



# **Fleet Electrification Study and Plan**

**Response to Council Resolution 20160505-025**

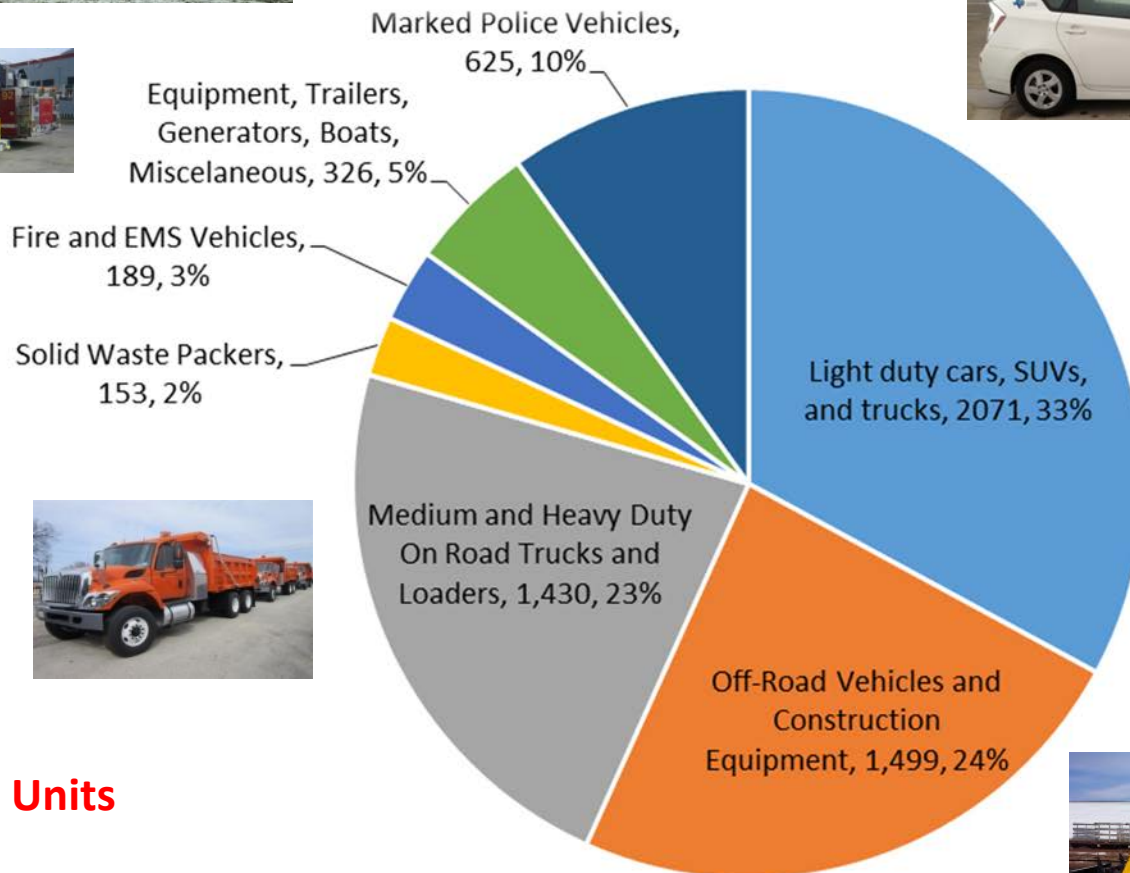
**October 5, 2016**

# Council Resolution 20160505-025

**“...work with Rocky Mountain Institute, Vulcan, Inc., and Electrification Coalition on an assessment to determine the benefits, timeline, and feasibility of increasing electric vehicle adoption into the City’s Fleet Services vehicles.”**

- Evaluate short and long-term cost savings.
- Analyze return on investment options.
- Determine impacts and benefits to Austin Energy.
- Identify electrification targets to achieve carbon neutral fleet by 2020.

# Current Fleet Composition



**6,293 Total Units**

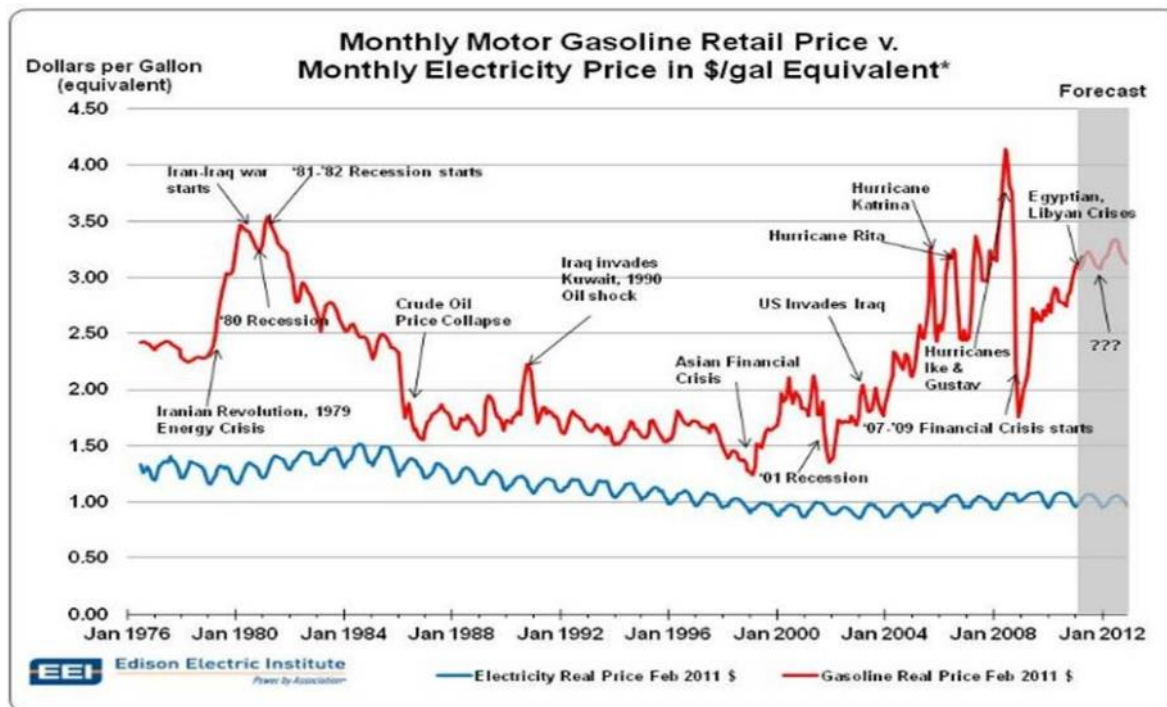
**78% are alternative fuel capable or hybrid**

# Recommendations

1. Add 330 plug-in electric vehicles by 2020.
2. Expand City Fleet charging stations from 33 to 330 by 2020.
3. Fund electric vehicle acquisitions by the execution of municipal leases (lease-to- own).
4. Fund charging infrastructure through an interdepartmental fuel surcharge.

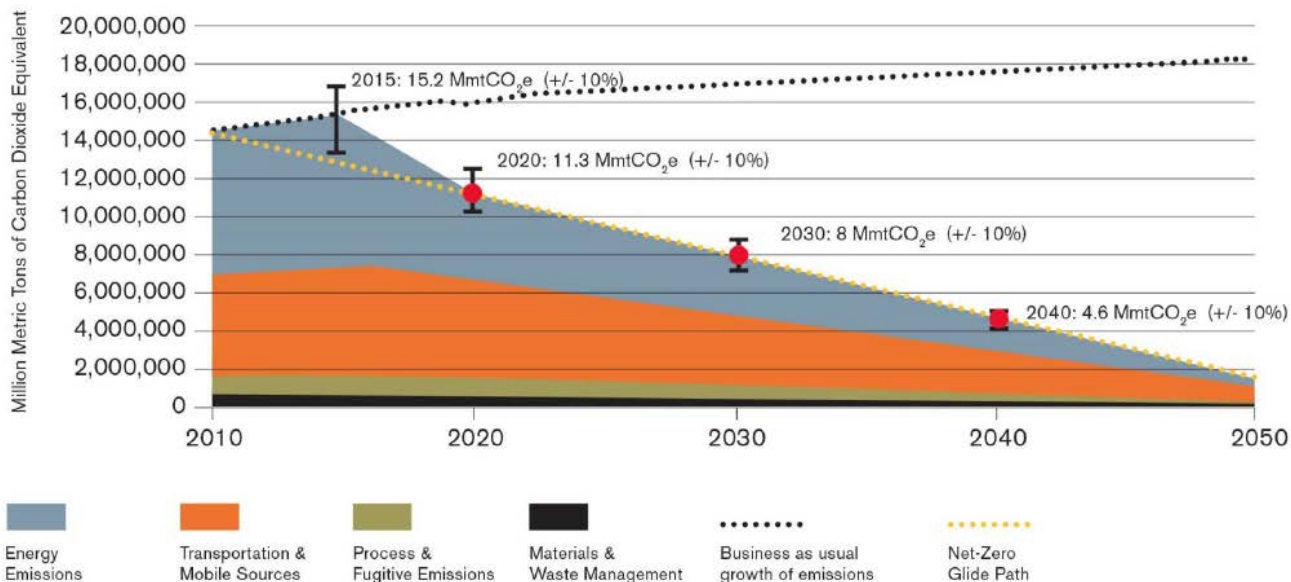
# Electric Vehicle Economic Benefits

- Lower life-cycle costs than gasoline vehicles.
- Supports the local economy by purchasing kWh from Austin Energy.
- Reduces fuel price volatility risk.



# Electric Vehicle Additional Benefits

- Supports Council adopted goal of Net Zero Community Wide GHG emissions by 2050.
- Demonstrates innovation and leadership to employees and the community.
- Diversifies the City fleet.
- Fuel independence.



# Vehicle Technology

## Battery Electric Vehicle (BEV)

Example: Nissan Leaf (MPGe: 126/101)



No gasoline used

No oil changes or transmissions required

20-100 kWh batteries

80–300 mile range on a single charge

## Plug-in Hybrid Electric Vehicle (PHEV)

Example: Chevy Volt (MPGe: 106/42)



Gasoline engine creates electricity

Oil changes and transmissions required

5-15 kWh batteries

20-50 mile range on a single charge

300 miles of gasoline-extended range

# Charging Technology

## Level 1:

1kW adds 4 miles per hour

## Level 2:

6.6kW adds 25 miles per hour

## DC Fast Charge:

50kW+ = full charge in 15 minutes



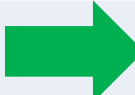


# Fleet Analysis

## Fleet Electrification Coalition:

- Analyzed over 1,000 City-owned sedans, minivans, and SUVs
  - Excluded marked police vehicles and pickup trucks
- Identified best electric vehicle candidates:
  - Older vehicles
  - Low daily mileage vehicles
  - High lifetime mileage vehicles
  - Expensive-to-operate SUVs and minivans
- 326 vehicles targeted for electrification
- **Fleet Services re-analyzed and recommends 330 by 2020**
  - 72 Plug-in Hybrids, 258 Battery Electric Vehicles

# Life Cycle Cost Analysis

10-year Life-Cycle	Continue Current Operations (Gasoline & Alt Fuels)	Electrification of Vehicles (Muni Lease)	Savings
Vehicle Purchase Cost	\$9,400,000	\$9,400,000	\$0
Lifetime Maintenance Cost	\$4,400,000	\$2,300,000	+\$2,100,000
Lifetime Fuel Cost	\$4,200,000	\$1,100,000	+\$3,100,000
Infrastructure Development	\$0	\$1,700,000	-\$1,700,000
Auction Proceeds	(\$1,400,000)	(\$1,400,000)	\$0
<b>TOTAL</b>	\$16,500,000	\$13,000,000	 <b>+\$3,500,000</b>

Based on: 330 Electric Vehicles, 10 year-100,000 mile lifetime,  
Electricity at \$0.11 / kWh, \$2.25 gasoline, and a \$7,500 EV Tax Credit

# Vehicle Purchases

## GOAL:

330 Plug In Hybrid and Battery Electric vehicles that are charged at City facilities by the end of CY 2020.

- **35** vehicles by the end of CY 2017
- **134** total vehicles by the end of CY 2018 (add 99)
- **229** total vehicles by the end of CY 2019 (add 95)
- **330** total vehicles by the end of CY 2020 (add 101)

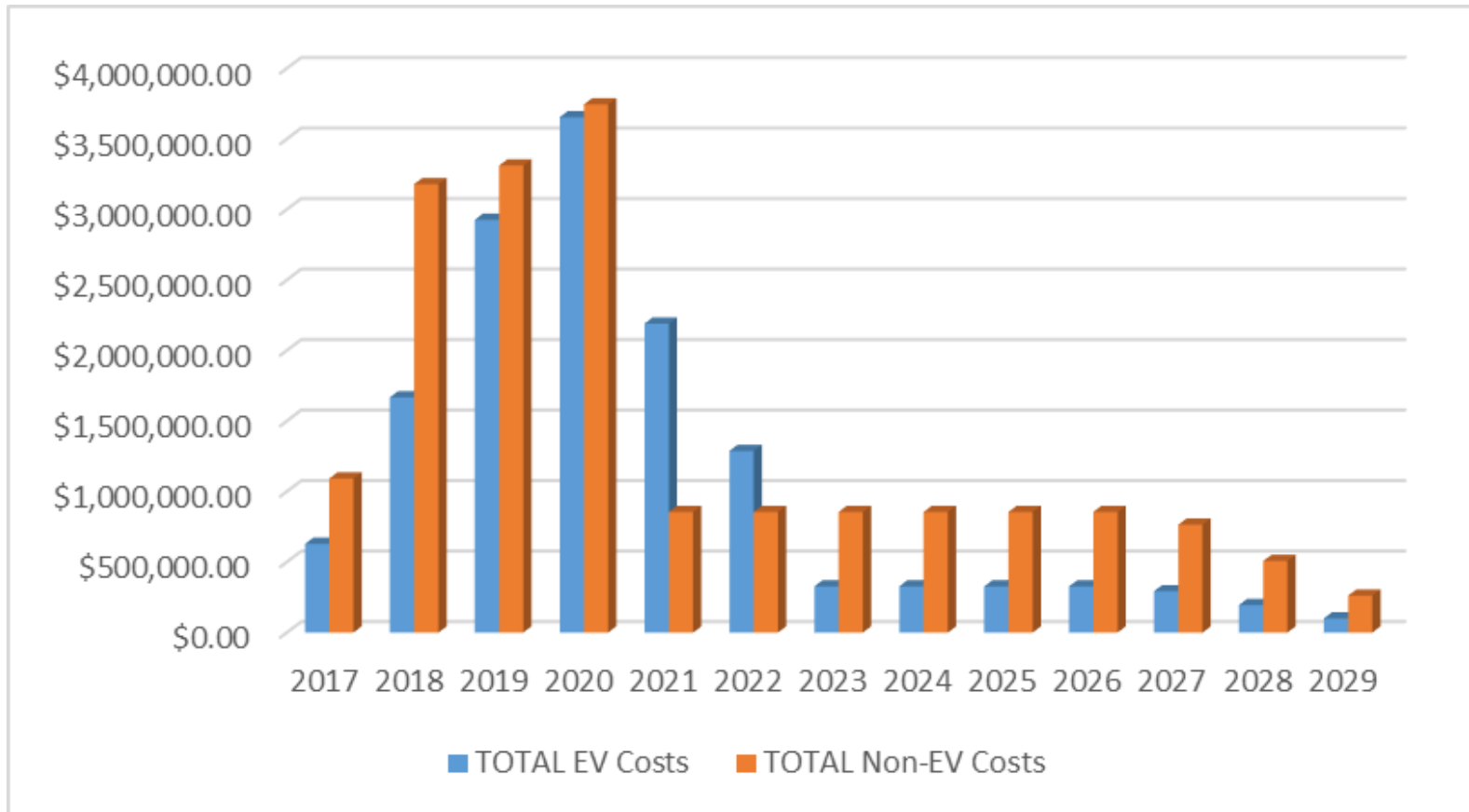
Municipal Lease to own:

- Spreads initial costs over 3 years
- Takes advantage of \$7,500 federal tax credit per vehicle

Over their 10 year lifetime, these 330 vehicles will avoid:

- 12,000 metric tons of Carbon Dioxide
- 22 metric tons of Nitrogen Oxides
- 34 metric tons of Volatile Organic Compounds

# 13 year Cash Flow



Total Non-EV Cost: \$16,500,000  
Total EV Cost: \$13,000,000  
10 Year EV Savings: \$3,500,000

# Charging Infrastructure Implementation

Currently 33 charging stations deployed

Add 100 stations by the end of CY 2018:

- 10 Departments
- 15 Building locations
- All Level 2 Charging

# Commission Feedback

- 9/13 – Urban Transportation Commission – Feedback positive
- 9/19 – Electric Utility Commission- questions related to GreenChoice and impact to AE operations. Positive feedback on the initiative.
- 9/21 – Environmental Commission- questions related to NOx and non attainment status. Positive feedback on the initiative.
- 9/28 – Joint Sustainability Committee

# 2017 Rollout Process

- Install charging stations
- Buy first batch of electric vehicles
- Train City staff on Electric vehicle operation
- Place electric vehicles into service
- Evaluate performance and adjust as necessary



**Questions?**