order, as well as to all non-revenue vehicles under the jurisdiction of the MBTA***." Marked and unmarked police cruisers are exempt from the requirements of this Section.



All agencies and authorities are encouraged to meet all provisions of the Executive Order regardless of whether the order applies directly to them or not.

Targets and Tracking

- Targets apply to the state portfolio as a whole
- Individual partners are encouraged to meet/exceed goals when possible
- Progress calculated annually for owned and managed assets
- Electricity use not calculated for emissions targets but will be part of EUI reduction calculations
- LBE to track overall GHG emissions in support of statewide goals

Summary of EO 594 Targets

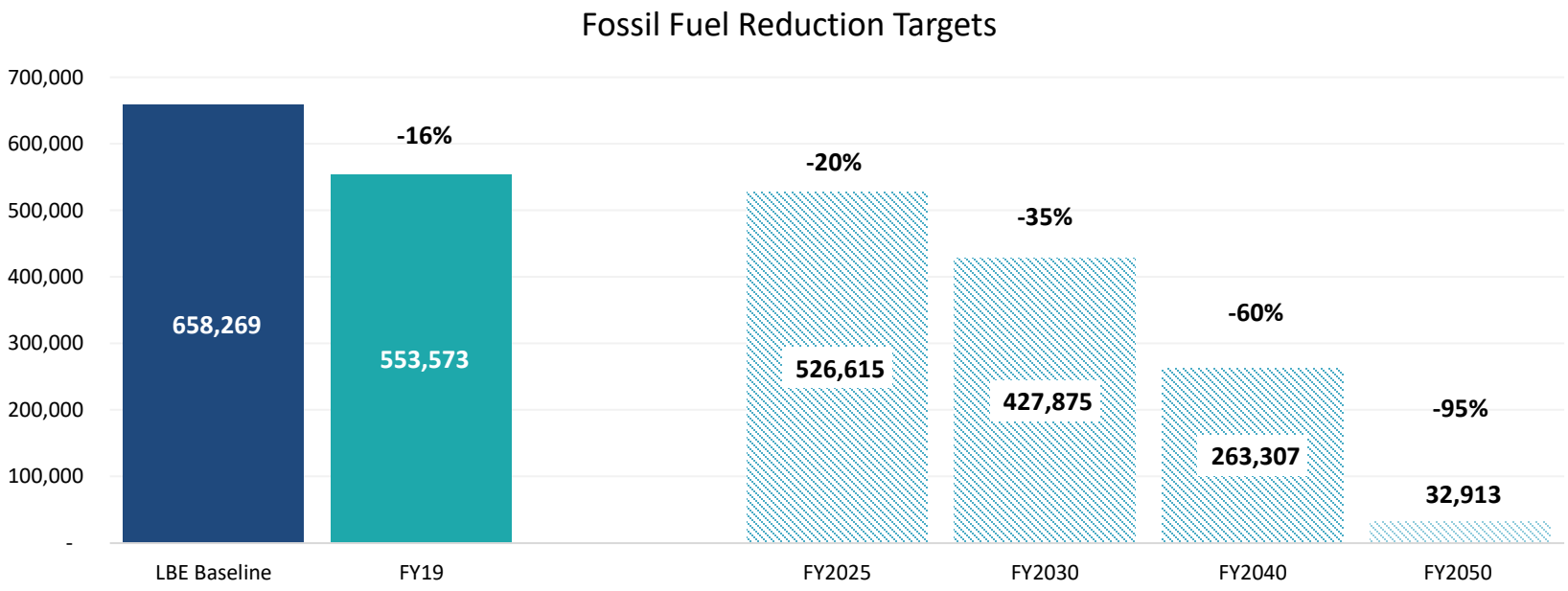
Objective	2025	2030	2040	2050
↓ emissions from onsite fossil fuels	-20%	-35%	-60%	-95%
↑ % of state fleet zero-emission	+5%	+20%	+75%	+100%
↓ fuel oil consumption	-90%	-95%	*TBD*	*TBD*
↓ overall site EUI	-20%	-25%	*TBD*	*TBD*
↑ total # of EV charging stations	+350	+500	*TBD*	*TBD*

Target Focus #1:
Onsite Fossil Fuel Emissions

Reduce emissions associated with the burning of onsite fossil fuels in state-owned buildings and vehicles:

- 20% reduction by 2025
- 35% reduction by 2030
- 60% reduction by 2040
- 95% reduction by 2050

Current progress: 16% reduction as of FY19

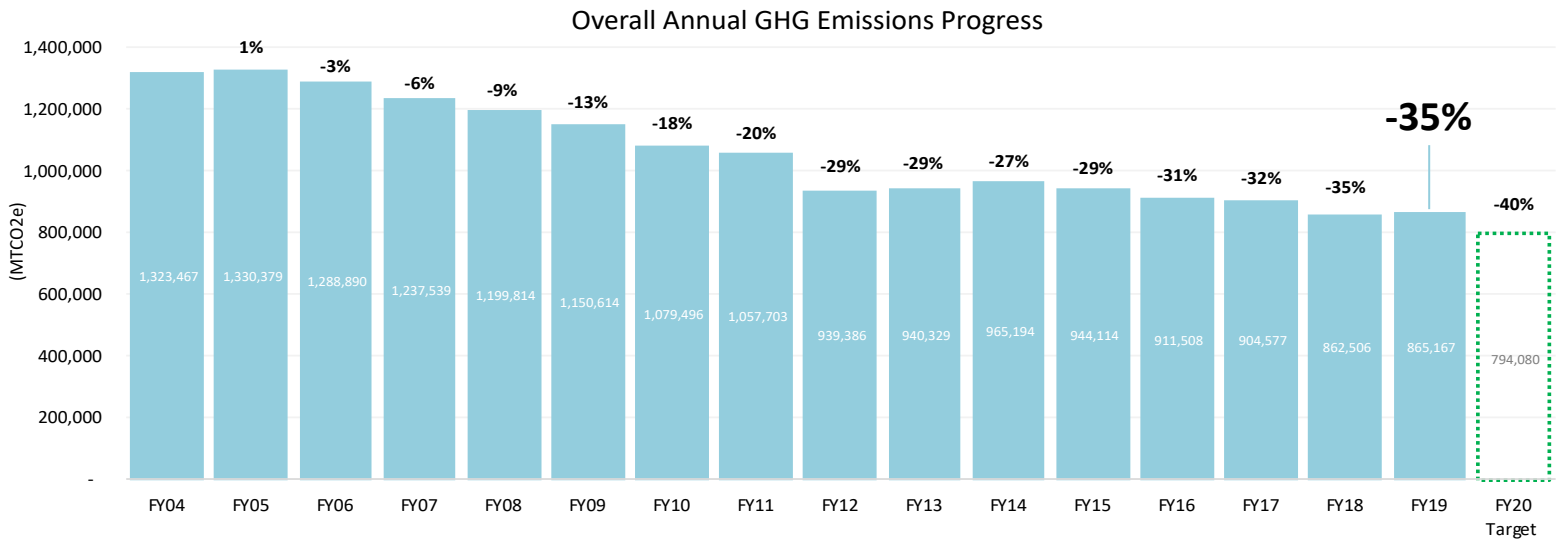


Target Focus #1:
Onsite Fossil Fuel Emissions

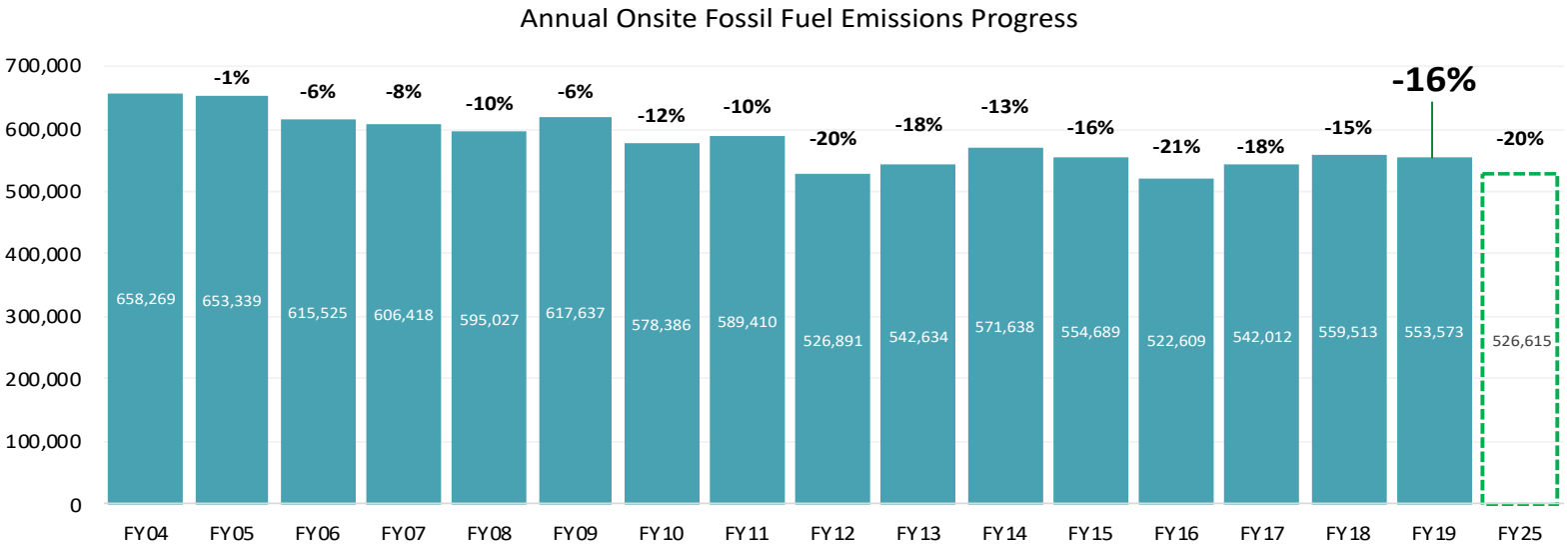
What's included	What's not included	Tracking & Reporting
• Emissions from all fossil fuels combusted at state facilities, including NG, propane, fuel oil, ULSD • Emissions from all fossil fuels combusted in vehicles that are owned/leased by any eligible state entity, including gasoline, diesel, CNG	• Emissions from grid electricity • Emissions from eligible non-fossil fuel sources	• FY 2004 baseline • Annual reporting • Calculated using annual consumption of each building and vehicle fuel • LBE will use standard emission factors as well as those determined by DOER, DEP

Emissions Progress Reporting

BEFORE: Overall Emissions

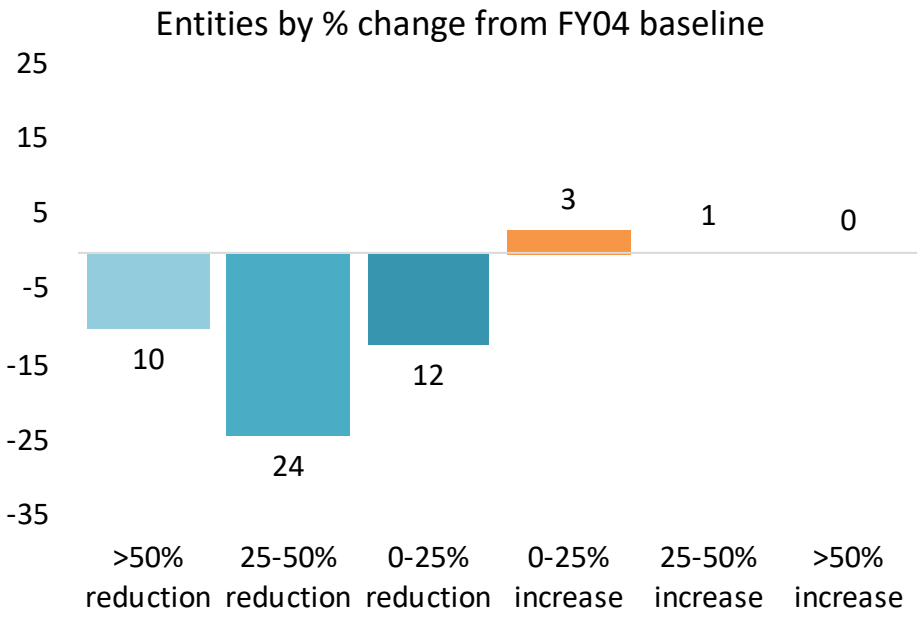


NOW: Fossil Fuel Emissions

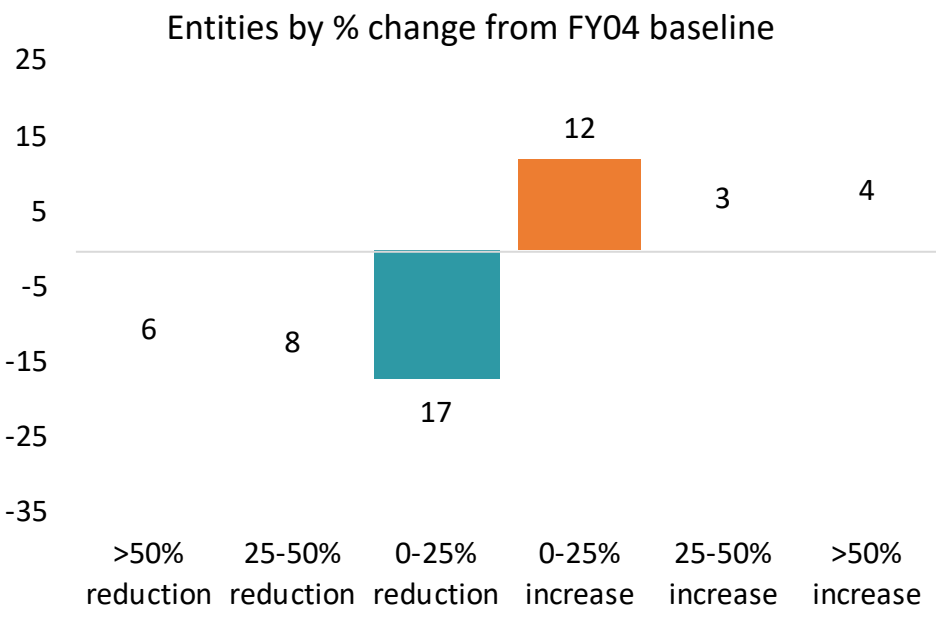


Emissions Progress Reporting

BEFORE: Overall Emissions



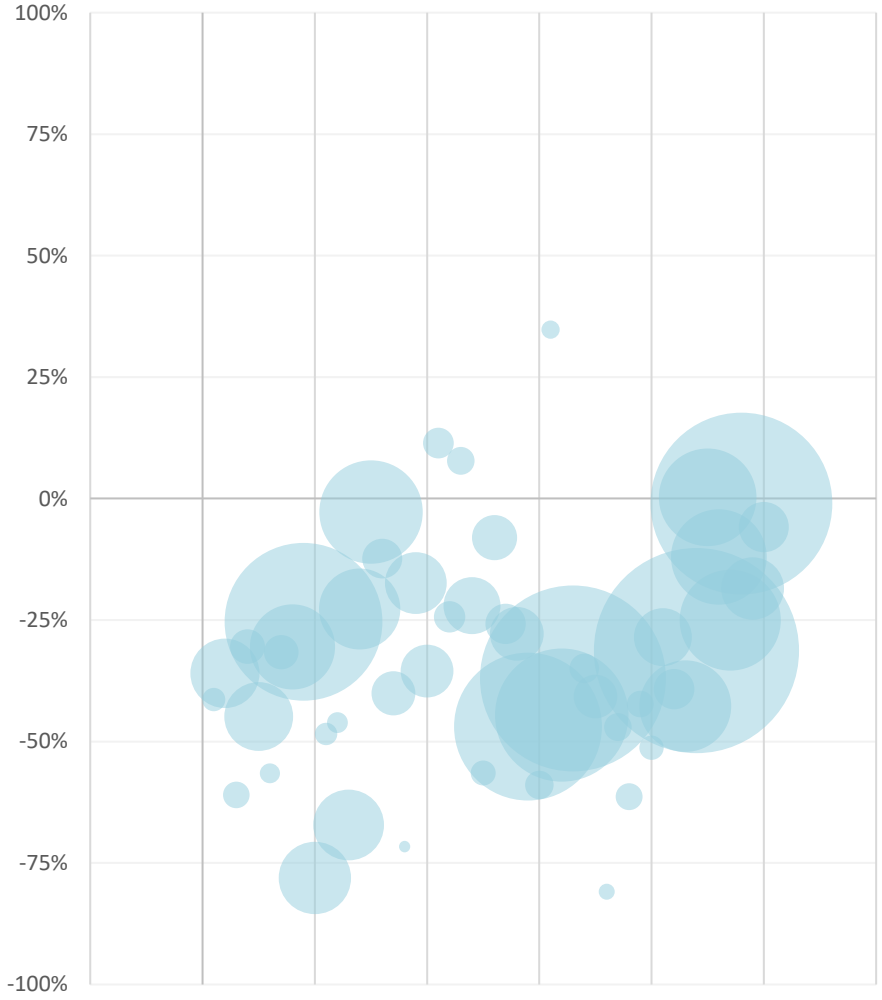
NOW: Fossil Fuel Emissions



Emissions Progress Reporting

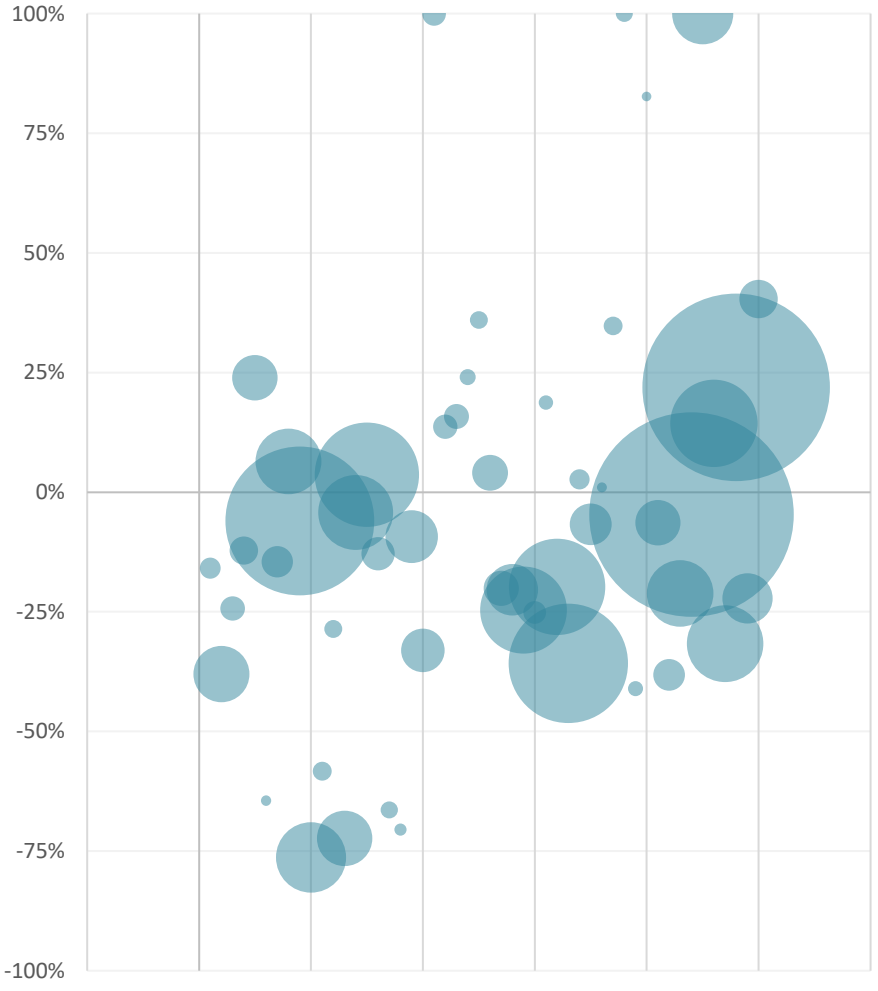
BEFORE: Overall Emissions

FY19 Overall Emissions by Entity Tonnage &
% change over baseline



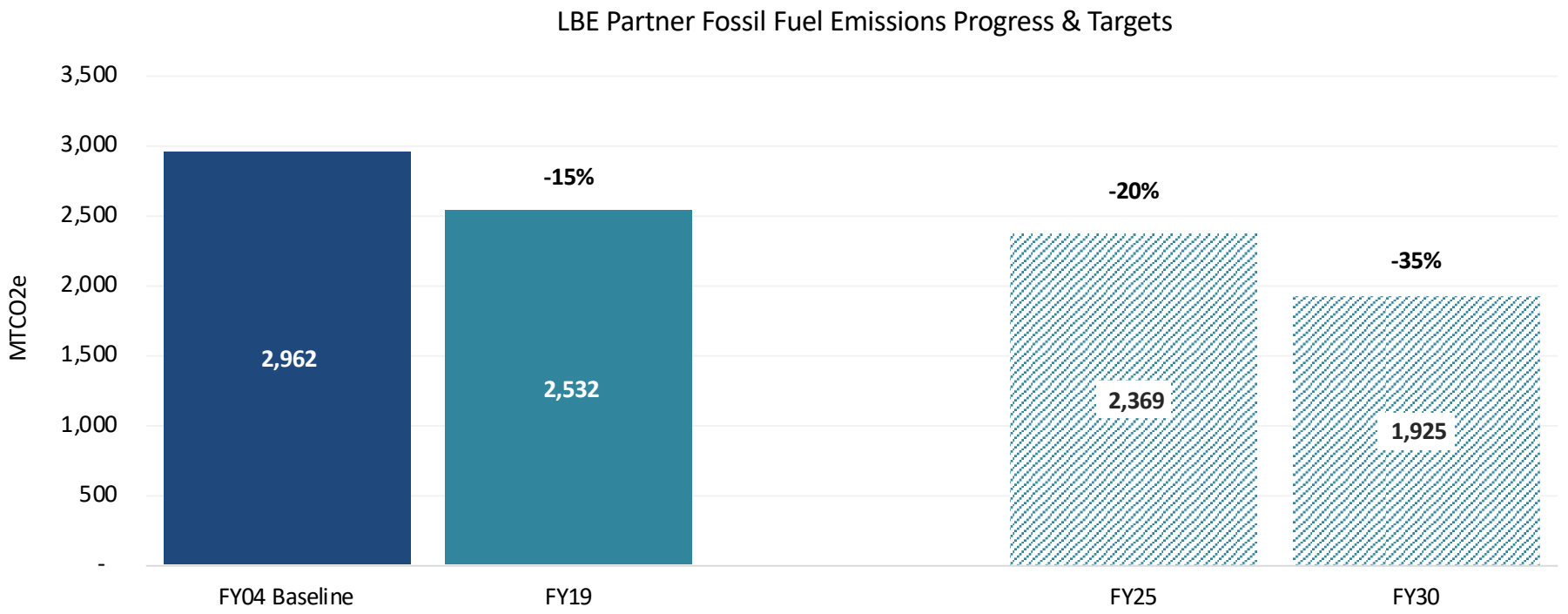
NOW: Fossil Fuel Emissions

FY19 Fossil Fuel Emissions by Entity Tonnage &
% change over baseline



Achieving Fossil Fuel Emissions Reduction Targets: LBE Partner Example

- Partner currently at 15% fossil fuel emissions reduction from baseline
- To meet the 2025 target, partner would need to reduce FY19 emissions by 6.5%
- To meet the 2030 target, partner would need to reduce FY19 emissions by 24%

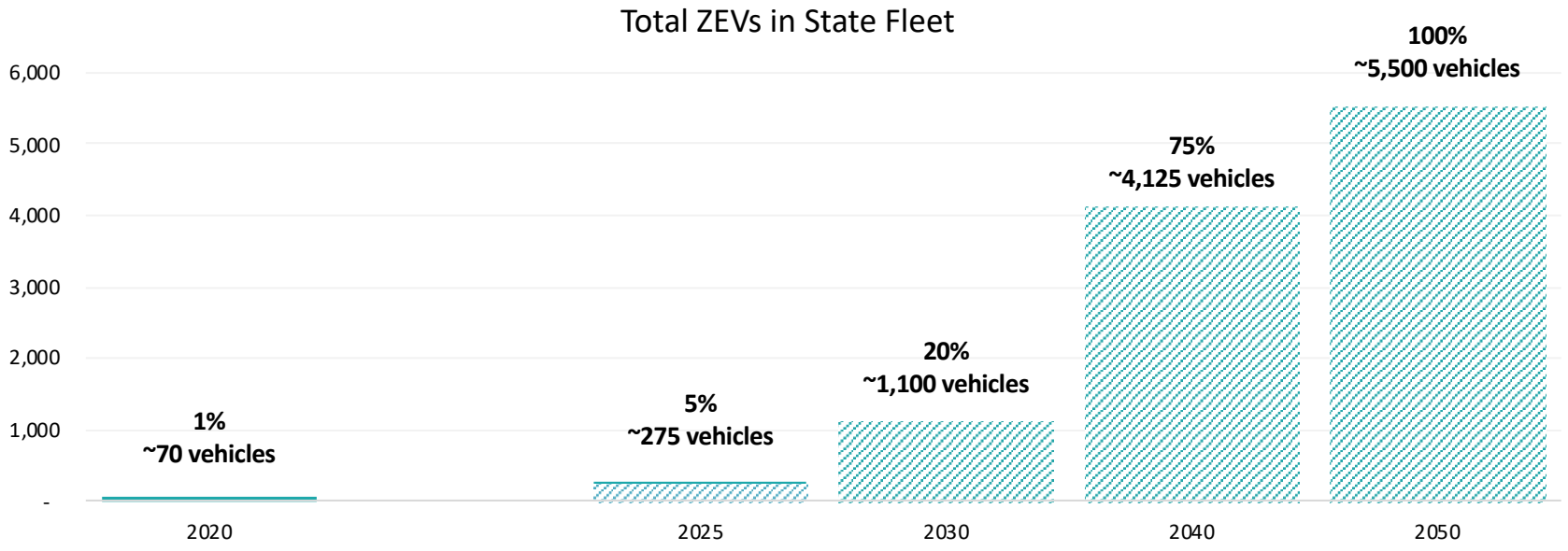


Target Focus #2: Zero-Emission Vehicles

Acquire zero-emission vehicles such that the total state fleet consists of:

- 5% ZEVs by 2025
- 20% ZEVs by 2030
- 75% ZEVs by 2040
- 100% ZEVs by 2050

Current progress: ~70 ZEVs (<1%) in state fleet as of May 2021

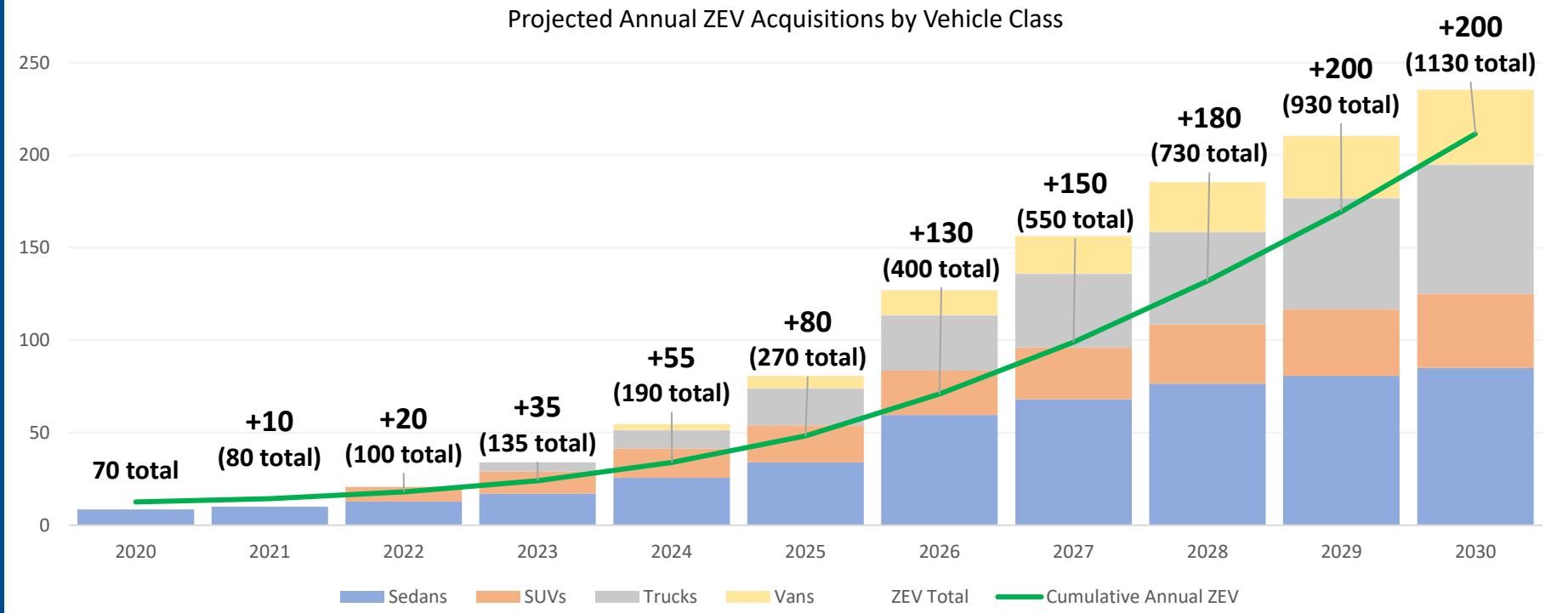


Target Focus #2: Zero-Emission Vehicles

What's included	What's not included	Tracking & Reporting
• Purchases & leases • All on-road vehicles or replacing on-road if registered and plated (e.g. NEV/UEVs) • ZEV technologies include (but not limited to) BEV, FCEV, and PHEV	• Off-road vehicles & equipment used for construction • Marked and unmarked police cruisers	• FY 2020 baseline • Ongoing calendar year tracking where possible • Annual fiscal year tracking & reporting

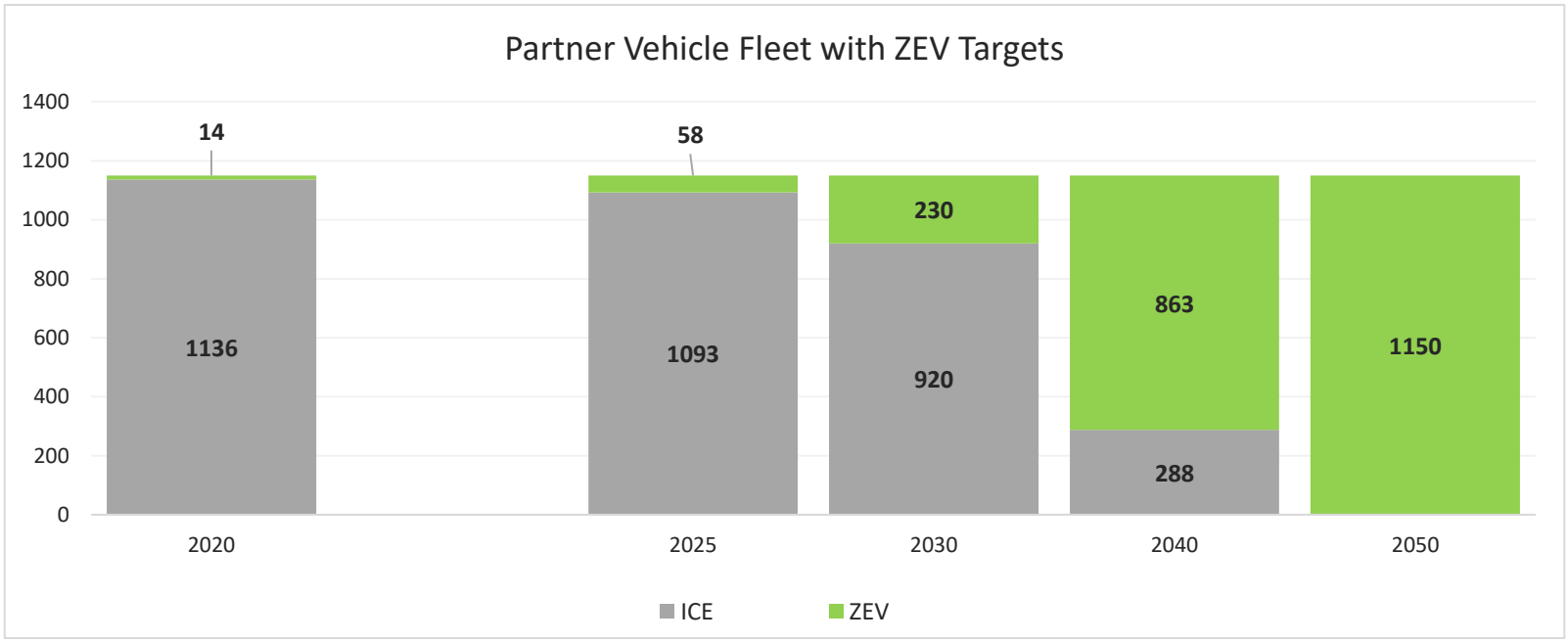
Achieving ZEV Targets: Annual Acquisition Projections through 2030

- Overall annual ZEV increases will vary depending on types of vehicles acquired and available ZEV models
- ZEV acquisition requirements starting in 2023 and 2025
- ZEV acquisitions expected to ramp up significantly starting in 2025



EXAMPLE: Achieving Zero-Emission Vehicle Targets

- Partner currently has 14 ZEVs in fleet out of 1150 total vehicles
- To meet 2025 5% target, partner would need to acquire 44 additional ZEVs
- To meet 2030 20% target, partner would need to acquire a total of 216 ZEVs
- 2023 & 2025 ZEV acquisition requirements will push transition in near term



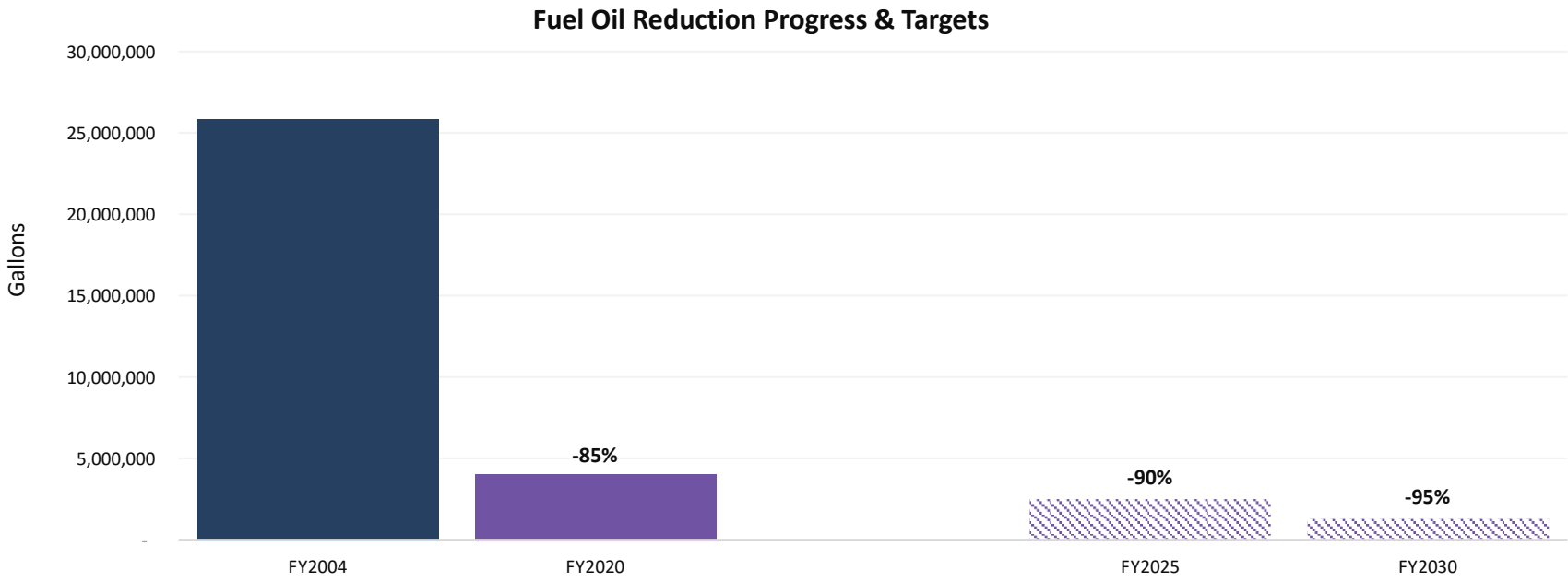
* Meeting ZEV targets will vary significantly by partner, depending on fleet size, make-up, replacement schedule, and current number of ZEVs in fleet

Target Focus #3:
Fuel Oil Consumption

Reduce non-vehicle, petroleum-based oil consumption used to satisfy thermal loads for buildings & for non-building uses at state owned facilities:

- 90% by 2025
- 95% by 2030
- 2040 and 2050 target TBD

Current progress: 85% reduction as of FY19

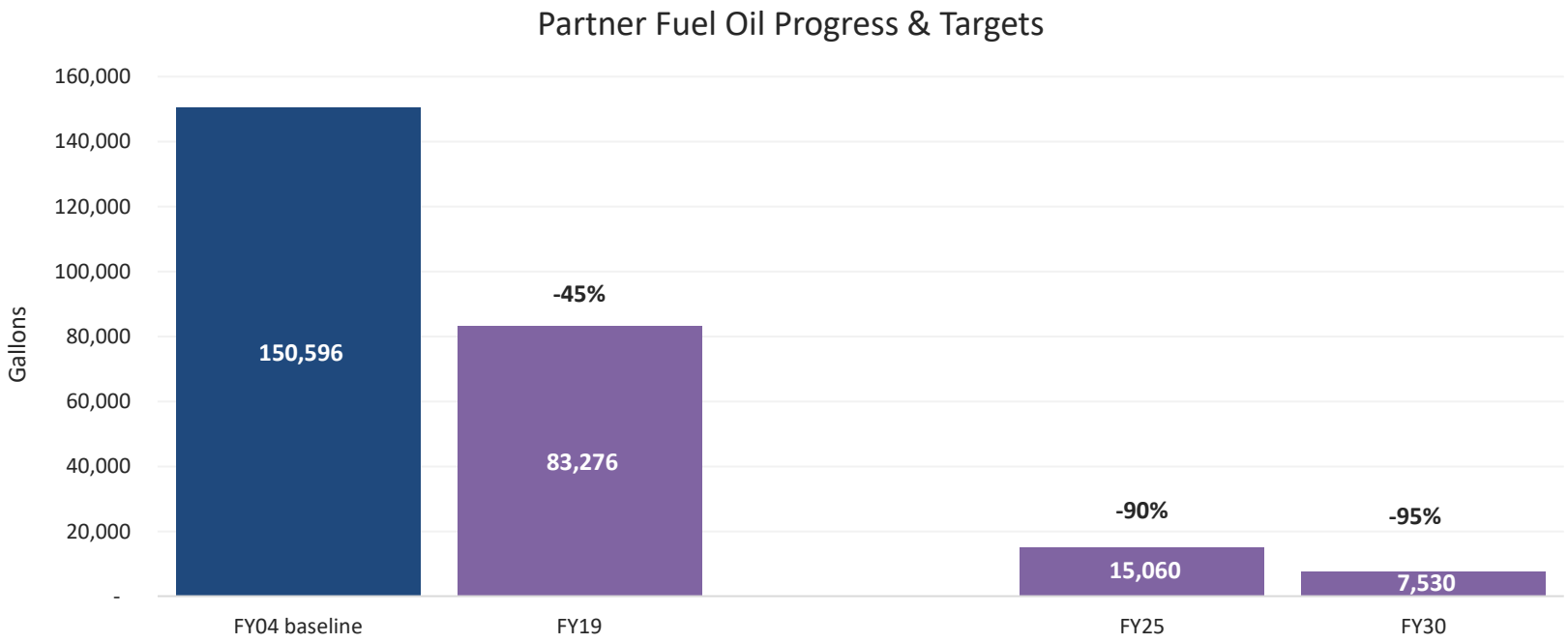


Target Focus #3:
Fuel Oil Consumption

What's included	What's not included	Tracking & Reporting
• Building and non-building uses • #2/4/6 heating oil, ULSD • Includes fuel oils used for heating, hot water, combined heat and power, marine transportation, dam & wastewater operations	• ULSD used in on-road vehicles • ULSD for emergency generation	• FY 2004 baseline • Annual reporting • Fuel oil reductions tracked annually based on fuel oil consumed by building and non-building loads • If actual consumption data unavailable, delivered fuel will be used

Achieving Fuel Oil Targets

- Partner has achieved a 45% reduction as of FY19
- To meet 2025 target, partner would need to reduce 82% from FY19
- To meet 2030 target, partner would need to reduce 91% from FY19

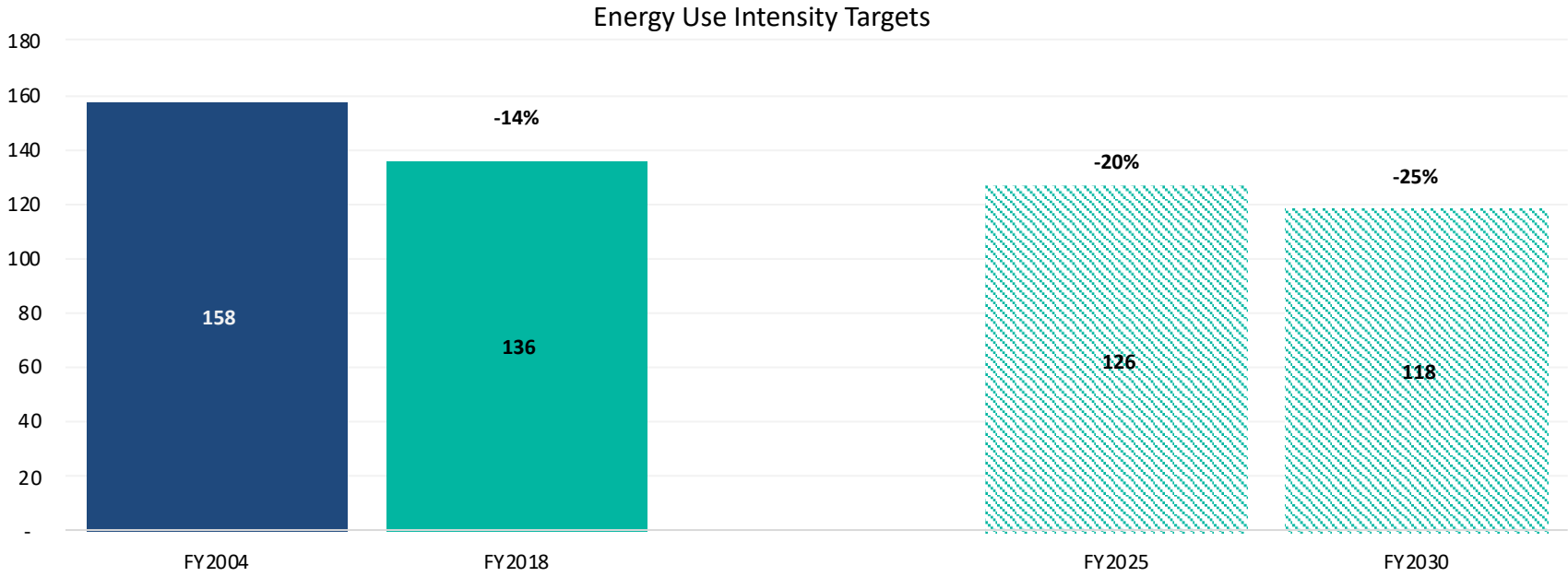


Target Focus #4:
Energy Use Intensity

Reduce overall site energy use intensity (EUI), defined as energy use per square foot, at state owned buildings:

- 20% by 2025 (average EUI 126)
- 25% by 2030 (average EUI 118)
- 2040 & 2050 target TBD

Current progress: 14% (average EUI 136) reduction as of FY19

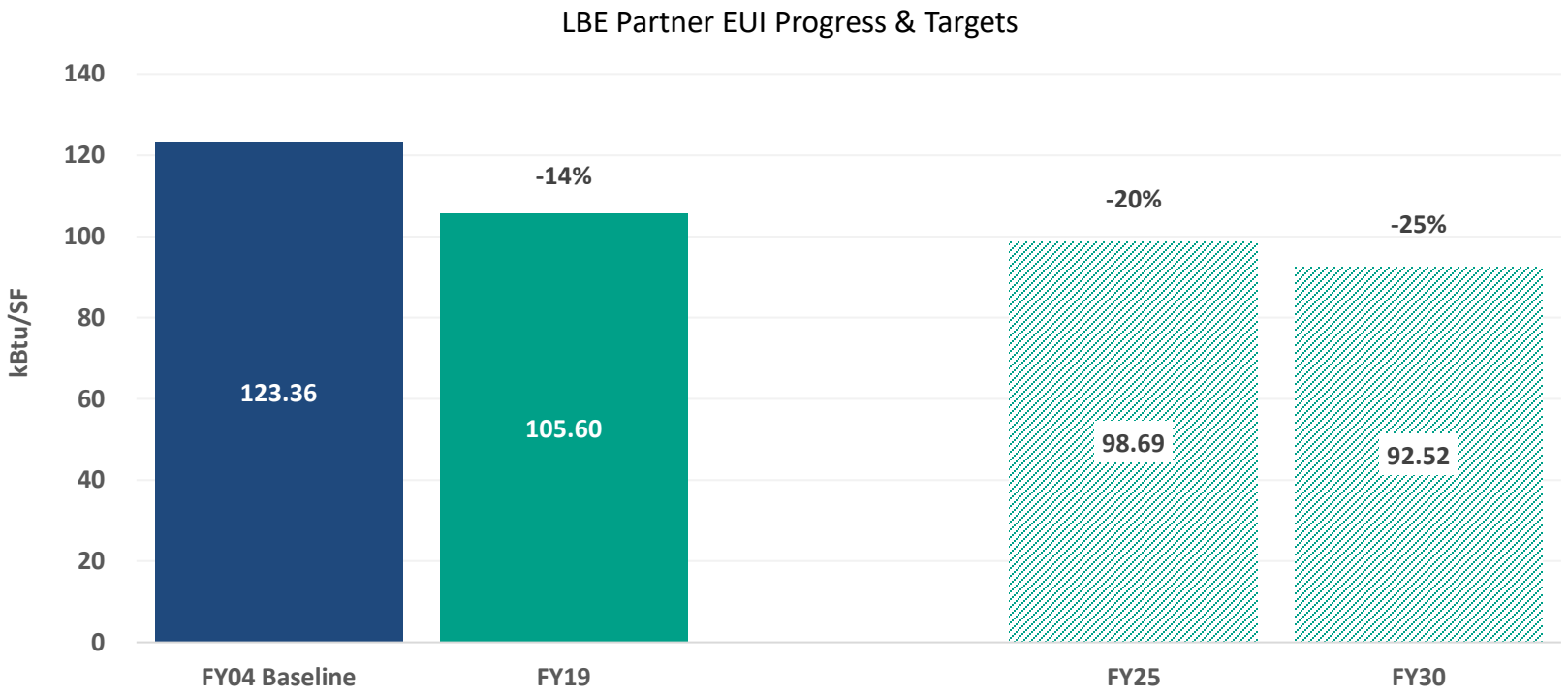


Target Focus #4: Energy Use Intensity

What's included	What's not included	Tracking & Reporting
• Total annual building square footage & energy consumption • Electricity, fossil fuel, and renewable energy consumption are all included	• Excess generation from onsite renewables • Non-building consumption	• FY 2004 baseline • Annual tracking & reporting • EUI will be calculated by converting total annual building energy use into kBtus and dividing such use by the total square footage • EUI data will be weather normalized by LBE

Achieving EUI Targets

- Partner has achieved a 14% reduction as of FY19
- To meet 2025 target, partner would need to reduce by 7% from FY19
- To meet 2030 target, partner would need to reduce by 12% from FY19

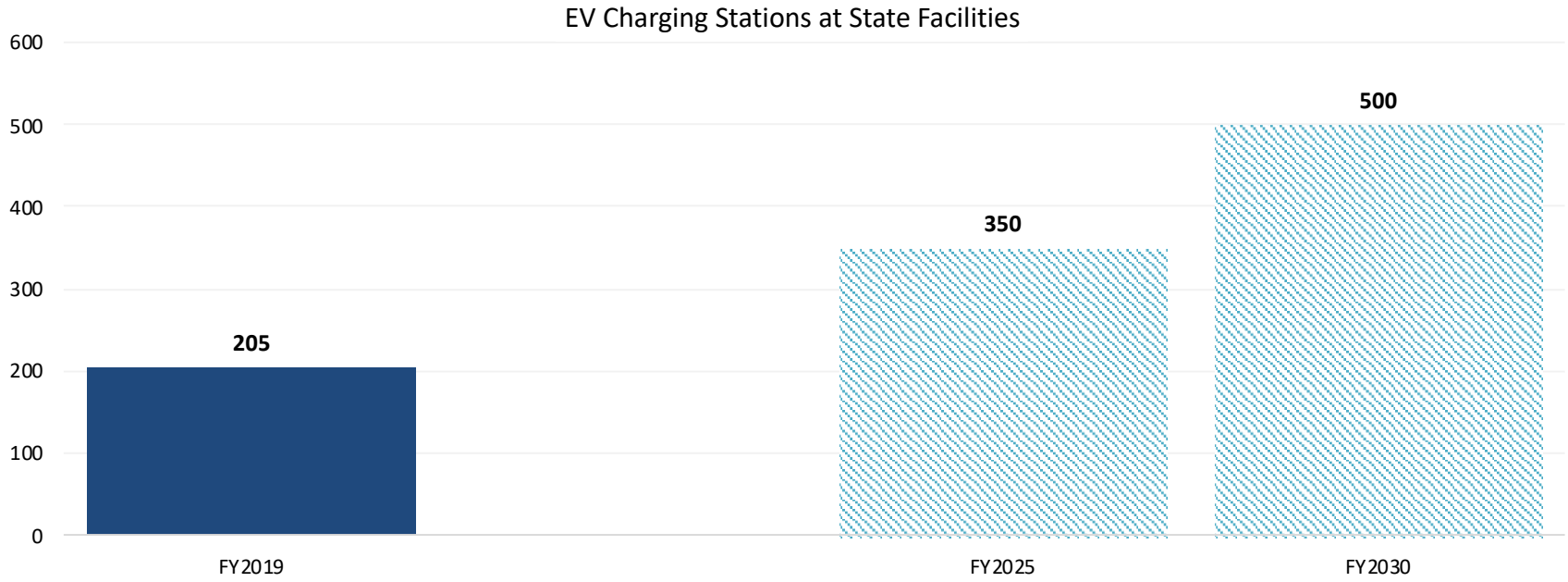


Target Focus #5:
Electric Vehicle Charging Stations

Increase the total number of electric vehicle charging stations on state properties to:

- 350 stations by 2025
- 500 stations by 2030
- 2040 target TBD
- 2050 target TBD

Current progress: 235 stations as of May 2021



Target Focus #5: Electric Vehicle Charging Stations

What's included	What's not included	Tracking & Reporting
• EV charging station targets can be met through the installation of stations utilized by state fleets, state employees, and/or the public • A station is a specific charging unit that may have one or two ports (i.e., plugs) • Innovative EVSE (Mobi, EV Arc, etc.)	• Privately-owned charging stations or stations at leased facilities that are not solely occupied by state entities	• FY 2020 baseline • Ongoing calendar year tracking • Annual fiscal year reporting

Thoughts on Meeting EO Targets

1) Decarbonization planning

- Incorporate emissions reduction into capital planning – always ask: what are the emissions impacts of this project we are funding and how can we mitigate/eliminate those impacts?
- Work with DCAMM/LBE to develop long-term planning efforts that explore the feasibility and costs of decarbonization strategies – again ask: what is the emissions impact of this plan and how can we mitigate/eliminate those impacts?

2) Building Electrification

- Prioritize air/ground source heat pumps for partial or full electrification in existing buildings
- Avoid any new fossil fuel systems in new building and wherever possible

3) Fuel switching

- Explore alternative decarbonization strategies for certain facilities and vehicles
  - modern wood heating
  - solar thermal
  - liquid biofuels, etc.
- Explore/study innovative solutions to heat non-standard spaces (e.g. garages, maintenance facilities, rinks, wastewater treatment, etc.)

Thoughts on Meeting EO Targets

4) Energy efficiency

- Reduce fossil fuel use while developing plans to electrify through
- Focus on envelope performance and air infiltration, then efficient equipment
- Implement operational efficiencies using monitoring/BMS systems
- Consider space optimization strategies, either permanent or seasonal

5) Fleets

- Conduct fleet analysis/create plan decarbonization plan
- Prioritize electrification, targeting full electric models
- Operational efficiencies (reducing VMT, proper maintenance)
- Procurement strategies (right-sizing fleet, down-sizing vehicles)
- Installing/planning for fleet EVSE to support charging needs
- Leveraging available funding (MassEVIP, MOR-EV, make-ready)
- Join the EV Purchase Challenge!

LBE Decarbonization Things to Remember

- Decarbonization will not all happen at once
- Try to do no harm (e.g. avoid creating new 30-year dependence on fossil fuels)
- Prioritize efforts based on low hanging fruit and/or largest opportunity
- Don’t be afraid of taking a reasonable risk
- Think incremental investment, not costs
- Don’t reinvent the wheel – learn from peers

Open Discussion and Q&A