# IOWA ENERGY PLAN

*APPENDIX E:*
*Iowa Energy Workforce Assessment*

**Collaborate locally.**
**Grow sustainably.**
**Lead nationally.**

IOWA ENERGY PLAN IS A JOINT INITIATIVE BETWEEN
IOWA economic development | IOWADOT

**Prepared by TEConomy Partners, LLC.**

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# A. INTRODUCTION

This report is one in a series of reports, produced by TEConomy Partners LLC to inform working group and stakeholder deliberations in developing the Iowa Energy Plan. Other reports in the series and analysis have focused on: an analysis of energy supply and demand and total employment in the energy sector in Iowa; strengths, weaknesses, opportunities and threats (SWOT) of Iowa in relation to energy; and a detailed assessment of in-state energy R&D core competencies and identification of "platforms" for energy-based economic development. This report focuses on summarizing workforce and energy-related occupations projections in relation to Iowa's energy sector.

Developing and maintaining a technology-driven industry sector like energy requires a robust education and workforce pipeline producing the right mix of skills and the right volume of trainees to match industry demand.

The necessary skills and educational requirements can vary significantly across an individual energy sector, but it is clear that specialized training is required to develop, deploy, manufacturer and maintain energy-related technologies and critical infrastructure for efficient production and distribution.

Developing, retaining, and attracting talent each raise distinct challenges based on workforce demand and factors such as geographical location (which in the energy industry sector can be especially challenging given the rural and remote locations of widespread infrastructure). While the nuances of specific workforce dynamics, ground truths and experiences of employers, educators and other workforce developers come through in the interviews conducted for this study, the project team has supplemented information covered in the SWOT interviews with a quantitative assessment of the recent and projected demand for "primary" energy-related occupations in Iowa.

# B. ANALYTICAL APPROACH

A two-pronged approach was undertaken to identify key occupations primarily related to the energy sector in Iowa:

- First, the project team reviewed detailed occupational job descriptions and titles to identify jobs most clearly and directly related to the energy sector and its primary functions.
- Second, the team utilized Iowa and U.S.-specific industry "staffing patterns" data that detail the occupational make-up of an industry utilizing the NAICS-defined industry structure developed by TEConomy and reported in the energy supply and demand white paper report. By examining those occupations most utilized by energy industry employers, a robust understanding of actual hiring across the industry can be developed.

There are key caveats and/or limitations to understand with respect to this approach including:

- There are a number of primary energy-related occupations for which Iowa may have some employment but it is too small for the Bureau of Labor Statistics(BLS) to disclose. BLS only provides estimates of employment from the occupational surveys when employment is estimated to be at least 30 jobs.
    - For example, BLS does not have estimates for Iowa's nuclear engineers and nuclear technicians, likely because they number fewer than 30.
    - Likewise, an occupational code now exists for Solar Photovoltaic Installers but no employment estimate is provided for Iowa.
    - While these occupations were certainly identified, for these reasons they are not included in the assessment developed here.[1]
- In addition, there are large employment areas that might be considered "secondary" to the industry from an occupational perspective where the job classifications do not signal a primary designation within energy. For example, utility companies and wind turbine blade manufacturers employ large numbers of workers in managerial, sales, IT, customer services, and administrative positions, and these are critical to their effective operations, but are not included here as these positions are so large in number and employed across numerous (indeed most) industries in Iowa.

## C. RESEARCH FINDINGS – OCCUPATIONAL DEMAND TRENDS

The TEConomy project team identified 15 key occupations that fit the primary designation described above, and have published employment values in Iowa for 2015. Table 1 presents these occupations, their employment levels, recent employment trends during the economic expansion, and the concentration of these jobs in Iowa relative to the national average is presented as a Location Quotient (LQ). Location quotients measure the degree of job concentration within a state or region relative to the nation.[2] A state LQ above 1.0 represents a greater concentration than the national average. When the LQ is significantly above average, 1.20 or greater, the state is said to have a "*specialization*" in the occupation.

[1] In addition to the two examples listed here, this also includes: Wellhead Pumpers; Pump Operators, Except Wellhead Pumpers; Nuclear Engineers; Petroleum Engineers.

[2] Location quotients (LQs) are a standard measure of the concentration of a particular industry in a region relative to the nation. The LQ is the share of total state or regional employment in the particular industry divided by the share of total industry employment in the nation. An LQ greater than 1.0 for a particular industry indicates that the region has a greater relative concentration, whereas an LQ less than 1.0 signifies a relative underrepresentation. An LQ greater than 1.20 denotes employment concentration significantly above the national average. In this analysis, regional specializations are defined by LQs of 1.20 or greater.

*Table 1. Summary Employment Metrics for Key Energy-Related Occupations in Iowa, 2015*

| Occupation | Iowa Employment, 2015 | Percent Change, 2010-15 | Location Quotient, 2015 |
|---|---|---|---|
| **Total, All Occupations** | 1,526,950 | 6.1% | 1.00 |
| **Electrical Power-Line Installers and Repairers** | 1,940 | 13.5% | 1.52 |
| **Electrical Engineers** | 1,300 | 6.6% | 0.66 |
| **Electrical and Electronics Engineering Technicians** | 920 | -22.0% | 0.60 |
| **Power Plant Operators** | 760 | -11.6% | 1.83 |
| **Control and Valve Installers and Repairers** | 600 | 33.3% | 1.27 |
| **Stationary Engineers and Boiler Operators** | 340 | 21.4% | 0.89 |
| **Meter Readers, Utilities** | 310 | -34.0% | 0.80 |
| **Wind Turbine Service Technicians** | 240 | n/a | 5.49 |
| **Gas Plant Operators** | 230 | -30.3% | 1.24 |
| **Chemical Engineers** | 170 | -10.5% | 0.48 |
| **Power Distributors and Dispatchers** | 170 | 142.9% | 1.33 |
| **Electrical and Electronics Repairers, Powerhouse, Substation, and Relay** | 110 | -60.7% | 0.43 |
| **Biochemists and Biophysicists** | 90 | 50.0% | 0.26 |
| **Petroleum Pump System Operators, Refinery Operators, and Gaugers** | 60 | -50.0% | 0.13 |
| **Gas Compressor and Gas Pumping Station Operators*** | 60 | n/a | 1.14 |

*Source: TEConomy Partners analysis of Bureau of Labor Statistics, Occupational Employment Statistics.*

*Note: N/A = Not available. *Employment and LQ data for this occupation are for 2014, the latest year available.*

**Iowa has "specialized" employment concentrations in six of the 15 energy-related occupations** where its concentration of jobs in these occupations exceeds the national average by 20 percent or more (a location quotient of 1.20 or greater). Having a disproportionately higher concentration signals an occupation that is highly utilized and a skills niche that is important to the state and its industry composition. These specialized occupational groups include:

- Wind Turbine Service Technicians (LQ is 5.49)
- Power Plant Operators (LQ is 1.83)
- Electrical Power-Line Installers and Repairers (LQ is 1.52)
- Power Distributors and Dispatchers (LQ is 1.33)
- Control and Valve Installers and Repairers (LQ is 1.27)
- Gas Plant Operators (LQ is 1.24).

The employment dynamics are plotted using a "bubble" chart (Figure 1) to show performance and relative position of each occupation across three variables—

employment size (size of the bubble), employment growth or loss (horizontal axis position), and relative employment concentration (using location quotients plotted on the vertical axis). Figure 1 shows the position of each occupation based on these characteristics, with the quadrant in which it lies helping to characterize its performance. For example, those occupations in quadrant 1 might be thought of as statewide "stars" as they are both growing and have an above-average concentration in Iowa relative to the national average (a LQ greater than 1.0).

Six of the occupations have demonstrated strong growth during the economic recovery with substantial demand evident for power distributors and dispatchers; biochemists and biophysicists; control and valve installers and repairers; and stationary engineers/boiler operators. The largest two occupational groups—electrical power-line installers/repairers and electrical engineers—have each added employment as well during the 5-year recovery period shown here.

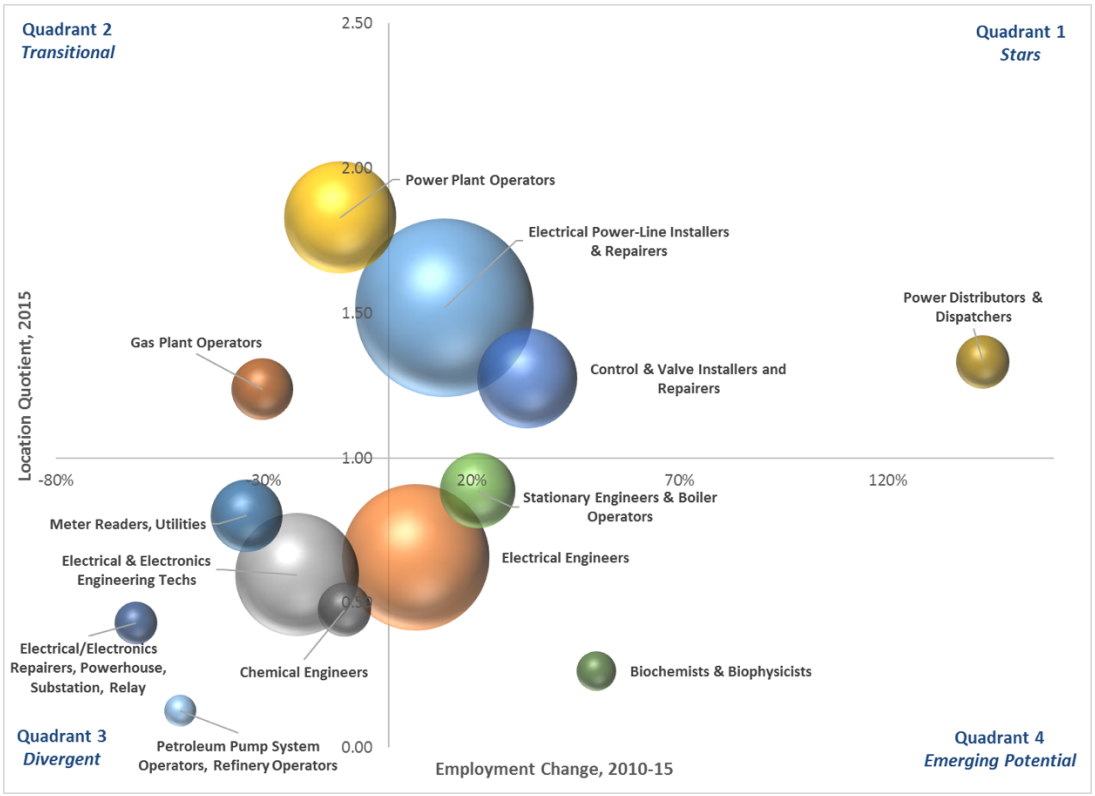


*Figure 1. Energy-related Occupations in Iowa—Employment Size, Trends, and Concentration, 2015*

*Note: not shown are data for Wind Turbine Service Technicians and for Gas Compressor and Gas Pumping Station Operators as there are no estimates available for 2010 with which to calculate a trend.*

A particularly useful comparison of recent demand for these occupational skills is to relate Iowa's trend in performance against that of the nation as a whole. It can be seen on Figure 2 that Iowa's recent trend shows not only growth, but also growth that exceeds that for the U.S. – the state is essentially gaining market share in this profession. Figure 2 shows the employment trend by occupational group for both Iowa and the U.S.

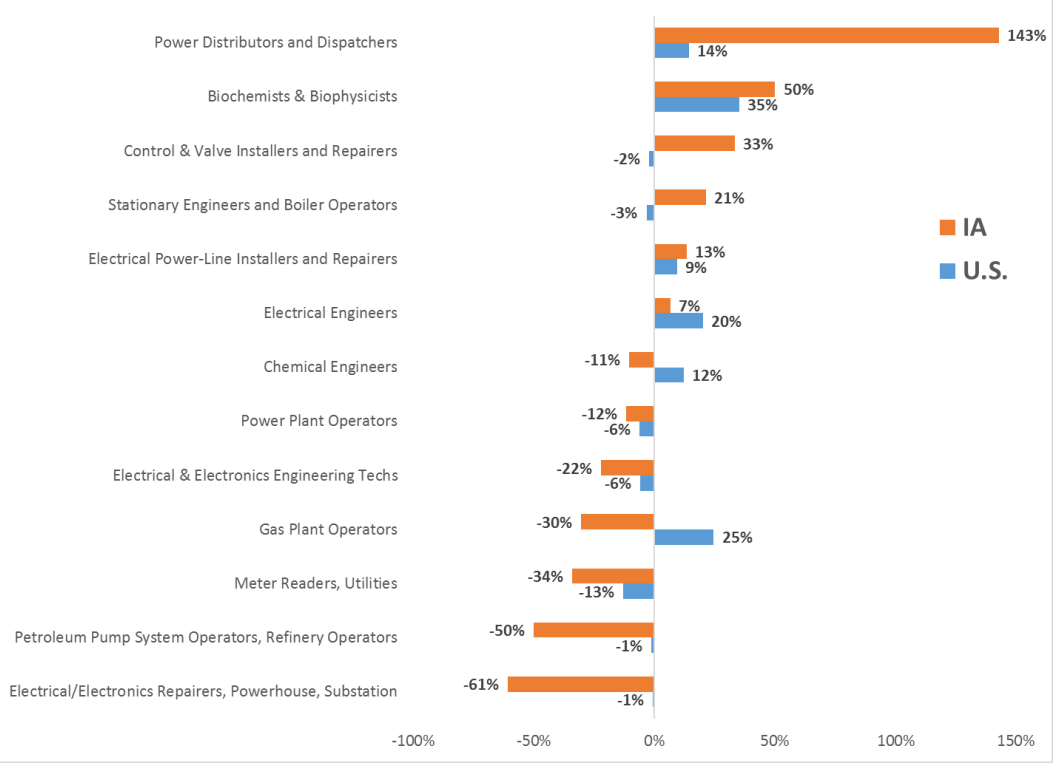


*Figure 2. Employment Trends in Energy-related Occupations, Iowa and U.S. 2010-15*

Iowa stands out in selected occupational groups where recent job growth exceeds that for the nation, and hence the state is gaining in its "market share" with respect to these skills and talent base. From Figure 2 it can be seen that in Iowa there have been employment gains exceeding those for the U.S. in:

- Power Distributors and Dispatchers
- Biochemists and Biophysicists
- Control and Valve Installers and Repairers
- Stationary Engineers and Boiler Operators
- Electrical Power-Line Installers and Repairers.

# D. RESEARCH FINDINGS – EMPLOYMENT PROJECTIONS

In terms of future demand, Iowa Workforce Development (IWD) calculates projected annual demands for occupations over a 10-year period, with the projections currently out to 2022. What is important to recognize is the need for workers to fill not only new jobs created but also to fill employer needs for "replacements" as workers retire or otherwise leave the labor force, or leave a specific occupation. It was noted in SWOT interviews that this is a challenge for multiple companies in the Iowa energy sector. While IWD has not developed projections for each of the detailed energy-related occupations, Figure 3 includes available data for five. These illustrate the importance for replacement workers in these lines of work as most, if not all of the need, for these occupations is projected to be on a replacement basis. This signals an aging workforce in these occupational groups and must be a key consideration in assessing demand into the future and being prepared for retirements.

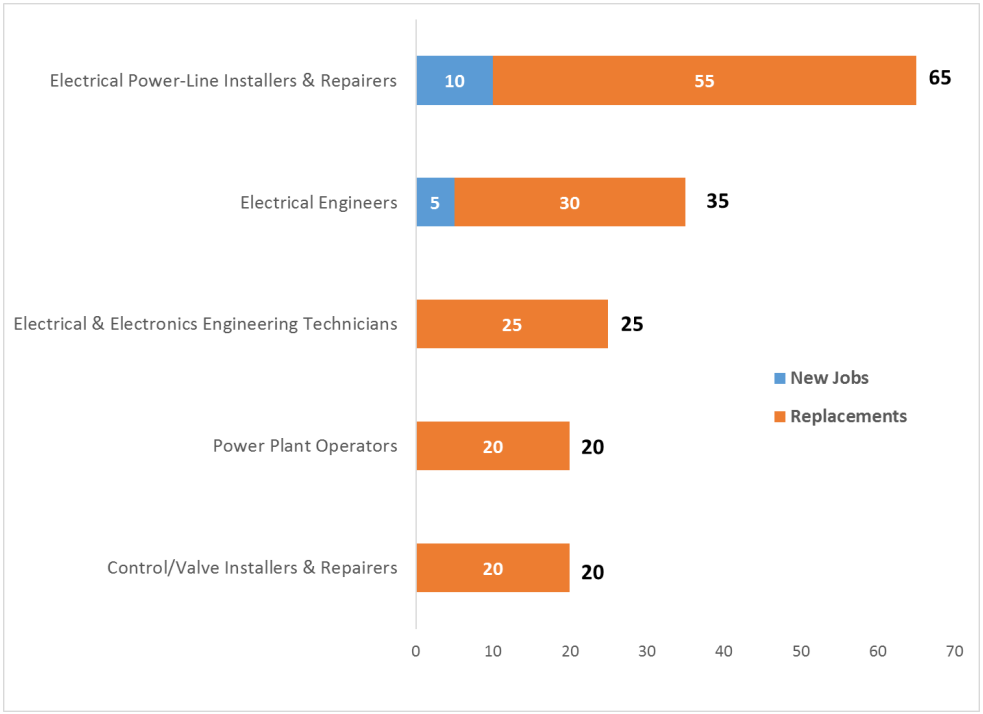


*Figure 3. Projected Annual Job Openings in Iowa by Type of Opening, 2012-22*

*Source: Iowa Workforce Development.*

# E. RESEARCH FINDINGS – EDUCATION AND TRAINING REQUIREMENTS

In preparing a workforce for energy-related positions, both BLS and IWD provide information on the education and training typically required for entry into the occupation as well as job competency. Among the energy-related occupations profiled the educational requirements can vary considerably and reflect the need for attention at all levels of the educational pipeline from K-12 through Doctoral programs. While much of this workforce, particularly in the operator and repair positions, requires a high school diploma, there is a recognition that moderate to longer-term on the job training is key to truly gaining expertise in these fields. Apprenticeships and other job training programs often serve these training needs beyond the K-12 and postsecondary education systems. It should be noted that interviewees in industry noted that just having a high school diploma is not enough – people need to be job ready and instilled with a work ethic.

Beyond just the primary energy-related occupations profiled in this section, there are further workforce and talent needs for Iowa's energy sector and many of these areas require four-year degrees and higher, including in management, IT, technical sales, and engineering areas.

*Table 2. Education and Training Requirements for Key Energy-related Occupations*

| Energy-related Occupations | Typical education needed for entry | Typical on-the-job training needed to attain competency in the occupation |
|---|---|---|
| Control and valve installers and repairers, except mechanical door | High school diploma or equivalent | Moderate-term on-the-job training |
| Electrical power-line installers and repairers | High school diploma or equivalent | Long-term on-the-job training |
| Gas compressor and gas pumping station operators | High school diploma or equivalent | Moderate-term on-the-job training |
| Gas plant operators | High school diploma or equivalent | Long-term on-the-job training |
| Meter readers, utilities | High school diploma or equivalent | Short-term on-the-job training |
| Petroleum pump system operators, refinery operators, and gaugers | High school diploma or equivalent | Long-term on-the-job training |
| Power distributors and dispatchers | High school diploma or equivalent | Long-term on-the-job training |
| Power plant operators | High school diploma or equivalent | Long-term on-the-job training |
| Stationary engineers and boiler operators | High school diploma or equivalent | Long-term on-the-job training |
| Electrical and electronics repairers, powerhouse, substation, and relay | Postsecondary nondegree award | Long-term on-the-job training |
| Wind turbine service technicians | Some college, no degree | Long-term on-the-job training |
| Electrical and electronics engineering technicians | Associate's degree | None |
| Chemical engineers | Bachelor's degree | None |
| Electrical engineers | Bachelor's degree | None |
| Biochemists and biophysicists | Doctoral or professional degree | None |

*Source: U.S. Bureau of Labor Statistics, Employment Projections program.*

As Iowa considers its current position and future strategic plans in the energy sector, it is critical to devote considerable attention to the available workforce as well as the workforce that is currently being developed to ensure a viable, innovation-driven industry going forward. In many states, including Iowa, attention to workforce development, retention, incumbent worker training, and attraction/recruitment of top talent are all key facets of a robust and complete workforce strategy. While there are a

wide range of occupational demands beyond those identified here as primary, this assessment is intended to focus attention on key areas of expertise and need for the industry that are specific to energy.