

EMERGING ISSUES, DISTRIBUTED ENERGY RESOURCES (DER)

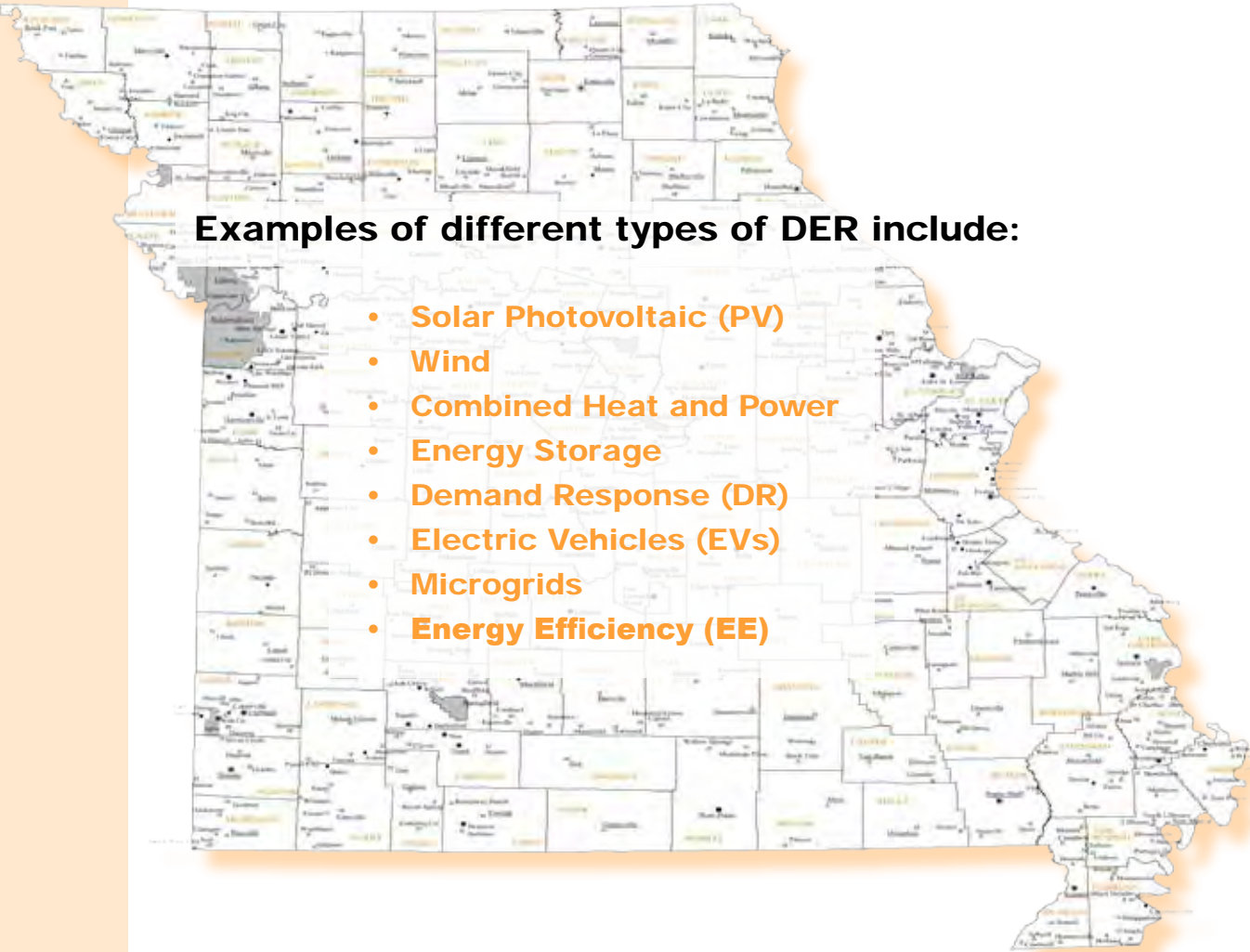
On March 24, 2017, the Commission opened a working docket to explore emerging energy-related issues. Distributed Energy Resources (DERs) is one of the emerging issues stakeholders recently explored.

WHAT IS DER?

The National Association of Regulatory Utility Commissioners (NARUC) defines DER as:

A resource sited close to customers that can provide all or some of their immediate electric and power needs and can also be used by the system to either reduce demand (such as energy efficiency) or provide supply to satisfy the energy, capacity, or ancillary service needs of the distribution grid.

The resources, if providing electricity or thermal energy, are small in scale, connected to the distribution system, and close to load.



Examples of different types of DER include:

- Solar Photovoltaic (PV)
- Wind
- Combined Heat and Power
- Energy Storage
- Demand Response (DR)
- Electric Vehicles (EVs)
- Microgrids
- **Energy Efficiency (EE)**

DER in Missouri



ENERGY EFFICIENCY

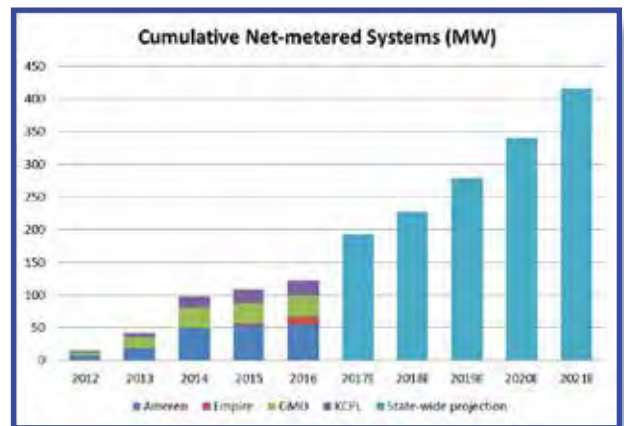
In 2009, the Missouri General Assembly enacted the Missouri Energy Efficiency Investment Act (MEEIA) to:

- 1) provide timely cost recovery for utilities;
- 2) ensure utility financial incentives are aligned with helping customers use energy more efficiently;
- 3) provide timely earnings opportunities associated with cost-effective measurable and verifiable efficiency savings.

Programs must be approved by the Commission, result in measurable demand or energy savings and be beneficial to all customers. Three of the investor-owned electric utilities in Missouri have energy efficiency programs subject to the requirements of MEEIA. The fourth investor-owned electric utility also provides energy efficiency programs outside the requirements of MEEIA.

SOLAR PHOTOVOLTAIC

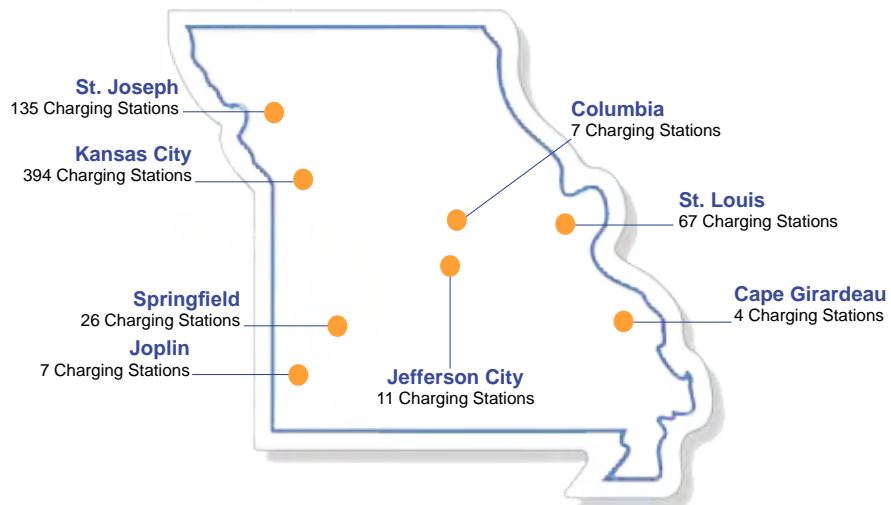
Solar photovoltaic (PV) devices (i.e., solar panels) convert sunlight into electricity. The graphic, at right, represents current and projected levels of solar PV in Missouri.¹



ELECTRIC VEHICLE CHARGING STATIONS

According to SolvingEV², Missouri has 1,248 electric vehicle charging stations. The map below shows some of the larger cities in Missouri with the number of charging stations per city.

EV CHARGING STATIONS IN SOME OF MISSOURI'S LARGER CITIES



¹ Staff Report on Distributed Energy Resources, Page 6. File No. EW-2017-0245.

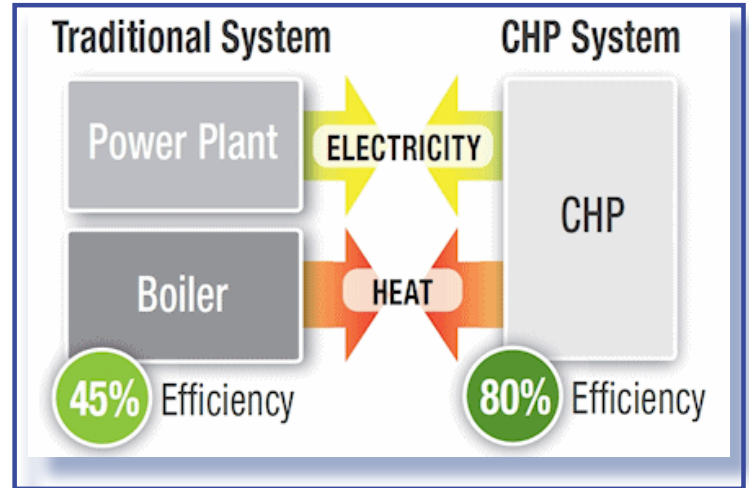
² Information was compiled using data from <http://solveev.com/browse-locations/state/mo-missouri>.

DER in Missouri



COMBINED HEAT AND POWER

Combined Heat and Power (CHP) refers to technologies that generate electricity and thermal energy from conventional or renewable fuel sources. CHP involves the recovery of wasted thermal energy to produce electricity. The following graphic demonstrates how CHP systems work.³



CHP can be used in energy-intensive business sectors such as chemicals, paper, refining, food processing and metals manufacturing. According to the U.S. Department of Energy, Missouri has the following installed CHP applications.

MISSOURI CHP APPLICATIONS

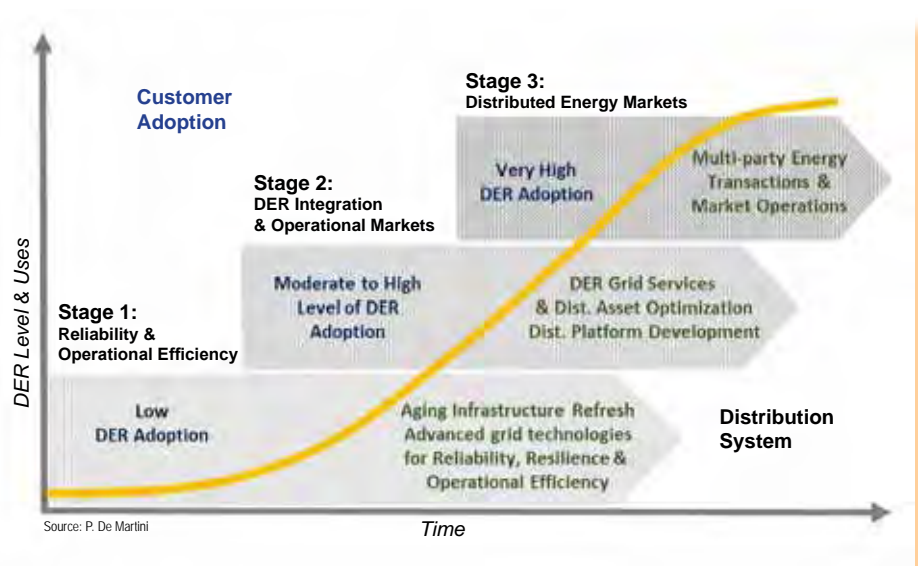
Sector	Installations	Capacity (MW)
Industrial	5	52
Commercial/Institutional	14	222
Other	2	5
Total	21	279

³ Missouri Department of Economic Development, Division of Energy. <https://energy.mo.gov/clean-energy/combined-heat-power>.

DER in Missouri

THE OVERALL PICTURE

Missouri, like much of the United States, is considered to have low DER adoption. The following figure demonstrates the evolution of DER adoption. Missouri, and many other states, are at Stage 1 of the progression.⁴



Moving into Stage 2 will require planning and data from utilities, including customer data, circuit-level data, adoption and performance data and data on the impact to the electric grid.⁵

On April 5, 2018, the Commission Staff (Staff) submitted a report in the Commission's emerging issues docket summarizing the various comments and information gathered through the exploration of DER in Missouri. Staff made several recommendations, many of which are related to additional utility planning and data gathering. For instance, Staff suggested revisions to current Commission electric utility long range planning rules to specifically analyze the needs, costs and benefits associated with DER.

In addition, appropriate rate structures and rate designs may enhance customer responsiveness to DER opportunities. In its report, Staff also recommended steps the utilities should take to improve customer education and work toward customer rate designs that are economically efficient, simple and understandable, and provide stable rates for customers and stable revenues for utilities.

The grid will become more complex over the coming decades and will present both challenges and opportunities. Transitioning to a modernized grid that will support increased DER deployment, two way power flows, and enhanced customer participation is an emerging trend in the utility industry. Achieving this vision while maintaining the PSC's mission of ensuring Missourians receive safe and reliable utility service at just and reasonable rates requires much careful planning.

⁴ "Integrated Distribution Planning", August 2016, prepared for the MN PUC, ICF International.

⁵ U.S. Department of Energy-Office of Electricity Delivery and Energy Reliability. 2017. Modern Distribution Grid, Volume III: Decision Guide. p. 48.