



Sustainable TRANSPORTATION

U.S. DEPARTMENT OF
ENERGY | Energy Efficiency &
Renewable Energy

EV Everywhere Grand Challenge

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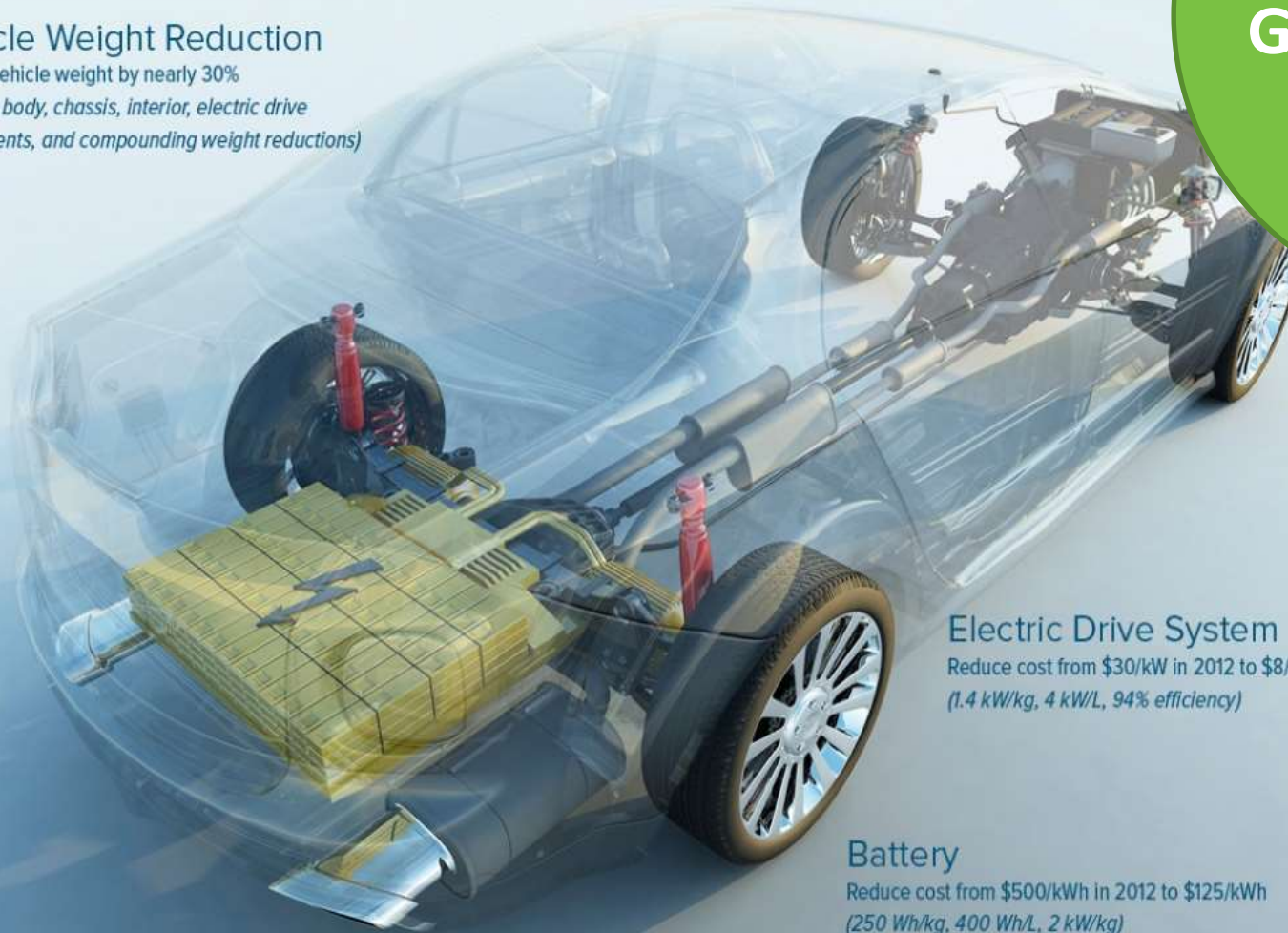
DOE Office of Energy Efficiency and Renewable Energy

February 11, 2016

EV Everywhere Grand Challenge

Vehicle Weight Reduction

Reduce vehicle weight by nearly 30%
(Includes body, chassis, interior, electric drive components, and compounding weight reductions)



Electric Drive System

Reduce cost from \$30/kW in 2012 to \$8/kW
(1.4 kW/kg, 4 kW/L, 94% efficiency)

Battery

Reduce cost from \$500/kWh in 2012 to \$125/kWh
(250 Wh/kg, 400 Wh/L, 2 kW/kg)

Stakeholder Summit

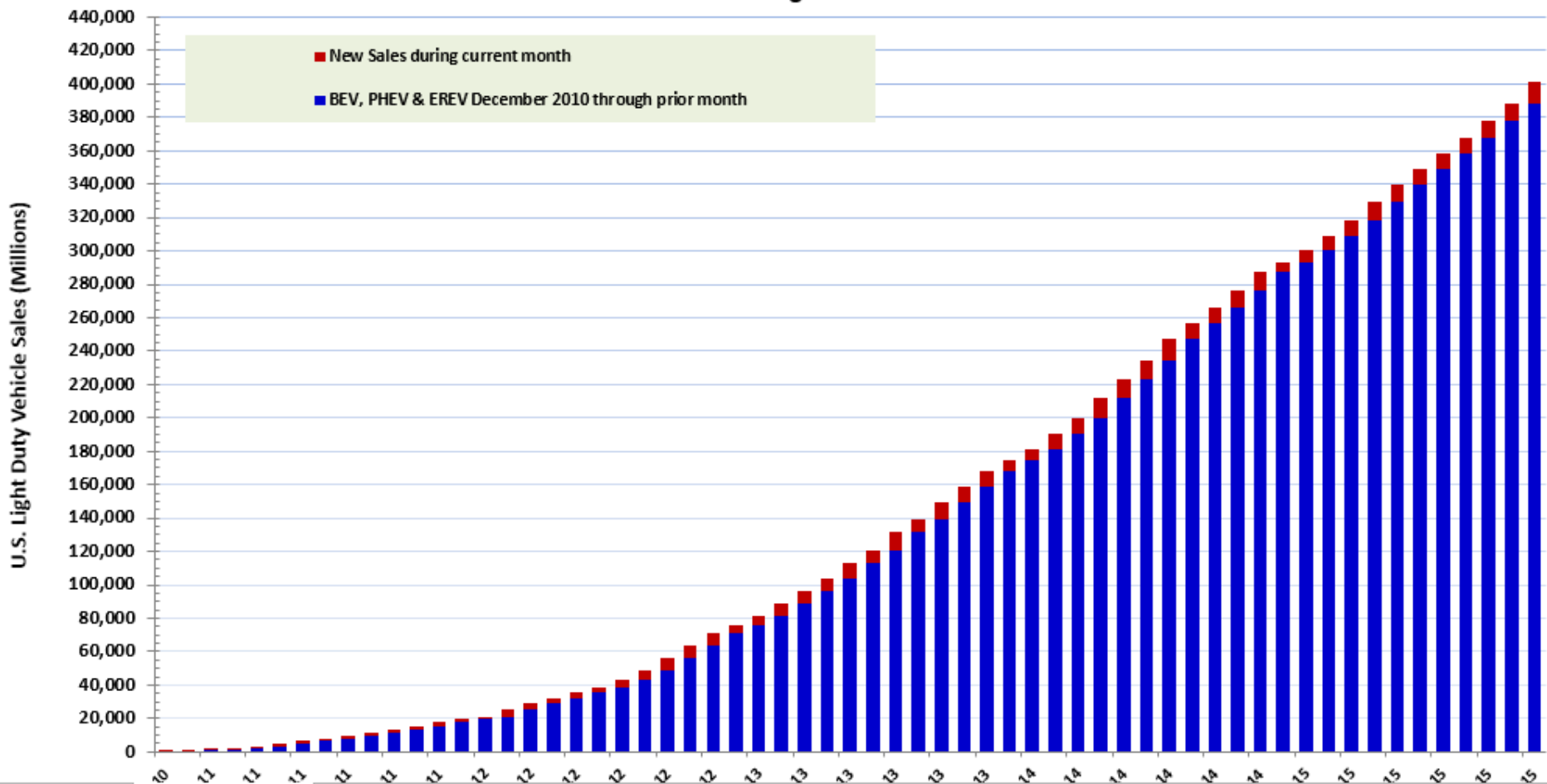
- December 1, 2015
- Ameren Corporation, St. Louis, MO
- 100+ stakeholders from EV industry



Marty Lyons, Executive VP and CFO of Ameren Corporation, welcomes everyone to the Stakeholder Summit. Photo courtesy of Ameren.

Plug-in Electric Vehicle Sales

Cumulative U.S. Plug-In Vehicle Sales



400,000+ PEVs on American highways at the end of 2015

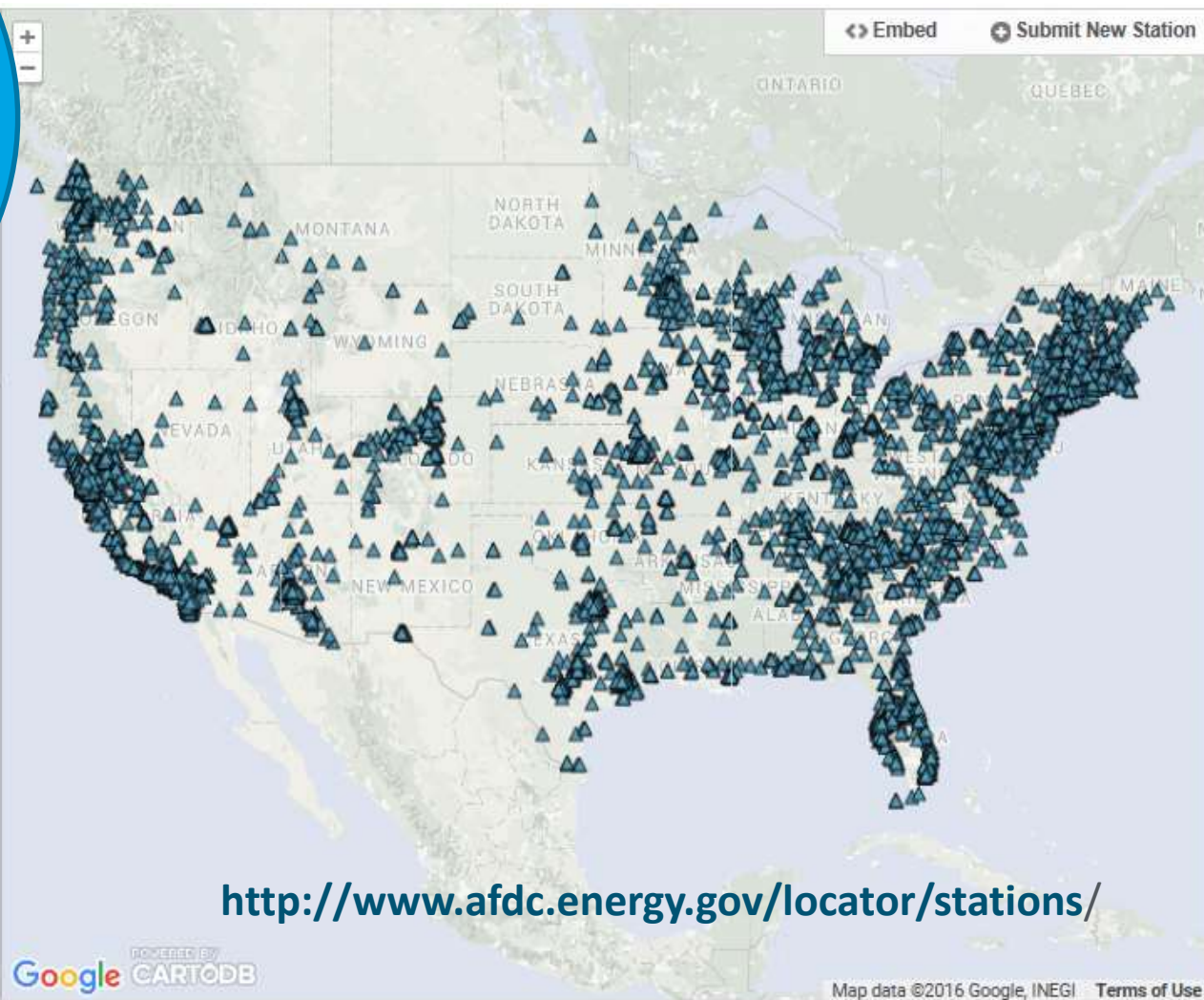
Alternative Fueling Station Locator

12,180 electric stations
30,628 charging outlets
in the United States

Excluding private stations

Location details are subject to change. We recommend calling the stations to verify location, hours of operation, and access.

ABOUT THE DATA



12,000+ public PEV charging stations in the U.S.

Awareness Campaign



Consumer education and outreach on PEVs under tagline
“Best.Drive.EVer.—Go Electric!”



\$100 Billion+

the amount U.S. utilities have spent over the past 10 years to modernize the grid

EV Everywhere Utility Partnership



Tom Kuhn, President of EEl, and Ernest Moniz, U.S. Secretary of Energy sign MOU in June 2015. Photo courtesy of EEl.

- DOE signed MOU with Edison Electric Institute in June 2015
- Breaking down barriers to widespread EV deployment
- 10 joint activities

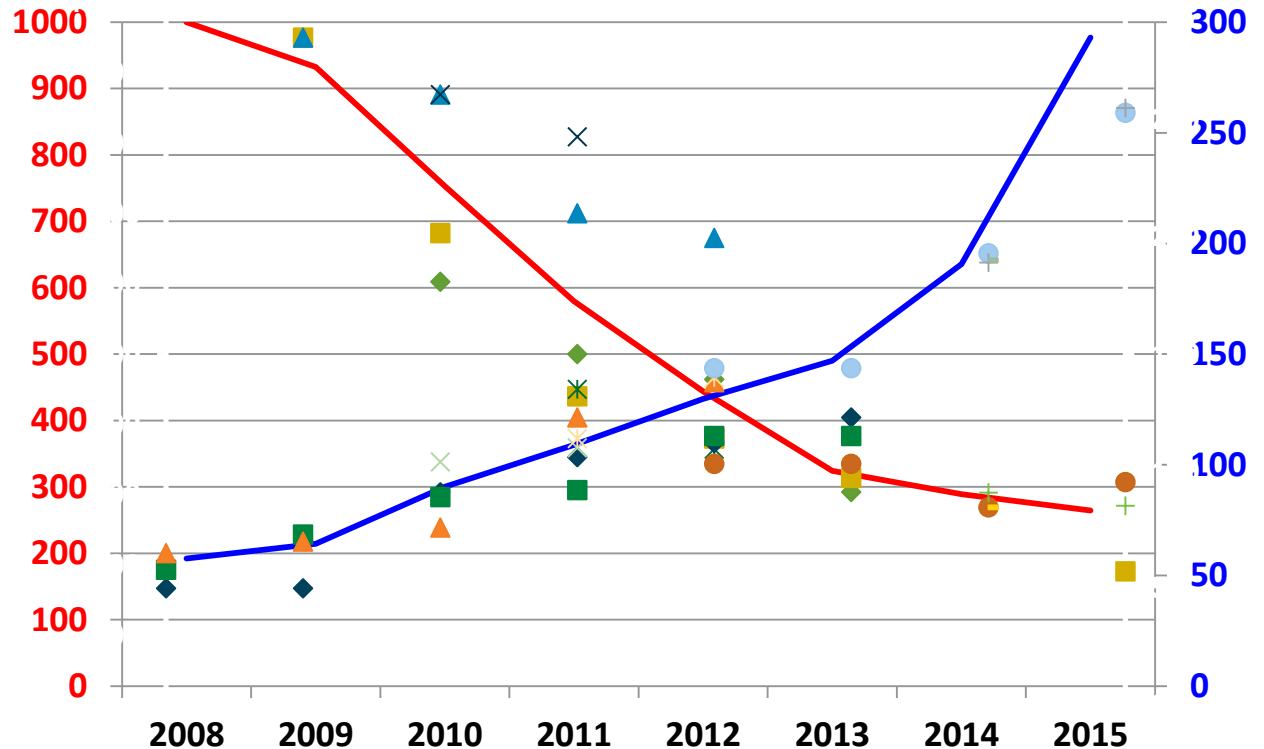
Battery Cost Reduction

\$264

Cost per kWh for modeled battery down from \$1000/kWh in 2008.

Pack Cost (\$/kWh)

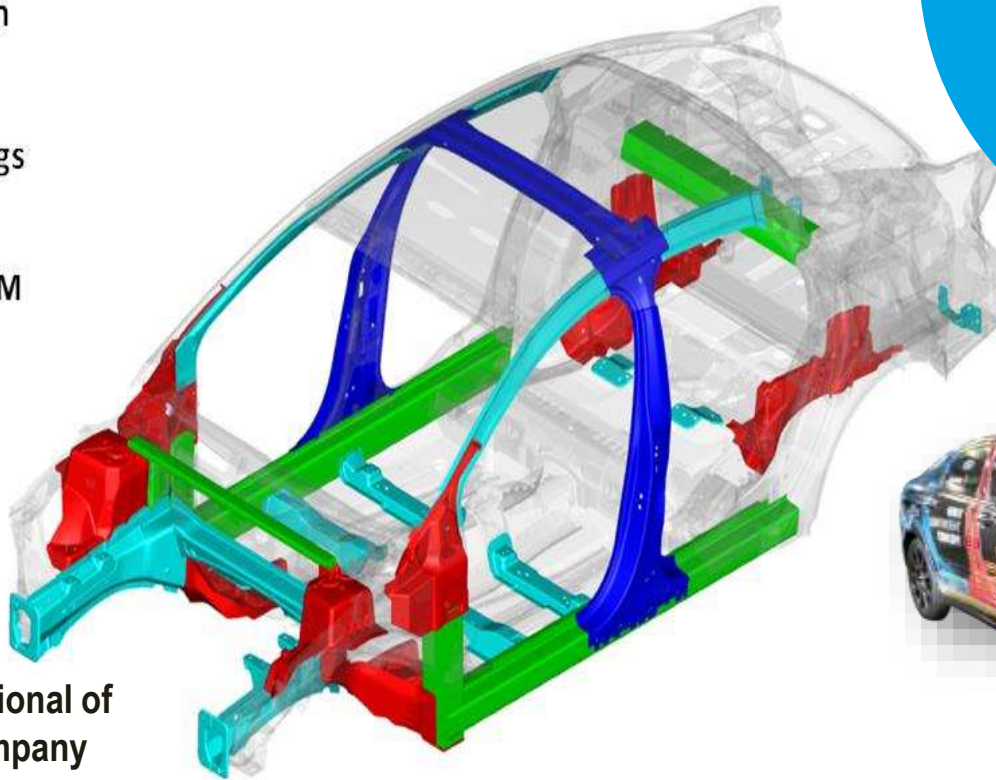
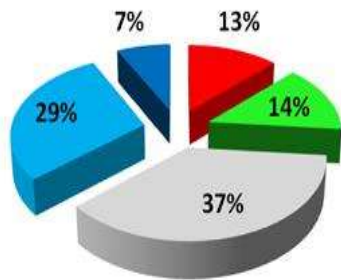
Pack Energy Density (Wh/L)



Lightweight Materials

- Aluminum Extrusion
- Hot Form Usibor
- HSLA Stampings
- Aluminum Stampings
- Aluminum Castings

36% STEEL – 64% ALUMINUM



Courtesy Vehma International of America, Ford Motor Company

Multi-Material Lightweight Vehicle demonstrates the feasibility of achieving 23% weight reduction and crashworthiness

\$58M

funding for vehicle
technology advancements...

VTO
Funding
Opportunity



eere-exchange.energy.gov
Grants.gov

...focusing on

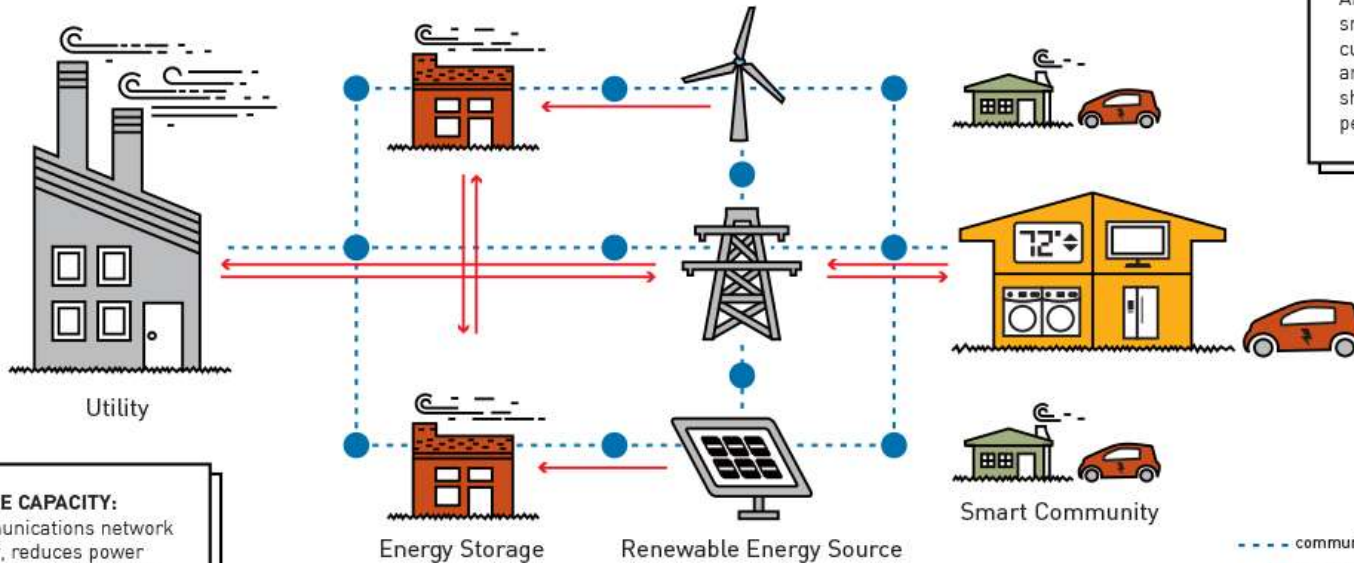
- advanced light-weighting;
- advanced battery development;
- low cost electric motor development;
- enabling technologies for high efficiency engines; and
- support for EV deployment and AFV workplace safety programs.

Grid Modernization

The existing U.S. power system has served us well...but our 21st Century economy needs a 21st Century grid.

GRID MODERNIZATION

INSTANTANEOUS RESPONSE AND INTEGRATION: The electricity grid joins the digital age with fast, reliable and secure communications that enable automated, optimized grid management. Efficiency and speed will drive down rates.



MORE RENEWABLE CAPACITY: A converged communications network improves reliability, reduces power outages, and increases quality while balancing demand.

CUSTOMER ENGAGEMENT: An integrated grid with smart meters gives customers the information and incentives they need to shift their energy use from peak to non-peak times.

--- communications network lines
 ● communications nodes
 ⇄ power flow

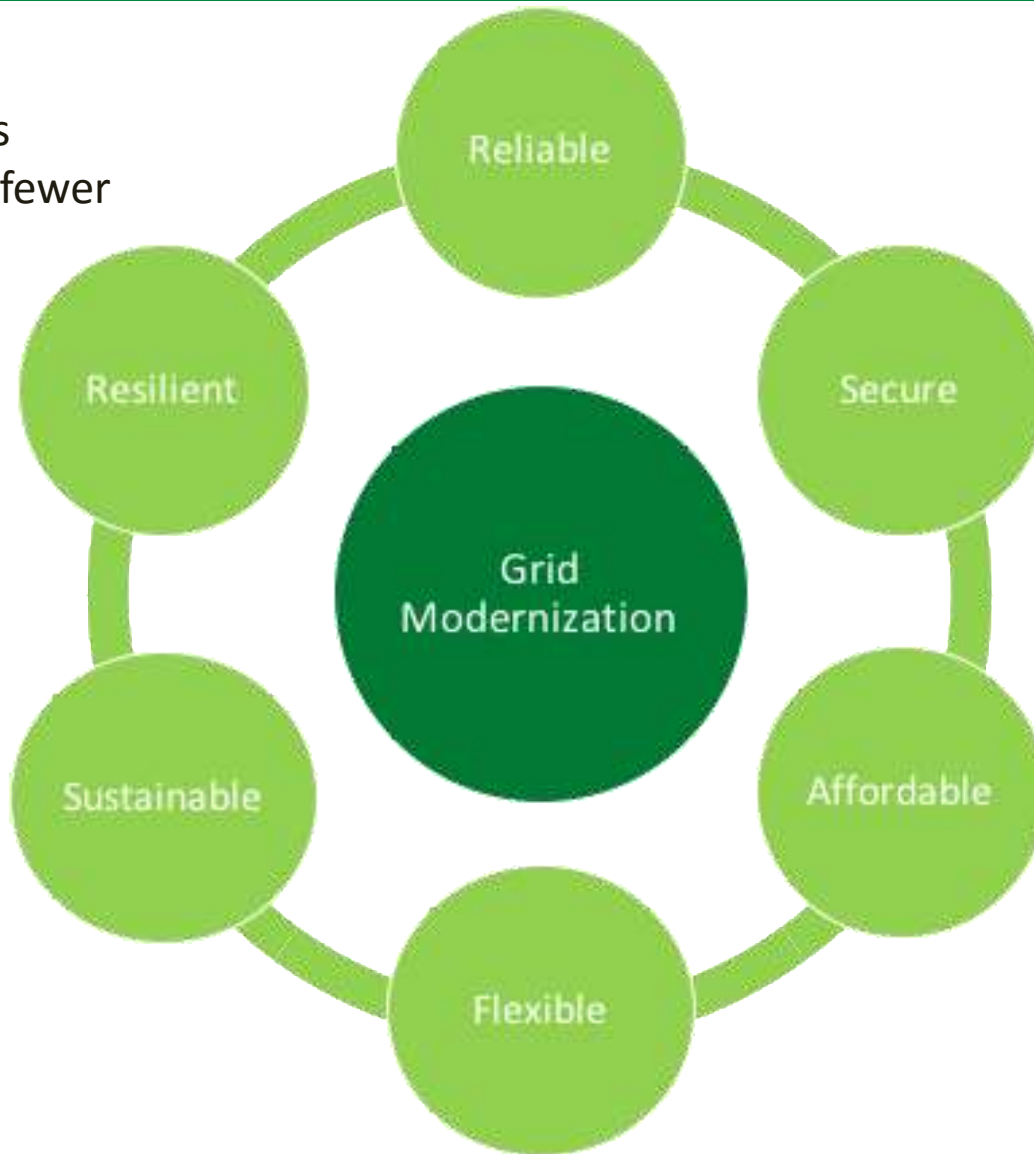
Image courtesy of the Hawaii Energy Office.

Key Attributes of a Modernized Grid

Reliable - Improves power quality and fewer power outages

Resilient - Quick recovery from any situation or power outage

Sustainable - Facilitates broader deployment of clean generation and efficient end use technologies



Secure - Increases protection to our critical infrastructure

Affordable - Maintains reasonable costs to consumers.

Flexible - Responds to the variability and uncertainty of conditions

GMI Funding Opportunity

\$220M

Grid modernization funding
over the next 3 years...



...to support critical research and development in advanced storage systems, clean energy integration, standards and test procedures, and a number of other key grid modernization areas.

SEO Actions



- **Develop joint modern grid and TE alignment in your state**
- **Educate and engage policymakers and community members on importance of PEVs and a modern grid**
- **Evaluate community PEV readiness using Scorecard on AFDC**

www.afdc.energy.gov/pev-readiness

Utility Actions

- Educate and engage policymakers and utility leadership
- Inform and support community planning efforts
- Be proactive with customers—tell them about the value of PEVs and offer incentives if possible
- Install PEV charging at your worksite and join the DOE Workplace Charging Challenge



[Energy.gov/everywhere](https://www.energy.gov/everywhere)

THANK YOU

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