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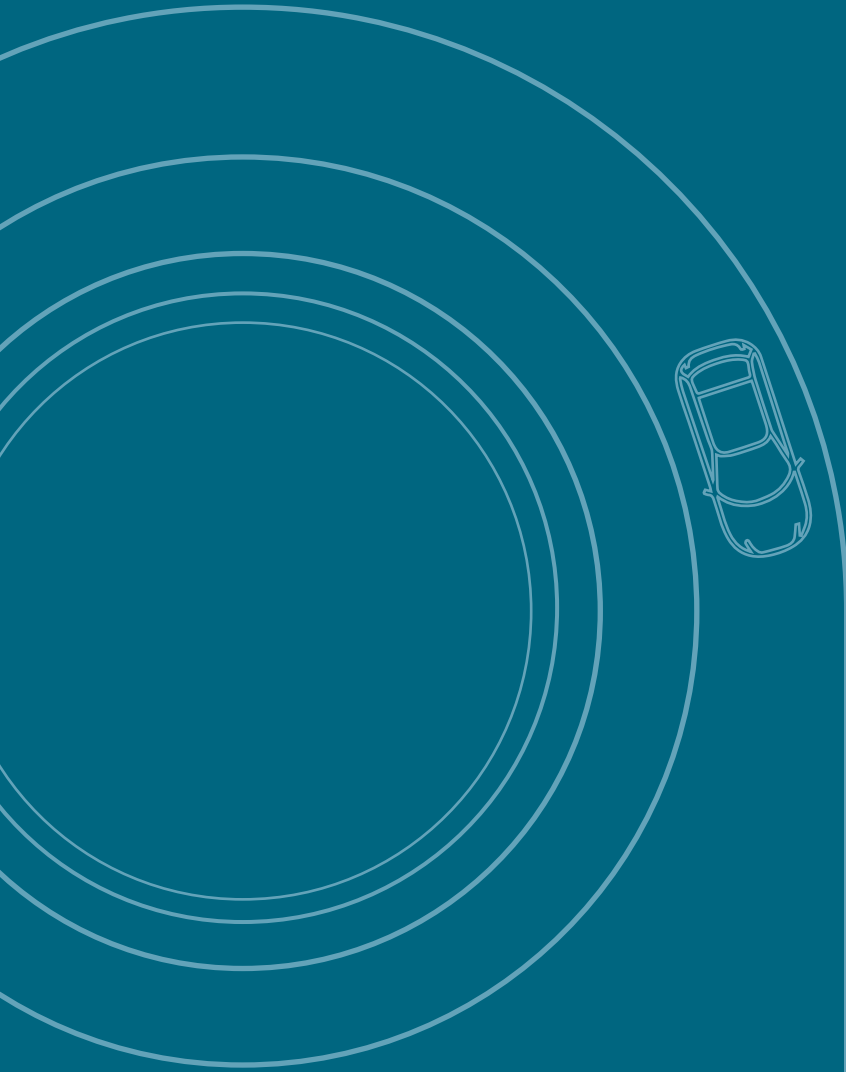
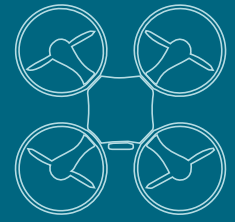


**SMART  
MOBILITY  
ROADMAP**  
2017

**AUSTIN'S APPROACH TO SHARED, ELECTRIC,  
AND AUTONOMOUS VEHICLE TECHNOLOGIES**

Austin, Texas





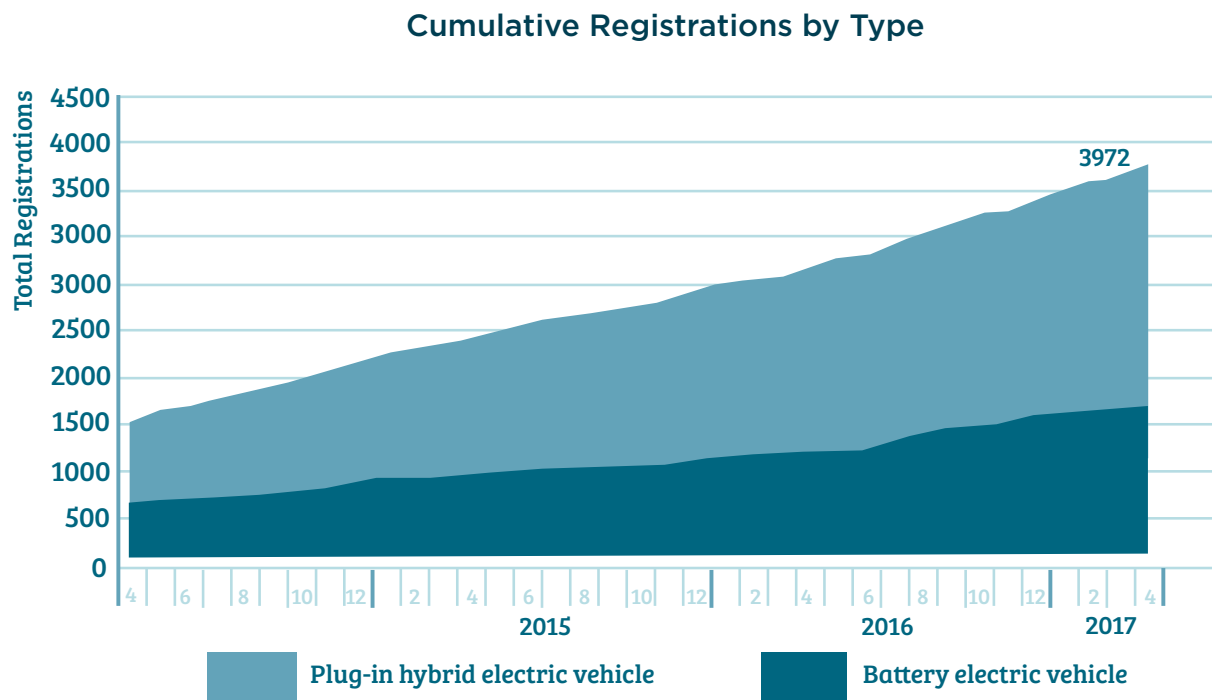
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## ELECTRIC VEHICLES AND INFRASTRUCTURE

Currently in the Austin area there are approximately 4,000 EVs that represent approximately 22 percent of the Texas EV market and a 55 percent EV growth rate over the last three years<sup>30</sup> Global future EV projections vary widely with some of the more aggressive models predicting EVs overtaking internal combustion sales by as early as 2038. But regardless of source, each major model does predict a continued growth curve in EV sales.<sup>31</sup> The rate of adoption is important because the increased deployment of electric vehicles in lieu of internal combustion engine (ICE) technology is an important strategy to reduce emissions, total cost of ownership and energy usage in the transportation sector.

### Austin-Area EV 3-Year Growth



Data provided quarterly from EPRI for Travis and Williamson County.

Moving transportation from petroleum-based energy to electric-fuel also supports national fuel independence as electricity is generated regionally and not imported. In order for Austin to help accelerate EV adoption in the Austin area, policy incentives to drive an EV will need to be complemented with increased electric charging infrastructure.

Per Texas state law under the Public Utility Regulatory Act (PURA), Austin Energy has the sole responsibility and obligation to provide electric service within its service territory. Having a community- owned utility with this obligation to serve has allowed Austin to create a cohesive vision on public electric vehicle service equipment (EVSE) with a focus on affordability, clean air, climate protection and consumer experience. However, as the increasing cost of providing rebates and installing charging stations matches the growth rate of EV adoption, hard debates about appropriate cost allocation will be required to ensure appropriate cost recovery. Of particular importance will be analysis of the rate impacts and their effect on affordability.

The City of Austin to date has made significant strides in transportation electrification and is widely considered a national leader on this front. The City of Austin/Austin Energy is listed by the ICCT in the top 10 U.S. cities for public and workplace electric charging infrastructure, per million population.<sup>32</sup>

Recently, from City of Austin Fleet Services, Office of Sustainability and Austin Energy analysis, with support from the Electrification Coalition, predicts that the City will save \$3.5 million over the course of 10 years by deploying 330 EVs through the year 2020.<sup>33</sup> Savings are expected to continuously improve, due to rapidly advancing battery technologies and lower manufacturing costs.<sup>34</sup>

Yet barriers to current electric vehicle adoption still exist and a combination of tools and actions are needed to grow the EV market adoption, including:<sup>35</sup>

- Policies, such as a Zero Emission Vehicle plan or free express lane access,
- Consumer purchase incentives,
- Widely available workplace and public charging points,
- EV car options (to include plug-in trucks and SUVs) and competitive price points, and
- Promotional and public awareness campaigns, including price incentives

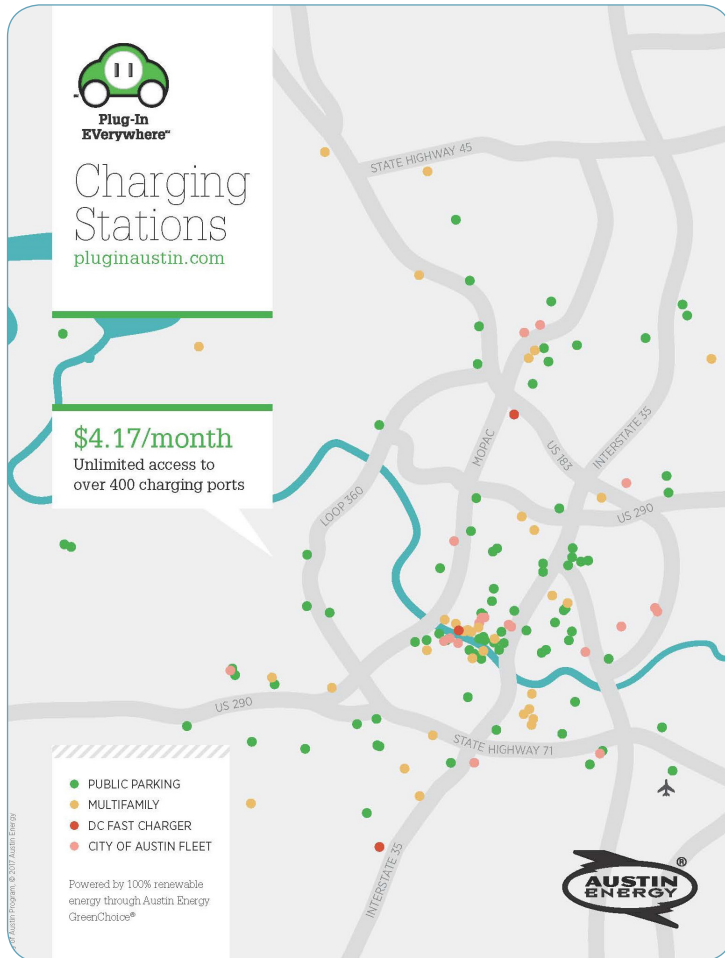


New fast-charging stations, like the one pictured here at Austin's Electric drive, refuel cars in minutes.

## AUSTIN ENERGY'S EV PROGRAM HIGHLIGHTS:

**EV Charging Network**—In 2011, Austin Energy installed the first EV charging infrastructure in the region. Today, Austin Energy has over 600 EV charging ports at 172 locations, including retail, workplace, multifamily and fleet locations throughout the city.<sup>36</sup> Austin Energy is adding 8-10 DC Fast Chargers to the network

beginning in 2018. The fast chargers will recharge a vehicle within 15 minutes and are slated to be positioned along major transportation corridors. Additionally, the Plug-In EVerywhere network is powered by clean, renewable wind energy via Austin Energy's GreenChoice Program and the cost to Plug-In EVerywhere customers is only \$4.17 per month for unlimited electric "fill-ups."<sup>37</sup>



On Electric Drive, in the heart of downtown, Austin Energy has also developed a showcase for sustainable transportation. Electric Drive includes a DC fast charger that meets both global standards for EV fast charging, as well as universal level 2 charging for customers to use while they are downtown. A solar powered kiosk with integrated battery storage includes level 1 charging for electric bikes, scooters, motorcycles and mopeds. Electric Drive is an integral part of the downtown redevelopment known as the Seaholm EcoDistrict, which features sustainability innovations.<sup>38</sup>

Capital Metro and Austin Energy are also reviewing opportunities to install EV charging infrastructure, including

additional DC fast charge stations, at public facilities such as metro park and rides, metro transit centers and metro transit oriented developments. Both organizations will jointly develop a strategy for identifying priority public charging station installations.

- **A Focus on Multi-Family Properties and EV Charging** – Given that over 40 percent of Austin's population lives in multi-family properties<sup>39</sup> and that the number of electric vehicles is rapidly growing in the Austin area, Austin Energy is working to encourage adoption of electric vehicles by multi-family residents. Over the past two years, Austin Energy has expanded the network of public EV charging infrastructure by supporting installation of EV chargers at 43 multifamily properties serving more than 25,040 residents.<sup>40</sup>

With support from the philanthropic 11th Hour Project, Austin Energy will lead a new effort to identify and develop EV sharing programs for low-to moderate-income communities.<sup>41</sup> Given unique challenges at multi-family properties—factors such as charging station siting, occupant



turnover, security, safety, billing and parking protocols—the effort will also aim to better understand the needs of electric vehicle charging habits at multifamily properties in order to continue providing the appropriate infrastructure for increased EV adoption.

- **Home Charging Rebates** – Even though Austin Energy offers extensive and affordable public charging, the majority of plug-in electric vehicle (PEV) charging will be conducted at home. For many electric vehicle drivers, standard existing electrical outlets will meet their needs. However, for those who want to charge more quickly, Austin Energy offers a 50 percent rebate—up to \$1,500—towards the hardware and installation of a level 2 fast charger<sup>42</sup>
- **EV360 Time-of-Use Rate Pilot Program** – Austin Energy has launched an EV-specific time-of-use rate pilot program called EV360. EV drivers can have unlimited off-peak charging at home and public charging stations for a flat rate of \$30 per month.<sup>43</sup> This not only gives drivers a consistent fuel charge for driving their EV, but also encourages off-peak charging to promote affordability and climate protection goals.
- **“EVs are for Everyone”** - is a new Austin Energy initiative to conduct electric vehicle outreach, program development and deployment with a focus on low to moderate income communities.

- **Two-Wheel E-Ride Rebates** – Austin Energy also offers rebates on electric bikes, scooters and motorcycles as an additional way to promote electric transportation. These rebates are available to individuals and to businesses and organizations offering these e-vehicles in fleets ranging in size from 5 to 25 vehicles.<sup>44</sup> The non-profit Bike Texas is Austin Energy’s lead community partner in this effort, and through Austin Energy’s rebate program, Bike Texas has secured 25 electric bikes that they use to provide public demonstrations to encourage adoption of e-bikes.<sup>45</sup>



- **EV-Share Pilots** – The Austin Transportation Department is also preparing to launch public/private initiatives for electric bikeshares, electric scooters, and electric pedicabs

- **Studying and Managing the Impact of EVs on the Grid**

In the long run, electric AVs will be a crucial technology for managing loads on power grids fueled by renewable energy sources. AVs will supply valuable data that will enable utilities to predict future demand for electricity as well as automatically schedule vehicle recharging and efficiently move vehicles around to spread the load more evenly.<sup>46</sup> Austin Energy is integrating electric vehicle charging into their demand-response programs and has successfully conducted a pilot to demonstrate that plug-in charging can be centrally managed, further improving grid reliability. Funded by the U.S. Department of Energy, Austin Energy’s ‘Austin SHINES’ project is using an open standards-based approach to integrating photovoltaic solar and storage into the grid.<sup>47</sup> The lessons learned from the SHINES project can be applied so that in the future EVs can more readily serve as a distributed energy resource asset to support grid reliability, reduce fuel cost and

maximize the reduction in CO<sub>2</sub> emissions by timing charging with the most efficient and clean generation of electricity. Austin Energy also launched a pilot time of use rate called EV360 to incentivize EV customers to charge off grid peak at home.

In the future, further study of this issue would be beneficial, along with additional pilots that will validate other evolving charging and storage opportunities. In particular, examination of impacts on distribution infrastructure, including upgrades to maintain reliability and expansion to accommodate increasing needs for facilities will be critical to understanding how best to roll out new programs.

## **MUNICIPAL FLEET ELECTRIFICATION**

In May 2016, Council passed a resolution directing the City Manager to develop an assessment to determine the benefits, timeline and feasibility of increasing electric vehicle adoption into the City's Fleet, and deliver recommendations for opportunities to the Council Mobility Committee by October 5, 2016.

In response, Fleet, Austin Energy and the Office of Sustainability, worked with RMI, Vulcan and the Electrification Coalition to research and analyze options, develop cost models and develop recommendations. To assess feasibility, staff examined the strengths, weaknesses, opportunities and threats that exist in the current automotive and equipment industry, as well as the resources required and prospects for success.

### **Based on this, the following recommendations were delivered in October 2016:**

- Add 330 plug-in electric vehicles to the City fleet by 2020,
- Expand City Fleet charging stations to support city fleet EV adoption,
- Fund electric vehicle acquisitions through municipal leases (lease-to-own), when feasible,
- Fund charging infrastructure through an interdepartmental fuel surcharge, and
- Total cost of ownership savings of \$3.5 million to the City of the 10 year life-cycle of the new EV fleet<sup>48</sup>

In August, Council approved the first installment of vehicles associated with this initiative. Fleet will be ordering 28 Chevy Bolts to be used by various departments. Council also authorized the purchase of an electric employee shuttle bus that should begin operations in the next few months.

As this roll-out of EVs into the City's fleet occurs, staff will be monitoring and analyzing areas of increased adoption based on cost savings and new technologies to include availability of electric trucks and SUVs.

Capital Metro is also working with the City of Austin's Fleet Operations and Austin Energy to deploy a fleet of electric vehicles for employee fleet use. Staff is coordinating opportunities for joint purchasing and procurement. Charging infrastructure is being installed at Capital Metro facilities in coordination with Austin Energy's EV infrastructure plan, for both fleet vehicles and personal EVs.

## **ELECTRIC VEHICLE (EV) CHALLENGE**

A regional group of stakeholders is developing a shared electric vehicle proposal, should the Central Texas region receive funds as part of the legal settlement that was approved as mitigation for Volkswagen's emissions-cheating scandal. As a result of the settlement, Texas is eligible for almost \$192 million, if the governor accepts the funds, and the Travis County-area could be eligible for some \$29 million, if funds are



dispersed geographically according to the number of vehicles that had been altered.<sup>49,50</sup> This “EV Challenge” group includes a number of City departments—the Intergovernmental Relations Office, Office of Sustainability, Austin Energy, Austin Transportation and Fleet Services—and Capital Metro. The group is advancing ways to work with other Texas cities to conduct a group/bulk-buy of electric vehicles to bring prices down and spur related economic development throughout the state.

## **TRANSIT SYSTEM ELECTRIFICATION**

Many transit systems around the country are moving swiftly to replace their gasoline or diesel powered fleets with electric buses. The Antelope Valley Transit Authority (AVTA), serving a 450,000 resident community in northern Los Angeles County, set a goal to convert all of its aging diesel buses to a 100 percent battery electric bus fleet, by purchasing up to 85 new all-electric buses in three years to be “100% Green by 2018.”<sup>51</sup> This spring Seattle’s King County Metro Transit announced plans to acquire 120 all-electric battery buses by 2020, creating the largest all-electric transit fleet in the nation.<sup>52</sup>

Research has shown that the total lifecycle cost of an electric bus is commensurate with the total lifecycle cost of a diesel bus, with operating cost savings from electric power offsetting the higher capital outlay to purchase the vehicle and associated charging equipment.<sup>53</sup> New York City Transit conducted an analysis that compared its current fleet of buses to electric buses. The study found that the cost savings associated with fuel and bus maintenance more than offset the higher cost of electric buses including the cost of charging infrastructure over the lifetime of a bus.<sup>54</sup> Electric buses cost approximately \$300,000 more than diesel buses. Annual savings are estimated at \$39,000 per year over the 12-year lifetime of the bus, totaling a \$468,000 in savings per bus, over the lifetime of the bus.<sup>55</sup>

These savings exclude the health care cost benefits associated with reduced levels of air pollution. Switching to electric buses eliminates the air pollution caused by diesel bus fuel combustion. The resulting health benefit to the population of the city from the reduction of respiratory and other diseases is estimated at \$150,000 per bus based on EPA data.<sup>56</sup> When health benefits and financial benefits are combined, total savings exceeds \$600,000, based on these estimates.

Capital Metro is planning and preparing to integrate electric buses into its fleet, concurrent with the implementation of the Connections 2025 Plan and the next procurement cycle for new buses in FY 2021. In support of that deployment, the following activity is underway:

- Coordination between finance, planning and operations departments to identify an appropriate funding mechanism to fund the increased capital cost of an electric bus program using a total cost of ownership model,
- Reviewing available grant funding opportunities for potential revenue to support the electrification of the fleet, and
- Installing basic infrastructure for electric buses at the North Operations and Maintenance facility. By early 2019 the bus yard at that facility will be “electric bus ready” and include parking configurations and electric service necessary to support the implementation of electric buses

## **ELECTRIC BATTERIES, PUBLIC AND PRIVATE CHARGING STATIONS**

In order to support the increasing electric vehicle market and reduce range anxiety, more public and private electric charging stations should be supported. These technologies will also benefit autonomous personal and commercial vehicles, including a rise in land delivery bots and a projected surge in electric bikes, or e-bikes.

New EV fueling stations will also likely need to be co-located with other modes of mobility such as public transit stations, car-sharing services, bike-sharing services and ride-hailing pick-up and drop-off points or parking spaces. What these new mobility hubs of the future look like will be important from an urban design standpoint.

Battery technology and charging infrastructure is simultaneously experiencing rapid advances that may change what infrastructure is needed where. For example, roadway electrification is being tested in several European countries and could impact the way vehicles are recharged.

## Recommendations for Electric Vehicles and Infrastructure in Austin

TIME PERIOD	ACTIONS	POLICIES	PILOTS AND PROGRAMS
1. On-going	Engage citizens, businesses and visitors to understand how this technology can meet their needs and help the City address community issues	Coordinate outreach/education program with other public and private organizations	Start dialogue with communities to be impacted by pilots; Extend communication across city
2. On-going	Launch electric technology demonstrations; (See the Shared Mobility Recommendations section)		
3. 0-2 years	Adopt a buy “Electric First” or “Zero Emission” policy for all City vehicles (and consider lease instead of buy); Unless business case or technology limitations preclude early adoption	Establish “buy electric first” policy for all city vehicles; Encourage City to accelerate vehicle conversion or vehicle count elimination (above current 330 vehicles by 2020) through lease or purchase by 2020; Develop reasonable exceptions policies which recognize the longer timeframe required for certain heavy-duty work vehicles and trucks	Review costs of leases v. purchase; Expand EV charging stations at COA, Capital Metro other properties
4. 0-2 years	Deploy shared electric mobility and charging infrastructure to include low-income neighborhoods	Continue Austin Energy rebate incentives to support e-bike fleets; Allocate funds to support pilot programs and marketing	Austin Energy EV deploy car share pilot program with charging infrastructure (fleet of EVs provided by a third party vendor); Identify low-income neighborhoods; Pilot E-bike stations
5. 0-2 years	Increase public awareness of electric vehicle benefits	Increased budget for outreach/marketing, as needed; Direct staff to assist creation of E-AV demonstration	Create an Autonomous and/or electric vehicle showcase at a major Austin-based event
6. 2-4 years	Deploy ‘smart’ public, private, and fleet charging infrastructure	Direct use of integrated communications and controls to proactively manage charging stations to include station reliability and enable consumer mobile apps to remotely locate and check availability of station access	Expand interactive map or application that shows the location of chargers and, current use status
7. 2-4 years	Expand rapid charging station network on-street (at curb/parking spaces); Examine free parking options for EVs	Assess feasibility and costs of expanding right of way for public charging infrastructure; Provide designated parking spaces for chargers; Consider reduced parking fees for EVs; Explore utility pole charging stations	Develop deployment plan with Austin Energy; Review/revise any related parking code necessary to implement
8. 2-4 years	Create Electric vehicle-for-hire priority access incentives for ABIA	Create permit system to allow priority access to ABIA for electric vehicles for hire	Electric chargers placed at ABIA; Create priority access pick-up and drop off locations. Partner with ABIA and AE

TIME PERIOD	ACTIONS	POLICIES	PILOTS AND PROGRAMS	
9.	2-4 years	Conduct vehicle managed charge and grid integration pilots	Conduct additional distributed energy resource studies in integrating electric vehicle charging into demand-response programs; Allocate funds for such studies	Leverage Austin SHINES project to access viability of EVs as a Distributed Energy Resource (DER) asset to support grid reliability, reduce fuel cost, and CO <sub>2</sub> emissions

\*\*A set of performance metrics will be developed for each implemented action to assess the benefits and impacts of the given action.