Analytical Tools and Resources for States

2017 National Energy Policy and Program Institute

Office of Energy Policy and Systems Analysis

U.S. Department of Energy

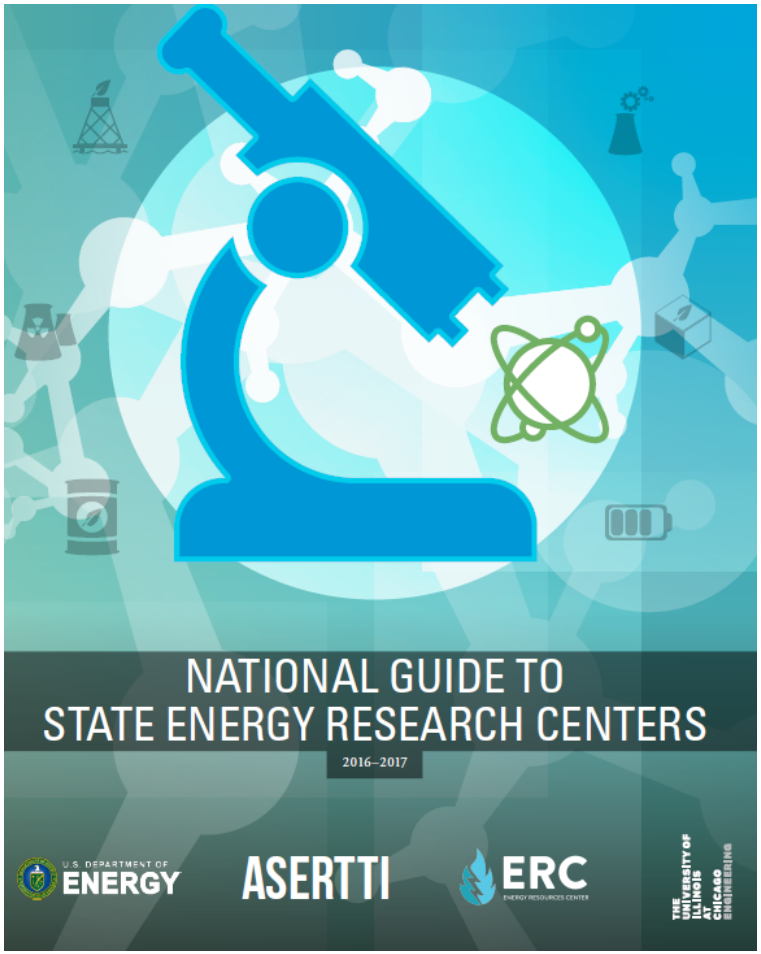
The Role of DOE's Energy Policy and Systems Analysis Office

- Deliver analysis to inform policy decision-making
- Conduct studies and prioritize options to strengthen national energy systems for economic growth, environmental quality, and national security
- Maintain analytical capabilities internally and coordinate those that are accessible externally
- Collaborate frequently with other agencies and organizations
- Build on policies of states, local governments, and external stakeholders

Website: https://energy.gov/epsa

Demonstrates the Role of the States in RDD&D

- Energy sector = economic driver
- This guide serves as a resource to highlight the efforts of the state energy research centers.
- The research fields of each center and their partners are included to help outside entities connect depending on needs or interests.
- New solutions are constantly being developed; it is these energy research centers that are overcoming the challenges faced by the industry with the states and the private sector to push the boundaries for how we use, produce, and deliver energy.



Prepares All-Hazards Resilience Assessments

National Resilience Needs

- Support industry, state, local, and Federal efforts to enhance grid security and resilience.
- Improve data on all-hazard events and losses as well as EIA's data, modeling, and analysis capabilities.
- Encourage cost-effective use of advanced technologies that improve transmission operations.

Threat	Intensity	System Components: Electricity Transmission	Electricity Generation	Electricity Substations	Electricity Distribution (above)	Electricity Distribution (below)	Storage
		Assessment of Risk & Resilience					
Natural/Environmental Threats							
Hurricane	"Low (<Category 3)"	●	●	●	●	●	◑
	"High (>Category 3)"	◑	●	●	◑	●	◑
Drought	"Low (PDSI>-3)"	●	●	●	●	●	●
	"High (PDSI<-3)"	●	◑	●	●	●	◑
Winter Storms/Ice/Snow	"High (PDSI<-3)"	●	●	●	●	●	●
	"Low (Minor icing/snow)"	●	●	●	●	●	●
Extreme Heat/Heat Wave		●	◑	●	●	●	●
Flood	"Low (<1:10 year ARI)"	●	●	●	●	●	●
	"High (>1:100 year ARI)"	●	◑	◑	◑	●	●
Wildfire	"Low (>Type III IMT)"	●	●	●	●	●	●
	High (Type I IMT)	●	●	●	●	●	●
Sea-level rise		●	●	●	●	●	●
Earthquake	Low (<5.0)	●	●	●	●	●	●
	High (>7.0)	●	●	●	●	●	●
Geomag-netic	"Low (G1-G2)"	●	●	●	●	●	●
	"High (G5)"	○	◑	○	◑	○	◑
Wildlife/Vegetation		●	●	●	●	●	●
Human Threats							
Physical	Low	●	●	●	●	●	●
	High	◑	◑	◑	●	●	◑
Cyber	Low	◑	◑	◑	○	○	
	High	○	○	○	○	○	○
Electromag-netic	"Low (Ambient EMI)"	●	●	●	●	●	●
	"High (NEMP & HEMP)"	●	○	○	●	●	○
Equipment Failure		●	●	●	●	●	●
Combined Threats		○	○	○	○	○	○

Levels of Risk

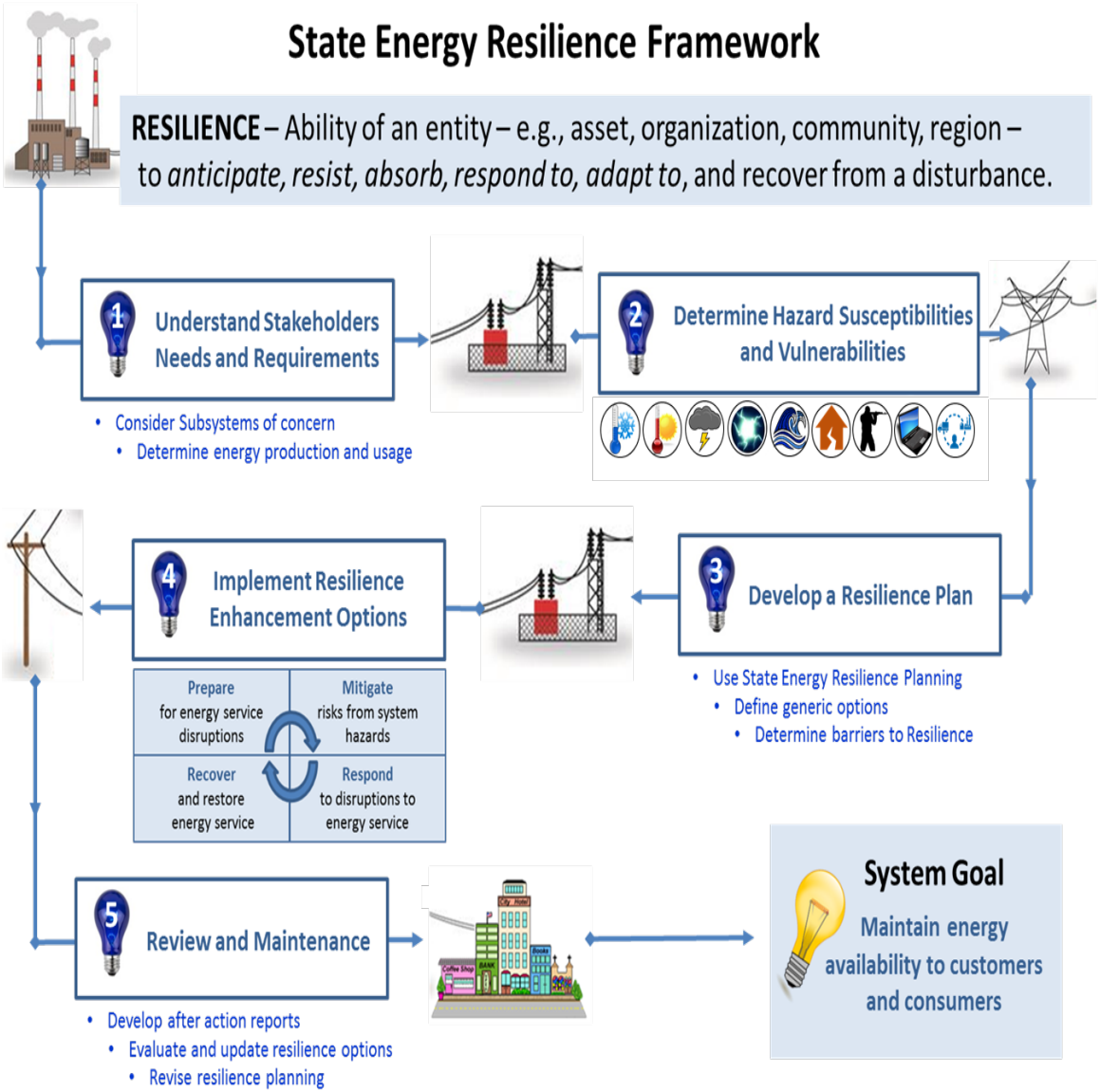
- Low
- Moderate
- High
- Unknown

Current Status of Risk Management Practice

- Nascent: Critical Vulnerabilities Exist
- Established, but opportunities for improvement remain
- Well-established and robust

Source: Preston et al., 2016

Develops Frameworks for State Energy Resilience

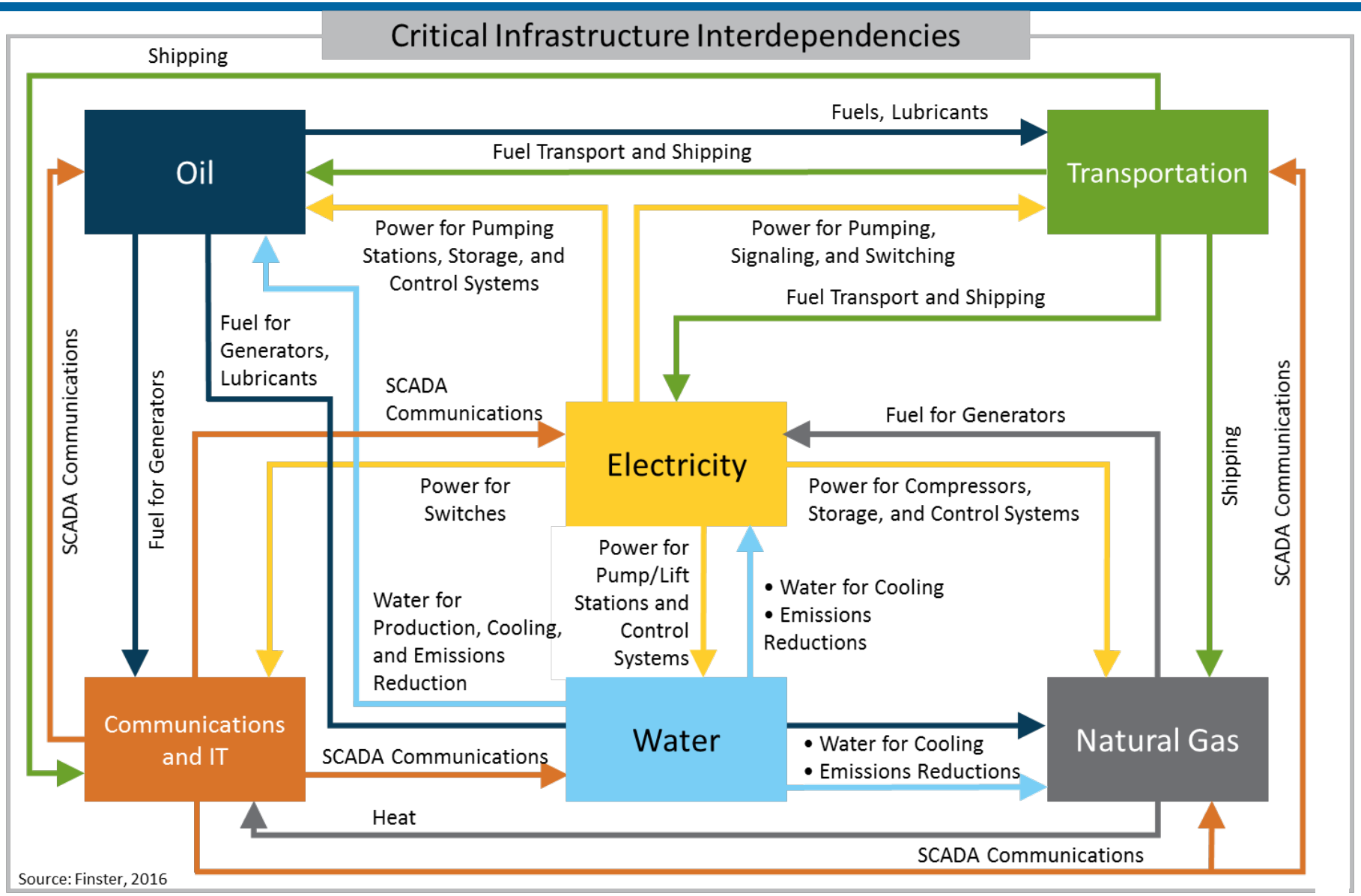


Case Studies:

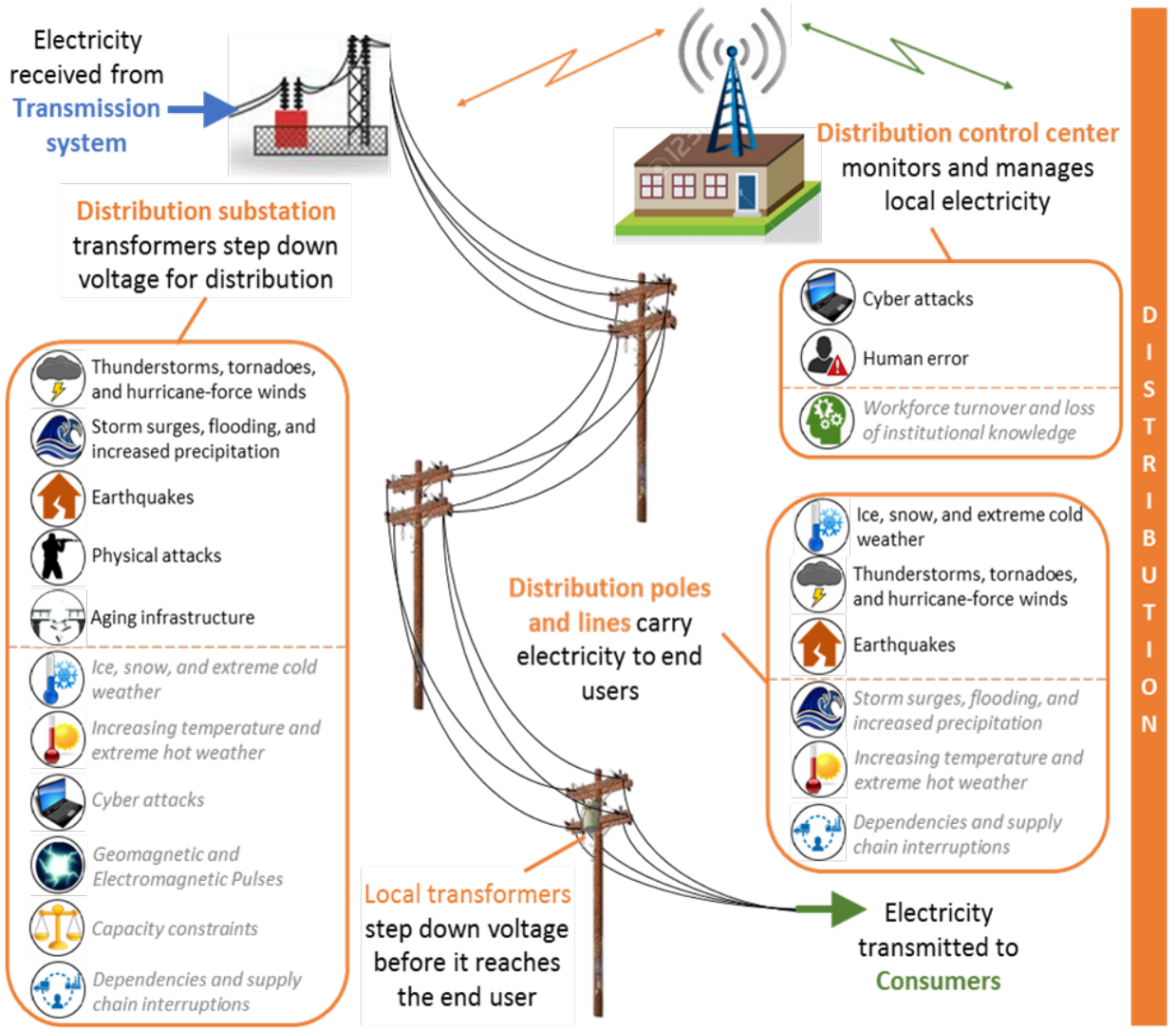
- New York – Fuel New York
- California – Substations Protection
- Oregon – Cascadia Fault

Available online:
https://energy.gov/epsa/downloads/state-energy-resilience-framework

Identifies Electricity Interdependencies for National Security



Maps Electricity Distribution System Hazards & Vulnerabilities



Partners with utilities to improve energy sector resilience

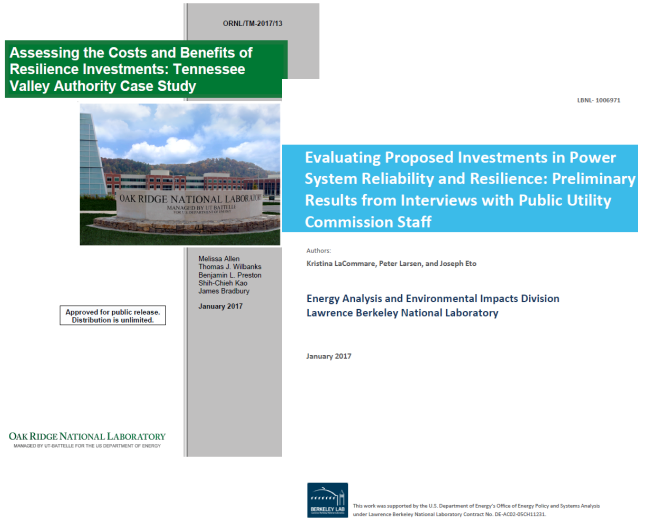
Partnership for Energy Sector Resilience:

— Membership includes 17 electric utilities serving approximately 25% of U.S. customers

— DOE and the Partnership have developed best practices for vulnerability assessments and resilience planning guides

Cost/Benefits of Resilience Investments:

- Phase I: Consolidates information on how regulators evaluate the costs and benefits of reliability/resilience investments.
- Phase II (in progress): Develop a guide for cost-benefit analysis of resilience investments



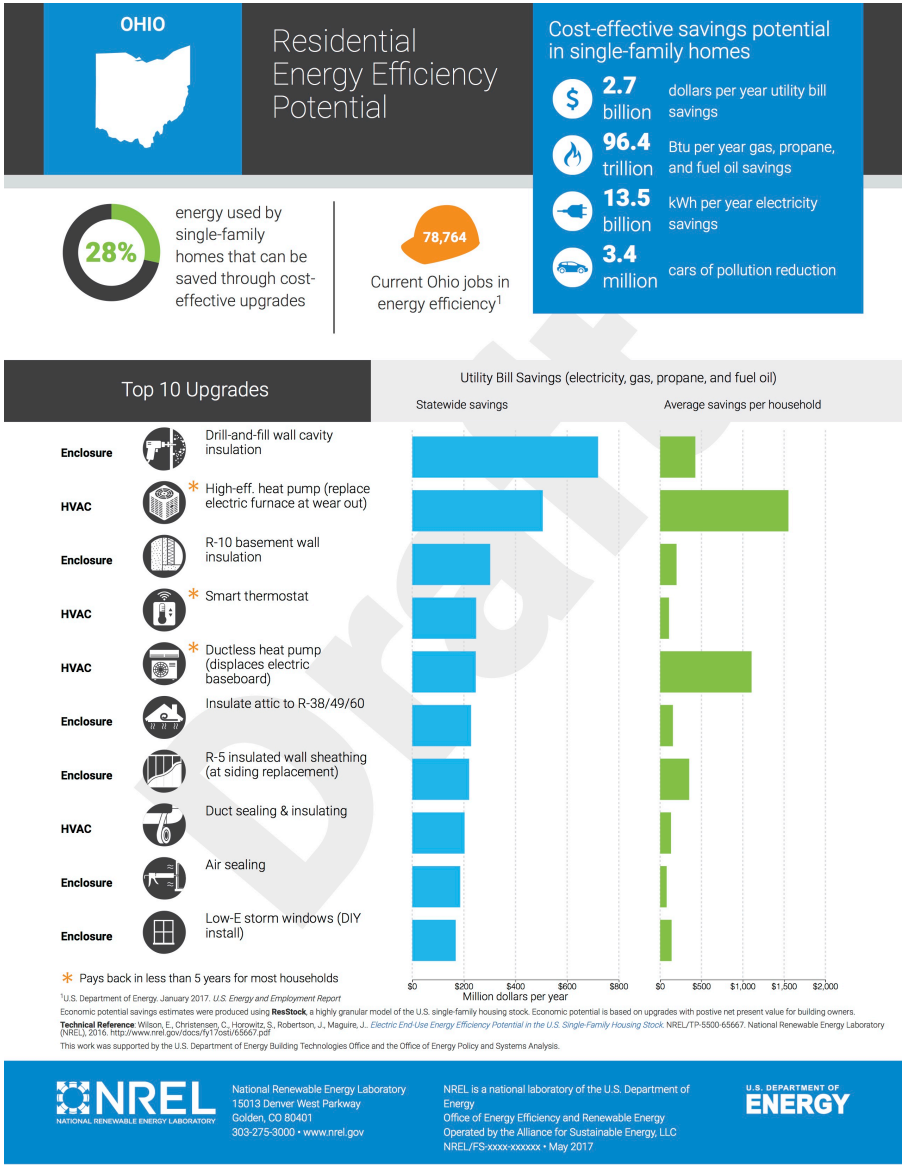
Available online: https://energy.gov/epsa/partnership-energy-sector-climate-resilience

Provides State Resources on Energy Efficiency Potential

- Cost-effective potential to reduce primary energy use in single-family detached homes by 25%
- Actionable results for states:
  - Top priority upgrades
  - State EE supply curves
  - Custom fact sheets for the lower 48
- DOE lead analyst:

  Erin Boyd – erin.boyd@hq.doe.gov

Original study
https://energy.gov/sites/prod/files/2017/01/f34/Electric%20End-Use%20Energy%20Efficiency%20Potential%20in%20the%20U.S.%20Single-Family%20Housing%20Stock.pdf



Explores Jurisdictional Challenges in the Electricity Sector

Federal Power Act (1935)

"Bright Line"

Federal Jurisdiction

- Wholesale sales
- Interstate commerce and transmission

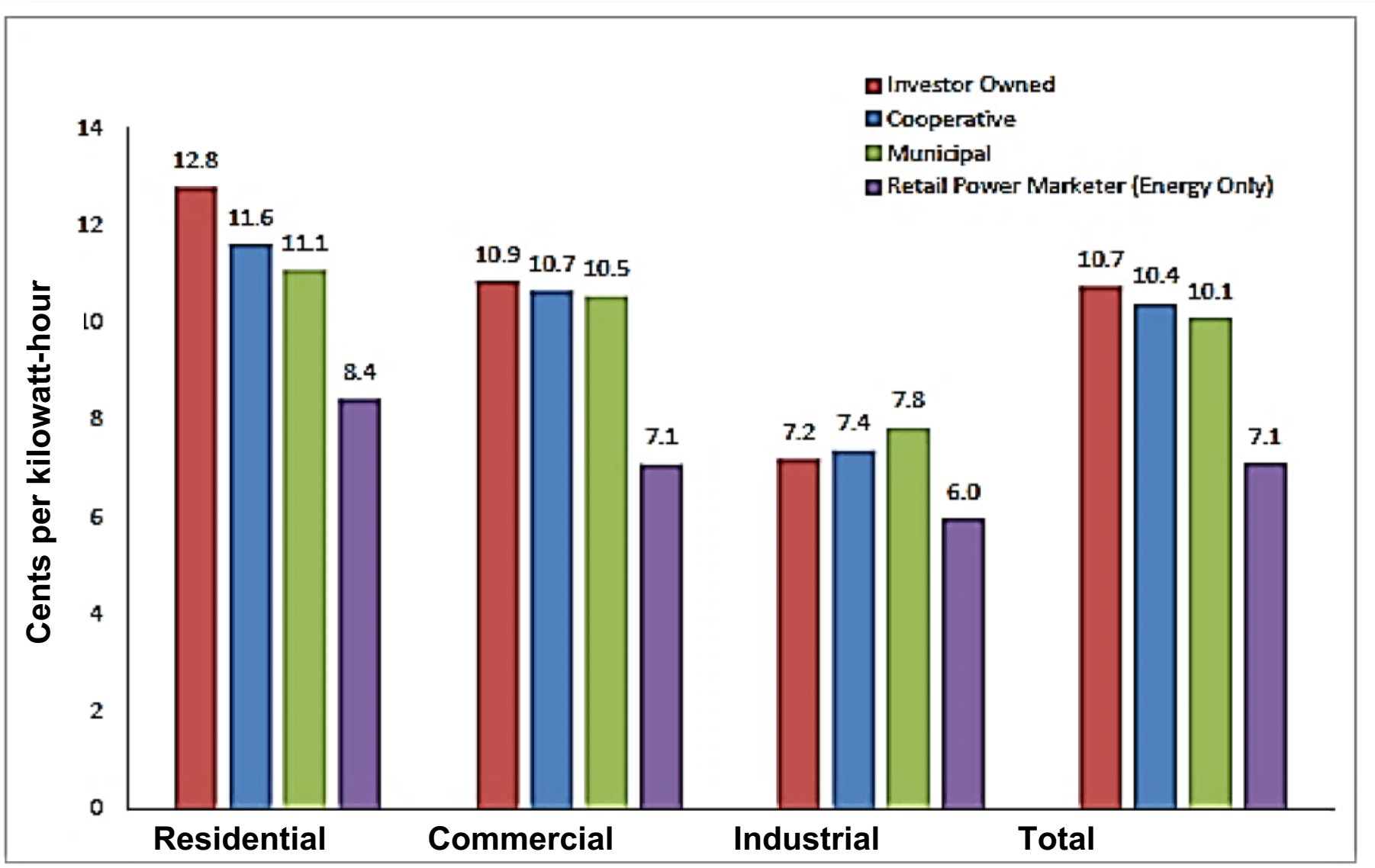
State Jurisdiction

- Retail sales
- Local distribution
- Facility siting
- Generation adequacy

"Hazy Bright Line"

- Distributed generation resources
- End-users adjusting retail demand in response to price signals
- Aggregation of individual retail transactions
- New technologies (e.g., microgrids, storage, load controls for demand response) and commercial practices
- New market entrants seeking different business models
- Need for more integrated transmission and distribution planning and potentially new rules between Federal and state governments (e.g., resource adequacy)

Examines Electricity Rates by Customer Class and Utility Type



Designing a Framework to Categorize Advanced Rate Designs

Attribute

Pricing to reflect the cost and value of various types of electricity services

Current practice is largely bundled pricing

Examples of alternatives: residential demand charge, Green Mountain Power energy product leasing

Locational

Pricing to reflect locational system needs and site-specific value

Current practice is no location-differentiation in pricing

Examples of alternatives: ConEd tiered distribution load relief program, California integrated DER pilot projects

Temporal

Pricing to reflect marginal prices or other time-based market signals

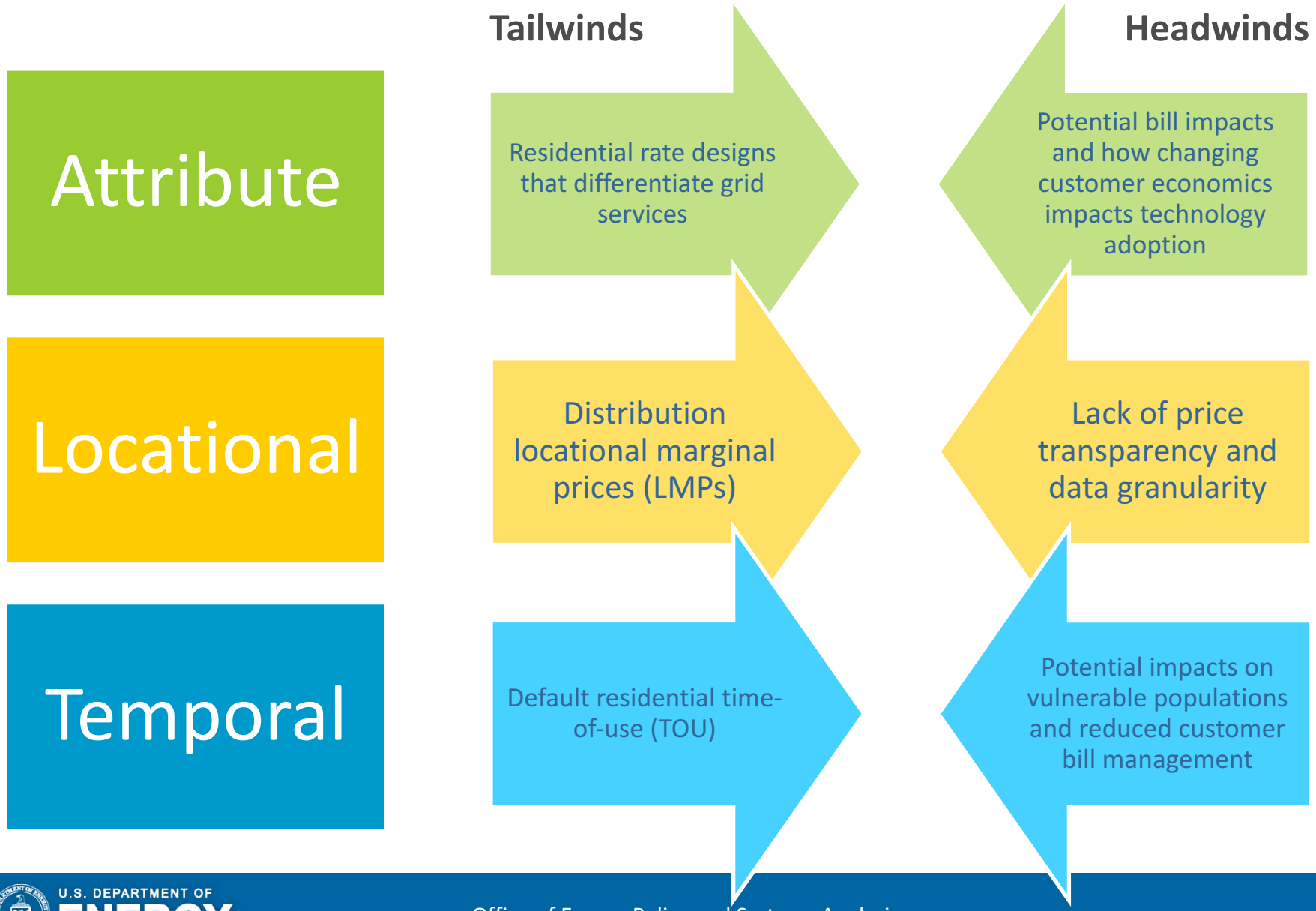
Current practice is no time-based differentiation in pricing

Examples of alternatives: California default residential time-of-use, SDG&E electric vehicle real-time pricing rate

Costs

Adapted from RMI (2014) *Rate Design for the Distribution Edge*

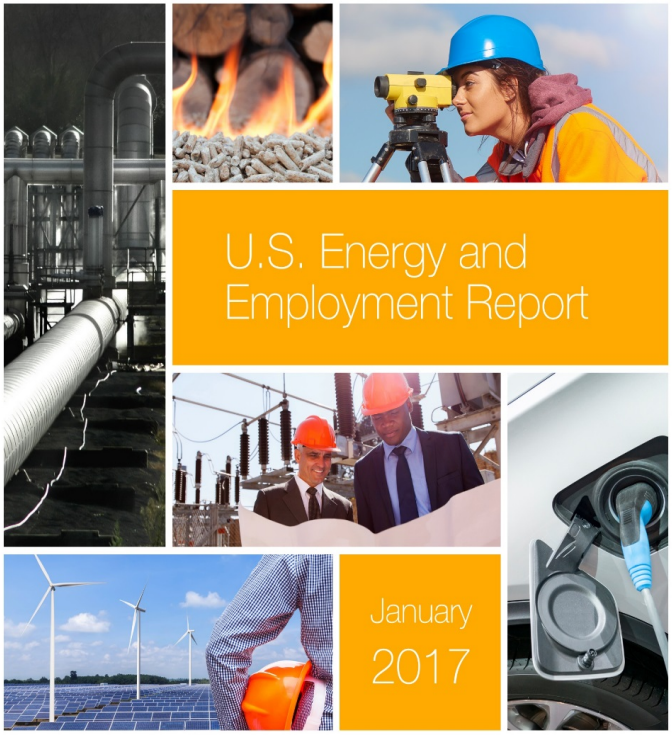
Analyzing Rate Design Trends



DOE Maintains the Most Comprehensive Energy Jobs Data

DOE's jobs analysis:

- Supplements the U.S. Bureau of Labor Statistics' (BLS) North American Industry Classification System (NAICS)
- Combines BLS data with a survey instrument to ~400,000 establishments with energy employment
- Counts jobs in traditional & new energy industries currently attributed to other sectors in BLS
- Provides the first national analysis of efficiency jobs
- Breaks out state and county-level job data across multiple sectors and technologies
- Provides coverage of workforce demographics, underserved workers, hiring difficulties, & jobs skills
- Quantifies anticipated state and national job growth by technology

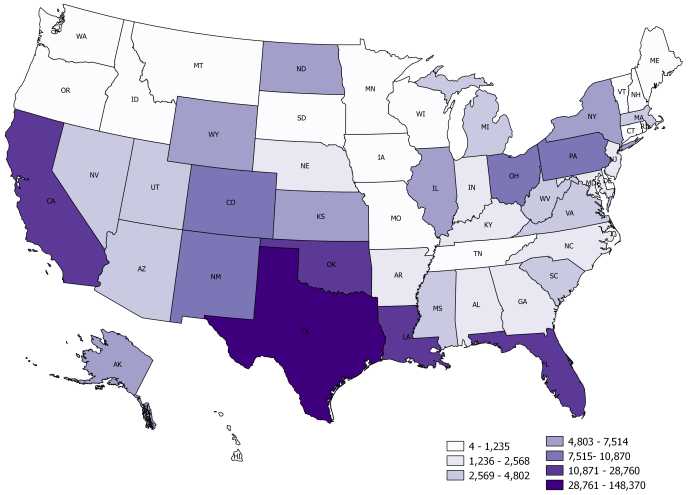


Energy Jobs CHALLENGES:

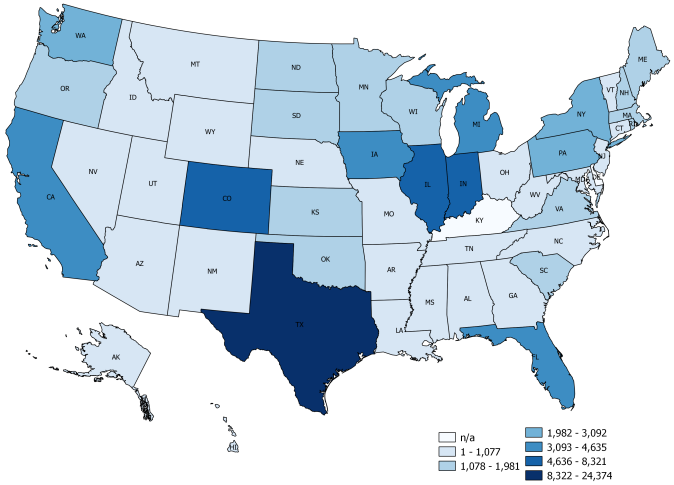
- Aging workforce
- Lack of skills, training
- Regionality of energy jobs

EPSA Data Analysis: Energy jobs are distributed regionally

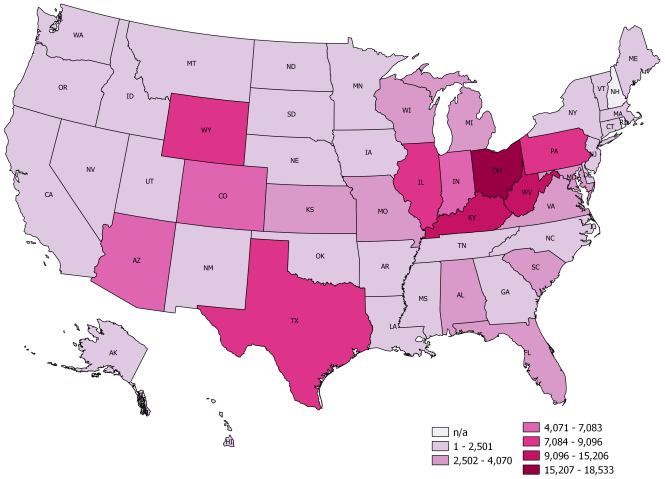
Distribution of Nat. Gas Industry Jobs by State, 2016



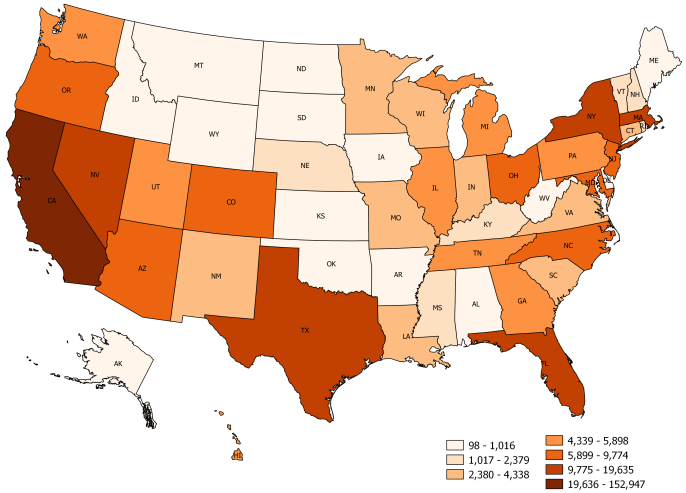
Distribution of Wind Industry Jobs by State, 2016



Distribution of Coal Industry Jobs by State, 2016



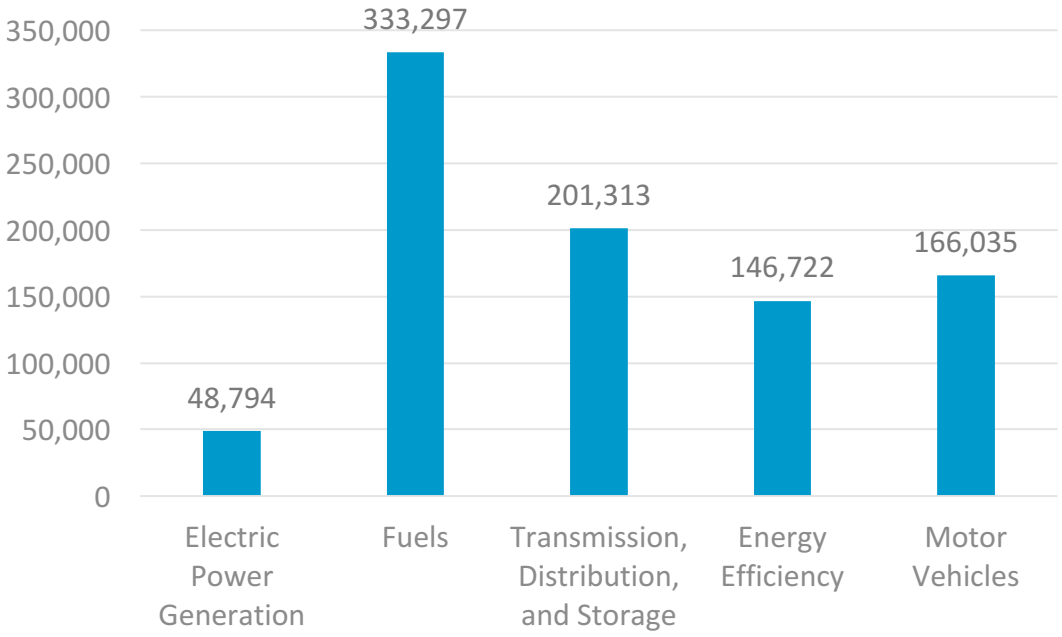
Distribution of Solar Industry Jobs by State, 2016



State Jobs Data by Industry, Technology, and Demographic

Texas

Employment by Major Technology



- Texas has a high concentration of energy employment, with **583,404** Traditional Energy workers statewide or 5% of total state employment.
  - 333,297 in the Fuels sector
  - 201,313 in TS&D and Storage
  - 48,794 in Electric Power Generation
- 146,722 jobs in Energy Efficiency (6.7% of all energy efficiency jobs nationwide)
- 166,035 in motor vehicles (6.8% of all motor vehicle jobs nationwide)
- 17.9 % of the Traditional Energy jobs across the U.S. are located in Texas.
- *COMING SOON*: Jobs by county by subtechnology

DOE Offers a Single Access Point to Technical Assistance

- Website provides links to information on technical assistance and tools/resources currently available by DOE offices.
- DOE provides assistance depending on each office's resources. Assistance varies between offices and requests.
- TA workgroup helps facilitate coordinated responses to inquiries from across the Department.

Website: http://energy.gov/technicalassistance
Email: technicalassistance@hq.doe.gov

Contact Information

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