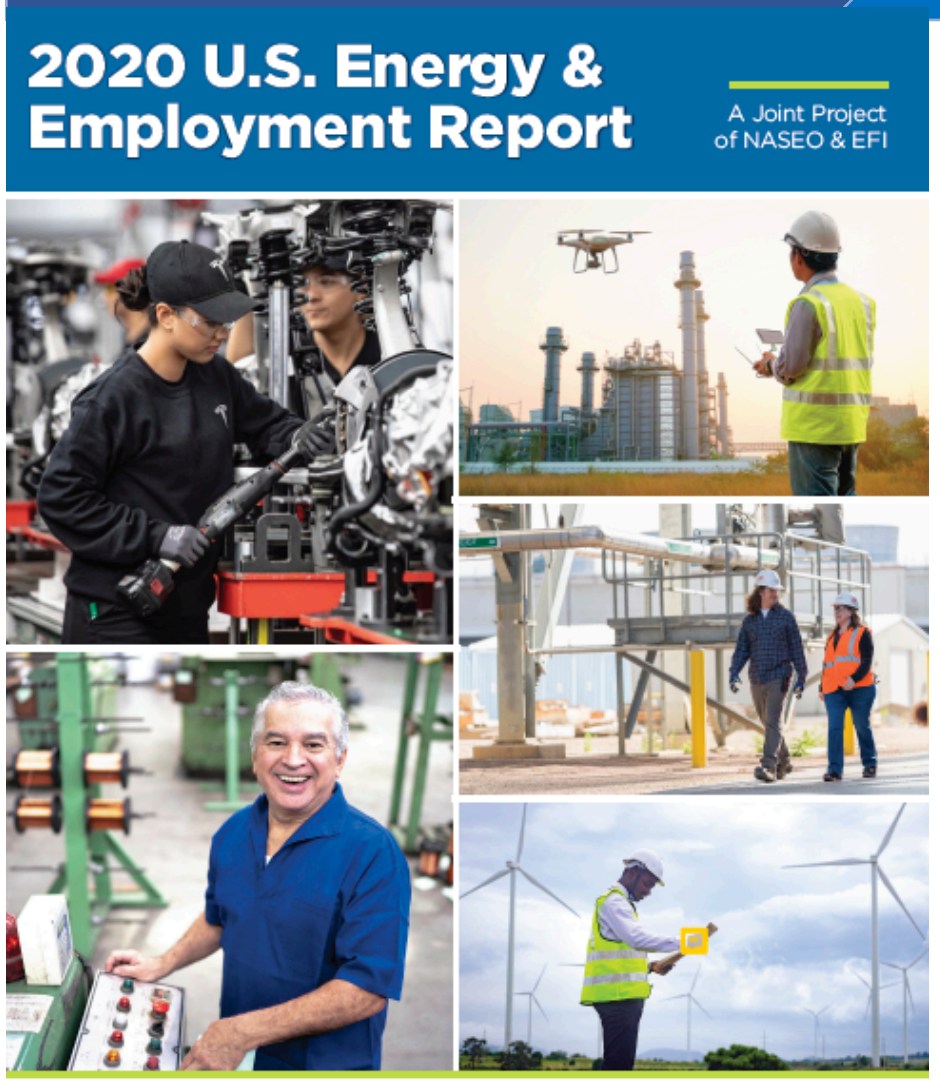
ENERGY FUTURES INITIATIVE

NASEO
National Association of State Energy Officials



The National Association of State Energy Officials (NASEO) and the Energy Futures Initiative (EFI) together with BW Research Partnership (BWRP) produced the 2020 U.S. Energy and Employment Report.

The 2020 USEER project was guided by David Foster, who directed the first four editions of the USEER and now serves as a Distinguished Associate with EFI.

Data collection and analysis was provided by BW Research Partnership, a full-service research firm with offices in California and Massachusetts

March 18, 2020

Webinar Presenters

Introduction	David Terry Executive Director The National Association of State Energy Officials
2020 Report	David Foster Distinguished Associate Energy Futures Initiative The U.S. Energy and Employment Report
5 Year Trends	Phil Jordan Vice President BW Research Partnership

About NASEO

- Membership includes the 56 Energy Governors' Energy Directors and their offices from the states, territories, and the District of Columbia, as well as private-sector Affiliate partners.
- Serves as a resource for and about the states on a number of topics, including workforce development, energy security, innovation, building energy efficiency, clean energy financing, fuels and grid integration, government affairs, transportation, energy policy planning, and climate.
- Works through topical committees to facilitate peer learning across states to improve the effectiveness of energy policies and programs.
- Visit www.naseo.org for more information.

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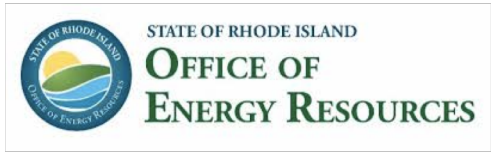
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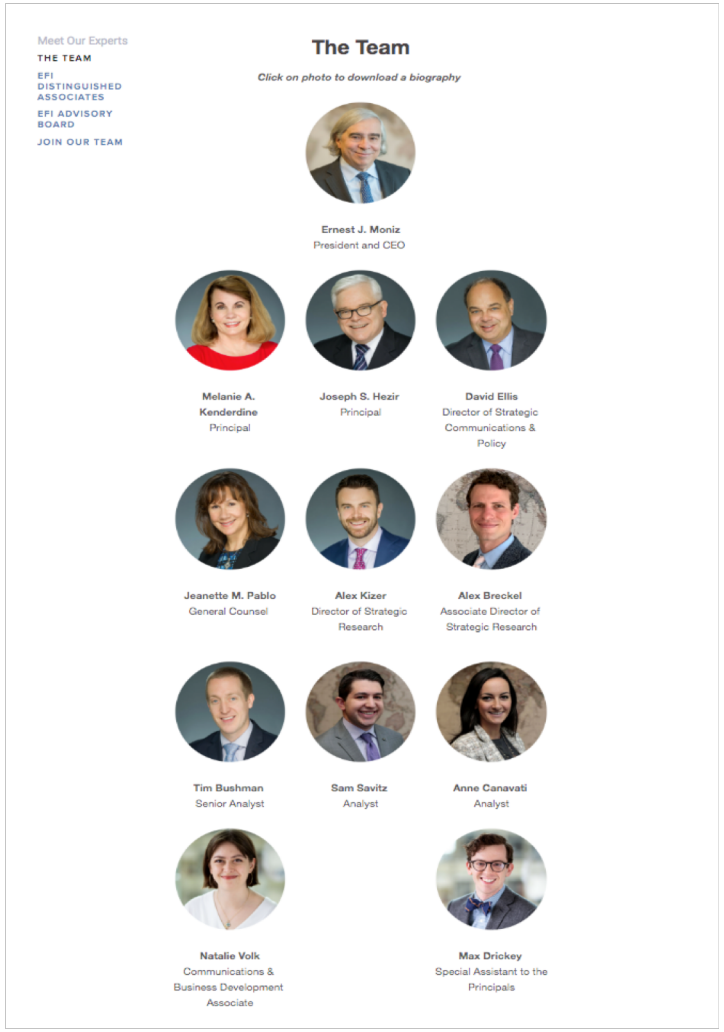

Our Mission

The Energy Futures Initiative advances solutions to the climate crisis through building coalitions, thought leadership, and evidence-based analysis. Under the leadership of Ernest J. Moniz, all final EFI analysis is peer-reviewed, published, and publicly available.

Energy Futures Initiative Reports

1. The U.S. Nuclear Energy Enterprise: A Key National Security Enabler (August 2017)
2. Leveraging the DOE Loan Programs: Using $39 Billion in Existing Authority to Help Modernize the Nation's Energy Infrastructure (March 2018)
3. The 2018 and 2019 U.S. Energy and Employment Reports (March 2019 & June 2018) – National Association of State Energy Officials*
4. Promising Blockchain Applications for Energy: Separating the Signal from the Noise (July 2018)
5. Advancing Large Scale Carbon Management: Expansion of the 45Q Tax Credit (May 2018)
6. Investing in Natural Gas for Africans: Doing Good and Doing Well (November 2018)
7. Advancing the Landscape of Clean Energy Innovation (February 2019) – IHS Markit*
8. More Funding Needed for Carbon Removal Technologies (April 2019) – Bipartisan Policy Center*
9. Optionality, Flexibility & Innovation: Pathways for Deep Decarbonization in California (May 2019)
10. The Green Real Deal: A Framework for Achieving a Deeply Decarbonized Economy (August 2019)
11. Clearing the Air: A Federal RD&D Initiative and Management Plan for Carbon Dioxide Removal Technologies (September 2019)

12. The 2020 U.S. Energy and Employment Report (March 2020) – NASEO + BW Research Partnership

*Partners

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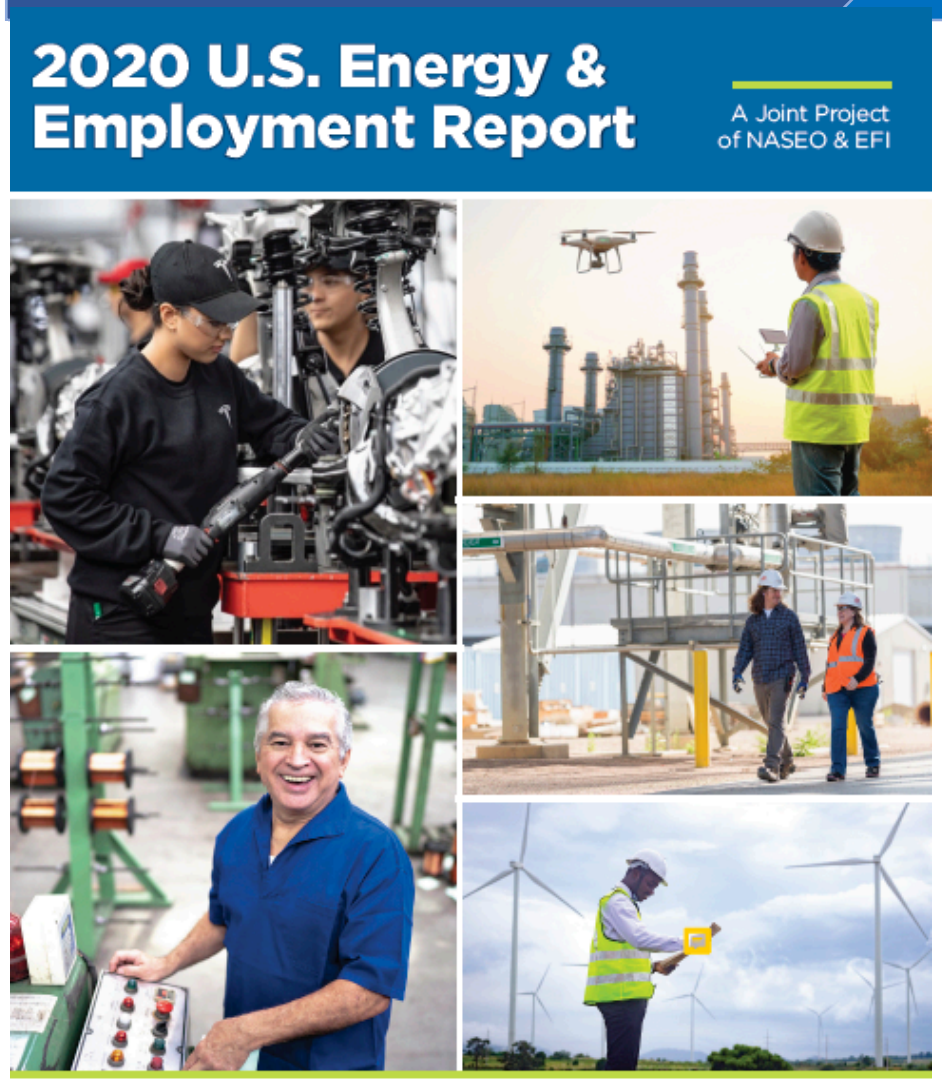


2020 U.S. Energy and Employment Report

A Joint Project of the National Association of State Energy Officials and the Energy Futures Initiative

March 18, 2020
Embargoed Webinar Briefing

David Foster, EFI, Distinguished Associate

ENERGY FUTURES INITIATIVE

Overview—2020 USEER

- The USEER is based on an annual supplemental employer survey, integrated with the BLS Quarterly Census on Employment and Wages.
- It studies employment in the following sectors:
  - Fuels
  - Electric Power Generation (EPG)
  - Transmission, Distribution, and Storage (TDS)
  - Energy Efficiency (EE)
  - Motor Vehicles
- Fuels, EPG, and TDS make up the Traditional Energy Sector.

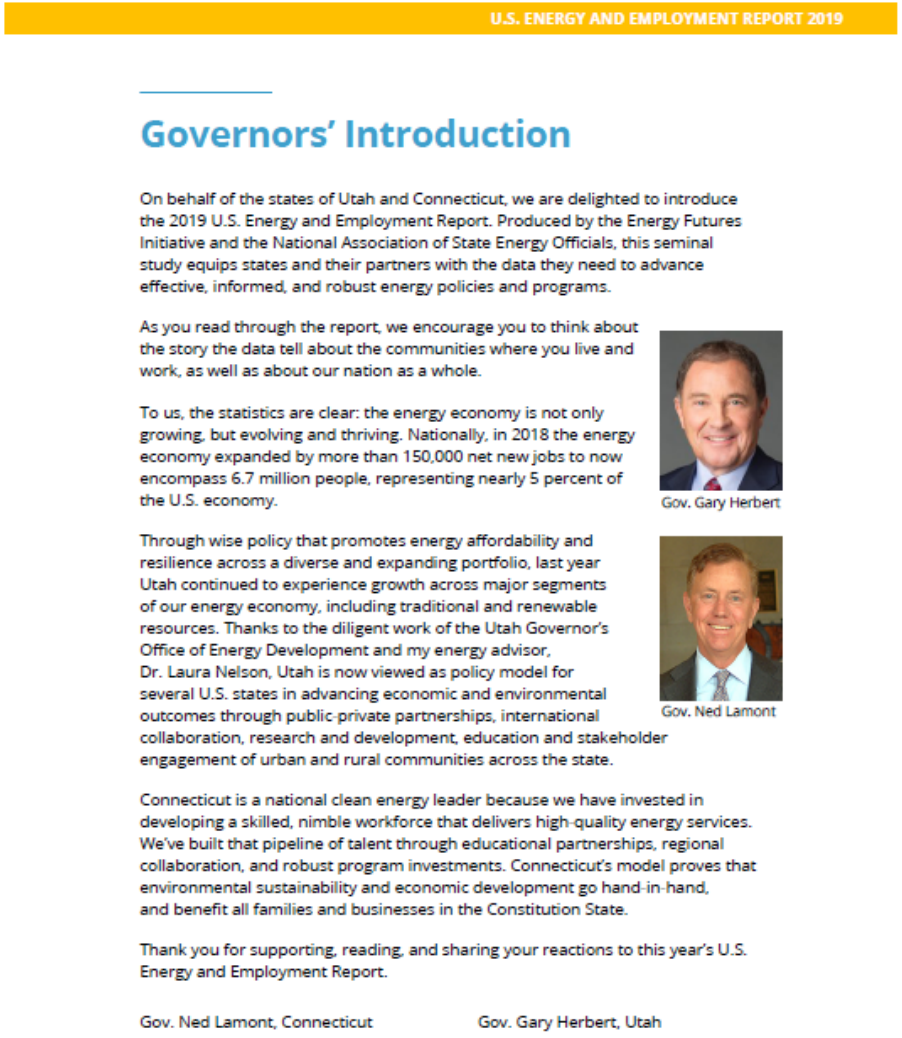
USEER Content

- The survey covers direct employment in 53 different energy, energy efficiency and motor vehicle technologies across 186 NAICS codes located in seven broad industrial classifications.

- The survey determines:
  - Employment numbers
  - Employer hiring expectations for the next 12 months
  - Hiring difficulty by technology and industrial classification
  - High demand jobs and skills gaps
  - Workforce demographics by race, ethnicity, gender, and veteran's status
  - Geographic location by state, county, congressional and legislative districts, and MSA of each technology and industrial classifications

2020 USEER Changes

1. Governor's Introduction from Governor Reynolds of Iowa and Governor Polis of Colorado.
2. Spotlight on real world experience from Tesla, CEWD, Xcel Energy, SMART, UA, and UAW.
3. In-depth look at ENERGY STAR-related jobs.
4. Utility-run energy efficiency programs.
5. Summary of 5-year Trends.



U.S. ENERGY AND EMPLOYMENT REPORT 2019

Governors' Introduction

On behalf of the states of Utah and Connecticut, we are delighted to introduce the 2019 U.S. Energy and Employment Report. Produced by the Energy Futures Initiative and the National Association of State Energy Officials, this seminal study equips states and their partners with the data they need to advance effective, informed, and robust energy policies and programs.

As you read through the report, we encourage you to think about the story the data tell about the communities where you live and work, as well as about our nation as a whole.

To us, the statistics are clear: the energy economy is not only growing, but evolving and thriving. Nationally, in 2018 the energy economy expanded by more than 150,000 net new jobs to now encompass 6.7 million people, representing nearly 5 percent of the U.S. economy.

Gov. Gary Herbert

Through wise policy that promotes energy affordability and resilience across a diverse and expanding portfolio, last year Utah continued to experience growth across major segments of our energy economy, including traditional and renewable resources. Thanks to the diligent work of the Utah Governor's Office of Energy Development and my energy advisor, Dr. Laura Nelson, Utah is now viewed as policy model for several U.S. states in advancing economic and environmental outcomes through public-private partnerships, international collaboration, research and development, education and stakeholder engagement of urban and rural communities across the state.

Gov. Ned Lamont

Connecticut is a national clean energy leader because we have invested in developing a skilled, nimble workforce that delivers high-quality energy services. We've built that pipeline of talent through educational partnerships, regional collaboration, and robust program investments. Connecticut's model proves that environmental sustainability and economic development go hand-in-hand, and benefit all families and businesses in the Constitution State.

Thank you for supporting, reading, and sharing your reactions to this year's U.S. Energy and Employment Report.

Gov. Ned Lamont, Connecticut Gov. Gary Herbert, Utah

Key Takeaways—2020 USEER

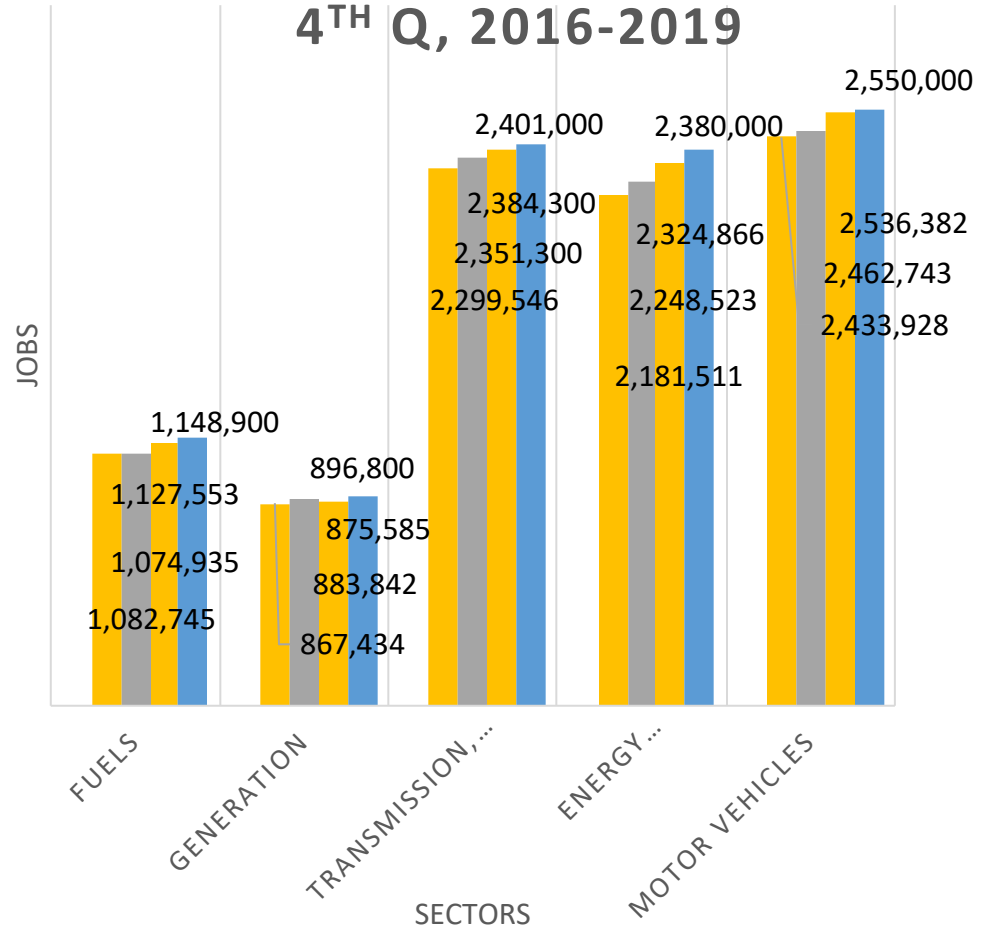
- Traditional Energy and Energy Efficiency added 120,000 jobs in 2019, out-performing the economy for the 5th year, in a row by 0.6 percentage point, 1.8% to 1.2%.
- Energy Efficiency again led the way with 54,000 new jobs, almost 330,000 new jobs in the last 4 years.
- Fuels production added 26,000 new jobs, 18,000 in oil and natural gas, while coal mining held firm.
- Solar jobs bounced back, adding 5,700 jobs after declining for two years in a row, while low emissions' natural gas, wind, CHP, and geothermal all continued to grow.
- Coal generation dropped by almost 8,000 jobs while coal mining increased slightly.
- Motor vehicles added 20,000 jobs, while alternative fuel vehicles declined slightly.
- Overall hiring difficulty continued to rise to over 84%, an increase of 7 percentage points.
- Overall surveyed employers predicted 3.1% growth rate for 2019.

Traditional Energy and Energy Efficiency sectors in 2019 employed approximately

6.8 MILLION AMERICANS

or **4.6 percent** of a workforce of roughly **149 million**

2020 US Energy and Employment Report

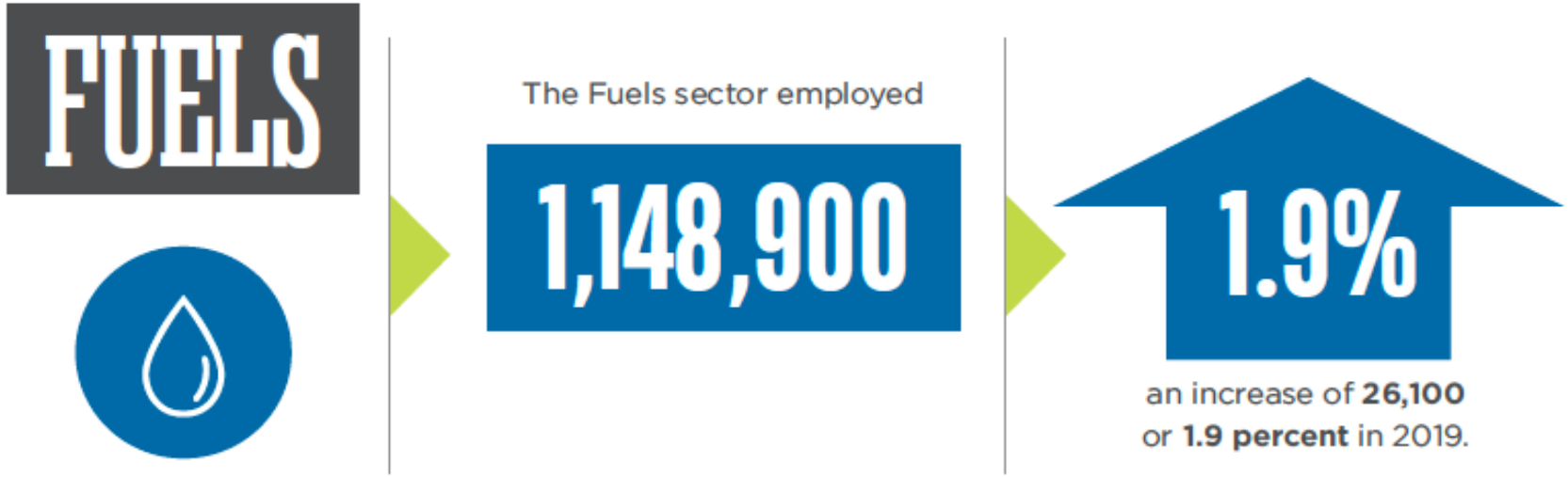


140,000 New Jobs in 2019 in 5 Sectors

- In total, 6.8 million Americans work in Traditional Energy* industries and Energy Efficiency
  - An increase of 120K to 6.8M (excluding gas stations).
- Fuels production directly employs almost 1.15 million workers,
  - 26,000 new jobs in Fuels.
- Electric Power Generation gained over 21,000 jobs
  - EPG employs 896,800. (Includes 97,000 minority-time solar.)
- 2.4 million** Americans work in Transmission, Distribution, and Storage of all energy products
  - 17,100 new jobs (excluding gas stations)
- 2.38 million work in Energy Efficiency
  - A net increase of over 54,000.
- In addition, 2.55 million work in motor vehicles
  - A net increase of 20,000 in 2019.
  - 266,000 work with alternative fuels vehicles, a decline of almost 2%.

*Traditional Energy sectors include Fuels, Electric Power Generation and Transmission, Distribution and Storage.
**Includes 1M gas station employees.

Executive Summary—Fuels



TRENDS

•**2019 Job Gain**. Growth in fuels slowed in 2019 by half.

•**Oil and Gas Recovery.** Oil and natural gas employers added 18,000 new jobs, employing 615,500 and 276,000 respectively.

•**Coal Growth.** Coal fuel jobs increased by 600 jobs, less than 1%, totaling 75,400.

•**Biofuels.** Biofuels increased by 2%, while corn ethanol decreased.

•**2020 Expectations.** Fuels' employers anticipate 1.7% job growth in 2019, with most of the increase expected in oil and natural gas.

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Executive Summary--Fuels

Employment Snapshot

Figure 1.
Fuels Sector – Employment by Industry, 2018-2019

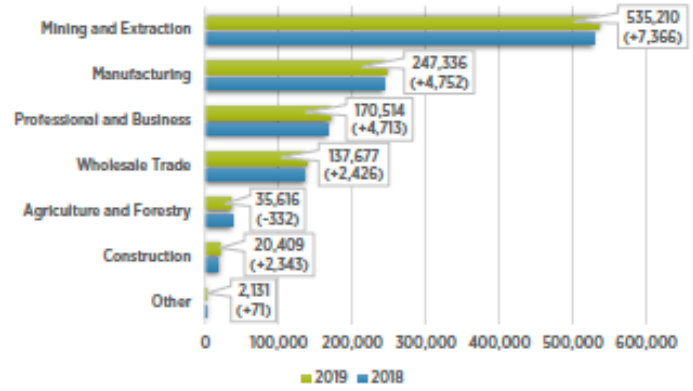
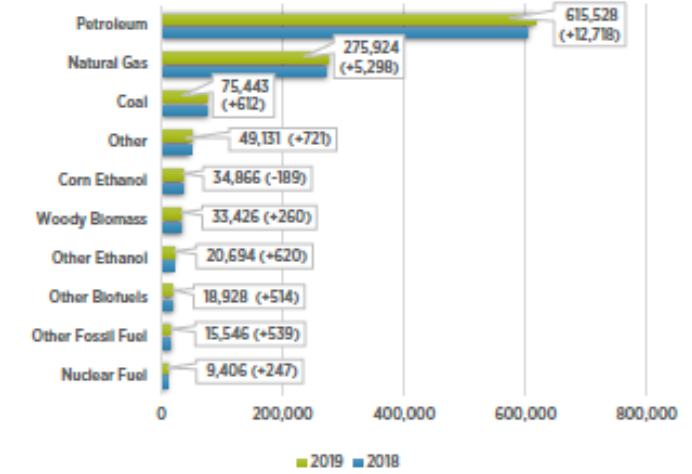


Figure 2.
Fuels Sector – Employment by Detailed Technology Application, 2018-2019



SPOTLIGHT

Chris Reilly, Sr.

Manager, Workforce Development and Education Programs, Tesla

"As a state, Nevada has a rich history of gaming, tourism and mining, but the recession following 2008 created a significant focus on diversifying the economy to include industries like advanced manufacturing and data center technology. Then as Tesla announced the Gigafactory coming to Nevada in 2014, this diversification spurred a growth in STEM jobs in the state that is projected to be 40 percent higher than in non-STEM jobs through 2024."

ENERGY FUTURES INITIATIVE

Executive Summary—Electric Power Generation

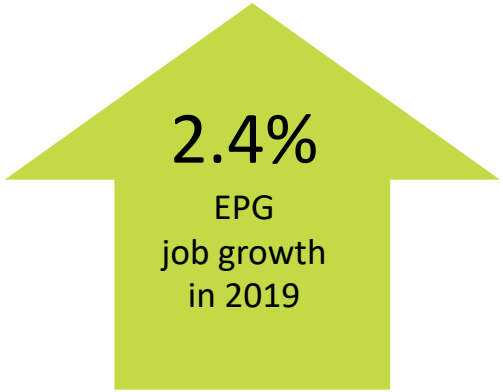
TRENDS

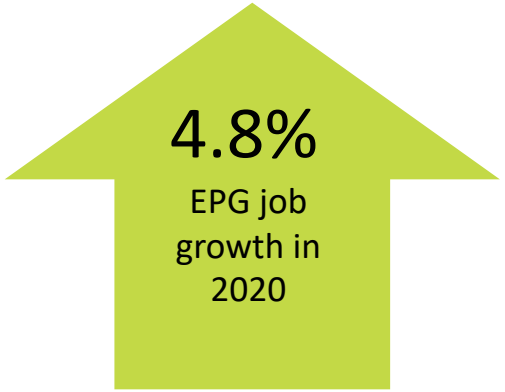
•**2019 Job Growth.** In 2019, the Electric Power Generation sector gained 21,245 jobs for a total of 896,830*, reversing last year's decline.

•**Technology Shifts.** Advanced and traditional natural gas added the most jobs, 9,100, while majority-time solar added 5,700. Other technologies that grew included wind, combined heat and power.

•**Generation Mix.** From 2006-2018 net electricity generation from natural gas increased by 86% while net coal generation declined by 42%. Coal generation declined by almost 8,000 jobs in 2019.

•**2019 Expectations.** Electric Power Generation employers anticipated 4.8% job growth in 2020, with most of the increase expected in renewable construction.





*includes 97,000 minority-time solar jobs

Executive Summary—EPG

Employment Snapshot

Figure 34.
Electric Power Generation Sector – Employment by Industry, 2018-2019

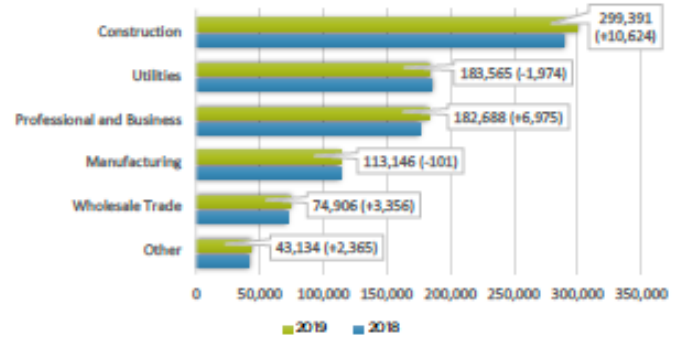
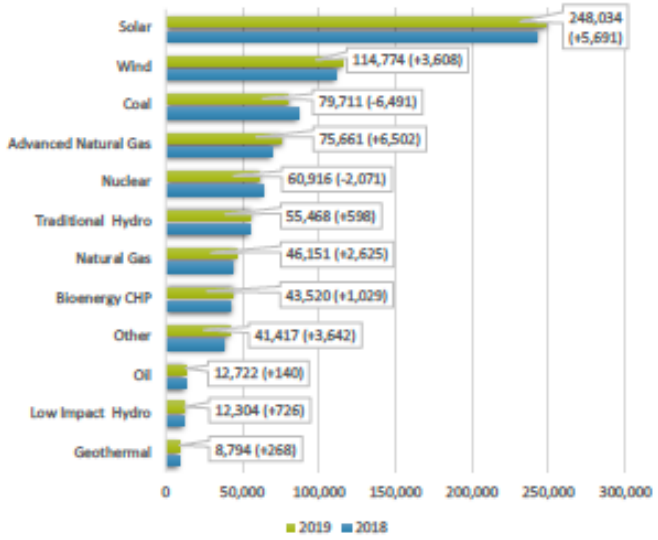


Figure 33.
Electric Power Generation Sector – Employment by Detailed Technology Application, 2018-2019



SPOTLIGHT

MJ Horner

Senior Director of Talent Strategy and Transformation, Xcel Energy

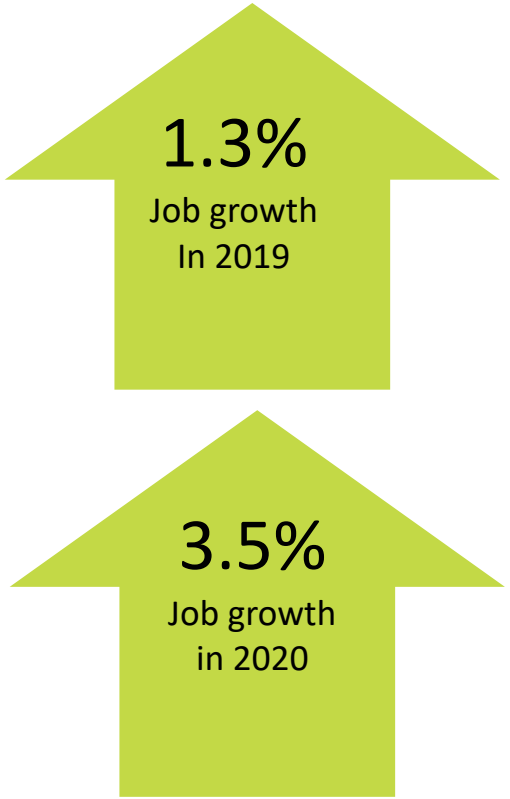
"We think a lot about the energy transition that is underway in America. We have announced our intention to deliver 100 percent carbon-free electricity by 2050. How we manage this transition is very important. We know that there will be fewer power plant jobs in the future but more jobs with data and grid management and customer service."

ENERGY FUTURES INITIATIVE

Executive Summary—Transmission, Distribution and Storage

TRENDS

- **2019 TDS Employment:** Excluding retail employees in gas stations and fuel dealers, 1,383,646 workers were employed in Transmission, Distribution, and Storage, adding 17,800 new jobs.
- **2020 Expectations:** TDS employers predict 3.5% job growth in 2019, led by their largest industry sector, construction employers, who anticipate 6.7% growth.
- **Key Industry Sectors:** The construction sector employed 36% of all TDS workers, while the utility industry employed another 30%



*TD&S includes both electricity and fuels.

Executive Summary—TDS

Employment Snapshot

Figure 74.
TDS Sector – Employment by Industry, 2018-2019

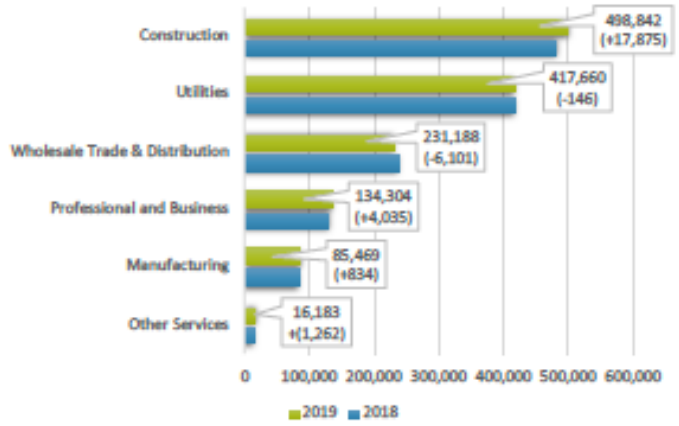
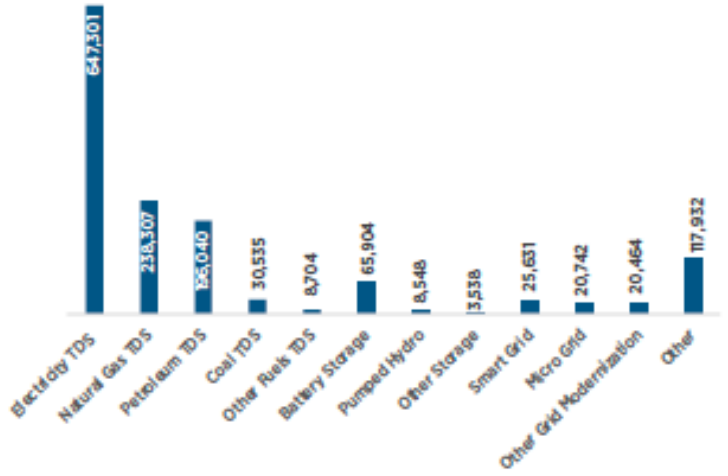


Figure 75.
TDS Sector – Employment by Detailed Technology Application, 2019



SPOTLIGHT

Missy Henriksen

Executive Director, Center for Energy Workforce Development

"The industry's biggest workforce issue today is skills. New jobs in utilities used to be like the old jobs. Now the modernization of infrastructure and the change in generation mix are requiring new skills that are changing on two and five-year cycles. However, industry certificate programs take four years, and we now need to predict new skills several years out."

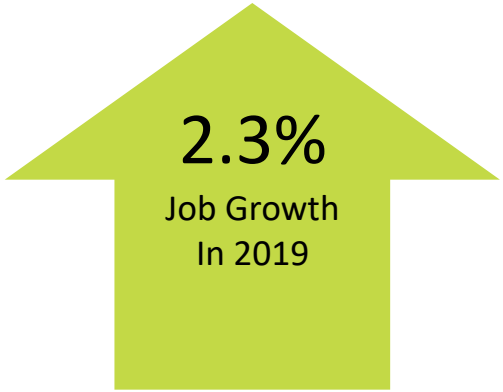
Executive Summary—Energy Efficiency

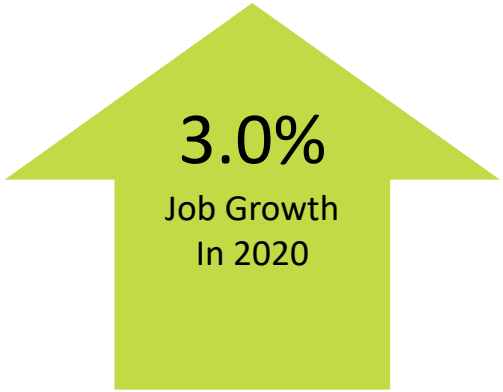
TRENDS

•**2019 Job Growth.** In 2019, the Energy Efficiency sector continued to produce the largest number of new jobs of any energy sector—over 54,000—with 2,378,893 jobs in total.
- •Construction added 27,600.
- •Professional services added 14,800.

•**2020 Expectations.** Energy Efficiency employers report a projected growth rate for employment in 2020 of 3 percent.
- •Construction employers predict 3.6% growth or 48,000 new jobs.

•**Key Occupations:** The majority, 56 percent, of Energy Efficiency employees worked at construction firms in 2019. Approximately one in five workers in the Energy Efficiency sector worked in professional and business services.





ENERGY FUTURES INITIATIVE

Executive Summary—Energy Efficiency

Table 40.
Energy Efficiency Sector – Employment by Detailed Technology Application and Industry, Q2 2019[69]

	Total	Construction	Manu-facturing	Wholesale Trade	Professional Services	Other Services
ENERGY STAR Certified Appliances (not including HVAC)	142,272	73,135	13,234	12,325	39,840	3,738
ENERGY STAR Certified Heating, Ventilation, and Cooling (HVAC)	282,028	198,478	39,262	18,594	22,488	3,206
Other high efficiency HVAC that are out of scope for ENERGY STAR certification[70]	154,263	81,775	36,523	8,464	25,975	1,527
Traditional HVAC goods, control systems, and services	598,375	330,269	32,649	56,743	161,872	16,843
ENERGY STAR certified water heaters	21,685	15,451	368	1,433	4,340	92
ENERGY STAR Certified Electronics[71]	6,969	154	3,912	1,522	267	1,114
ENERGY STAR Certified Windows, Doors and Skylights	26,448	14,449	1,234	2,328	8,050	386
ENERGY STAR Certified Roofing	34,982	23,244	7,301	1,218	2,910	309
ENERGY STAR Certified Insulation	118,101	104,286	7,511	1,110	4,988	207
Air sealing	72,191	39,107	2,469	17,458	12,899	258
ENERGY STAR Certified Commercial Food Service Equipment	29,864	14,732	4,411	948	9,025	748
ENERGY STAR Certified Data Center Equipment	10,949	1,539	3,912	3,045	227	2,228
ENERGY STAR Certified LED lighting	153,293	62,767	13,917	17,676	55,876	3,056
Other LED, CFL, and efficient lighting	227,007	124,739	37,113	23,305	41,277	573
Other renewable heating and cooling[72]	108,313	69,033	7,370	6,687	24,488	736
Advanced building materials/insulation	114,886	28,898	56,782	1,164	26,754	1,288
Recycled building materials	83,862	47,673	12,112	2,808	18,203	3,066
Reduced water consumption products and appliances	93,361	59,213	6,055	5,430	21,269	1,394
Other	100,044	34,502	39,119	4,567	18,514	3,342
TOTAL	2,378,893	1,323,444	325,255	186,824	499,261	44,108

SPOTLIGHT

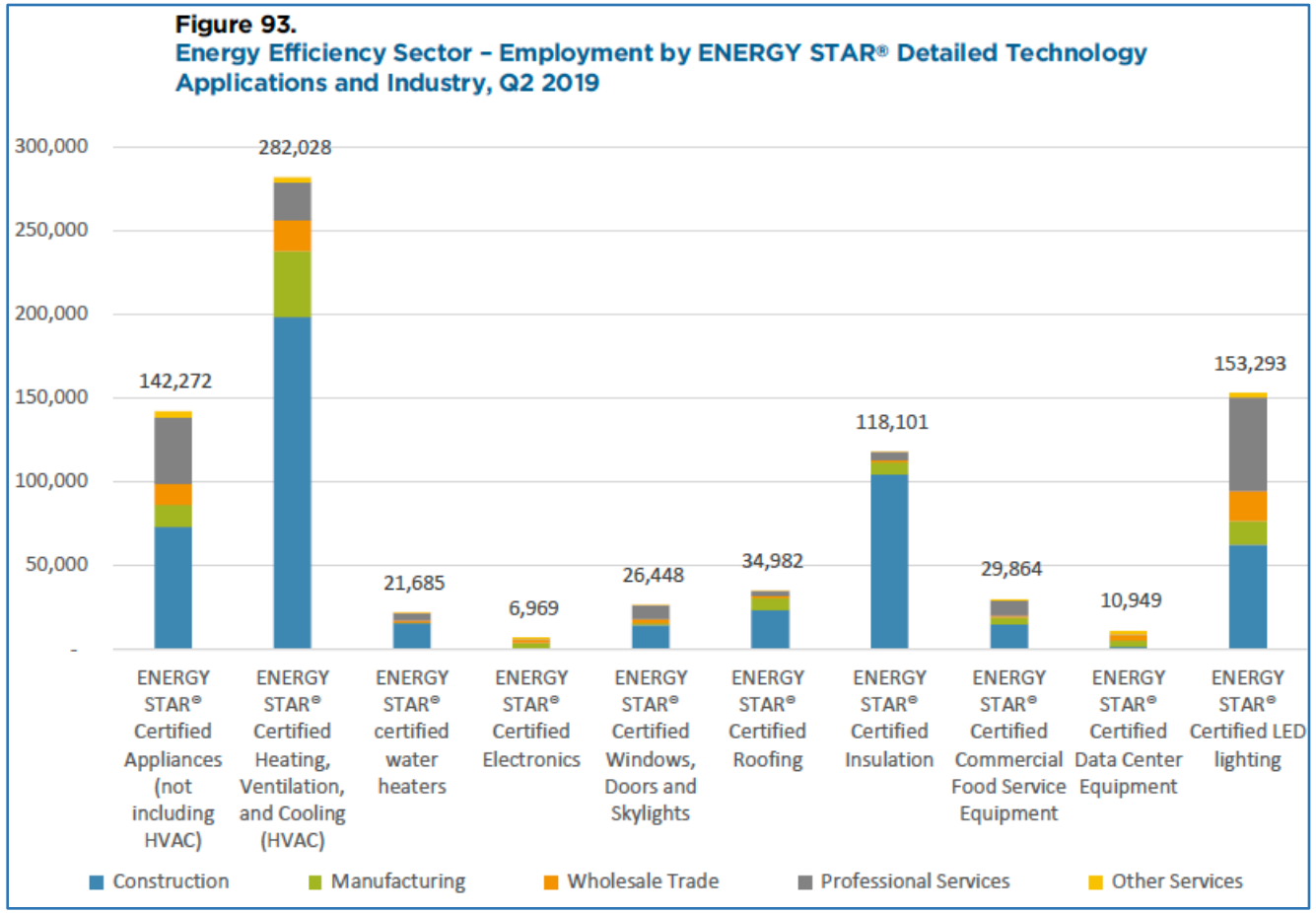
Marc Norberg

Assistant to the General President of SMART

Today, our apprentices are generally older, in their late 20's. Often times they have a college education but haven't been able to get employment in their preferred degree. Our union is also much more diverse. Forty years ago, we were a white man's country club, but today we also do a lot of recruitment of women.

ENERGY FUTURES INITIATIVE

ENERGY STAR PRODUCTS & SERVICES



- 826,500 employees are involved in the manufacture, design, installation, wholesale distribution and other services for ENERGY STAR.
- HVAC systems make up 34%, followed by LED lighting and appliances.
- 508,200 of these employees work in construction.
- 148,000 work in professional services and 95,000 in manufacturing.

ENERGY FUTURES INITIATIVE

Executive Summary—Motor Vehicles

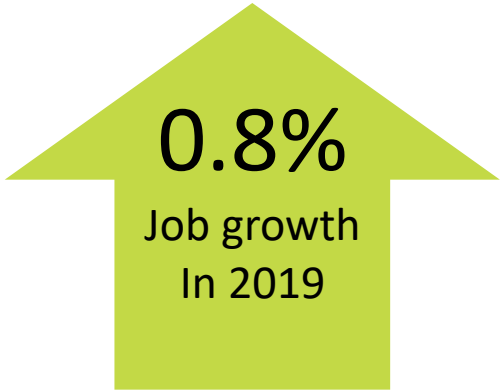
TRENDS

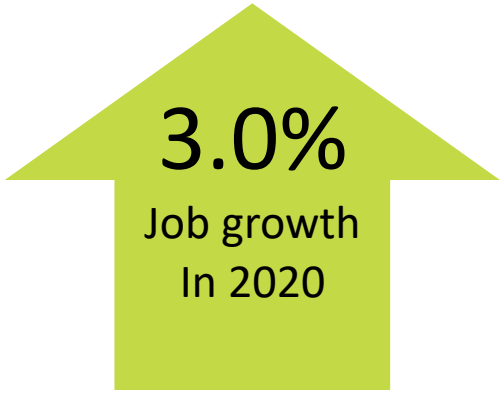
•**2019 Job Growth.** The U.S. Motor Vehicles* sector employed 2,556,492 Americans in 2019, increasing by 20,000 employees over 2018 or 0.8%. This is exclusive of dealerships and retailers, which employed nearly two million additional workers.

•**Alternative fuels vehicles.** Alternative fuels' vehicles employed 266,384 workers in 2019, a decline of over 5,300.

•**Fuel economy.** 44% of employees—over 494,000—in the auto parts sector work with products that contribute to fuel economy.

•**2019 Expectations.** Motor Vehicles' employers anticipate 3.0% growth in 2019.





*The Motor Vehicles sector is not part of the Traditional Energy and Energy Efficiency sectors which separately employ 6.8 million.

Motor Vehicles by Industry Sector & Fuel

Employment Snapshot

Figure 98.
Motor Vehicle and Component Parts Sector – Employment by Industry, 2018-2019

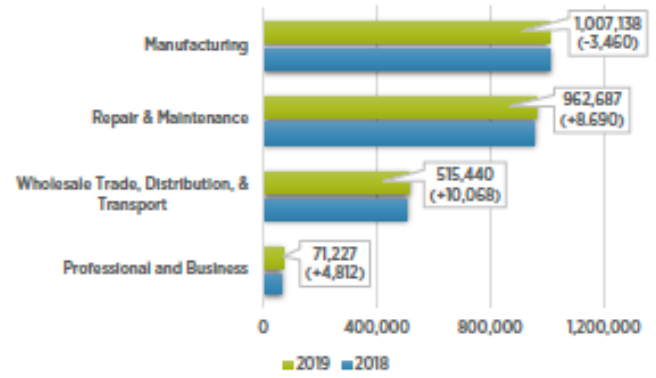
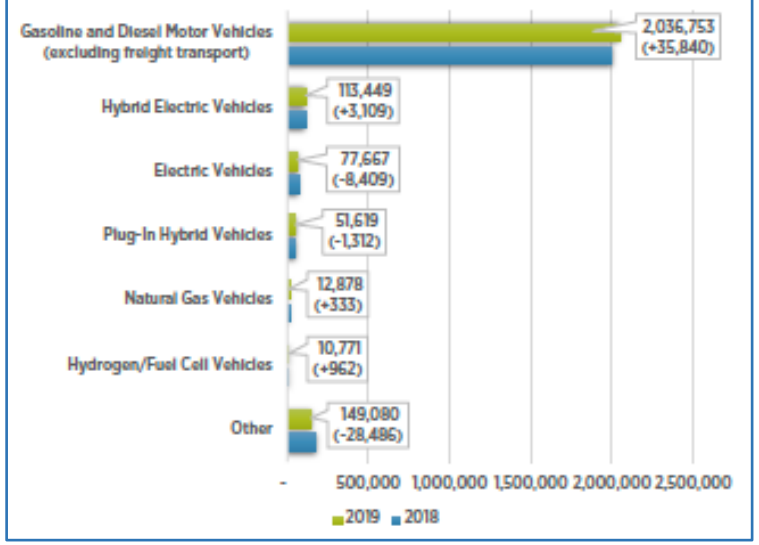


Figure 99.
Motor Vehicles and Component Parts Sector – Employment by Detailed Technology, 2018-2019



SPOTLIGHT

Josh Nassar

Legislative Director, United Autoworkers

"Job quality is very important to maintaining the middle class in America. Over the last 15 years, pay in auto jobs overall (union and non-union) declined by 20%, when adjusted for inflation. That's what was so important about last year's auto negotiations. We need to improve job quality if we're going to restore equality."

ENERGY FUTURES INITIATIVE

Executive Summary—Low Carbon Emissions Energy

- **834,000 Americans are employed, in whole or part, in low carbon emissions** generation and fuels, up 4% from 2017.
- **In generation**, these include:
  - Solar--248,000 spending a majority of their time, with another 97,000 spending less than 50%, increases of 2.4% and 4.3%.
  - Wind—114,000, increase of 3.2%
  - Nuclear—70,600 (generation and fuels), decrease of 2.5%
  - Biomass & CHP—43,500, increase of 3%
  - Geothermal—8,800, increase of 3.1%
  - Hydro—67,800 (12,300 low impact), an increase of 2%
  - Low emissions natural gas—75,700, an increase of 9.4%
- **In fuels**, these include:
  - Corn Ethanol—34,900, a decrease of 1%
  - Woody Biomass/Cellulosic Biofuels—33,400, an increase of 1%
  - Other Ethanol and Non-woody Biomass, incl. Biodiesel—20,700, an increase of 3%
  - Other Biofuels—18,900, an increase of 2.8%

ENERGY FUTURES INITIATIVE

Executive Summary—Construction Industry

- **Of the 7.5 million construction workers in the U.S., over 2.142 million, about 29%** are employed by traditional energy or energy efficiency firms.
  - **1,323,400 jobs are in Energy Efficiency**.
  - **498,800 jobs** are in Transmission, Wholesale Distribution, and Storage
  - **299.400 jobs** are in Electric Power Generation
  - **20,400 jobs** are in Fuels

- Construction firms in EE report the greatest hiring difficulty in the entire survey with 45% indicating it is “very difficult” to hire new employees with 91% reporting some level of difficulty.

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Executive Summary—Professional Services

- **Of the 21.2 million professional and business services jobs in the U.S., 986,800, about 4.7%** are directly engaged in traditional energy or energy efficiency firms.
  - **170,500 jobs** are in Fuels.
  - **182,700 jobs** are in EPG
  - **134,300 jobs** are in TDS
  - **499,300 jobs** are in EE.
    - **2020** projected growth rate is 4.5% or 44,300 new jobs with the majority expected in Electric Power Generation and Energy Efficiency.

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Executive Summary—Manufacturing

- **Of the 12.8 million manufacturing jobs in the U.S., over 771,200, about 6%** are directly involved in the production of fuels, generating, and transmission equipment, and energy efficiency products.
  - **247,300 jobs** are in Fuels.
  - **113,100 jobs** are in Electric Power Generation.
  - **325,300 jobs** are in Energy Efficiency.
  - **85,500 jobs** are in Transmission, Wholesale Distribution, and Storage.

  - Another **1.01 million jobs** are in Motor Vehicle manufacturing.
    - **85,000** of these jobs are in manufacturing alternative fuels vehicles.
    - **634,000 manufacturing jobs** are in component parts. 44% of all component parts jobs support fuel efficiency technologies.

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Crosscuts—Natural Gas and Coal Industries

Table 35.
Natural Gas Industry Employment by Detailed Technology Application and Industry, Q2 2019[46]

	Total	Mining and Extraction	Utilities	Construc-tion	Manufac-turing	Wholesale Trade, Distribution, + Transport (including Pipeline)	Professional and Business Services	Other Services
Fuels	275,924	165,602	--	--	45,276	29,633	35,235	178
Conventional Gas Generation	46,151	--	19,276	10,551	3,635	3,180	8,371	1,139
Advanced Gas	75,661	--	47,224	9,638	2,791	4,983	10,118	907
Fuel Transmission + Distribution	236,580	--	117,112	88,824	--	30,644	--	--
Storage	1,727	--	--	563	285	214	653	12
TOTAL	636,042	165,602	183,612	109,576	51,986	68,653	54,377	2,236

Table 36.
Coal Industry Employment by Detailed Technology Application and Industry, Q2 2019[51]

	Total	Mining and Extraction	Utilities	Construc-tion	Manufac-turing	Wholesale Trade, Distribution, + Transport	Profes-sional and Business Services	Other Services
Fuels	75,443	55,669	--	--	10,643	1,031	8,075	25
Coal Generation	79,711	--	38,158	8,847	1,083	6,104	24,508	1,011
Fuel Transmission + Distribution	30,535	--	--	--	--	30,535	--	--
TOTAL	185,689	55,669	38,158	8,847	11,726	37,670	32,582	1,036

WAGE DISTRIBUTION[50]

- The average reported median full-time hourly wage for all entry level workers in the natural gas industry is $19.99/hour.
- The average reported median full-time hourly wage for all mid-wage workers is $27.24/hour.
- The average reported median full-time hourly wage for the highest earners in the industry is $39.19/hour.

WAGE DISTRIBUTION[55]

- The average reported median full-time hourly wage for all entry level workers in the coal industry is $18.41/hour.
- The average reported median full-time hourly wage for all mid-wage workers is $28.48/hour.
- The average reported median full-time hourly wage for the highest earners in the industry is $42.07/hour.

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Crosscut—Nuclear Industry

Table 38.
Nuclear Industry Employment by Detailed Technology Application and Industry, Q2 2019[61]

	Total	Mining and Extraction	Utilities	Construction	Manufac-turing	Wholesale Trade, Distribution, + Transport	Professional Services	Other
Fuels	**9,406**	**348**	**--**	**--**	**3,078**	**929**	**5,052**	**--**
Nuclear Generation	**60,916**	**--**	**44,366**	**2,217**	**1,901**	**2,639**	**9,705**	**89**
TOTAL	70,323	348	44,366	2,217	4,979	3,568	14,757	89

Wage distribution[64]

- The average reported median full-time hourly wage for all entry level workers in the nuclear industry is $22.56/hour.
- The average reported median full-time hourly wage for all mid-wage workers is $36.46/hour.
- The average reported median full-time hourly wage for the highest earners in the industry is $54.86/hour.

Figure 86.
National Heat Map Showing Distribution of Nuclear Jobs

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Executive Summary—Hiring Difficulties

- **84.4% of all surveyed employers reported difficulty hiring qualified workers over the last 12 months; 29% noted it was very difficult.** (In 2018, these numbers were 76.9% and 29%)
- **Technologies and Occupations with the highest hiring difficulties:**
  - Energy Efficiency construction jobs, 45% very difficult, 91% somewhat difficult.
  - Professional and business services EE jobs, 80% very or somewhat difficult.
  - TDS construction employers, 80% very or somewhat difficult.
- **Highest Demand Occupations in EE Construction:**
  - Installation workers (49%)
  - Technician or mechanical support (48%)
  - Sales, marketing, or customer service (14%)

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Executive Summary—Projected Hiring Rates

Projected growth rate in 2020

4.8%

Electric Power Generation employers projected the highest growth rate in 2020.

3.5%

Transmission, Distribution, and Storage

3.0%

Energy Efficiency

3.0%

Motor Vehicles sector

1.7%

Fuels

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Executive Summary—Workforce Demographics

- **Many of these sectors are now racially more diverse than the workforce as a whole** (22%).
  - 10-19% Latino or Hispanic compared to 17% overall.
  - 5-9% Black or African-American compared to 12% overall.
  - 7-10% 2 or more races compared to 2% overall.
  - EPG is the most diverse sector with 31% of the workforce people of color.
- **Women make up from 23-32%** of these sectors compared to 47% of the overall workforce.
  - Electric Power Generation employs the highest percentage of women.
- **Veterans comprise about 8-10%** of employees, compared to 6% nationally.
- **Unionization rates are generally higher than the national rate of 6.2% in the private sector:**
  - TDS-17%, Motor Vehicles-13%, EE-10%, EPG-7%, and Fuels-3%

5 Year Trends—Energy Jobs Are Changing

- **3.3 million** Americans work every day to produce and distribute the fuels and electricity that power our lives.
- **4.93 million** Americans in Energy Efficiency and Motor Vehicles work every day to use that energy more efficiently.

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5 Year Trends—Energy Jobs Are Changing

SPOTLIGHT

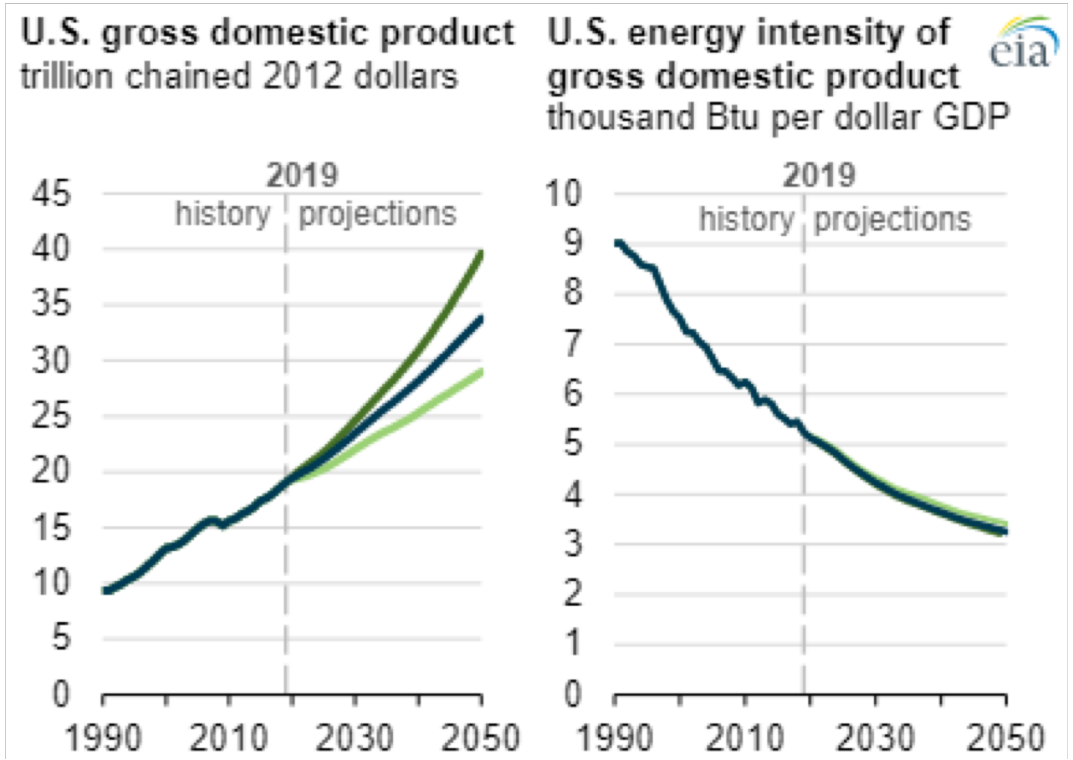
Mike Mulvaney

Director of Energy and Infrastructure, United Association of Plumbers, Fitters, Welders and Service Techs

"It used to be that you graduated from high school on Friday and entered our apprenticeship program on Monday. But high school counselors today are always encouraging kids to go to college. Instead of acknowledging that the trades provide a very good living. Some of our pipeline welders make $150,000 to $200,000 a year.

"We are also seeing big increases in energy efficiency technologies. We are just in the first or second inning of 'smart buildings'".

Decoupling of Energy Production and Consumption Has Been Good for Jobs



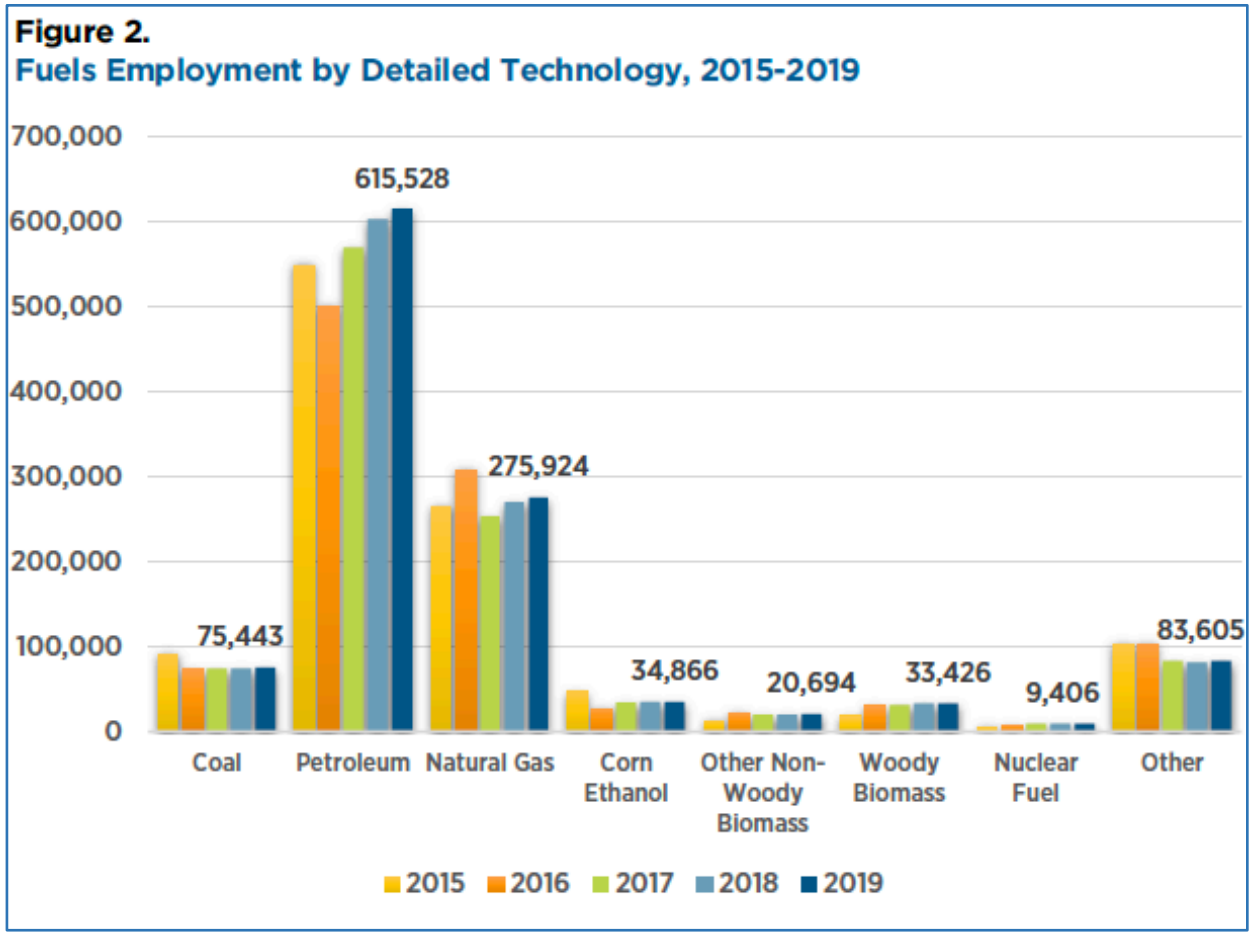
Between 2015 and 2019:

Energy production and distribution created 254,000 new jobs.

U.S. GDP energy intensity decreased by 8%

Energy Efficiency and Fuel Efficiency created 481,000 new jobs.

Trends 2015-19: Fuels

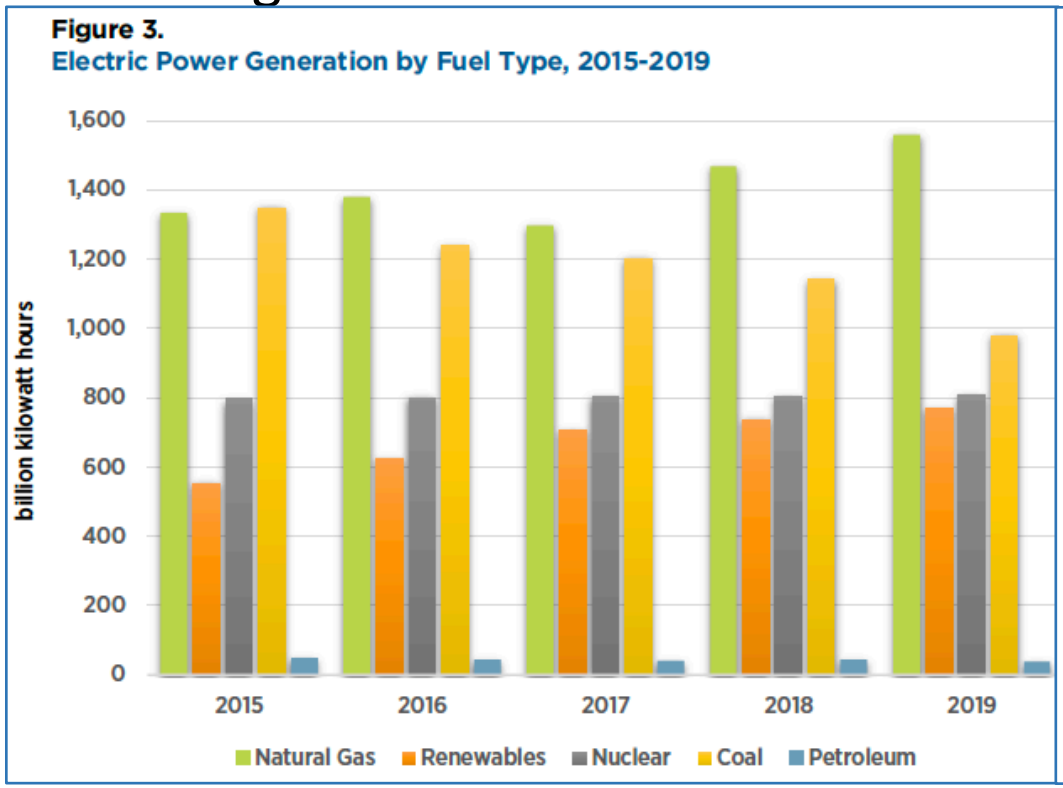


- Oil and gas fuels combined employ over 891,000,adding 73,000 jobs or 8.9%.
- Coal fuels lost 17,000 jobs, a decline of 18%.
- Overall, ethanol and biofuels have declined by 3,600 jobs with corn ethanol down by 12,000 and various biofuels up by 65%.
- Mining and extraction jobs comprise 55% of all fossil fuel jobs; 88% of them are located in just 10 states.

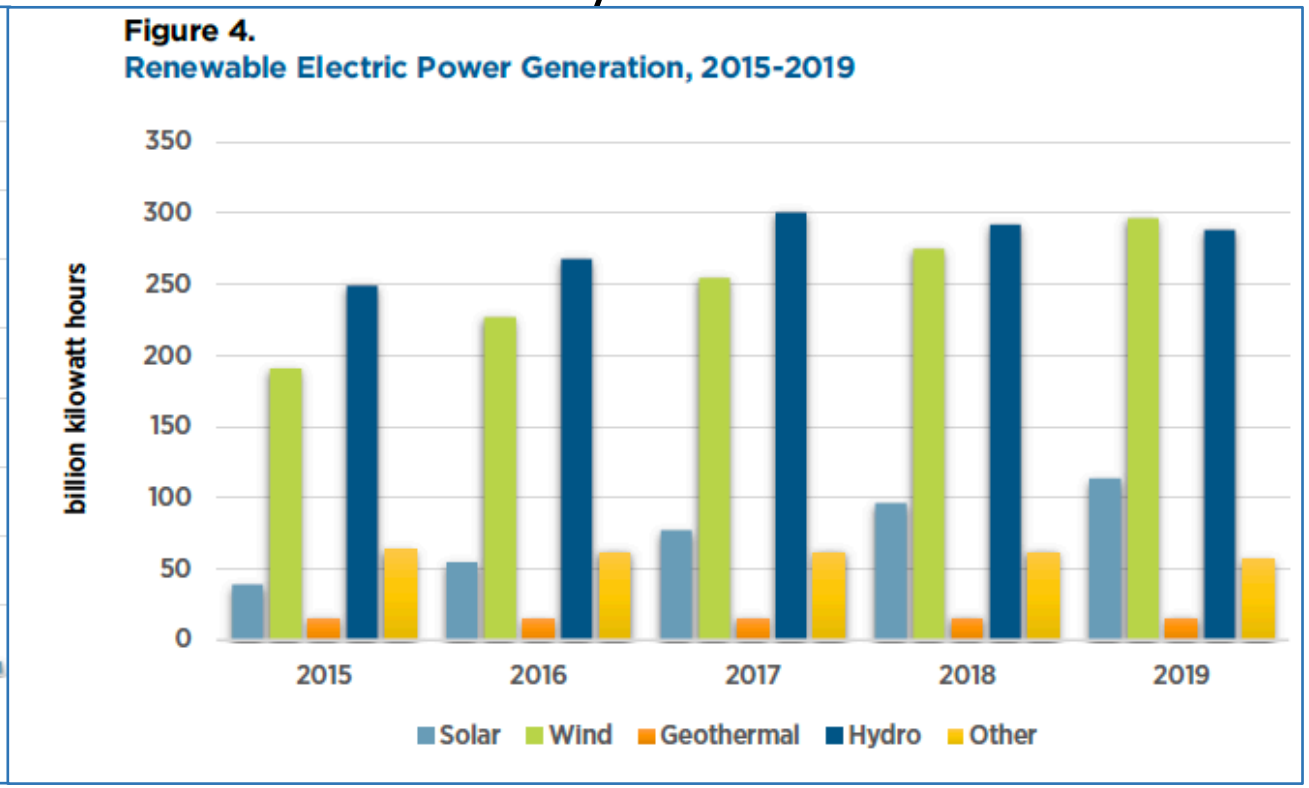
Trends 2015-2019: Electric Power Generation

Two Notable Shifts Occurred in Generation Sources

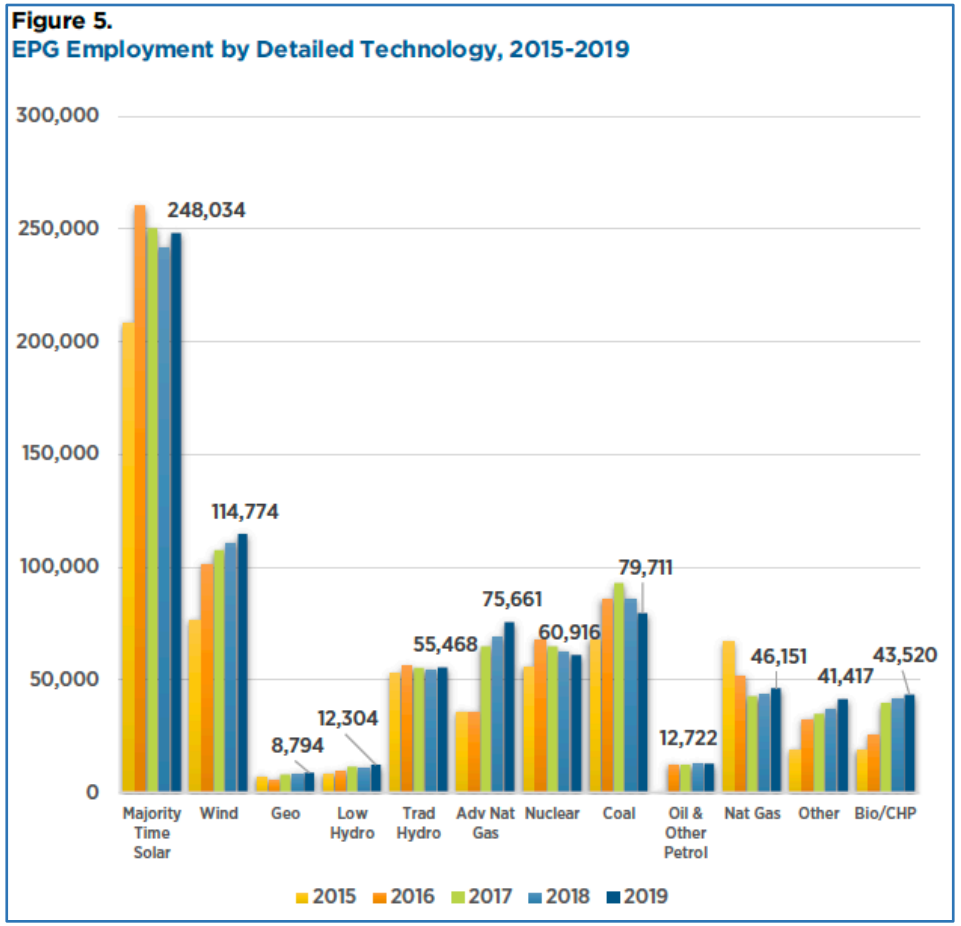
Natural Gas Displaced Coal as the Largest Net Power Generator



Within Renewables, Wind Displaced Hydro

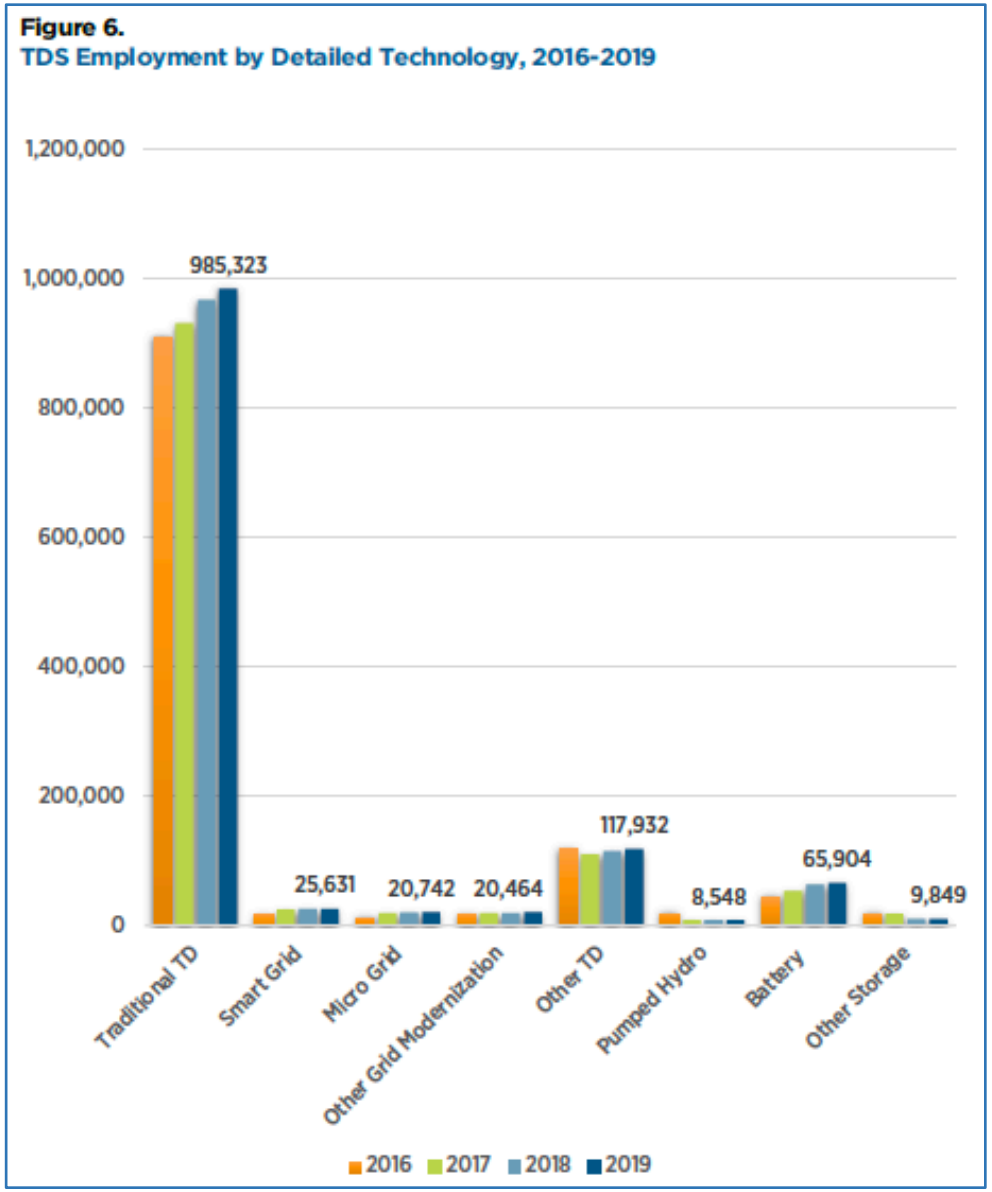


Trends 2015-2019: Electric Power Generation



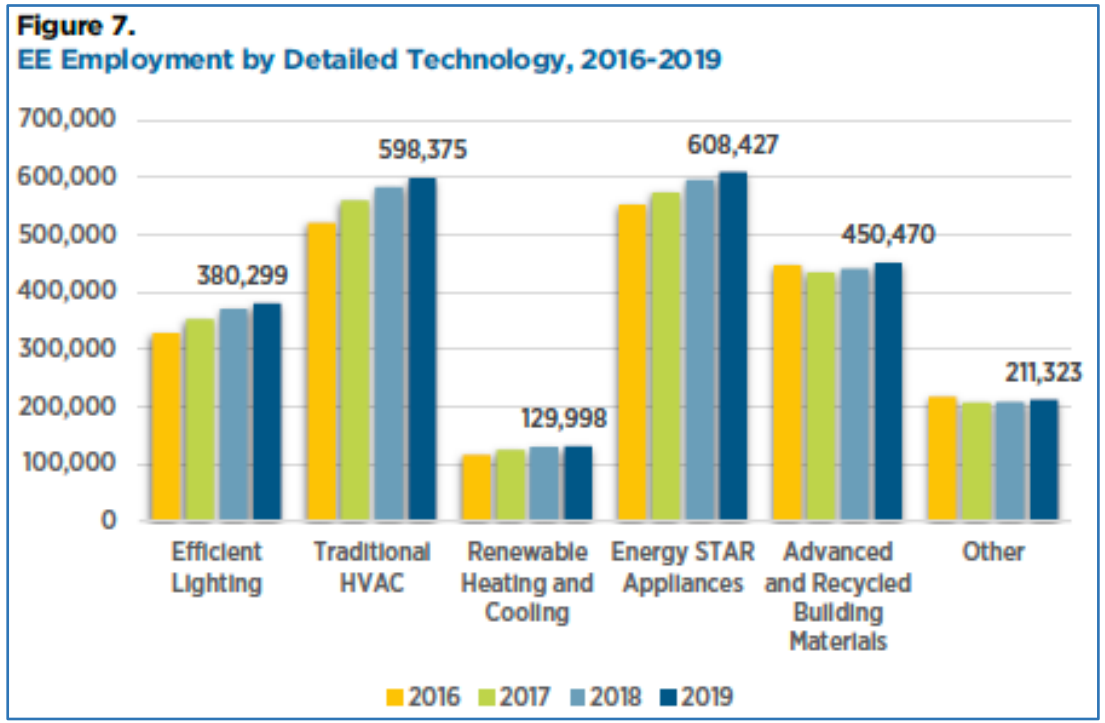
- During the last 4 years, EPG added 52,000 jobs, mostly in natural gas, wind, and CHP.
- Coal generation lost 18,000 job and now employs 79,700 while natural gas employs 121,800.
- Wind is the largest renewable in net generation and second in employment at 114,800.
- Solar has declined from its peak in 2016.

Trends 2015-2019: Trans., Dist., & Storage



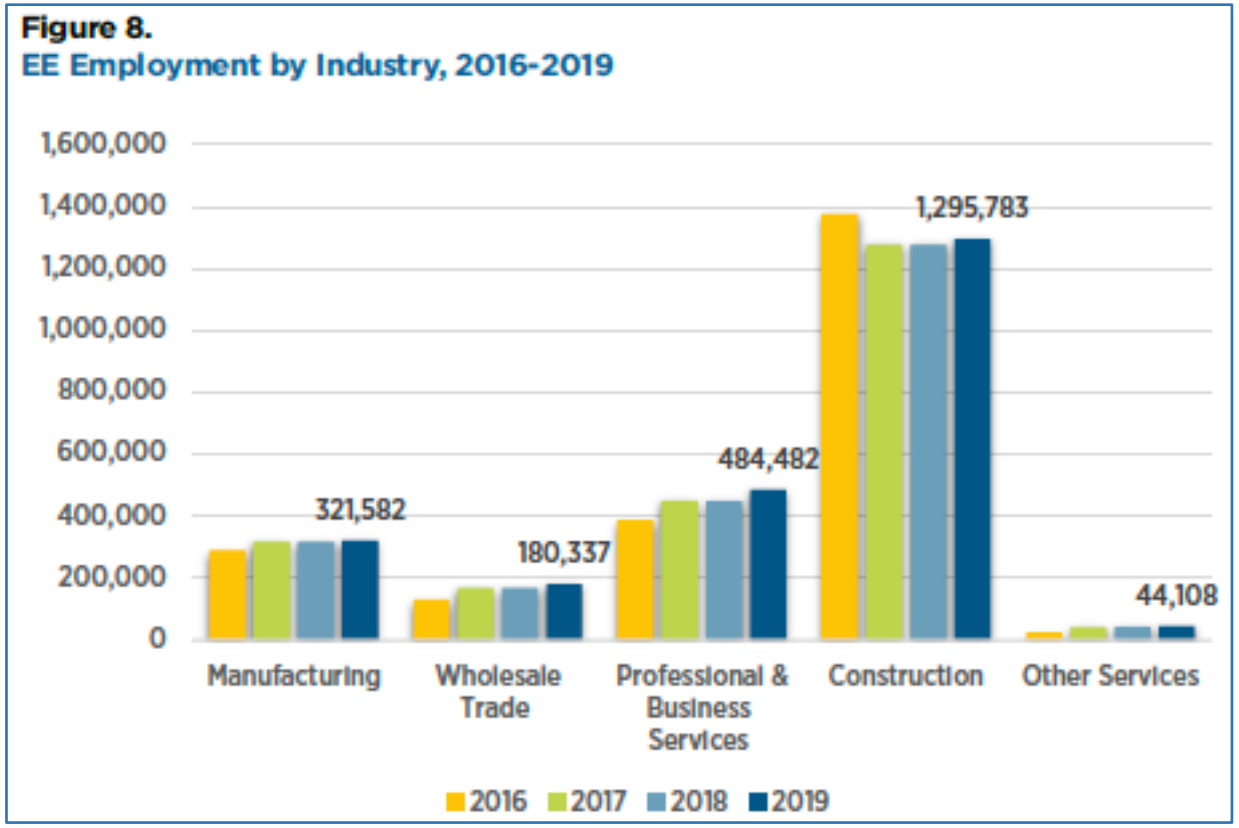
- TDS added 156,000 new jobs driven by:
  - Expanding oil and gas production
  - Renewables deployment
  - Grid modernization
  - Smart grid
  - Storage demand
- Battery storage added 18,700 jobs.

Trends 2015-2019: Energy Efficiency



- Energy Efficiency added the most jobs of any sector—over 400,000.
- Traditional HVAC employers added the most new jobs, 77,800.
- Efficient lighting added 52,500 new jobs.
- In 2019, the USEER identified 826,500 jobs associated with the ENERGY STAR standards.

Trends 2015-2019: Energy Efficiency



- Construction comprises the largest sector of Energy Efficiency with over 54%. However, extreme hiring difficulty has hampered growth.
- EE construction companies report that 78% of their employees spend the majority of their time on EE technologies, up from 64.8% in 2015.
- Professional services, the second largest sector, has added the most jobs, over 113,000.

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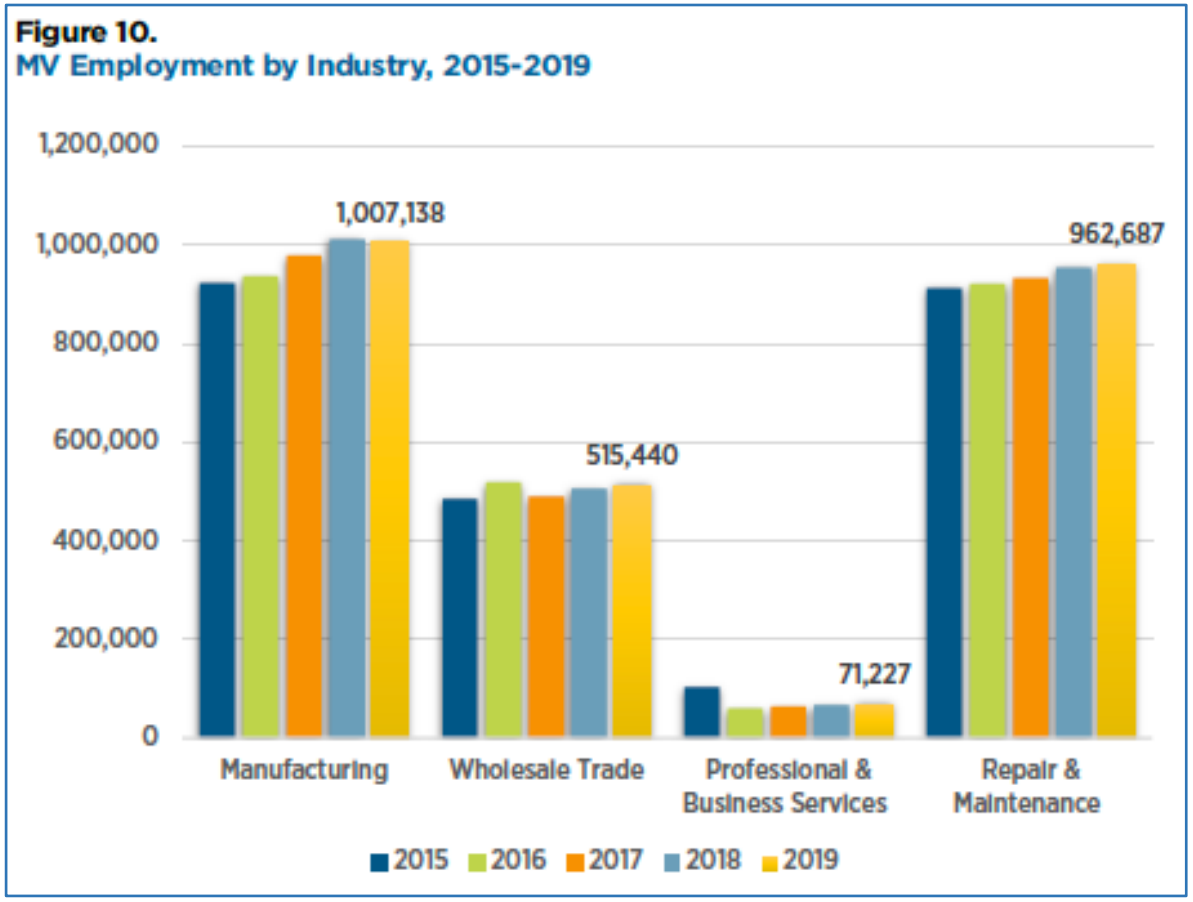
Trends 2015-19: Motor Vehicles & Parts

Fuel Efficiency and Electrification Are Driving Job Growth



- MV has added 134,300 new jobs. 95,000 were in manufacturing.
- Alternative fuels vehicles now employ 266,000 Americans, adding over 76,000 new jobs since 2015.
- All-electric vehicles added the most jobs, up 36,000.
- 494,000 Component Parts employees now contribute to fuel efficiency.

2020 USEER

Thank you!

Questions?

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