

# Electric Vehicles (EV) & Resource Planning

# Adopted Austin Energy Resource, Generation and Climate Protection Plan to 2025

Includes the following complementary strategy:

- Expand efforts to increase electric vehicle utilization and,
- facilitate integration of electric vehicles in the utility service area and,
- Utilize these vehicles as a valid distributed storage technology.



## *Austin Energy Resource, Generation and Climate Protection Plan to 2025: An Update of the 2020 Plan*

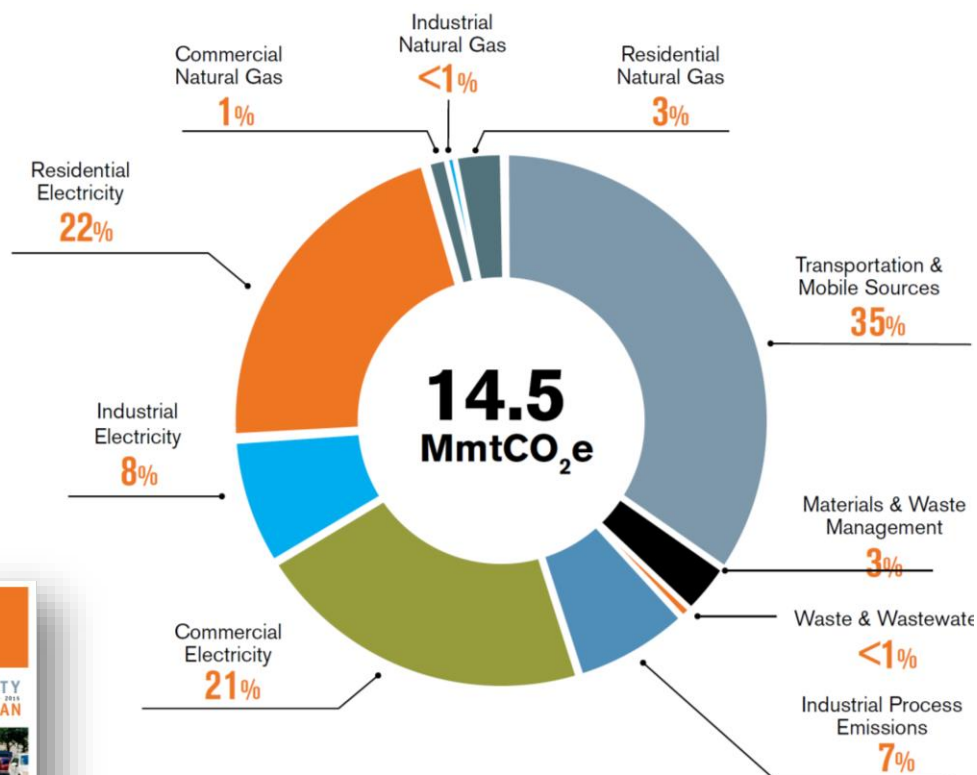
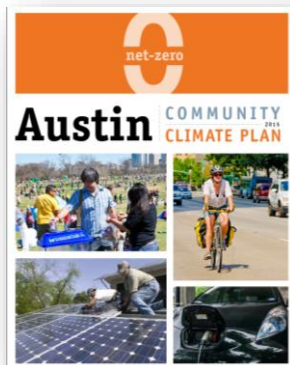
### **INTRODUCTION**

The Austin City Council adopted the Austin Climate Protection Plan (ACPP) in 2007 to build a more sustainable community. Every City department was subsequently tasked to create action plans intended to ensure that departmental operations were consistent with the ACPP. Austin Energy developed a Resource, Generation and Climate Protection Plan to 2020 to meet these objectives, which was approved by City Council in 2010 and further refined in 2011 by Council by adding affordability metrics. As part of that plan, Austin Energy committed to update it every two years.

In April of 2014, City Council passed Resolution No. 20140410-024 (2014 ACPP) that recognized the need to further accelerate the reduction of greenhouse gas emissions beyond the 2007 ACPP standards and set a goal of reaching net zero community-wide greenhouse gas emissions by 2050 preferring to achieve this goal sooner if feasible. Moreover, in April of 2014, the City Council appointed the 2014

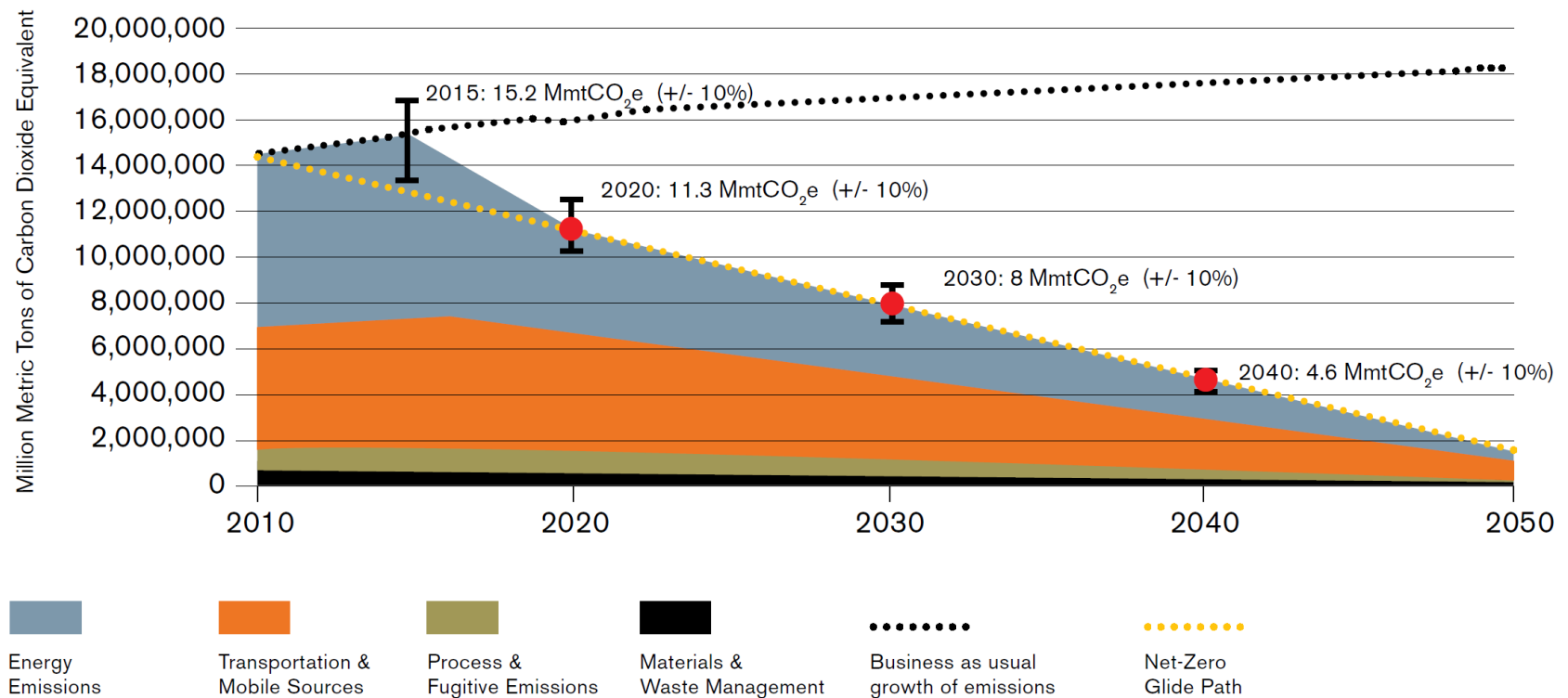
# Austin Community Climate Protection Plan

- Greenhouse gas emissions from transportation are relevant and significant
- Most emissions are from personal vehicles



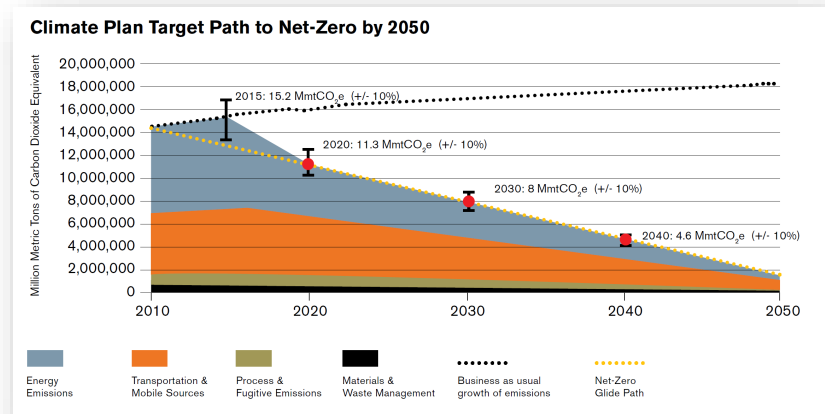
# Austin Community Climate Protection Plan

## Climate Plan Target Path to Net-Zero by 2050



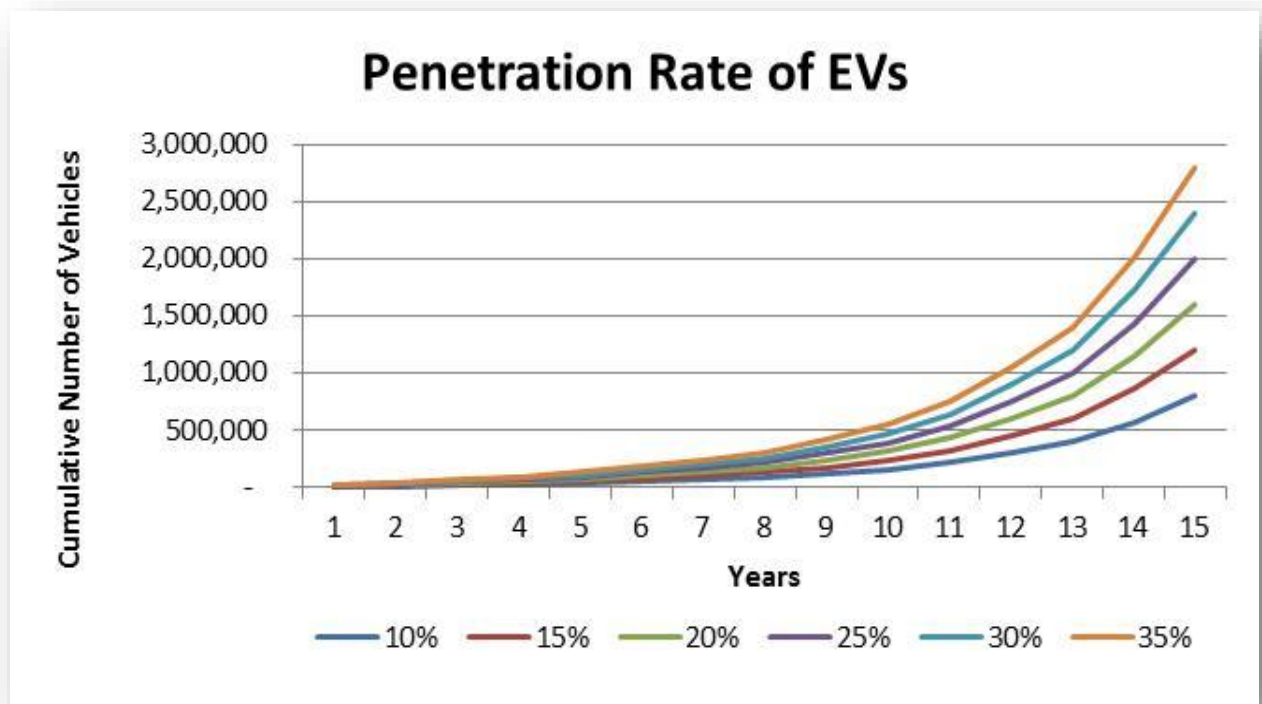
# Austin Community Climate Protection Plan

- 1,000,000 registered vehicles in Travis County
- Greenhouse gas emission reduction target of 25% each 10 years
- What is necessary to meet this goal?
  - 250,000 EVs by 2020
  - 500,000 EVs by 2030
  - ...



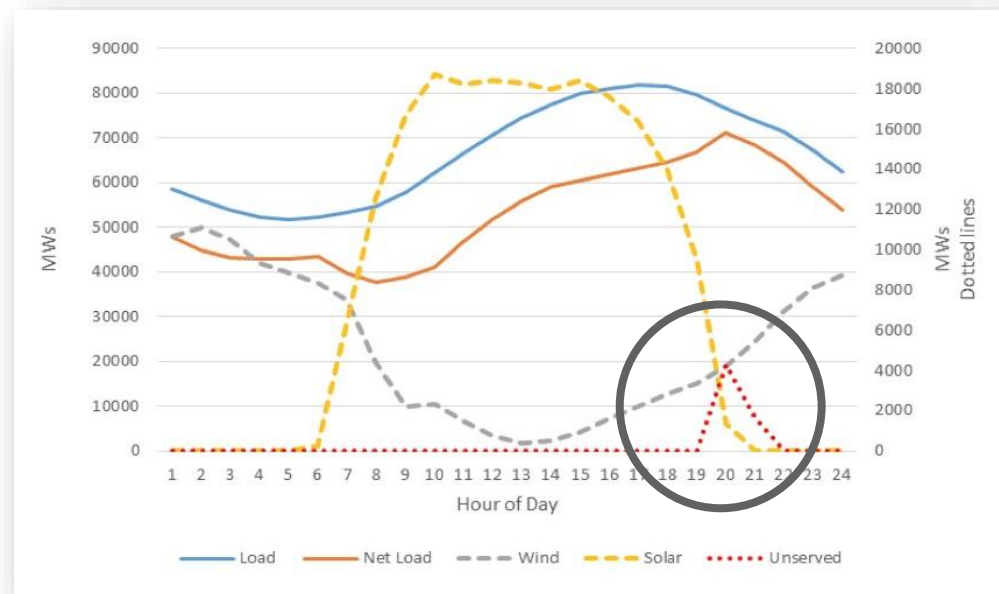
# ERCOT LTSA Projections

1,000,000 to  
3,000,000 EVs  
in Texas by 2030  
Which equates  
to 70,000 –  
210,000 EVs in  
the Austin



# ERCOT could use EV as a Resource

- ERCOT Long Term System Assessment Report: wind and solar can meet demand most hours of the day
- Problematic hours are between 7pm and 11pm when solar ramps down and wind does not ramp up enough
- DR in combination with EV's can easily fill this gap
- Something similar needed for Austin Energy to meet NET-ZERO by 2030 goal set by City Council



# Proposed recommendation

The Joint Sustainability Committee moves that

The Electric Utility Commission Resource Planning Working Group adopt a goal of 100,000 Electric Vehicles in Travis County by 2025 and 50% of all vehicles by 2030, and that,

the City Manager be directed to issue an RFP to develop a plan by the second quarter of 2017 to achieve the 2025 goal.



# EVs as a Resource

# Recommendation to the EUC Working Group

*With the need for a significant contribution of EVs to meet the goals laid down in the Austin Community Climate Plan, and*

*With the unique opportunity of having a municipal utility*

Start a planning/implementation process to define the :

- value for Austin Energy rate payers
- role that EVs can play in Resource Planning for 100,000 and 250,000 EV market
- impact on infrastructure and capital program (expenditure and savings)
- roadmap to leverage this opportunity

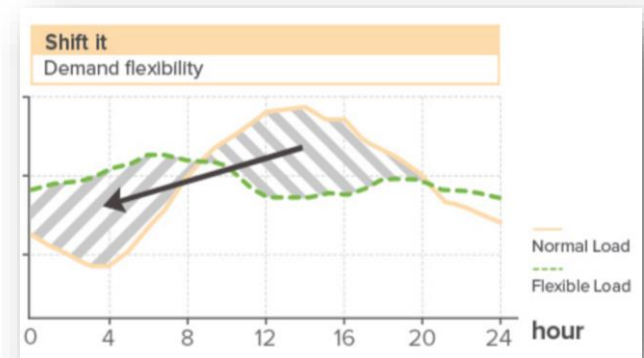
# Austin Energy agrees that a comprehensive study is required

*Austin Energy Sathibabu Chakka | Manager, Energy Market Analysis stated, when asked about the impact on resource planning whether Austin Energy is working on a scenario that would include 250,000*

“... we are also interested in the application of EV; however, we believe this is a topic that is more apt for the next update of the resource plan, which is slated for 2018. We believe that **to perform a comprehensive study of EV requires, 6 - 12 months of detail modeling and understanding of EV...**”.

# EVs as a Resource

- Allows for higher integration of renewables (low price charging; resolve intermittence)
- Higher capacity factors for non-renewable resources (see graph)
- Low risk resource (small unit size, not fuel-based, short lifespan)
- Always latest technology (short lifespan compared to other resources)
- Carbon-free resource (impossible to meet ACCP goals without EVs)
- Drought resistant (no water footprint)



# Business case for EVs

## With current technology (now)

- Value of additional kWh sales (30% of current sales)
- Value of 2<sup>nd</sup> use of car batteries for grid services (80% of capacity retained, ...)
- Value of smart charging using TOU rates (low ERCOT prices, ...)

# Business case for EVs

## **With almost available technology (short term)**

Demand Response controlled by Austin Energy like with the NEST thermostat

- Value of Smart Charging combined with Dynamic Pricing (low ERCOT prices, not adding to peak demand)

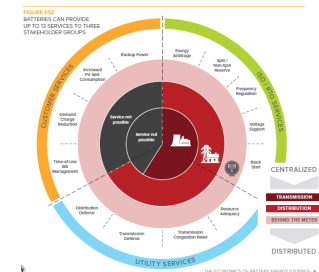
Austin Energy rebate program for chargers already includes a stipulation that Austin Energy is allowed to make chargers Wi-Fi enabled.

# Business case for EVs

## With V2G technology (mid term)

- Value of smart discharge (fast response, non-fuel based, scaleable)
- Value of scaling down grid improvements (capital program savings)
- Value of spinning reserve (EV-car lots)
- Etc.

There are over 15 value elements to storage which benefit either the grid operator, the utility or the customer



# V2G pilots

- There are several pilots for V2G through the US military and in Europe (UK, NL, D, DK)
- Players are Nissan, NRG, ENEL, Nuvve
- Takao Asami, Nissan senior vice president, said. “Before we had the concern about the degradation of the battery — that’s why we had to limit the amount of energy we could pull out of the vehicle,” he told GTM. “But year by year, this durability is being improved.”





# Business case for EVs

## **New Business Model (now)**

- Value of car purchase/loan/leasing (commission)

Similar to PEC solar loans for up to \$20,000 with 10-year terms. Customers can finance grid-tied distributed energy resource (DER) systems, including distributed solar and grid-tied battery storage installed by one of the ten participating local vendors. PEC members can repay the loan through monthly installments thanks to on-bill financing.

**1,000,000** registered vehicles in Travis County; **300,000** change hands every year; **100,000-130,000** new cars sold each year

Average lifespan of a car in the US is **11 years**

ERCOT expects **between 1-3 million EVs** by 2030; Austin represents **7%** of TX market; equal share would be **70-210,000 EVs** by 2030

Financing **100,000 EVs**, using muni bonds has a value of \$500-\$1000 per car per lease or **\$50-\$100 Million**

When all cars in Travis County are electric this will **add sales of 4 TWh** worth over **\$400 million**

Current Austin Energy sales **12 TWh**

Fuel savings for 100,000 EVs **\$80 million**

**100,000 EVs**, using 40% of battery capacity delivers **1600 MW Peak Capacity** for an hour

Austin Energy Peak Demand **2700 MW**

Reuse of the same batteries using 70% of battery capacity delivers **2100 MW Peak Capacity** for an hour

Value of arbitration **\$60 million**

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**\$500**/ly/EV

**\$1,250**/lifetime/EV

**\$500**/ly/EV

**\$5,000**/lifetime/EV

**\$800**/ly/EV

**\$8,000**/lifetime/EV

100,000 EVs, using 40% of battery capacity delivers **1600 MW** Capacity for an hour

Austin Energy Peak Demand **16,000 MW**

Same batteries battery capacity **16,000 MW** Peak Capacity for an hour

Value of arbitration **\$60 million**

**\$500**/ly/EV

**\$5,000**/lifetime/EV

# Ambition – is this happening?

- Countries sales and targets
  - 35% of all cars sold in Norway are EV today
  - All cars EV by 2030 in Norway
  - All cars EV by 2035 in The Netherlands (1 charging station per 4 PHEV/EV)
- City EV targets
  - Portland targets 50,000 EVs by 2030
- Car manufactures
  - For Motor Company: Investments line-up to over 50% EV sales by 2030
  - Daimler CEO Dieter Zetsche expects electric vehicles will make up 15-25 percent of Mercedes sales by 2025
  - Volkswagen: EVs account for almost 25% of sales by 2025
  - Volvo plans to go all-electric, sets a goal to make 1 million electric cars by 2025

# Recommendation to the EUC Working Group

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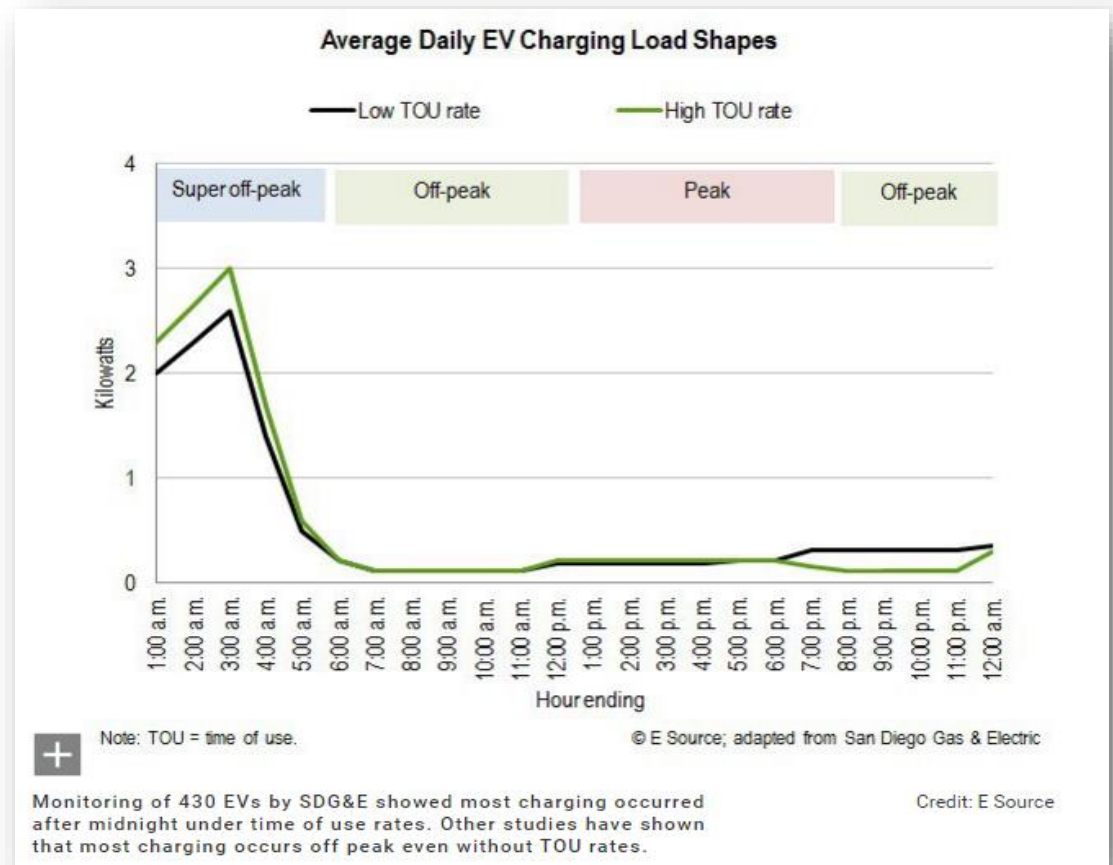
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Back-up

# Time of Use Rates

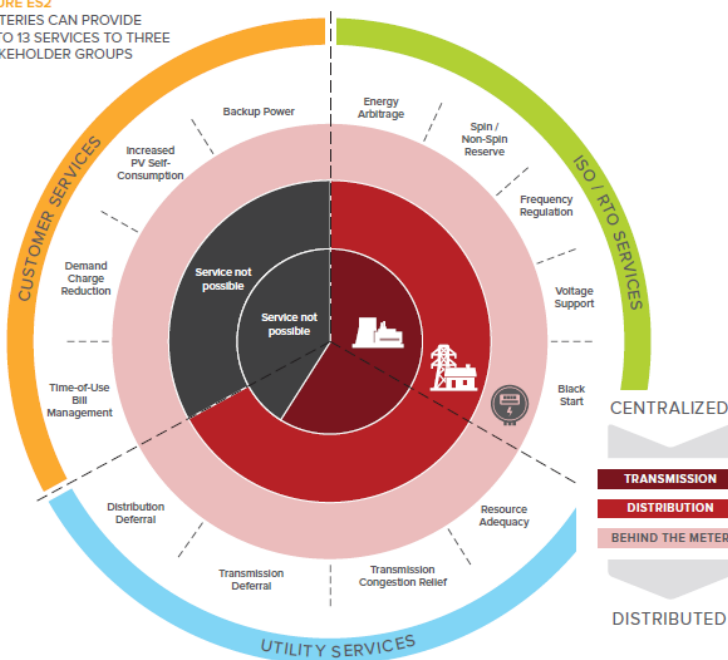
- Most charging happens at night
- Small percentage of charging happens during the early evening hours
- Time of use rates reduce charging when the utility does not want it, and increases charging when it encourages charging



# Value of Storage: 15 components

FIGURE ES2

BATTERIES CAN PROVIDE UP TO 13 SERVICES TO THREE STAKEHOLDER GROUPS



THE ECONOMICS OF BATTERY ENERGY STORAGE | 6

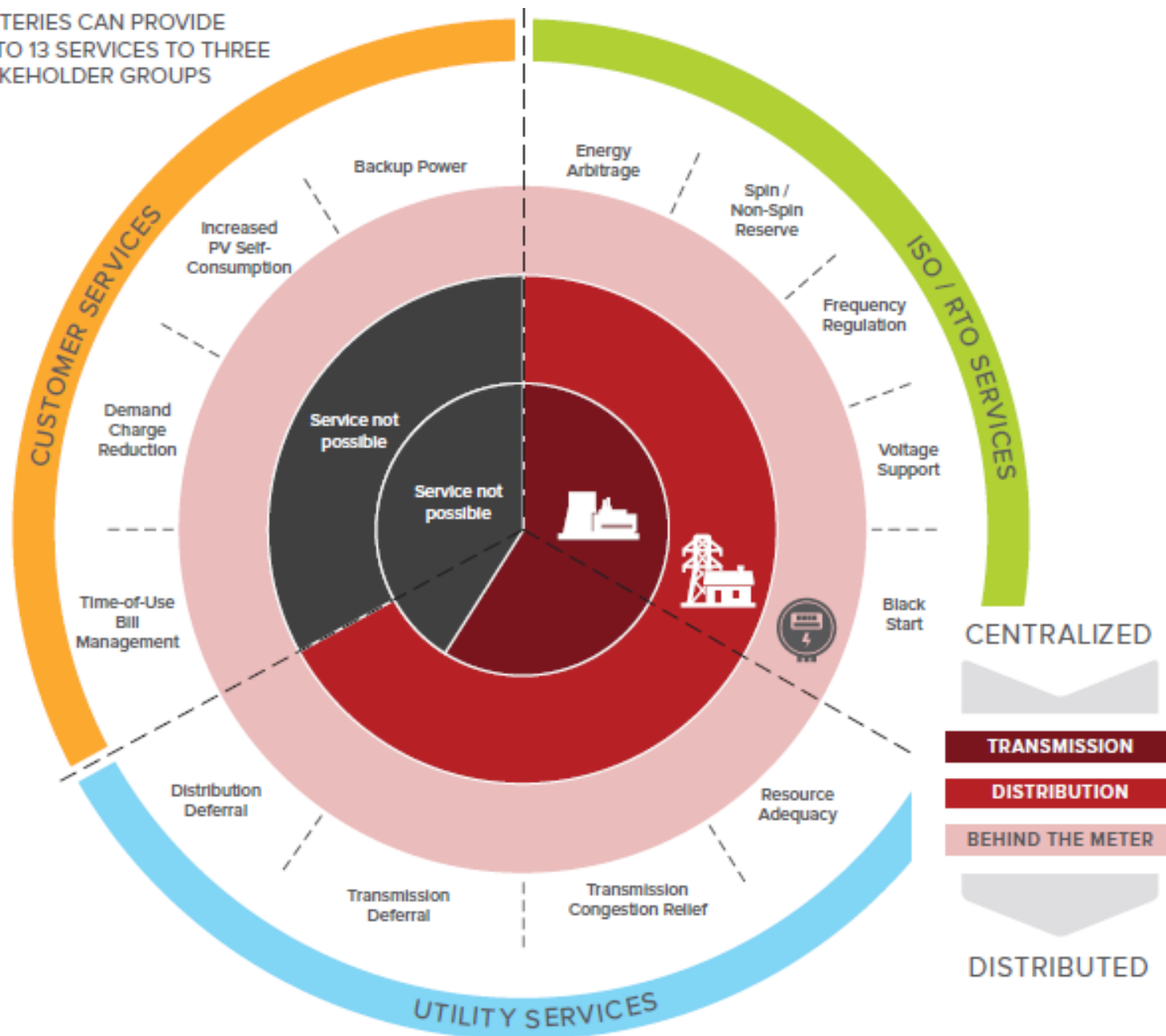
From RMI, 2105 THE ECONOMICS OF BATTERY ENERGY STORAGE; HOW MULTI-USE, CUSTOMER-SITED BATTERIES DELIVER THE MOST SERVICES AND VALUE TO CUSTOMERS AND THE GRID

Used by PG&E: Electricity Business Models of the Future 2016 Austin Electricity Conference Dan Halperin Director, Distributed Generation April 21, 2016

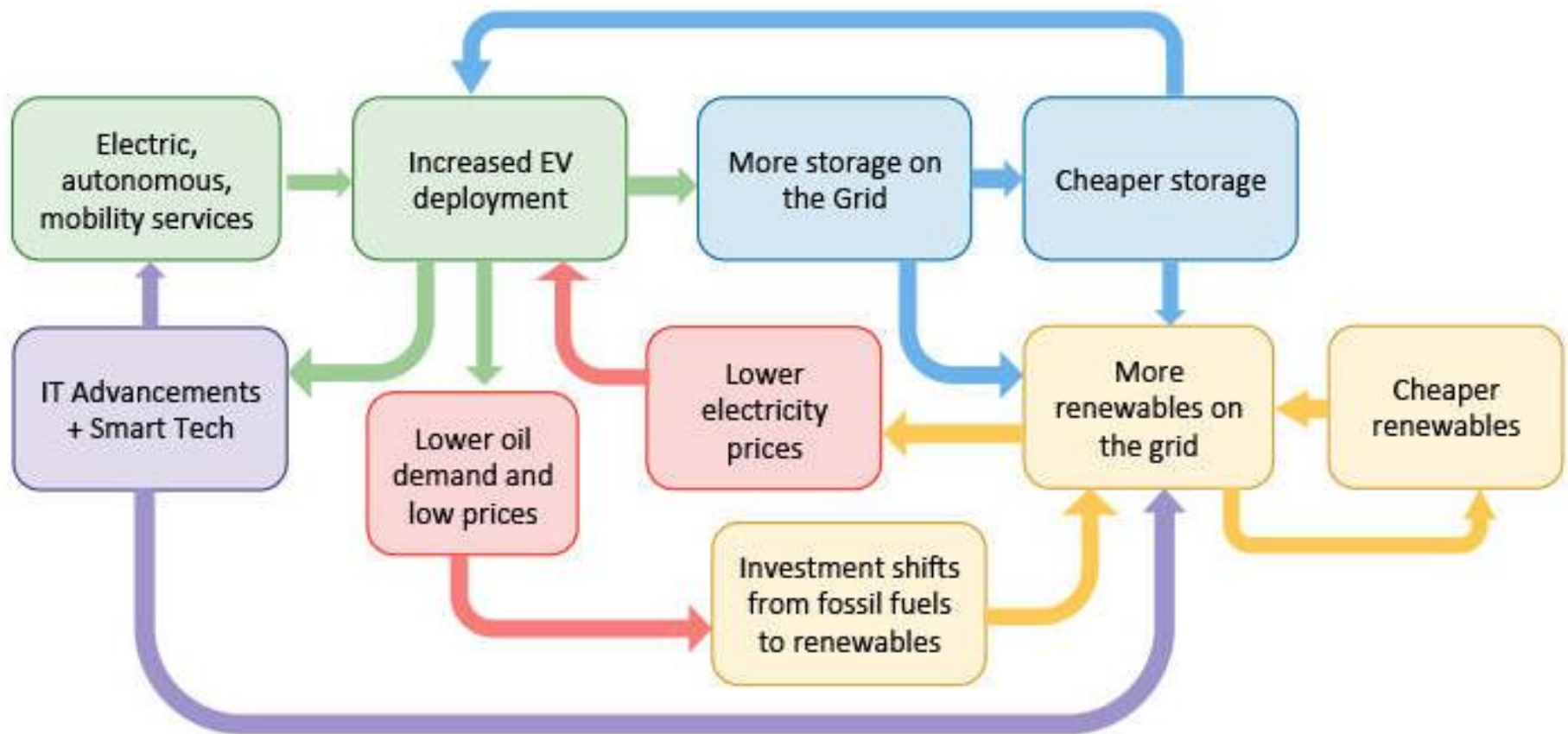
Austin Energy has not studied all 15 components, also not in combination with large penetration of Evs. Austin Energy does not incentivize home storage for any of the four components under customer service. The Austin Shines project covers some of these components.



BATTERIES CAN PROVIDE  
UP TO 13 SERVICES TO THREE  
STAKEHOLDER GROUPS



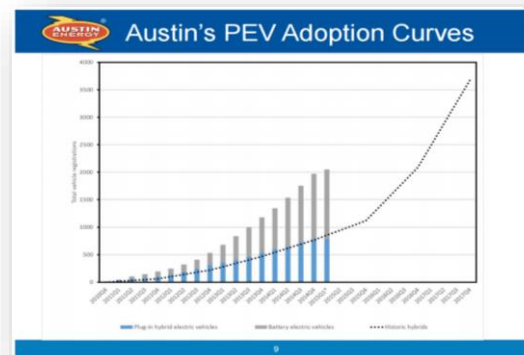
# Inevitability



# Three phases of EV Utility Policies

1. Removing barriers
2. Charging infrastructure and Equity
3. Capture Value of Grid Services and Integrating Renewable Energy

Where is Austin Energy



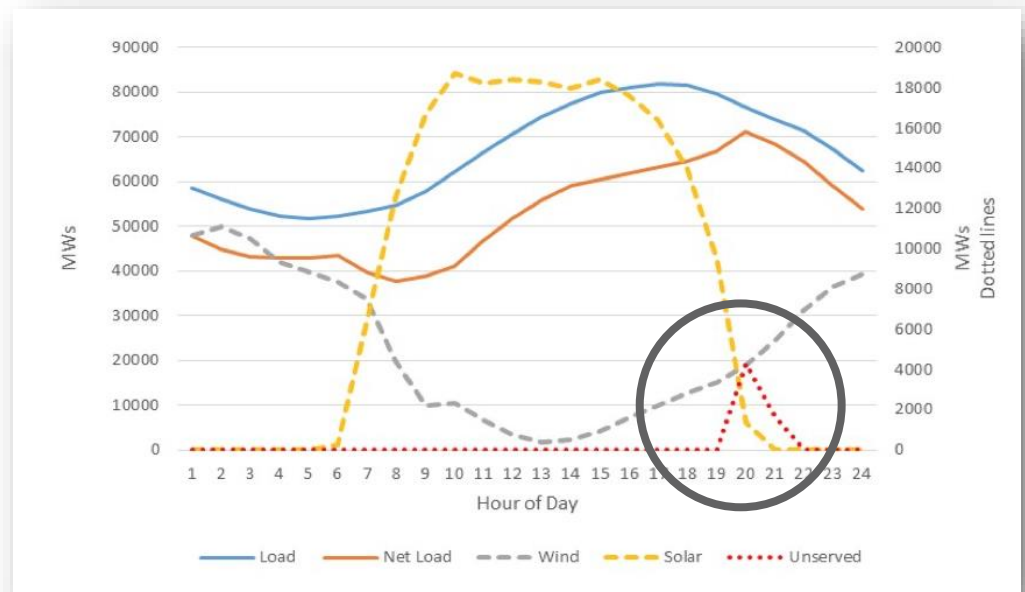
THE THREE PHASES OF UTILITY POLICY TO ACCELERATE THE ELECTRIC VEHICLE MARKET	
<b>1. Removing Barriers to Adoption, Ensuring Grid Reliability, and Maximizing Fuel Cost Savings</b>	
Clarify that electric vehicle charging companies will not be regulated as utilities	
Inform distribution system planning	
Provide consistent and fair treatment of electric vehicle load	
Adopt appropriate rates to maximize fuel savings and manage charging	
Target customer education and outreach programs	
<b>2. Closing the Charging Infrastructure Gap and Promoting Equity</b>	
Utility-facilitated deployment of charging infrastructure	
Increase access to electricity as transportation fuel in disadvantaged communities	
Promote broader awareness through mass-market education and outreach	
<b>3. Capturing the Value of Grid Services and Integrating Renewable Energy</b>	
Implement traditional demand response programs for electric vehicle customers	
Implement advanced demand response programs for electric vehicle customers	
Integrate V2G and battery second life programs into wholesale and retail markets	



# EV as a Resource

DR in combination with EV's can fill this gap

- Austin Energy peak demand:
  - ~2700 MW
- EVs capacity:
  - 100,000 = 1600 MW
  - 250,000 = 4000 MW



# Potential new revenue

ERCOT market value historically (not having to pay for this amount of power on peak)

	10,000 cars value (million dollars)	dollars per car per year	100,000 cars value (million dollars)	dollars per car per year	250,000 cars value (million dollars)	dollars per car per year
2011	12	1,205	121	1,212	260	1,038
2012	5	459	45	454	103	413
2013	5	522	51	512	122	487
2014	5	545	52	521	128	512
2015	4	441	43	432	103	412