Electrifying Transportation in Virginia

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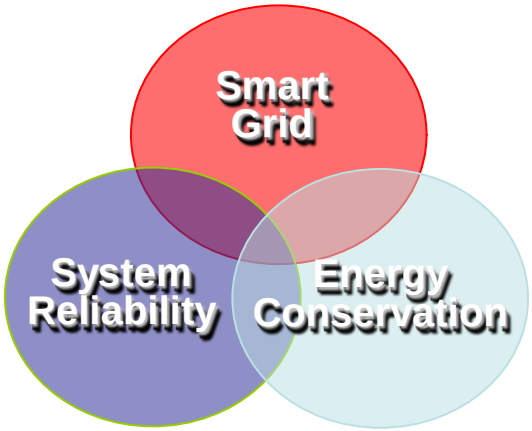
Alternative Energy Solutions at Dominion



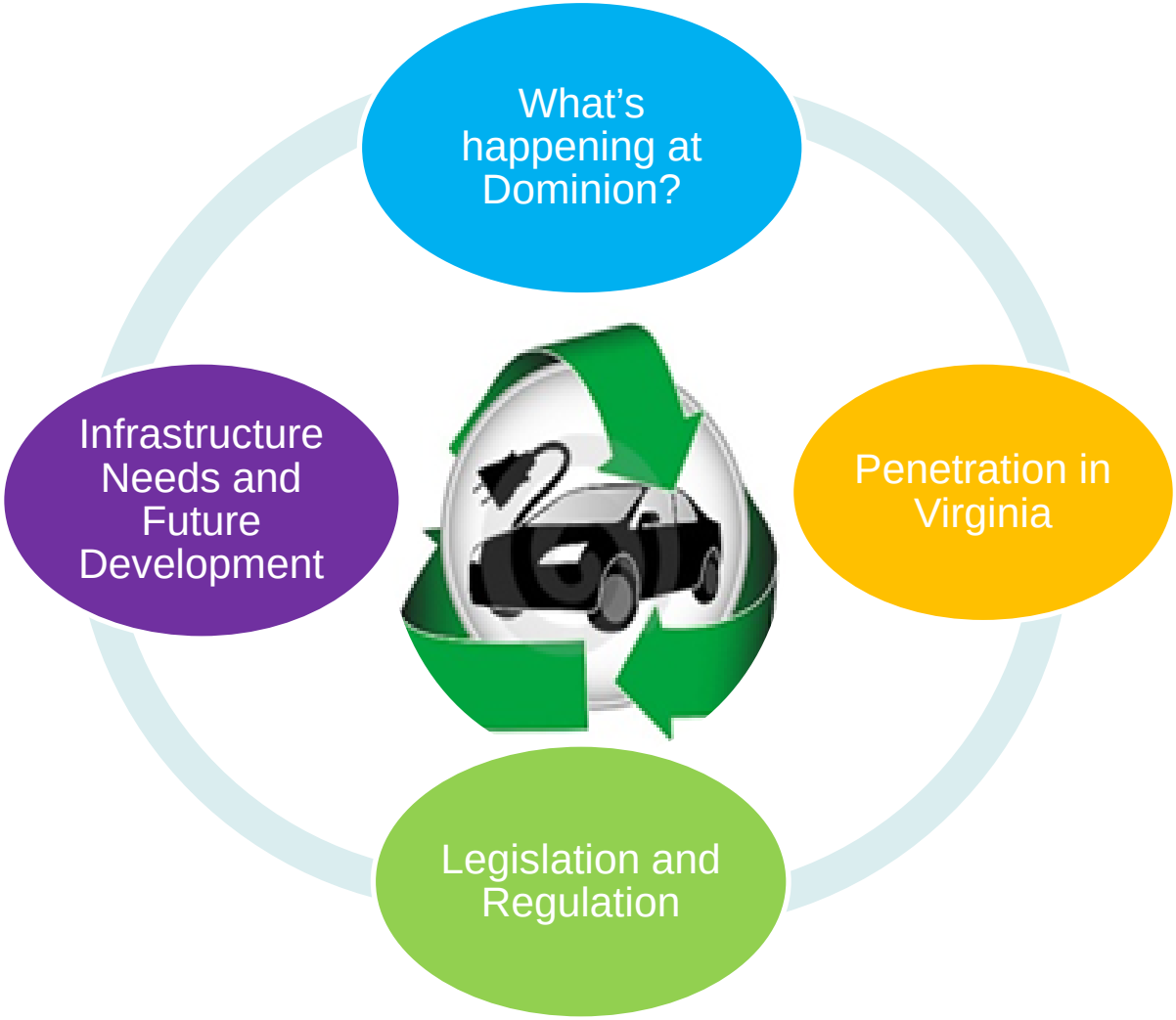
Transmission and Distribution Technologies

- Smart Grid
  - Demand Side Management
- Distributed Generation
  - Solar
  - Wind
- Electric Vehicles

Renewables

- Fuel Cells
- Tidal
- Storage
- Solar
- Offshore Wind

Electric Vehicles in Dominion's Service Territory



What's Happening at Dominion? Projects and Partnerships

- Current company owned EVs
  - 3 converted Toyota Prius sedans
  - 4 bucket trucks (EPRI Eaton Study)
- Dominion will lease three Chevy Volts for research and interoperability assessment
  - Track usage of PHEVs to validate loading model
- DVP has installed public charging units at New Kent County West Bound 64 Rest Area
- EPRI Study Completed on Glebe Road - Circuit 328
  - Determine whether T&D capacity will be sufficient to supply the increased demand of PHEV charging
- Participated in *Virginia Project Get Ready* Initiative to educate the public about vehicle electrification and make recommendations for Virginia
- Participating in *EEI Transportation Electrification Task Force*

Ford Drive one.

STIR
Sustainable Transportation Initiative of Richmond

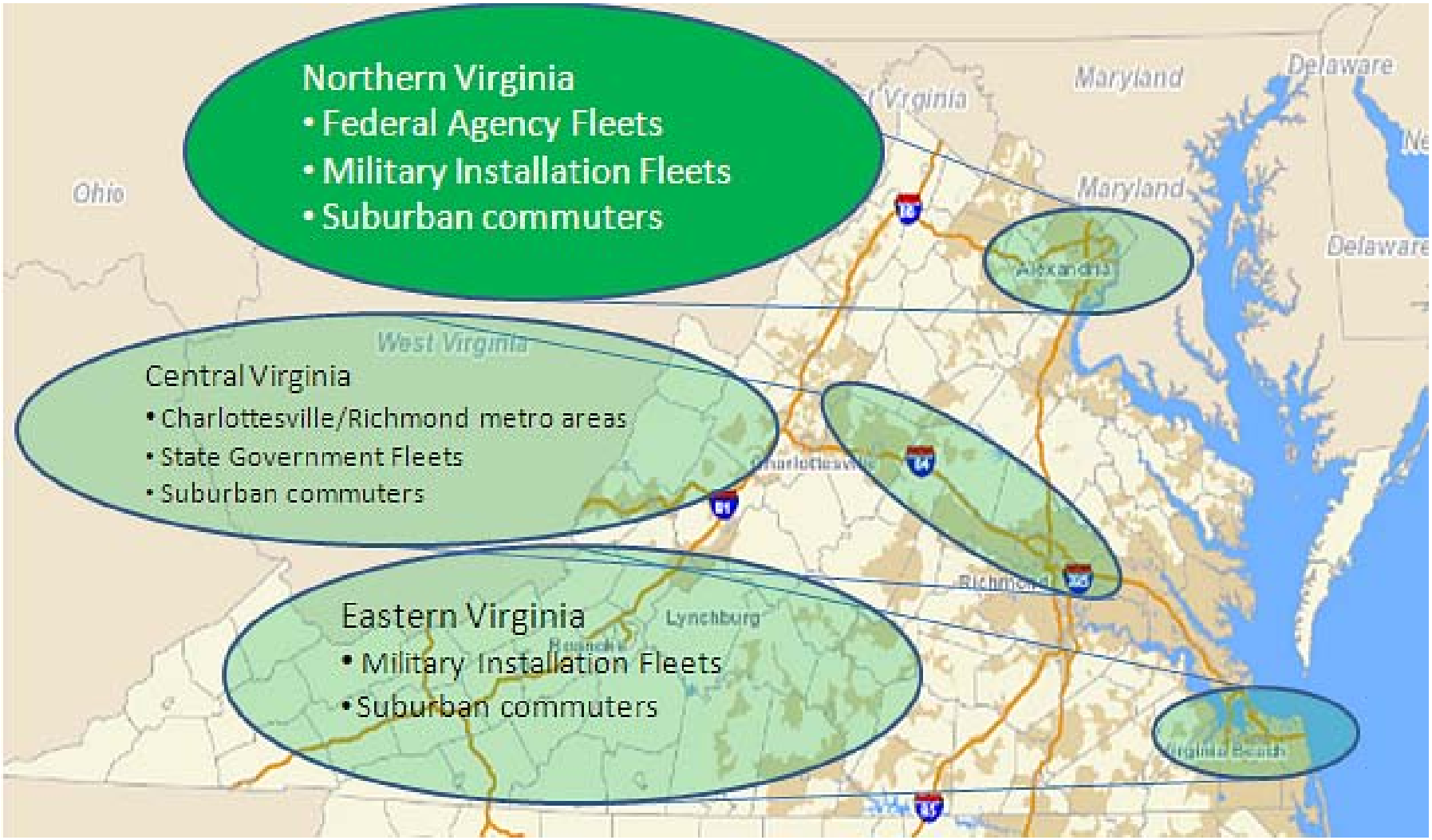
Virginia Get Ready
Initial Electric Vehicle Plan

EPRI ELECTRIC POWER RESEARCH INSTITUTE

What's Happening at Dominion? Proposed EV Pilot Program

- Pilot program offering time-of-use pricing options
- DVP hopes to learn about EV penetration, customer's charging patterns, and impacts on the grid
- Supports customers' adoption of EVs while attempting to minimize grid modifications by encouraging off-peak charging
  - EV-only rate: 35 cents/night for 40-mile commute
  - Whole-house rate: 33-41 cents/night for 40-mile commute
  - Compares to 86 cents/night using standard residential rate
  - Up to 750 participants in each rate option

Penetration in Virginia
Where are the early adopters?



Electric Vehicles
Legislation and Regulation

Virginia

- **Regulation of EV Charging Services and Authorization of Pilot Programs (HB2105)**
  - Excludes EV charging service providers from state regulation prohibiting resale of electricity and from utility regulation provided that (1) the electricity is used solely for transportation and (2) the electricity is procured from the public utility serving the territory.
  - Deems provision of EV charging service to be a permitted utility activity
  - Authorizes EV off-peak charging pilot programs and annual EV pilot cost recovery
- **Extension of sunset on use of HOV lanes by clean special fuel vehicles to July 2012 (HB1432)**

Federal Government

- **$7,500 tax credit for qualified plug-in electric motor vehicles**
- **30% tax credit for charging infrastructure (≤ $30,000 for businesses/ ≤ $1,000 for residences)**
- **Proposed "Charging America Forward Act" –** (S.298 Stabenow-D-MI) – would change EV tax credit to instant rebate, would increase limitation number of vehicles eligible for tax credit, and would extend and increase charging infrastructure tax credit

Electric Vehicles Infrastructure Needs

- Inventory of Existing Public EVSE Locations
- Accurate database for New EVSE Installations
  - Electric Permitting/Inspection likely to catch most new stand-alone locations
  - Residential installations should not be made public, but utilities should have access to certain information for reliability reasons
- Pre-wiring and Pre-installation of conduit for new construction

Source: installgroup

Electric Vehicles Infrastructure Needs

- Federal, state, and local government new construction may want to consider pre-installation of conduit and/or pre-wiring

Which is more cost effective for future EVSE installation?

Source: Bridgeport Bright Futures

Source: Washington State DOT

By a landslide…

Electric Vehicles Infrastructure Needs

- How do individuals that live in areas that are congested, high traffic, or offer no-off street parking charge their EVs?
- It is technically feasible to install EVSE pedestals/bollards in many of these areas, but usually is expensive
- Need to utilize existing infrastructure in a way that reduces the need for new construction and/or trenching
- One possible idea is to mount EVSE on streetlight poles

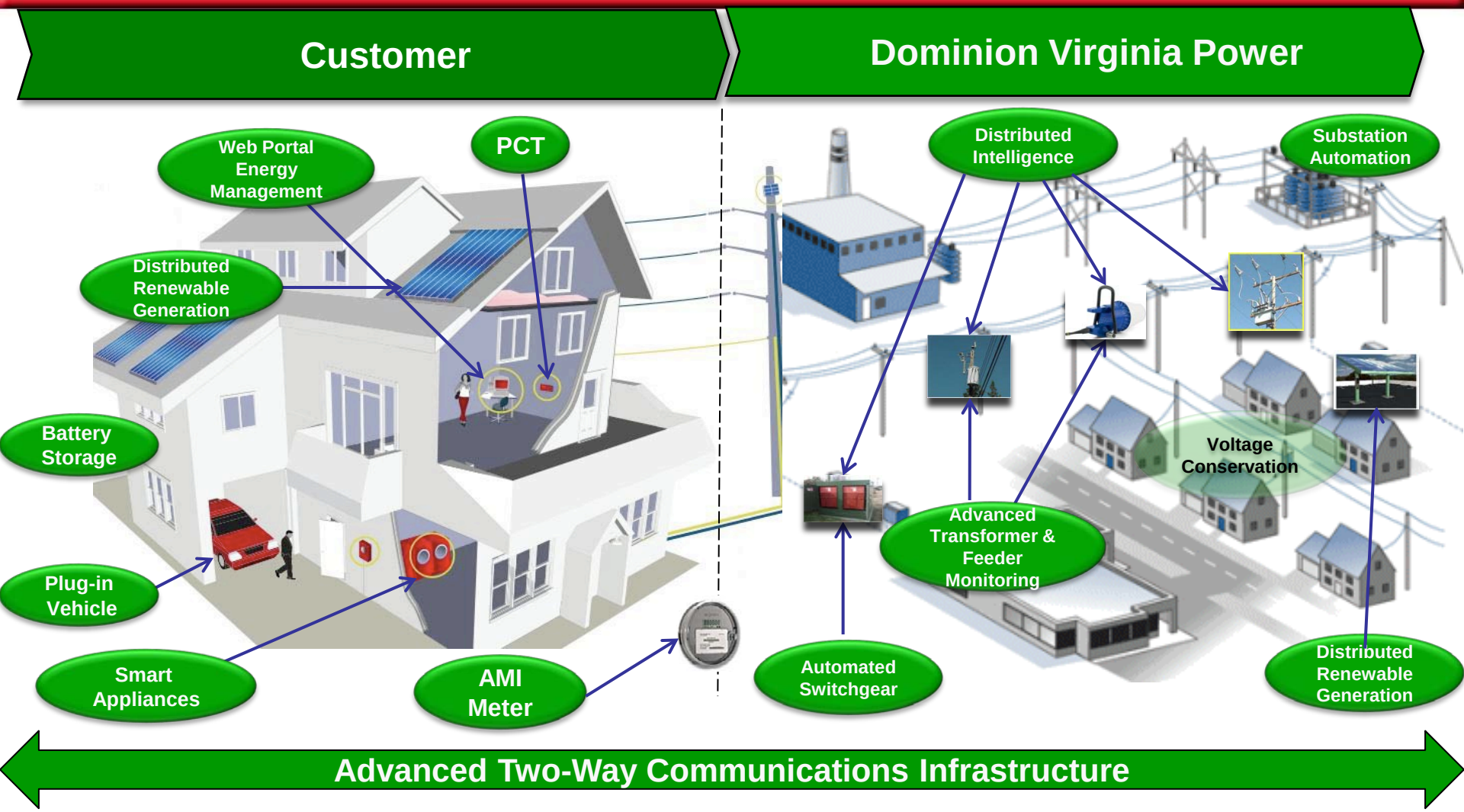
Source: Coulomb Technologies

The Future of EVs: V2G, GIV, and the "Smart Garage"

- Grid Integrated Vehicle Concept
  - Grid managers control vehicle's storage capabilities (enabled by two-way power flow from vehicle-to-grid connection)
- Potential Benefits
  - EV's provide ancillary services and receive compensation
  - Storage of power for later dispatch (peak shifting)
- Risks and Barriers
  - Security Issues
  - Regulatory and Market Complexity
  - Uncertain Consumer Adoption
  - Current battery costs too high
  - Limitations in battery technology and storage capability
  - Enhancements needed to vehicles and EVSE
  - Limited Smart Grid Infrastructure

"Despite their promise…V2G applications are still many years away from practical application…", *Electrification Roadmap*, Electrification Coalition, November 2009. *http://electrificationcoalition.org/*

The Future: The Smart Grid and Tomorrow's AMI-Enabled Home



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