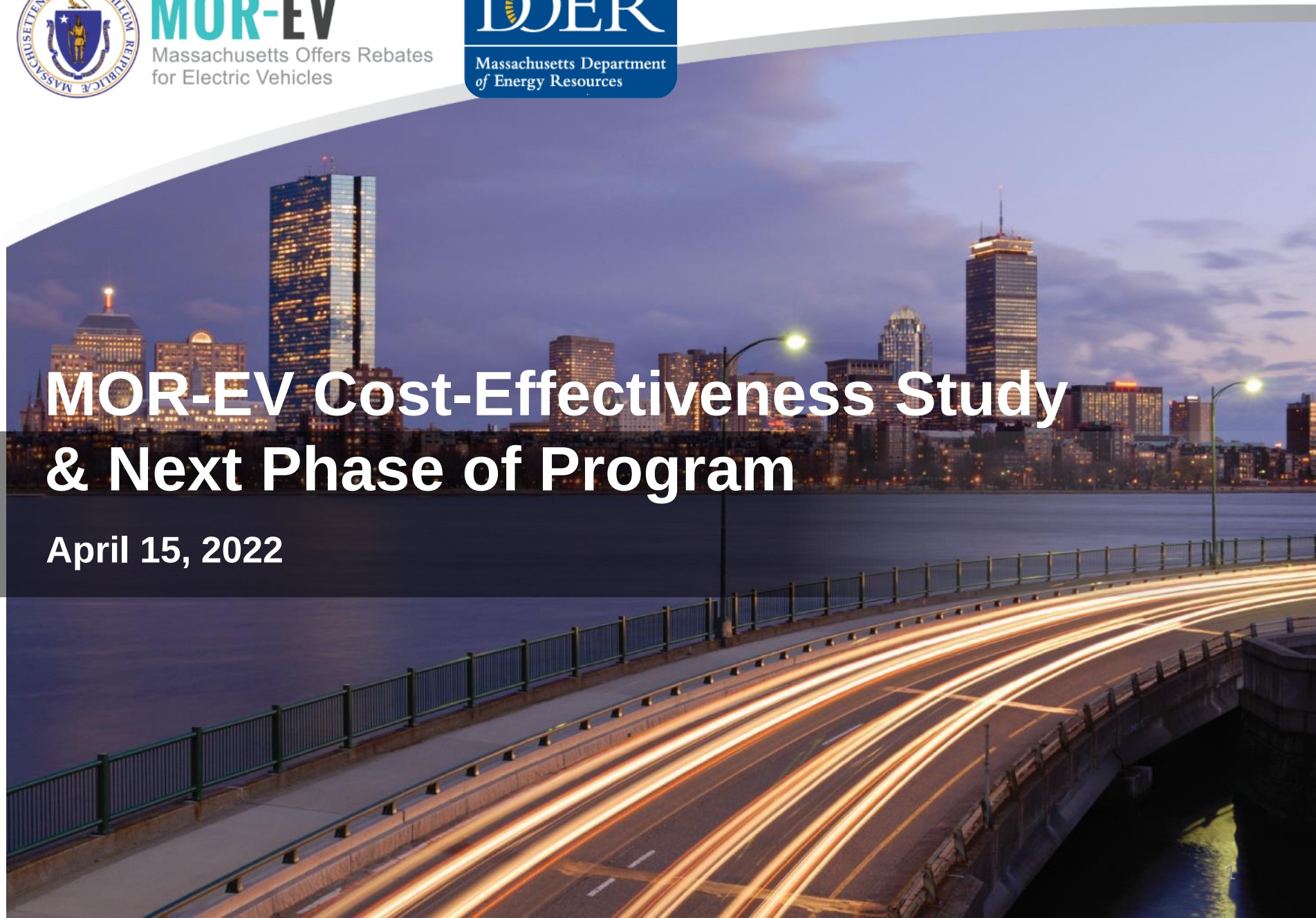
MOR-EV
Massachusetts Offers Rebates for Electric Vehicles

DOER
Massachusetts Department of Energy Resources



MOR-EV Cost-Effectiveness Study & Next Phase of Program

April 15, 2022

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Agenda

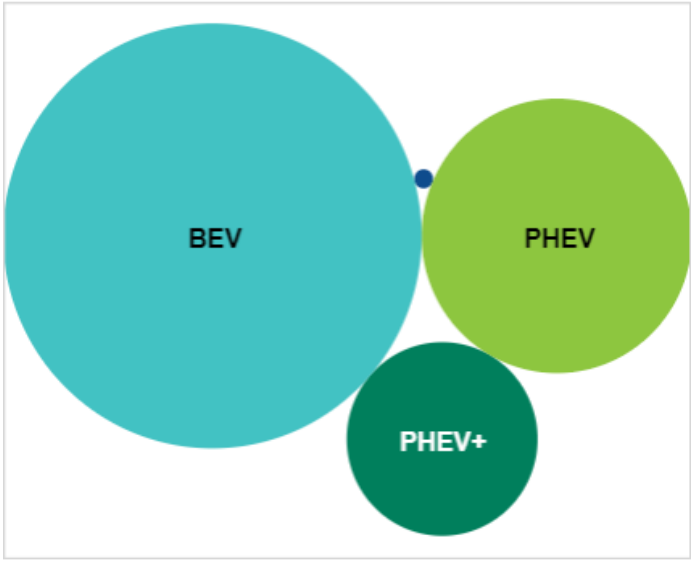
- MOR-EV Program Summary
- Final Cost-Effectiveness Study
  - Program results
  - Summary of key findings
  - Opportunities identified for consideration
- Next phase of MOR-EV Program
  - Proposed implementation of new program elements
  - Other areas for consideration and discussion

Current MOR-EV Post-Purchase Rebates

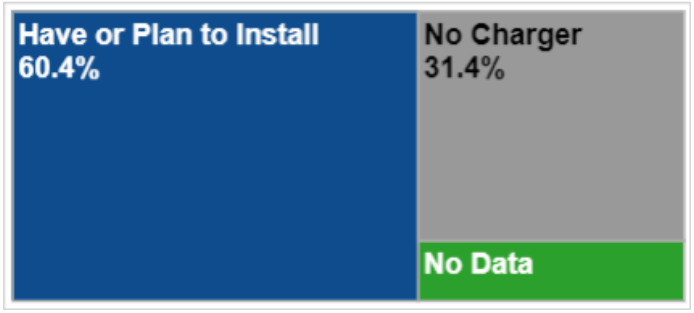
	Individual and Fleet	Trucks
Applicant Eligibility	MA residents, businesses, and nonprofits	MA residents, businesses, nonprofits, and public entities
Vehicle Types *(new only)*	PHEVs, BEVs, FCEVs	BEVs, FCEVs
GWVR	8,500 lbs. or less	8,501 lbs. or greater
Rebate Amounts	$1,500 PHEV $2,500 BEV or FCEV	$7,500 - $90,000 depending on weight class Incentive values decline by 15% in each block
Purchase Price Limit	Up to $50,000	Greater than $50,000
Requirements	Purchase or lease for 36+ months	
Participation Limit	Fleets eligible for 10 rebates/year, up to 20 total	Single entity cannot reserve more than 10% of a single block

Program Stats June 2014 - March 2022

Rebates by Vehicle Category



Drivers Who Have or Plan to Install a Level 2 Charger



Rebates Reserved & Issued

BEV	14,982
PHEV+	3,112
PHEV	6,247
ZEM	30
Grand Total	**24,371**

Rebate Dollars Reserved & Issued

BEV	$32,934,000
PHEV+	$7,581,500
PHEV	$9,219,000
ZEM	$20,700
Grand Total	**$49,755,200**

Rebates by Vehicle Make

Tesla	8,451
Toyota	4,291
Chevrolet	4,126
Nissan	1,357
Hyundai	1,171
Ford	1,133
Honda	731
BMW	673
Volkswagen	635
Kia	537
Chrysler	369
Smart	263
Mitsubishi	209
MINI	143
Volvo	109
Audi	57
Mercedes-Benz	51
Zero	26
Cadillac	17
Porsche	15
Jaguar	4
Victory	2
FIAT	1

PHEV+ denotes vehicles rebated between 2014-2018 with battery >10kWh

MOR-EV COST-EFFECTIVENESS STUDY

Independent Study Prepared by Synapse Energy Economics for DOER

1. 2014-2020 Program Results
2. Key Findings
3. Opportunities to Consider

PROGRAM RESULTS

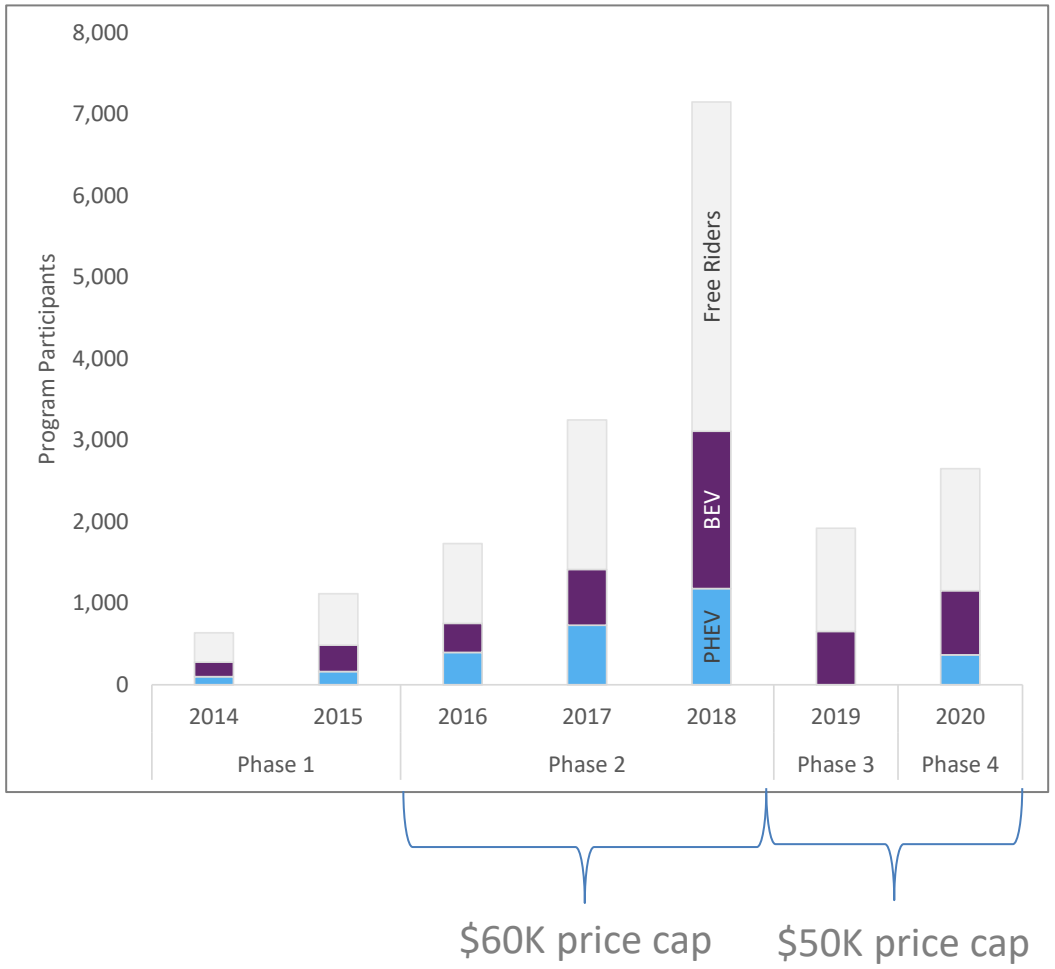
Overview of Results

- Cost of CO_2 emissions reduced through MOR-EV 2018-2019 was comparable to other transportation sector programs
  - *Emissions savings based on the vehicle being replaced, its fuel efficiency, vehicle miles driven, and the vehicle life*
- Program free ridership is up to 50% of participants
  - *Free riders include participants who made a purchase knowing rebates may not be available (2019) and those identified through post-rebate surveys (2014-2018 and 2020)*
- MOR-EV was cost-effective for the overall program and participants in 2018 & 2019, even when accounting for free riders

Participation

Number of individuals who received a rebate

- Number of rebates has remained relatively steady other than 2018, which was one year prior to a price cap reduction
- Percentage of free riders fairly consistent across all program years

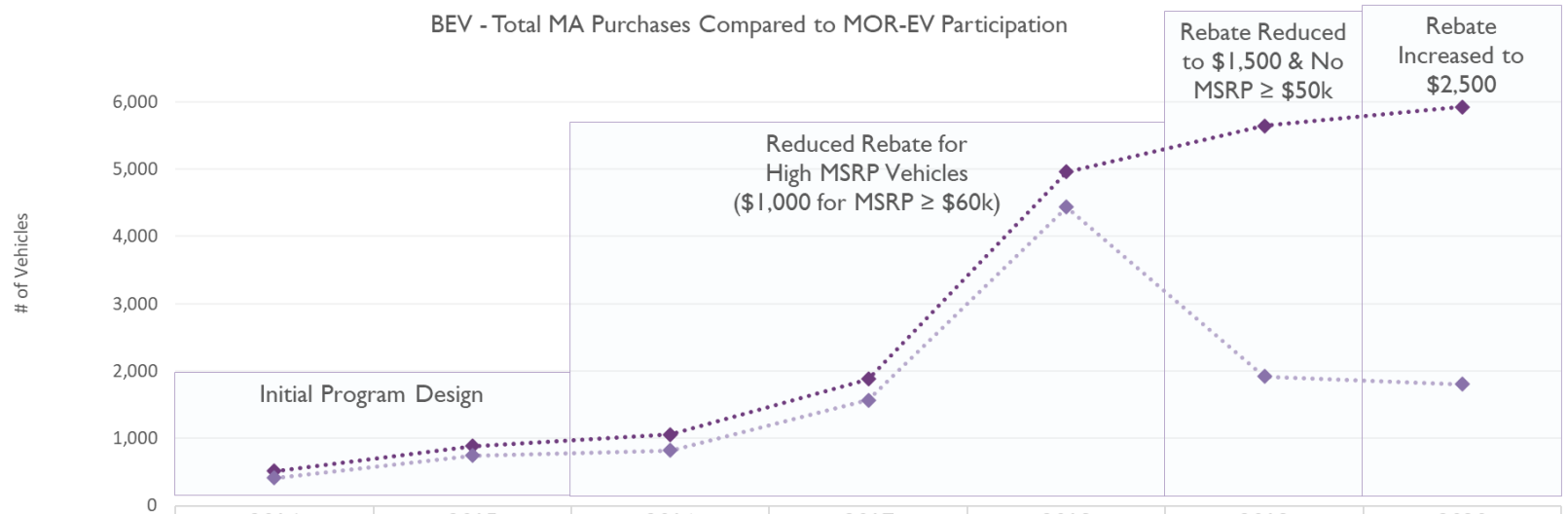


Participation Rate: BEVs

Portion of statewide BEV purchases that received MOR-EV rebates

Note: Participation rate includes free riders

- BEV purchases climbed slowly but steadily from 2018 – 2020 irrespective of MOR-EV rebates issued
- Lower price cap and lower rebate amount had minimal impact on overall BEV sales



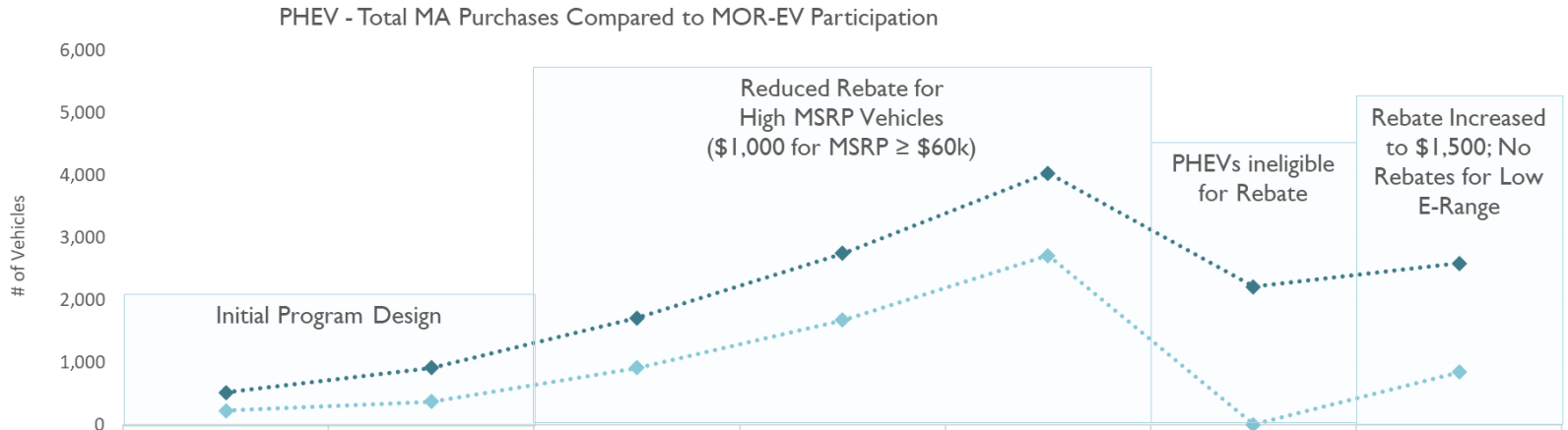
	2014	2015	2016	2017	2018	2019	2020
	Phase 1		Phase 2			Phase 3	Phase 4
MA Total BEV Purchases	517	889	1,061	1,885	4,959	5,646	5,923
Total MOR-EV Program Participants	412	747	821	1,569	4,438	1,923	1,808
MOR-EV as % of Total BEV Purchases	80%	84%	77%	83%	89%	34%	31%

Participation Rate: PHEVs

Portion of statewide PHEV purchases that received MOR-EV rebates

Note: Participation rate includes free riders

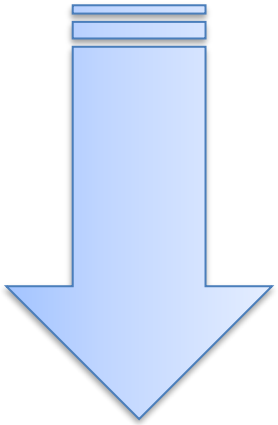
- Rebates and overall sales follow similar trends
- Elimination of rebate in 2019 may have affected total sales



	2014	2015	2016	2017	2018	2019	2020
	Phase 1		Phase 2			Phase 3	Phase 4
MA Total Purchases	518	912	1709	2747	4031	2212	2589
MOR-EV - With Free Riders	227	371	911	1,681	2,716	0	845
MOR-EV as % of Total PHEV Purchases	44%	41%	53%	61%	67%	0%	33%

CO_2 Reduction Costs

MOR-EV:
$162 to $231 per metric ton CO_2 reduced



Estimated Range of Per Ton CO_2 Reduction Costs*	
Gasoline Tax	$19 – $49
Federal CAFE Standards	$50 – $321
Low Carbon Fuel Standards (California)	$104 – $3,004
Incentives for Biodiesel (federal tax credit)	$155 – $259
Federal Cash for Clunkers Program (2009)	$280 – $435
Incentives for EVs (federal tax credit)	$362 – $663

*Cost estimates based on 2017 dollars

- 2018-2019 cost per metric ton reduction for **BEVs: $162-$201**
- 2018 cost per metric ton reduction for **PHEVs**: **$323**
  - *Assumes PHEVs operate on gasoline 46% of the time*

Free Ridership

- Half the individuals who applied for MOR-EV rebates would have made the purchase w/o the rebate
  - *Free ridership rates increase with higher purchase prices*
- Higher free ridership increases the dollars per ton of GHG reduced and reduces the program benefit-cost ratio
- The benefits attributed to free riders were removed from cost-effectiveness calculations

Cost-Effectiveness

- Benefit-cost analyses (BCA) determined whether benefits outweighed costs
  - *A benefit cost ratio (BCR) greater than 1.0 indicates cost-effectiveness*
- Program cost-effectiveness accounted for free ridership by reducing the benefits while holding costs the same
  - *The replaced vehicle and driving behavior of the participant strongly influence the cost-effectiveness of the program*
- Program and participant analyses showed cost-effectiveness for both program and participants

MOR-EV BCR	2018	2019
Program	1.20	1.08
Participant	1.35	1.07

Note: Program BCR uses $128/short ton social cost of carbon

KEY FINDINGS

Cost-Effectiveness & Free Ridership

Free ridership is a critical factor in program cost-effectiveness

- Increases $/ton of CO_2 emissions reduced
- Reduces benefit-cost ratio
- Higher incidence for vehicles with higher purchase prices

Long-Term Financial Sustainability

- Increased market adoption of EVs will strain the long-term financial sustainability of the program
- Options for less costly ways to influence the purchase of new EVs
  - E.g., tax and fee exemptions, broader consumer education, disincentives for ICEV purchases, etc.

Equity / LMI Consumers

LMI consumers are less likely to participate in the MOR-EV Program due to:

- Lower rate of new vehicle ownership
- Higher price of new vs. used vehicles
- Higher upfront cost of EVs vs. ICE vehicles

OPPORTUNITIES TO CONSIDER

Near-Term Opportunities

- Enable **point-of-sale** rebate model
- Reduce vehicle **price cap**
- Limit **PHEV eligibility**
- Develop **awareness campaigns** for underserved consumers
- Implement **additional, targeted outreach** toward consumers whose vehicle, location, and behaviors result in higher emissions

Other Areas for Potential Consideration and Discussion

LMI Incentives

- Additional incentive amount for new purchases/leases based on certain eligibility criteria
- Define method of LMI verification and rebate issuance
- Possible rebate adder for nonprofit organizations that serve LMI populations

Used EV Incentives

- Separate used EV rebates for LMI consumers with a focus on BEVs

Summary of Opportunities

Timing	Opportunities to Consider	Cost-Effectiveness	Financial Sustainability	Equity
Nearer Term (early 2022)	Reduce purchase price cap for eligibility	✓	✓	✓
	Limit PHEV incentive eligibility to vehicle types with no BEV alternatives at reasonable price points	✓	✓	
	Consider the inclusion of separate incentives for LMI customers			✓
	Increase accessibility through targeted awareness campaigns to dealers, vehicle salespeople, and customers in select geographies			✓
Mid Term (mid/late 2022)	Target incentives to consumers whose current vehicle, location, and behaviors result in higher emissions	✓	✓	✓
	Enable up-front incentive payment with the potential for a share of the incentive for the dealer/vehicle salespeople in select geographies			✓
Longer Term (2023+)	Make eligibility contingent upon participation in other state programs	✓	✓	
	Include used EVs and/or a guaranteed secondary fleet sale program for LMI consumers			✓

NEXT PHASE OF MOR-EV PROGRAM

Proposal: Point-of-Sale Rebates

- Initiate a MOR-EV point-of-sale rebate program with third-party management as part of new vendor contract in fall 2022
  - Will require several months of auto dealer outreach and program setup before point-of-sale is established
- Initially implement a hybrid program model with both post-purchase rebates to consumers and point-of-sale rebates to dealers
- Transition to only point-of-sale model upon reaching a predetermined percentage of in-state dealers participating in the program

Proposal: Price Cap Reduction

Given supply chain issues and pricing pressures, should we be cautious about making these changes now or in the near future?

Average Purchase Price, Vehicles Receiving MOR-EV Rebates			
Timeframe	**BEVs**	**PHEVs**	**Total**
01/2021-present	$43K	$36.4	$40.5K
09/2021-present	$44.5K	$42.3K	$43.3K

- Reduce vehicle price cap by $2,500 ➡ $50,000 to $47,500 by Fall 2022
- Consider implementing phased $2,500 reductions until reach cap of $42,500
- Periodically review ZEV pricing and vehicle availability to determine if price cap should be lowered as more and lower cost BEVs become available
- Consider alternate approach for light-duty pickup trucks, which have larger emissions impact

Proposal: Limiting PHEVs

- Update program so that rebates only given to PHEVs when there are not multiple BEV models available in the same vehicle class under the price cap
  - Determine BEV equivalency for PHEVs based on vehicle type (sedan, SUV, minivan) and vehicle type size (small/compact, mid- to full-size, etc.)

PHEVs with Current BEV Equivalents

Current PHEVs on MOR-EV Eligibility List	Vehicle Type	Vehicle Type Size Category	2022 BEV Equivalents Under Current $50K Price Cap	2022 BEV Equivalents Under Potential $47.5K Price Cap
Chrysler Pacifica	Minivan	Minivan		
Ford Fusion Energi	Sedan	Mid-Size and Full-Size		
Hyundai Sonata				
Kia Optima				
Honda Clarity	Sedan	Sub-Compact through Small	✓	✓
Hyundai Ioniq				
Toyota Prius Prime				
Ford Escape	SUV	Crossover through Small	✓	✓
Hyundai Tucson				
Kia Niro				
Toyota RAV4 Prime				
Hyundai Santa Fe	SUV	Mid-Size and Full-Size		
Kia Sorrento				

Sources: Statewide Contract VEH110
US News Cars database

Note: equivalence determined as minimum of 3 models from 3 different manufacturers, using 2022 model year

Next Steps

- Provide financial stability for program (RGGI funding expires 6/30/22)
- Issue bid for new program manager (e.g., outside vendor)
- Award contract for new program manager to enable point-of-sale rebate model and manage all changes (by 10/1/22)
- Reduce eligible vehicle price cap (Summer 2022)
- Limit PHEV eligibility (Fall/Winter 2022)
- Consider inclusion of separate LMI incentives (Winter 2022) and/or targeted used EV incentives
- DOER interested on feedback through end of April on these or other program design ideas: email eric.friedman@mass.gov.