DERs and the Grid

UT Energy Week

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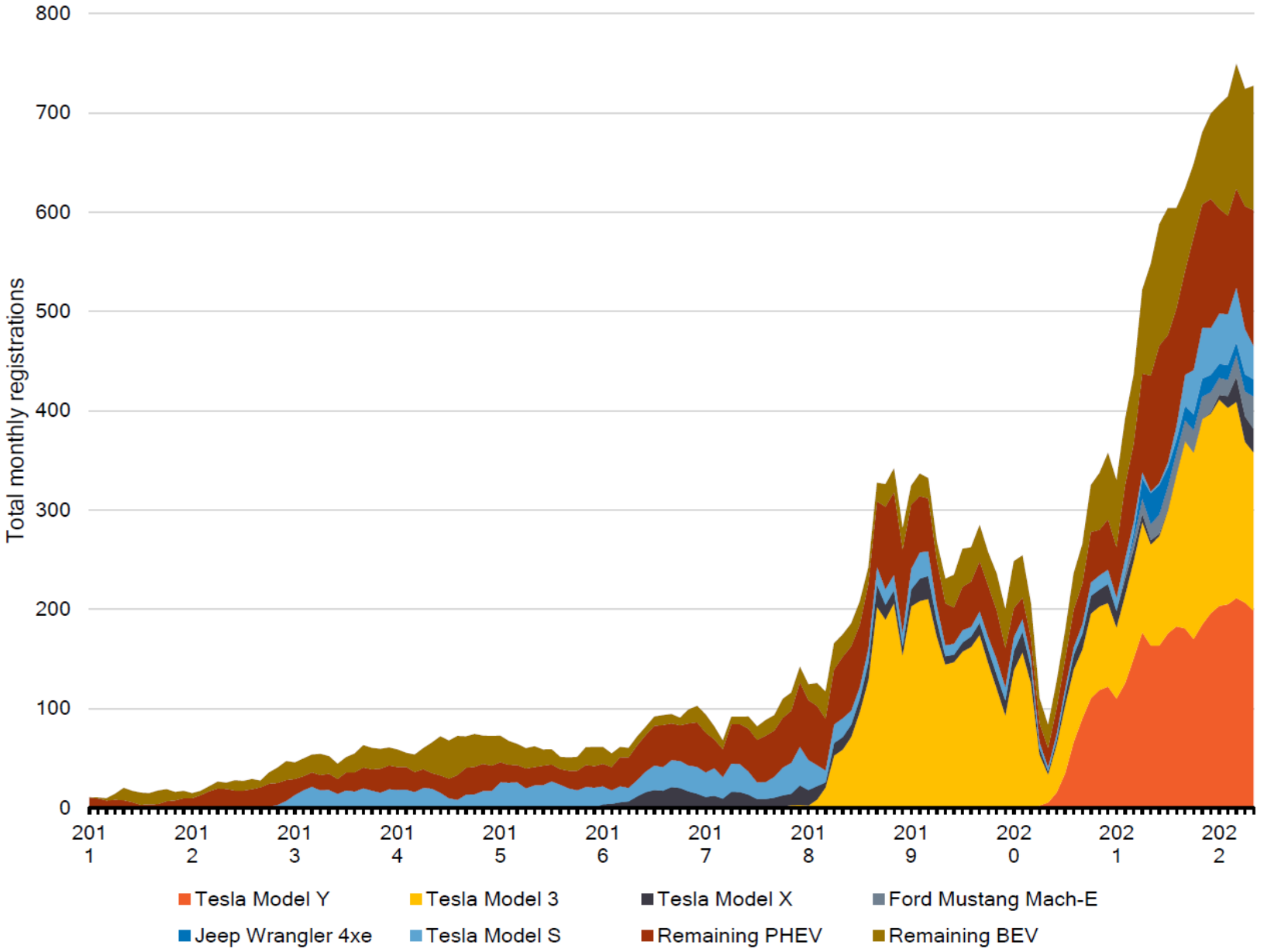
EV Adoption Rates

Auto manufacturers are set to introduce almost 100 new EV models by 2024

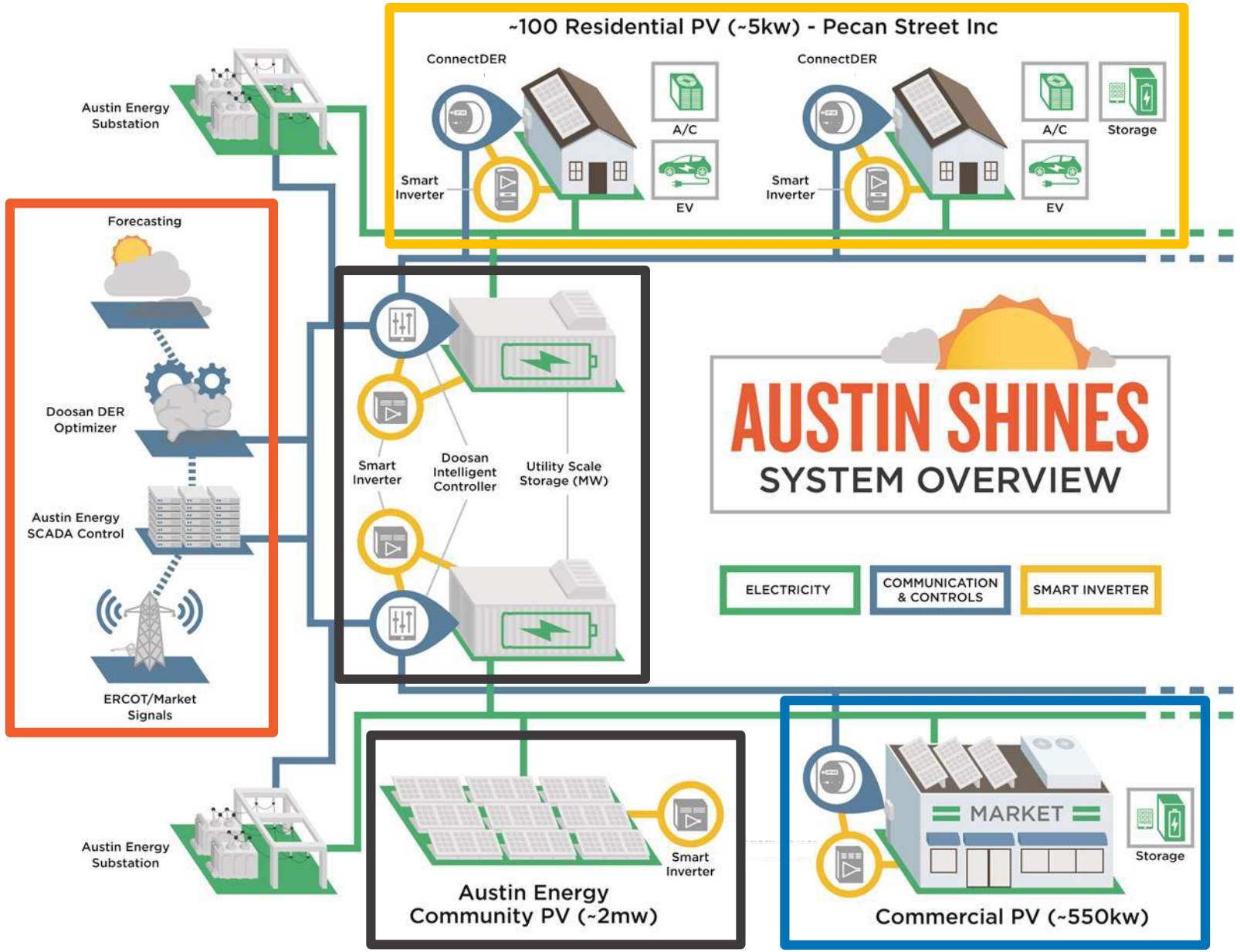
~ Consumer Reports



Austin SHINES

SHINES:

Sustainable and
Holistic
INtegration of
Energy storage and
Solar PV



Utility Scale Energy Storage + PV

Commercial Energy Storage + PV

Residential Energy Storage + PV

DER Management Platform

Potential Impacts of DER

Unintentional Islanding

Utility crews or the public may encounter unintentionally energized equipment

Voltage Regulation & Equipment Loading

Variable DERs cause voltage fluctuations and can exceed applicable limits

DER can mask loads, and the loss of either can lead to imbalance

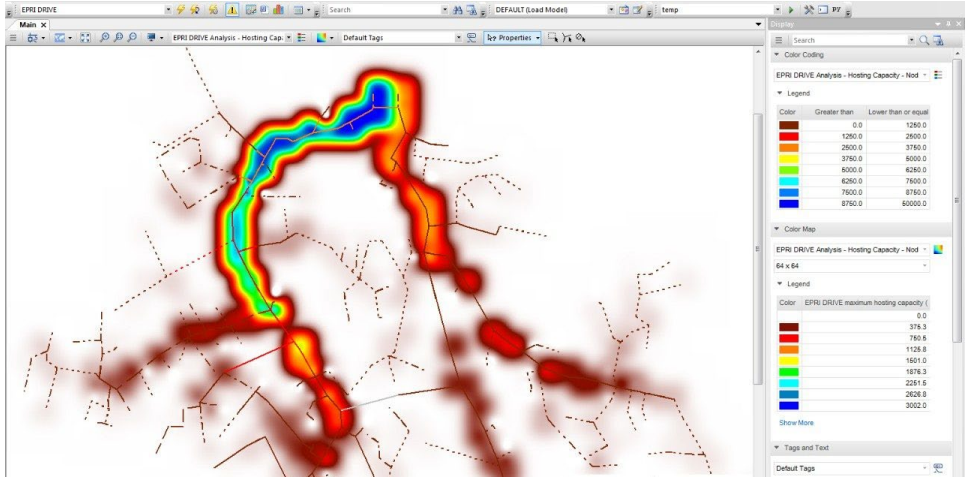
Protection & Power Quality

Protection elements often not intended for bi-directional flow

Power electronics in inverters can cause harmonics

DER Penetration Levels

%Minimum Load	<5%	5 to 30%	>30% to 100+%
DER Penetration Scenarios	Low-numbers and relative capacity	Moderate-level, less stiff grid connection	High-level, grid depends on DER
DER Integration Objectives	To be compatible and non-interfering	To manage local distribution impacts	To engage with grid operations/support
Main Concerns for interconnection and integration of DER	Voltage and current trip limits Fault response	Regulation Recovery Times Islanding Coordination	Dispatching Regulation Ramping Response Ride-thru



Excerpted from ***Finding a Bright Spot: Utility Experience, Challenges, and Opportunities in Photovoltaic Power,*** IEEE Power and Energy Magazine, May/June 2009

and

EPRI Technical Update ***Storage and Distributed Generation Engineering Guide***, February 2022

DER Feasibility & Impact Studies

Common Study Areas

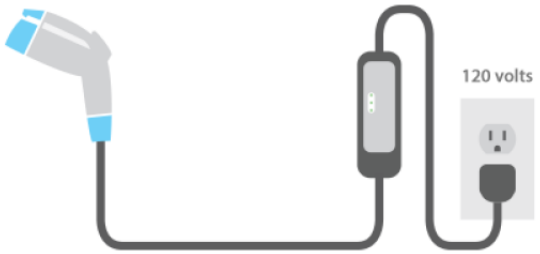
- Load Flow
  - Steady State Voltage
  - Voltage Imbalance
  - Tap Changer Transitions
- System Protection
  - Short Circuit Current
  - Coordination
  - Interrupt Rating
- Power Quality
  - Voltage Fluctuations
  - Flicker
  - Harmonics

System Improvement Triggers

- Voltage Change (Dip/Rise)
- Voltage Drop
- Tap Changer Transitions
- Reverse Transformer Flow
- Overloaded Lines
- Transformer Power Factor

Exponential Impacts of Fast Charging

Level 1 Charging



1 kW

8-12 hours

Level 2 Charging

6 kW

2-4 hours

DC Fast Charging

50-125 kW

150-300 kW

5-20 minutes

DEPLOYMENT COST

LEVEL 1:
$100 per plug/port
and in many cases
already available

LEVEL 2:
$1,800 per port (home)
$4,500 per port (public)

DC Fast:
$150,000 per port

Thank you!

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