

# World Combined Heat & Power (CHP): Micro, Small and Large-Scale

<https://marketpublishers.com/r/W291ADB980BEN.html>

Date: April 2012

Pages: 176

Price: US\$ 4,950.00 (Single User License)

ID: W291ADB980BEN

## Abstracts

Combined heat and power (CHP) systems were responsible for just under 10% of global electrical power generation capacity in 2011. CHP is a set of power generation technologies that provides both heat in the form of steam or hot water and electricity from a single system. These systems include a prime mover to convert fuel into electricity, a heat recovery steam generator (HRSG) to generate the process heat and perhaps a boiler if the system burns coal or wood waste to run a steam turbine.

The CHP market has been driven by China in the last five years, as that country's fast paced electrical generation capacity increases have significantly bolstered the CHP market in the country. However, China's power capacity growth is slowing, resulting in an essentially flat global CHP market between 2007 and 2011, posting a compound annual growth rate (CAGR) of just 0.4% for the period to reach a value of \$19.3 billion. The CHP market has been much stronger in the U.S. and Germany, with both countries achieving near 20% CAGR between 2007 and 2011. The small-CHP market has experienced an incredible CAGR of 24.8% in the same period on the strength of micro-CHP (under 5 kW) sales in Japan and small-CHP (up to 1 MW) sales in Germany.

Spark spread and government incentives are the two main driving forces behind the CHP market, although each has a different effect for different market segments. The U.S. market has been up and down over the period, and has been lower than what was experienced in the first part of the decade, because of the lack of strong government support and dropping natural gas prices. Germany, on the other hand, has a strong feed in tariff policy that is continuing to drive the CHP market in the country and will continue to do so in the long term. In Japan, exceptionally large subsidies for micro-CHP systems continue to accelerate that segment of the CHP market in the country.

Natural gas turbines continue to provide most CHP electricity generation in the U.S. and Europe, but it is reciprocating engine-based CHP systems that are the most numerous. The most common type of fuel in use for CHP systems in most countries is natural gas. The major exception is China where coal is still the dominant fuel being used in many of the country's district heating systems. Countries such as Sweden, Switzerland, Norway and Finland have over 30% of CHP electricity generation from renewable fuels such as wood waste and municipal waste.

The CHP market will continue to experience slow growth over the next five years. However, SBI Energy expects global electricity costs to rise faster than the cost of natural gas in the long term, leading to a much stronger CHP market through the end of the decade. By 2021, there will be 651 gigawatts (GW) of CHP capacity installed worldwide, and the global CHP market will be worth \$43.1 billion. The small-CHP segment will continue to grow faster than the overall CHP market, achieving a CAGR of 12.2% between 2012 and 2021 and growing to be worth a little over 6% of the global CHP market.

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