Distributed Generation Monitoring for On-Site Power Systems

How Does Distributed Generation Monitoring Define On-Site Units?

Distributed generation monitoring covers grid-connected units that directly offset retail purchases, under the definition the U.S. Energy Information Administration uses in modeling guidance released December 2, 2020. Dispersed generation sits outside that boundary as off-grid equipment serving remote loads where grid power is cost-prohibitive.

Residential coverage includes solar photovoltaic arrays and wind units alongside natural gas-fired fuel cells. Commercial coverage adds reciprocating engines and turbines to that base. EIA attributes non-residential, non-CHP installations to the commercial sector for modeling, which keeps small-unit records in one reporting home. Buyers checking sensor points can use the distributed generation technologies overview as a cross-reference for equipment classes.

Why Does Distributed Generation Monitoring Focus on CHP Sites?

Distributed generation monitoring focuses on combined heat and power because that stock dominates on-site capacity. U.S. Energy Information Administration figures for the end of 2011, published October 4, 2012, put national CHP capacity near 70 GW, almost 7 percent of total U.S. capacity.

Sector | CHP capacity

Industrial | 25 GW
Commercial | 2 GW
Electric power | 43 GW

More than 85 percent of generating capacity at industrial and commercial facilities uses this technology. Gulf Coast plants cluster near refineries and chemical plants. Smaller installations sit near pulp and paper mills. Operators planning heat metering can compare duty profiles in the combined heat and power library entry.

What Should Small Distributed Generation Monitoring Projects Measure First?

Small distributed generation monitoring projects should measure steam delivery alongside kilowatt-hours from the start. Averaged over 2004-2011, industrial CHP plants directed 70 percent of fuel consumption to useful thermal output, while commercial sites directed 65 percent there. Electric-power-sector plants directed 28 percent to useful heat over the same span.

The largest electric-power-sector examples by fuel used for heat all sit in Texas, each paired with a neighboring chemical plant or refinery steam host. Natural gas fuels over 65 percent of operating CHP capacity. Paired steam and power records keep host-driven outages visible in monthly reports.

Which Connection Rules Shape Distributed Generation Monitoring

Timelines?

Connection rules shape distributed generation monitoring timelines because interconnection and metering terms vary by state. More than 45 states maintain some form of interconnection standard or guideline for distributed capacity. EIA scores each state out of 100 from the five policies below in modeling guidance released December 2, 2020.

1. Net energy metering — 30
2. Interconnection rules — 25
3. Renewable portfolio standard — 25
4. Fuel cells or CHP in standards — 10
5. Renewables access laws — 10

Twenty-three states recognize combined heat and power in portfolio or efficiency standards. EIA notes unfavorable regulatory environments can slow CHP growth through added review or missed interconnection windows. Project teams can cross-check local terms against state interconnection rules before fixing commissioning dates.

What Drove Early-2000s Changes in Distributed Generation Monitoring Stock?

Early-2000s build rates explain why legacy CHP data cluster around older host plants. Annual additions averaged more than 2,960 MW over 2000-2005, then fell below 500 MW per year over 2006-2011. Through the end of August in 2012, six generators totaling 209 MW came online, with more than 3,700 MW proposed for 2013-2016.

Industrial CHP generators averaged a 57 percent capacity factor in 2011. Commercial diffusion series used in federal modeling begin in 2004, so trend screens anchor baselines there. Cost projections assume capital costs fall 13 percent with each doubling of fuel-cell and photovoltaic capacity, 10 percent for microturbines, and 3 percent for distributed wind. Federal tax treatment included a 30 percent credit through 2019, 26 percent in 2020, 22 percent in 2021, and 10 percent for commercial equipment from 2022 onward.

Distributed Generation Monitoring FAQ

What does distributed generation monitoring track at a CHP site?

Distributed generation monitoring at a CHP site tracks electric output and fuel input separately from useful thermal output. Between 2004 and 2011, only 6.5 percent of total fuel consumption reported to EIA produced useful thermal output. Separate steam and power records expose standby losses that a single revenue meter hides.

Which distributed generation monitoring sizes suit small commercial buildings?

Distributed generation monitoring practice grew out of small-scale CHP research centered on microturbines. Microturbines are compact units of 25-500 kilowatts that can serve homes and other buildings. That lineage explains why building-scale metering practice follows prime-mover size bands rather than utility billing classes.

How does distributed generation monitoring handle state policy differences?

Distributed generation monitoring across states uses EIA interconnection scores plus local program tags. California and New York pair portfolio recognition with specific incentive programs for CHP. Combined tags let multi-state fleets compare availability and reporting fields on equal terms.

Why did distributed generation monitoring data show CHP output falling while other output rose?

Distributed generation monitoring data link the CHP output drop to the recession hitting host industries. CHP facilities at industrial sites were disproportionately hard hit by the recent economic recession. Host shutdowns cut run hours while grid-only units continued operating.