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Combined Cycle Gas Turbine (CCGT) Plants Employment Forecast Analysis

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Angela Ryu & Shon R. Hiatt
Zage Business of Energy Initiative, University of Southern California

USC Marshall
Zage Business of Energy Initiative

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This report provides an employment forecast for the construction and operation of combined-cycle gas turbine (CCGT) plants in the United States during 2025–2030. CCGT plants generate electricity from natural gas by combining a combustion turbine with a steam turbine, with waste heat recovered through a heat-recovery steam generator (HRSG) to increase overall efficiency. Characterized by high thermal efficiency and low heat rates (EIA, 2025), CCGT represents a significant share of dispatchable generation on the U.S. grid amid recent growth in electricity demand, including from data centers (EIA, 2023).[1]

The estimation model is based on total capacity (MW) of operating and planned CCGT projects reported by the U.S. Energy Information Administration (EIA), combined with staffing intensities (jobs/MW) benchmarked against reported employment at comparable CCGT facilities (see Appendix A1 for detailed sources). Analyses suggest CCGT plants typically require 0.6-1.5 workers per MW during construction and 0.02-0.10 operational staff per MW once operational. Modern CCGT facilities demonstrate exceptional efficiency: plants in the 700-1,100 MW range often operate with just 25-50 permanent staff due to advanced automation and centralized digital control systems.

1. Benchmark Summary by Facility Size

The table below presents summary benchmark ranges drawn from publicly disclosed employment statistics for CCGT facilities in comparable capacity buckets. Reported peak construction and operational employment levels due to factors not modeled in this report (e.g., project design, contracting structure), which cannot be fully modeled in the nation-level projection.[2] Therefore, the benchmarks in the table are used primarily as rules of thumb to inform and constrain the selection of staffing-intensity parameters for the employment estimation model (see Appendix A2). Due to limited reporting on indirect and induced employment effects for CCGT facilities, the benchmarks presented below reflect direct employment only.

[1] Figure 5 (p.12) of Annual Energy Outlook from EIA (2023) shows the reference hourly U.S. electricity generation relies on natural gas combined-cycle plants as the major source of baseload generation in 2022 across hours of the and in the near term, while projecting an increasing share of renewable energy toward 2050.

[2] Alternative cost-to-job methods (e.g., dividing total capital expenditure by average labor cost) also have limitations, as they can over- or underestimate employment due to fluctuations in construction costs (e.g., materials, supply-chain inflation). Therefore, this report relies on the workers/MW metric as a consistent physical benchmark, while acknowledging that actual workforce estimates may vary depending on future labor market conditions and cost escalation trends.

Facility Size	Nameplate Capacity Range	Total Peak Construction Workers (Direct)	Total Operational Workers (Direct)	Construction Timeline
Small	≤ 400 MW	150-375	10-25	24-30 months
Medium	400-650 MW	300-750	20-35	30-36 months
Large	650-950 MW	525-1,050	25-50	36-42 months
Very Large	≥ 950 MW	700-1,500	25-75	36-48 months

2. Detailed Benchmark Ranges: Workforce per MW

a. Construction Staffing Intensity

Range	Construction Workers per MW	Typical Scenario
Low (Efficient Builds)	0.6-0.8	Large plants with economies of scale; greenfield sites with efficient construction practices
Medium (Standard Projects)	1.0	Standard benchmark for 500-800 MW facilities; most common ratio observed in recent projects
High (Complex Sites)	1.3-1.5	Smaller plants (<500 MW) or complex sites; union labor markets; extensive site preparation required

b. Operational Staffing Intensity

Range	Operational Employees per MW	Typical Scenario
Low (Highly Automated)	0.02-0.03	Large plants with state-of-the-art automation and H/J-class turbines
Medium (Typical Automation)	0.05-0.07	Standard modern facilities (500 800 MW) with typical automation levels
High (Labor-Intensive)	~0.1	Smaller facilities (<400 MW) or older plants with less automation; multi-unit sites

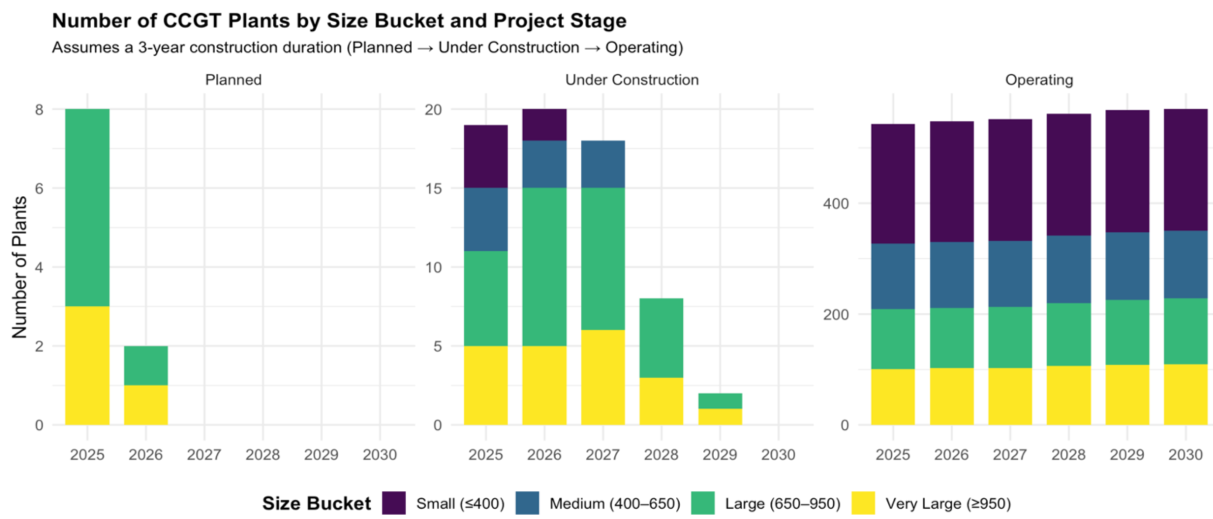
3. Distribution of CCGT Plants by Size and Project Stage

The figure below shows the distribution of 570 CCGT plants tracked by facility size (i.e., nameplate capacity) and development stage, based on EIA's *Preliminary Monthly Electric Generator Inventory* (as of October 2025).[3] These CCGT plants include units that are already

[3] The inventory is available at https://www.eia.gov/electricity/data/eia860m/ and "monitors the current status of

operating or planned to enter operation during the 2025-2030 period. The analysis assumes a three-year construction period, during which projects progress from Planned to Under Construction to Operating.

Among CCGT plants planned or operating as of October 2025, the median facility nameplate capacity is 580 MW, and the mean is 616 MW, with a typical project falling in the medium-size category. Large- and very-large-scale facilities (above 650 MW) account for 40% of the development pipeline, indicating a continued preference for scale in new CCGT investments.[4] According to EIA, growth in CCGT capacity has slowed in 2024, partly due to "a shift to bring more renewable capacity online, mainly solar and wind", while 18.7 GW of capacity is projected to come online through 2028 (Aramayo et al., 2025).



4. CCGT Workforce Projection Model

This model estimates future employment associated with combined-cycle gas turbine (CCGT) projects by linking near-term capacity additions (2025-2030) with staffing intensities that vary by plant size. Both construction and operations workforces are expressed as:

- A_t= MW of new CCGT capacity **starting construction** in year t
- C_t= MW of new CCGT capacity **entering operation** in year t
- W_c= construction workers per MW (size-specific; Appendix A2)

existing and proposed generating units at electric power plants with 1 megawatt or greater of combined nameplate capacity". We identified CCGT units using the technology filter "Natural Gas Fired Combined Cycle."

[4] A more detailed analysis of construction pipeline is provided by the EIA (see https://www.eia.gov/todayinenergy/detail.php?id=65464). Project status is classified as: planned for installation with regulatory approvals not initiated; regulatory approvals pending; regulatory approvals received; under construction and less than or equal to 50% complete; under construction and more than 50% complete; and construction complete but not yet in commercial operation.

- W_o= operations employees per MW (size-specific; Appendix A2)
- D= average construction duration (years) = 3 years
- α= ratio of average annual to peak construction workforce = 0.6

a. Construction Workforce

Building a CCGT plant takes several years; in any given year, some projects begin construction, others remain under construction, and others are completed. The number of construction workers required at any given time depends on the backlog of projects under construction.

Under-construction MW (stock): This term represents the total megawatts of projects still under construction in year t. As this model assumes each plant requires approximately D = 3 years to complete, we sum all projects that began construction in the current year and in the previous two years.

$$U_t = \sum_{k=0}^{D-1} A_{t-k}$$

Peak construction workforce (stock): The MW of capacity under construction in each size class is multiplied by the construction labor intensity (Wc, construction jobs/MW) to estimate the total number of jobs required at peak activity across all projects underway.

$$W_t^{\text{peak}} = \sum_{\text{size}} W_c(\text{size}) \cdot U_t(\text{size})$$

New construction hires in year t (flow): This equation estimates the number of new construction jobs created in year t by projects that begin construction during that year. It represents the annual inflow of new construction jobs rather than the total workforce already in place.

$$W_t^{\text{flow,constr}} = \sum_{\text{size}} \alpha W_c(\text{size}) \cdot A_t(\text{size})$$

b. Operation Workforce

Once the plants are completed, the size of the operational workforce is estimated based on the total generating capacity. More specifically, the cumulative MW that have come online up to year t (i.e., the total capacity) is summed, and the result is multiplied by the number of jobs required per MW of operation.

Operational workforce (stock): This term multiplies the total MW of operating data centers in year t by its operations staffing intensity (Wo, operation jobs/MW), summed across all facilities online

$$W_t^{\text{stock, ops}} = \sum_{\text{size}} W_o(\text{size}) \cdot MW_{\text{oper}}(\text{size}, t)$$

New O&M hires in year t (flow): Finally, this term captures the incremental O&M positions added in year t as new plants enter commercial operation. It measures the annual inflow of new permanent operations jobs rather than the cumulative total.

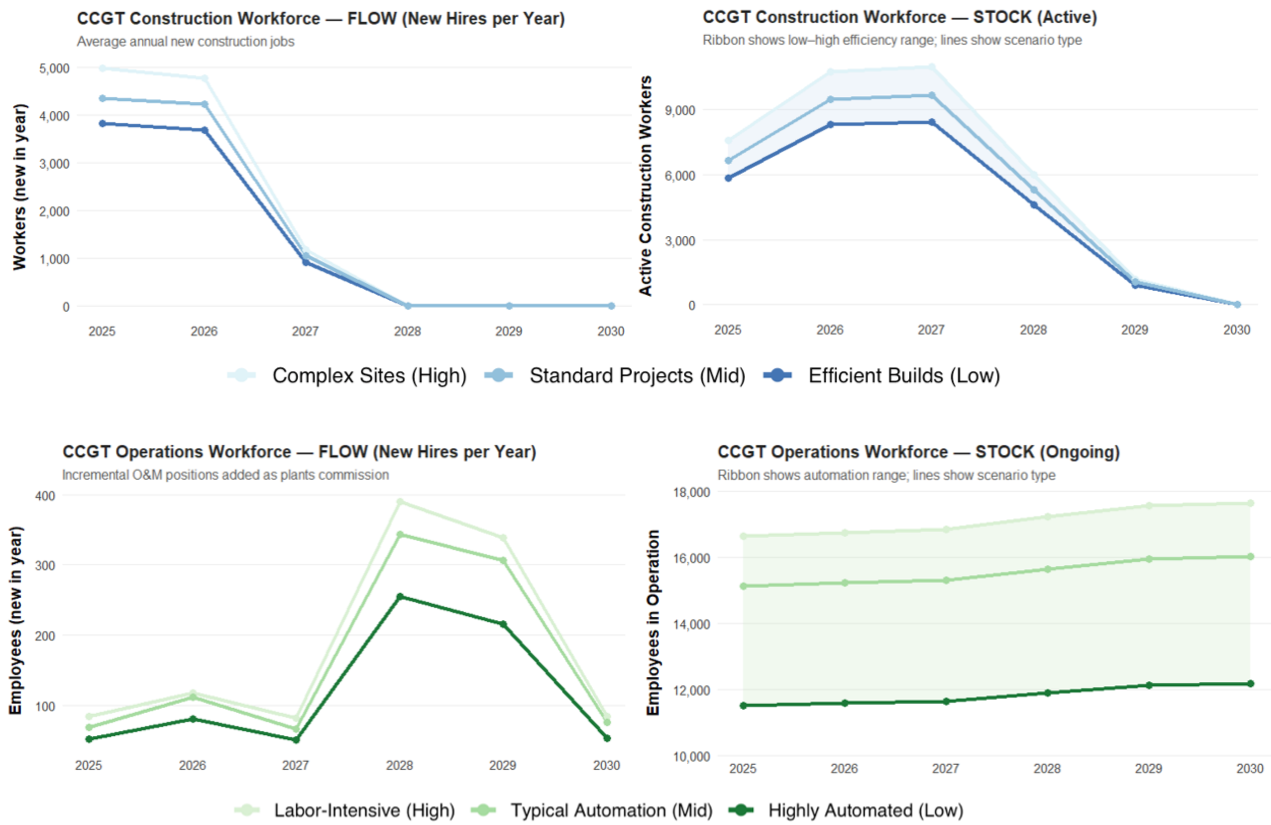
$$W_t^{\text{flow,ops}} = \sum_{\text{size}} W_o(\text{size}) \cdot C_t(\text{size})$$

5. CCGT Workforce Estimation Results

Applying these formulas to the CCGT development pipeline yields projected, *direct* employment trajectories under three scenarios (each applied with size-specific workforce intensities; see Appendix A2 for the full list of parameters and weights used): Efficient Builds / Highly Automated (Low), Standard Projects / Typical Automation (Mid), and Complex or Labor-Intensive Sites (High).

The estimates suggest that construction employment peaks around 2028, when the number of ongoing construction projects is highest, and then declines as construction projects are completed. Operations employment increases with continuous capacity additions, with growth attenuating toward 2030. Across all scenarios, the majority of total CCGT labor demand occurs during construction phases; however, long-term employment is sustained through ongoing O&M positions as the operational fleet expands.

Under the standard build scenario, total active construction employment ("stock") exceeds 9,000 workers, with annual new hires ("flow") beginning at over 4,000 in 2025. By 2027, as the pace of development declines, new-construction employment is projected to decline sharply by 2028, although ongoing multi-year projects will sustain a portion of the workforce through 2028. As planned projects are completed, operations employment becomes the long-term source of jobs. Total active operations staff ("stock") grows steadily to approximately 16,000 full-time equivalents (FTEs) by 2030, with annual new hires ("flow") peaking at over 300 employees in 2028 (under the typical automation scenario).



6. Conclusion

This workforce forecast indicates a two-phase employment impact of new CCGT development. Construction activity concentrated in the next few years leads to a significant but temporary employment surge, while operations employment grows more gradually, creating more stable long-term employment. Over time, this dynamic suggests a shift in the composition of CCGT employment: as construction activity becomes more efficient and operations become more automated, larger and more recently built plants are likely to require as few as 25–50 operations jobs per facility, compared with over 1,000 workers per site during peak construction.

References

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Appendix

A1. Source and Methods for Benchmark Ratio Calculation

1. **CCGT Construction Jobs/MW:** Benchmarks on construction employment for facilities of different capacities were drawn from public reports and press releases.

   Examples include:
   - Cricket Valley Energy Center (New York): 1,100 MW project, employed approximately 1,100 peak construction workers = 1.0 jobs/MW (Bechtel, 2017).
   - Carroll County Energy (Ohio): 700 MW facility, approximately 700 construction workers at peak during its construction = 1.0 jobs/MW (Bechtel, n.d.).
   - CPV Valley Energy Center (New York): 680 MW facility, over 900 direct construction jobs at peak = 1.3 jobs/MW (Competitive Power Ventures, 2024).
   - Reidsville Project (North Carolina): 475 MW facility, estimated peak workforce of approximately 300 craft workers = 0.63 jobs/MW (Argan, Inc., 2018).

2. **CCGT Operation Jobs/MW:** Benchmarks on operation and permanent full-time employment for facilities of different capacities were drawn from the same sources as the construction employment benchmarks. Although not all permanent full-time positions are strictly operational, we classify them as operations jobs that "manage, operate, and maintain the plant" (Wagman, 2017).

   Examples include:
   - Cricket Valley Energy Center (New York): 1,100 MW facility, 25 permanent jobs = 0.023 jobs/MW. This represents one of the most efficient staffing ratios for large-scale power generation (Bechtel, 2017)
   - Carroll County Energy (Ohio): 700 MW facility, approximately 25 permanent full-time jobs = 0.036 jobs/MW (Bechtel, n.d.).
   - CPV Valley Energy Center (New York): 680 MW facility, 23 plant staff = 0.034 job/MW (Competitive Power Ventures, 2024).
   - Reidsville Project (North Carolina): 25-30 permanent jobs for a 475 MW facility = 0.053-0.063 jobs/MW (Argan, Inc., 2018).
   - Lake Charles Power Station (Louisiana): 994 MW facility, 31 job openings after construction = 0.031 jobs/MW (Wagman, 2017).

A2. Parameters Used in the Model

Size Buckets Used in the Model

Size Category	**Capacity Range (MW)**	**Description**
Small	≤ 400 MW	Compact or multi-unit sites with higher labor intensity
Medium	400-650 MW	Typical new-build projects in the mid-size range

Large	650-950 MW	Modern high-efficiency plants with moderate automation
Very Large	≥ 950 MW	Advanced H/J-class facilities with extensive automation and centralized controls

Construction Labor Intensity ($\boldsymbol{W_c}$ = construction workers per MW)

Size Bucket	Low (Efficient Builds)	Mid (Standard Projects)	High (Complex Sites)
Small (≤ 400 MW)	1.3	1.4	1.5
Medium (400-650 MW)	0.9	1.0	1.2
Large (650-950 MW)	0.8	0.9	1.0
Very Large (≥ 950 MW)	0.6	0.7	0.8

Operations Staffing Intensity ($\boldsymbol{W_o}$ = operation workers per MW)

Size Bucket	Low (Highly Automated)	Mid (Typical Automation)	High (Labor-Intensive)
Small (≤ 400 MW)	0.08	0.1	0.1
Medium (400-650 MW)	0.05	0.06	0.07
Large (650-950 MW)	0.03	0.04	0.05
Very Large (≥ 950 MW)	0.02	0.03	0.03

How the Weights Are Applied

1. Each plant in the dataset is assigned to a size bucket based on its nameplate capacity.
2. The model multiplies the MW of new or operating capacity in that bucket by the relevant Wc and Wo values corresponding to the scenario (Low, Mid, High).
3. Construction employment is calculated for both stock (projects active in multi-year builds) and flow (new starts). Similarly, operations employment is estimated for stock (cumulative online staff) and flow (new hires as plants enter service).
4. The results are summed across all size buckets to obtain total national CCGT workforce estimates under each automation and efficiency scenario.