

Colorado Energy & Environmental Issues

Chris Hansen, PhD

Senior Advisor, Janys Analytics

Candidate, Colorado House of Representatives

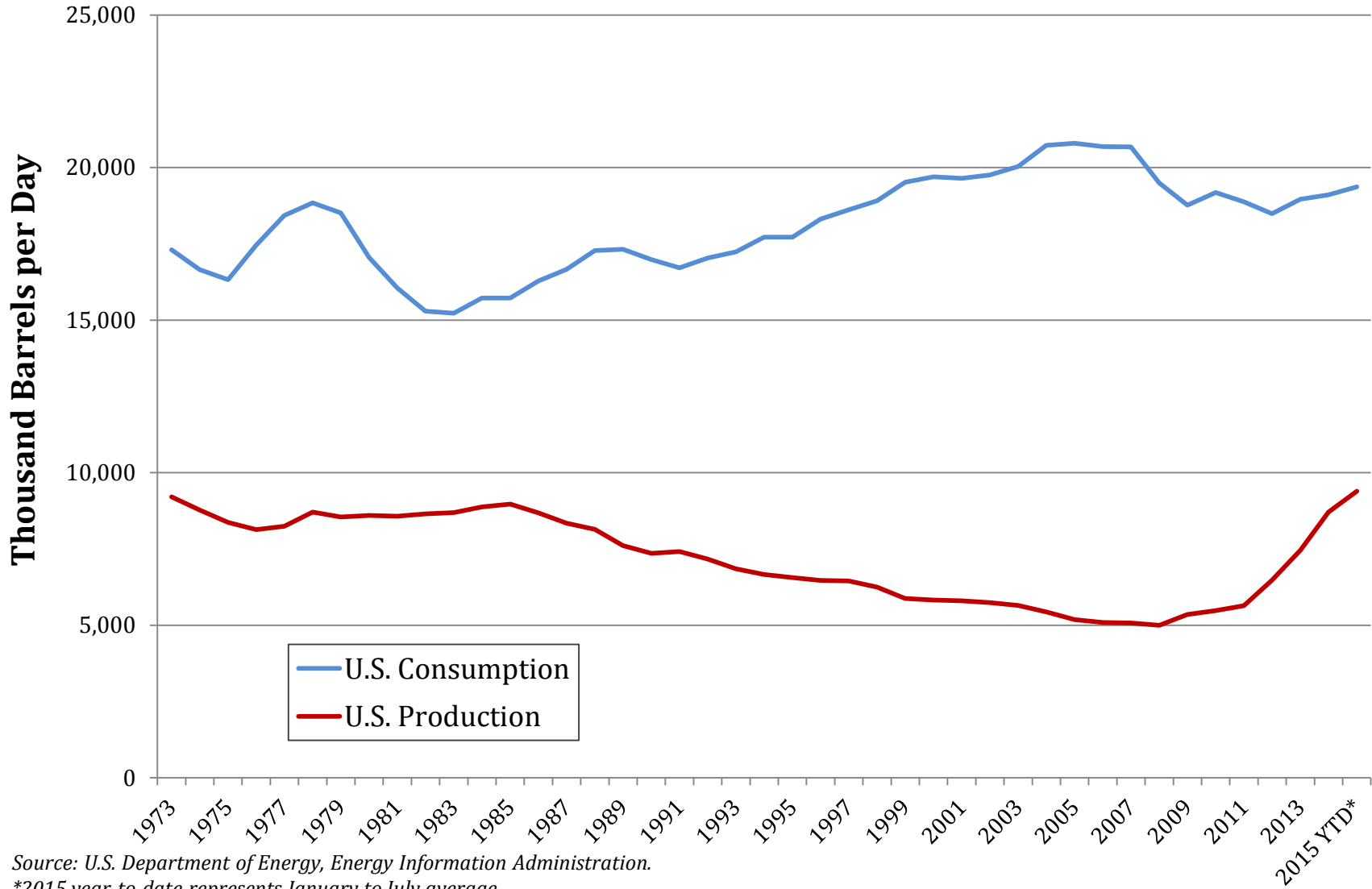


Oil



U.S. Crude Oil Production & Consumption, 1973-2015

As of 2014, 73% of petroleum products consumed in the U.S. are produced domestically; up from 60% in 2012

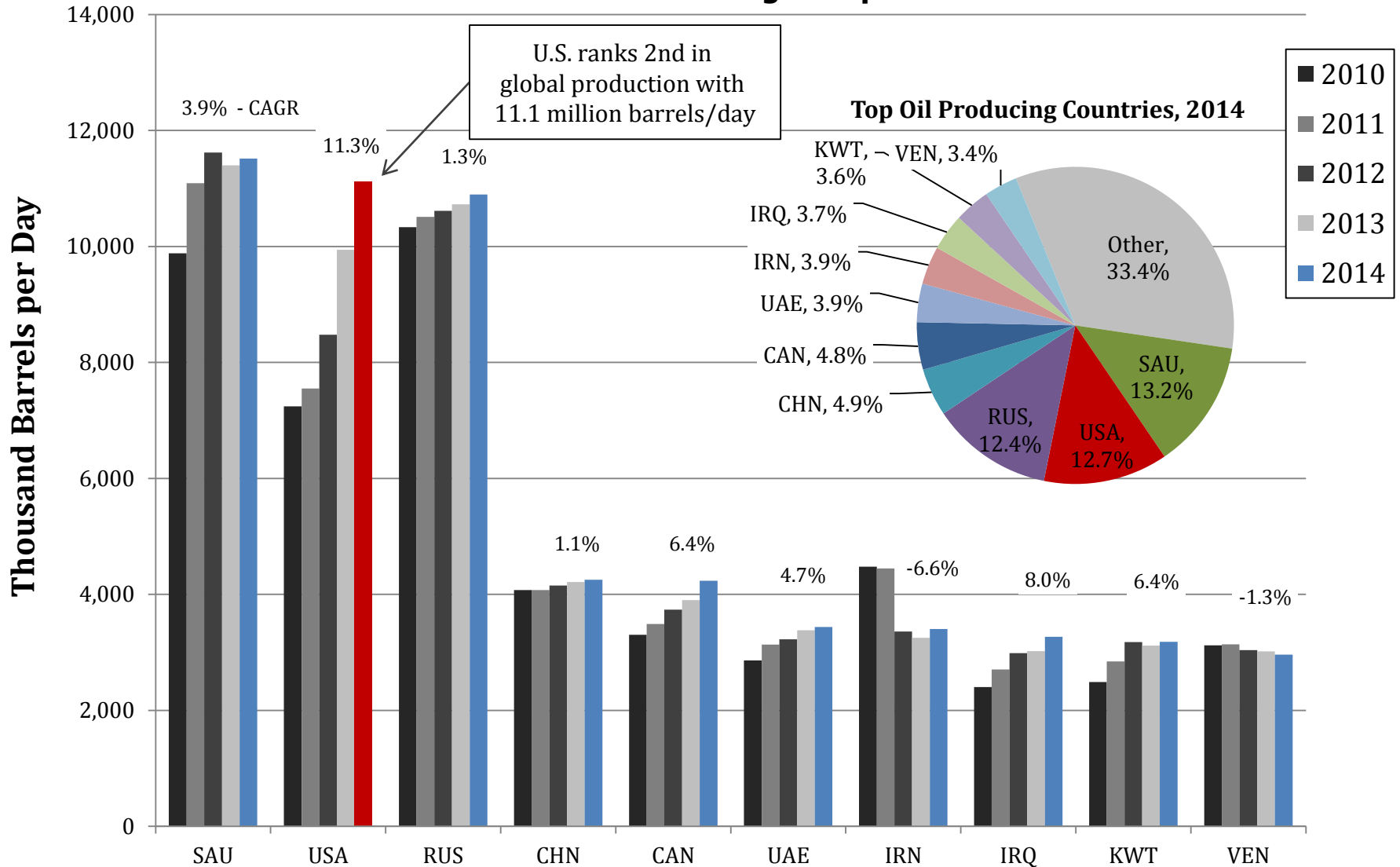


Source: U.S. Department of Energy, Energy Information Administration.

*2015 year-to-date represents January to July average.

Global Crude Oil Production Leaders, 2010-2014

Multiple sources indicate that once final data for 2014 is tabulated, the U.S. will rank first in global production



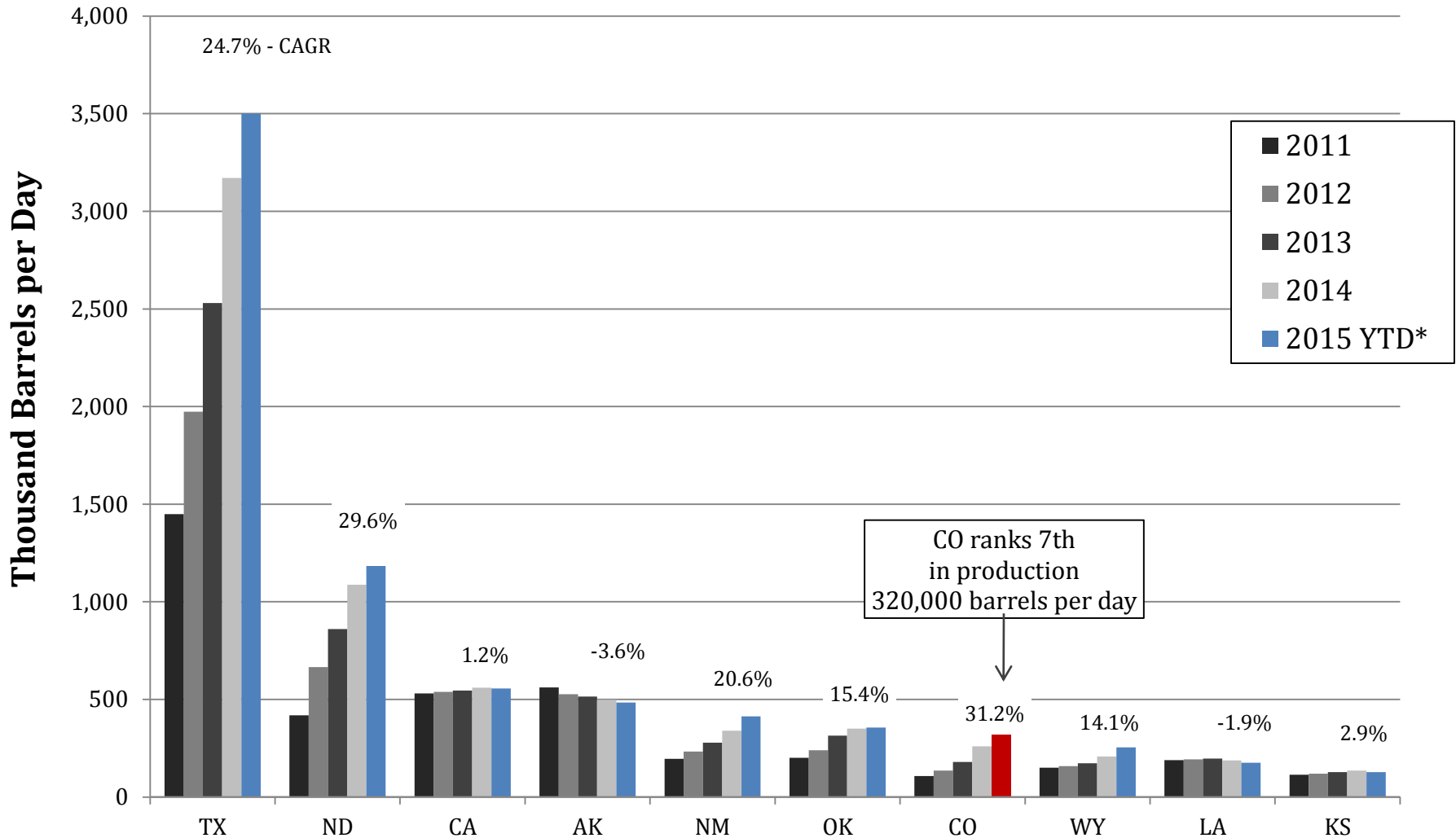
Source: International Energy Agency.

Note: Includes crude oil, natural gas liquids, feedstocks, additives, and other hydrocarbons; 2014 data represent estimates.

Fig. 9

Crude Oil Production by State, 2011-2015

Colorado has the fastest, average growth rate of top-10 producers;
 U.S. 2011 to 2015 compound annual growth rate (CAGR) was 13.6%



Source: U.S. Department of Energy, Energy Information Administration.

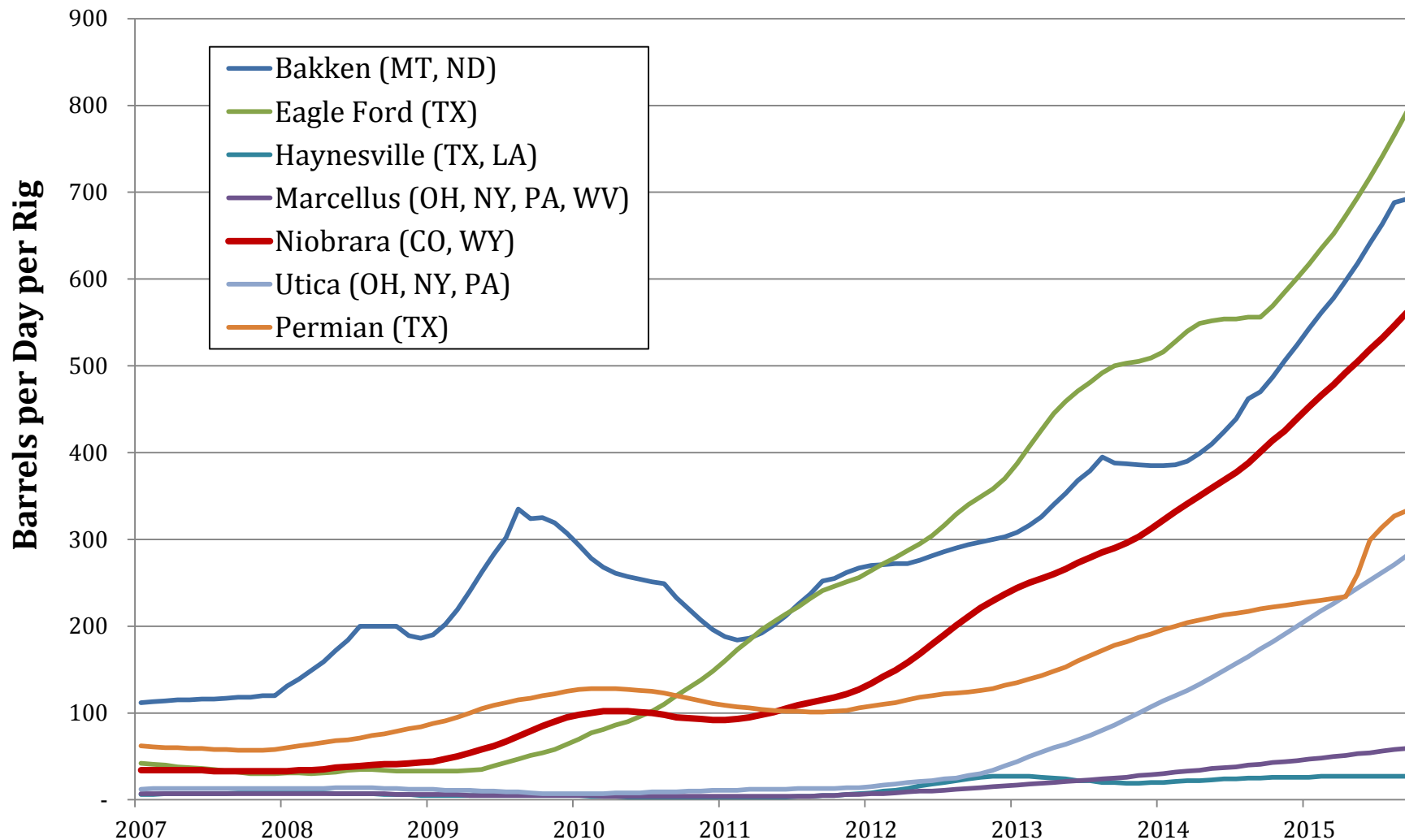
Note: Crude oil includes lease condensate recovered as liquid from natural gas wells.

*2015 year-to-date represents January to July.

Fig. 2

U.S. Shale Oil Production per Rig by Major Resource Play

New well production in the Niobrara formation has increased by a factor of six since 2011



Source: U.S. Department of Energy, Energy Information Administration.
 Note: Does not include legacy production; 2015 data through September.

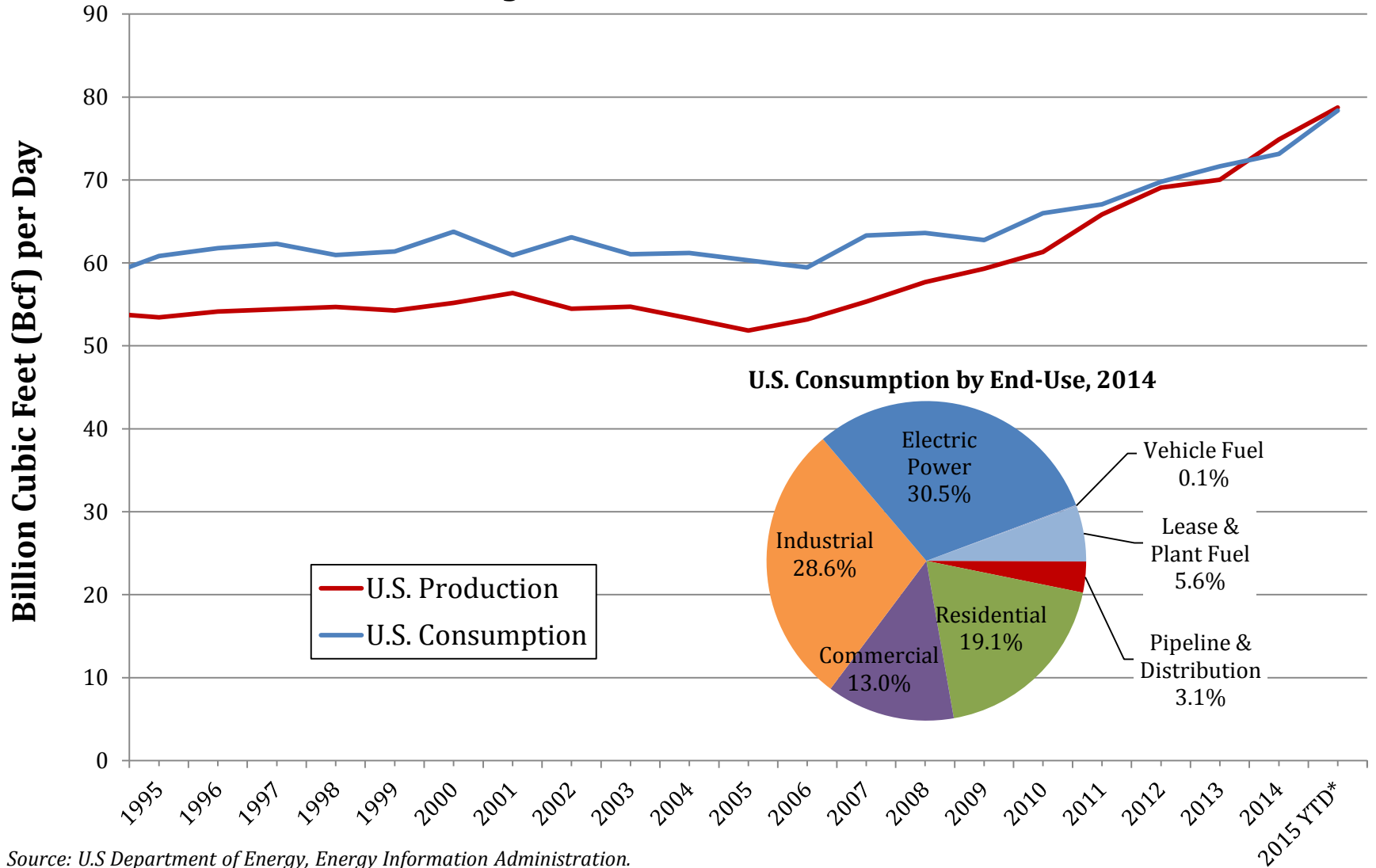
Fig. 4

Natural Gas



U.S. Natural Gas Production & Consumption

Domestic production has increased steadily since 2006; consumption surge due to GDP growth and fuel switch from coal

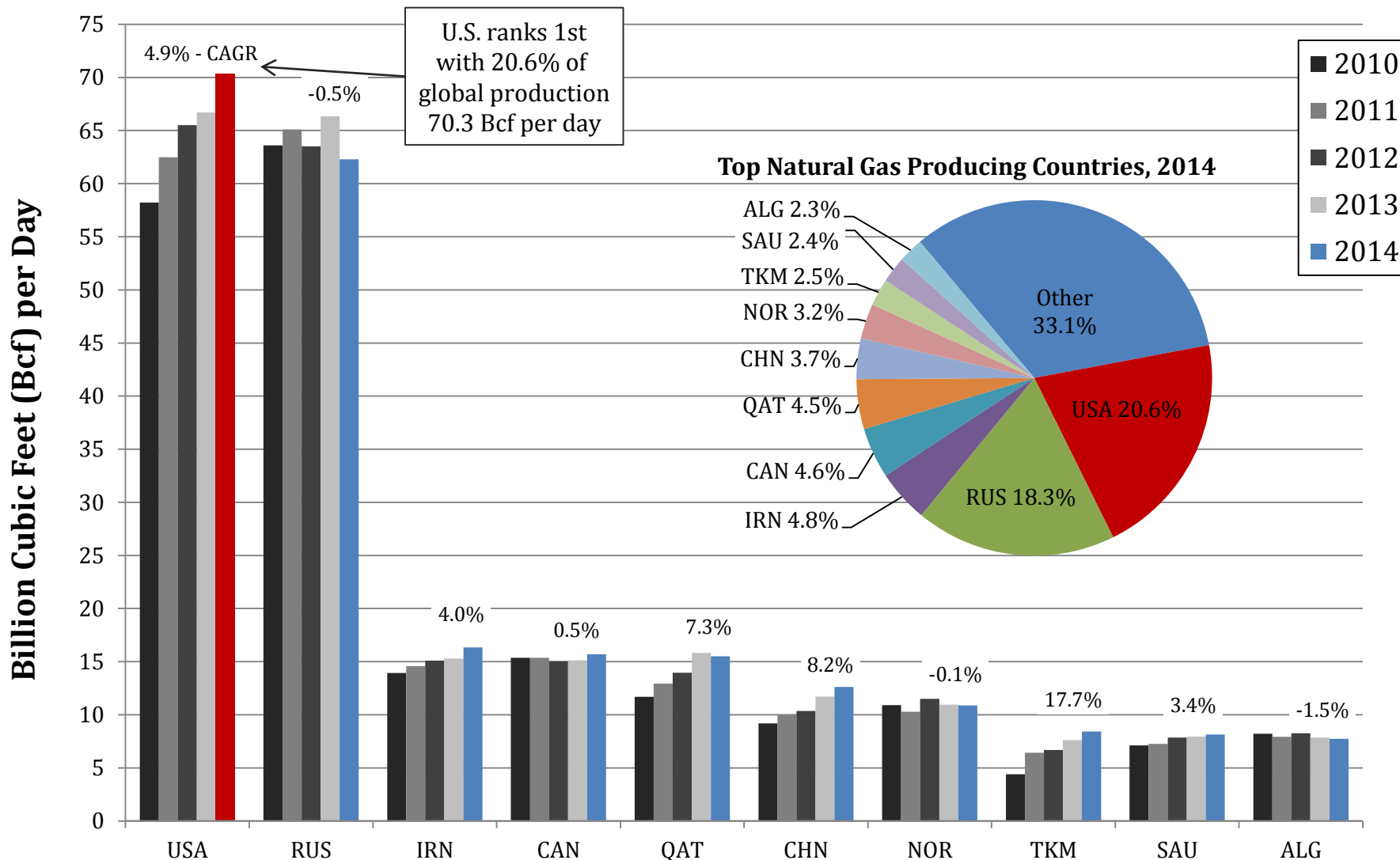


Source: U.S. Department of Energy, Energy Information Administration.

*2015 year-to-date represents January to July.

Global Natural Gas Production Leaders, 2010-2014

Top 10 producers account for 67% of global production

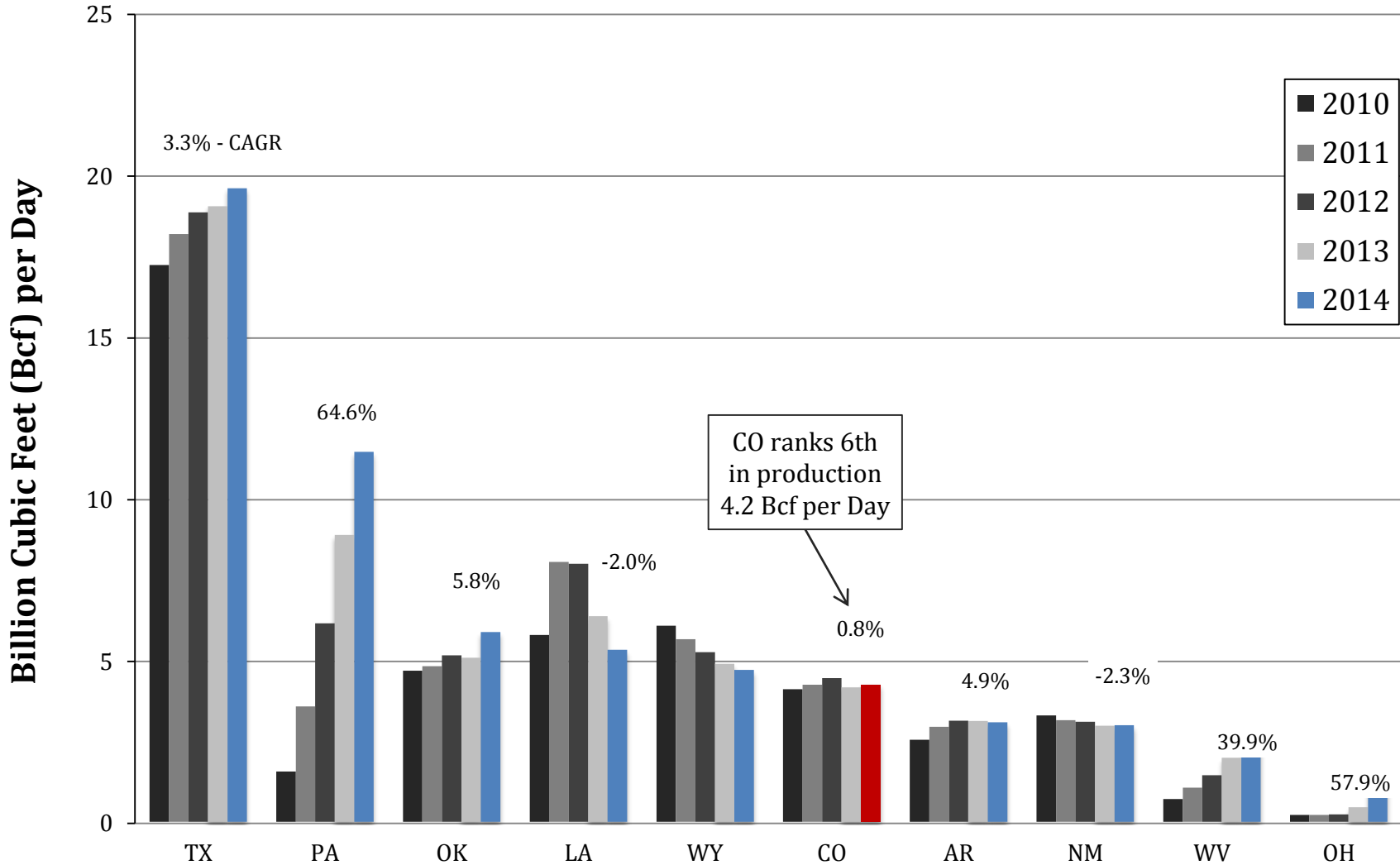


Source: International Energy Agency.
 Note: 2014 data represent estimates.

Fig. 19

Natural Gas Production by State, 2010-2014

Colorado's production has remained stable since 2010;
U.S. production has increased at an annual rate of 4.8% since 2010

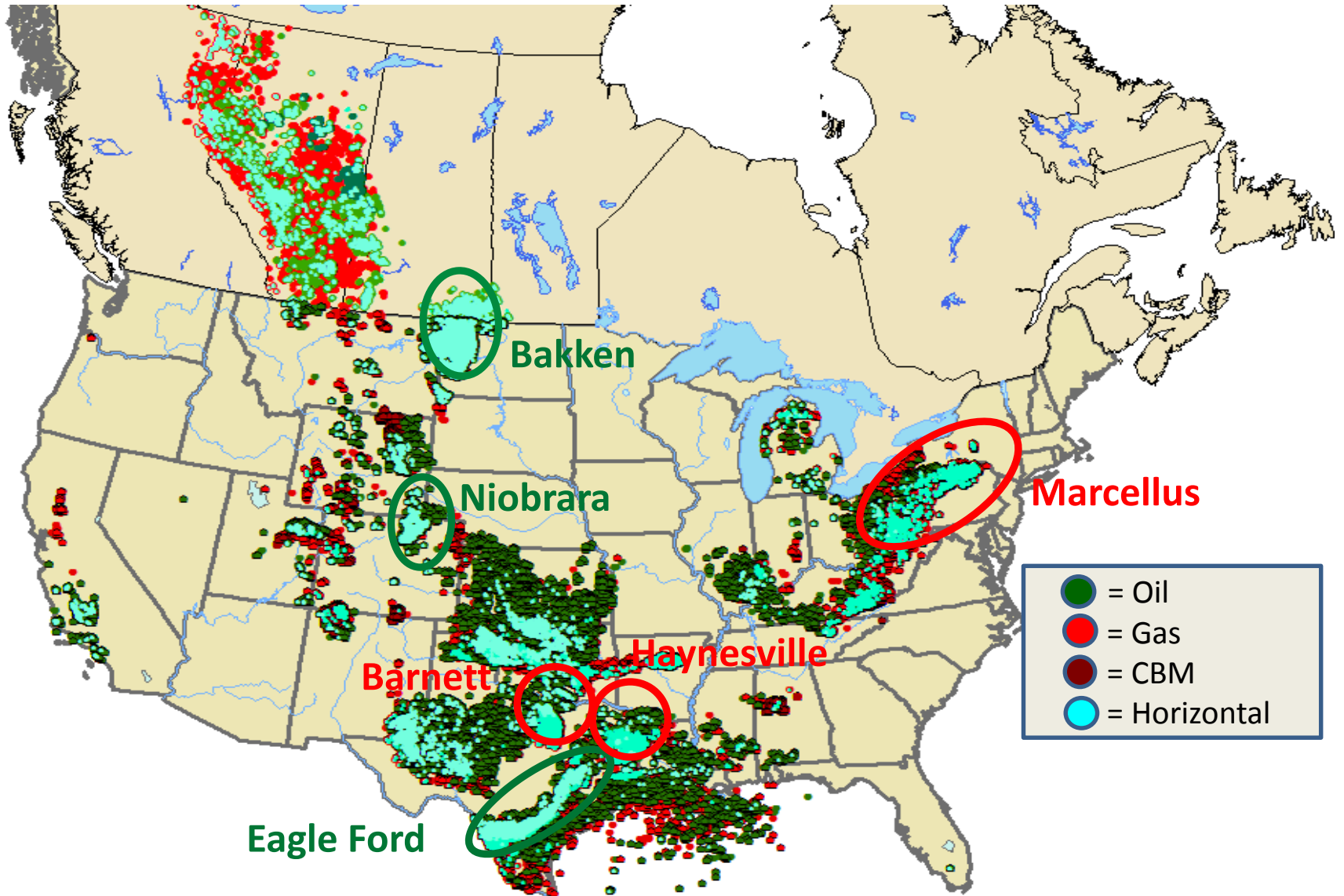


Source: U.S. Department of Energy, Energy Information Administration.

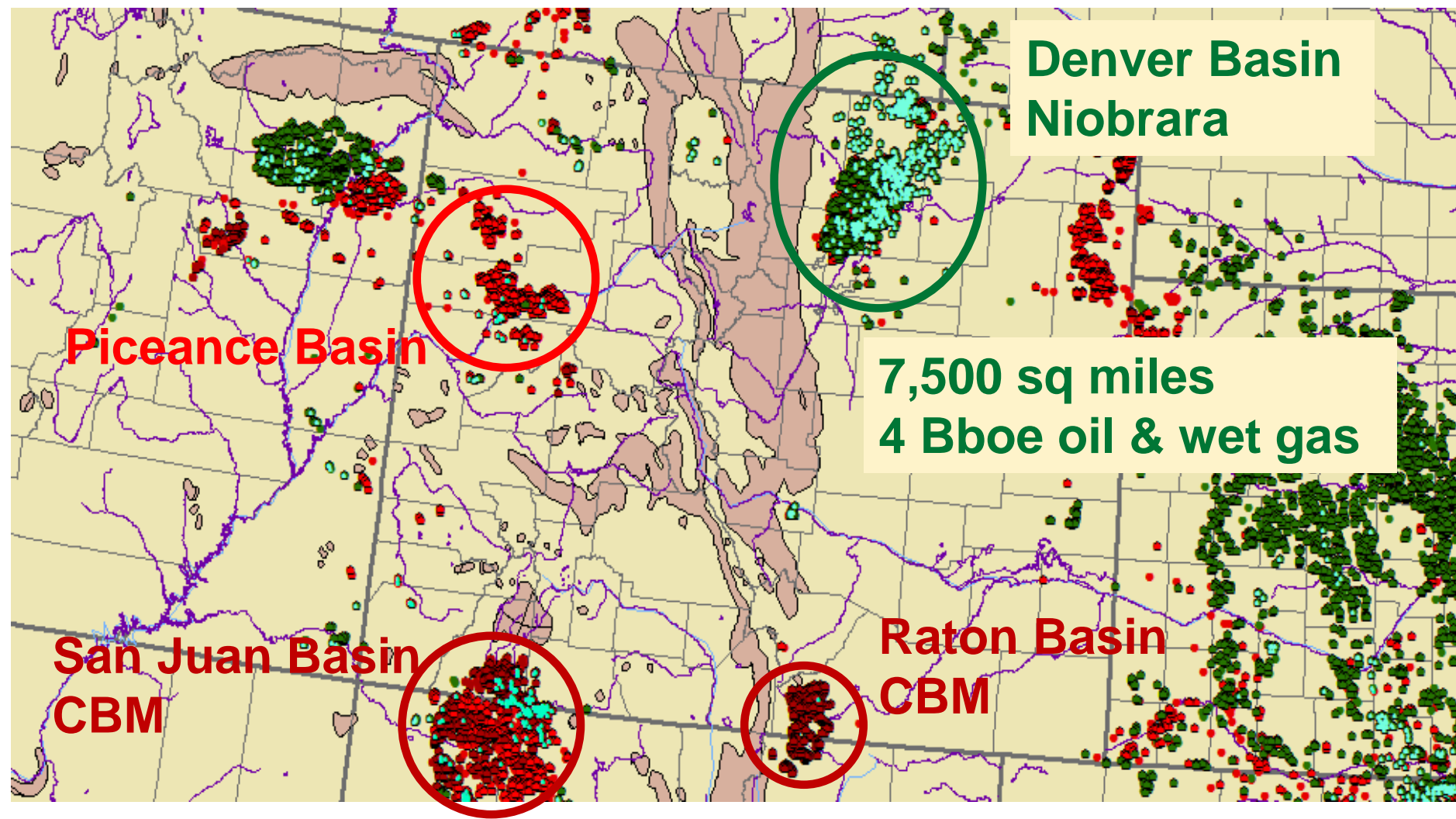
Fig. 12

The Unconventional Revolution

Key Oil and Gas Plays

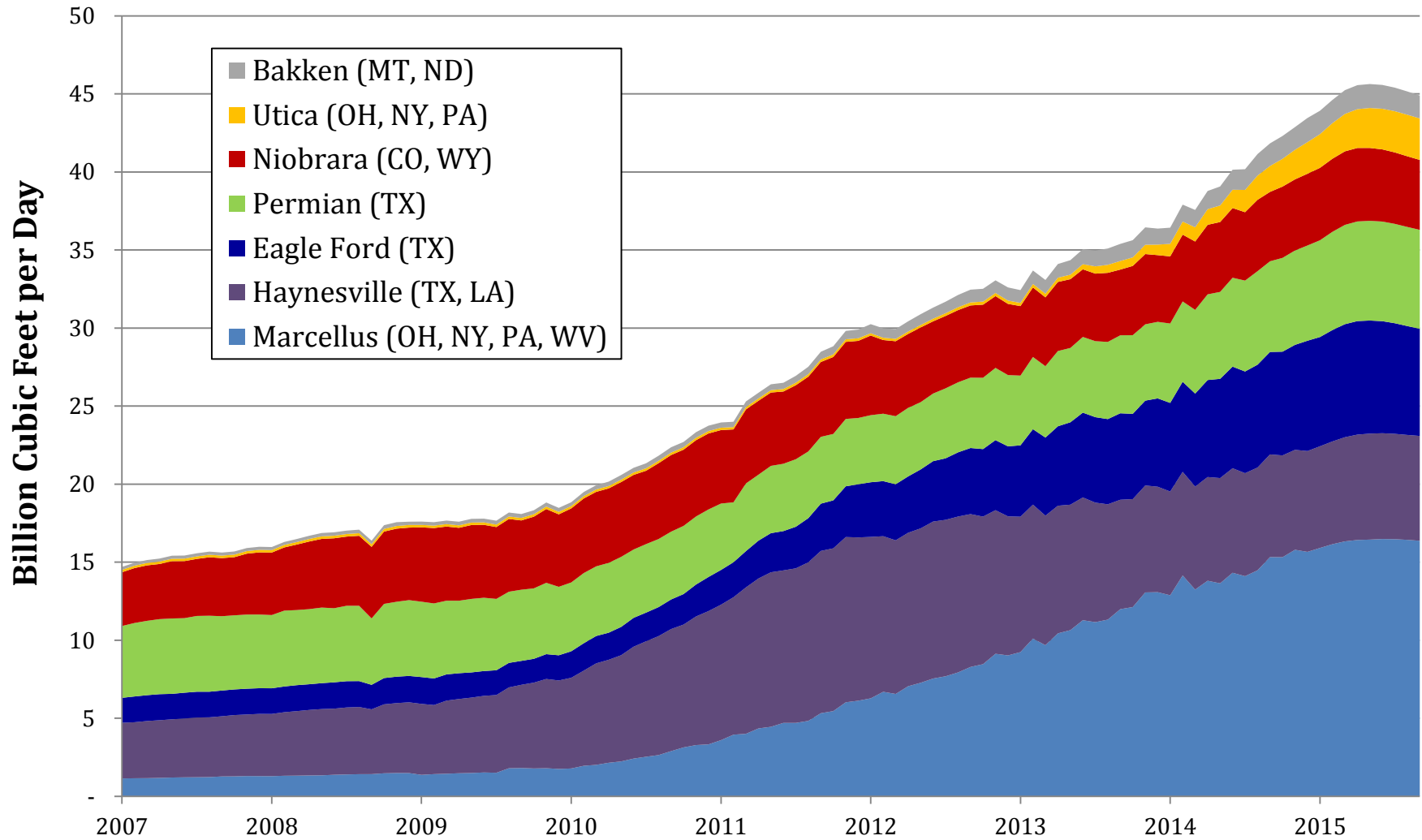


Colorado Key Oil and Gas Plays 2009-2013



U.S. Shale Gas Production by Major Resource Play

4.5 bcf per day in the Niobrara formation as of September 2015

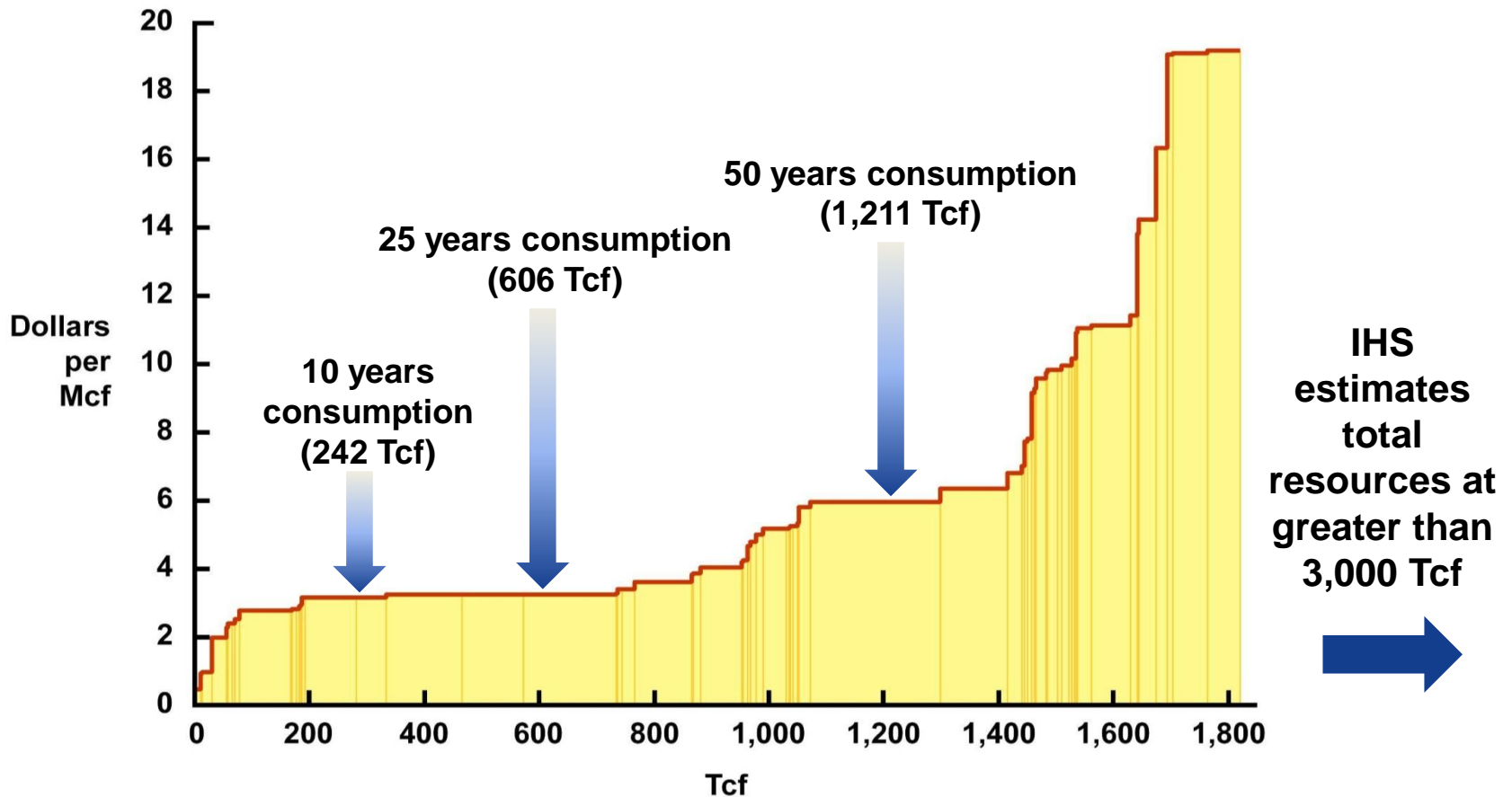


Source: U.S. Department of Energy, Energy Information Administration.
 Note: Excludes legacy production; 2015 data through September.

Fig. 17

North American gas supply is plentiful and low cost

Breakeven Henry Hub price for natural gas resources in 17 analyzed unconventional plays

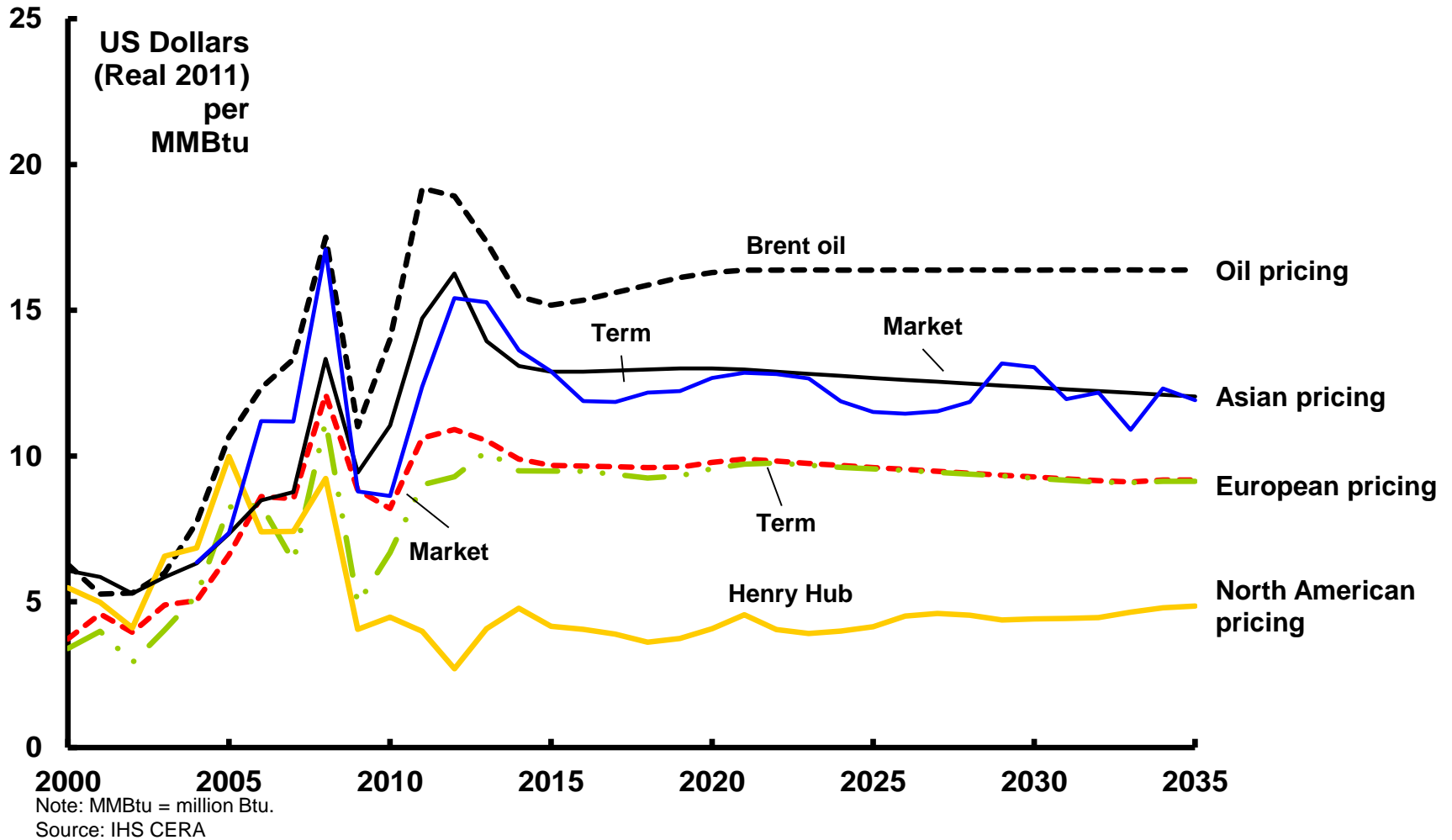


Note: Proved, possible, and potential resources; Mcf = thousand cubic feet.

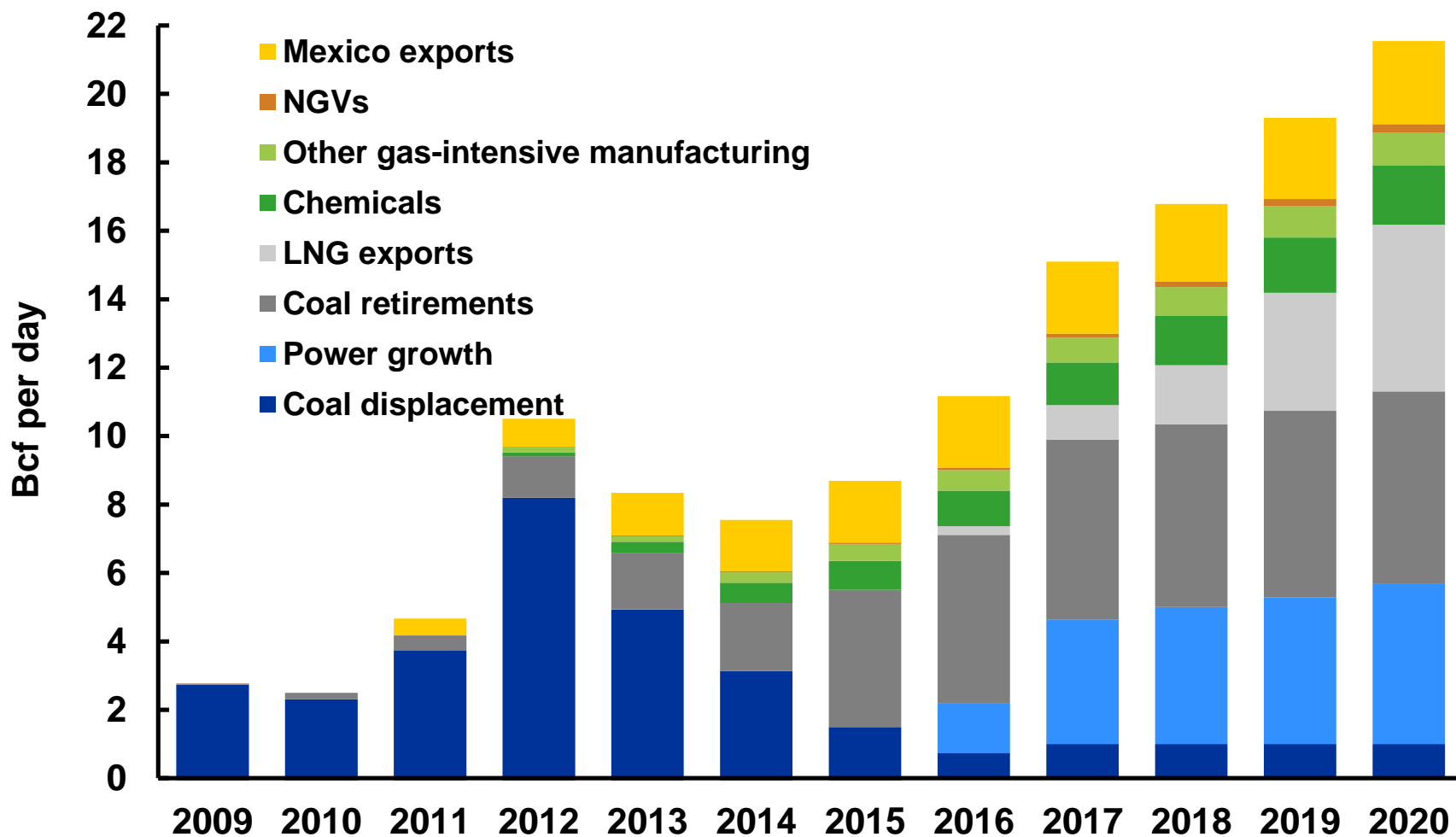
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Source: IHS CERA

Regional natural gas price differentials: here to stay in the long term



Components of US natural gas demand growth relative to 2008



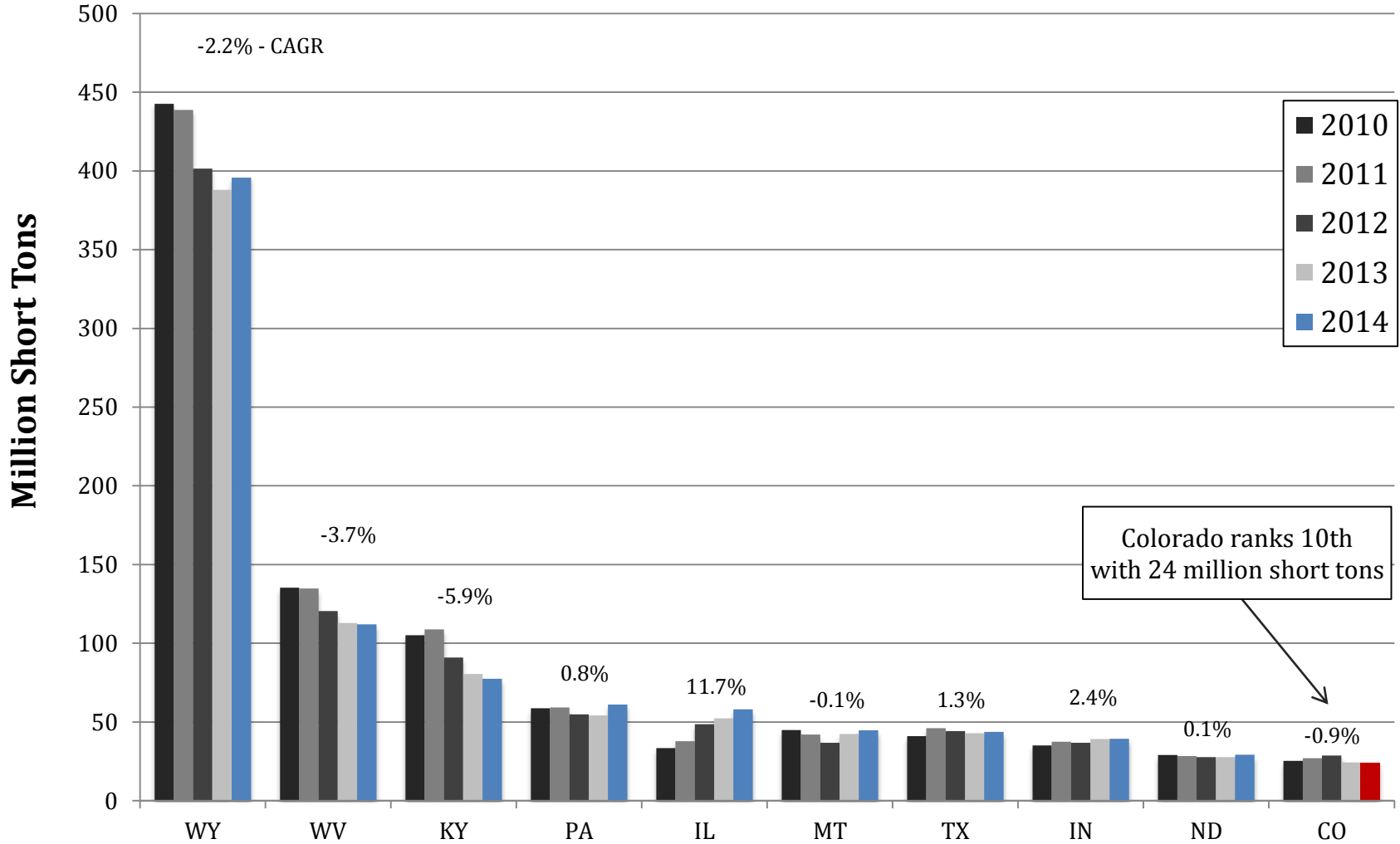
Source: IHS CERA

Coal



U.S. Coal Production by State, 2010-2014

65% of Colorado coal is shipped beyond state borders; 10% shipped internationally; policy and market changes are reducing domestic demand

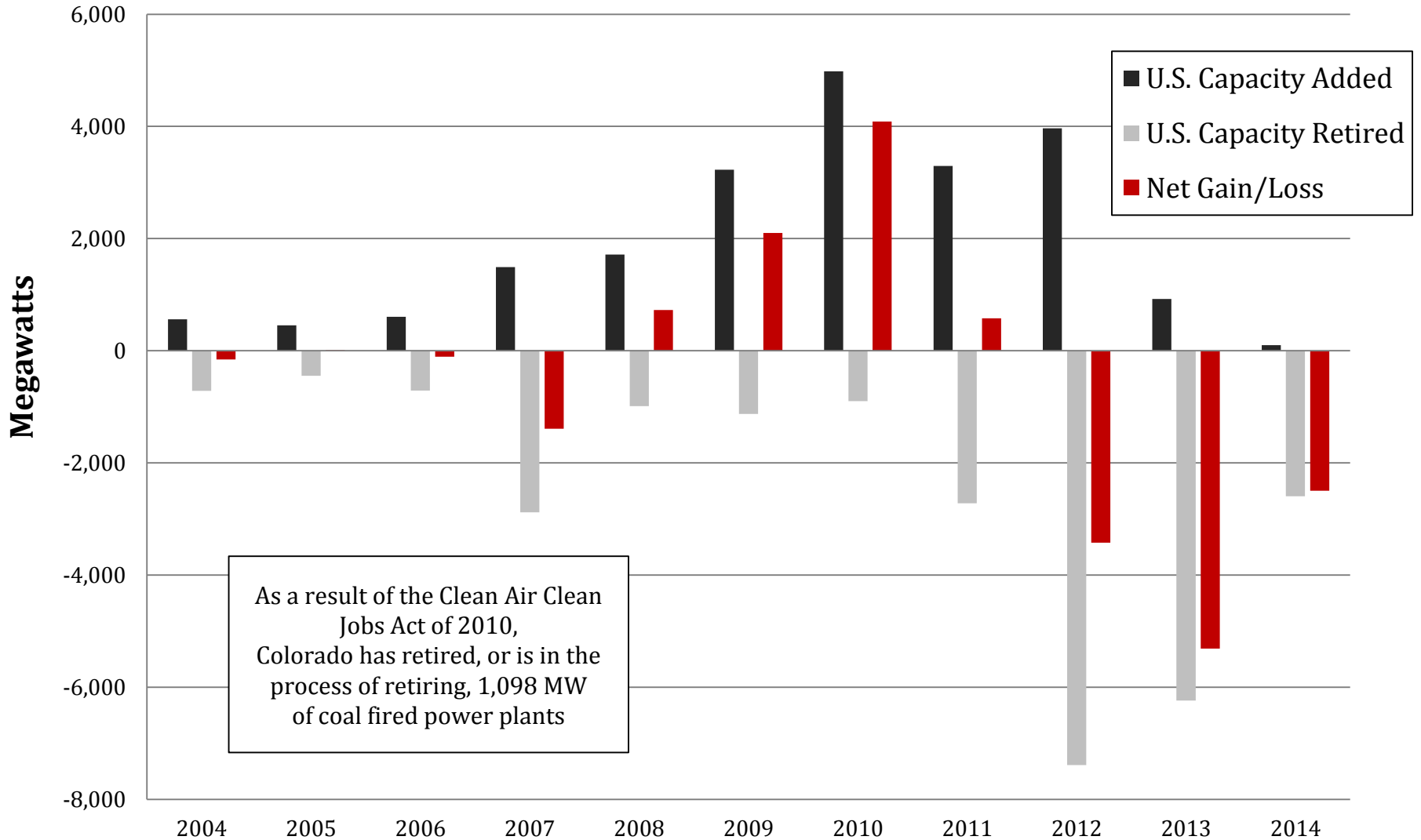


Source: U.S. Department of Energy, Energy Information Administration.
 Note: Short ton equals 2,000 pounds.

Fig. 22

U.S. Coal Additions and Retirements, 2004-2014

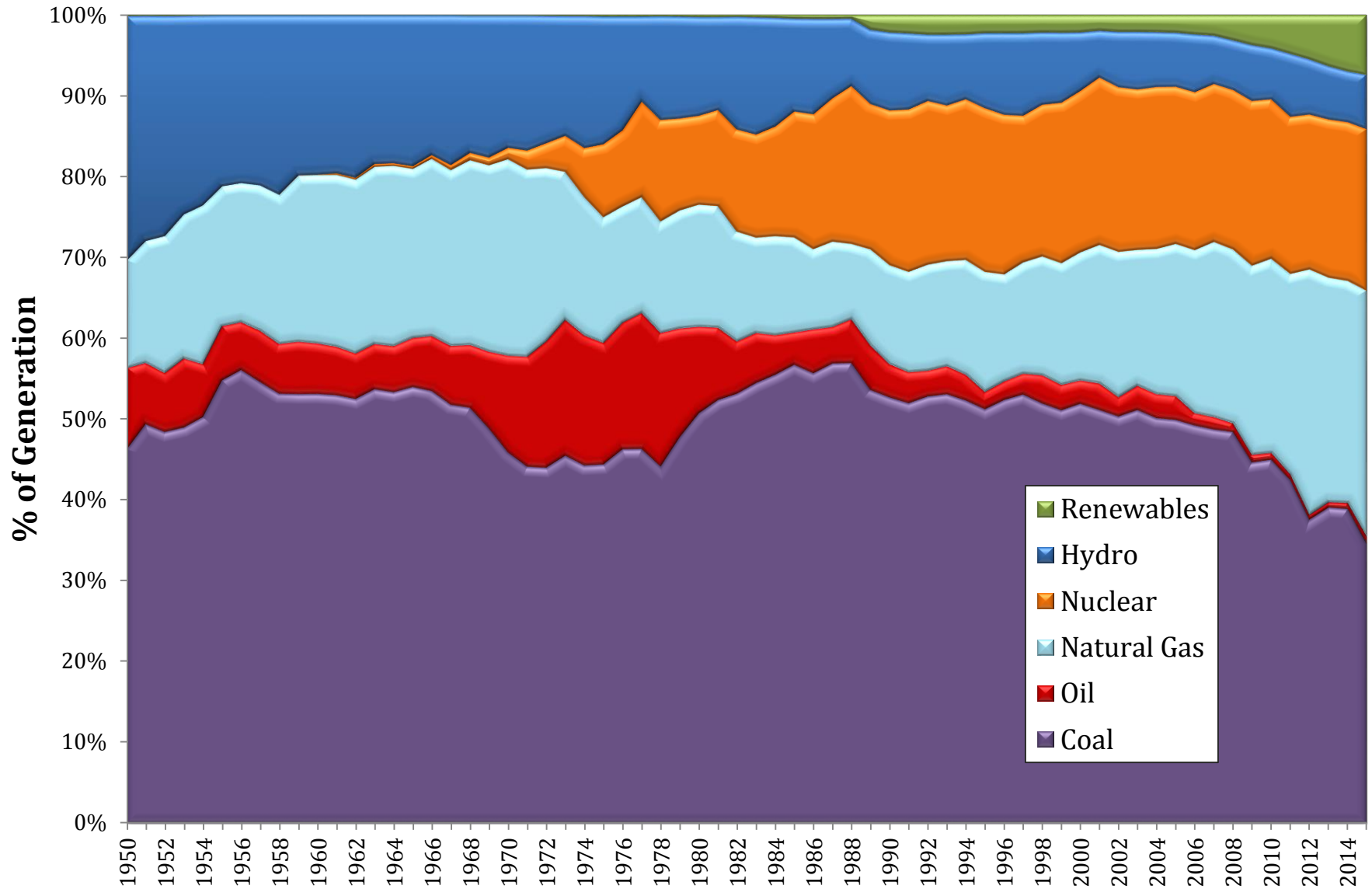
Global demand increasing while U.S. demand decreasing due to economics and policies



Power



U.S. Net Generation History by Resource, 1950-2015



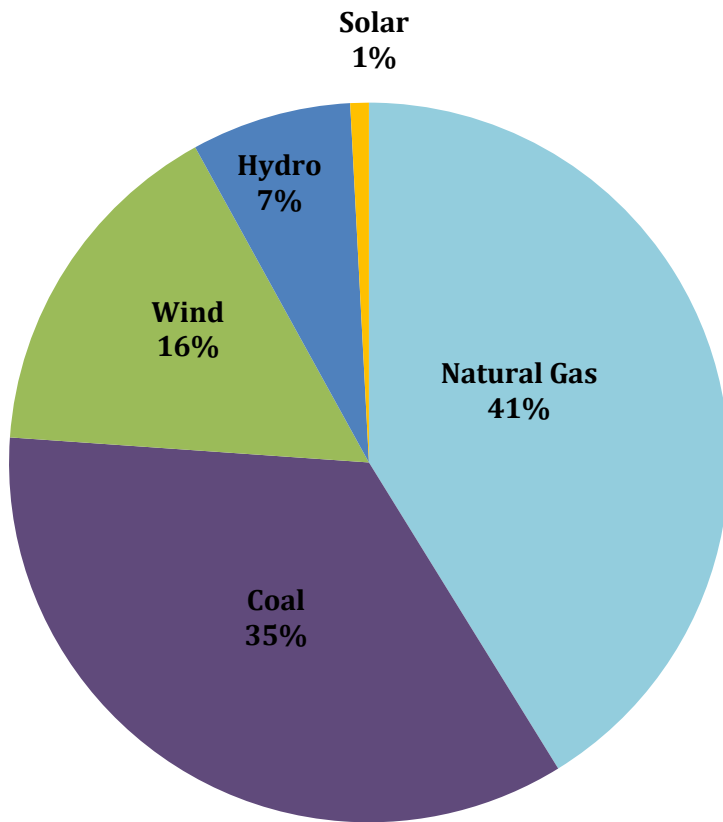
Source: U.S. Department of Energy, Energy Information Administration.
*2015 data represent January through June.

Colorado Nameplate Capacity & Net Generation, 2014

Available installed capacity compared to utilized capacity

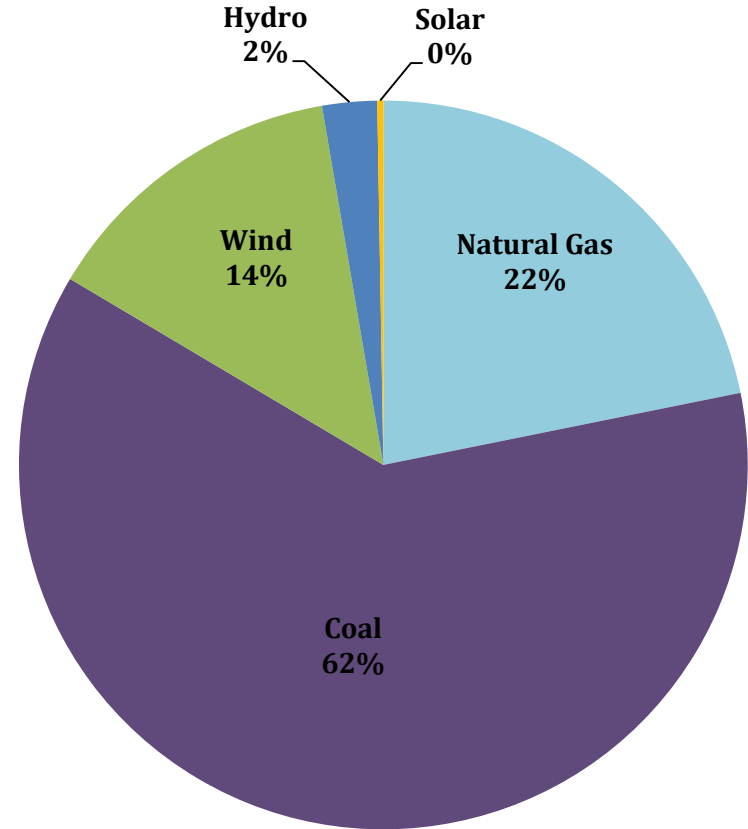
Colorado Operating Nameplate Capacity

16.3 gigawatts of installed capacity



Colorado Net Generation by Resource

52,901 gigawatt hours of total generation



Source: SNL Energy.

Note: Electricity use by sector - Industrial (28%), Residential (34%), Commercial (38%); figures exclude idled power plants and distributed generation. Fig. 44

Renewable Energy Policies, 2015

Colorado has a Renewable Portfolio Standard (RPS) of 30% by 2020 for investor owned utilities, 20% by 2020 for rural cooperatives, and 10% by 2020 for large municipalities

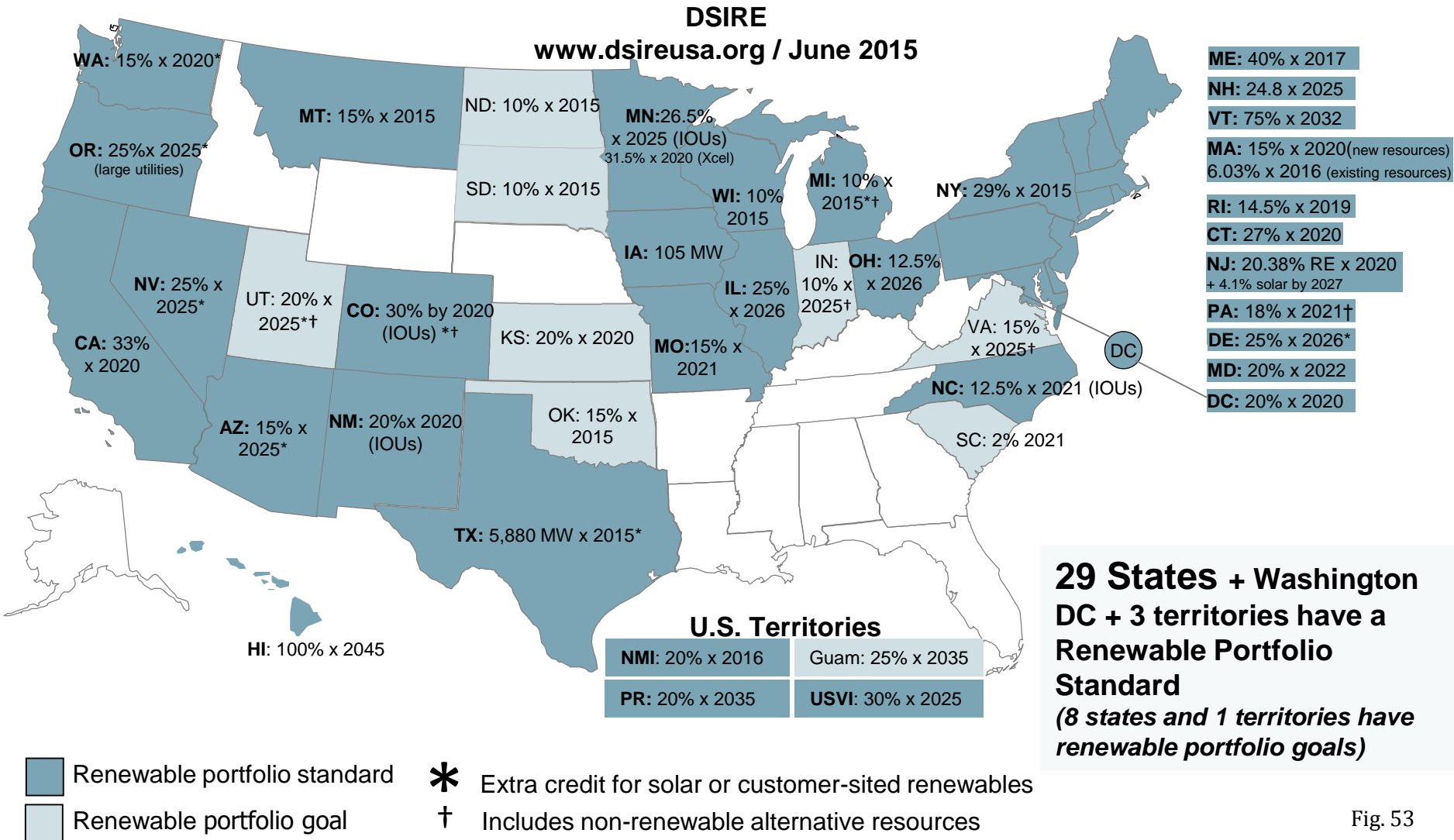
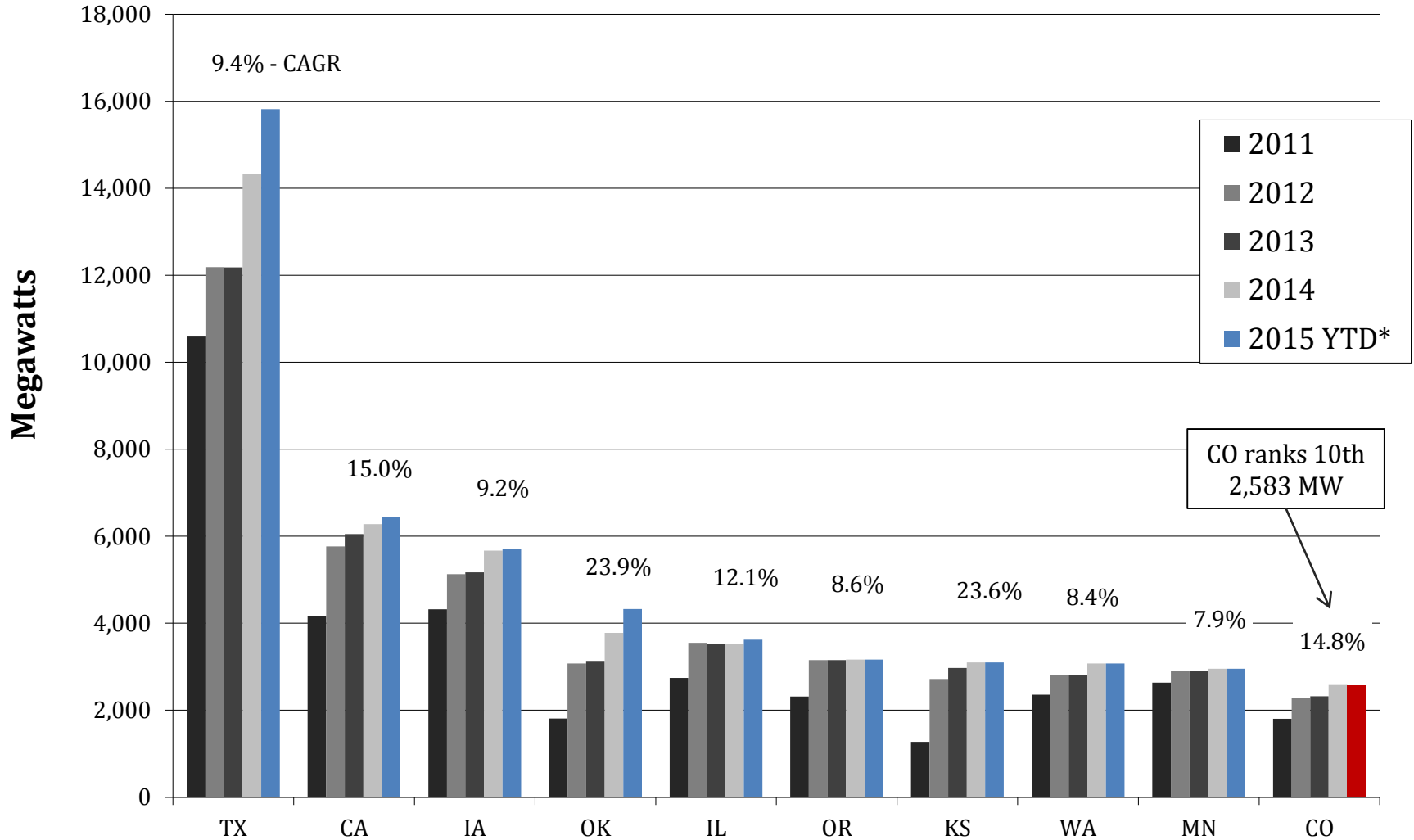


Fig. 53

Total Installed Wind Capacity, 2011-2015

More than 400 MW of new wind capacity is projected to come online in Colorado in 2016

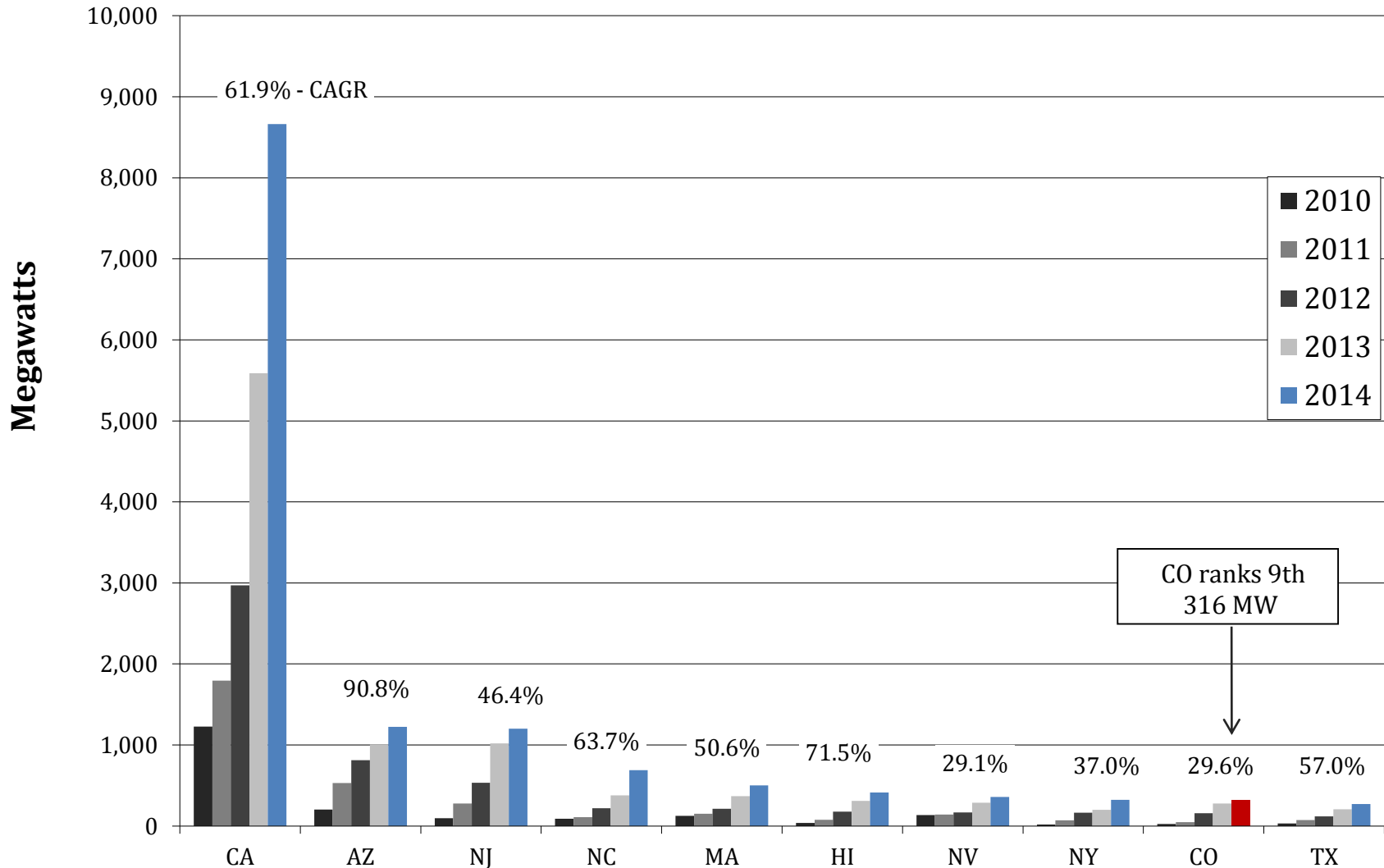


Source: SNL Energy.

*2015 year-to-date represents capacity as of September.

Total Installed Solar Capacity, 2010-2014

More than 290 MW of new solar capacity projected to come online in Colorado 2016; over half of U.S. installed solar capacity (15,668 MW) is in California

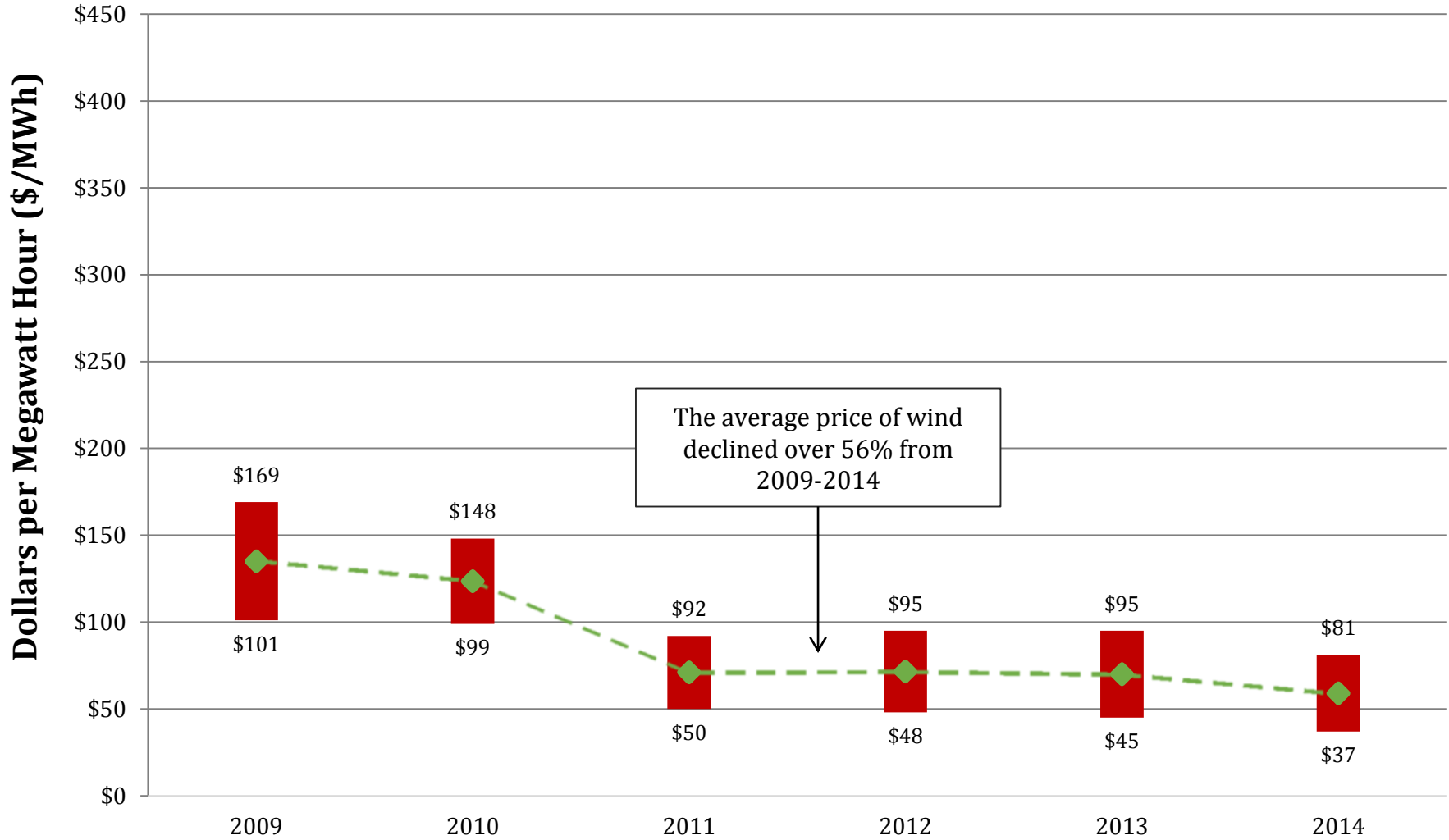


Source: Solar Electric Power Association (SEPA); solar includes residential, commercial, and utility-scale installations.

Fig. 30

Price of Wind, 2009-2014

Levelized cost of wind has decreased significantly since 2009



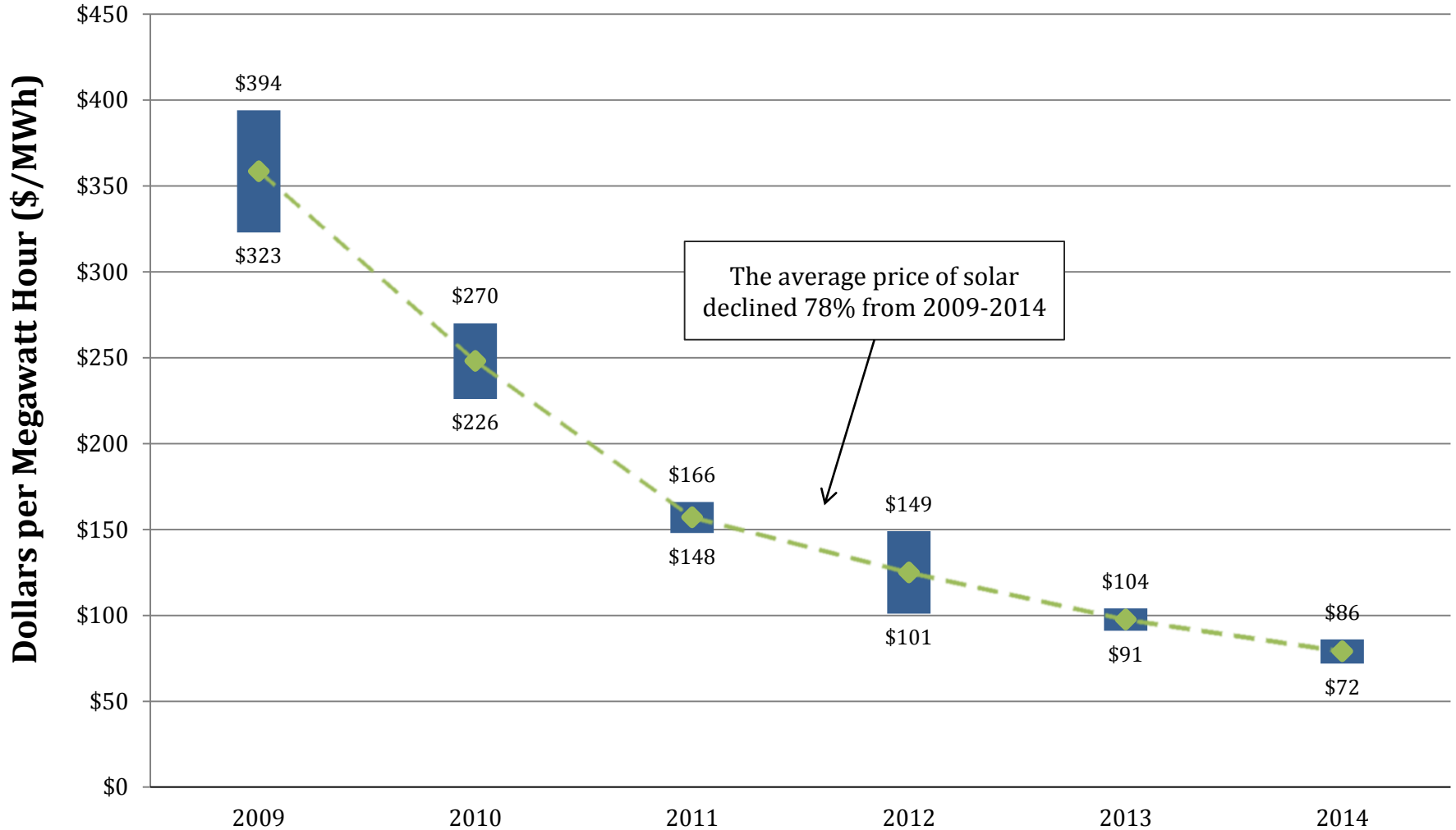
Source: Lazard.

Note: \$/MWh range is due to site and type of technology; levelized cost does not include tax incentives; price range expressed on annual basis.

Fig. 40

Price of Solar, 2009-2014

Levelized Cost of Solar has decreased significantly since 2009



Source: Lazard.

Note: \$/MWh range is due to site and type of technology; levelized cost does not include tax incentives; price range expressed on annual basis.

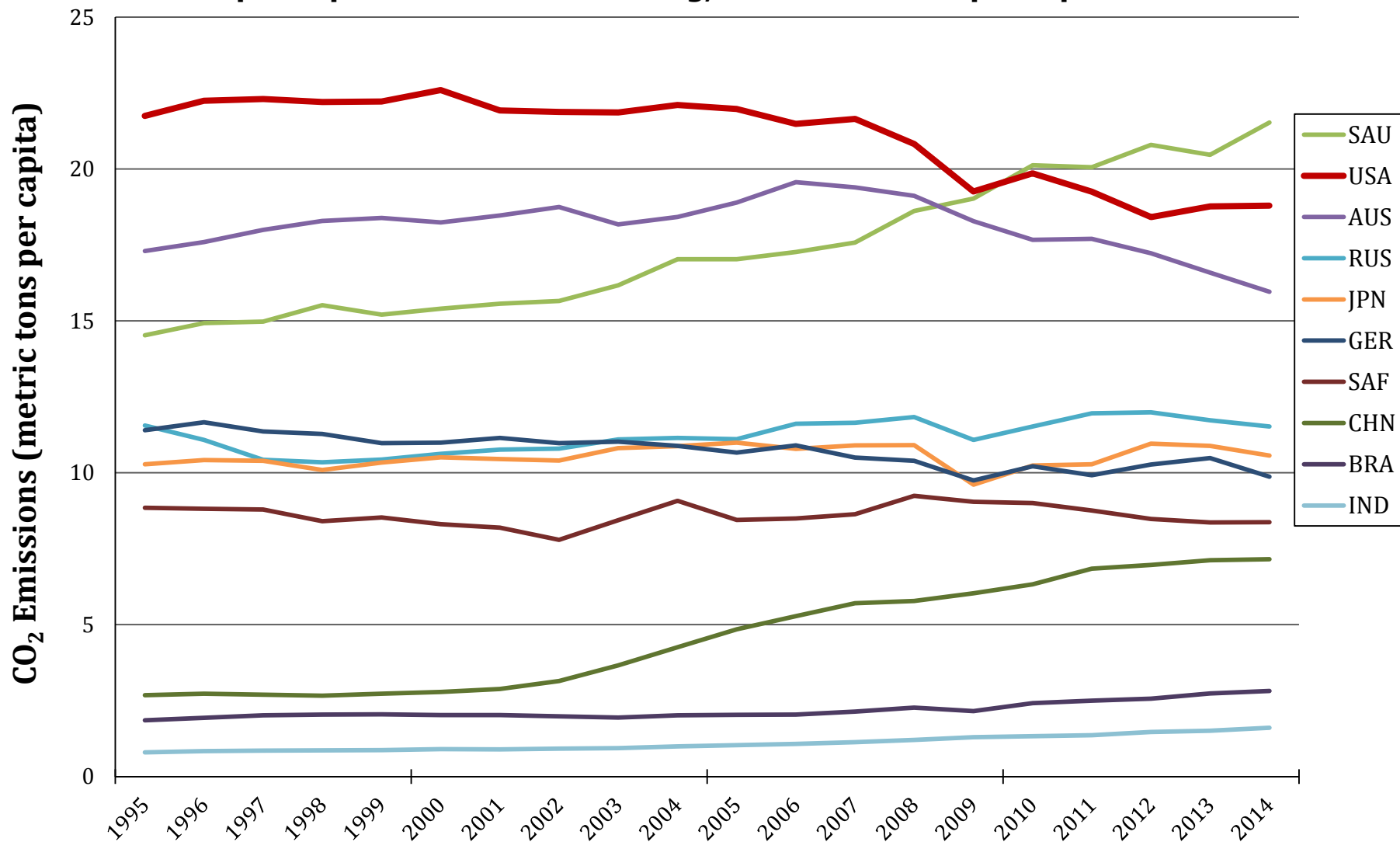
Fig. 41

Policy & Economic Impacts



Global CO₂ Emissions per Capita, 1995-2014

U.S. per-capita emissions decreasing; 18.8 metric tons per capita in 2014

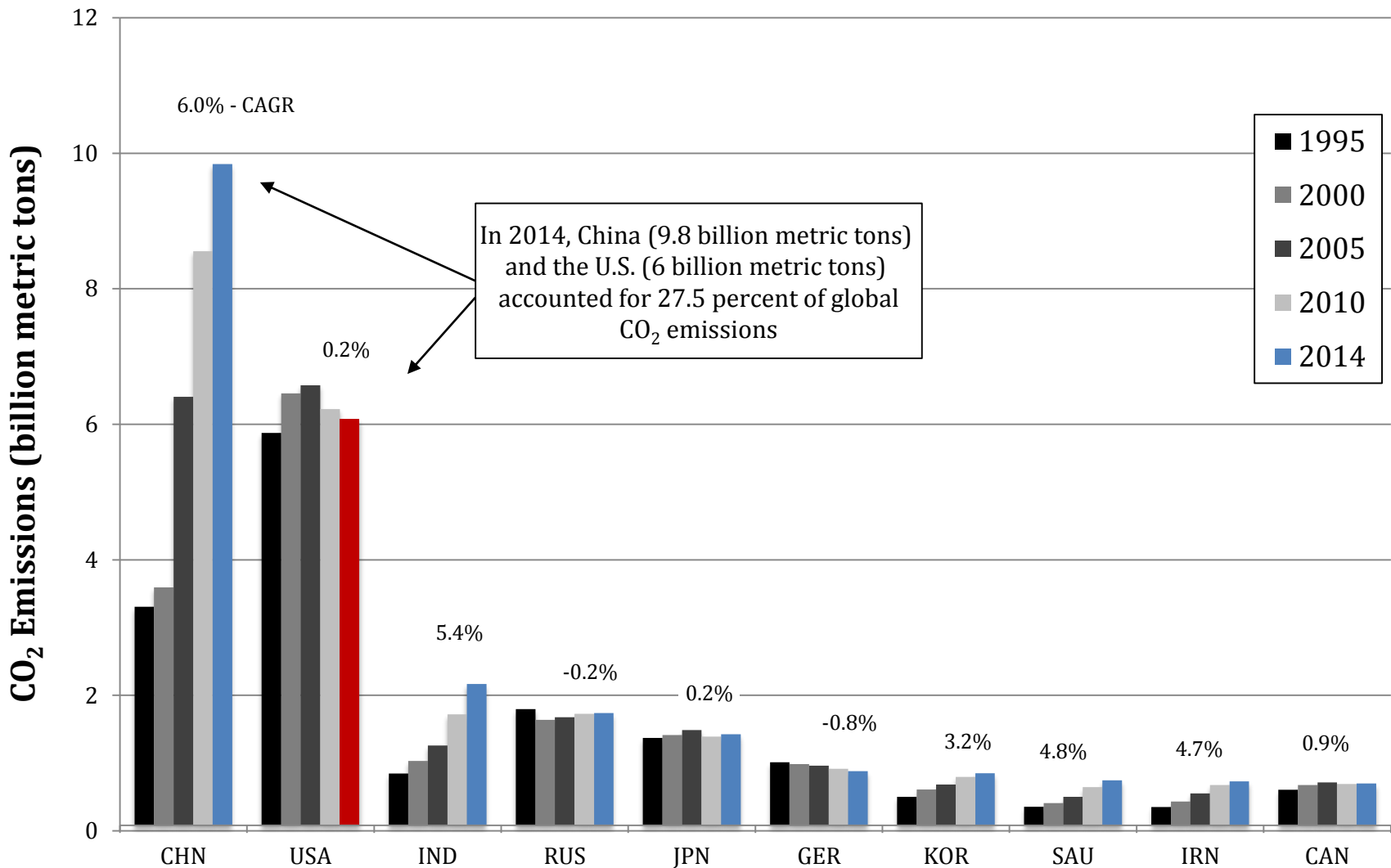


Source: BP Statistical Review; The World Bank.

Note: Carbon emissions reflect consumption of oil, gas and coal, and are based on standard global average conversion factors.

Global CO₂ Emissions by Country, 1995-2014

Global CO₂ emissions in 2014 were 35.5 billion metric tons

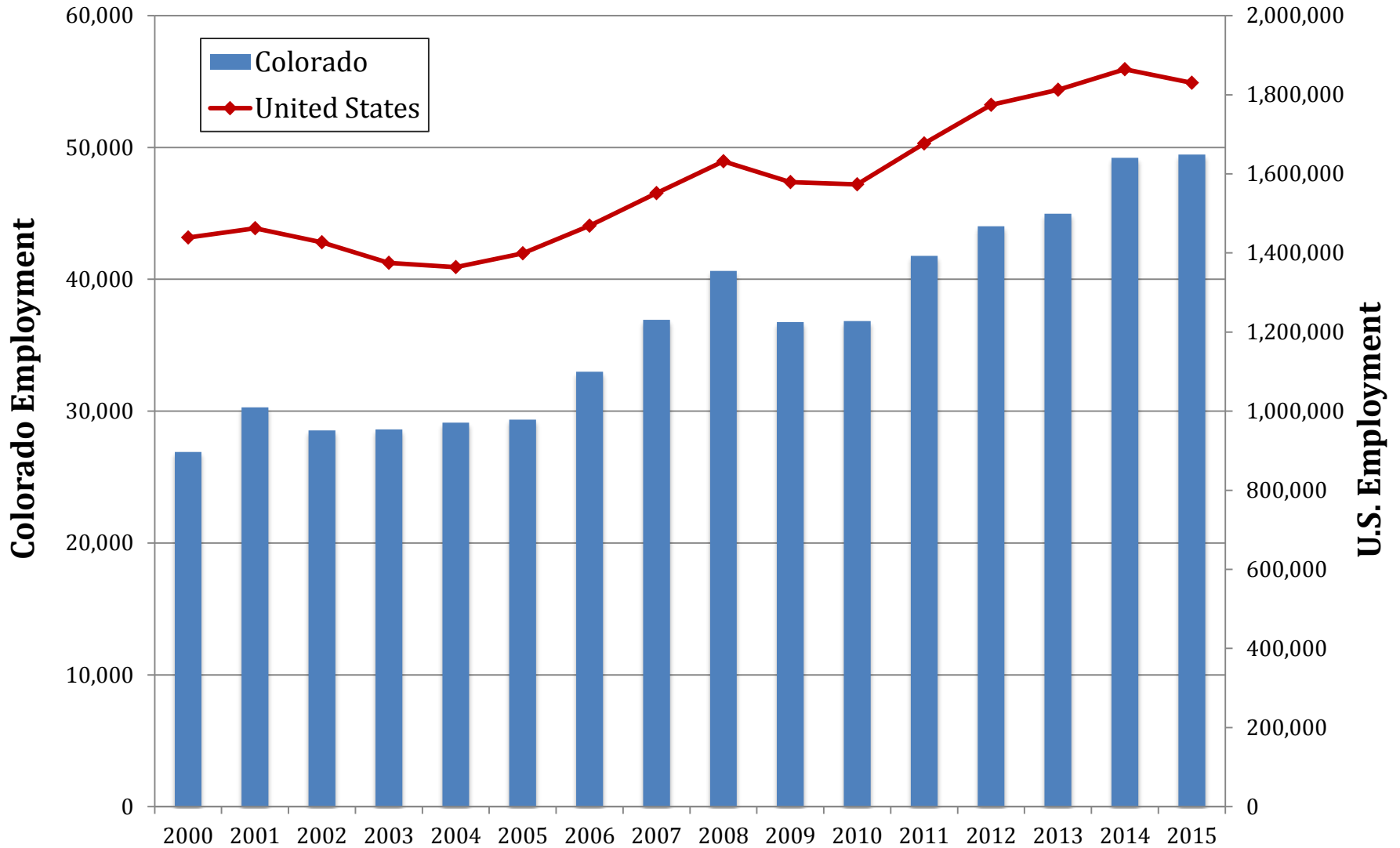


Source: BP Statistical Review; The World Bank.

Note: Carbon emissions reflect consumption of oil, gas and coal, and are based on standard global average conversion factors.

Colorado Fossil Fuels Direct Employment

Colorado fossil fuels sector employed 49,460 direct workers in 2015



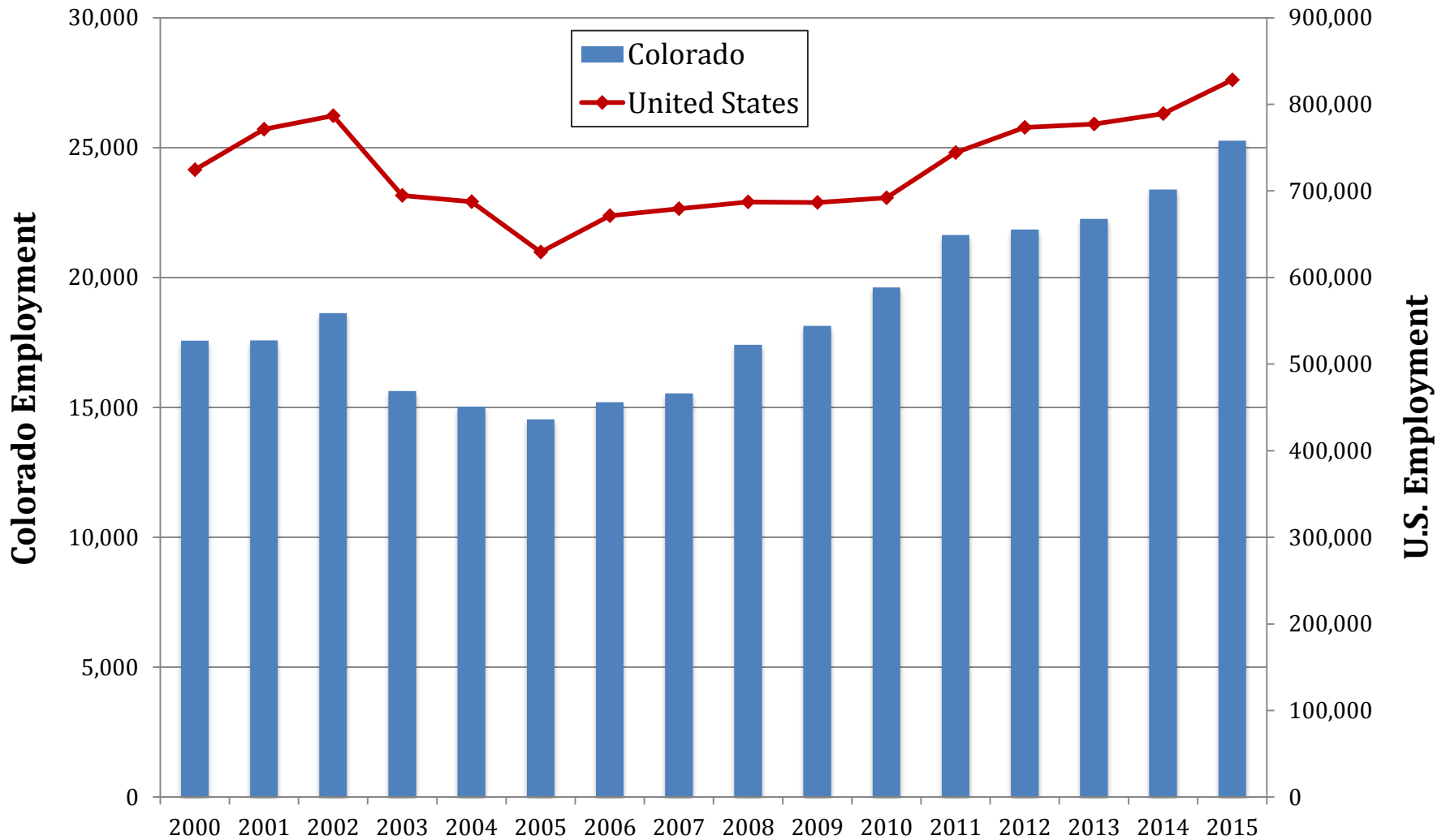
Source: Dun & Bradstreet, Inc.; Marketplace database, July-September, 2009-2010; Market Analysis Profile, 2011-2015.

Note: Employment represents the coal, oil, gas, pipeline, refinery, generation, transmission, distribution, and engineering services sectors.

Fig. 60

Colorado Cleantech Direct Employment

Colorado cleantech sector is growing; 25,260 direct employees in 2015



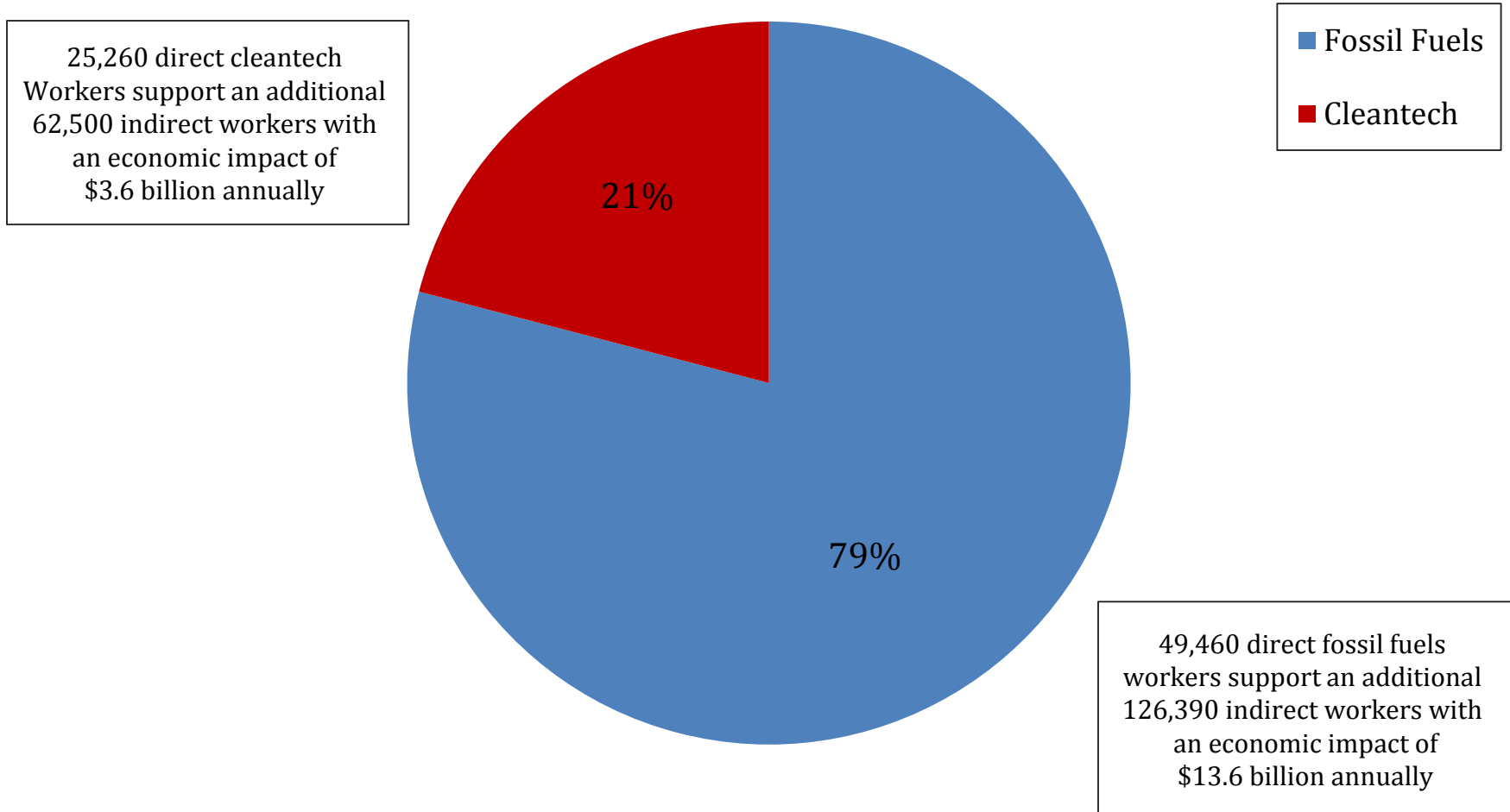
Source: Dun & Bradstreet, Inc.; Marketplace database, July-September, 2009-2010; Market Analysis Profile, 2011-2015.

Note: Employment represents the solar, wind, geothermal, fuel cell, efficiency, storage, green transportation, cleantech R&D, and environmental consulting sectors.

Fig. 62

Economic Impact, 2015

The economic impact of Colorado's energy industry was \$17.2 billion with 74,720 direct energy workers supporting an additional 188,890 indirect workers, for a total of 263,610 employees statewide

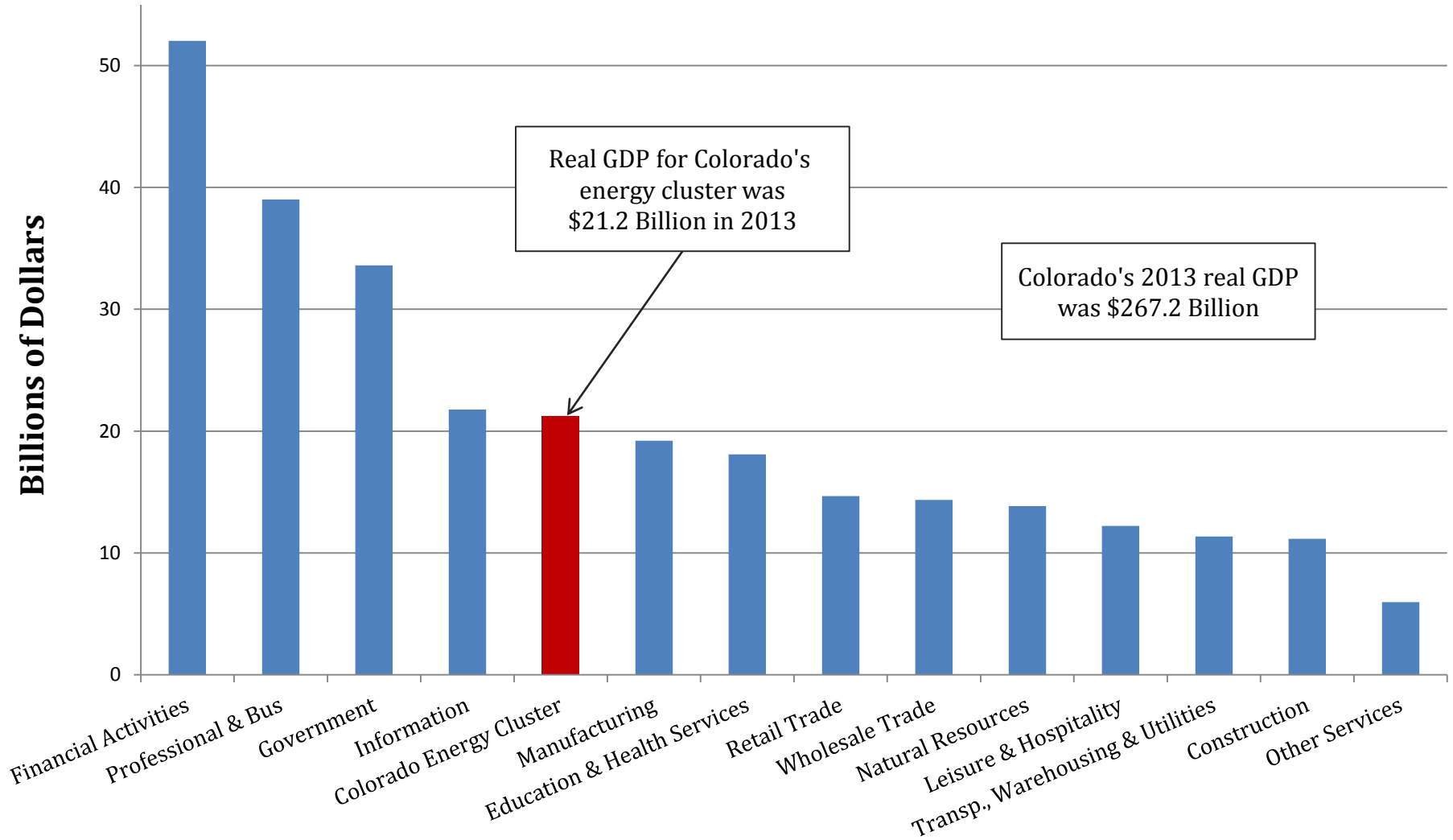


Source: 2015 Metro Denver EDC Energy Industry Cluster Study.
Note: Economic impacts represent the benefits of employee earnings.

Fig. 65

Colorado GDP by Sector, 2013

The energy cluster in Colorado represents 7.9 percent of the state's Gross Domestic Product (GDP); GDP is the value of all finished goods and services produced in the state



Source: U.S. Department of Commerce, Bureau of Economic Analysis; Economic Modeling Specialists International (EMSI).

Note: Data represent real GDP in chained 2009 dollars. Colorado energy cluster GDP is not discrete; it consists of parts of several sectors.

Fig. 66

Colorado Energy Policy Landscape

2016:

- State-wide Fracking Ban – Ballot Measures Fail
- Implement (or expand) existing RPS targets and goals
- Increase efficiency programs
- State Emissions Targets?

Future:

- Support residential energy efficiency
- Improve transmission permitting process
- Implement EPA's Clean Power Plan?
- Carbon Markets?



Chris Hansen, PhD

+1 720 243 2546

chris@hansenforcolorado.com



CHRIS HANSEN

Democrat

For State Representative