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Clean Cities
DENVER METRO COALITION

AMERICAN LUNG ASSOCIATION.
IN COLORADO

Agenda

1. **Clean Cities Overview**
   a. DMCCC
   b. DMCCC Projects
2. **EV Benefits and Challenges**
3. **Colorado EV efforts**

Clean Cities Mission

To advance the energy, economic, and environmental security of the U.S. by supporting local decisions to reduce petroleum use in transportation.

- Provides a framework for businesses and government agencies to work together
- Goal: Reduce U.S. petroleum use by 2.5 billion gallons per year by 2020

Clean Cities Strengthens Markets

- Nearly 100 coalitions in 45 states covering 73% of the U.S. population
- Public/Private Partnerships that Promote Deployment and Strengthen Markets

DMCCC Projects

- Project FEVER
  - US DOE grant
  - Colorado PEV Readiness Plan
    - Remove barriers, Tier 1 market
    - 100 partners, 13 subcontractors
  - Colorado specific:
    - EV Market projections (2015 and 2025, low, medium, high scenarios)
    - Model policies, ordinances, permitting examples
    - Vehicle and infrastructure pricing
    - Case studies
    - Wells to wheel emissions analysis
  - WWW.ELECTRICRIDECOLORADO.COM

DMCCC Projects

- Refuel Colorado Fleets
  - CEO, CLEER
  - Energy Coaches
    - Benefits, Costs
    - Incentives
    - Applications
    - Partnerships

  - WWW.REFUELCOLORADO.COM

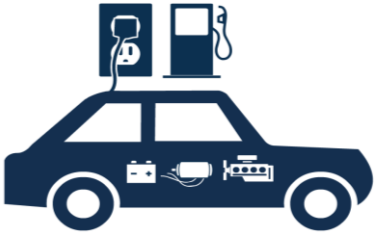
Electricity: Hybrids and Plug-ins

Hybrids and plug-in electric vehicles use electricity either as their primary fuel or to improve the efficiency of conventional design

Three categories of vehicles:

Hybrid Electric Vehicles (HEVs)

Plug-In Hybrid Electric Vehicles (PHEVs)



All-Electric Vehicles (EVs)

Charging EVs and PHEVs

- Electric Vehicle Supply Equipment (EVSE)
- Charging times for fully depleted batteries vary based on type of battery and type of EVSE
  - **Level 1**: AC, 120V, 6-20 hours, residential
  - **Level 2**: AC, 240V, 3-8 hours, residential and public
  - **DC Fast**: DC, 208-600V, 30 minutes, public

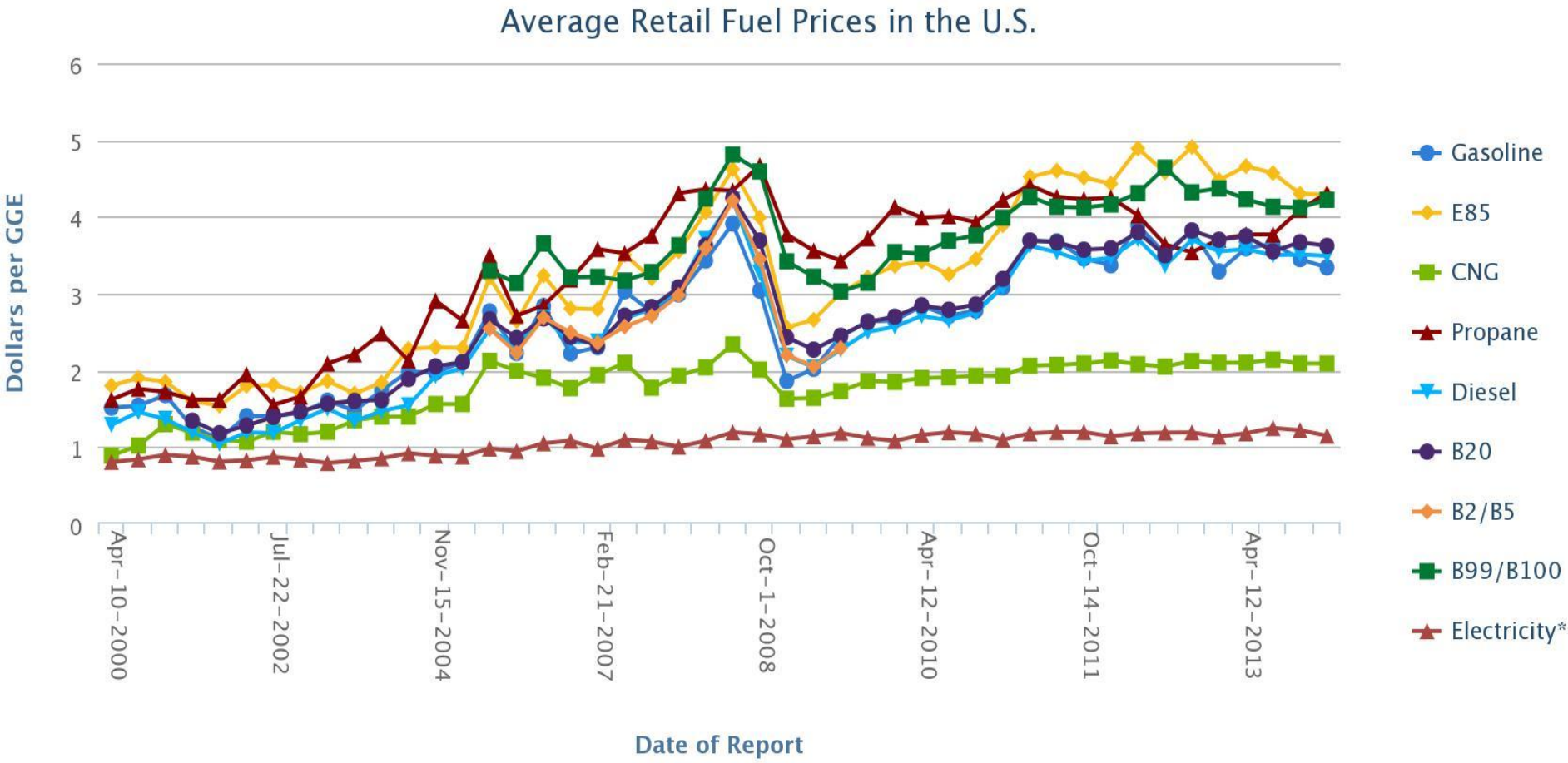
Benefits and Challenges

Capitalizing on advantages and combatting barriers

Electric Vehicles

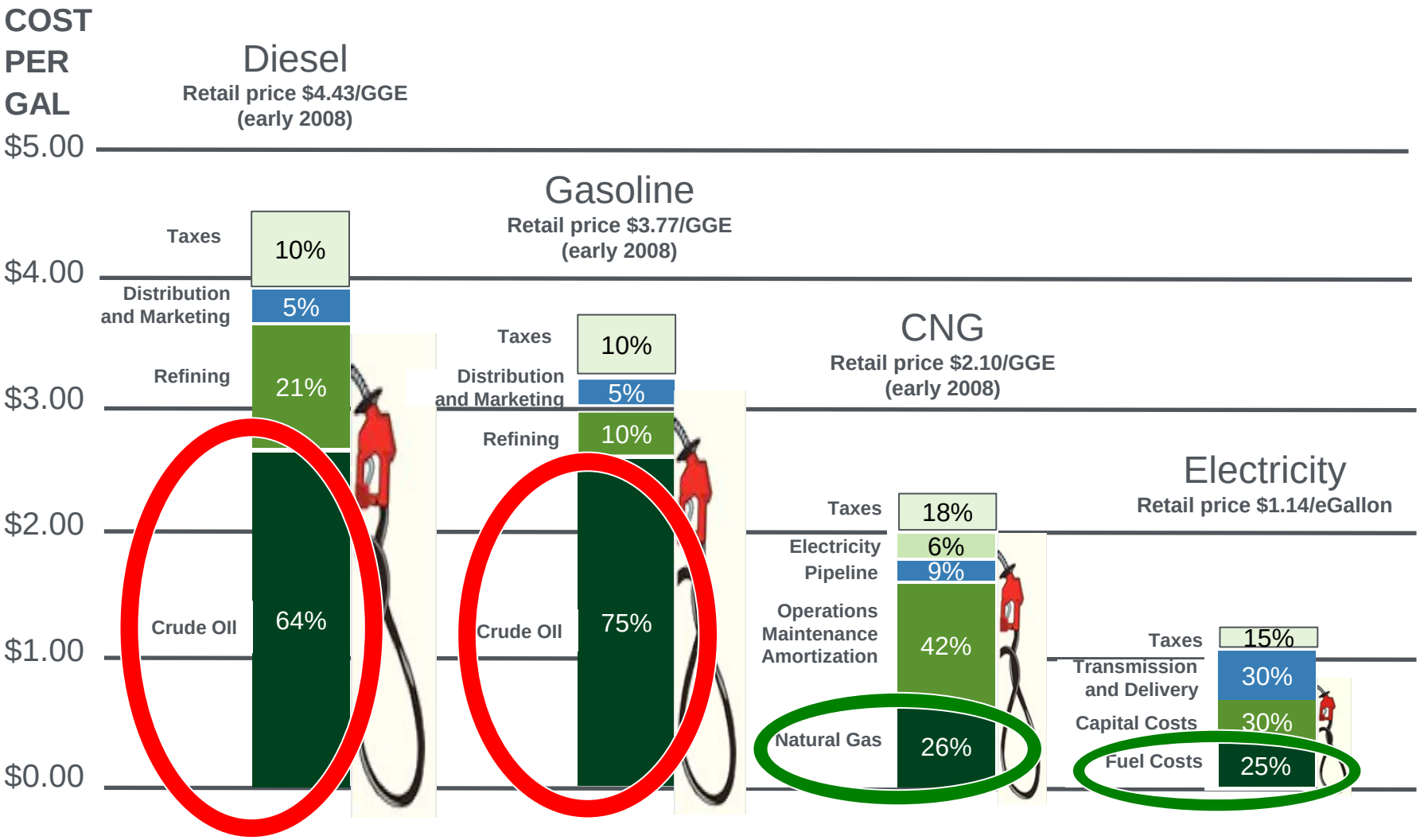
- Benefits
  1. Air Quality Investment
     1. Evolution of electricity generation
  2. Historically Cheap, Consistent
     1. $1.13/eGallon
     2. Low maintenance
  3. Performance
  4. Convenient
  5. Domestic

CNG and electricity have advantages: Lower price, lower volatility



Source: AFDC

FUEL PRICE VOLATILITY



Source: US DoE EERE, EIA, and NGVA

Light Duty

- Ford, Nissan, BMW, Chevy, Cadillac, Tesla
- All electric range of 22-85 miles
  - Most duty cycles are within range
- City of Loveland, Indianapolis, Washington State, Houston, many others
- Price competitive
  - Alt Fuels CO/Charge Ahead/Tax Credits

Medium Duty EV

Boulder Electric Vehicle

500, 1000 Series

80-100 mile range

4,000 - 6,500lb payload

Configurations

-Box, reefer box

-Stake

-Flatbed

-Utility

Medium Duty EV Applications

- Frito-Lay, UPS, FedEx, CU Boulder
- Frito-Lay has around 300 EV delivery trucks.

EV Challenges

- **Education**
  - Range anxiety, speed, applications, charging
- **Infrastructure**
  - Type and placement
  - Electricity generation portfolio
- **Incremental cost**
- **Range**

EV Challenge Solutions

- **Education**
  - Refuel Colorado
  - Ride and drive events
- **Infrastructure**
  - Charge Ahead Colorado
  - Renewable Energy Standard, 30% renewable by 2020 - Investor Owned Utilities
  - Solar
- **Incremental cost**
  - Colorado Innovative Motor Vehicle Credit, Federal Credit, Alt Fuels Colorado
- **Technology**
  - EV Everywhere Grand Challenge – 280 mile BEV same price as ICE

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