



Insight

U.S. Manufacturing's Clean, Efficient Energy Future

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For the U.S. manufacturing sector to prosper over the next quarter century and beyond, it must have an energy power source that is both cost-efficient and reliable as to domestic supply. Moreover, although the U.S. Environmental Protection Agency (EPA) reports that the manufacturing sector is responsible for only 4.6 percent of total U.S. greenhouse gas emissions in 2010, a progressive reduction in carbon dioxide over that emitted from other energy sources, such as coal and oil, would be a favorable environmental outcome. To power America's manufacturing future, increasing domestic supplies of less polluting natural gas, in conjunction with combining heat and power (CHP) efficiency systems, are potential energy solutions to the competitive challenges of a global economy.

In 2010, the U.S. Energy Information Administration (EIA), U.S. Department of Energy (DOE), estimated that roughly one-third of total U.S. delivered energy is consumed by the manufacturing sector (and more than 40 percent of transport of manufactured goods is included). The EIA's *Annual Energy Outlook 2012* reports that total industrial demand for delivered energy will increase 16 percent, from 23.4 quadrillion British Thermal Units (Btu) in 2010 to 27.0 quadrillion Btu by 2035. The major user of energy in the manufacturing sector is the bulk chemicals industry, which represented 21 percent of total energy consumption in 2010. By 2026, the refining industry, which uses petroleum, biofuels, and coal-to-liquids fuel facilities, is anticipated to become the largest energy-consuming industry. The energy-intensive manufacturing industries, including bulk chemicals, refining, paper products, iron and steel, aluminum, food, glass, and cement, produce just over 25 percent of the total dollar value of industrial shipments while accounting for nearly two-thirds of industrial delivered energy consumption.

The boom in shale gas discoveries, coupled with technological breakthroughs in horizontal hydraulic fracturing processes, is rapidly changing the U.S. energy outlook regarding the nation's future energy source portfolio. The primary energy source of the U.S. manufacturing sector over the next quarter century and beyond is natural gas. Total industrial natural gas consumption, according to the EIA, is estimated to be 8.7 quadrillion Btu in 2035. Based on the best estimates of recoverable natural gas, its cost is the lowest of all major energy power sources (\$90.10), the second longest supply (92 years) of reliable domestic energy, and has carbon dioxide emissions that are approximately 44 percent lower than coal and 29 percent lower than petroleum. As of 2010, according to the EIA, natural gas is the highest source of Btu production of all sources (24,781 trillion) of energy in the U.S.

A 2012 report, *America's New Energy Future*, published by HIS, a global market information and analytics company, identifies increasing domestic natural gas supplies as providing a foundation for a manufacturing renaissance in the U.S. for those industries where energy costs are an important component of overall costs. Chemical companies are now reportedly planning to significantly invest capital in new U.S. factories because of the domestic supply of inexpensive, stable priced natural gas. Furthermore, nearly \$3.0 trillion in capital expenditures is forecasted to take place between 2012 and 2013 in natural gas activity, establishing the physical infrastructure for this forthcoming manufacturing renaissance. This anticipated increase in the use of natural gas as an energy source by U.S. manufacturers will, however, come at the expense of coal, and possibly nuclear

energy, as a manufacturing fuel supply.

While identifying the sources of energy needed to fuel the U.S. manufacturing sector are crucial to discern for long-term business planning purposes, a parallel effort to increase efficient energy usage is of complementary importance. In this case, CHP offers American manufacturers one of the most cost-effective, near-term solutions to reduce U.S. energy use and costs while promoting economic growth. For example, instead of burning fuel in an on-site boiler to create thermal energy and buying electricity from a utility grid, a manufacturing facility can use a single CHP system to provide both forms of energy in a single energy efficient process. In 2011, the Pew Environment Group reported that U.S. manufacturers already avoid more than 5 percent of their energy usage by employing CHP. Moreover, manufacturing industry surveys indicate that the average plant facility can reduce its energy consumption by 10 to 20 percent, and at least 30 percent of the manufacturing sector's overall energy savings can be acquired without capital expense by simply making changes to procedures and operating behavior.

To spur investments in energy innovation, on August 30, 2012, President Obama signed an Executive Order, *Accelerating Investment in Industrial Energy Efficiency*, which encourages the expansion of efforts by U.S. manufacturing facilities to invest in more efficient manufacturing processes and facilities and the expanded use of CHP. Under this Executive Order, the DOE, EPA, U.S. Department of Commerce, and U.S. Department of Agriculture are to coordinate actions at the Federal level, provide policy and technical assistance to the states to support investment in industrial efficiency and CHP, and strongly encourage private sector efforts to achieve a national goal of deploying 40 gigawatts of new, cost effective industrial CHP in the U.S. by 2020. According to the DOE and EPA, this goal is nearly a 50 percent increase from the 82 gigawatts of industrial CHP annually currently generated at over 3,700 U.S. industrial and commercial facilities which represents approximately 8 percent of current U.S. generating capacity and 12 percent of total MWh generated annually.

In conclusion, American manufacturers will find themselves contributing less carbon dioxide in the ensuing years as its primary source of energy continues its transition to natural gas, while increasing energy efficiency through alterations in industrial processes and the increased deployment of CHP systems in manufacturing facilities. By embracing a cleaner energy source and efficient energy technology alternatives, the U.S. manufacturing sector becomes both increasingly globally competitive and environmentally-friendly, a win-win situation for America's economy and natural environment.