

# Advanced Clean Cars and Colorado

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# Overview

- Current developments concerning clean cars
- Background on EPA Phase 2 greenhouse gas (GHG) standards
- Effects of weakening the existing EPA Phase 2 GHG standards on Colorado
- The benefits of adopting the state Advanced Clean Cars (ACC) program in Colorado

# Current Clean Car Developments

# Trends in Electric Vehicle Penetration

- Auto Company Investments

- **Volvo** announced that “all the models it introduces starting in 2019 will be either hybrids or powered solely by batteries” ([New York Times, July 2017](#))
- **GM** announced plans for 20 new all-electric models by 2023, including two within the next 18 months ([New York Times, October 2017](#))
- **Ford** will add 13 electrified models over the next several years, with a five-year investment of \$4.5 billion. (*Id.*)
- **Fiat-Chrysler** to electrify portfolio ([Wards Auto, July 2017](#))
- **Toyota** and Mazda have formed new company to develop electric vehicle technologies, building from Prius platform ([The Verge, September 2017](#))

- U.S. Market

- From January through August, sales of 8 fully electric cars grew 47% in the US. Sales of 6 plug-in hybrid cars were up 30%. ([Clean Technica, September 2017](#))
- Electric vehicle battery cost dropped 80% in last 6 years down to \$227/kWh ([Electrek, January 2017](#))

# Trends in Electric Vehicle Penetration

- International

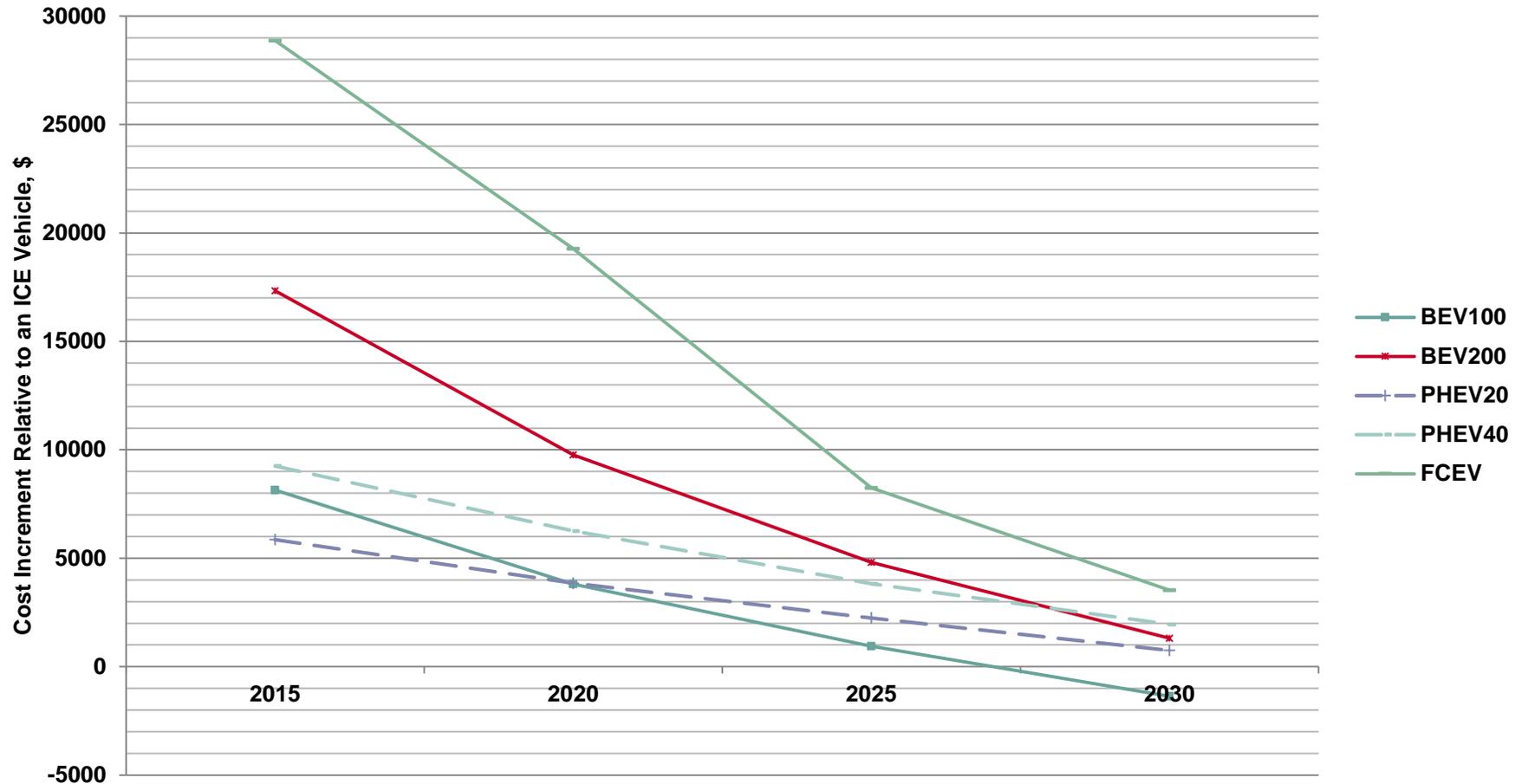
- **France** set target to end sale of gasoline and diesel cars by 2040  
(New York Times, July 2017)
- **India** has announced goal of ending sale of petrol and diesel-powered cars by 2030 (NDTV, June 2017)
- **China** has called for one out of every five cars sold to run on alternative fuel by 2025, and has said it will eventually ban sale of all gas-powered cars  
(New York Times, October 2017)
- **Britain** announced that it will ban the sale of all diesel and gas-powered cars after 2040  
(New York Times, July 2017)
- **Norway** aims to ban sale of fossil fuel-powered cars by 2025  
(Independent, June 2016)

# Technologies are Developing Rapidly

- Advanced gasoline vehicle technologies will continue to be main compliance pathway through 2025; very low levels of plug-in hybrid electric vehicles (PHEVs) and battery electric vehicles (BEVs) are needed to comply with current GHG standards
- Automakers are developing and deploying fuel efficient technologies at a faster rate than forecasted in 2012 final rule
- A number of emerging technologies offer the potential to lower costs and achieve greater reductions in the future
- The cost of lithium ion batteries is declining rapidly; 100 mile BEV could be cost competitive with a conventional technology vehicle by 2030 (Figure 1)
- The availability of cost competitive zero emission vehicle (ZEV) technologies opens a technological pathway for all OEMs to achieve very large CO<sub>2</sub> emission reductions

# Figure 1: Incremental Manufacturing Cost of ZEVs Relative to Small Gasoline Car

(From Wolfram and Lutsey, Electric Vehicles: Literature Review of Technology Costs and Carbon Emissions, ICCT)



# EPA Phase 2 Greenhouse Gas Standards

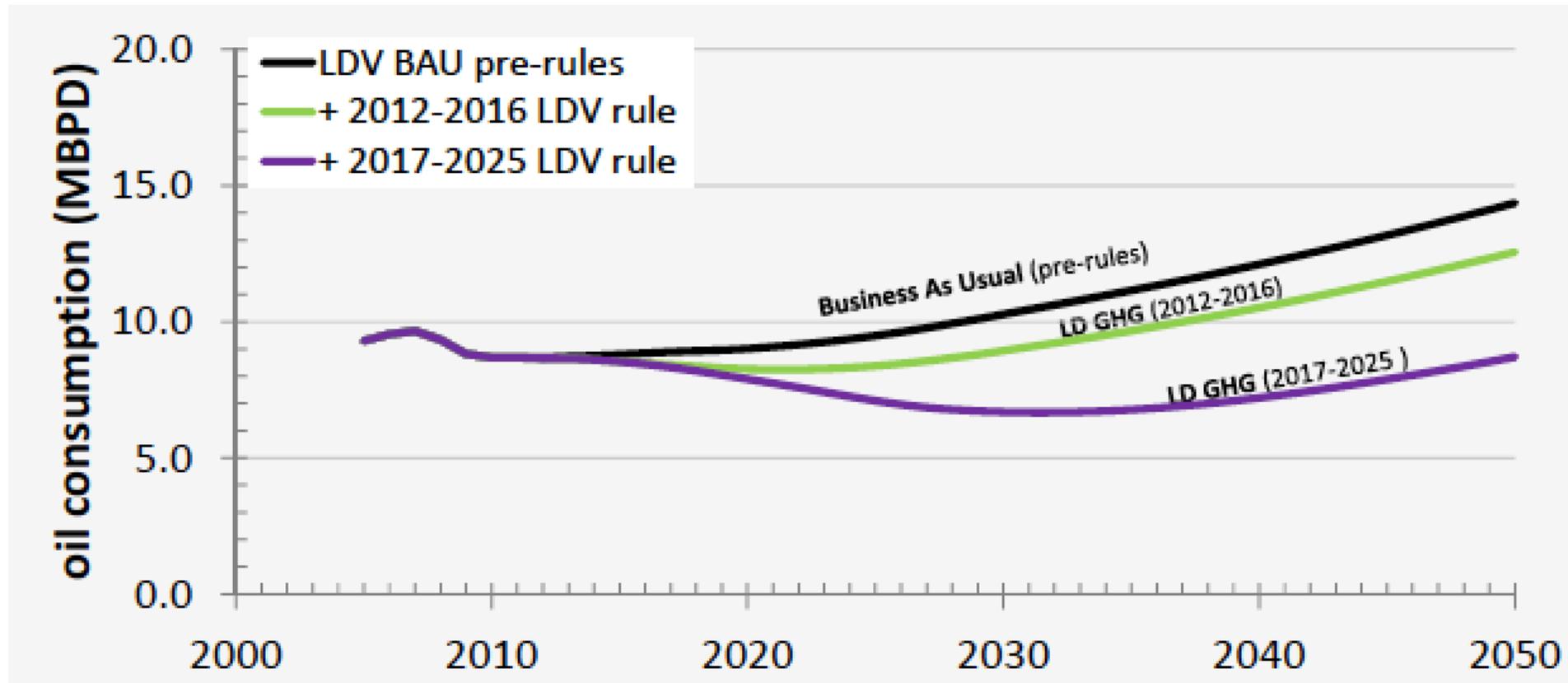
# GHG/Fuel Economy Standards for Light-Duty Vehicles

- EPA and NHTSA finalized joint rules in April 2010 and in August 2012 - created "one national program" that aligned the Federal program with California requirements
- By 2025, average fleet-wide CO<sub>2</sub> emission levels projected to be 163 grams per mile (g/mi), which is equivalent to 54.5 mpg
- Average price increase for 2025 vehicle projected to be about \$1,800; net lifetime savings due to better fuel efficiency estimated at \$5000 per vehicle
- Combined program reduces CO<sub>2</sub> emissions by 6 billion metric tons and reduces our oil dependence by 2 million barrels per day in 2025

# Status of Midterm Evaluation of MY2022-2025 Standards

- In January 2017, EPA made a Final Determination that the MY2022-2025 standards remain appropriate
- Automakers are developing and deploying fuel efficient technologies at a faster rate than forecasted in 2012 final rule and compliance costs are lower than those projected in the final rule
- California also completed a separate, corresponding midterm evaluation (MTE) and determined, on March 24, 2017, that the MY2022-2025 standards remain appropriate
- On March 22, 2017, EPA published its intention to reconsider the Final Determination, and on August 23, 2017, EPA issued a notice requesting comment on its reconsideration of the Final Determination and MY2021 standards too - widely anticipated that standards will be substantially relaxed

# Projected Benefit of Light-Duty Rules on Vehicle Oil Consumption



From EPA presentation

# What If EPA Greenhouse Gas Standards Are Relaxed?

# What's at Stake?

- EDF conducted an analysis using EPA analytical tools to ascertain impacts in Colorado of rolling back the EPA Phase 2 standards
- Assumed the EPA GHG standards for MY2021-2025 are relaxed to MY2020 levels
- Incorporated Colorado-specific inputs on fleet make-up and upstream emissions
- National and Colorado emission benefits losses are substantial
  - About 50% of the GHG emission benefits expected from the current MY2025 standards are lost
  - More than 60% of the criteria emission benefits are lost
  - By 2040, these losses could be 5 to 15% (depending on pollutant) of the total on-road inventory

# Table 1: Lost Nationwide Benefits if MY2025 Standards are Relaxed to MY2020 Levels

Calendar Year	CO <sub>2e</sub> (thousand metric tons/year)	NOx (US tons/year)	VOC (US tons/year)	PM2.5 (US tons/year)	SOx (US tons/year)
2030	103,039	15,118	54,868	2386	9512
2040	155,895	26,723	78,573	4176	16,562

# Colorado: Lost Air Pollution Reduction Benefits

- Lost Reductions in CO<sub>2e</sub> (Annual): 2.2 million tons (2030), 3.8 million tons (2040)
- Smog-Forming Emissions: Lost benefits in reducing both VOCs and NOx
- Additional Health Harming Pollution: Lost benefits in reducing PM<sub>2.5</sub> and SOx
- For these criteria pollutants the lost benefits are a significant portion of the overall on-road emissions inventory

# What if Colorado Opts In to the State Advanced Clean Car Program?

# Advanced Clean Car Implications for Colorado

- EDF conducted an analysis of the costs and benefits of adopting the Advanced Clean Car program in Colorado
- We utilized the same models and assumptions that EPA used in its Final Determination and incorporated Colorado inputs on vehicle fleet, EV sales, and upstream emission impacts to the extent possible
- A number of scenarios were evaluated ranging from adopting only the ACC GHG standards to adopting both the GHG and ZEV components of the ACC program
- The lifetime fuel savings for all scenarios far outweigh the costs (Table 2)
- ZEV costs are declining rapidly and will reduce the per vehicle cost dramatically for the ACC program (Figure 1)

# Table 2: Impacts of State Advanced Clean Car Program in Colorado – Incremental to MY2020 (in 2025)

Scenario	Cost per Vehicle (\$)	Lifetime Fuel Savings (\$)	Payback Period (in years)
Existing National GHG Rule	1378	3049	4.4
State Advanced Clean Car Program – GHG only	1496	4158	4.1
State Advanced Clean Car Program – GHG and ZEV Requirement	2216	3481	N/A
State Advanced Clean Car Program – GHG and ZEV Requirement; CO EV Credit	1767	3481	N/A

# Summary

- It is very likely the EPA Phase 2 GHG rule will be relaxed and Colorado will lose significant future emission reductions
- Lifetime fuel savings for the Advanced Clean Car program far outweigh the costs
- Advanced gasoline and ZEV technologies are developing rapidly and their costs are declining faster than anticipated
- Adopting the Advanced Clean Car Program is the only way to protect against the loss of both smog protections and greenhouse gas benefits in Colorado