

CABQ Climate Action Task Force



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Land of Enchantment Clean Cities Coalition

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Land of Enchantment Clean Cities' Mission

- Operates as a not-for-profit supported by U.S. DOE Clean Cities – a network of nearly 100 Coalitions nationwide – incorporated in 1994 covering all of NM
- Advances the nation's economic, environmental, and energy security by supporting local actions to reduce greenhouse gas emissions, cut petroleum use, and improve efficiency in transportation
- Promotes non-petroleum, alternative transportation fuels defined by DOE – natural gas, propane, hydrogen, ethanol, and electricity
- Advances carbon-reduction through EEMS or Energy Efficient Mobility Systems
- Offers presentations, buying and cost-of-operation calculators, technical resources, publications, coalition network, and national laboratory collaboration
- Check out the LOECC EV Charging Checklist
www.loecleancities.org



Land of Enchantment Clean Cities' Projects and Partners since 1990s

- City of Santa Fe -- Transit and Environmental Services
- City of Albuquerque -- Transit and Solid Waste
- Cities of Socorro, Deming, Moriarty and Estancia
- North and South Central Regional Transit Districts
- Fleet technician and manager training
- Alternative-fuels vendors and dealerships
- Regional and national Clean Cities Coalitions
- Volkswagen Beneficiary and Mitigation Plan
- DOE and DOT related funding opportunity announcements (FOA)

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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Alternative Fuels Data Center

Search the AFDC

FUELS & VEHICLES | CONSERVE FUEL | LOCATE STATIONS | LAWS & INCENTIVES | Maps & Data | Case Studies | Publications | Tools | Ab

EERE » AFDC

Fuels & Vehicles

Biodiesel | Electricity | Ethanol | Hydrogen | Natural Gas | Propane

Information by State

Information by Fleet Application

Maps & Data

Tools

Need a Jump?

Ten ways to get rolling on petroleum savings, emissions reductions, and lower fuel costs.

The Information Source for Alternative Fuels and Advanced Vehicles

The Alternative Fuels Data Center (AFDC) provides information, data, and tools to help fleets and other transportation decision makers find ways to reduce petroleum consumption through the use of alternative and renewable fuels, advanced vehicles, and other fuel-saving measures.

The AFDC is a resource of the U.S. Department of Energy's Clean Cities program.

Gaseous and Liquid Alternative Fuels, used alone and in Combination with Advanced Power-trains

- **Propane (LPG/autogas -- C3H8)** – lowest ICE Nitrogen Oxides (NOx) emissions in light-duty (LD) class, typically sourced from shale methane but also renewable from agricultural feed-stock (RLPG)
- **Compressed Natural Gas (CNG -- CH4)** – lowest ICE NOx emissions in all classes using geological NG and lowest (net negative) of all alternative fuels using Renewable Natural Gas (RNG)
- **Hydrogen (H2)** – used in ICE but currently in Fuel Cell Electric Vehicles (FCEV) and produced by reforming natural gas (NOx, CO, HC produced), zero emission if sourced from electrolysis of water. H2 is the fuel source for fuel cells, which are a highly-efficient means of power-to-wheels and emerging in transport and blended with pipeline natural gas
- **Ethanol (E85 -- EtOH)** – low-energy density liquid but highly beneficial for combustion efficiency and low emissions in conventional and advanced ICE -- Albuquerque CO attainment



Battery Electric and Hybrid Electric Vehicles

Classifications:

- 1) BEV light, medium- and heavy-duty, and 2) HEV/PHEV/FCEV same duty-cycles

Duty Cycles & Weight Classes:

- Class 1 (0–6,000 lbs) automobile/SUV, light, local/distance
- Class 2 (6,001-10,000 lbs) truck light/SUV, light-medium, local/distance
- Class 3 – 6 (10,001-26,000 lbs) truck/bus, medium, local
- Class 7 -8 (33,000 + lbs) truck/bus, heavy, local/distance

Infrastructure Requirements:

- BEV – 100% energy from on-board electro-chemical battery storage – grid power (geologic or renewable) – light-duty (locally or on-road charged); medium- and heavy-duty (locally or on-road charged)
- HEV – gasoline, diesel or gaseous fuel ICE, battery pack and electric motor on-board electric generation from liquid- or gaseous-fuel source
- PHEV – gasoline, diesel or gaseous fuel ICE, battery, electric motor with on-board or plug-in charging capability
- FCV – uses on-board fuel storage (typically hydrogen) to run a Fuel Cell that produces power through and electric motor to the wheels



Battery Electric & Hybrid Electric Vehicles

Status of BEV:

- Light-duty: mature technology, cost, models and incentives available
- Medium/Heavy-duty: developing technology, cost, models, and some incentives

Advantages of BEV – zero vehicle emissions, light-duty mature, ideal for daily commutes/deliveries regional and statewide growth, and renewable energy potential

Status of HEV/PHEV/FCV:

- Light-duty: mature technology, cost, models and incentives available
- Medium- and Heavy-Duty: developing technology, cost, models, and incentives

Advantages of HEV/PHEV/FCV – triple fuel economy (renewable-energy options), low emissions (80% less NOx), full-electric operation and quieter and enhanced performance

CNG/LNG Hybrid Electric

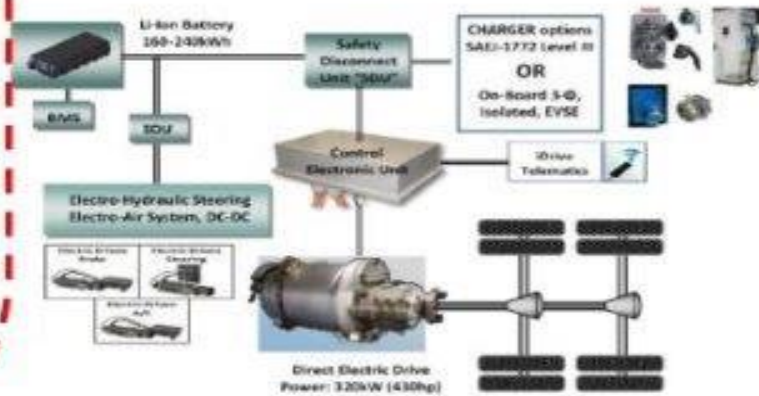
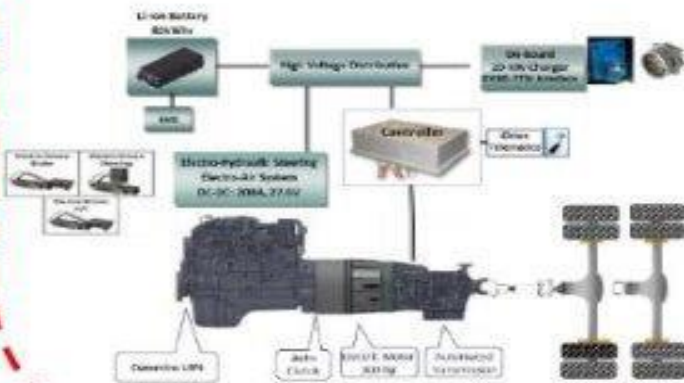


Battery Electric



Fuel Cell Electric

Drives like Electric Fuels like CNG



FC engine mounted under hood





Electric Power-trains: Benefits

- Highly-efficient conversion of energy-to-wheels
- Excellent torque and acceleration characteristics
- Less maintenance than conventional ICE
- Mature, available technology
- Zero-emission at vehicle (BEV/FCEV)
- Cost-effective lifetime payback with savings



Electric Power-trains: Challenges

Battery cost, weight, power, and sustainability/environmental considerations

BEV cost payback long without grant funding and strong warranty/lease on batteries

Range and access to recharging – in yard and in service

BEV recharging network for lower- and higher-Class vehicles: Interstates, U.S Routes, and rural areas

Utility demand-charge adjustments and time-of-charge for mid-Class vehicles; e.g. overnight, low demand periods

Higher-incremental costs of BEV, PHEV, HEV, and FCEV vehicles



Contact Information

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Detailed information on fuels, vehicles, technologies, challenges and strategies:

State-specific and federal information

Tools

Publications

Fleet-specific information

Links: presentations, webinars, podcasts, Motor Week

<https://afdc.energy.gov/>