



Resource Rich Colorado

Third Edition, December 2011

Executive Summary

The Colorado Energy Coalition (CEC), an affiliate of the Metro Denver Economic Development Corporation (Metro Denver EDC), published the first edition of *Resource Rich Colorado (RRC)* in 2009, as its annual analysis of Colorado's competitive position in the national energy economy.

In the third edition of *RRC*, we can report that Colorado's energy economy is among the strongest in the United States. Colorado consistently ranks in the top 10 or higher in terms of natural resource reserves, production of fossil fuels, installed capacity, and generation of renewable resources. While many states are either considered "fossil" or "cleantech" states, Colorado is a leader among the states that have embraced a balanced energy philosophy.

Colorado's resource mix includes:

- The Niobrara Shale, a complex geological formation that stretches across several Western states and is thought to contain massive reserves of natural gas and oil.
- The Piceance Basin, a tight-shale field with estimated reserves of 1.5 trillion barrels of oil.
- Reserves of supercompliant coal with the lowest sulfur, mercury, and ash content, which is mixed with coal from other regions, allowing those regions to meet air quality standards.
- Excellent solar resources in south-central Colorado.
- Excellent wind resources along Colorado's eastern border.

Colorado's energy industry benefits from many competitive advantages that attract major job growth and investment to Colorado. Vestas located its first North American factory in Colorado in 2008. Since that time, Vestas has constructed three additional manufacturing plants in Colorado, invested \$1 billion, and created more than 2,000 jobs. Most recently, GE Energy acquired a Colorado-grown company, PrimeStar Solar, in 2011 and announced its decision to locate a new thin-film manufacturing plant in Aurora. Set to open in 2012, GE expects to create 355 new, advanced-technology jobs at this facility in the next three to five years.

Among Colorado's strongest assets in the energy industry is its climate of innovation and entrepreneurship, which are enhanced by the National Renewable Energy Laboratory (NREL) and Colorado's top-ranked research universities. NREL is the only U.S. Department of Energy laboratory dedicated to the research, development, commercialization, and deployment of renewable energy and energy efficiency technologies. Proximity to NREL provides partnership and subcontractor opportunities for companies on research and development projects, as well as access to NREL research facilities. NREL also engages in research partnerships with the Colorado School of Mines, the University of Colorado Boulder, and Colorado State University through the Colorado Renewable Energy Collaboratory and through a network of partnerships between the universities and private industry.

Colorado's low taxes, moderate business costs, and progressive industry policies also help attract and retain businesses in the energy industry. Nearly 70 energy-related pieces of legislation have been adopted in Colorado since 2007. The state's 30 percent Renewable Energy Standard is one of the most aggressive in the United States. Also, the Colorado Bioscience and Clean Technology Reinvestment Act was passed in 2011 to provide a dedicated source of grant funds for cleantech and bioscience.

In spite of its many competitive advantages, Colorado's energy companies do face regulatory and political uncertainties at the federal level that could slow business investment and new job creation.

The federal Investment Tax Credit (ITC) for renewable energy projects is scheduled to expire at the end of 2011, and the federal Production Tax Credit (PTC) is set to expire for wind projects at the end of 2012. The pending expiration of the PTC for wind, in particular, has resulted in the delay or abandonment of projects, and the resulting loss of investment and job creation in this sector. Whether these credits will be extended is not known at the time of this report's publication. At the same time, Congress is debating whether to eliminate certain long-standing tax credits for the oil and gas industry. The questions being raised are whether the nascent cleantech industry needs tax credits to grow, and whether the oil and gas industry should continue to be granted subsidies since the industry is well established. Before any of these tax credits are eliminated, a cost-benefit analysis across all energy-related tax credits is required to strike the right balance and support job growth and investment in both fossil fuels and cleantech.

Regulations being proposed at the federal level also impact how natural resources are developed locally. Hydraulic fracturing is a process that stimulates the flow of oil and natural gas to the wellhead. In hydraulic fracturing, water, mixed with sand and chemicals, is pumped down the wellbore at high pressure to break apart tight formations and free trapped oil and gas. While it has been an accepted practice for more than 40 years, hydraulic fracturing has recently come under fire from environmental interests due to potential contamination of drinking water aquifers. In response, the Environmental Protection Agency (EPA), the Department of Energy, and the Department of the Interior have proposed new regulations. This practice has traditionally been regulated at the state level. Some states, including Colorado and Texas, are enacting new, stricter rules on hydraulic fracturing to preempt federal oversight. Colorado adopted new rules in December 2011, that require oil and gas operators to publicly disclose all chemicals used in the hydraulic fracturing of wells, while still recognizing and protecting trade secrets. The new rules are endorsed by industry and environmental groups and were approved by the nine-member Colorado Oil and Gas Conservation Commission. State oversight of hydraulic fracturing is appropriate and should be supported based on local regulators' understanding of local regulatory and geological realities.

Additional issues being debated at the federal level without a clear resolution include:

- Proposed rules on emissions by the U.S. Environmental Protection Agency (EPA) that would apply to oil and gas production sites, power plants, and oil refineries.
- Constrained access to federal lands and waters for drilling by the U.S. Department of the Interior and the Bureau of Land Management.
- Delayed review of the application for the Keystone XL pipeline that would bring oil from Canadian tar sands through the United States to Gulf Coast refineries.

Volatile commodity prices also pose a challenge to industry. Natural gas prices in the last decade have fluctuated wildly, with record-low prices reining in industry growth for the last two years. With more interest in natural gas as a bridge fuel, the market may drive prices up, but potentially at the expense of coal production rates and commodity prices. Crude oil prices are also volatile, plummeting in 2009 in part due to the global recession, but also due to competition from imports and constraints on domestic drilling.

The incentives Colorado offers to lure companies are based on tax credits with almost no cash incentives. Tax credits may be appealing to companies that are well established, but they are meaningless to early-stage, pre-profit—and pre-tax—companies. The recent expansion of the Colorado Bioscience and Clean Technology Innovation Reinvestment Act is a step in the right direction. It is a cash incentive that provides up to \$2 million per year (for 10 years) in grant funding for cleantech. Nonetheless, Colorado's competitive advantage is diminished compared to other states that have begun to offer more cash incentives in lieu of tax credits. Finding more cash for incentives in Colorado requires a critical review—cost-benefit analysis of current incentive programs, evaluation of other states' incentive programs, and the political will to change the state's incentive structure.

Colorado is highly regarded for its skilled workforce. It is ranked second-highest among the 50 states for residents with a bachelor's degree or higher, eighth-highest in Ph.Ds, and 14th-highest in science and engineering graduate students. Partnerships among the state's research universities and NREL are creating new centers of excellence and offering intellectual property to generate new companies. The fact remains that many of Colorado's skilled workers come here from other states. In recent years, Colorado's public education system has borne significant funding cuts as the state seeks to balance its budget. The conflicting resolutions of three constitutional provisions in Colorado's constitution—TABOR, Amendment 23, and the Gallagher Amendment—create an intractable problem in resolving budgetary issues and the potential for more cuts to public education. Discussions must continue to either amend or eliminate these three provisions.

In this report, we added a new section that compares the United States to select countries. These include other global energy economies and the United States' top trading partners—Brazil, Canada, China, Germany, India, Japan, Mexico, South Korea, and the United Kingdom—and the Russian Federation.

The United States continues to be a top global producer and consumer of natural resources. It is a major producer and net importer of natural gas and crude oil. The United States is also a major producer and exporter of coal, exporting 3.6 percent of its coal to countries in Asia and Europe. Domestic power consumption per capita is the second highest among countries in this study.

Power generation globally includes a varied mix of resources. Every country in the study utilizes a broad mix of resources, in different proportions, to generate electricity. The United States uses coal, natural gas, and nuclear energy as its primary sources of power generation, while slowly building its renewable power base through the addition of wind, solar, biomass, and hydroelectric resources. The emerging economies of China and India are primarily fueled by coal, but China in particular is attempting to expand its renewable resource base to offset climate impacts from coal. Brazil and Canada rely heavily on hydroelectricity.

One surprise finding is that U.S. gasoline prices are among the lowest in the world because the federal tax on gasoline is among the lowest compared to other countries in the study at 18.4 cents per gallon.

The third edition of *RRC* demonstrates that Colorado's energy economy is strong in spite of the state's fiscal constraints and challenges from outside influences. The energy economies of Colorado and the United States could be strengthened by clear and consistent domestic policies. Finally, the United States needs to improve its competitive advantage in the global energy economy through sound policymaking that supports growth in domestic resource exploitation in order to reduce imports and increase exports.