

New Energy —Same Challenges

*Uncertainty Casts
Shadow Over Future
Business Opportunities for
Manufacturers*

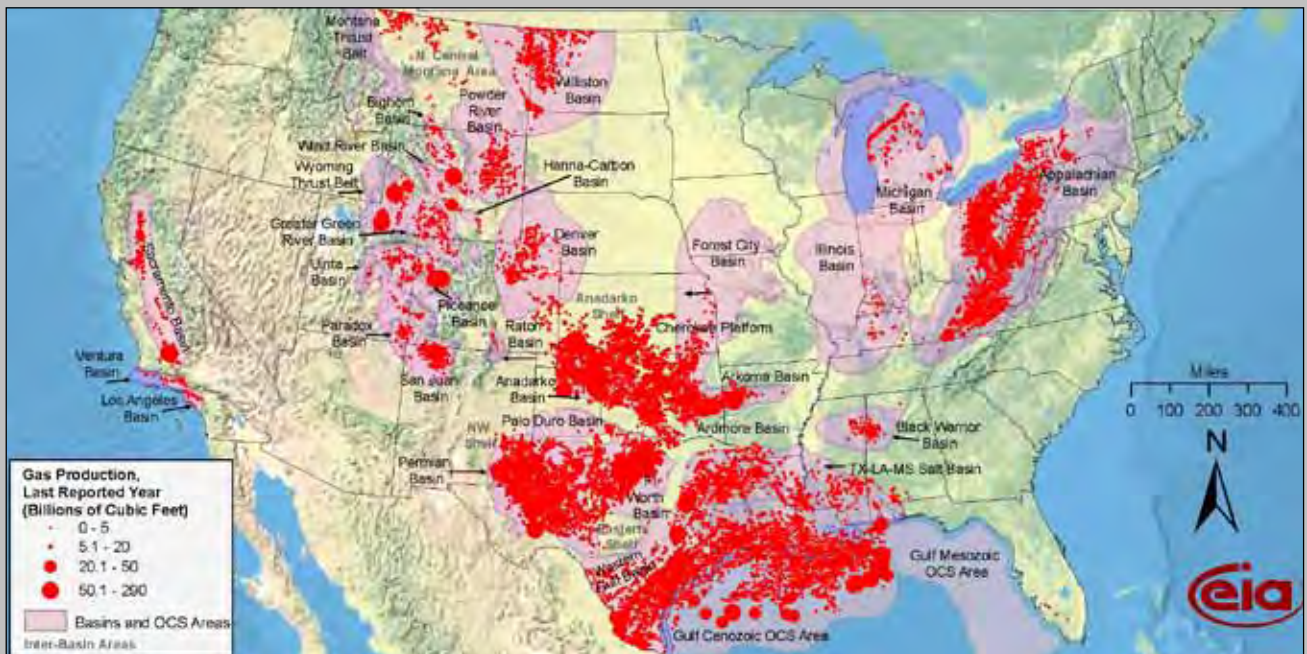
Matthew Jaster, Associate Editor

It's important to have a contingency plan. Call it Plan B, a backup plan or a secondary course of action—just make sure you have one. For many manufacturing companies, the energy industry was going to create an excess of new business opportunities five years ago. It was going to single-handedly resurrect heavy industrial manufacturing in North America, Asia and Europe. Many companies dove head first into renewable energy segments like solar and wind. Others put their resources and equipment into the oil and gas industry. Nuclear energy was being heralded as a clean energy resource that can be affordable and reliable and reduce pollution.

Then the Montara and Macondo oil spills happened, soon to become a public relations nightmare. The Fukushima accident in Japan brought nuclear energy risks back to the forefront. Wind and solar installations battled a “boom or bust” environment with each new government policy. In 2012, there's no denying opportunities in energy still exist, you just need to know the risks that come with them.

“There was tremendous growth in the energy market in 2010 and 2011, but nobody expects that to continue,” says Peter Loetzner, CEO of EMAG. “It's important to be diverse so you are not depending on one market and its economic up or down swing.”

Current U.S. Conventional Gas Fields Production and Shale Gas Plays in Lower 48 States



Gas production in conventional fields in the lower 48 states (compiled by the U.S. Energy Information Administration).



Current and prospective shale gas plays in the lower 48 states (compiled by the U.S. Energy Information Administration).

“We made a strategic decision to deploy our expertise in tight-tolerance gearing for wind turbines into broader energy and infrastructure markets,” says Sergio Gamboa, sales director at Brad Foote Gear Works, a Broadwind Energy company. “Today we are a much more diverse company serving wind, oil and gas, mining and other industries.”

Oil and Gas: A Commitment to Efficiency

Europe discusses international standards. The oil and gas industry uses international standards to enhance technical integrity, improve safety, facilitate global operations and reduce the environmental impact of operations worldwide. A lot has been achieved by the industry over the past two decades and the work of the International Association of Oil and Gas Products (OGP) Standards Committee in supporting and promoting the development and use of these international standards has long been established.

The Montara and Macondo oil spills have put a much larger emphasis on the need for robust and comprehensive standards. There is also greater recognition of the role national regulators have to play in the standards development process; i.e., in selecting topics and priorities for standardization, in helping to develop standards themselves, or in using completed standards within the regulatory landscape.

OGP recently welcomed the resolution of the International Regulators Forum (IRF) meeting in November 2011 to support the ISO standard system as the principal

system for offshore regulators in order to achieve global offshore standards. At the same time, IRF recognized the crucial role that relevant national and regional standards would continue to play whilst no equivalent ISO (or IEC) standards existed.

IRF is now in the process of setting up a standards subgroup that will engage with the OGP Standards Committee, ISO/TC67 Management Committee and other relevant groups. “IRF is the principal international regulatory forum for offshore safety, so this is an important step which may lead to the more consistent use of international standards by regulators and potentially simplify the movement of rigs and equipment across national borders,” says Ross Smith, OGP standards committee chair. “This also applies to those OGP members that use different standards for the same topics. We look forward to working together with IRF in the years to come and will continue to encourage the use of the same international standards worldwide.”

Additionally, OGP has launched an industry initiative—GasNaturally. Backed by all the major gas industry associations, the initiative was established to “highlight the many benefits of gas in the context of the European Commission’s forthcoming Energy Roadmap 2050.” As the initiative points out, “Gas is the cleanest hydrocarbon fuel; it is also an abundant, secure and reliable energy source, making it an attractive, stand-alone energy source

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GasNaturally is a response to the European Commission’s call for an inclusive debate on competitive solutions to ensure security of energy supplies while achieving the targeted CO₂ reductions. Converting old, high-carbon power generation to modern gas-fired power plants would help meet the EU’s ambitious target of cutting CO₂ emissions in a cost-effective way, the initiative says.

What this means for gear manufacturers. Open any major newspaper in the last three months and you’re bound to find an article or two about job creation in the oil and gas industry. Gear manufacturers may want to pay close attention to developments in this energy segment and the potential for future business as long as new regulations and standards continue to develop.

The U.S. shale gas debate. The Marcellus Shale (covering areas in Kentucky, Maryland, New York, Ohio, Pennsylvania, Tennessee, Virginia and West Virginia) contains about 84 trillion cubic feet of undiscovered, technically recoverable natural gas and 3.4 billion barrels of undiscovered, technically recoverable natural gas liquids, according to a recent report from the U.S. Geological Survey (USGS).

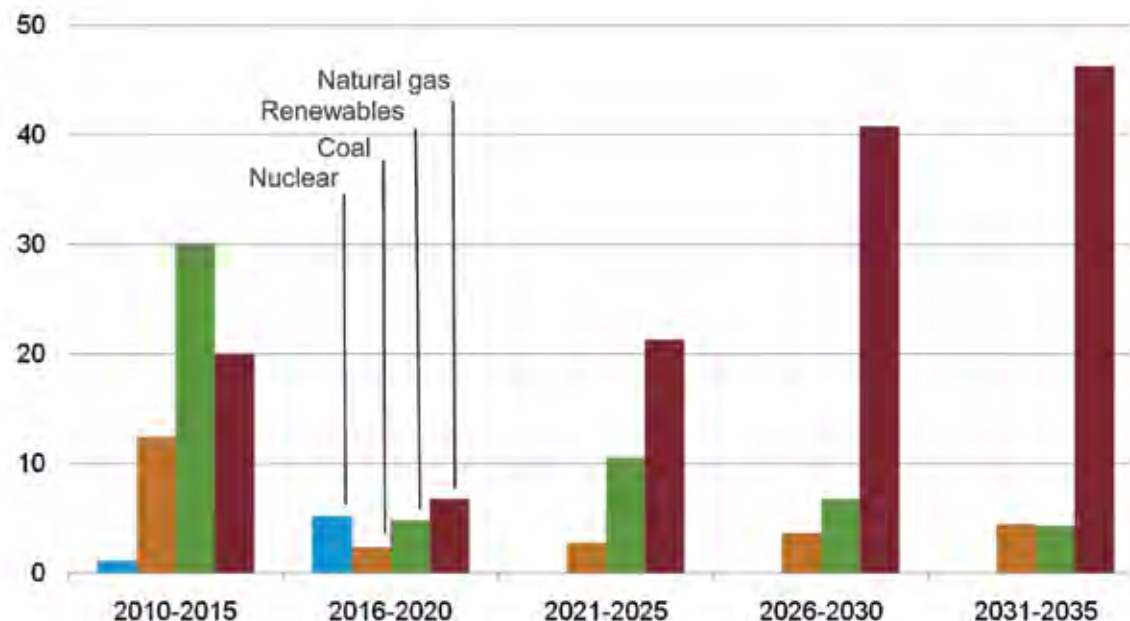
While some gear manufacturers have found work in the shale gas arena, the polarizing debate on its environmental—not to mention health impact—continues. In October 2011, the EPA issued initiatives to set discharge standards for wastewater from shale gas extraction. Based on data provided by the industry, it is evident that a portion of the injected fracturing fluid will return to the surface as “flowback,” sometimes called “produced water.” Up to one million gallons of shale gas wastewater may be produced from a single well within the first 30 days following fracturing. These produced waters generally contain elevated salt content (often expressed as total dissolved solids, or TDS) many times higher than that contained in sea water, conventional pollutants, organics, metals and NORM (naturally occurring radioactive material). Additional data show that flowback waters contain concentrations of some of the fracturing fluid additives.

The EPA plans to reach out to affected stakeholders and to collect information to better characterize shale gas wastewaters and the efficiency of various treatment, re-use and disposal technologies that will reduce shale gas wastewater pollutant discharges, including those technologies currently in use in public and private treatment plants. The EPA will collect financial data on the shale gas industry to determine the affordability of treatment, and will conduct a study of the effects of hydrofracturing on groundwater.

Meanwhile, the Department of Energy is also collecting

Electricity Generation Capacity Additions by Fuel Type, 2010-2035

electric power capacity additions
gigawatts



U.S. Energy Information Administration 2011 report on electricity generation capacity from 2010-2035.

new information related to shale gas wastewater and its disposal. The two agencies are coordinating and sharing information. Should the new information indicate that shale gas wastewaters are already adequately treated, EPA is open to adjusting its rulemaking plans accordingly.

While some of the shale gas wastewater is re-used or re-injected, a significant amount still requires disposal. Some shale gas wastewater is transported to public and private treatment plants, many of which are not properly equipped to treat this type of wastewater. As a result, pollutants are discharged into surface waters such as rivers, lakes or streams, where they can directly impact aquatic life and drinking water sources. The EPA plans to propose new standards for public comment in 2014.

In September of 2010, Scranton, Pennsylvania residents were warned not to drink well water after methane was detected near drilling sites. Ohio state leaders have ordered four fluid injection wells to shut down in the aftermath of earthquakes near their location in Youngstown in 2011. Currently the federal government is preparing fracking regulations that seem to be upsetting groups like the American Petroleum Institute (www.api.org).

"It's going to take more than tweaking current policies at the margins," said API president and CEO Jack Gerard in a speech recently delivered in the nation's capital. "It's going to take a course correction. We must engage the American people on these issues and make energy an important part of

our national debate this year."

Gerard said that the State of American energy can be strengthened, bringing more benefits to Americans and that sound policies should encourage all forms of energy. "We must abandon energy rhetoric that pits one resource against another," Gerard said. "We need all of our resources—oil and natural gas, coal, nuclear, wind, solar, biofuels and more. Only through smart, realistic deployment of all of America's energy assets can we realize our goal of keeping this country energy secure."

"This is an incredibly new, nascent resource," said Francis O'Sullivan, a research engineer for the MIT Energy Initiative in an MIT *Technology Review* article. "There is not yet enough data to definitively forecast the performance of shale gas deposits over the next 20 to 30 years."

What this means for gear manufacturers. Predictions and politics aside, the geologic and engineering data out there suggests that shale gas could become a key player in the United State's energy market—reducing a reliance on foreign fuel and producing less carbon dioxide than coal. But it's obvious the most important need right now is for further research, particularly with growing environmental and health concerns.

Renewable Energy: A Global Roadmap

Europe. In December 2011, European Energy Commissioner Günther Oettinger called for binding 2030 renewable energy targets to be in place by 2014. At a recent



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press conference launching Europe's Energy Roadmap 2050, Oettinger said, "With our roadmap we want to ensure that, for all participants, there should be an interesting discussion on binding targets for renewables by 2030. This should begin now and lead to a decision in two years' time."

The European Commission's Energy Roadmap 2050 shows that a high renewable energy mix including 97 percent of the EU's electricity consumption met by renewable energy, including 49 percent wind power in 2050 would have the same "overall energy system costs" as any other de-carbonization or business as usual scenario.

According to the EWEA, all five de-carbonization scenarios in the Roadmap, as well as the business as usual scenario, show that wind energy will produce more electricity than any other power generating technology by 2050: between 32 and 49 percent of EU power production in the de-carbonization scenarios.

Additionally, the EWEA reports that 2011 was a stable year for the offshore wind industry, with 235 new offshore wind turbines grid-connected, worth approximately 2.4 billion euros. Nine offshore wind farms currently under construction will bring online an additional 2,375 MW, increasing the EU's total installed offshore wind power capacity by 62 percent. Across the EU, a total of 1,371 offshore turbines have now been grid-connected, with a total power capacity of 3,813 MW in 53 wind farms in 10 European countries. EWEA's target for installed EU offshore wind power capacity by 2020 is 40,000 MW, producing approximately four percent of the EU's total electricity consumption.

"The offshore wind sector witnessed a stable market in 2011," says Justin Wilkes, policy director of EWEA. "Despite the economy-wide financial squeeze, 2011 saw a 40 percent increase on the previous year in offshore non-recourse debt financing, up from 1.46 billion euros in 2010 to 2.05 billion euros in 2011. The strong project pipeline and financial developments highlight the importance of countries continuing to provide and develop stable long-term



A long-term production tax credit (PTC) in the United States could benefit wind turbine manufacturers like Siemens (courtesy of Siemens).

frameworks for offshore wind power in order to allow the industry to continue its development.”

What this means for gear manufacturers. Offshore wind is a safe bet in Europe, particularly in Britain where 87 percent of all newly installed and grid-connected offshore wind power in 2011 was in British waters. Siemens supplied 80 percent of the MW installed offshore last year while SSE and RWE Innogy were the most active developers and DONG Energy continued to be the most active equity player in offshore wind power.

United States. With the Production Tax Credit (PTC), wind power’s key policy incentive, set to expire at the end of the year, industry members and advocates will be pushing for a PTC extension so that the industry can grow to nearly 100,000 jobs just four years from now. Meantime, developers will be busy getting wind farms built and online by the end of 2012.

“American manufacturing jobs are coming back, with tens of thousands of new jobs from wind power,” says Denise Bode, AWEA CEO. “But these jobs could vanish if Congress allows the Production Tax Credit to expire, in effect enacting a targeted tax increase and sending our jobs to foreign countries. Congress must act as early in 2012 as possible to keep this American manufacturing success story going.”

While the PTC has been around since the 1990s, Congress has extended it mostly in one- and two-year incre-



Siemens supplied 80 percent of the MW installed offshore in 2011 (courtesy of Siemens).

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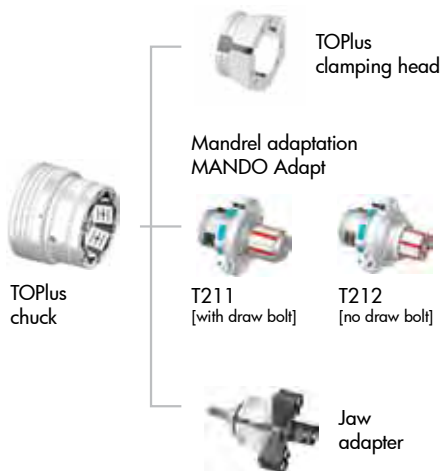


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ments and even has allowed the credit to expire on occasion. The result is a boom and bust pattern that is difficult for businesses to plan around. Under-construction numbers are up; 8,400 MW were counted at the end of the third quarter in 2011. Expect them to continue to surge as 2012 gets under-way.

In 2012 utilities will continue to embrace the price-locking benefit of wind power by signing long term power contracts for the affordable energy source. The AWEA believes this is because unlike the volatile prices of fossil fuels, wind power's fuel cost is fixed: *zero*. The fuel cost was zero last year, and it's guaranteed to stay at zero in 2012 as well. And wind power chalks up big zeros in other key areas: zero water use, zero air emissions, and zero water pollution.

A new study released this month finds that with a stable tax policy the wind industry can grow to nearly 100,000 American jobs in the next four years. The wind manufacturing sector would grow by one third, to 46,000 American manufacturing jobs. Such job additions will keep the wind sector on track toward supporting the 500,000 jobs by 2030 projected in a report by the U.S. Department of Energy during the George W. Bush administration.

A recently released report from Navigant Consulting also found that if Congress allows the PTC to expire, jobs in the wind industry will be cut in half, meaning a loss of 37,000 American jobs and a one-third cut to American wind manufacturing jobs, while private investment in the industry would drop by nearly two thirds.

What this means for gear manufacturers. With many wind turbines inching closer to the end of their respective life spans, replacement and repair opportunities might prove beneficial to gear manufacturers entrenched in the market. The lingering political "tug of war" for long-term wind poli-



Safety improvements are a priority at the Limerick Nuclear Generation Station located in southeastern Pennsylvania (courtesy of the Nuclear Regulatory Commission).



The United States firmly believes that nuclear power will continue to play a role in the country's clean energy portfolio (courtesy of the Nuclear Regulatory Commission).

cies and credits, however, could hinder new wind installations and force major players to look toward other industries.

A Nuclear Energy Facelift

While all forms of energy come with certain challenges and risks, the Fukushima accident in Japan didn't exactly send a positive message for the future of nuclear power. Since the controversial meltdowns and equipment failures at the Fukushima plant, various energy institutions have come together to weigh in on the future of this clean energy source.

Speaking at the American Tokyo Center in Japan, Daniel Poneman, D.O.E. deputy secretary, spoke about the future of nuclear power in December. "As President Obama made clear, the United States will study the lessons of Fukushima to improve the safety of our reactors, but we continue to believe nuclear power has an important role to play as part of a diversified clean energy portfolio that will promote economic prosperity, enhance our security, and reduce global carbon pollution," Poneman said. "Though the Fukushima accident has heightened awareness about the risks of nuclear energy, we must recognize that the larger energy challenges we faced before the disaster still persist. With population and demographic changes, the demand for global energy resources will continue to grow. The International Energy Agency estimates that by 2035, global demand for electricity will grow 85 percent."

Poneman went on to explain that clean energy resources can offer affordable and reliable electricity for families and businesses in a way that boosts the welfare of future generations. As one of the few large-scale, carbon-free sources of energy available for deployment today, safe, secure nuclear power is an important part of that puzzle.

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The World Nuclear Association recently released information on the critical issue of heavy manufacturing of power plants. These findings may be of particular interest to component manufacturers. Three key areas of discussion include:

- The availability of plants to make reactor components.
- Supply challenges in heavy forgings as well as engineered components.
- The integration of international suppliers and vendors.

Though Westinghouse was once an integrated supplier of first- and second-generation nuclear power plants, today's power plants come from a range of international suppliers and vendors. There's also a growing demand for local suppliers, which often means a high level of technology transfer is needed. These suppliers must be qualified and quality-controlled, given the strict requirements in both the design and fabrication of the components. Here in the United States, for example, the American Society of Mechanical Engineers (ASME) nuclear accreditation is known as N-stamp and is internationally recognized. Along with supply/vendor issues, metallurgy poses its own unique set of challenges in the nuclear energy segment. Fourth-generation power plants will operate at higher temperatures and will require new materials. It's an energy segment that is currently going through a variety of changes and technological advancements.

What this means for gear manufacturers. The International Energy Agency wants the world to invest more than 26 trillion in energy solutions over the next two decades. Many believe that nuclear energy will play a large role in this. This means more nuclear power installations and more opportunities for component suppliers to provide critical parts.

Lessons Learned

The economic highs and lows in the energy market are no different than other industrial segments—just ask those involved in automotive. Still, global energy has huge potential if governments and manufacturers can somehow get on the same page. No matter what energy segment you're involved in, the best course of action is to simply keep your options open.

"Diversification helps us control our future and leverages our historic strength in engineering precision gearing systems for a variety of energy and infrastructure applications," Gamboa at Brad Foote says. "We are shifting our customers from mainly wind to a broader range of oil, gas, mining and industrial customers."

Future energy installations will undoubtedly generate more revenue for those that provide the various power transmission components. Some economists go as far to say that business in the energy market has nowhere to go but up.

Just don't bet the (wind) farm that it's going to stay that way. ⚙️



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