Employment Security Department
WASHINGTON STATE

Clean Energy Employment in Washington State

Prepared for Pacific Northwest Regional Economics Conference
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Background

- In 2023, the Washington State Legislature passed House Bill 1176, the Climate and Clean Energy Service Workforce Programs bill
  - Address state workforce needs as we transition away from fossil fuels and into a clean energy economy
- This legislation created the Clean Energy Technology Workforce Advisory Committee (CETWAC)
  - Members drawn from business, labor, education, career and training programs, as well as several state agencies
  - Biennial reporting on research and recommendations
    - First report in 2023, upcoming 2025
- Employment Security Department's role
  - Provide labor market data that can inform CETWAC's policy recommendations

Labor Market Report Goals

- Establish a baseline measure of clean (and traditional/mixed) energy employment in the state
  - Industry employment, wages and trends
  - Occupational employment and wages
  - Projected employment by industry and occupation
  - Demographics of the clean energy workforce
- Two methods of examining this
  - “Traditional” labor market information – BLS & ESD, LEHD
  - Washington’s unemployment insurance (UI) wage records
    - Worker-level data: hours worked, wage distributions by industry and occupation (new!)

Roadmap

- Background
- Data and methods
- Industry employment and wages
- Occupational employment and wages
- Employment projections
- Demographics
- Unemployment insurance wage records detail
- Future work and discussion

Previous Work

- U.S. Department of Energy – U.S. Energy & Employment Jobs Report (USEER)
  - Annual survey of employers to identify clean energy jobs that may not be captured through traditional industry definitions
  - Pros: Avoids strict industry definitions, detailed responses
  - Cons: Difficult to interpret trends when employer perception of clean energy changes

- Clean Energy Transition Institute - Net-Zero Northwest (NZNW) report
  - How would existing and future jobs change if the Northwest were on the path to net-zero emissions?
  - Modeling-based approach (IMPLAN) to project direct, indirect, and induced employment in clean energy industries over time, under several scenarios
  - Pros: Can be a powerful planning tool for policy makers
  - Cons: Results can be sensitive to model assumptions, “best case scenario” outlook

Data and Methods

- Selection of NAICS and SOC codes
  - Clean energy industries not well defined by North American Industry Classification System (NAICS)
    - Following industries identified by USEER and NZNW reports
    - Assistance from BW Research
  - Occupations: Review of 2018 Standard Occupational Classification (SOC) manual
    - Top occupations in “known” clean, traditional, and mixed energy industries
    - Prominent occupations within USEER and NZNW industries
  - See report for full list of NAICS and SOC codes used
- Traditional Labor Market Information (LMI) data sources
  - Quarterly Census of Employment and Wages (QCEW)
  - Occupational Employment and Wage Statistics (OEWS)
  - Employment Projections
  - Longitudinal Employer-Household Dynamics (LEHD)
- Unemployment Insurance (UI) Wage Records
  - Greater detail on wage distribution by industry, occupation

Clean Energy Industries

- Four major categories, following NZNW and USEER reports
- Energy Production
  - **Electricity** - electric power generation, distribution, transmission, and control; power and communication line and related structures construction
  - **Fuels** - natural gas extraction, distribution, transportation; coal mining; petroleum and petroleum product transportation; drilling oil and gas; support activities for oil and gas; oil and gas related construction and manufacturing
- Energy Consumption
  - **Buildings -** residential and nonresidential construction; specialty residential and nonresidential construction; heavy and civil engineering construction; steam and air-conditioning supply
  - **Transportation -** manufacturing of motor vehicles, motor vehicle parts, motor vehicle body and trailers, motor vehicle wholesalers; automotive repair and maintenance
    - USEER and NZNW constrain to motor vehicles, WA full report contains air and ship as well
- Data source: Quarterly Census of Employment and Wages (QCEW)
  - Employment, establishments and wages by industry (NAICS code) for all employers covered by unemployment insurance
  - This report uses annual averages, 2023 most recent year
    - 2013-2023 annual average wages not adjusted for inflation

Electricity

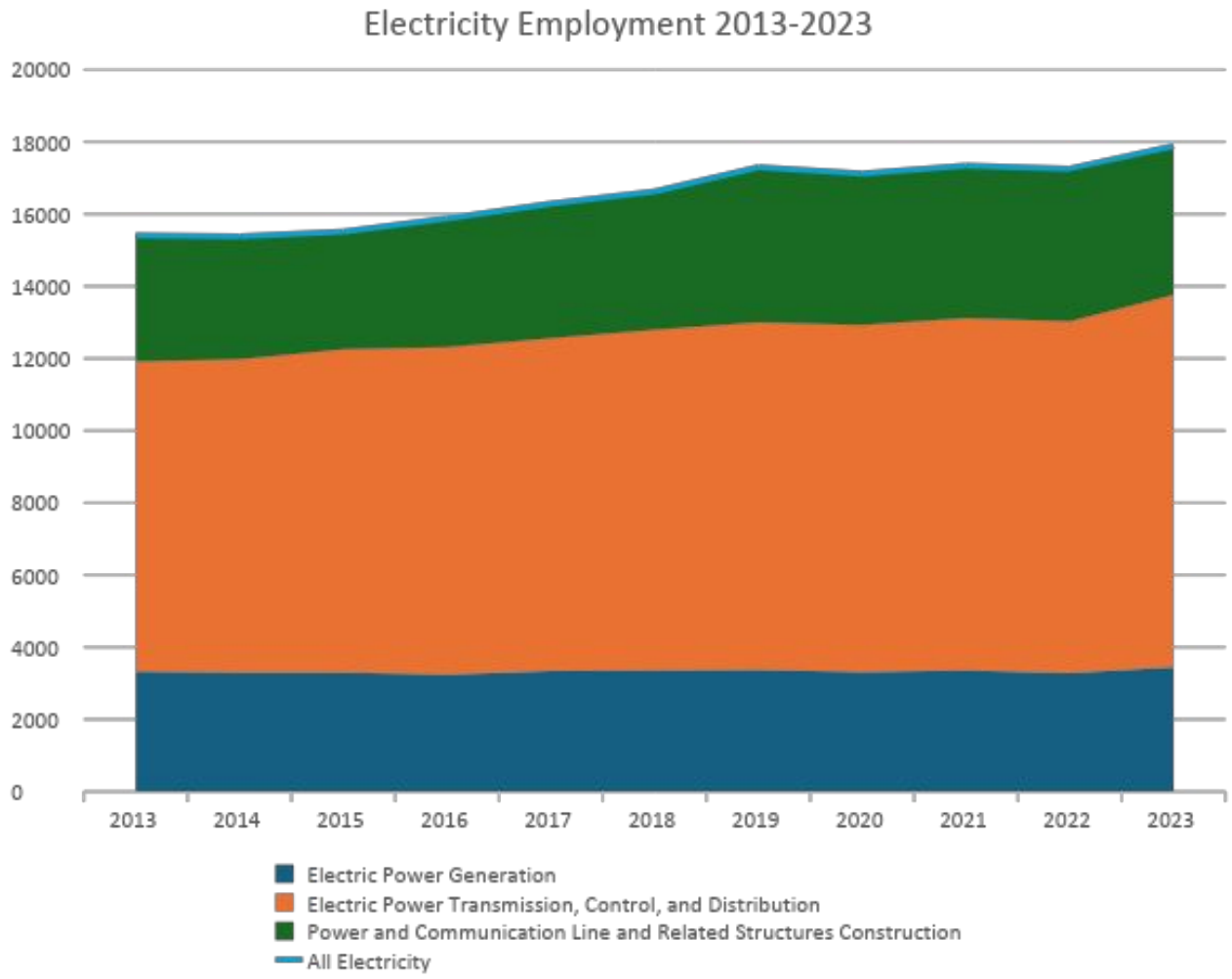
2023 Total electricity employment: **17,887**

- Up by 3.6% from 2022

10,308 jobs in electric power transmission, control and distribution

4,132 jobs in power and communication line and related structures construction

3,447 jobs in electric power generation



Electricity Wages

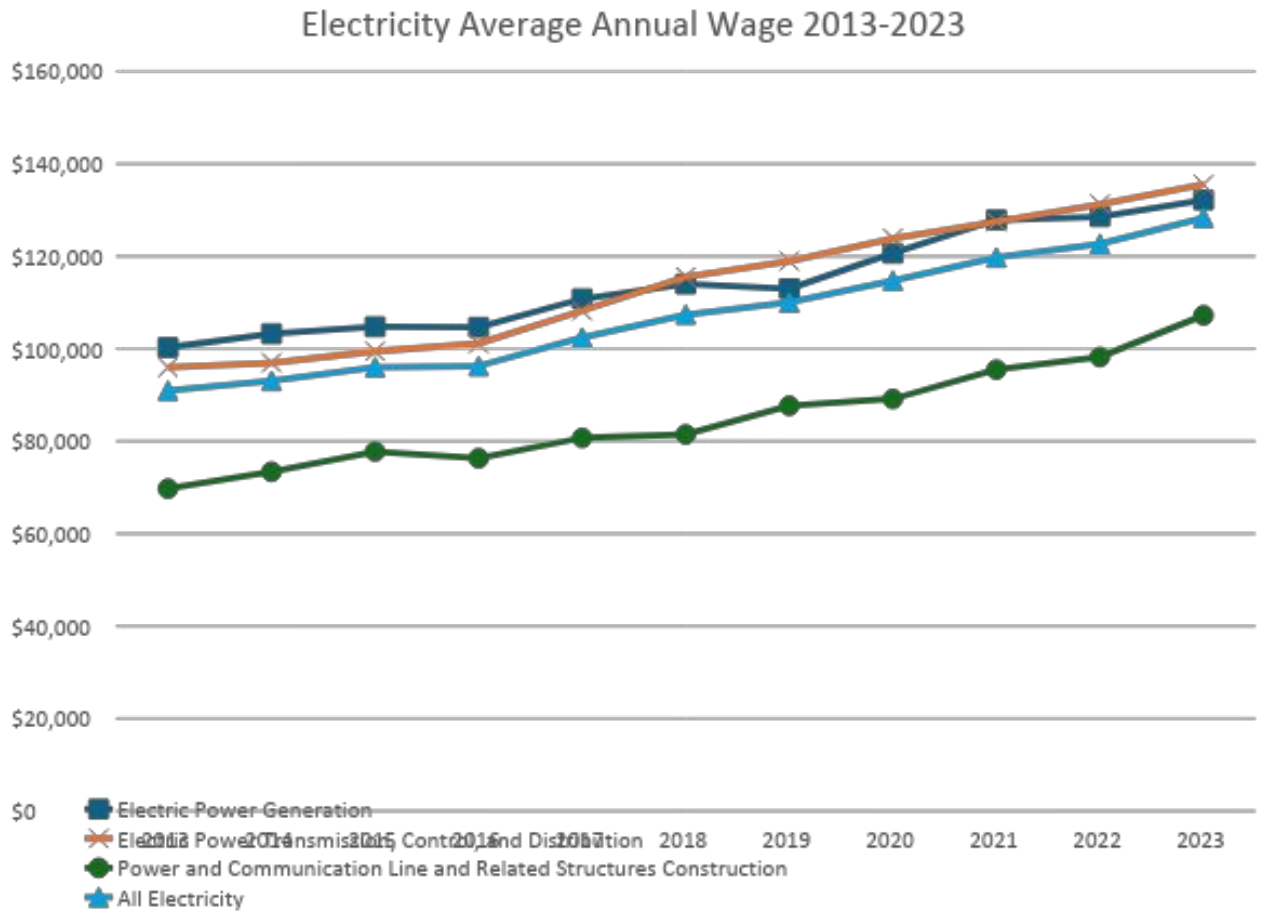
$128,344 average annual wage in 2023

- Up 4.6% from 2022

$135,515 for electric power transmission, control, and distribution

$132,201 for electric power generation

$107,236 for power and communication line and related structures construction



Fuels

Total employment: **4,997** in 2023

- Down by 0.36% from 2022

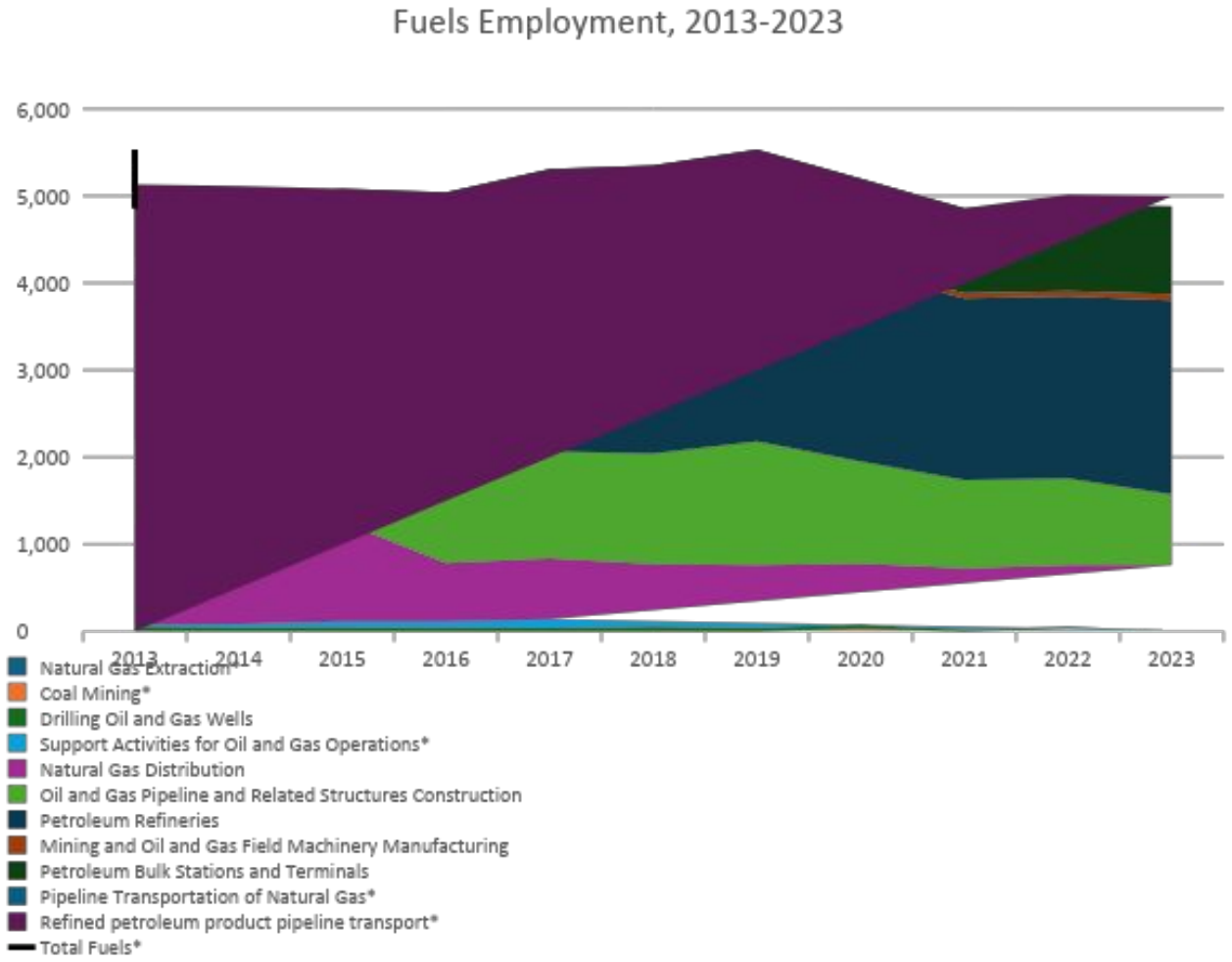
2,228 jobs in petroleum refineries

1,012 in petroleum bulk stations and terminals

811 in oil and gas pipeline and related structures construction

749 in natural gas distribution

197 in all other fuels industries



Fuels Wages

$142,831 average annual wage in 2023

- Up by 5.6% from 2022

$183,239 in petroleum refineries

$150,816 in refined petroleum product pipeline transport

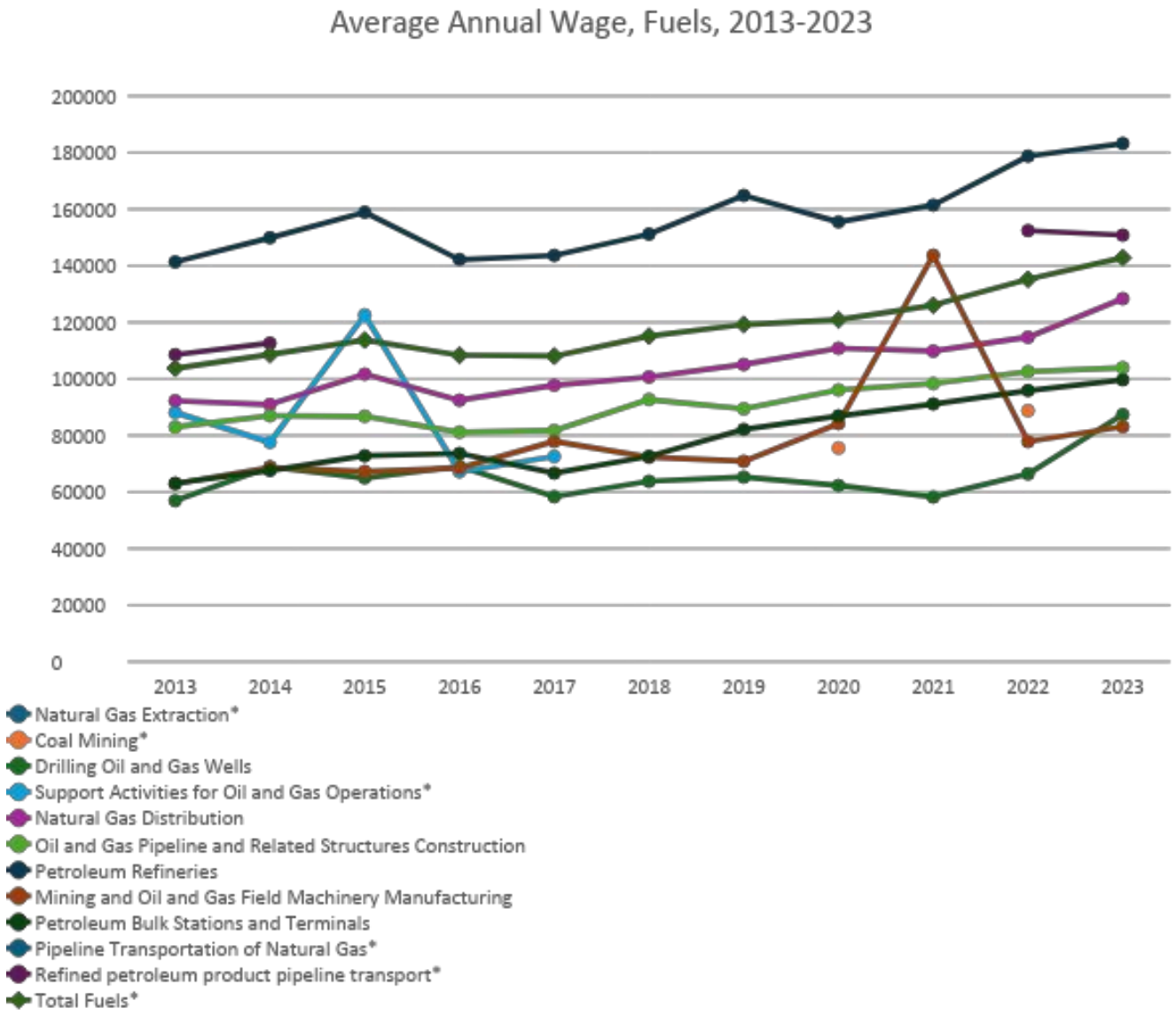
$128,359 in natural gas transport

$103,945 in oil and gas pipeline and related structures construction

$99,689 in petroleum bulk stations and terminals

$87,385 in drilling oil and gas wells

$83,086 in mining and oil and gas field machinery manufacturing



Buildings

Total employment: **209,553** in 2023

- Down by 0.35% from 2022

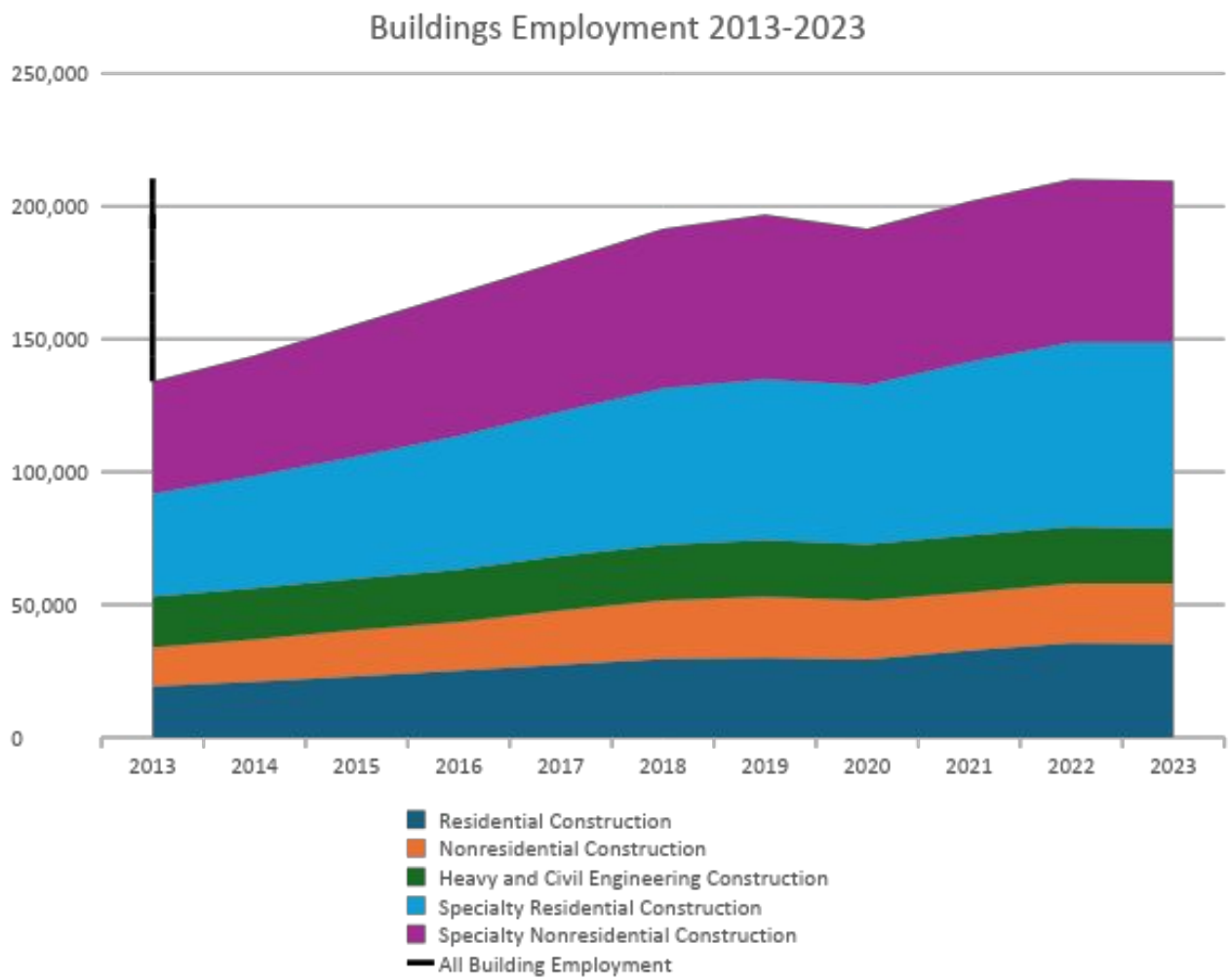
70,052 jobs in specialty residential construction

60,754 jobs in specialty nonresidential construction

35,336 jobs in residential construction

22,744 jobs in nonresidential construction

20,667 jobs in heavy and civil engineering construction



Buildings Wages

$80,327 average annual wage in 2023

- Up 5.8% from 2022

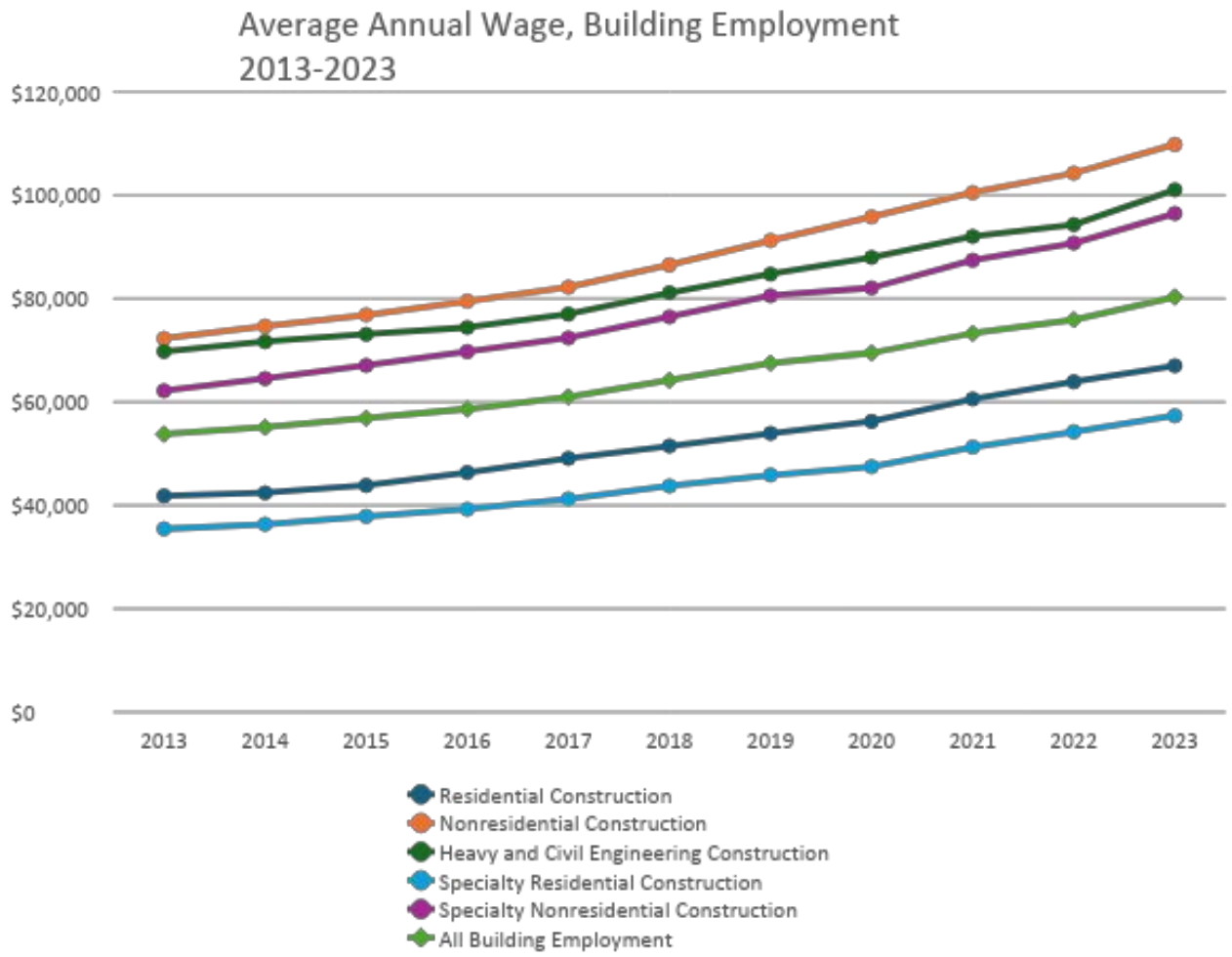
$109,820 in nonresidential construction

$101,045 in heavy and civil engineering construction

$96,457 in specialty nonresidential construction

$67,012 in residential construction

$57,349 in specialty residential construction



Transportation

Total employment: **30,043** in 2023

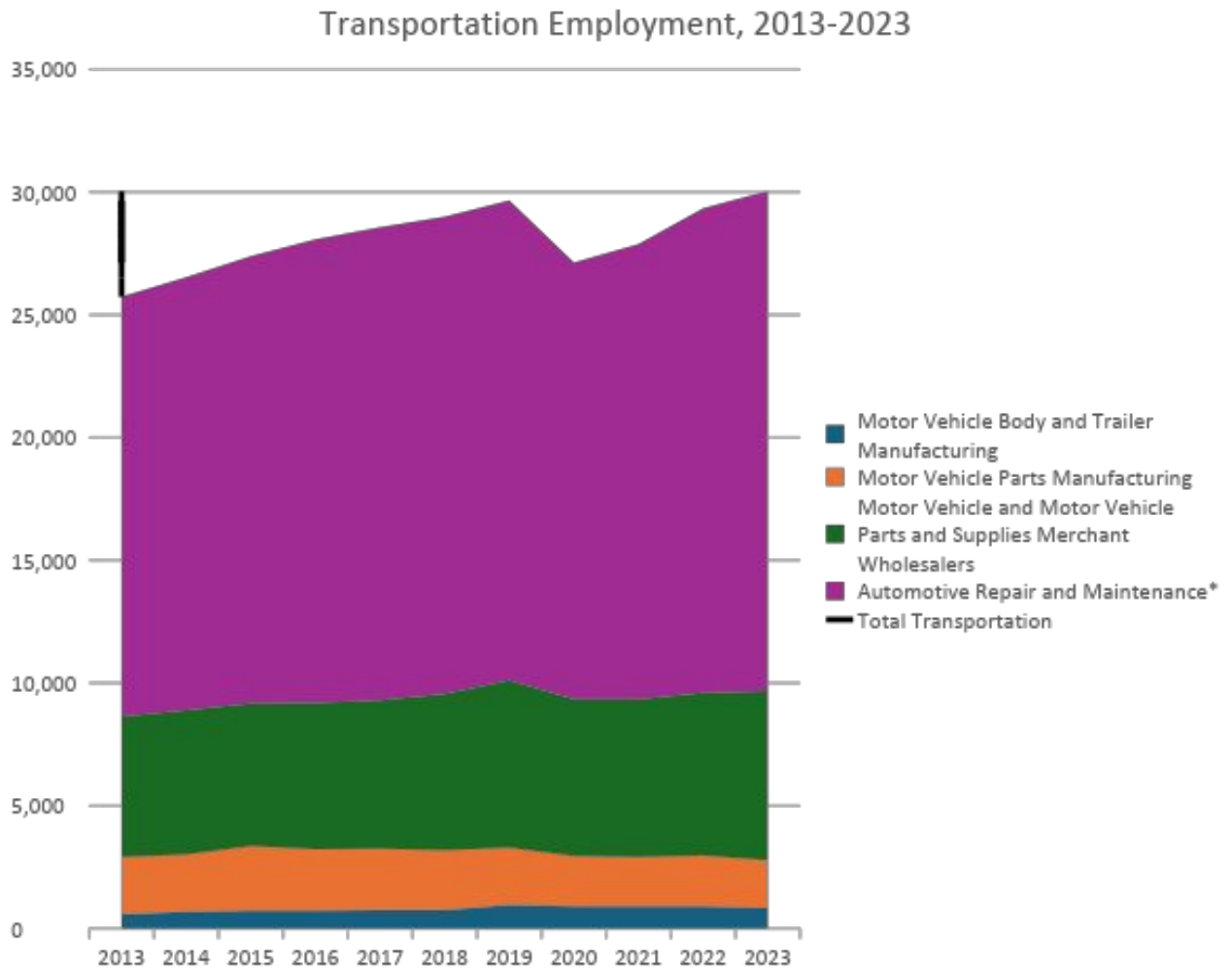
- Up 2.4% from 2022

20,380 jobs in automotive repair and maintenance

6,878 in motor vehicle and MV parts and supplies wholesalers

1,951 in MV parts manufacturing

834 in MV body and trailer manufacturing



Transportation Wages

$65,853 average annual wage in 2023

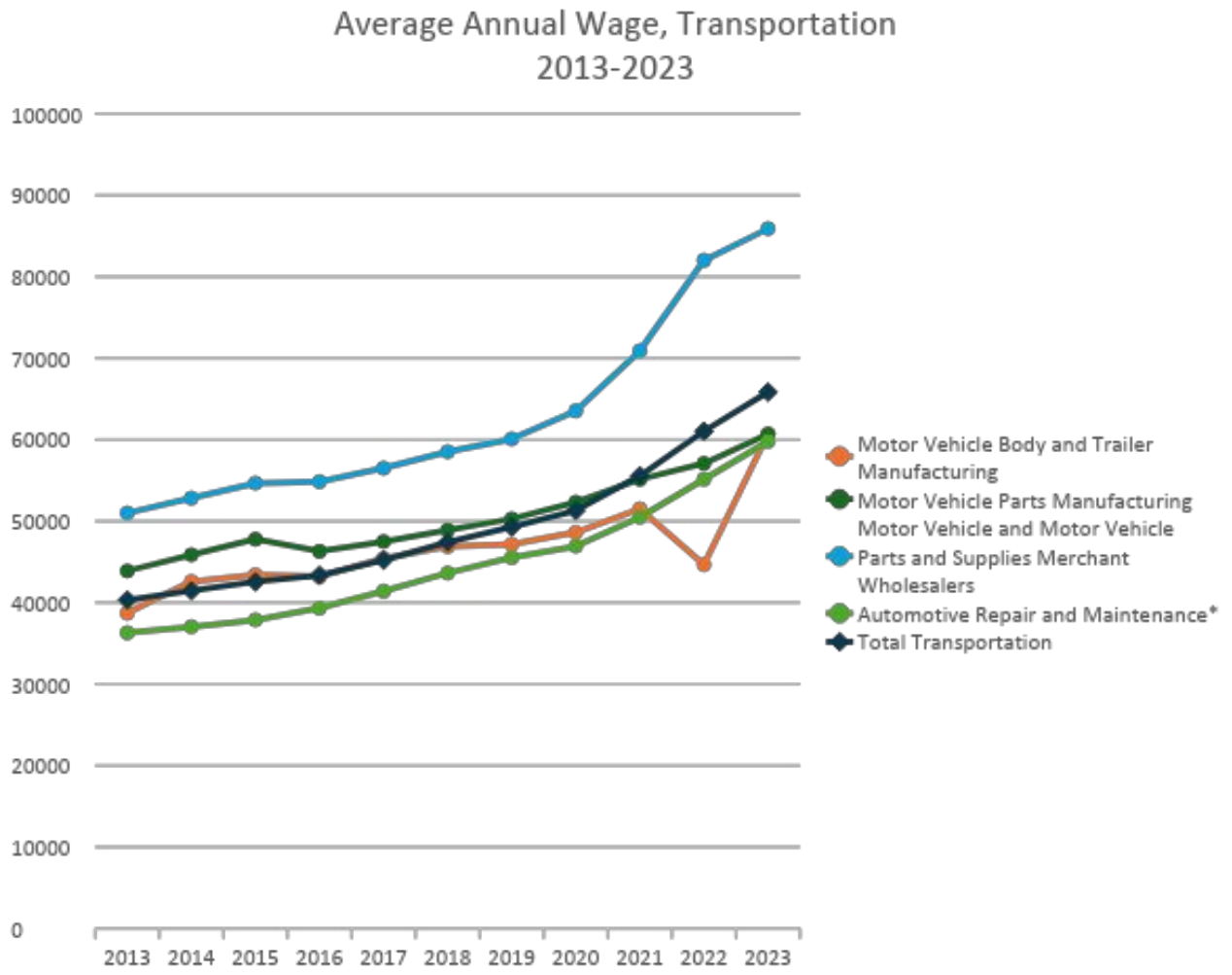
- Up 7.9% from 2022

$85,901 in motor vehicle and MV parts and supplies wholesalers

$60,685 in motor vehicle manufacturing

$60,684 in motor vehicle parts manufacturing

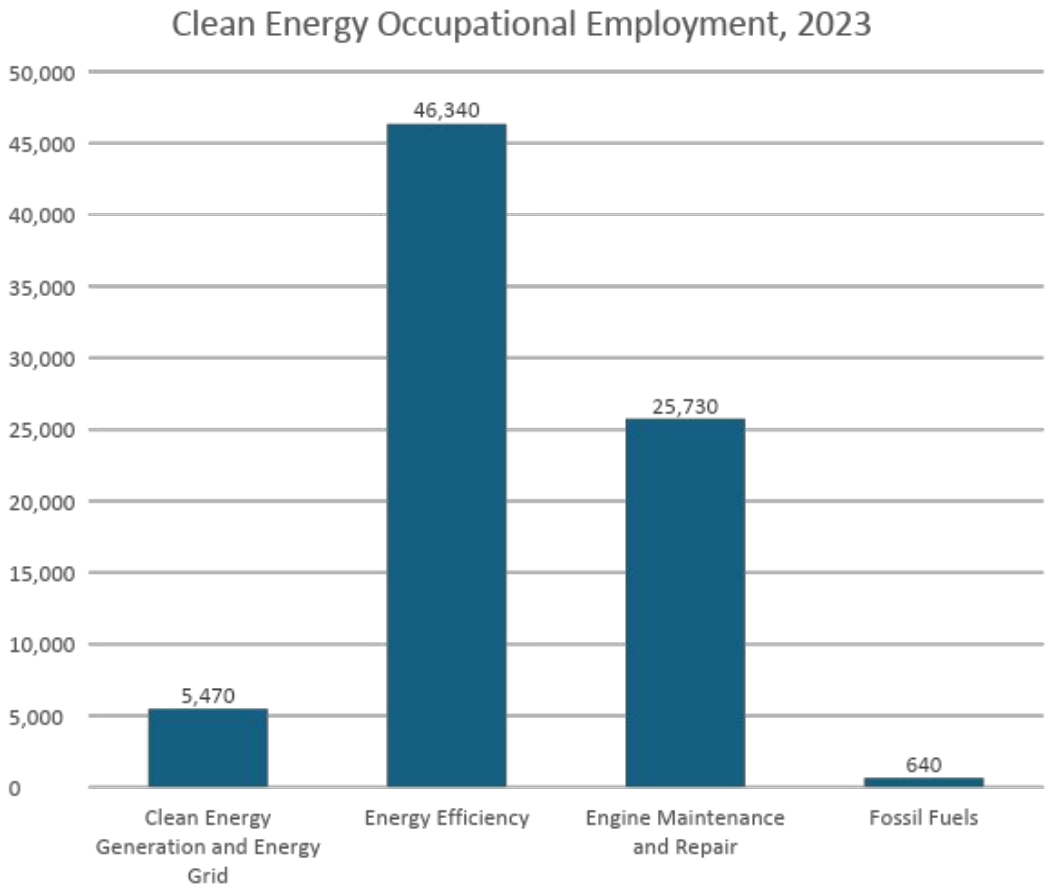
$59,793 in automotive repair and maintenance



Occupational Employment and Wages

- Previous studies (USEER and NZNW) have not focused on occupations
  - USEER did not include, NZNW examined via industry staffing patterns but did not directly define clean energy occupations
- This report: occupation-first approach
  - Direct study of employment and wages in likely clean energy occupations
- Selection of SOC codes
  - “Known” clean energy occupations from CETWAC discussions (e.g. solar PV installers, electricians, weatherization workers)
  - Prominent occupations within USEER and NZNW industry sectors (electricity, fuels, buildings, transportation)
- Data used: Occupational Employment and Wage Statistics (OEWS)
  - Employment and wage estimates annually for about 867 occupations
  - Most recent data (2023) pools surveys from fall 2020, fall/spring 2021, fall/spring 2022, spring 2023

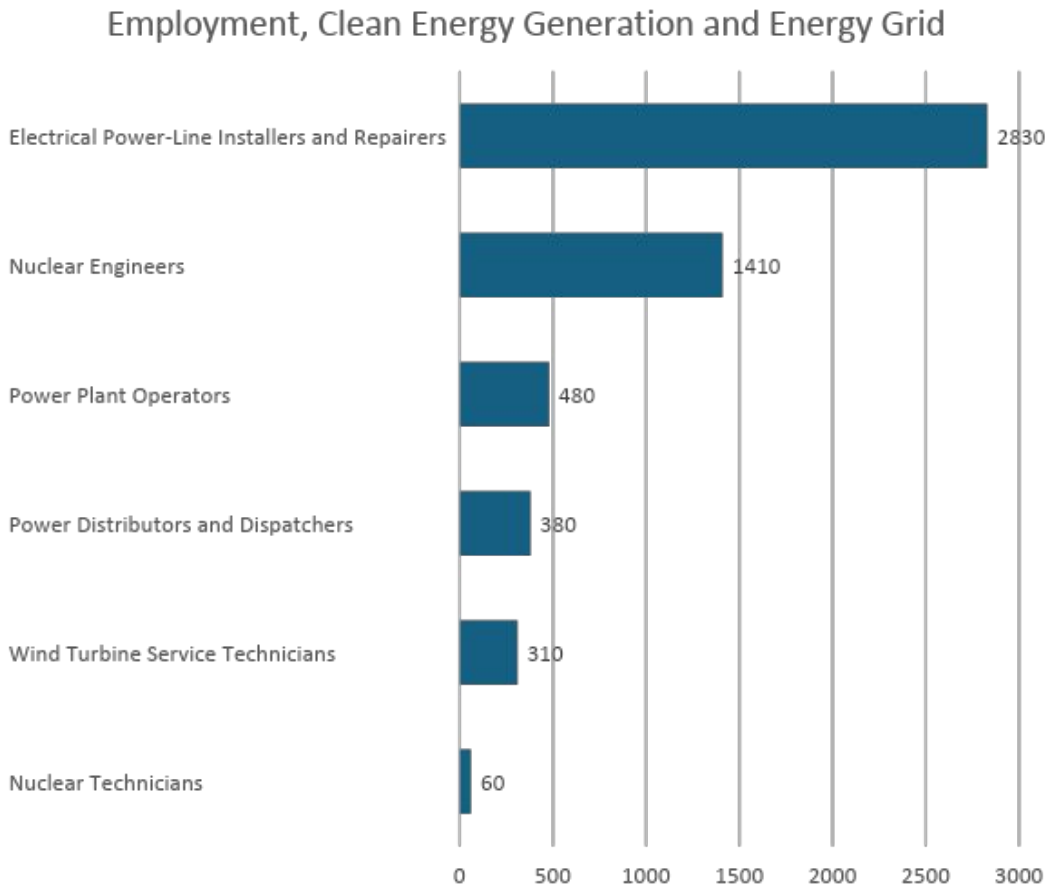
Occupational Groups

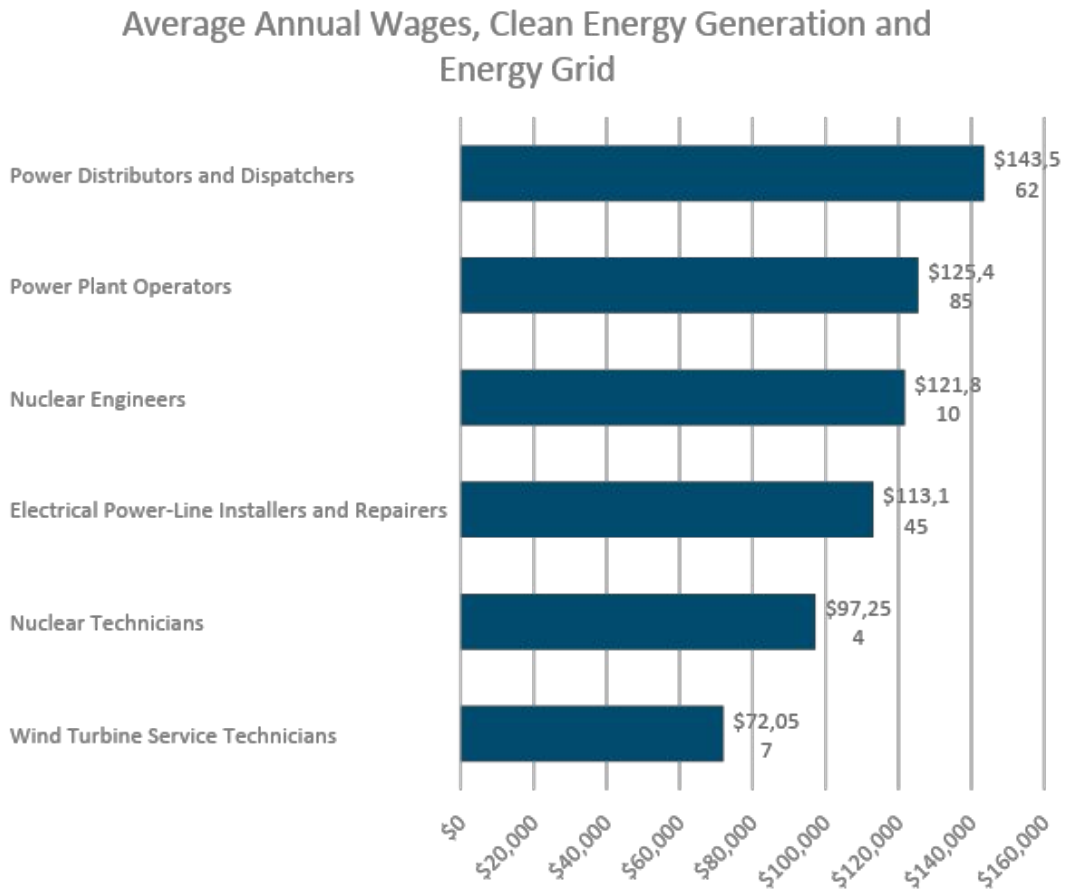


- **Clean energy generation and energy grid*** – nuclear engineers and technicians, power plant operators, wind turbine service tech, power distributors and dispatchers, electric power-line installers and repairers
- **Energy efficiency** – construction trades involved in energy efficiency or weatherization: electricians, insulation workers, plumbers, pipefitters and steamfitters, roofers, misc. construction and related workers
- **Engine maintenance and repair** – mechanics and services techs focused on engine-based transportation
- **Fossil fuels** – petroleum engineers and pump system operators

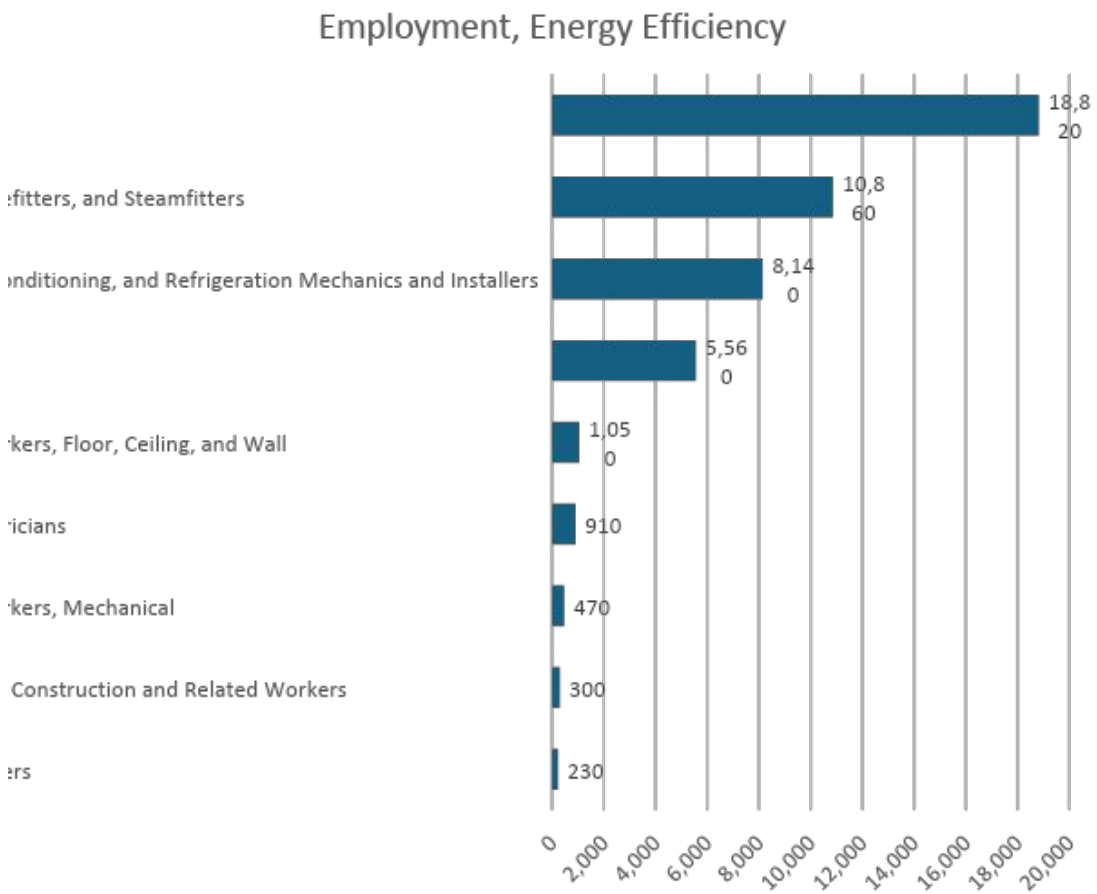
*Solar PV installers and nuclear power reactor operators suppressed in OEWS due to sample size

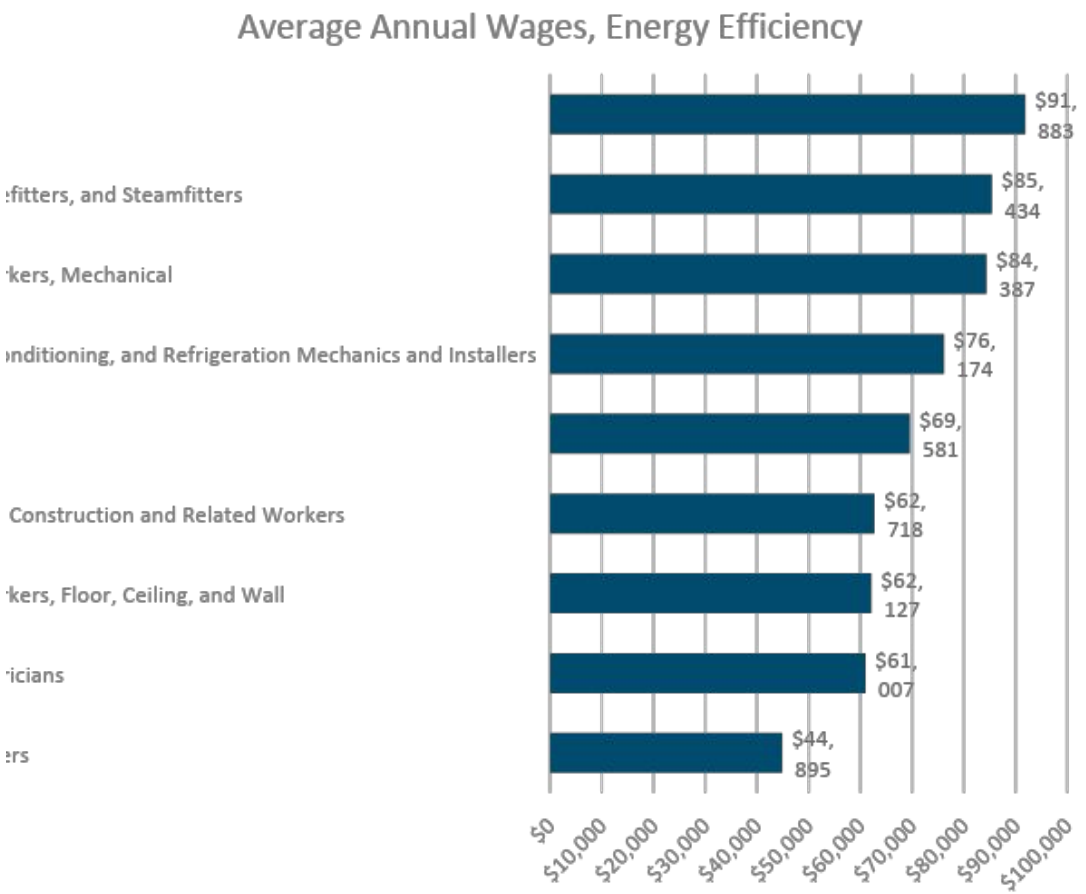
Clean Energy Generation and Energy Grid



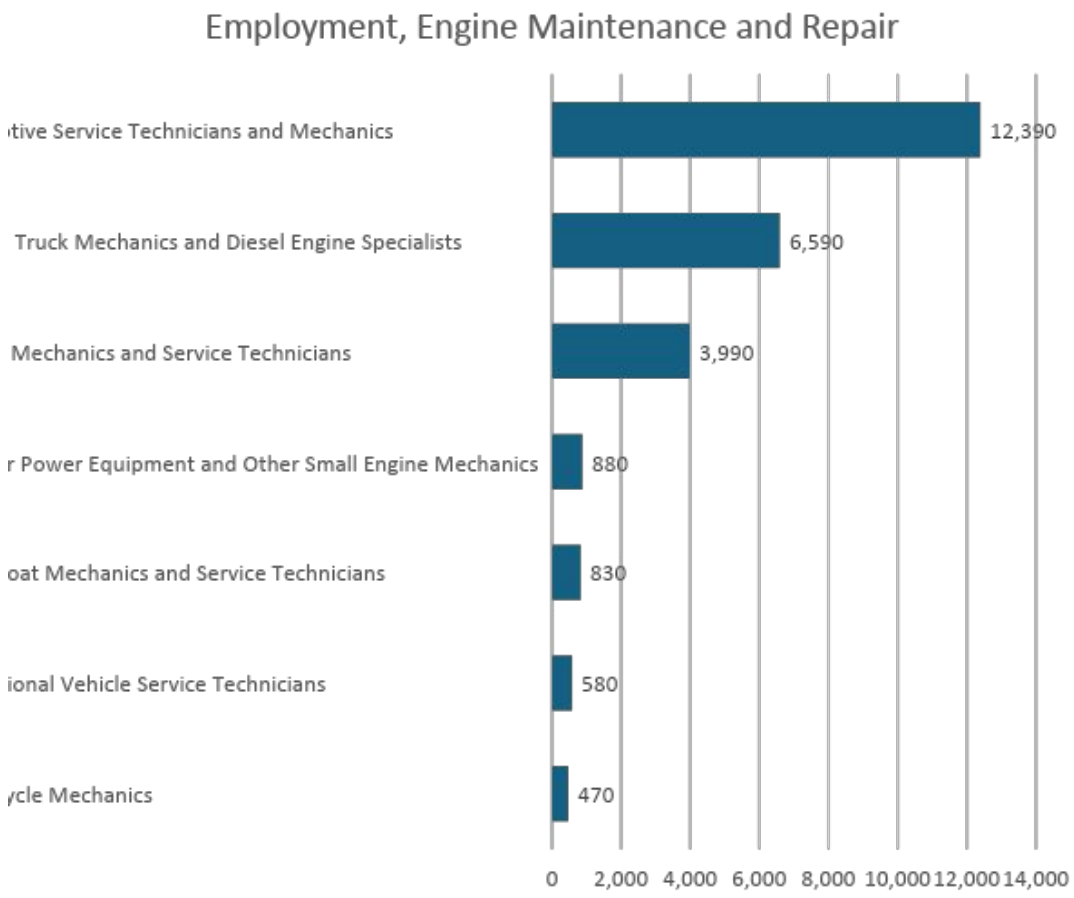


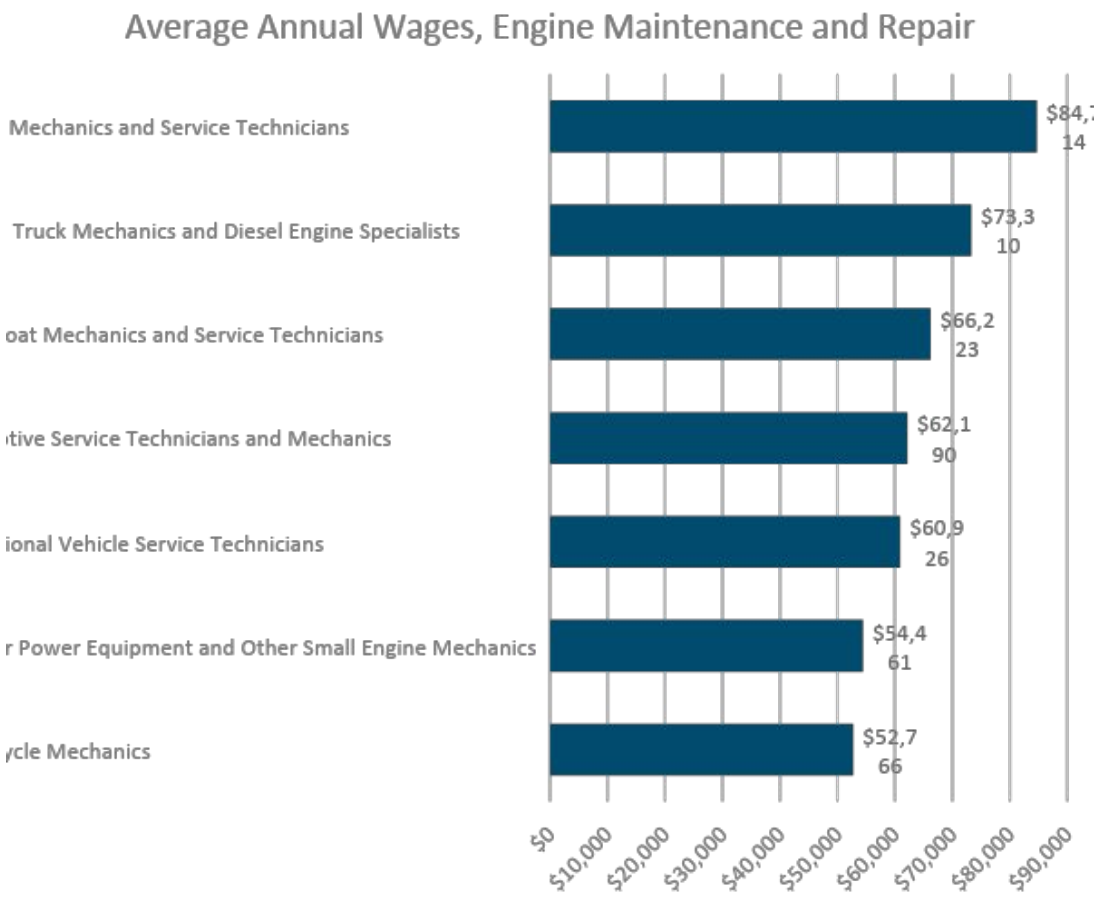
Energy Efficiency



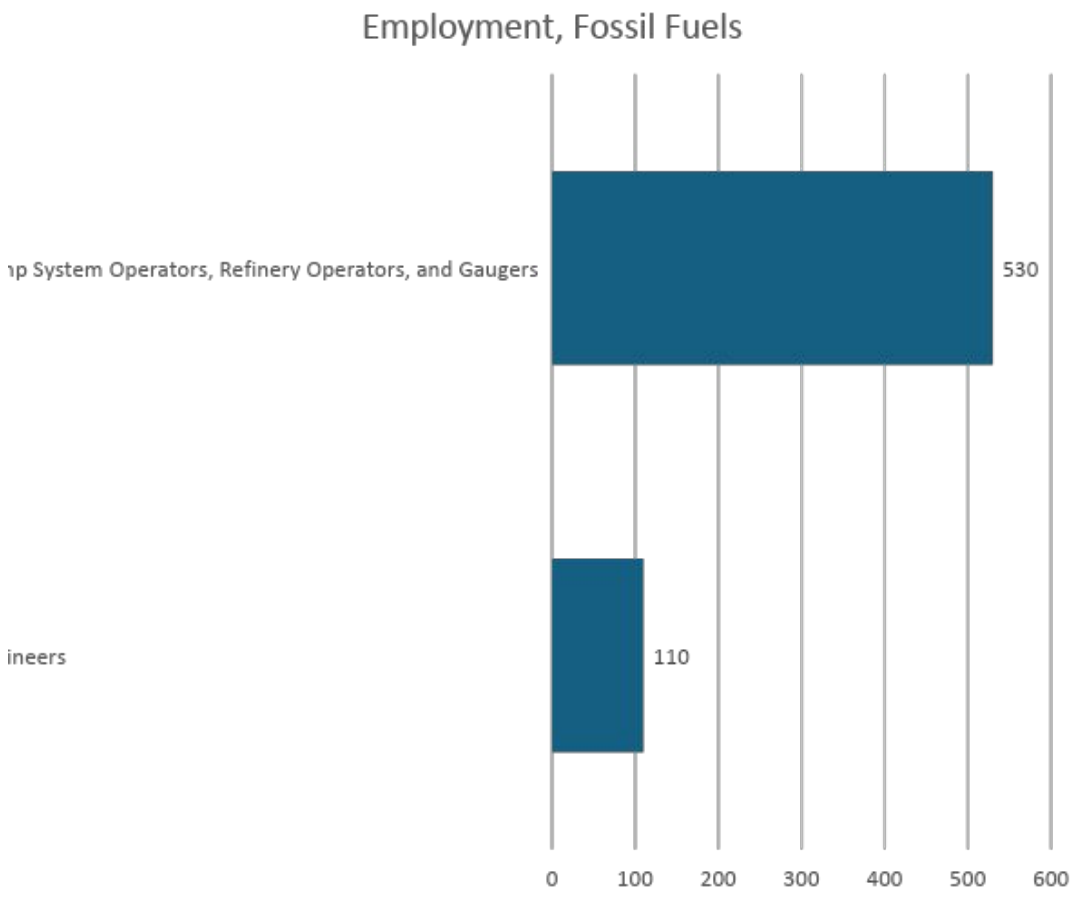


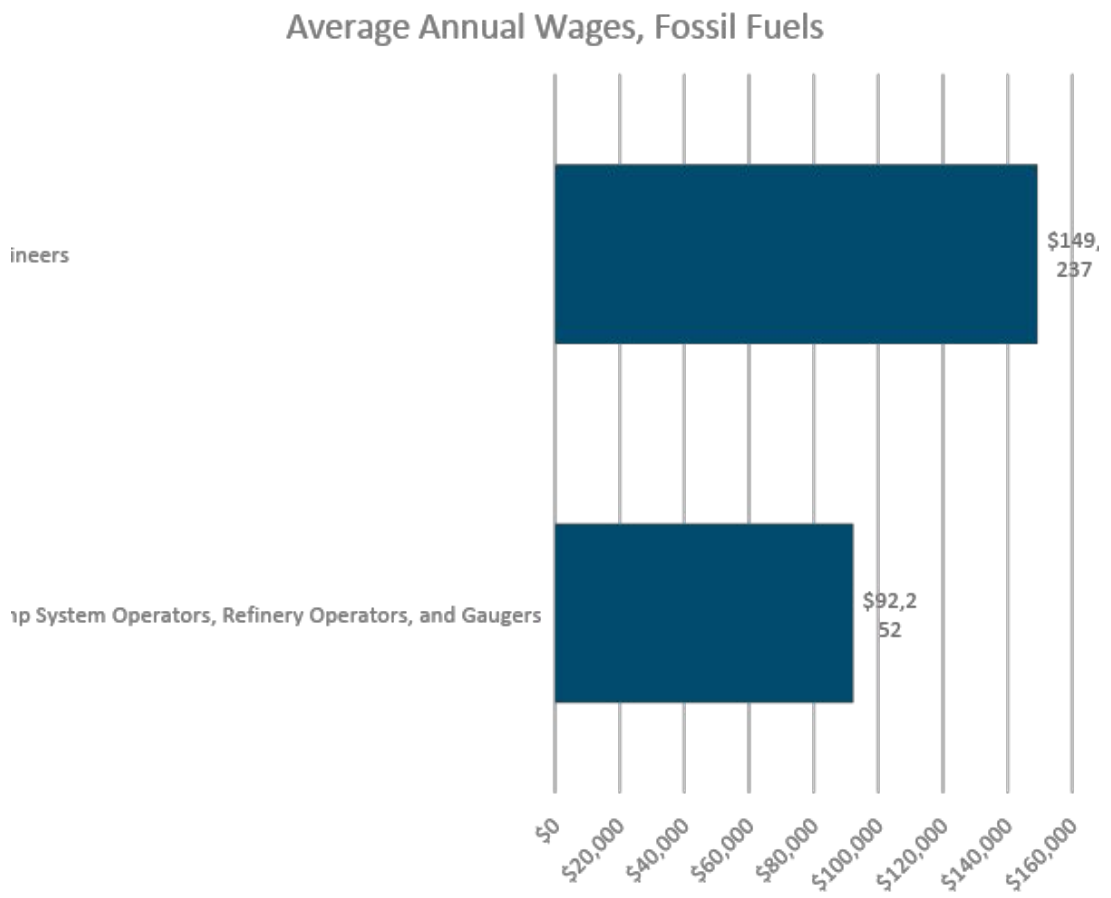
Engine Maintenance and Repair

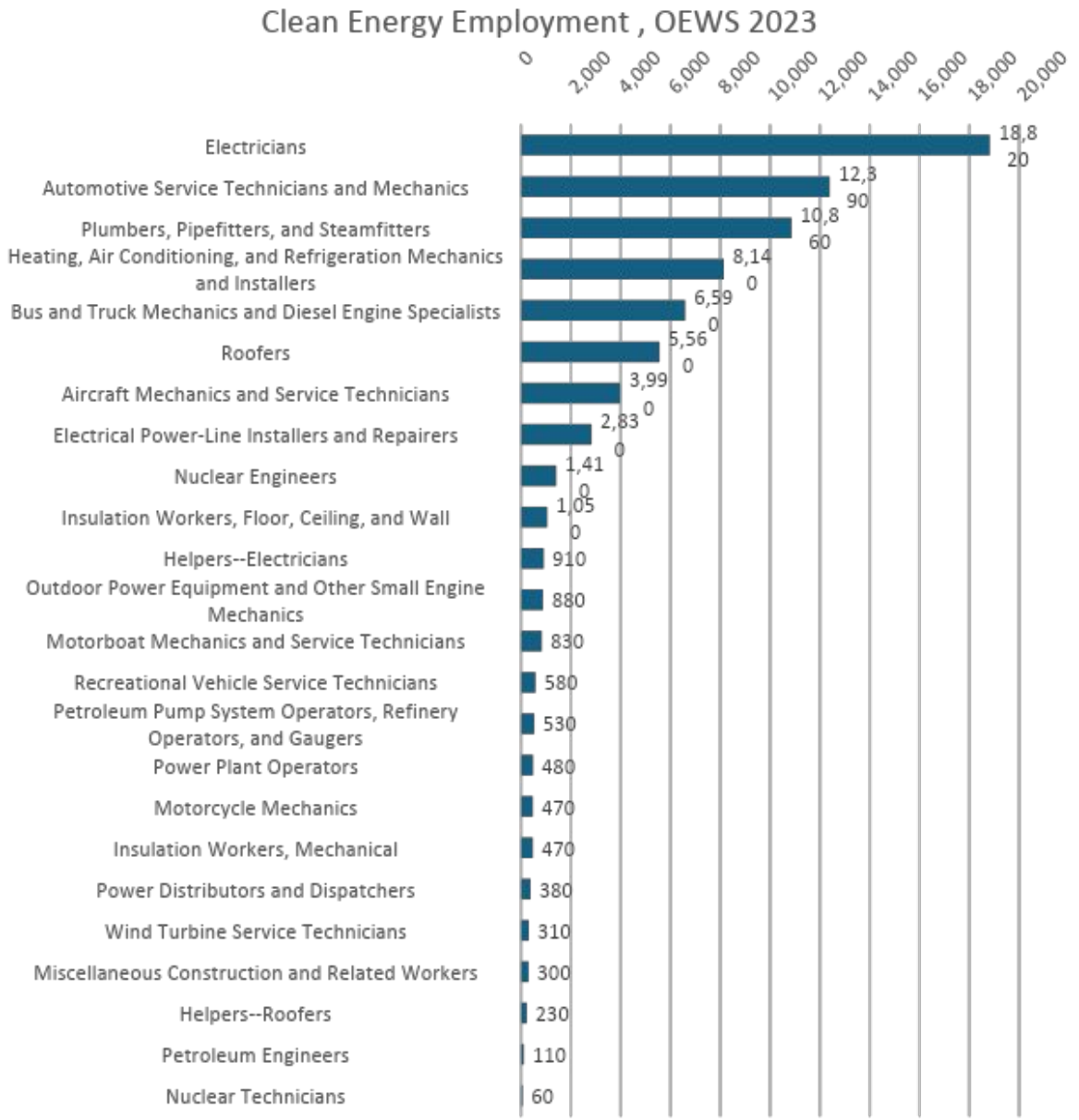


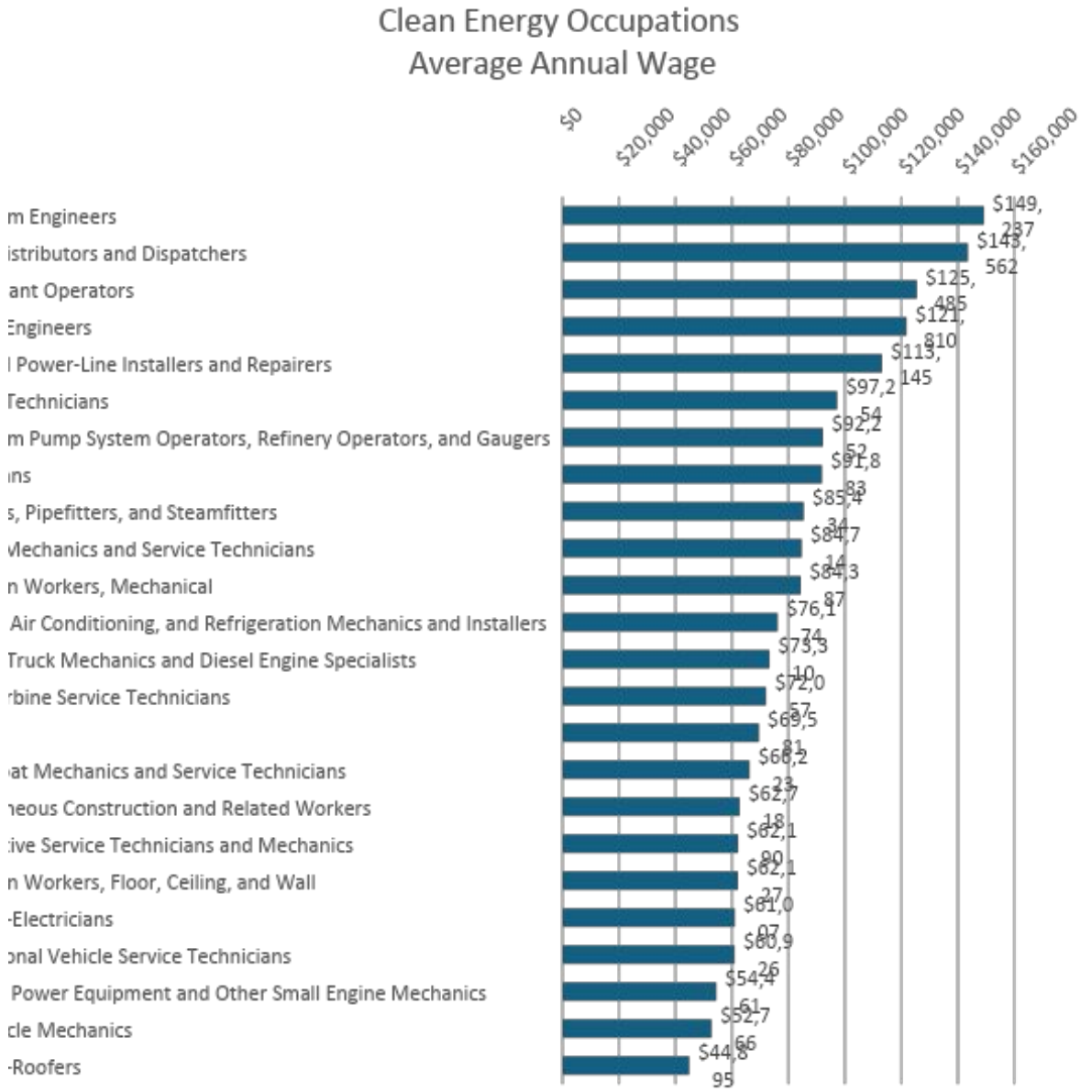


Fossil Fuels






Clean Energy Employment , OEWS 2023
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
Electricians 18,820
Automotive Service Technicians and Mechanics 12,390
Plumbers, Pipefitters, and Steamfitters 10,860
Heating, Air Conditioning, and Refrigeration Mechanics and Installers 8,140
Bus and Truck Mechanics and Diesel Engine Specialists 6,590
Roofers 5,560
Aircraft Mechanics and Service Technicians 3,990
Electrical Power-Line Installers and Repairers 2,830
Nuclear Engineers 1,410
Insulation Workers, Floor, Ceiling, and Wall 1,050
Helpers--Electricians 910
Outdoor Power Equipment and Other Small Engine Mechanics 880
Motorboat Mechanics and Service Technicians 830
Recreational Vehicle Service Technicians 580
Petroleum Pump System Operators, Refinery Operators, and Gaugers 530
Power Plant Operators 480
Motorcycle Mechanics 470
Insulation Workers, Mechanical 470
Power Distributors and Dispatchers 380
Wind Turbine Service Technicians 310
Miscellaneous Construction and Related Workers 300
Helpers--Roofers 230
Petroleum Engineers 110
Nuclear Technicians 60


Clean Energy Occupations
Average Annual Wage
$0
$20,000
$40,000
$60,000
$80,000
$100,000
$120,000
$140,000
$160,000
m Engineers $149,237
istributors and Dispatchers $143,562
ant Operators $125,485
Engineers $121,810
l Power-Line Installers and Repairers $113,145
Technicians $97,254
m Pump System Operators, Refinery Operators, and Gaugers $92,252
ıns $91,883
s, Pipefitters, and Steamfitters $85,434
Mechanics and Service Technicians $84,714
n Workers, Mechanical $84,387
Air Conditioning, and Refrigeration Mechanics and Installers $76,174
Truck Mechanics and Diesel Engine Specialists $75,310
rbine Service Technicians $72,057
$69,581
at Mechanics and Service Technicians $66,223
neous Construction and Related Workers $62,718
ive Service Technicians and Mechanics $62,180
n Workers, Floor, Ceiling, and Wall $62,027
-Electricians $61,007
onal Vehicle Service Technicians $60,926
Power Equipment and Other Small Engine Mechanics $54,461
cle Mechanics $52,766
-Roofers $44,895

Occupation-Industry Matrix

Top 10 Occupations: ICT 2211 Electric Power Generation, Transmission and Distribution		
SOC code	**Occupational title**	**Estimated employment 2023 Q2**
43-4051	Customer Service Representatives	539
13-1199	Business Operations Specialists, All Other	362
49-9051	Electrical Power-Line Installers and Repairers	302
17-2071	Electrical Engineers	226
51-8013	Power Plant Operators	199
49-1011	First-Line Supervisors of Mechanics, Installers, and Repairers	130
13-1111	Management Analysts	117
43-1011	First-Line Supervisors of Office and Administrative Support Workers	101
15-1211	Computer Systems Analysts	97
51-8012	Power Distributors and Dispatchers	87

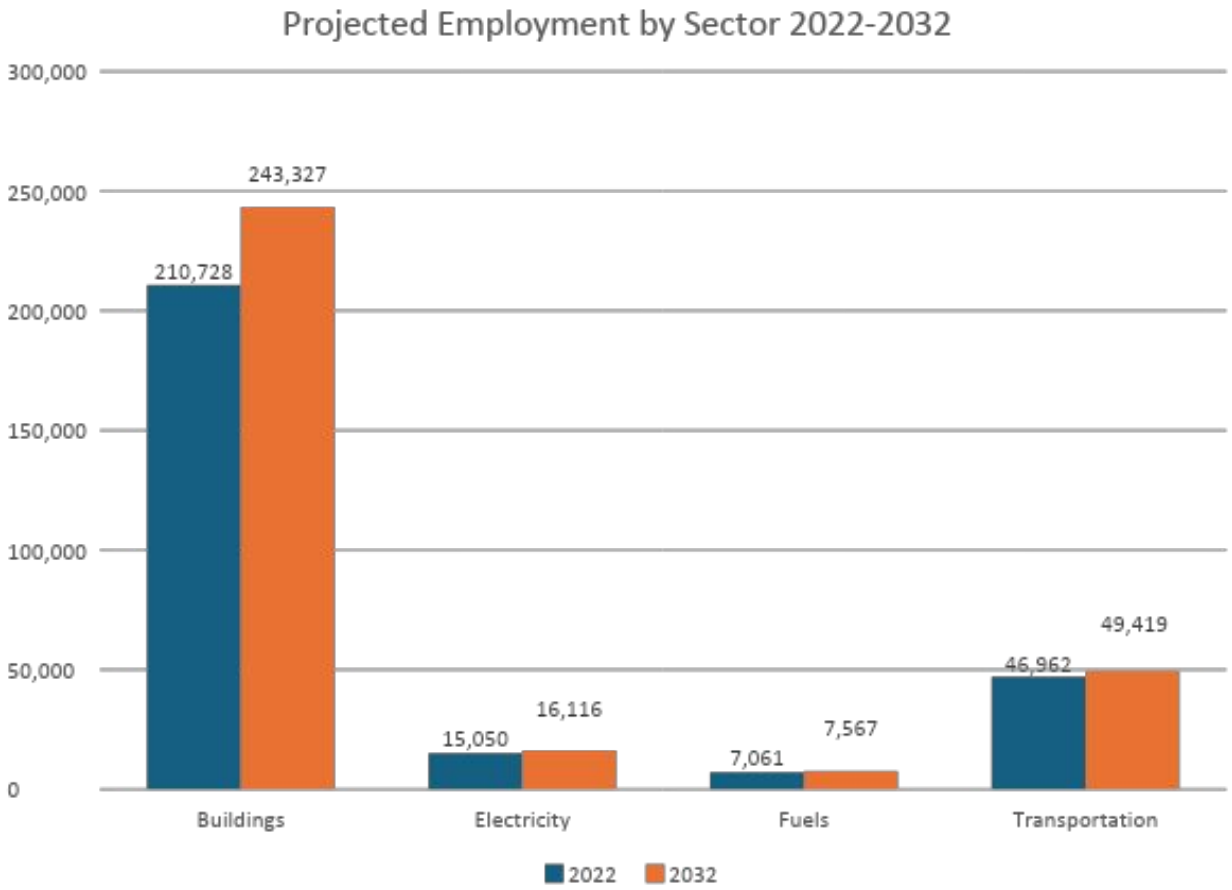
Top 10 Industries: SOC 47-2111 Electricians		
ICT code	**Industry title**	**Estimated employment 2023 Q2**
2382	Building equipment contractors	17786
9991	Federal government	821
9993	Local government other	746
2362	Nonresidential building construction	455
5613	Employment services	247
3364	Aerospace product and parts manufacturing	202
3366	Ship and boat building	176
6100	Education	158
3211	Sawmills and wood preservation	104
3399	Other miscellaneous manufacturing	104

Employment Projections

- Developed annually by ESD
- Current and projected employment by industry and occupation
- Available for 2-year, 5-year and 10-year horizons
- Projections are based on historic trends, and do not incorporate expected or anticipated policies

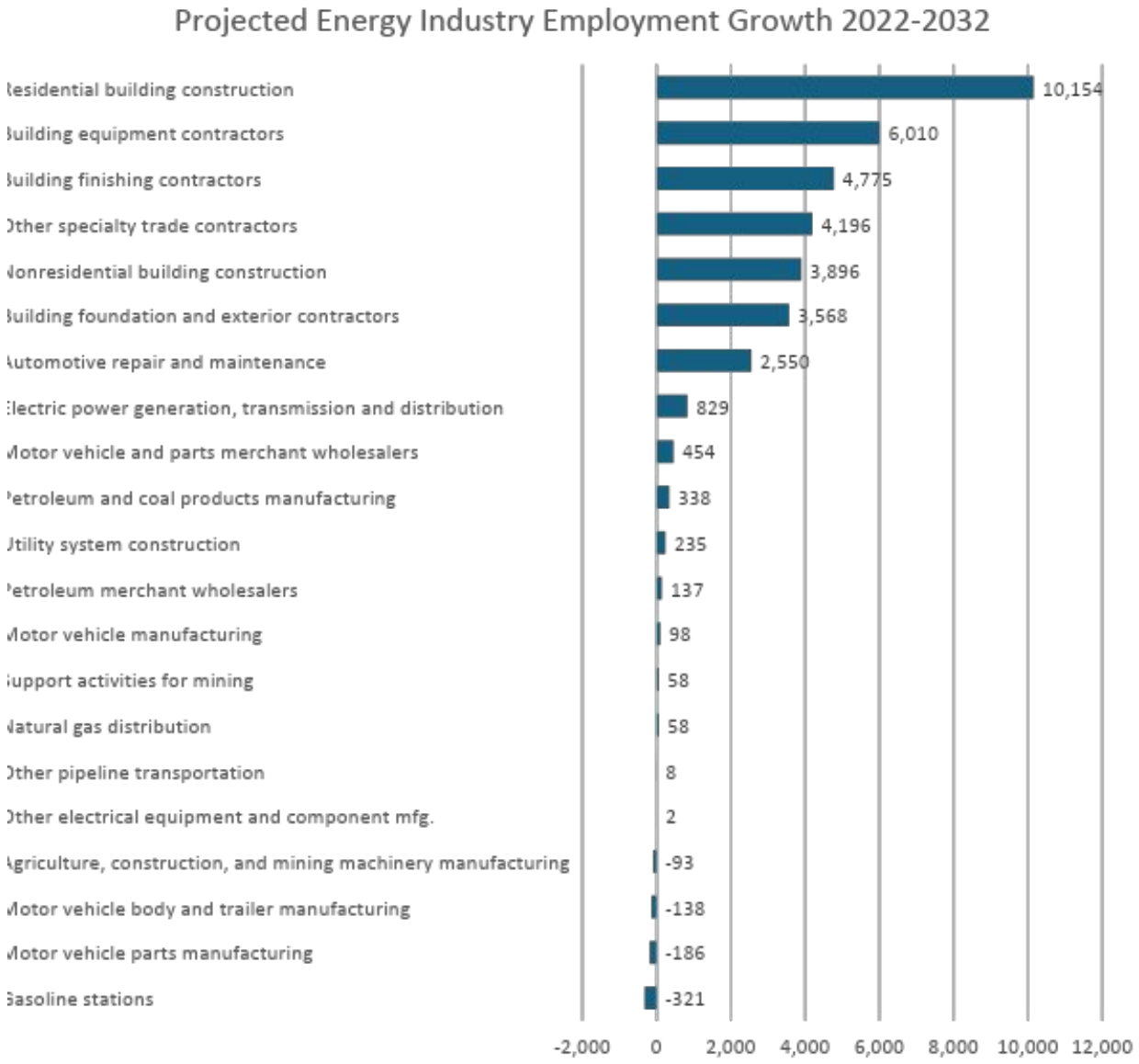
- This report: 10-year projections 2022-2032
- Same industry and occupation groupings as previous section
  - See report for full list

Industry Employment Projections

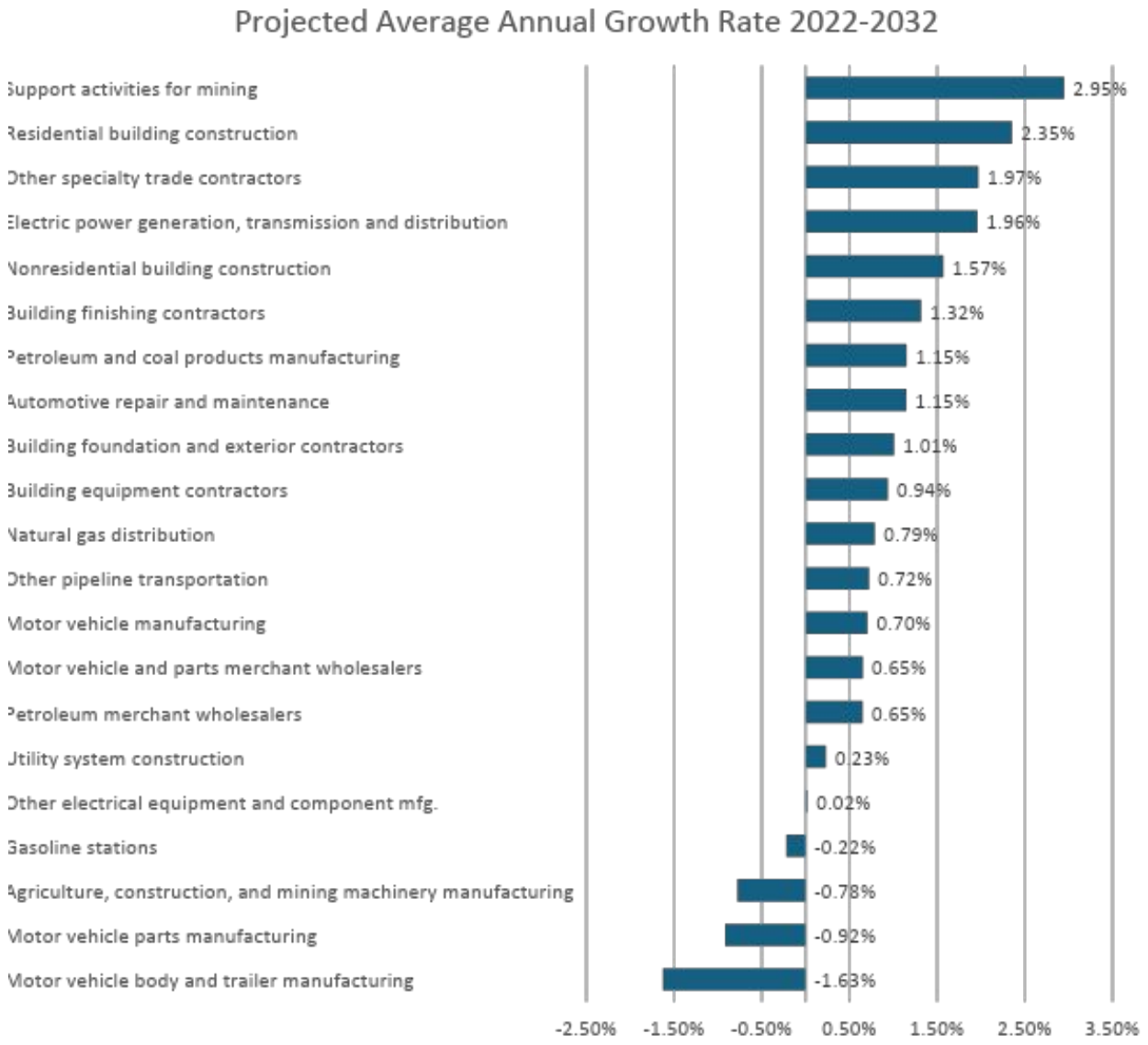


- Expected job growth of **36,628** over the 2022-2032 period
  - 32,599 in buildings
  - 2,457 in transportation
  - 1,066 in electricity
  - 506 in fuels

*Industry projections use industry control totals (ICTs), see report for details

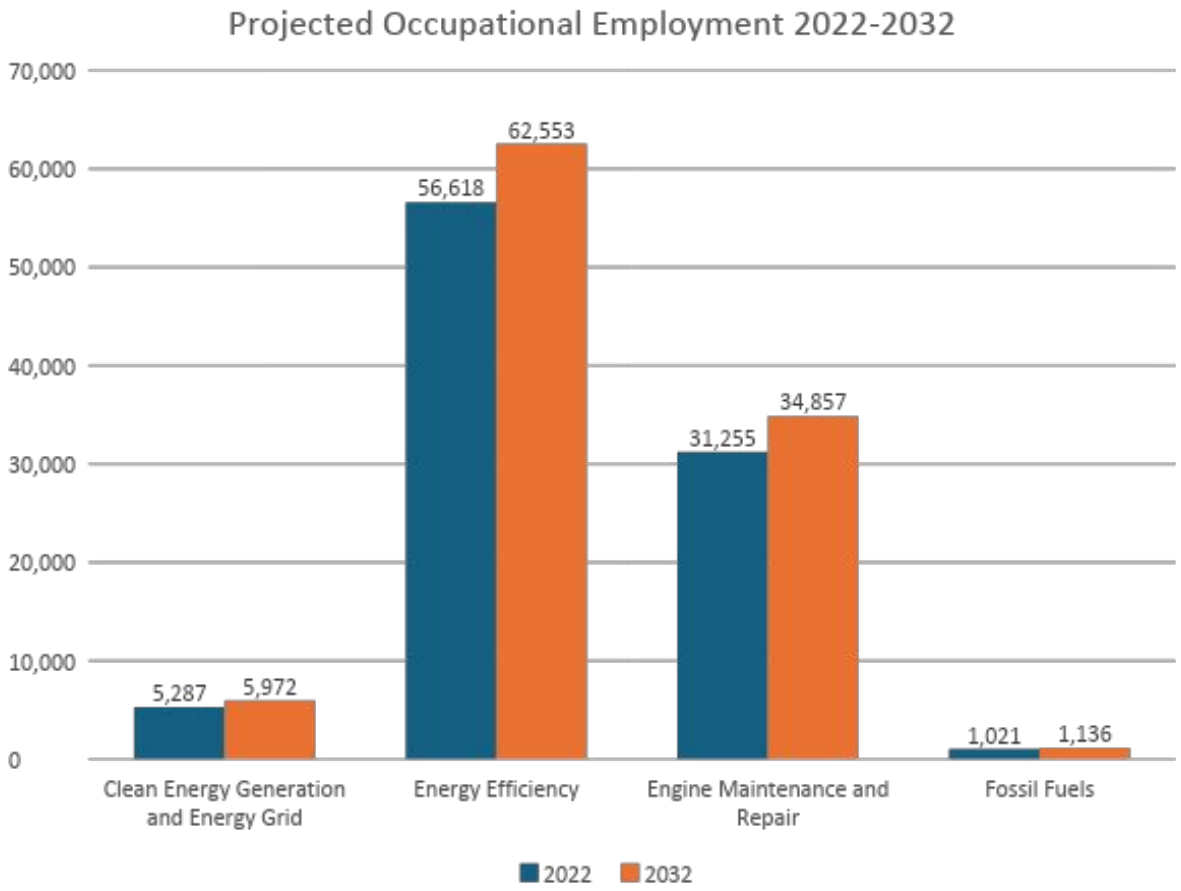


- Top industries in job growth:
  1. Residential building construction (+10,154 jobs)
  2. Building equipment contractors (+6,010 jobs)
  3. Building finishing contractors (+4,755 jobs)

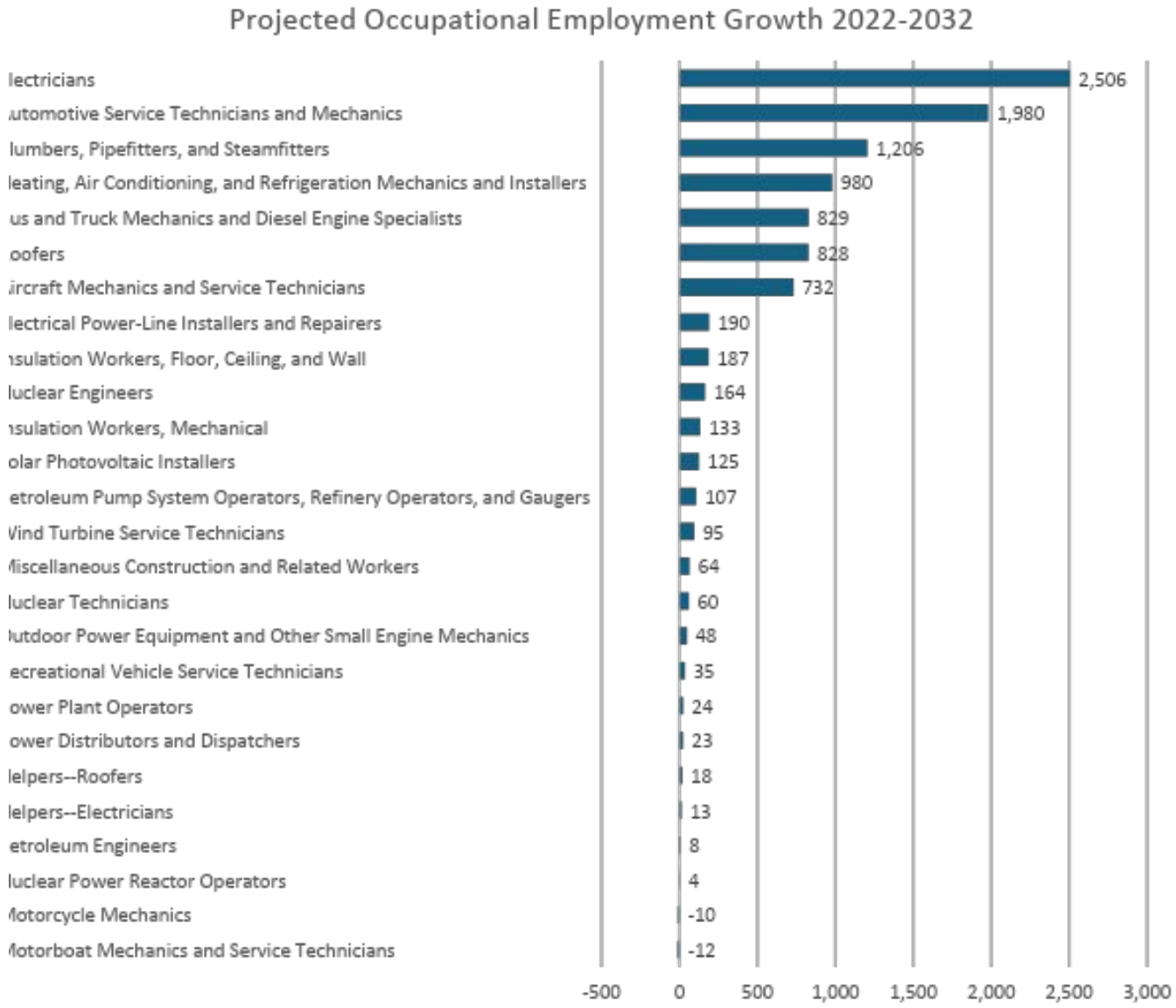


- Top industries in average annual growth rates:
  1. Support activities for mining (2.95% per year)
  2. Residential building construction (2.35% per year)
  3. Other specialty trade contractors (1.97% per year)

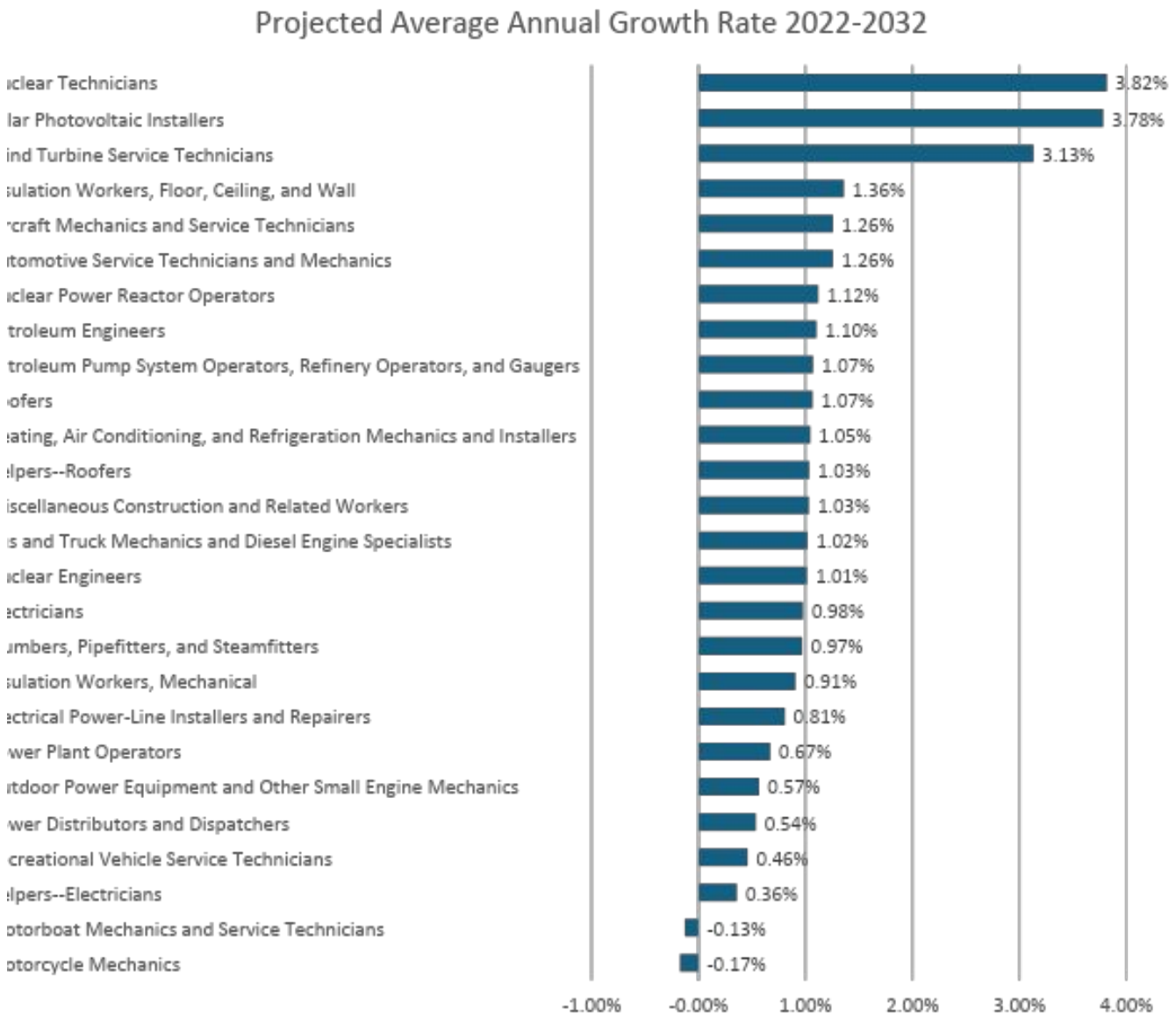
Occupational Employment Projections



- Expected growth in clean energy occupations: **10,337** over the 2022-2032 period
  - 5,935 in energy efficiency
  - 3,602 in engine maintenance and repair
  - 685 in clean energy generation and energy grid
  - 115 in fossil fuels



- Top job growth 2022-2032:
  1. Electricians (2,506 jobs)
  2. Automotive service technicians and mechanics (1,980 jobs)
  3. Plumbers, pipefitters, and steamfitters (1,206 jobs)

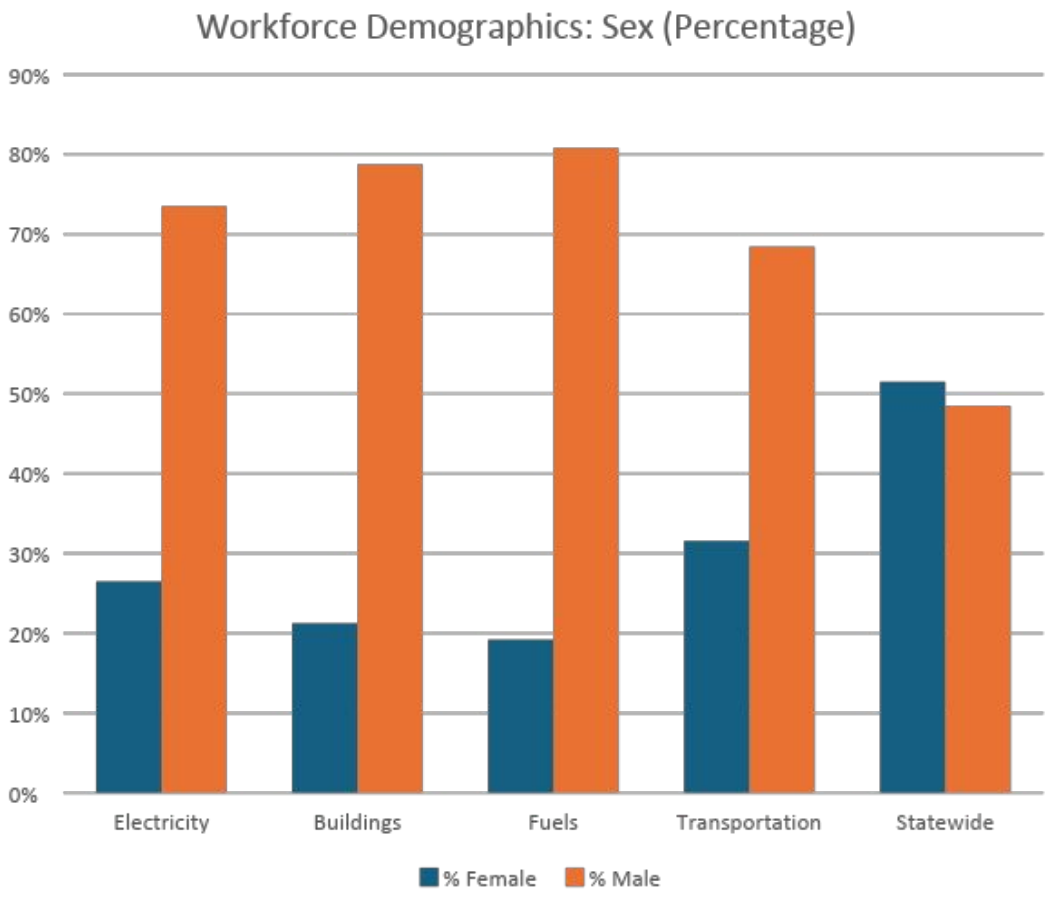


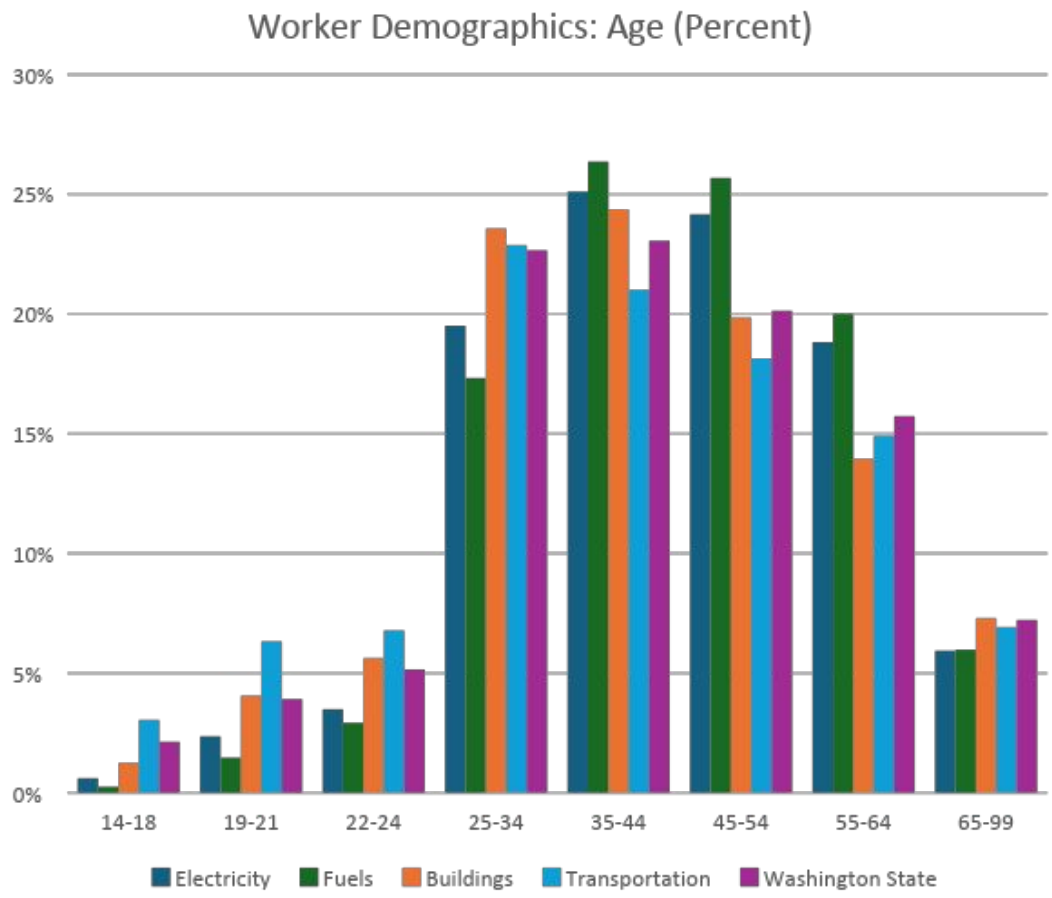
- Top growth rates:
  1. Nuclear technicians (3.82% per year)
  2. Solar photovoltaic installers (3.78% per year)
  3. Wind turbine service technicians (3.13% per year)

Workforce Demographics

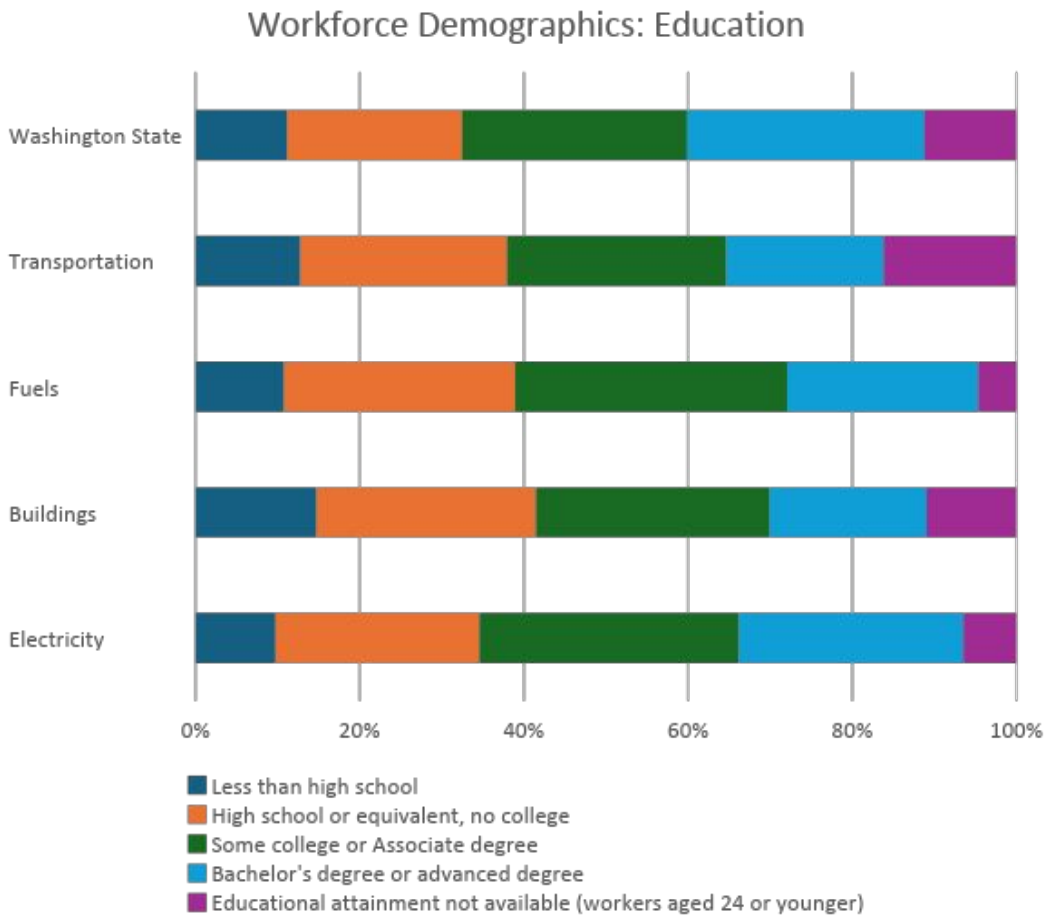
- Data source: Longitudinal Employer-Household Dynamics (LEHD) Quarterly Workforce Indicators
- Industry data at 4-digit NAICS level
  - 2023 Annual Averages

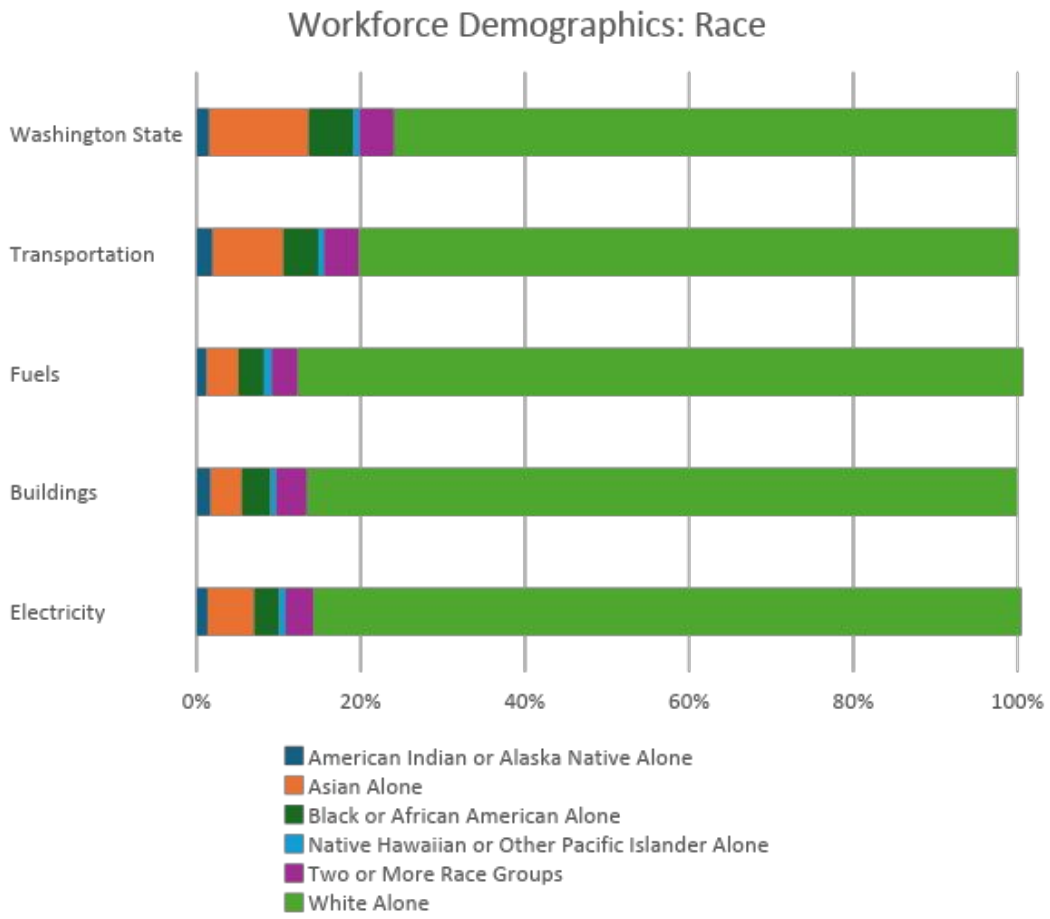
Workforce Demographics





Workforce Demographics

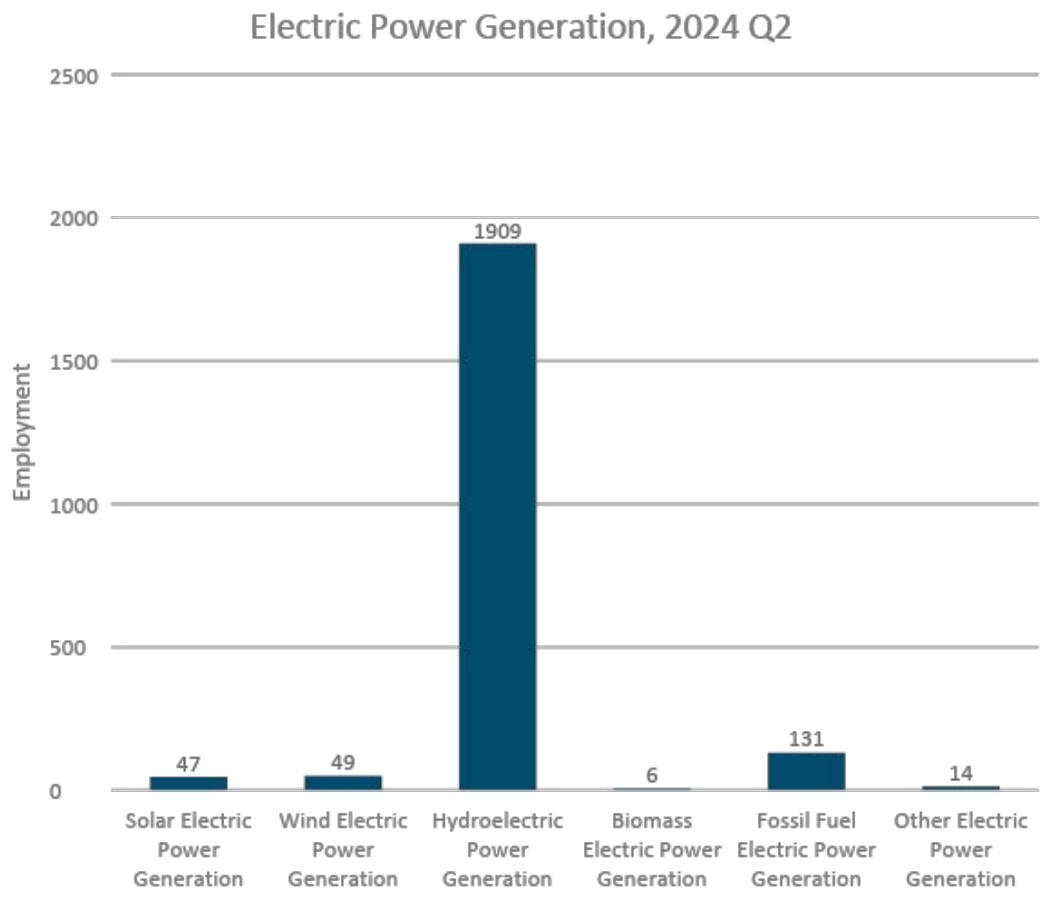


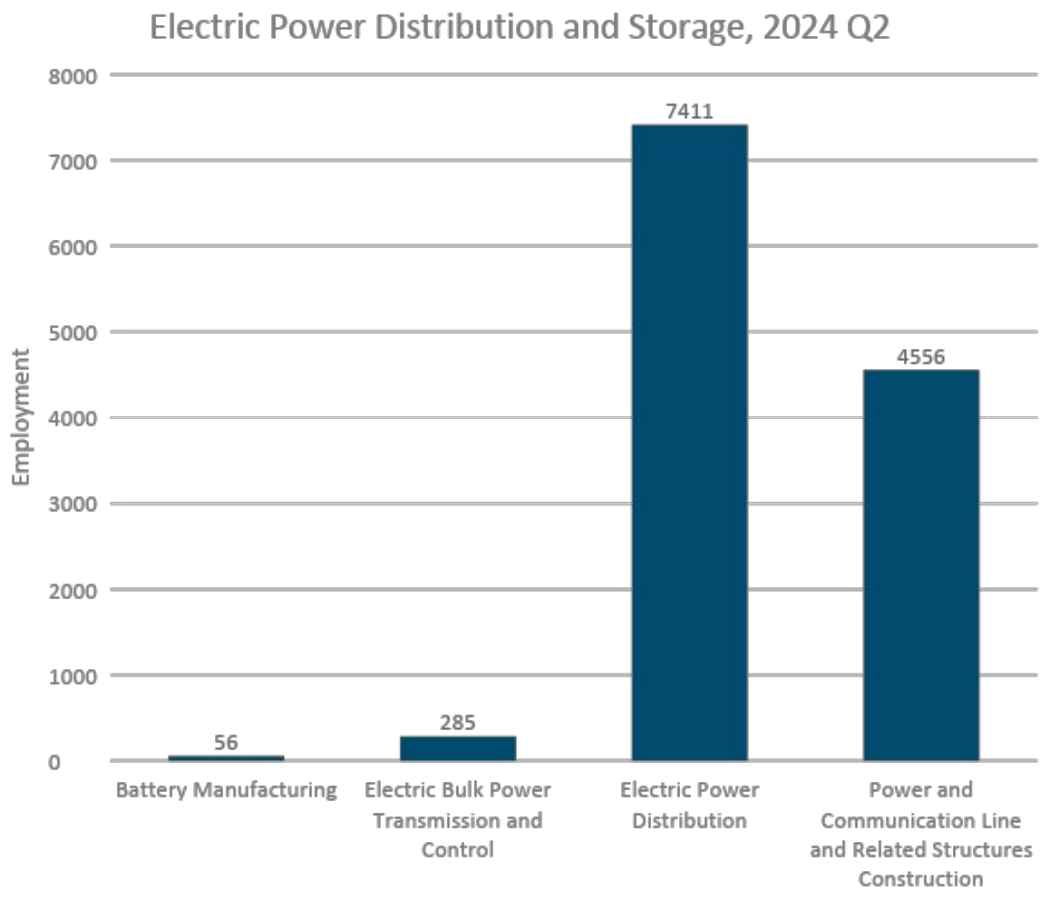


Unemployment Insurance Wage Records Detail

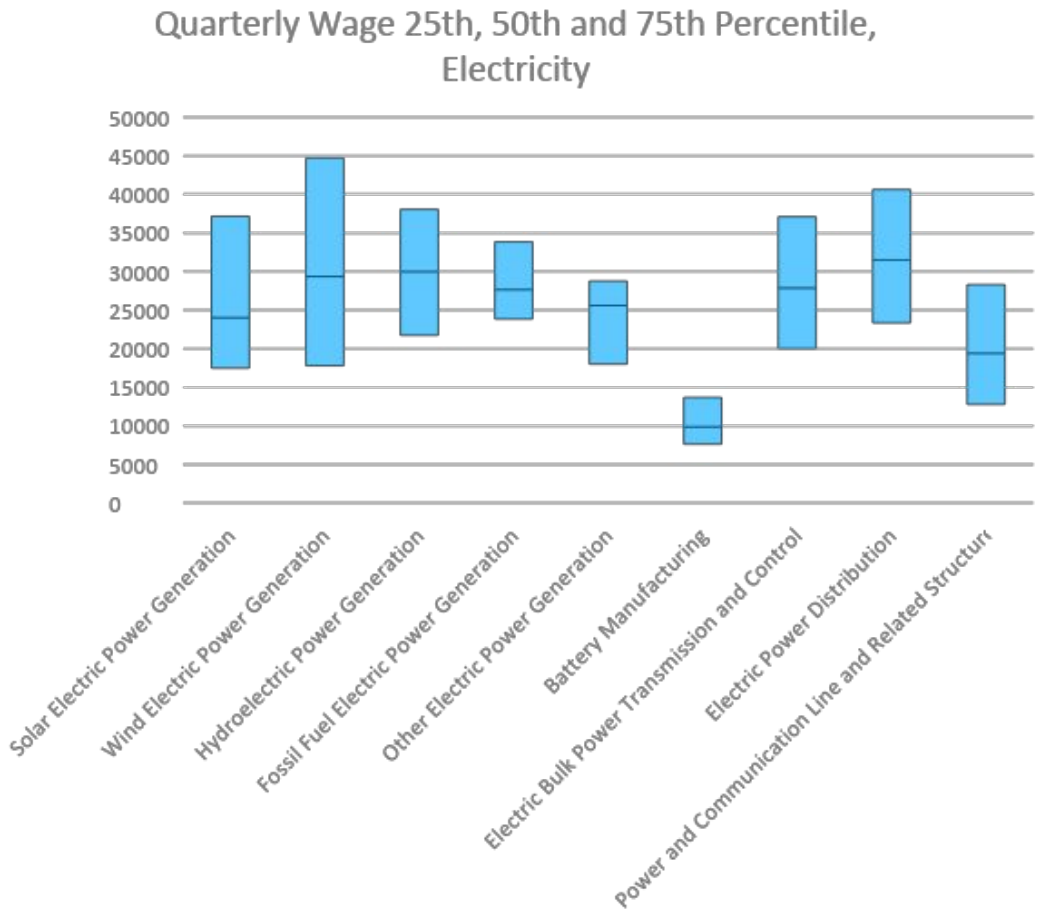
- Administrative dataset, collected when employers file quarterly UI taxes
- Data reported:
  - Employment
  - Hours
  - Wages
  - Industry (NAICS)
  - Occupations (SOC), beginning 2022 Q4
- Benefit of wage records: wages and hours reported per employee, not aggregated
  - Allows analysis of wage and hour distributions among workers in an occupation or industry
- This report is one of the first to explore occupational detail from UI wage records

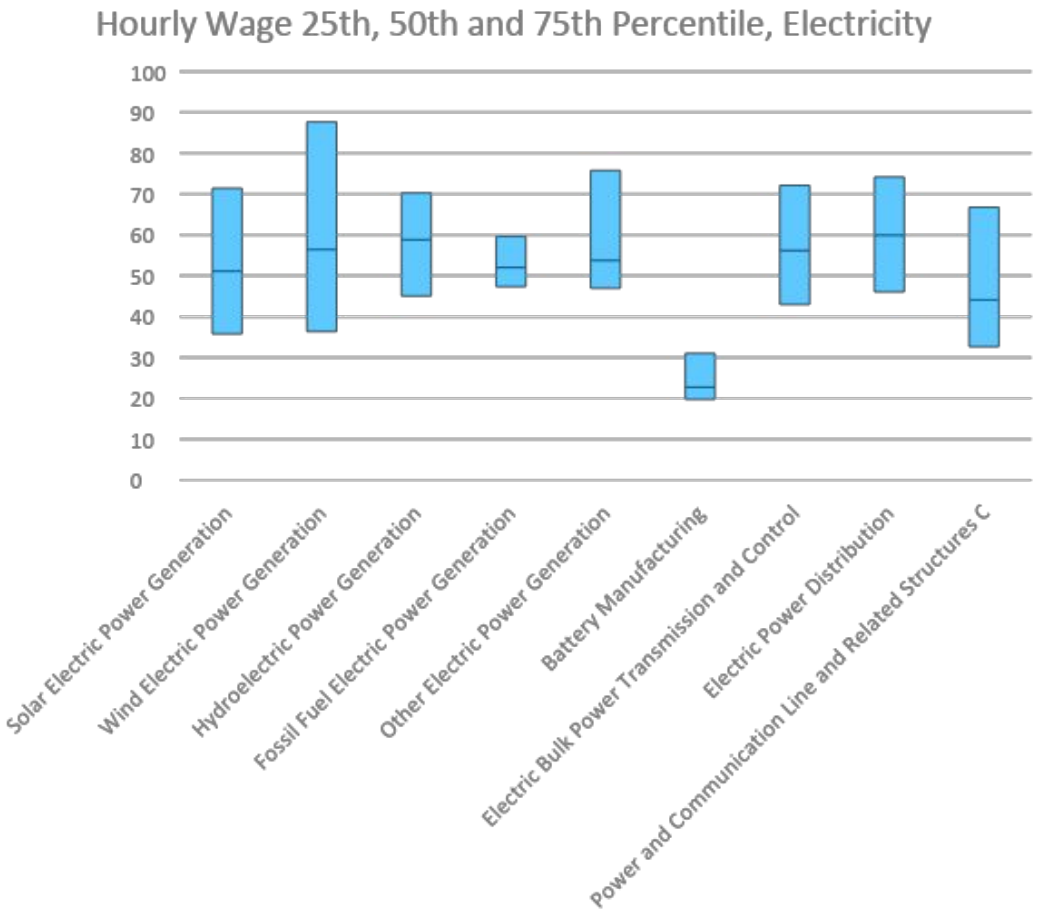
Industry Detail: Electricity



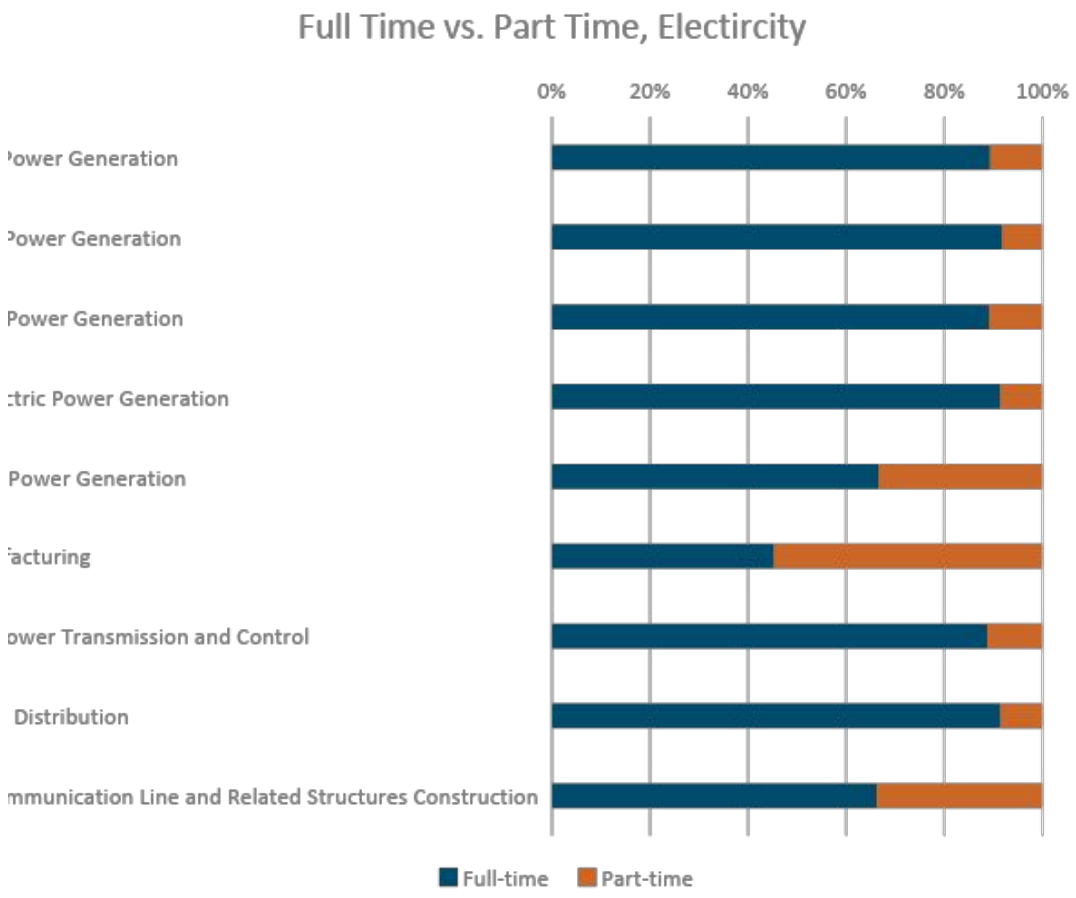


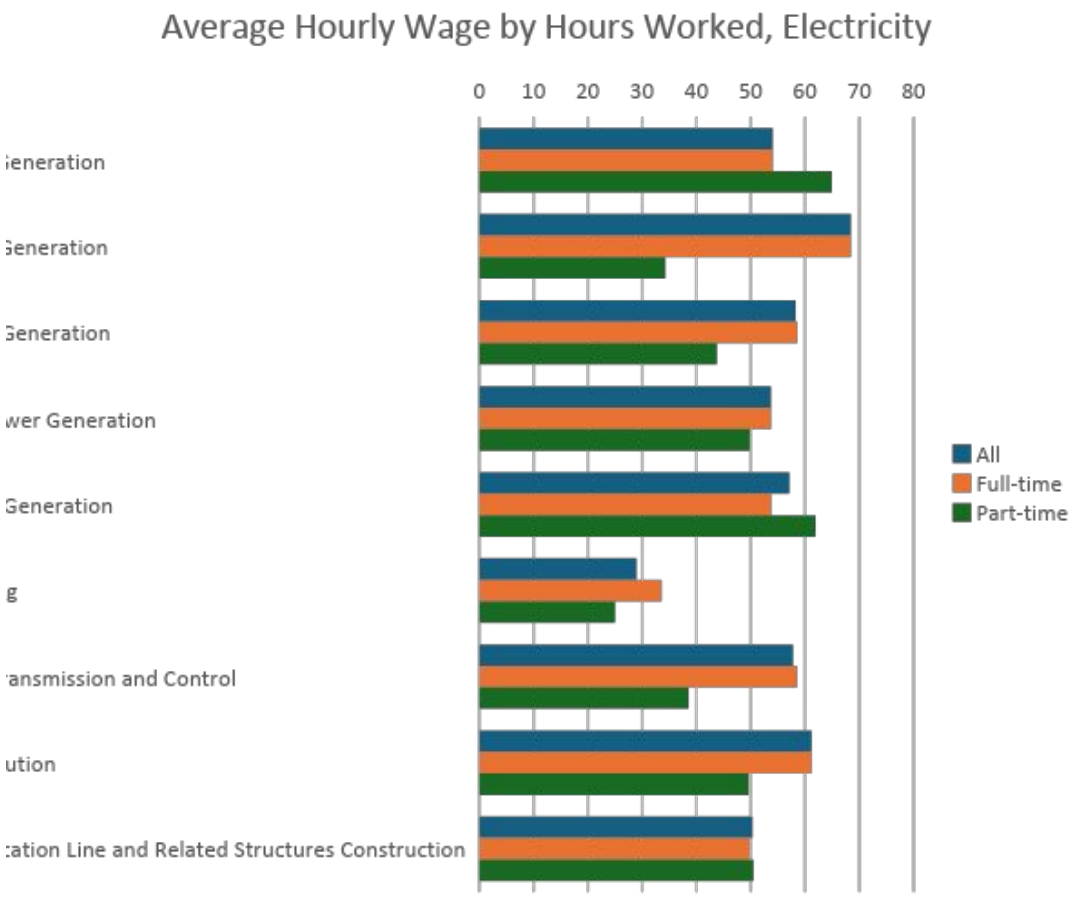
Industry Detail: Electricity



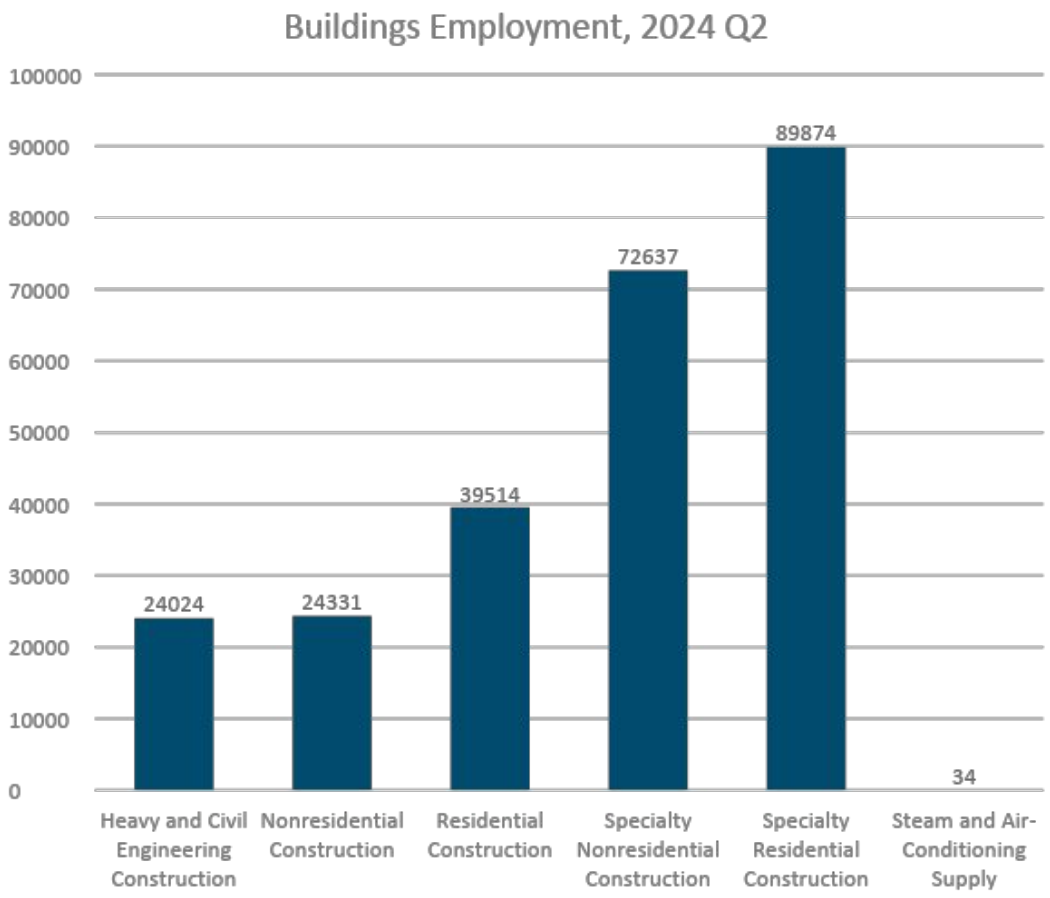


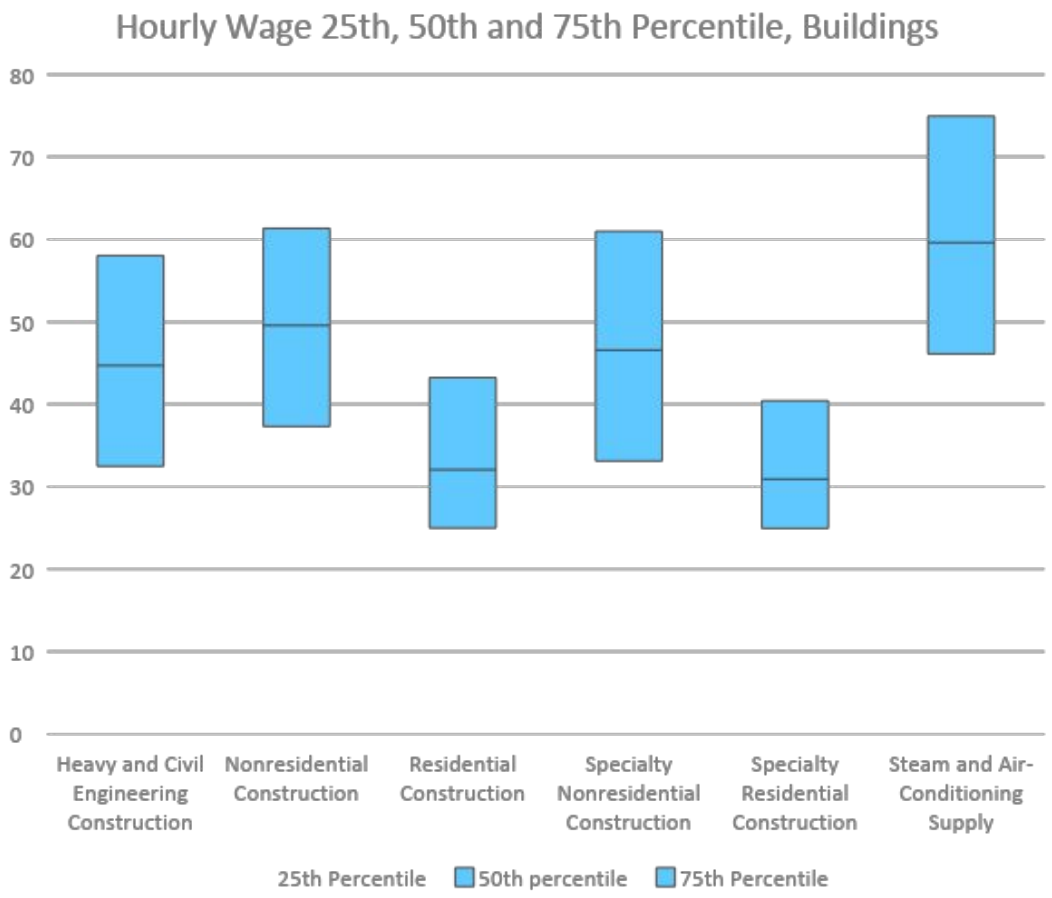
Industry Detail: Electricity



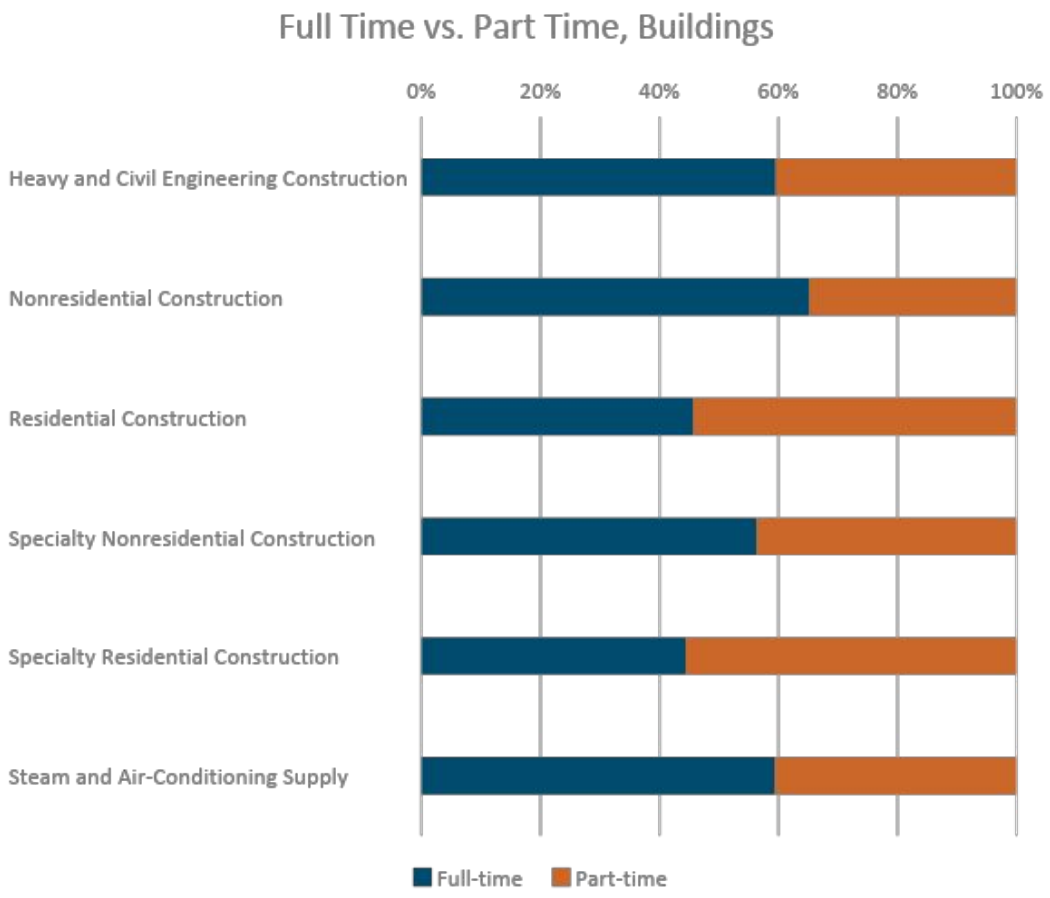


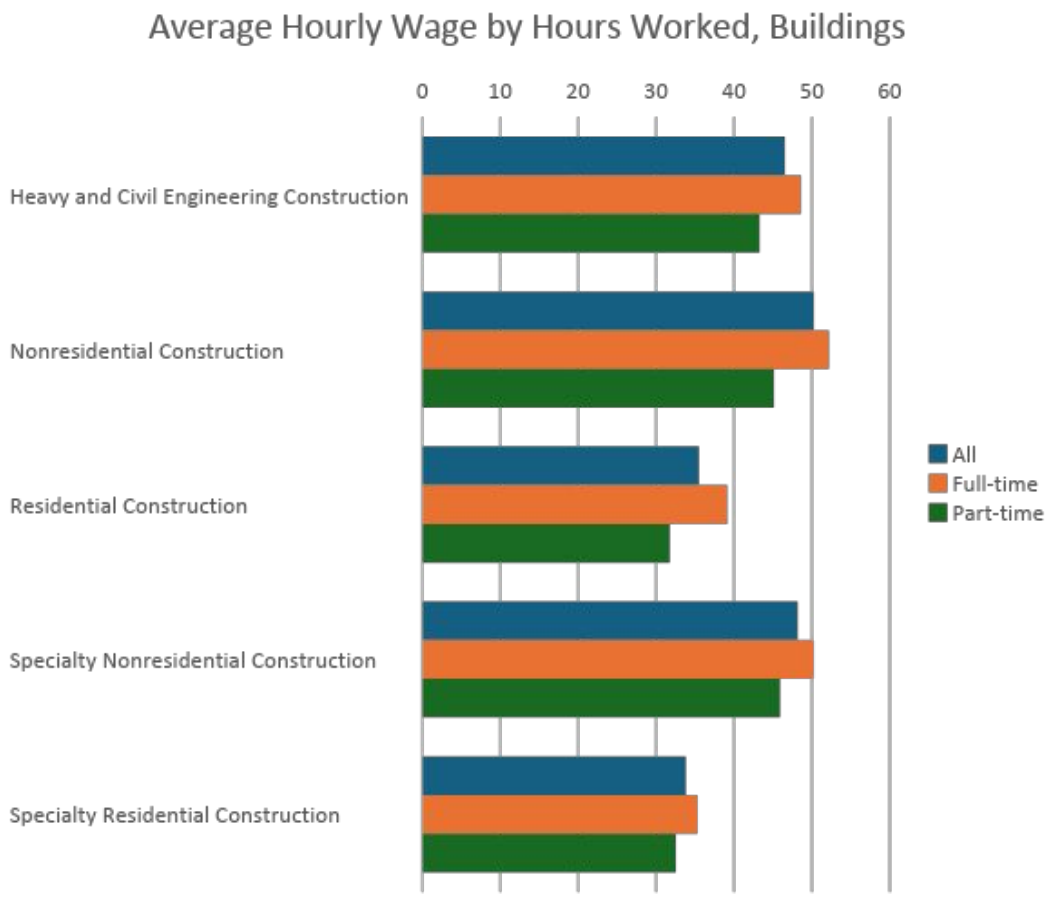
Buildings


Buildings Employment, 2024 Q2
100000
90000
80000
70000
60000
50000
40000
30000
20000
10000
0
24024
24331
39514
72637
89874
34
Heavy and Civil Engineering Construction
Nonresidential Construction
Residential Construction
Specialty Nonresidential Construction
Specialty Residential Construction
Steam and Air-Conditioning Supply

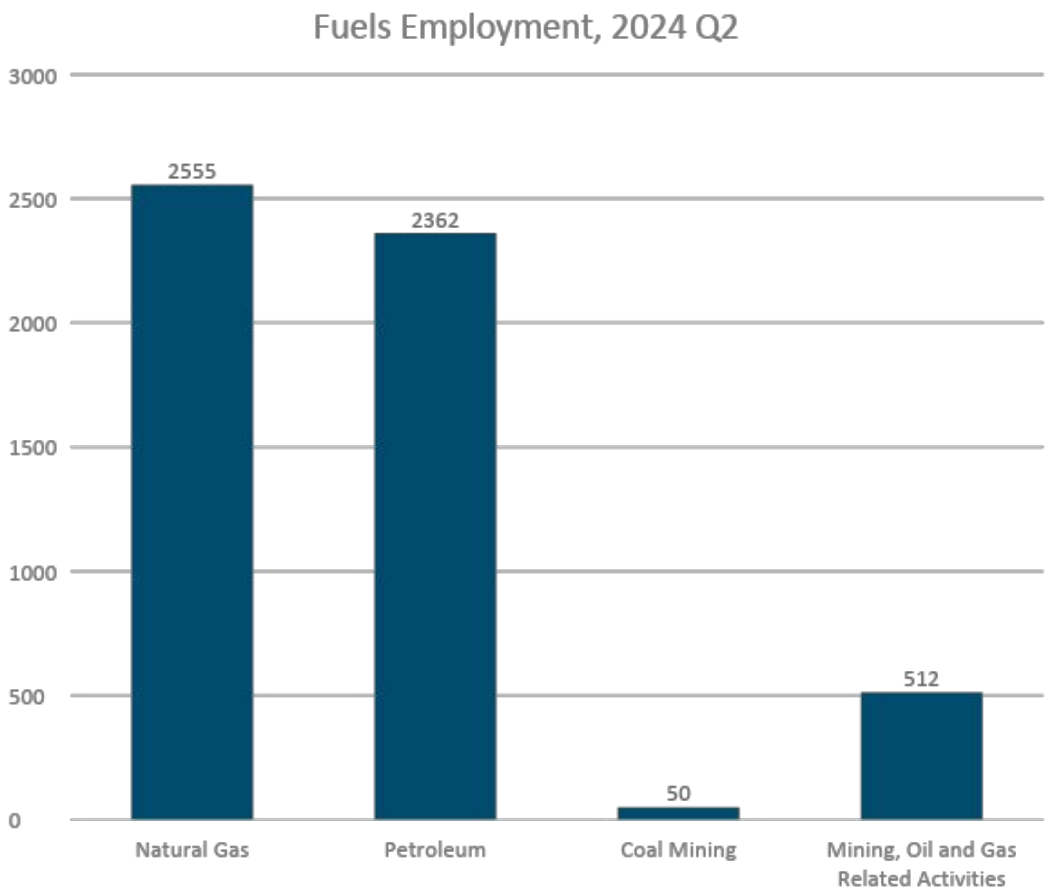

Hourly Wage 25th, 50th and 75th Percentile, Buildings
80
70
60
50
40
30
20
10
0
Heavy and Civil Engineering Construction
Nonresidential Construction
Residential Construction
Specialty Nonresidential Construction
Specialty Residential Construction
Steam and Air-Conditioning Supply
25th Percentile
50th percentile
75th Percentile

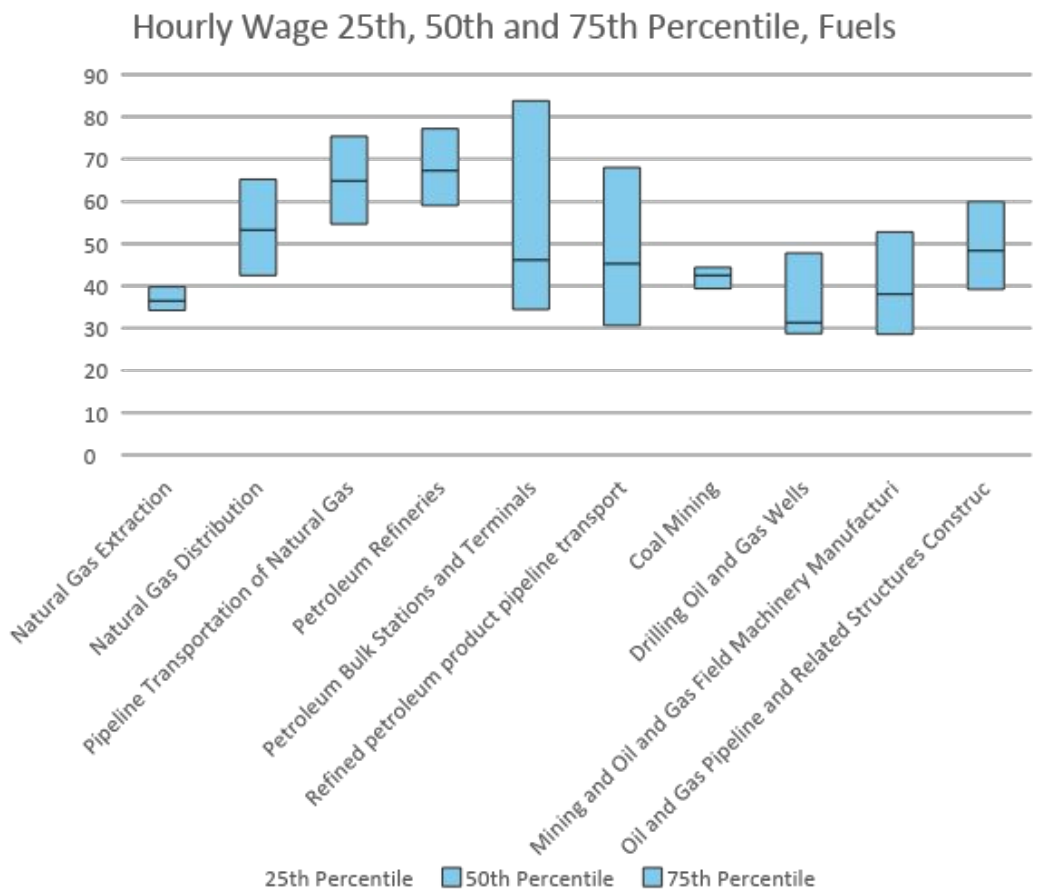
Buildings


Full Time vs. Part Time, Buildings
0%
20%
40%
60%
80%
100%
Heavy and Civil Engineering Construction
Nonresidential Construction
Residential Construction
Specialty Nonresidential Construction
Specialty Residential Construction
Steam and Air-Conditioning Supply
Full-time
Part-time

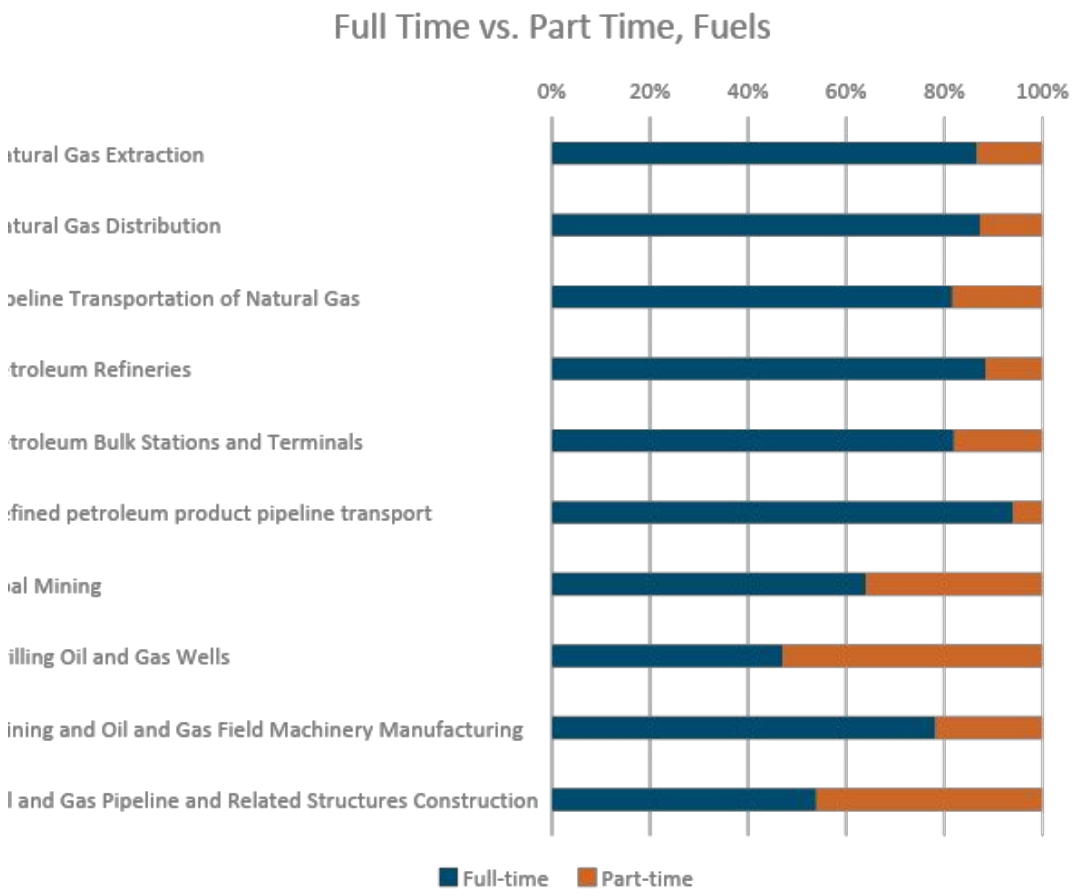

Average Hourly Wage by Hours Worked, Buildings
0
10
20
30
40
50
60
Heavy and Civil Engineering Construction
Nonresidential Construction
Residential Construction
Specialty Nonresidential Construction
Specialty Residential Construction
All
Full-time
Part-time

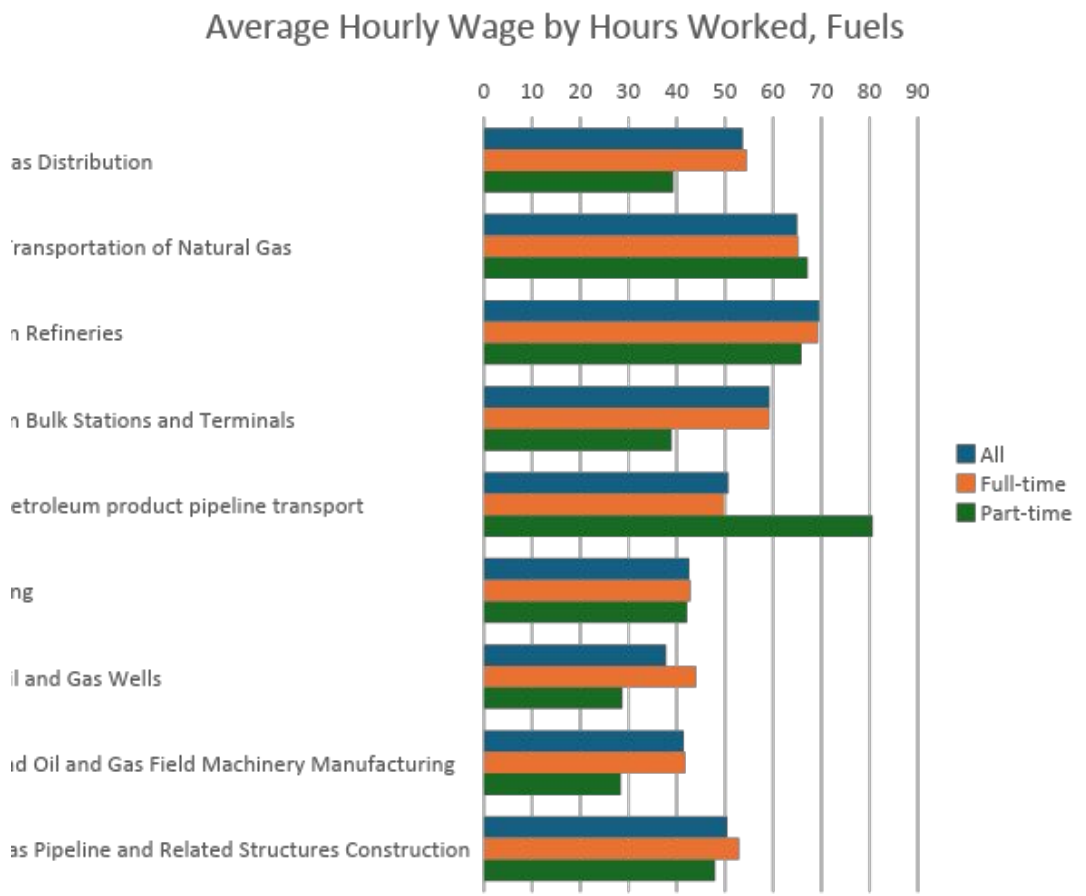
Fuels


Fuels Employment, 2024 Q2
3000
2500
2000
1500
1000
500
0
2555
2362
50
512
Natural Gas
Petroleum
Coal Mining
Mining, Oil and Gas Related Activities

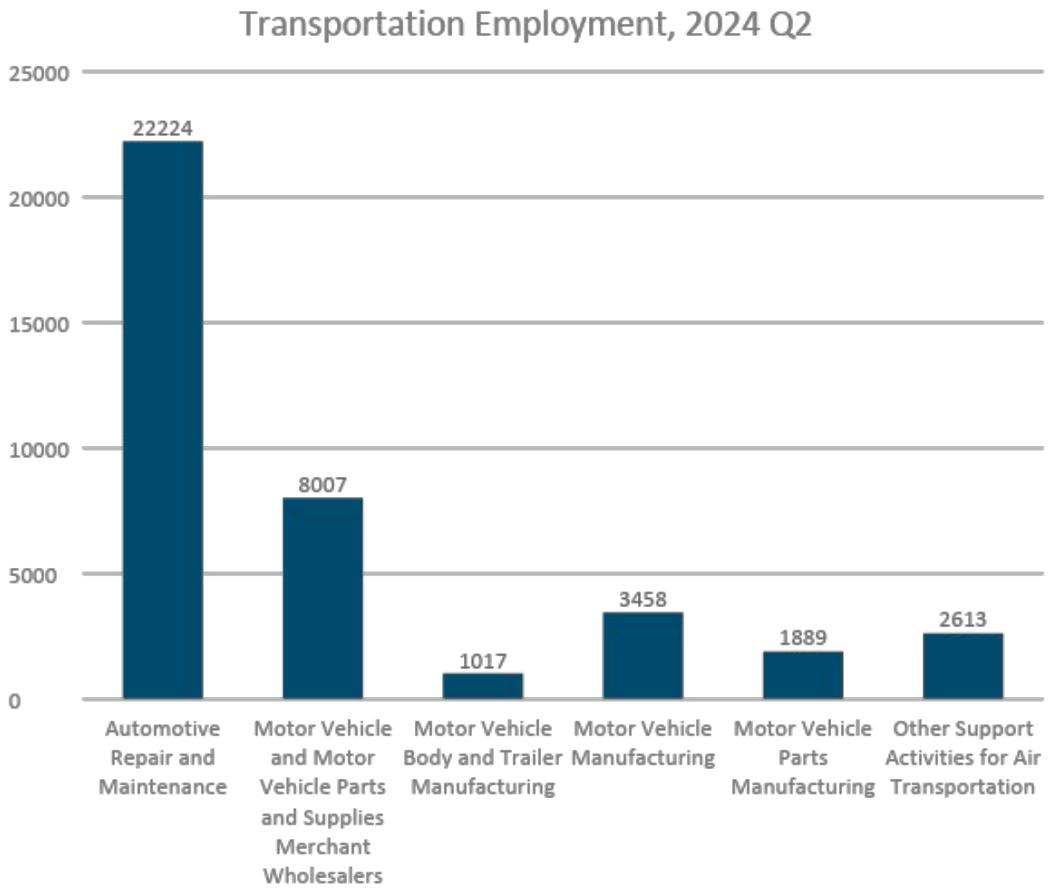

Hourly Wage 25th, 50th and 75th Percentile, Fuels
90
80
70
60
50
40
30
20
10
0
Natural Gas Extraction
Natural Gas Distribution
Pipeline Transportation of Natural Gas
Petroleum Refineries
Petroleum Bulk Stations and Terminals
Refined petroleum product pipeline transport
Coal Mining
Drilling Oil and Gas Wells
Mining and Oil and Gas Field Machinery Manufacturi
Oil and Gas Pipeline and Related Structures Construc
25th Percentile
50th Percentile
75th Percentile

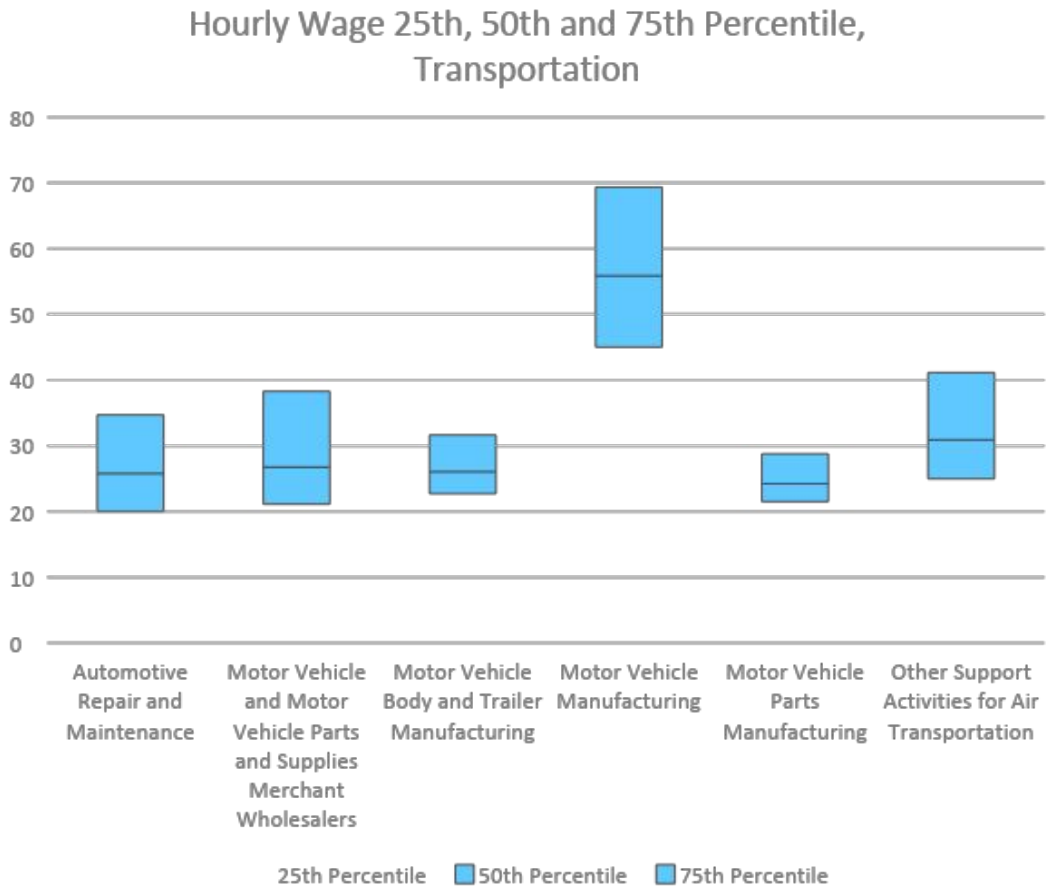
Fuels


Full Time vs. Part Time, Fuels
0%
20%
40%
60%
80%
100%
tural Gas Extraction
tural Gas Distribution
peline Transportation of Natural Gas
troleum Refineries
troleum Bulk Stations and Terminals
fined petroleum product pipeline transport
al Mining
illing Oil and Gas Wells
ining and Oil and Gas Field Machinery Manufacturing
l and Gas Pipeline and Related Structures Construction
Full-time
Part-time

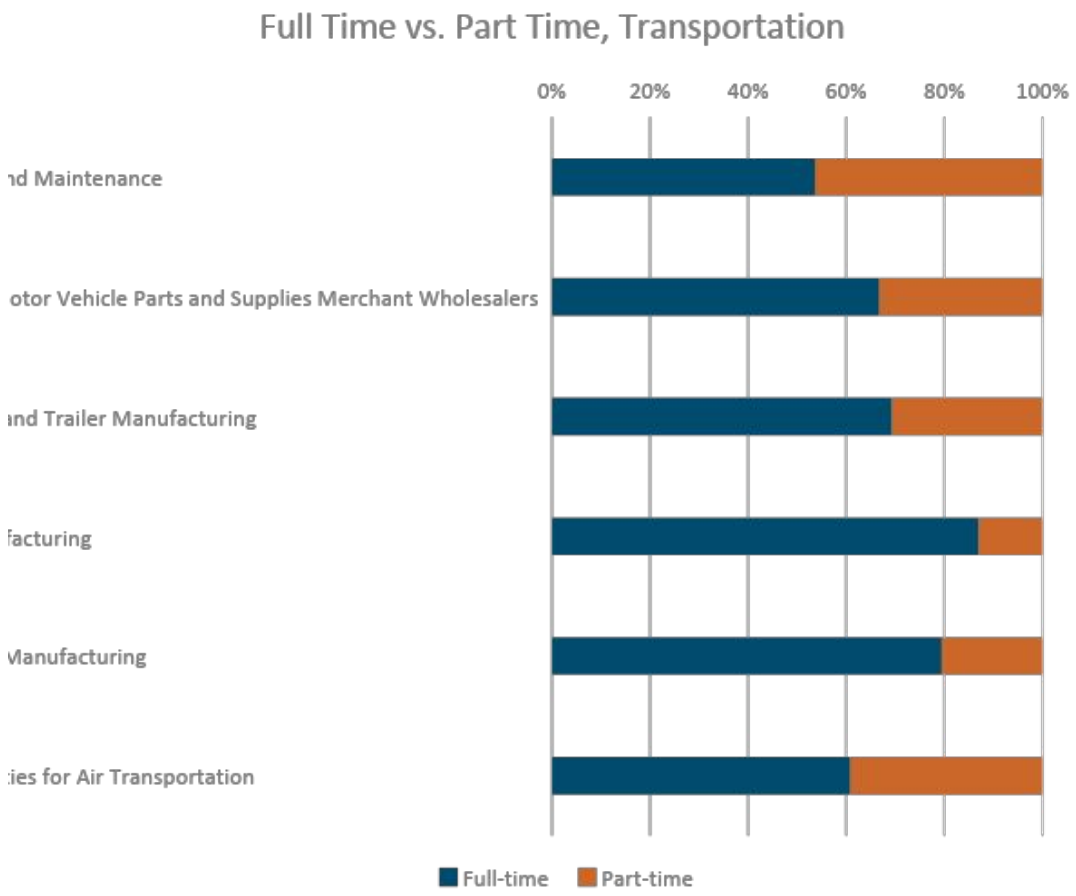

Average Hourly Wage by Hours Worked, Fuels
0
10
20
30
40
50
60
70
80
90
as Distribution
ransportation of Natural Gas
n Refineries
n Bulk Stations and Terminals
etroleum product pipeline transport
ng
l and Gas Wells
d Oil and Gas Field Machinery Manufacturing
as Pipeline and Related Structures Construction
All
Full-time
Part-time

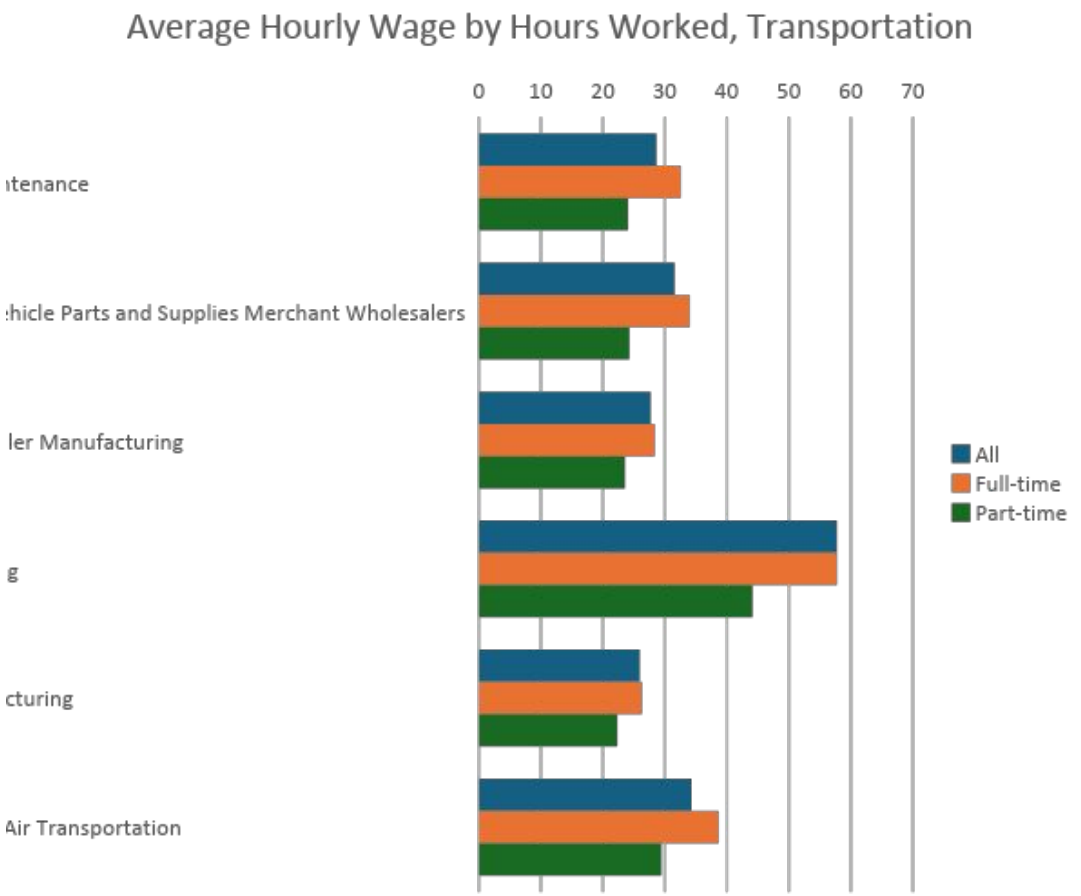
Transportation



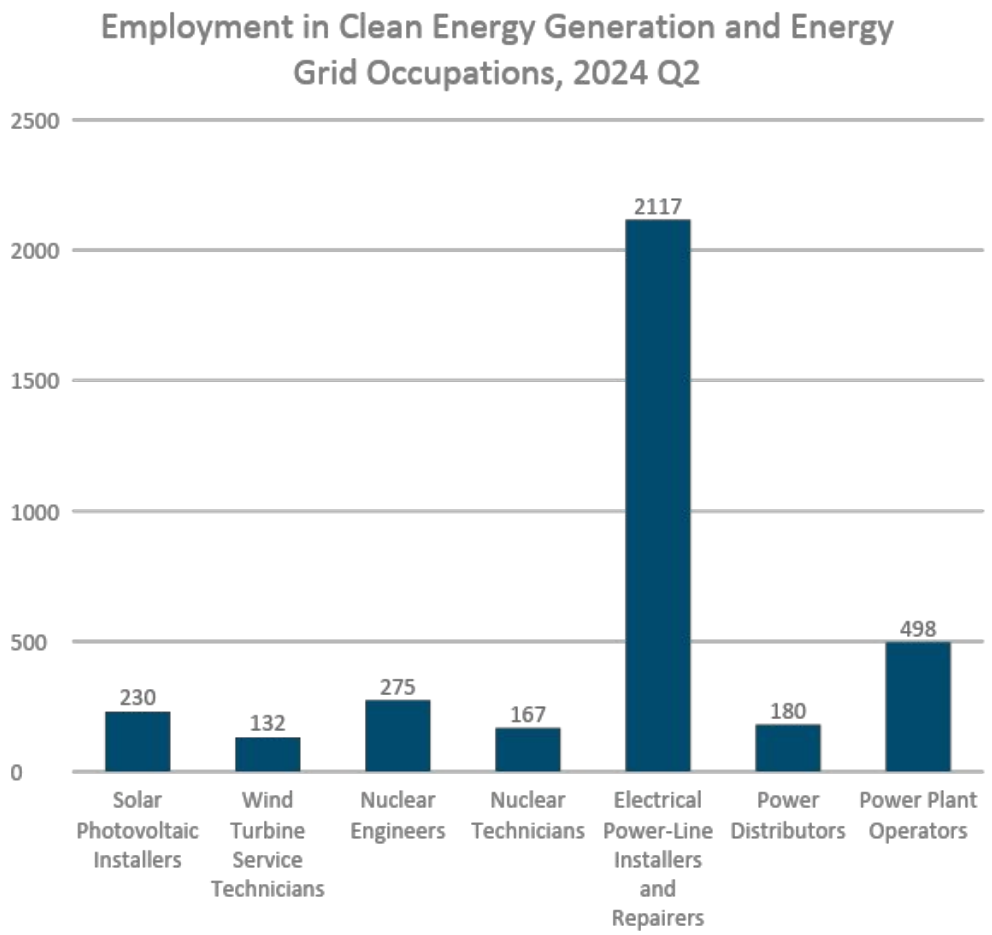


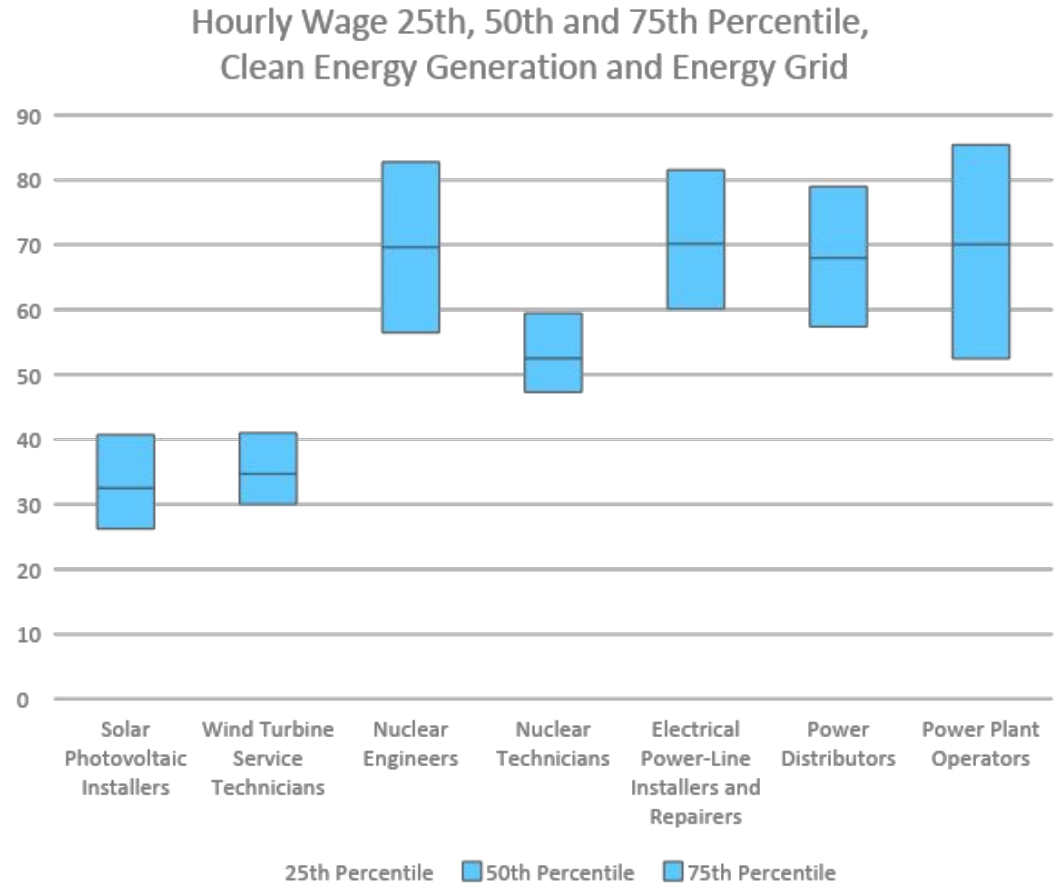
Transportation



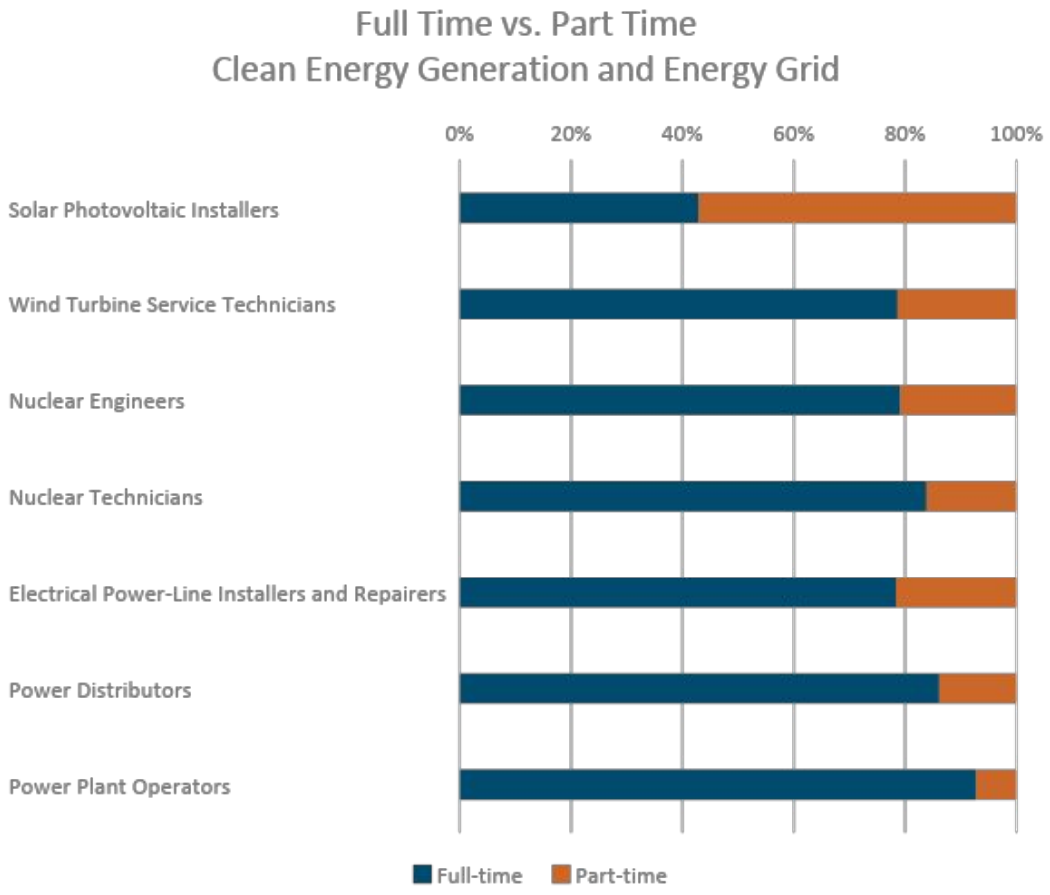


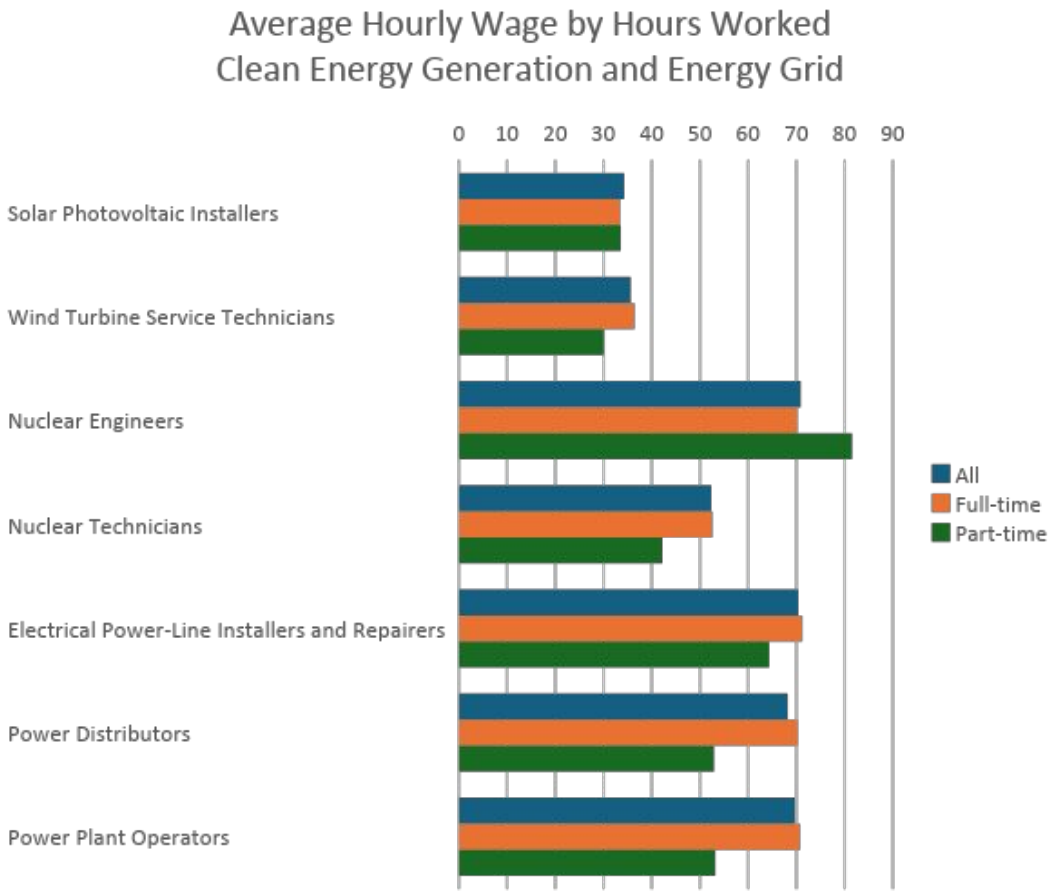
Occupation Detail: Clean Energy Generation and Energy Grid



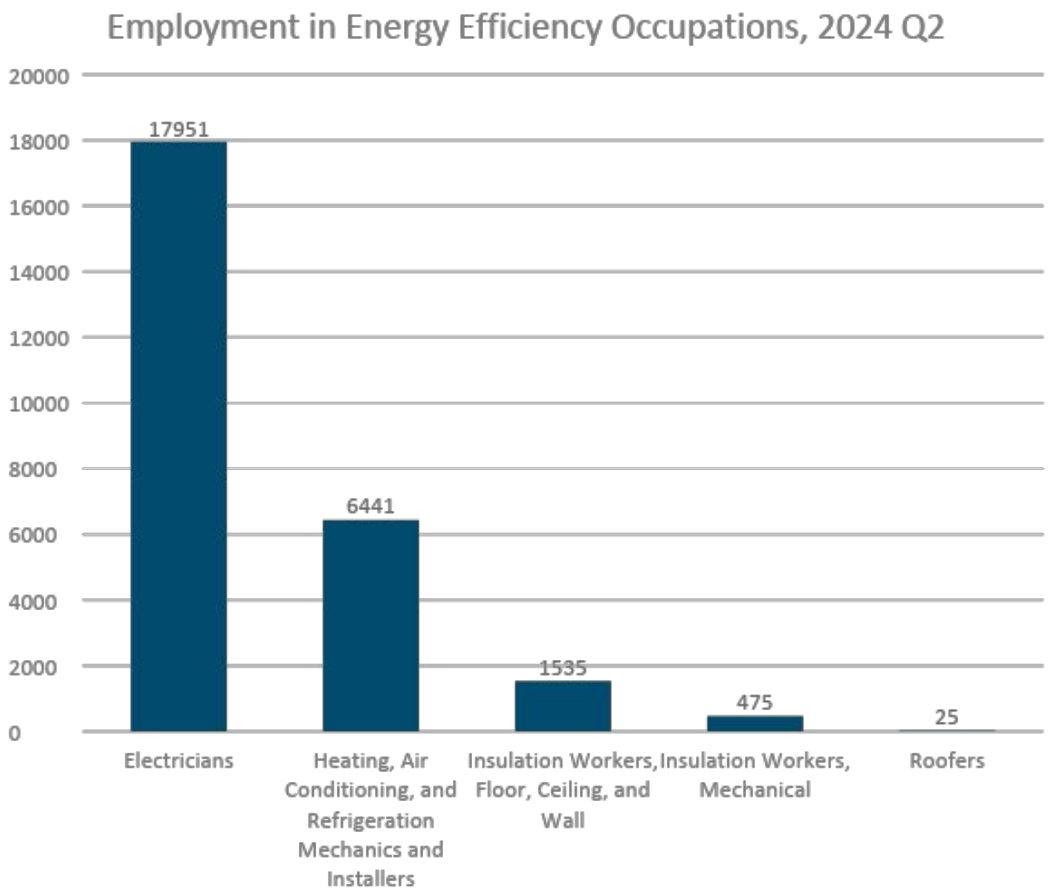


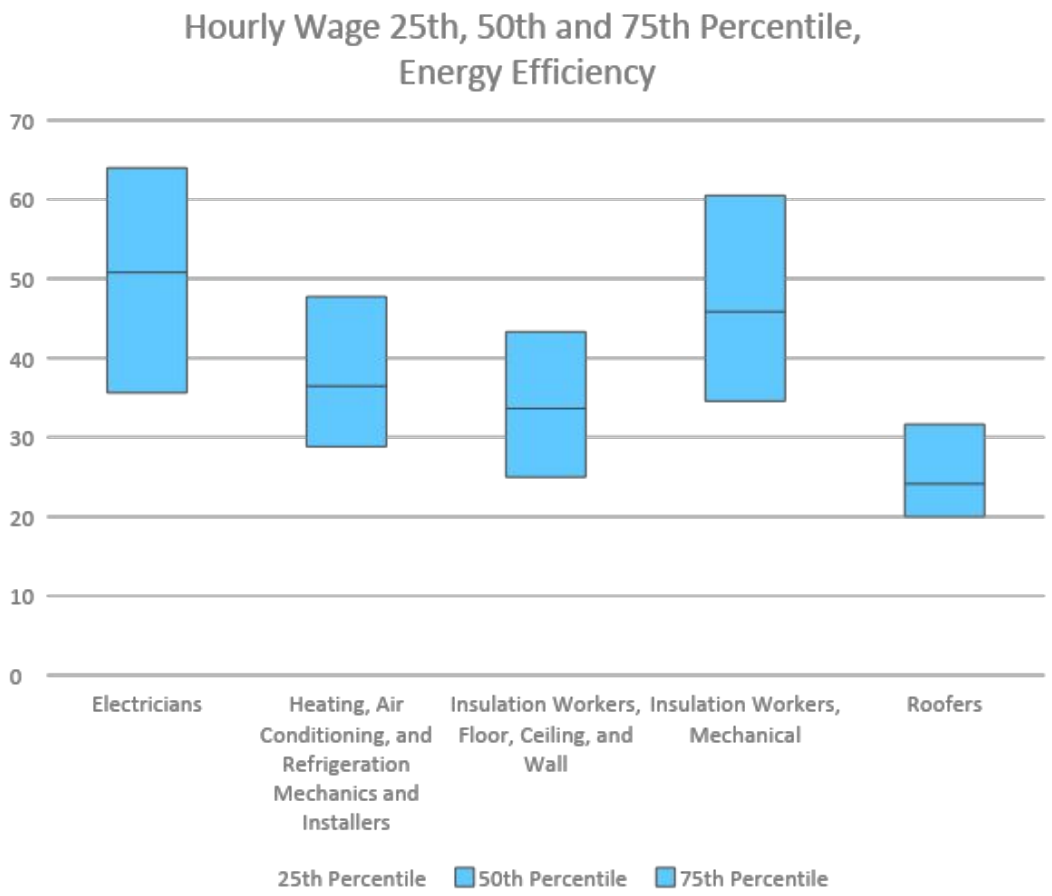
Occupation Detail: Clean Energy Generation and Energy Grid



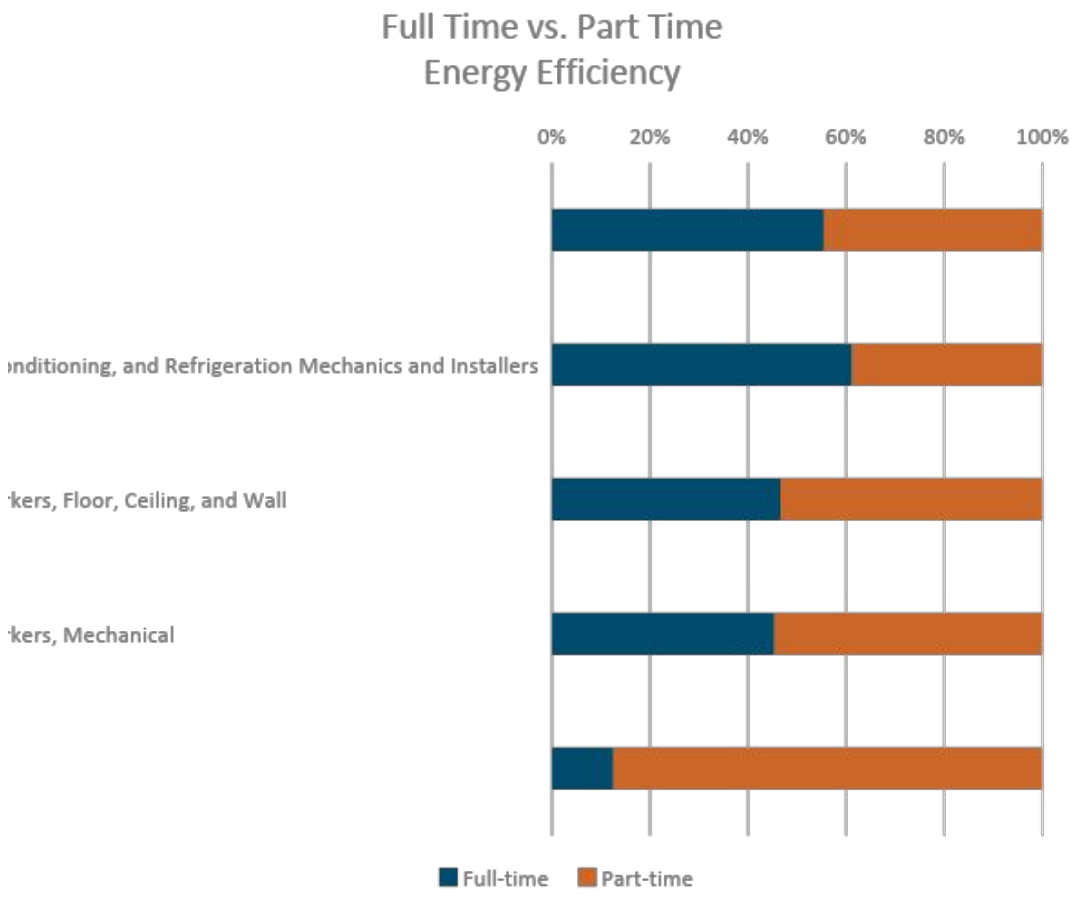


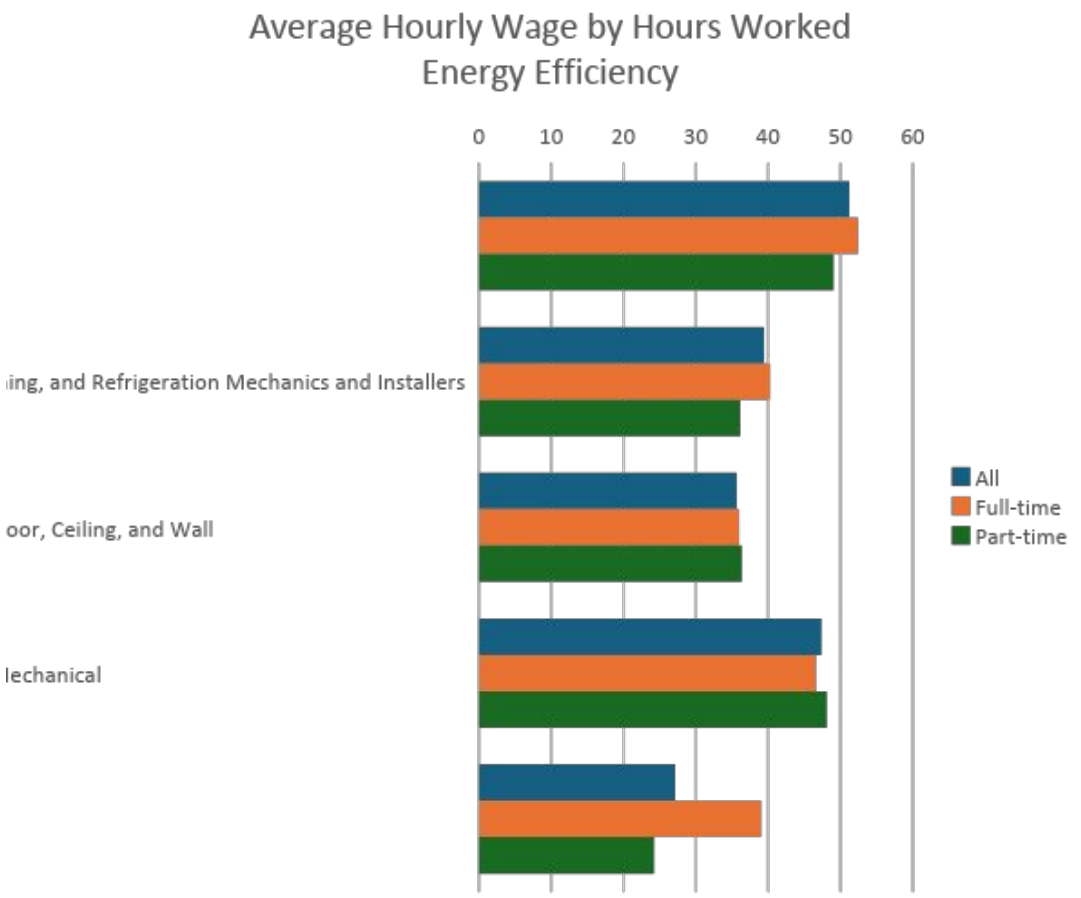
Energy Efficiency



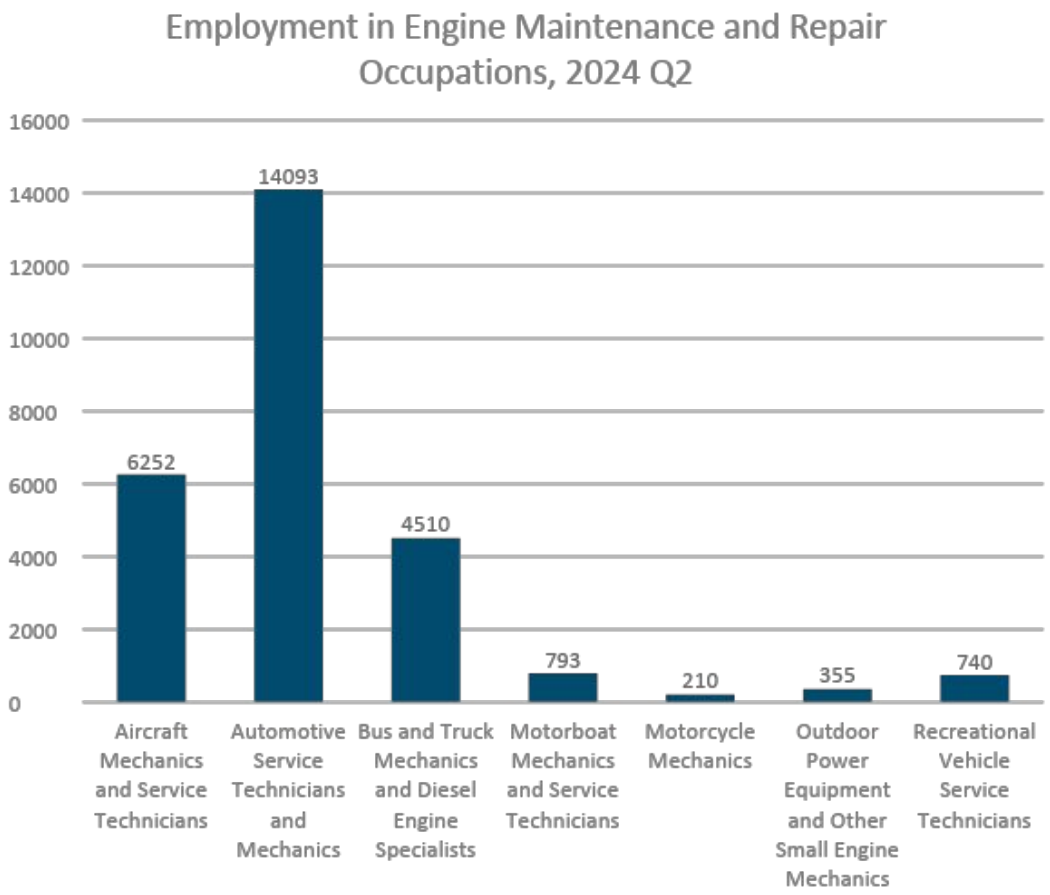


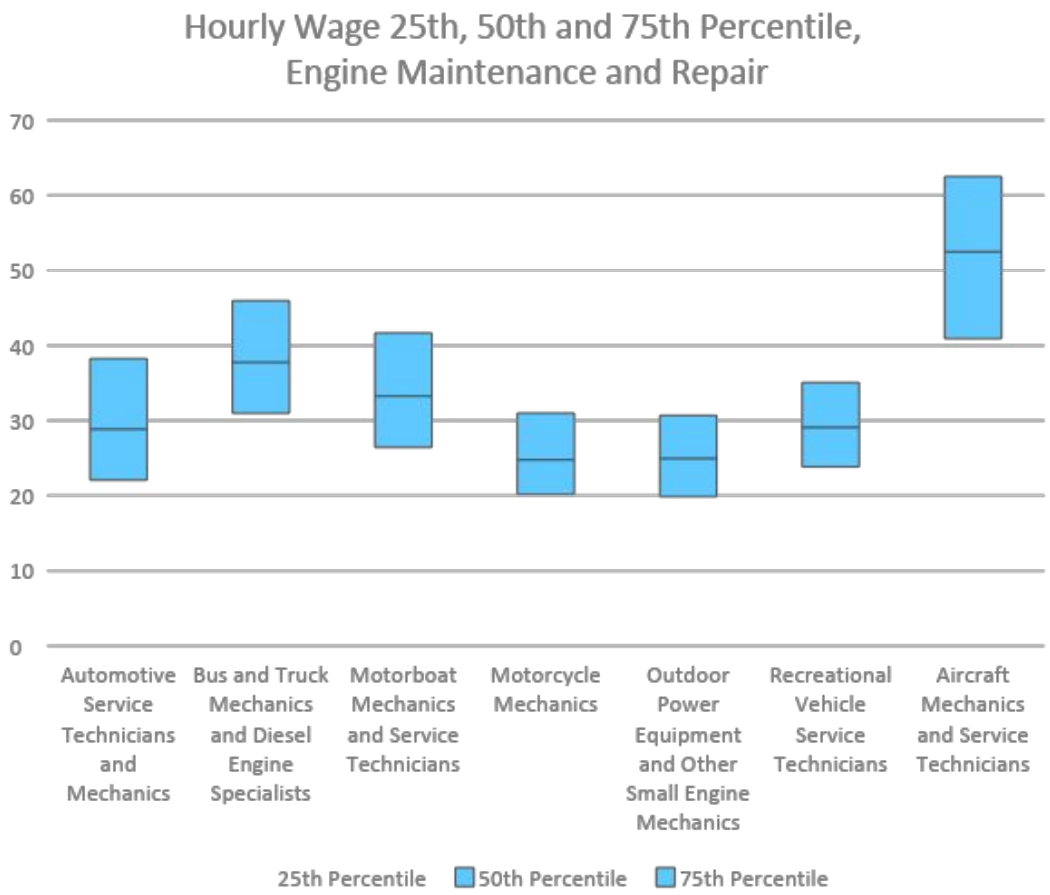
Energy Efficiency



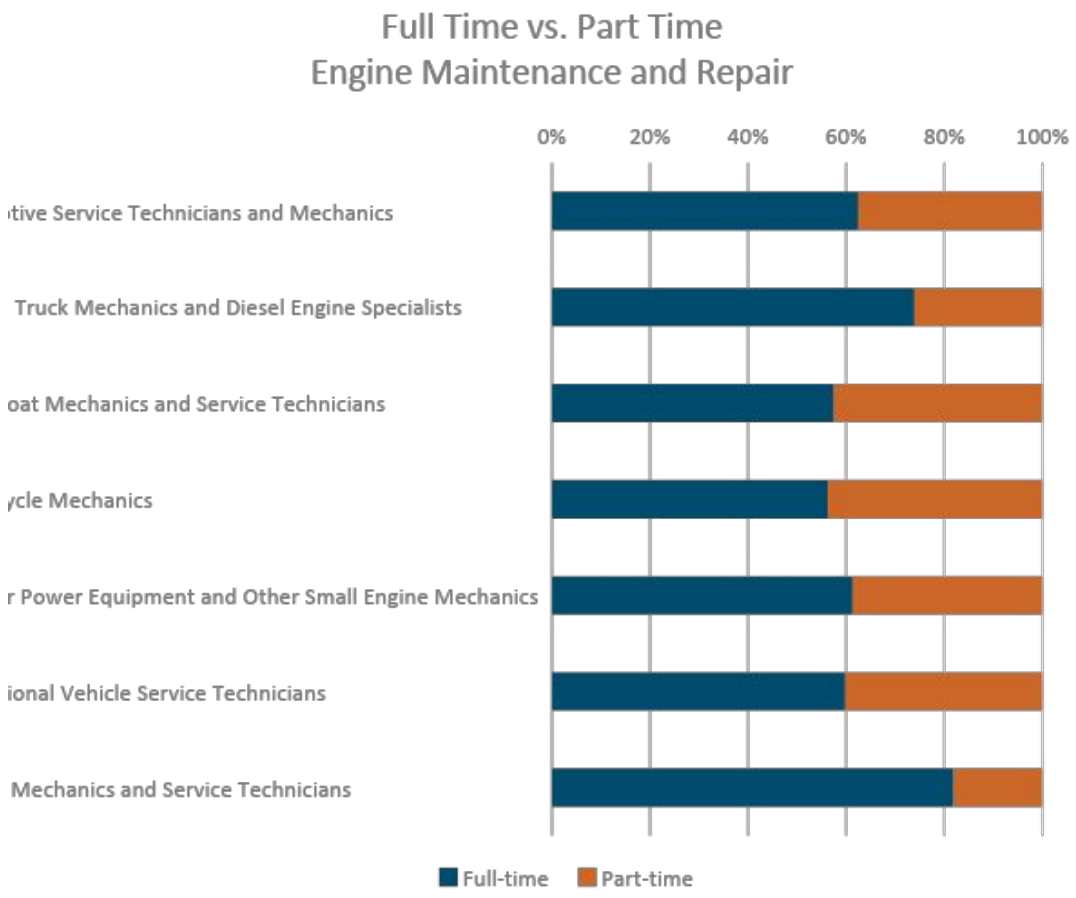


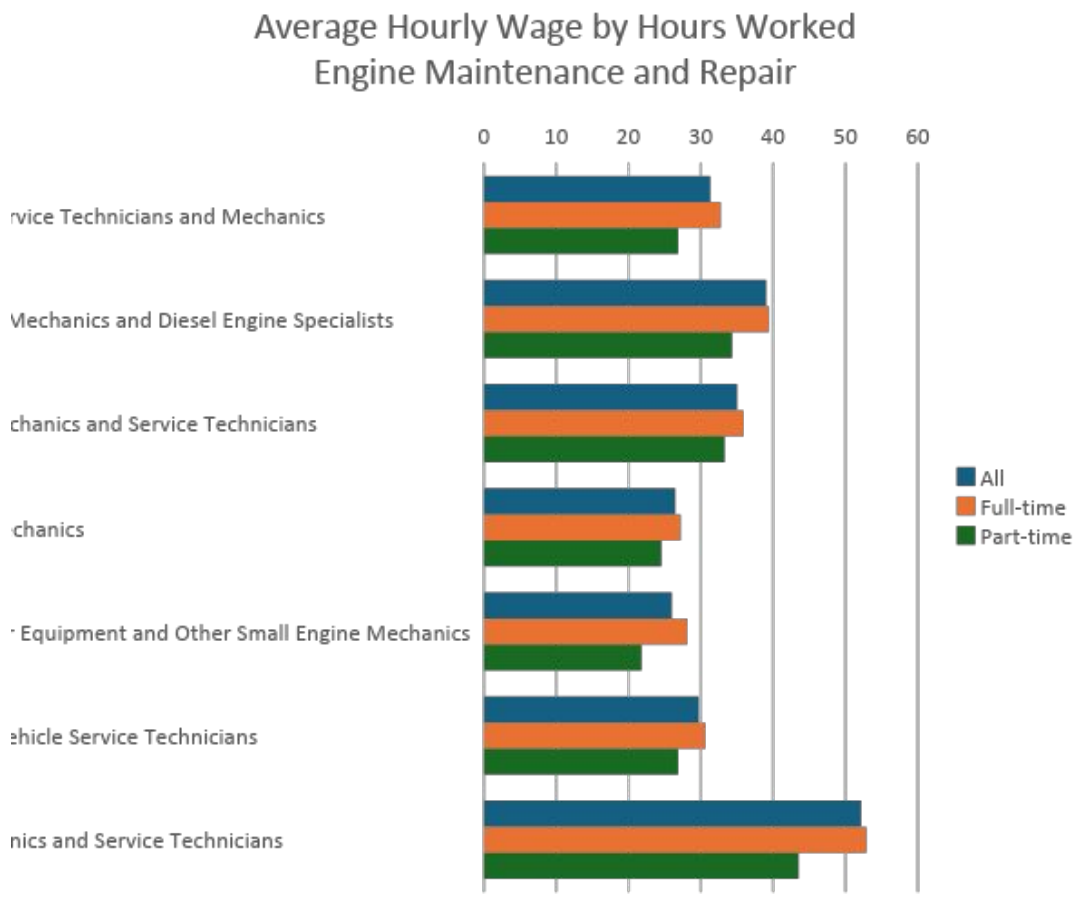
Engine Maintenance and Repair



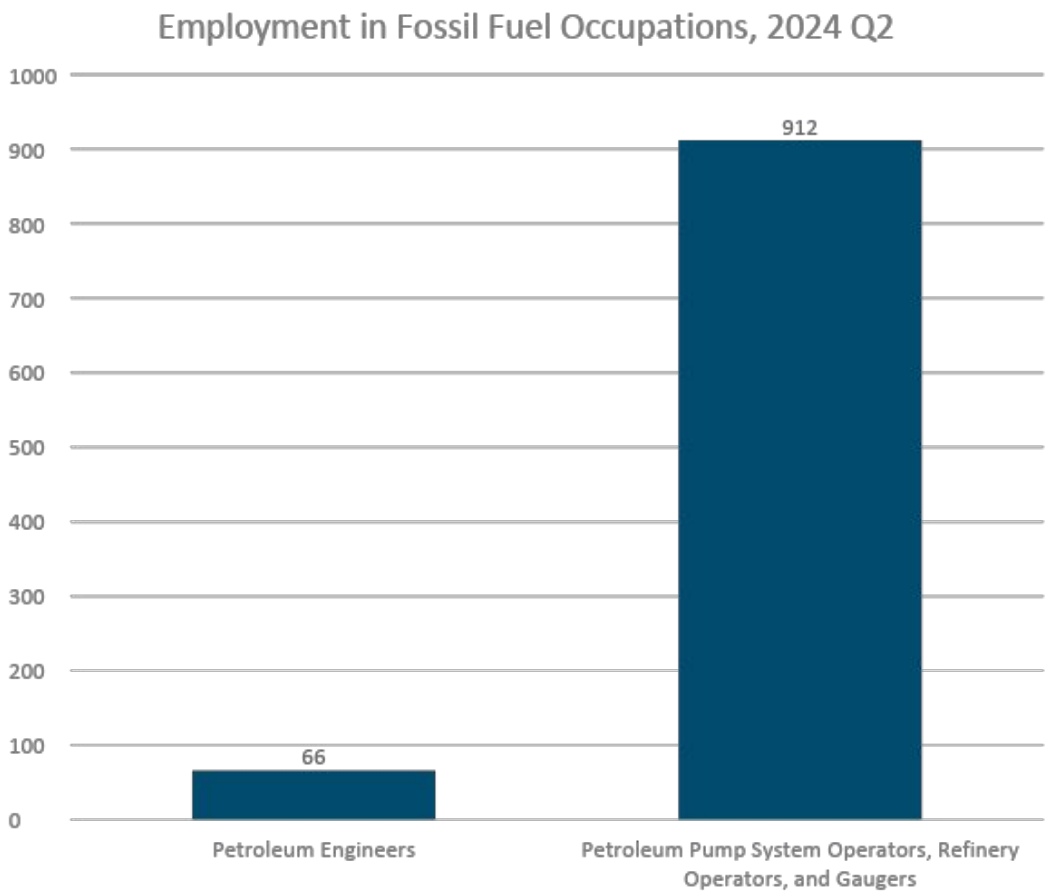


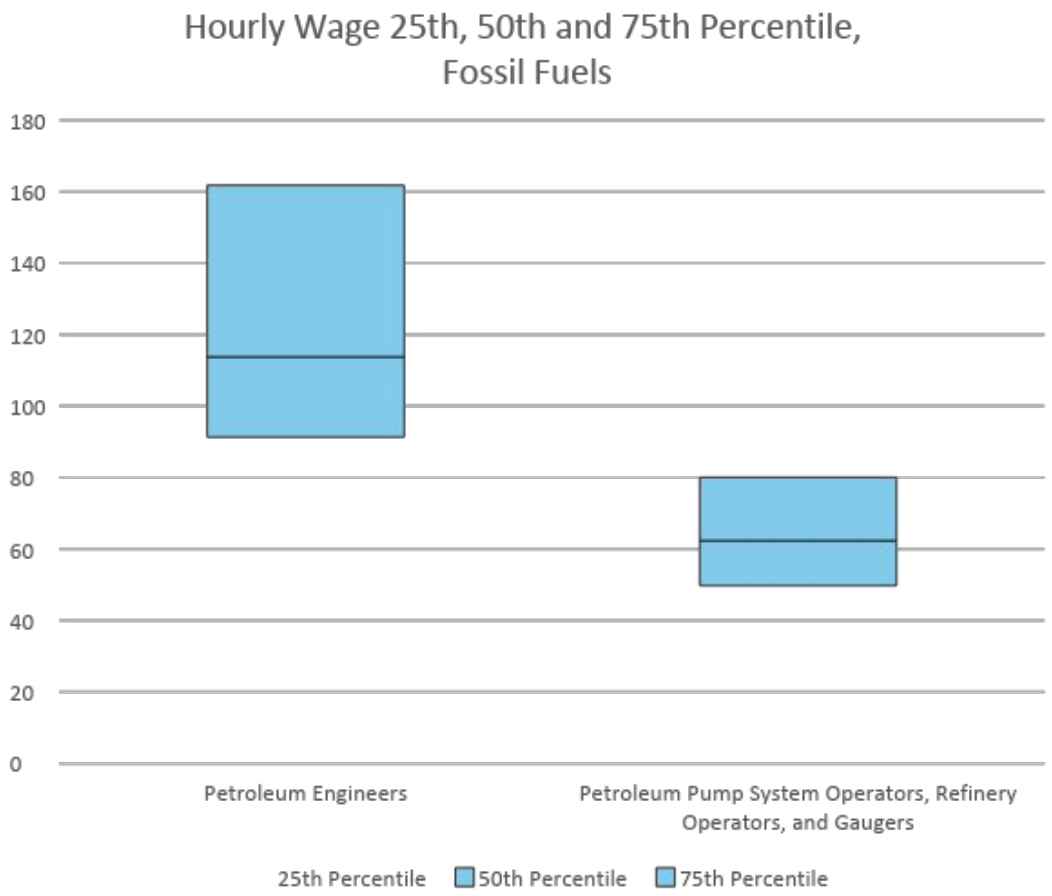
Engine Maintenance and Repair



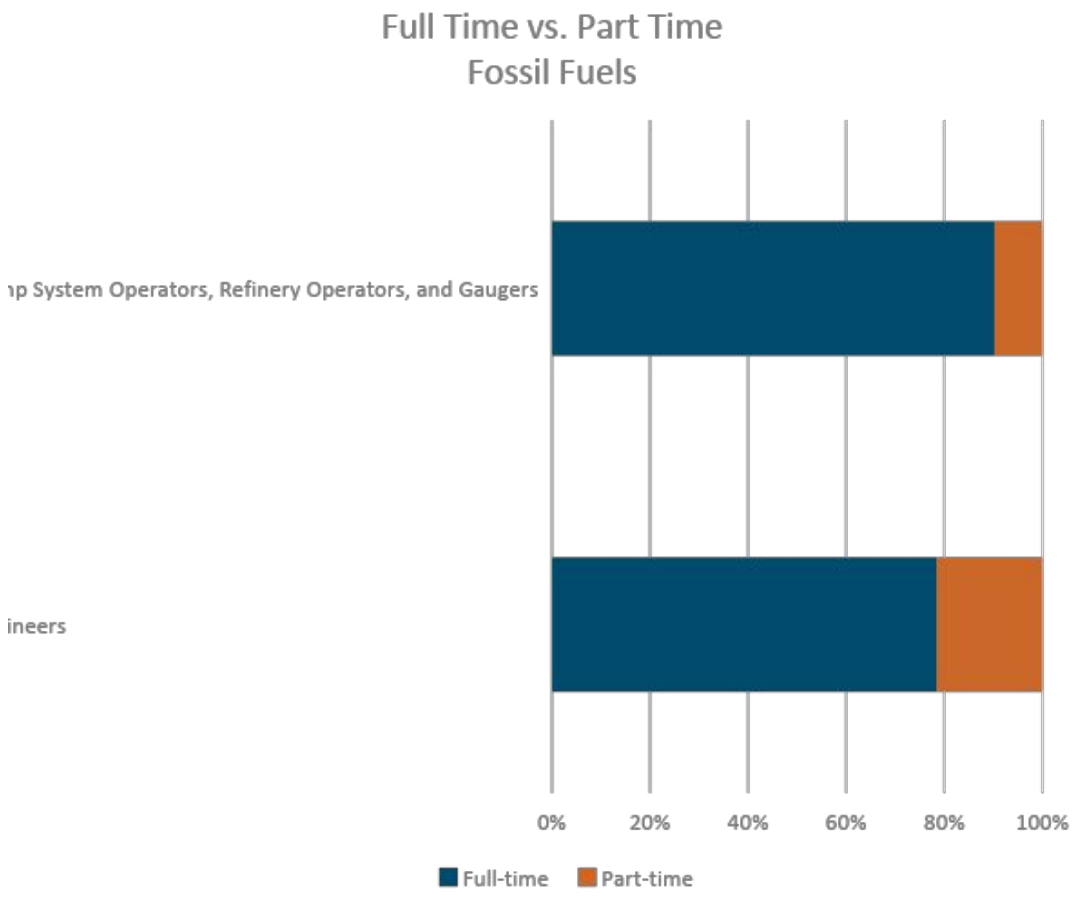


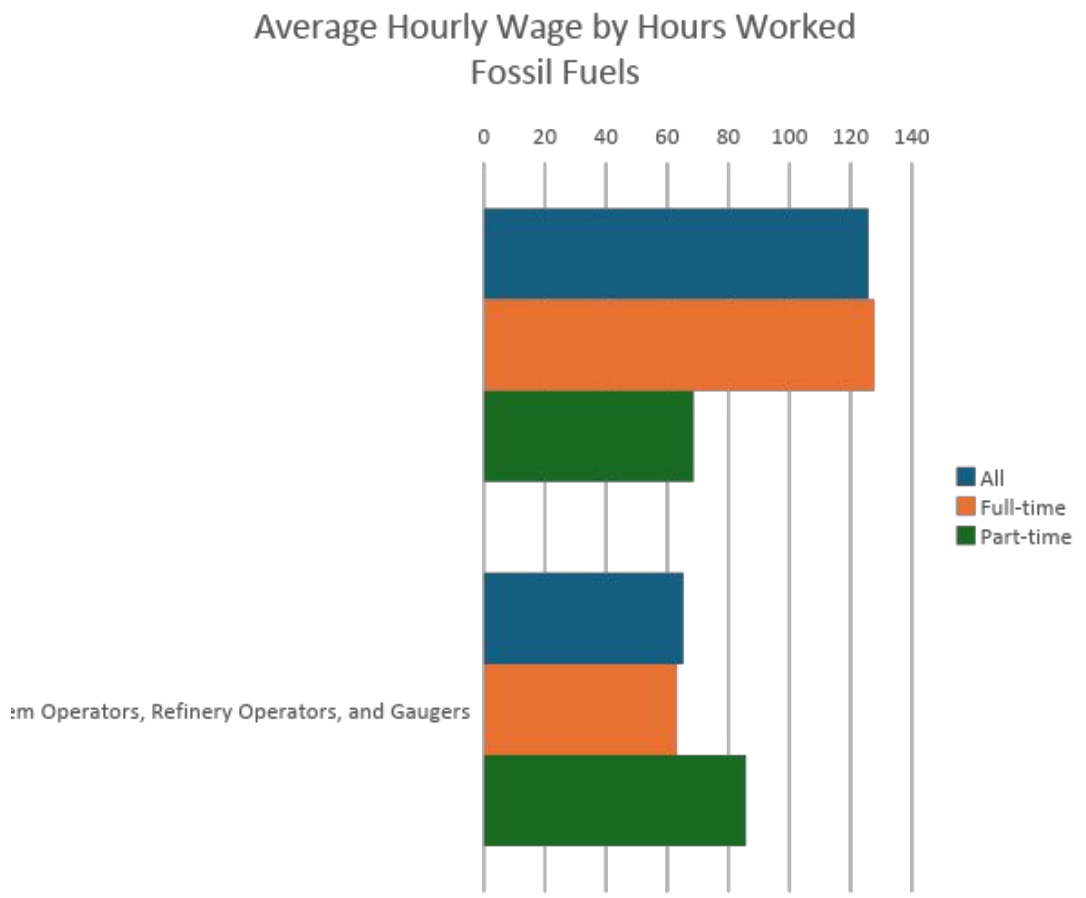
Fossil Fuels





Fossil Fuels





Future Work and Discussion

- Further investigation into industry-occupation staffing patterns in UI wage records to identify previously excluded clean energy industries and occupations
- Identify clean energy employers in wage record via principal products and services field
- In subsequent years, trend analysis on occupational wages in UI wage records
- Skills and education analysis in clean energy occupations

Thank You!

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