EV Evolution

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Signature Transformative Innovation Initiatives

Decarbonization Options

Connected Communities

Advanced Nuclear Solutions

Electric Vehicle Evolution

Storage Integration

Regional Grid Transformation

6 Initiatives
Electric Vehicles...
calm waters?
or a tidal wave?
EV Manufacturing in the Tennessee Valley

- **Ford**: 2024 Next-gen EV pickup, Stanton, TN, $5.6B
- **Nissan**: 2013 Leaf, Smyrna, TN, $2B
- **VW**: 2022 ID.4, Chattanooga, TN, $1B
- **GM**: 2022 Cadillac Lyriq, Spring Hill, TN, $4.2B

Total EV manufacturing investments: $12B+
Powerful Forces are Driving EV Adoption
Policy, technology, and compelling EV options are driving consumer adoption

Policy, Legislation, Regulation
- IIJA: $17.5B for EVs
- IRA: EV tax credit reform
- US: 2030 goal 50% EV sales
- CA: 2035 ban on ICE cars

Technology “Tipping Points”
- 300k+ mile batteries
- Long range, fast charging
- Vehicle autonomy
- V2H, V2G

Compelling Vehicles

Consumer Adoption
EVs are *accelerating* in the Tennessee Valley

Today:
- 31,000+ EVs on the road
- 50% YoY growth
- LPCs installing new DC Fast chargers
EV Metrics

**EV Population**
- **31.0k** EVs in TN Valley (Q2 2022)
- **50%+** YoY Growth

**TVA Vehicle Fleet**
- **79** Number of Plug-in Electric Vehicles
- **6.5%** to fleet goal of 1200 EVs by 2030
- **--** Electric miles driven (starting in Aug.)
- **150** Charging plugs installed at TVA facilities
- **53 BEVs**

**Fast Charge Network**
- **4 / 8** Sites operational / dispensers installed
- **16.0%** Corridors covered (DCFC every 50 mi)

**Partner Engagement**
- **30** Fast Charge Network Contracts Signed
- **48** LPCs requested or implemented EV rate
- **4.8B** Potential EV media impressions (FY thru Aug.)

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Updated: 09/20/2022
**Addressing Four Market Barriers to EV Adoption**

- **Charging Infrastructure Availability**
  - Remove “range anxiety”
  - Foundational EV charging network
  - Partner with Local Power Companies (LPCs)

- **EV Availability and Offerings**
  - Partner with automakers and fleets
  - Support making a wide range of EVs available

- **Innovative and Supportive Policies**
  - Remove utility policy or pricing barriers
  - Craft policies and pricing that encourage investment and enable a market

- **Consumer Awareness**
  - Help consumers make sound choices
  - Educate, inform, and promote while lifting TVA and LPC brands

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**Removing market barriers in key areas**

TVA is working with stakeholders to realize these initiatives throughout the Valley
Fast Charge Network – Program Overview

TVA and state agency partners are working with Local Power Companies (LPCs) to install, own and operate fast charging stations along interstates and major highway corridors at least every 50 miles.

Eliminate Range Anxiety
- Network of fast charging stations across the TVA region
- Ensure drivers can charge at least every 50 miles

LPCs Will Install, Own and Operate
- LPCs will secure the charging station site, design and install the station and operate and maintain equipment
- TVA will provide technical specifications and site development guidelines

TVA and Partners Provide 80% Funding
- Programs provide 80% reimbursement (up to $150,000 per charger) of eligible costs
- LPCs will provide at least 20% share of the total project cost
New! Fast Charger in Martin, TN

WCMES installed two fast chargers through TVA’s Fast Charge Network program

- Aug. 31st ribbon-cutting
- Coincided with TVA Board meeting
- 100+ attendees
- First site in TN, many more to come!

EV Fast Charger Location Installed At Martin, Tn.
Tuesday, August 30, 2022

Andrea Harrington, WCMES general manager, plugs in the charging unit for the first charge

The Weakley County (Tn.) Municipal Electric System announced on Tuesday that it is the first local power company in Tennessee to install a fast charger location (109 University Street, Martin, Tn.) as part of Fast Charge TN, a partnership between the Tennessee Valley Authority (TVA) and the Tennessee Department of Environment and Conservation (TDEC), and Seven States Power Corporation.

Chattanoogan.com
Research Focus Areas: EV Evolution

**Fleet Electrification**
Fleets represent 5% of vehicles, yet 25% of fuel consumption. Already deployed in last mile vans, buses.

**Managed Charging / V2G**
Managed charging to shift load. V2H, V2G demonstrations to understand potential benefits.

**Innovation Ecosystem**
Supporting LPC, state, regional partners to make TN Valley the EV epicenter for the US.

**EV Adoption Forecasting**
Monitor EV adoption and share load forecast with Enterprise Planning.
EV (Hurricane) Forecasting

- Challenge: quantify a range of possible outcomes with rapidly changing conditions
- More clarity near term, less in the long term
- Multiple, disparate computer-modeled scenarios are combined to find alignment
- Greater alignment = more certainty
- “Hurricane hunters” continuously gather data: New data, new models
Long Term Scenario Comparison

Approximate 9M – 10M vehicles in the Valley

“Medium” scenario chosen for Enterprise Forecast

TVA Restricted Information - Deliberative and Pre-Decisional Privileged
Managed charging starts with understanding organic behavior

Previous EV Charging Program Provided Key Insights

SmartCharge Nashville, provided valuable insights but was interrupted by COVID-19

EV adoption has increased, driving patterns have changed, there are a variety of new models, and more rural communities are home to EVs

Additional Valley-wide research needed to understand the impact of EV charging on load and load shape

Examples from SmartCharge Nashville
Where we’re going: V2X

Ford
- V2H demonstration with TVA-owned Lightnings
- Potential for large-scale V2G demonstration under development

Electric School Buses: Community DER?
- Bi-directional charging summer peak: New DR opportunity
  - One district, 25 buses = 1 MW for 2 hours
- Valley-wide potential for up to 500 MW / 1 GWh
- Disaster response: potential as “mobile microgrids”
Electric Fleets are coming

First movers (now):
• Last mile delivery
• Electric school buses

Coming soon:
• Semi tractors
• MW+ charging hubs

Nikola Tre BEV Class 8 tractor for sale in Smyrna, TN (750 kWh battery)

Nashville: New Amazon delivery vans from Rivian

Jerry Roddy, MBA • 2nd
Area Operations Manager II at Amazon

Our new additions to the Amazon Delivery family are getting ready to head out into Nashville from DTN8!!! Amazon has made a Climate Pledge to be Net-Zero Carbon by 2040 and in partnership with Rivian, 100,000 Rivian Delivery vans will be added to the fleet.

#amazon #rivian
Fleet Example: Electric School Buses
With $5B from IIJA, EPA will replace diesel school buses with clean and electric buses over 5 years

### Year 1 Applications

- **60+** TN Valley school districts applied (est.)
- **200+** electric school buses in applications (est.)
- **44%** of TN’s prioritized districts (high need, rural) applied for electric school bus funding
- **14** prioritized school districts attended TVA Office Hours over the summer

- **TN districts submitted $50M in applications for EPA funding**

### Next Steps

- Establish cohort group (schools + LPCs)
- Resume “office hours” for assistance
- Identify demonstration opportunities

**Tennessee’s first electric school bus at Washington County Schools, Johnson City, TN**
Appendix
Medium forecast is slightly higher than previous EV adoption forecast.

TVA’s goal is 200k EVs by 2028 (~0.5% of TVA’s load).

Medium Scenario projects 252k and High Scenario projects 471k in 2028.
Siting a Fast Charge Station

Charging sites should follow Site Selection Guidelines provided by the program to ensure a positive consumer experience given the anticipated 20 to 30 minutes for EV charging (put your communities “best foot forward”)

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<th>Amenities</th>
<th>Distance from Highway</th>
<th>Weather Protection</th>
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<td>24 / 7*</td>
<td>Restaurants</td>
<td>&lt;1 mile preferred</td>
<td>Sheltered from elements desirable</td>
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<td>Publicly accessible*</td>
<td>Shops</td>
<td>5 miles max*</td>
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<tr>
<td>No charge for entry*</td>
<td>Restrooms</td>
<td>50 miles or less between stations</td>
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<td>Power Supply</td>
<td>Safety</td>
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<td>Future upgradability</td>
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<td>Populated areas</td>
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* Denotes Program Requirements