



THE COLORADO CLEAN-TECH LANDSCAPE

Trends and Analysis / October 2015



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Colorado Cleantech Industries Association

Founded in 2008, Colorado Cleantech Industries Association (CCIA) is a state-wide organization dedicated to promoting Colorado's cleantech industries. CCIA impacts Colorado's policies, people, products and programs that drive expansion of a cleaner, cheaper, more efficient and secure energy economy. Through advocacy, public policy leadership, development and education, CCIA works to ensure that Colorado is a global cleantech leader. For more information about CCIA, visit www.coloradocleantech.com.



Clean Edge, Inc., founded in 2000, is the world's first research and advisory firm devoted to the clean-tech sector. The company offers a suite of benchmarking services, including clean-energy stock indexes with NASDAQ, the U.S. Clean Tech Leadership Index ranking states and metro regions, and other indexes tracking utilities, companies, and consumers. The company advises corporates, governments, and NGOs working to advance a clean-energy economy. Clean Edge managing director Ron Pernick and senior editor Clint Wilder are coauthors of two business books, *The Clean Tech Revolution* (HarperCollins, 2007) and *Clean Tech Nation* (HarperCollins, 2012). To keep abreast of the latest clean-tech trends and learn more about Clean Edge, visit www.cleantech.com and follow us on Twitter @CleanEdgeInc.

“Chubb is proud to sponsor this report from Clean Edge and the Colorado Cleantech Industry Association highlighting the state's leadership in the clean technology sector. We hope the insights shared here will have a positive impact on the growth of the clean-tech industry in Colorado and beyond.”

—AMY INGRAM, WORLDWIDE CLEAN TECH SEGMENT MANAGER, CHUBB GROUP OF INSURANCE COMPANIES

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THE COLORADO CLEAN-TECH LANDSCAPE

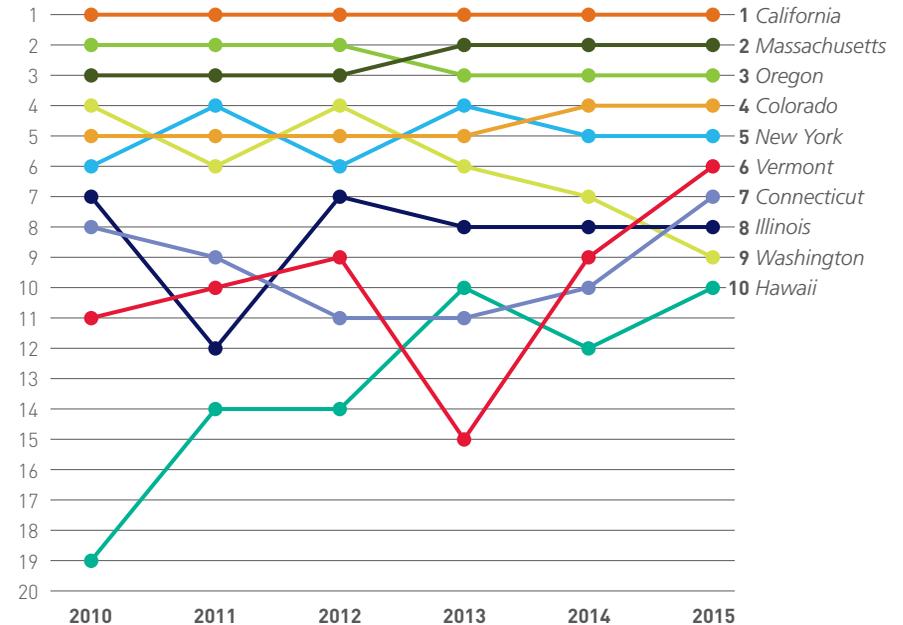
In recent years, Colorado has been one of the top states in the country in the clean technology sector. It ranked fifth in the nation in Clean Edge’s Clean Tech Leadership Index from the Index’s inception in 2010 through the 2013 edition; in 2014, it jumped to fourth, where it remains today. Perhaps this isn’t surprising, given Colorado’s reputation as a progressive state that treasures its natural environment. Nevertheless, the progress made in the Centennial State required hard work from its residents and businesses, as well as strong leadership from political leaders.

This briefing will dig deeper into the details of Colorado’s clean-tech sector, illustrating where the state’s strengths and weaknesses lie. The following insights cover a wide range of content, from clean electricity, advanced transportation, and green buildings, to human and financial capital, to the public policies supporting these sectors.

The results show that Colorado is generally a top-10 state when it comes to advanced technology deployment, including utility-scale wind and solar power, electric vehicles, and green buildings. It is also a leader in clean-tech innovation and investment, and has a steadily improving policy environment underpinning these successes. However, Colorado has been surpassed in recent years on many measures by booming markets across the country. The state’s early leadership was partly an outcome of executive commitment in Colorado. However, over the last five years, other governors and key leaders across the nation have erased Colorado’s early-mover advantage, helping propel their states to clean-tech success.

“Colorado has certainly, in the past, led the states when it comes to deployment

FIGURE 1: 2015 TOP 10 STATES (INCLUDING HISTORICAL RANKINGS)

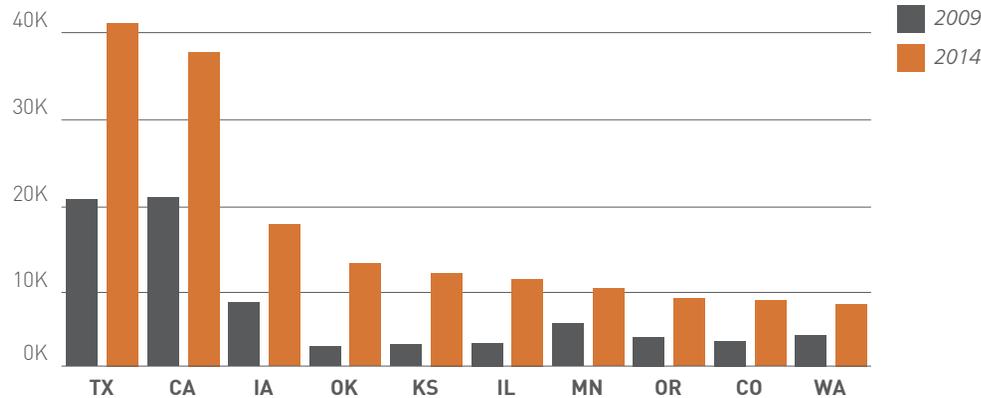


Source: U.S. Clean Tech Leadership Index, Clean Edge, Inc.

and development of clean technologies, but it does appear that we are falling behind in some metrics,” said Christine Shapard, executive director of the Colorado Cleantech Industries Association. “This report should serve as a wakeup call for all clean technology companies and organizations to come together to retake the nation’s leadership position.”

Colorado has shown itself to be a leader in the clean tech sector over the years. As shown in the following pages, even as other states are catching up, Colorado is well positioned to keep setting the tone into the future.

FIGURE 2: TOTAL GENERATION (GWH) FROM UTILITY-SCALE WIND AND SOLAR: 2014 TOP 10 STATES

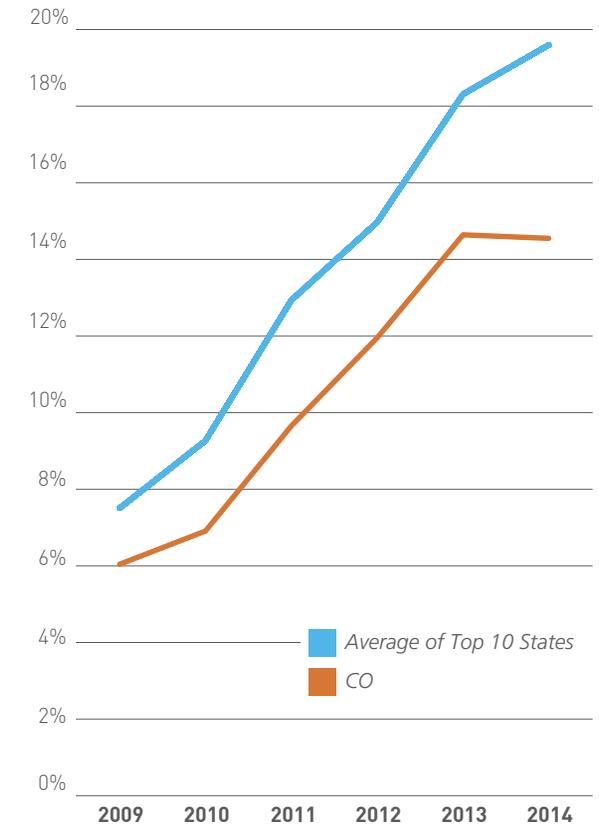


Source: EIA with Clean Edge Research. Clean electricity sources include wind, solar PV, and solar thermal. EIA electricity generation data is gathered from monthly surveys of power plants with peak capacity of at least 1 MW, meaning sub-1 MW solar installations do not count toward generation totals. Note: CO ranked ninth on this measure in 2014.

Utility-Scale Wind and Solar Electricity Generation

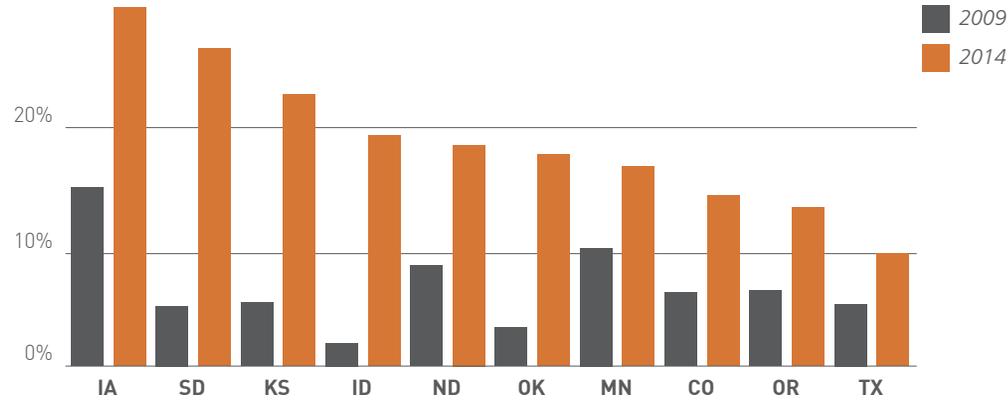
Colorado is one of the nation’s leaders in renewable energy. Utility-scale wind and solar electricity in Colorado (measured in gigawatt hours, or GWh) has grown at a robust 20.83% compound annual growth rate (CAGR) since 2009, spurred on by a strong renewable portfolio standard (RPS) and generally high demand for renewable electricity. The state is a top-10 performer in both the total amount (in GWh) of renewable electricity produced, and in the percent of electricity produced in the state that comes from renewable resources. However, as Figure 3 (which plots Colorado’s renewable electricity percentage against the average percentages of the top 10 states) shows, Colorado is falling behind other top-performing states in its percentage of utility-scale renewable generation. In 2009, Colorado had the sixth-highest percentage; in 2014, it had fallen to ninth. While Colorado remains a strong renewable electricity state, others (particularly in the wind-swept Midwest) have seen their renewable electricity sectors grow more quickly.

FIGURE 3: PERCENT OF TOTAL GENERATION FROM UTILITY-SCALE WIND AND SOLAR: CO VS. AVERAGE OF 2014 TOP 10 STATES



Source: EIA with Clean Edge Research. Clean electricity sources include wind, solar PV, and solar thermal. EIA electricity generation data is gathered from monthly surveys of power plants with peak capacity of at least 1 MW, meaning sub-1 MW solar installations do not count toward generation totals. Note: CO ranked ninth in this measure in 2014.

FIGURE 4: PERCENT OF TOTAL GENERATION FROM UTILITY-SCALE WIND: 2014 TOP 10 STATES

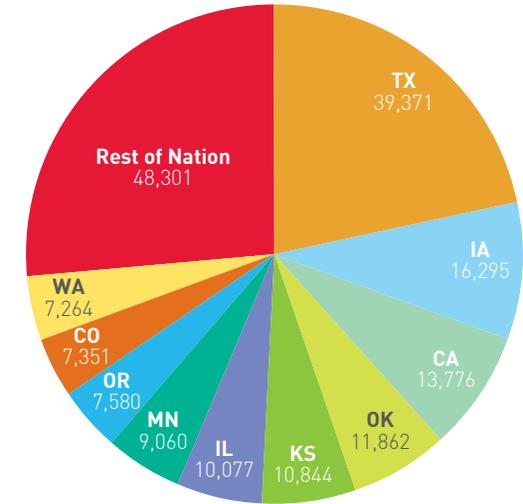


Source: EIA data with Clean Edge analysis. EIA electricity generation data is gathered from monthly surveys of power plants with peak capacity of at least 1 MW, meaning sub-1 MW solar installations do not count toward generation totals. Note: CO ranked eighth on this measure in 2014.

Utility-Scale Wind Electricity Generation

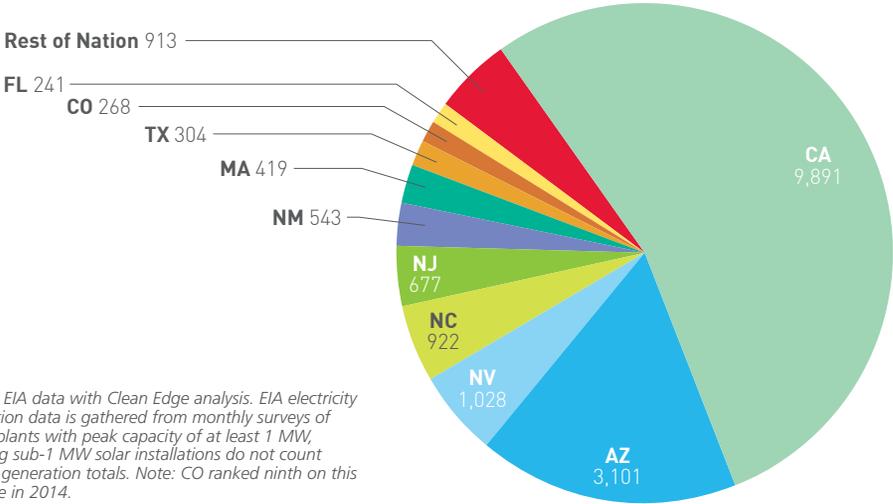
At the utility scale, wind power is by far the biggest renewable resource in Colorado. The state produced 7,351 GWh of wind-power electricity (13.61% of total generation) in 2014, representing a CAGR of 20.10% since 2009. These numbers again place the Centennial State among the top 10 wind power-generating states. Once again, though, other states have passed it by. In 2009, South Dakota, Kansas, Idaho, and Oklahoma all received a smaller proportion of their generation from wind power; by 2014, all four had surpassed Colorado in this measure. These states are blessed with great wind potential, and have moved to take advantage of it faster than has Colorado.

FIGURE 5: 2014 TOP 10 STATES IN UTILITY-SCALE WIND GENERATION (GWH)



Source: EIA data with Clean Edge analysis. EIA electricity generation data is gathered from monthly surveys of power plants with peak capacity of at least 1 MW, meaning sub-1 MW solar installations do not count toward generation totals. Note: CO ranked ninth on this measure in 2014.

FIGURE 6: 2014 TOP 10 STATES IN UTILITY-SCALE SOLAR GENERATION (GWH)

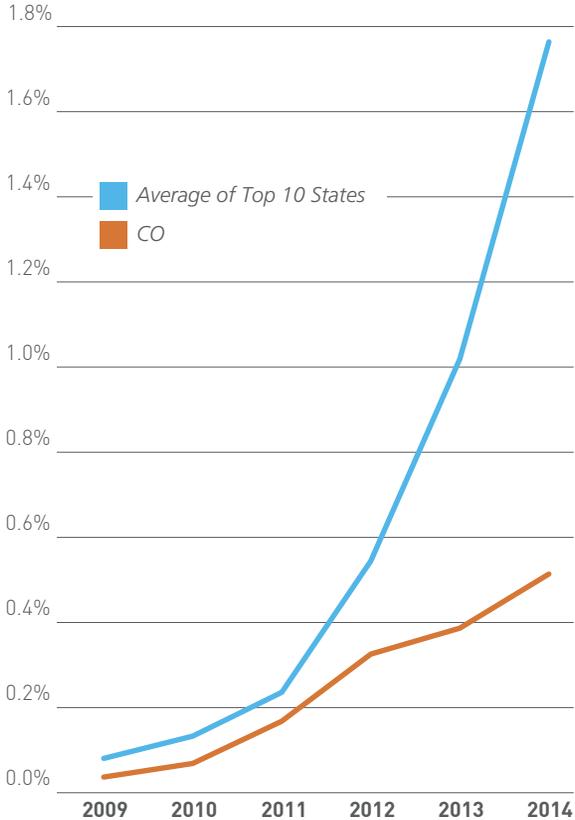


Source: EIA data with Clean Edge analysis. EIA electricity generation data is gathered from monthly surveys of power plants with peak capacity of at least 1 MW, meaning sub-1 MW solar installations do not count toward generation totals. Note: CO ranked ninth on this measure in 2014.

Utility-Scale Solar Electricity Generation

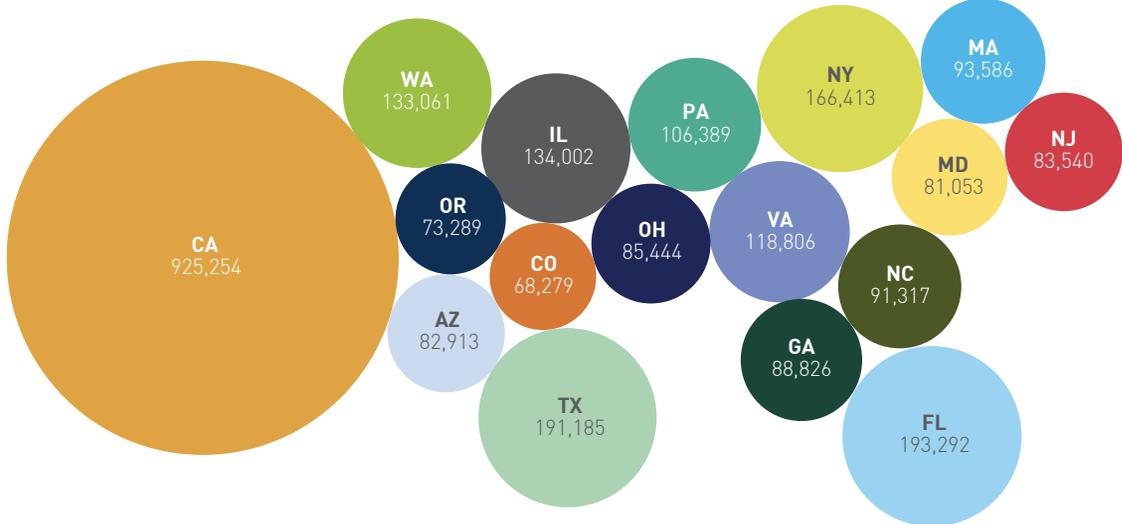
Utility-scale solar power generation in Colorado reached 268 GWh in 2014, representing a CAGR of 74.57% since 2009. This represents just 0.50% of total in-state generation (although the best-performing state on this measure – California – clocks in at only 5%). The remarkable growth in Colorado’s utility-scale solar sector, though, has paled in comparison to other strong solar states. As Figure 7 shows, Colorado, despite having the nation’s ninth-highest proportion of utility-scale solar, has been left far behind by the top solar states (such as California, Nevada, and Arizona). Yearly solar installation data confirms that other states are catching up: The Solar Electric Power Association (SEPA) reports that in 2014, Colorado installed 40 MW of solar capacity. That is the same amount as in Indiana, which has far less total installed solar capacity. One area where Colorado continues to lead is in community solar: The Carbondale-based Clean Energy Collective by itself has 21 completed community solar projects in the state.

FIGURE 7: PERCENT OF TOTAL GENERATION FROM UTILITY-SCALE SOLAR: CO VS. AVERAGE OF 2014 TOP 10 STATES



Source: EIA with Clean Edge analysis. EIA electricity generation data is gathered from monthly surveys of power plants with peak capacity of at least 1 MW, meaning sub-1 MW solar installations do not count toward generation totals. Note: CO ranked ninth in this measure in 2014.

FIGURE 8: ADVANCED VEHICLES (EVS, PHEVS, & HEVS): 2014 TOP 17

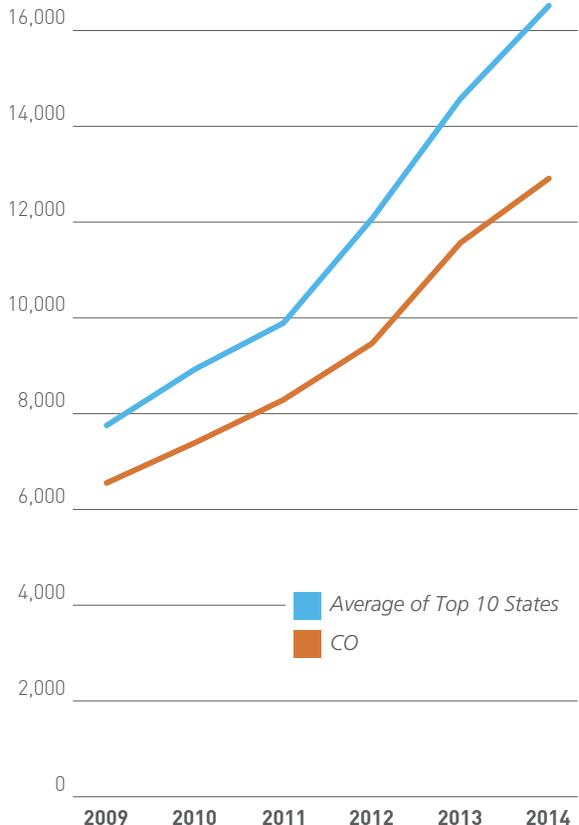


Source: IHS Automotive data with Clean Edge analysis. This measure adds electric vehicles (EVs), hybrid electric vehicles (HEVs), and plug-in hybrid electric vehicles (PHEVs) together. IHS Automotive data is a snapshot of every vehicle in operation as of January 1, 2015. In prior years, this indicator included plug-in hybrid electric vehicles like the Chevy Volt. However, plug-in vehicles are now tracked in a separate indicator. Note: CO ranked 17th in this measure in 2014.

Advanced Vehicles (Electric, Hybrid, & Plug-In Hybrid Electric Vehicles)

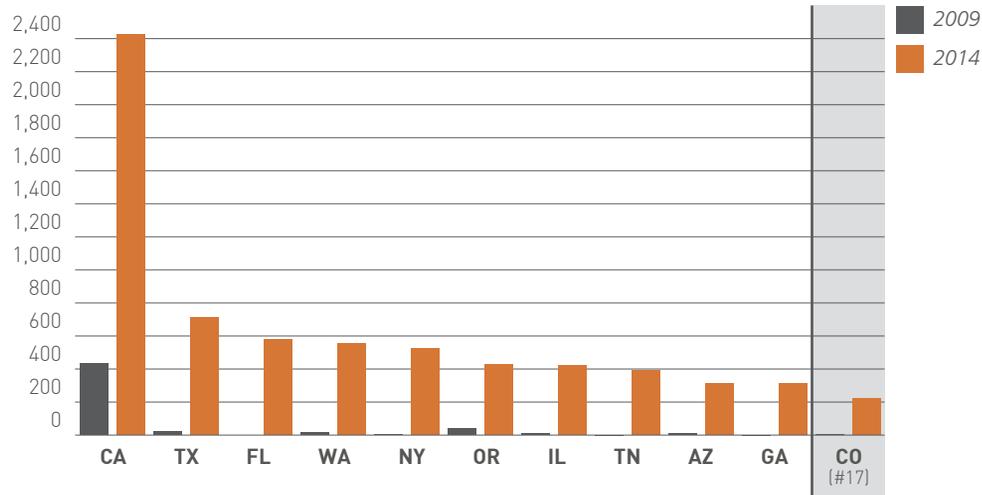
Colorado has seen decent growth in its hybrid (HEV), electric (EV), and plug-in hybrid electric vehicle (PHEV) market since 2009. The state has doubled its number of such vehicles per million residents in the last six years, to 12,748 per million people; meanwhile, the total market has expanded by a compound annual growth rate of 15.88%. This growth is likely partially attributable to a highest-in-the-nation \$6,000 state electric vehicle incentive (on top of federal incentives). This is another area, though, where in terms of raw numbers, Colorado is falling behind other states. Georgia, for instance, had 6,000 fewer advanced vehicles than Colorado in 2009; by the end of 2014, also thanks to aggressive incentives, the Peach State was home to 20,000 more such vehicles. Colorado remains a high performer, ranking 10th in HEV, EV, and PHEV vehicles per million residents in 2014, but the gap between it and the top nine is expanding.

FIGURE 9: ADVANCED VEHICLES (EVS, PHEVS, & HEVS) PER 1 MILLION PEOPLE: CO VS. AVERAGE OF 2014 TOP 10 STATES



Source: IHS Automotive and Census Bureau with Clean Edge analysis. This measure adds electric vehicles (EVs), hybrid electric vehicles (HEVs), and plug-in hybrid electric vehicles (PHEVs) together, then calculates the number of advanced vehicles per million people. IHS Automotive data is a snapshot of every vehicle in operation as of January 1, 2015. In prior years, this indicator included plug-in hybrid electric vehicles like the Chevy Volt. However, plug-in vehicles are now tracked in a separate indicator. Note: CO ranked 10th in this measure in 2014.

**FIGURE 10: TOTAL EV CHARGING STATIONS:
2014 TOP 10 STATES+CO**

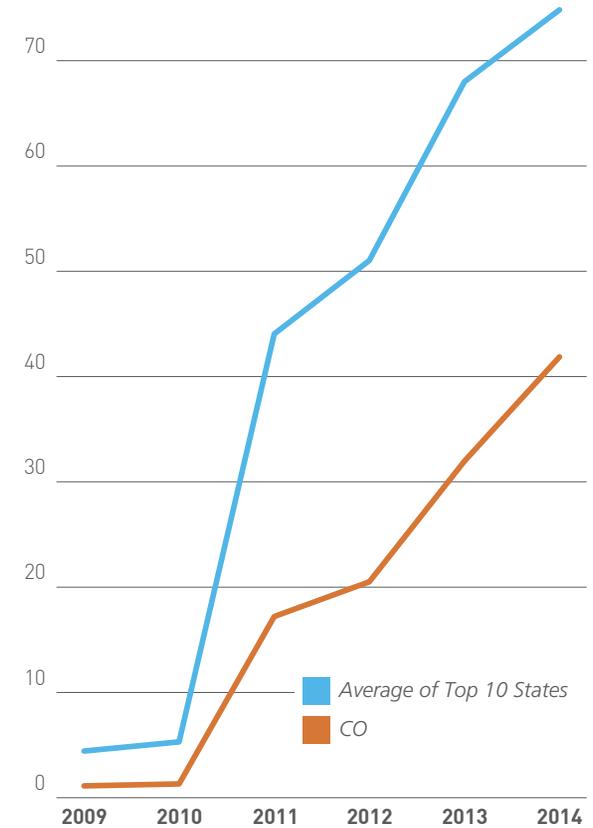


Source: The DOE's National Renewable Energy Lab (NREL), reported by the DOE's Alternative Fuels & Advanced Vehicles Data Center.
Note: CO ranked 17th in this measure in 2014.

Electric Vehicle Charging Stations

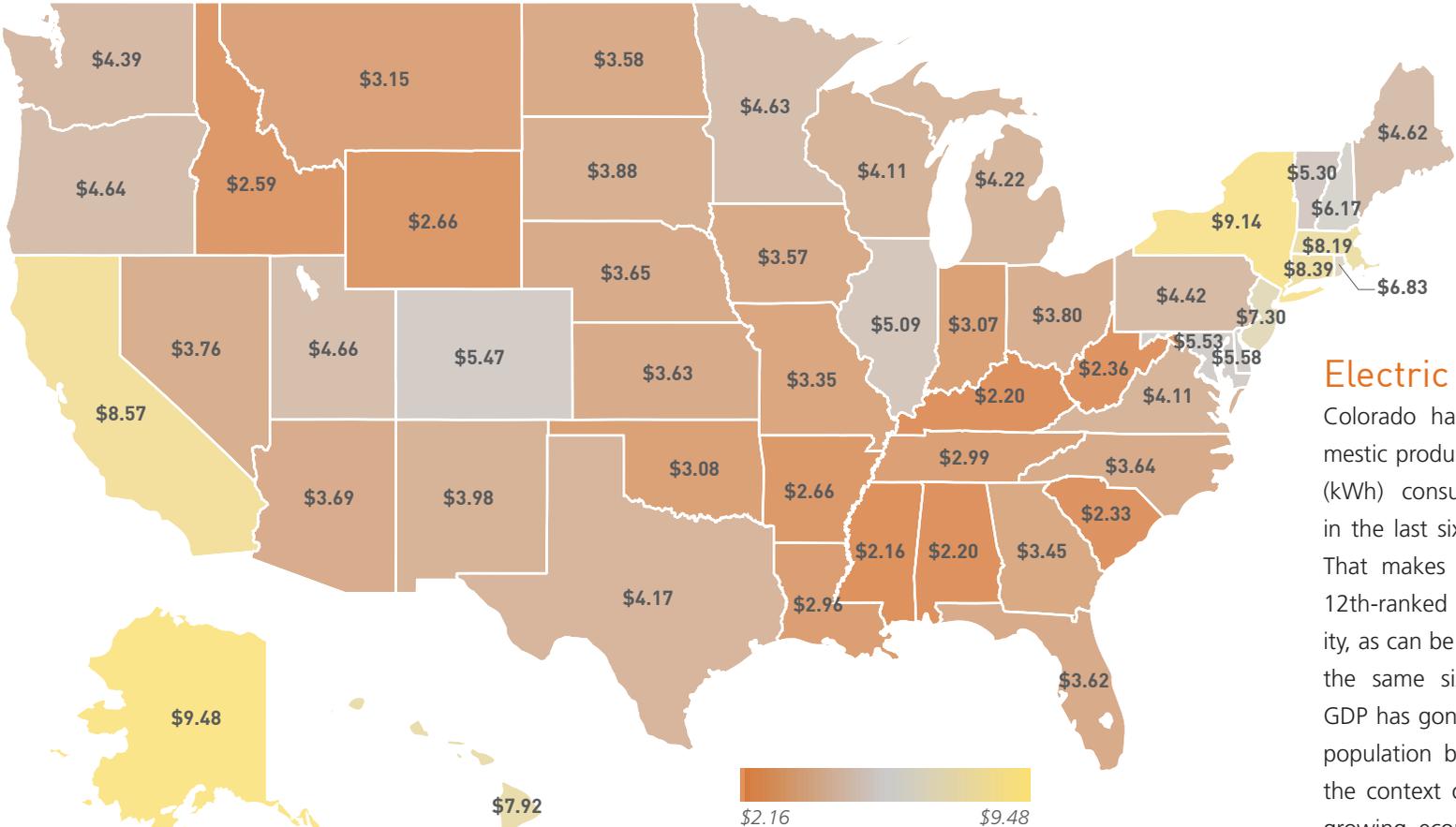
Colorado has largely kept pace with the nation in its deployment of EV charging stations per million residents. At the end of 2014, it had 41 such stations per million people, good for 12th in the nation. As in other areas, several states have moved more aggressively in adding EV stations than has Colorado. Despite a 113.15% CAGR since 2009, the state has fallen from 11th to 17th in total EV station deployment. Colorado, though, is trying to reverse this trend: the State Energy Office and Regional Air Quality Council are offering purchase incentives to fleet operators for both EVs and EV charging stations, and both the state and its utilities are working to understand the tariff structures that will best incentivize off-peak charging.

**FIGURE 11: EV CHARGING STATIONS
PER 1 MILLION PEOPLE: CO VS.
AVERAGE OF 2014 TOP 10 STATES**



Source: The DOE's National Renewable Energy Lab (NREL), reported by the DOE's Alternative Fuels & Advanced Vehicles Data Center, and Census Bureau with Clean Edge analysis. Note: CO ranked 12th in this measure in 2014.

FIGURE 12: ELECTRIC PRODUCTIVITY (GDP OUTPUT PER KWH CONSUMED)

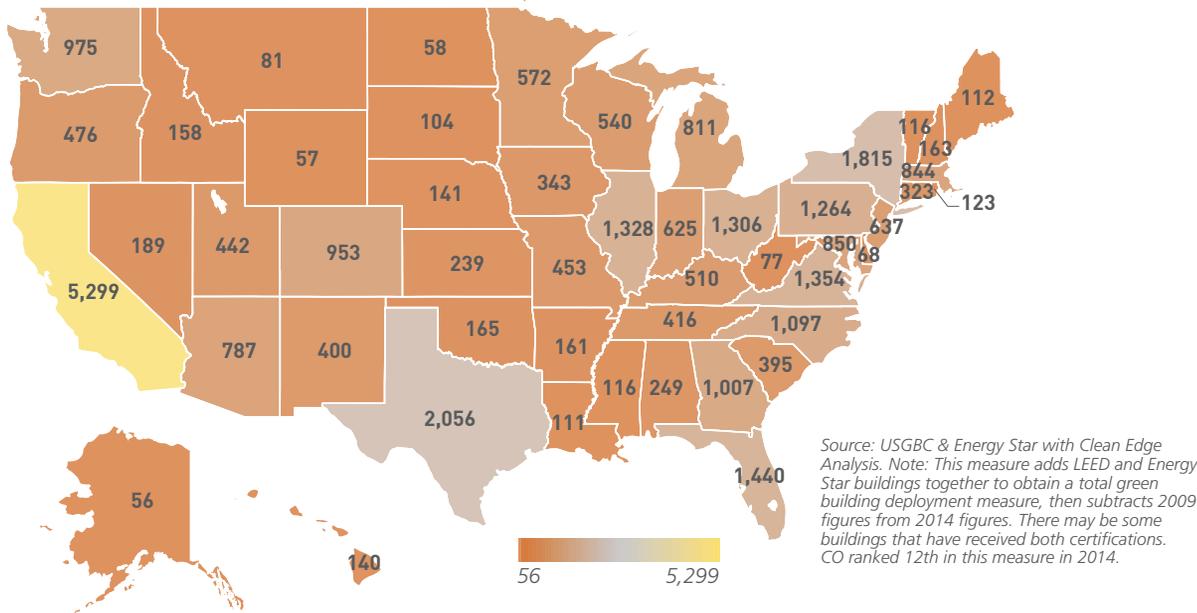


Electric Productivity

Colorado has increased its gross domestic product (GDP) per kilowatt hour (kWh) consumed by 14.7% (\$0.70) in the last six years, up to \$5.47/kWh. That makes the Centennial State the 12th-ranked state in electric productivity, as can be seen from Figure 12. Over the same six-year period, Colorado’s GDP has gone up about 18.4% and its population by 10.2%. When put into the context of a growing state with a growing economy, the state’s increase in electric productivity is an impressive accomplishment.

Source: EIA and Bureau of Economic Analysis with Clean Edge Analysis.
 Note: CO ranked 12th in this measure in 2013.

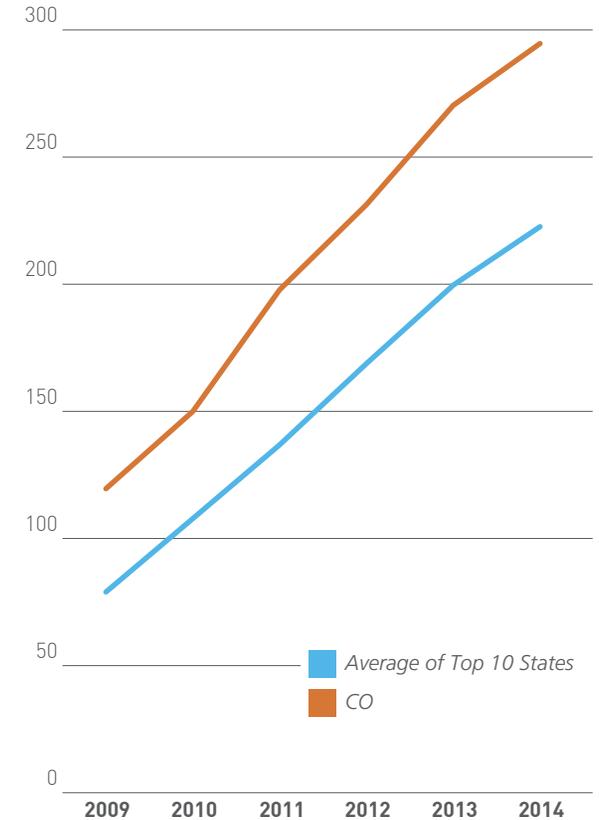
FIGURE 13: TOTAL GREEN BUILDINGS (LEED & ENERGY STAR) ADDED SINCE 2009



Total Green Buildings (LEED and Energy Star Buildings)

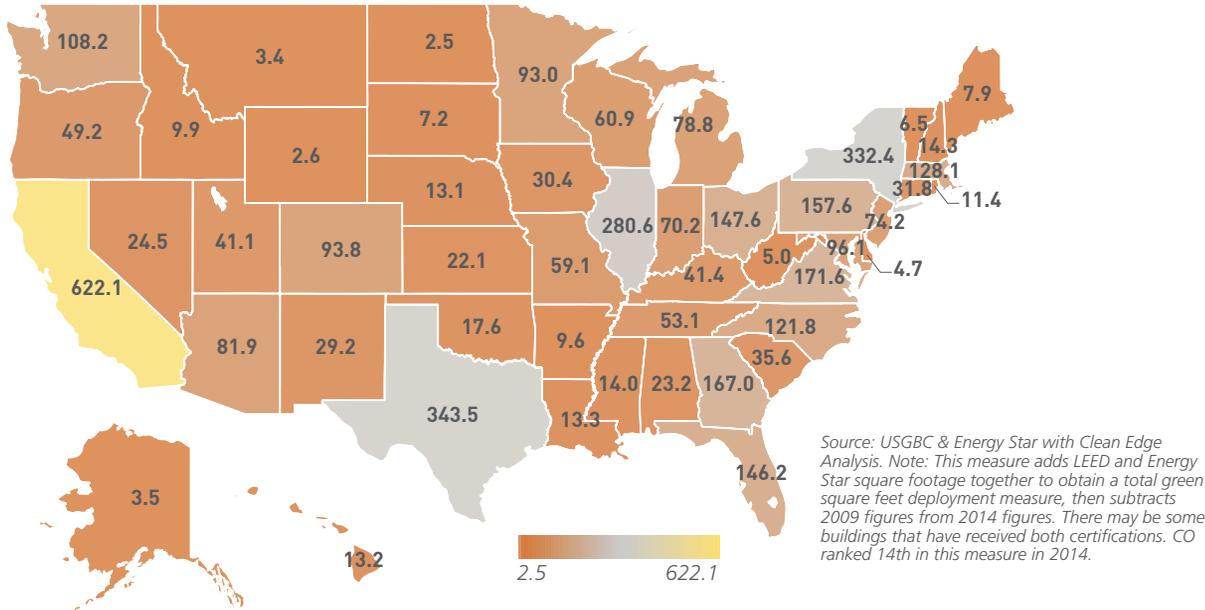
Green building deployment is clearly Colorado’s greatest strength among data tracked in the Clean Tech Leadership Index. Home to a robust energy efficiency sector and leading building efficiency research organizations such as the Rocky Mountain Institute and the National Renewable Energy Laboratory, Colorado leads the nation in both LEED and Energy Star buildings per million residents, and its total green building market has grown by a CAGR of 21.38% since 2009. As Figure 14 shows, Colorado has increased its lead over the rest of the country in green buildings (LEED and Energy Star projects combined) per million people. Figure 13, though, shows that some states are beginning to close the gap: In 2009, Colorado was fifth in total green building deployment; by 2014, it had fallen to 10th. Nevertheless, when normalizing for state population, Colorado remains #1, and likely won’t relinquish that title any time soon.

FIGURE 14: TOTAL GREEN BUILDINGS (LEED & ENERGY STAR) PER 1 MILLION PEOPLE: CO VS. AVERAGE OF 2014 TOP 10



Source: USGBC, Energy Star, & U.S. Census Bureau with Clean Edge Analysis. Note: This measure adds LEED and Energy Star buildings together to obtain a total green building deployment measure, then calculates the number of green buildings per million people. CO ranked first in this measure in 2014.

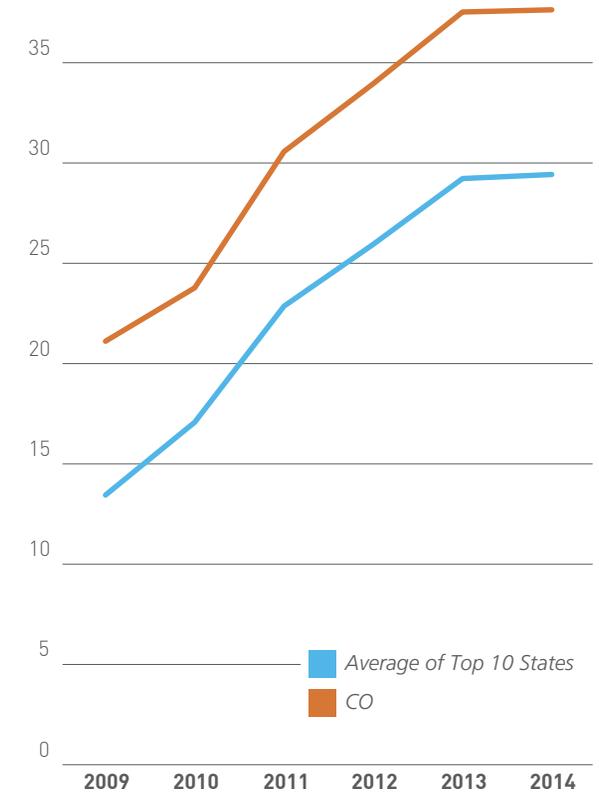
FIGURE 15: TOTAL GREEN BUILDINGS (LEED & ENERGY STAR) SQUARE FEET ADDED SINCE 2009 (IN MILLIONS)



Total Green Buildings Square Footage

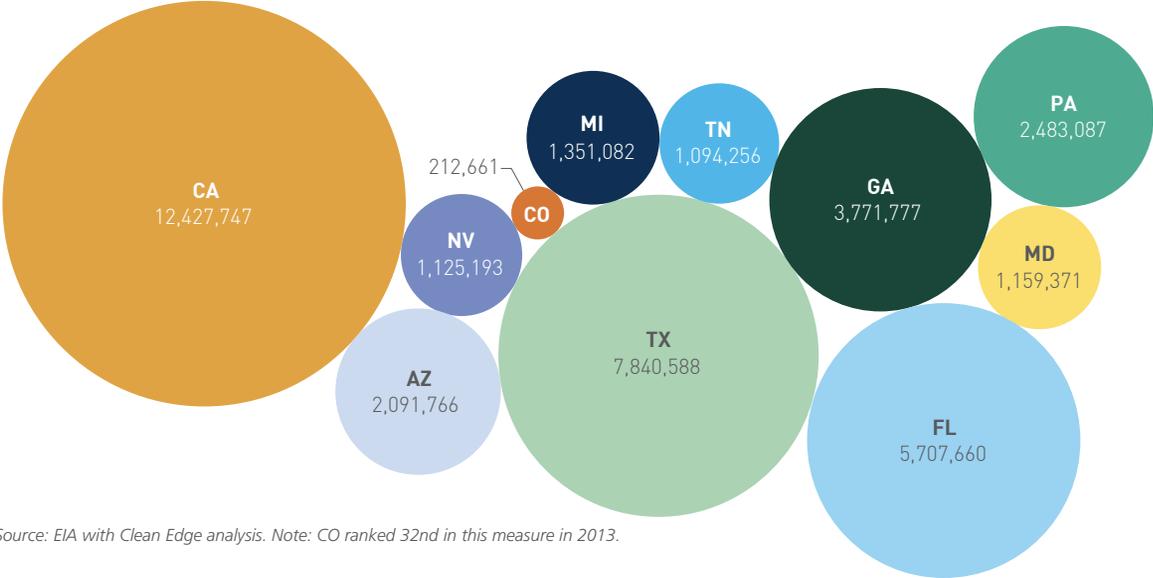
Unsurprisingly, Colorado is also tops in green building square feet per capita (by more than three square feet per person over #2 Illinois). In fact, Colorado has increased its lead over the top-10 average by just over half a square foot per capita in the last six years. However, as shown in Figure 15, the state ranks only 14th in the amount of green building square footage added since 2009, and was 11th in overall green building square footage as of 2014, despite having posted a CAGR of 13.74%. While the gap is again narrowing, Colorado continues to hold down the top per capita green building square footage spot, where it will likely stay for the foreseeable future.

FIGURE 16: TOTAL GREEN BUILDINGS (LEED & ENERGY STAR) SQUARE FEET PER CAPITA: CO VS. AVERAGE OF 2014 TOP TEN



Source: USGBC, Energy Star, & U.S. Census Bureau with Clean Edge Analysis. Note: This measure adds LEED and Energy Star square footage together to obtain a total green building square footage measure, then calculates the number of green buildings per million people. There may be some buildings that have received both certifications. CO ranked first in this measure in 2014.

FIGURE 17: TOTAL SMART METERS INSTALLED: 2013 TOP 10 STATES+CO

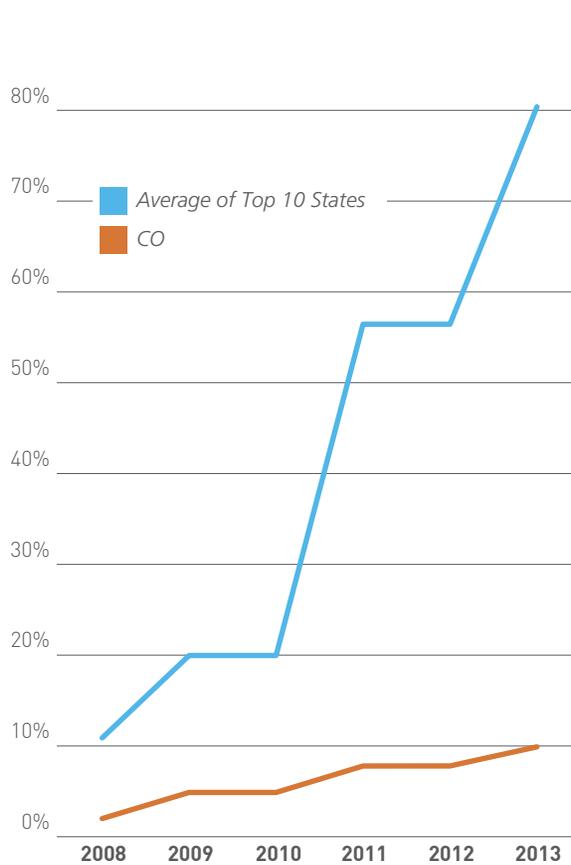


Source: EIA with Clean Edge analysis. Note: CO ranked 32nd in this measure in 2013.

Smart Meter Deployment

Colorado’s low smart meter deployment rate – it ranked just 39th in the nation in percentage of smart meters in 2014 – provides a stark contrast to its green building success. While on average nearly 79% of the electric meters in the top 10 smart meter penetration states are smart meters (see Figure 18), Colorado’s smart meter penetration rate is less than 10% (according to EIA data). Colorado has installed just 212,661 smart meters overall, a figure dwarfed by the deployment figures of the top states in terms of number of meters deployed (as shown in Figure 17). Efforts to install smart meters throughout the state have met with mixed success: Xcel Energy’s 2008 Smart-GridCity program in Boulder missed its objectives and overran on costs, while the Black Hills Corporation installed 95,000 meters in 2010 and the FortZED project in Fort Collins continues to yield valuable smart meter lessons.

FIGURE 18: SMART METER PENETRATION RATE: CO VS. AVERAGE OF 2013 TOP 10 STATES



Source: EIA with Clean Edge analysis. Note: CO ranked 39th in this measure in 2013.

Policy

Over the years, Colorado has made steady progress in implementing policies that impact the clean technology sector. The Centennial State has 24 of the 36 policies tracked in the Clean Tech Leadership Index, a number bested by only nine other states. The state's voters made it the first in the nation to institute a renewable portfolio standard (RPS) by popular vote in November 2004, which shows how progressive the state can be. Colorado's RPS, strengthened by the state legislature since that vote, is also one of the stronger such policies in the country: only four states have a more ambitious goal in terms of percent of renewable electricity. Colorado trumps some other states by not allowing clean coal or nuclear to count towards its RPS, and by having a carve-out for solar generation. The state took a further step in 2013 when it mandated that rural electricity cooperatives, which aren't subject to the RPS, reach 20% renewable energy by 2020.

Other policies also make Colorado an attractive clean-tech marketplace. The state has had property-assessed clean energy (PACE) financing legislation on the books since 2008 (a PACE program is set to roll out in fall 2015), and community solar legislation since 2010. It allows third-party renewable financing (such as solar leases) and has a mandated green power purchasing option, along with the aforementioned incentives promoting advanced vehicle purchases.

In addition to policies incentivizing technology deployment, Colorado has a number of incentives aimed at promoting business growth in the clean-tech sector. The state has several programs that provide grants or tax relief to advanced industry firms (including clean-tech companies) that invest in Colorado. The Energy Fellows Institute is also working hard to train CEOs from other sectors to lead Colorado's clean-tech companies.

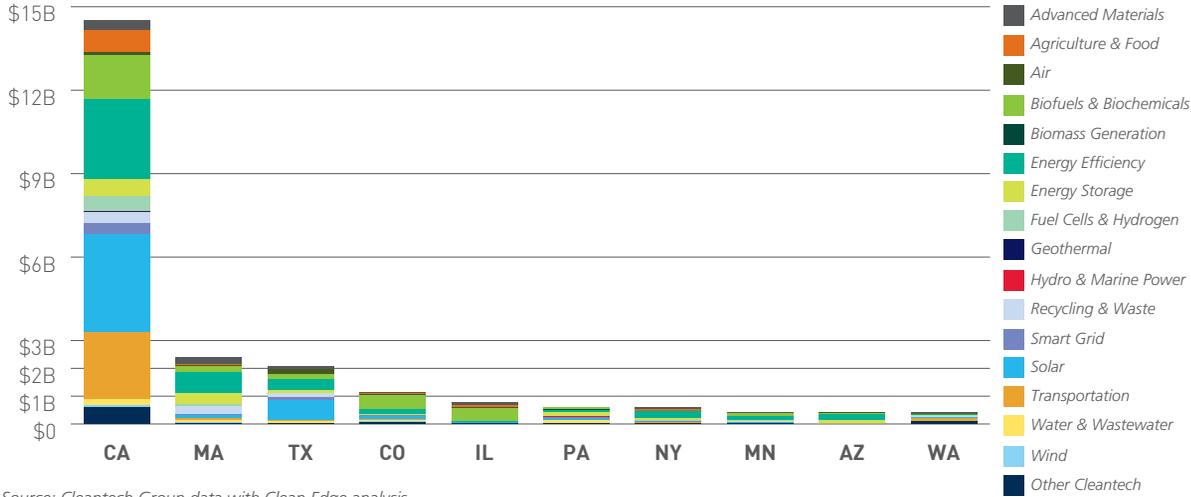
There is room for improvement, though. The state could consider a renewable fuel standard and/or a low-carbon fuel standard. Colorado is alone among the Leadership Index's top 15 policy states in not having a GHG reduction target. Finally, Colorado could expand its use of utility on-bill finance programs to help make energy efficiency and renewables more cost-effective for consumers.

FIGURE 19: CLEAN-TECH POLICIES IMPLEMENTED IN COLORADO AND NATIONWIDE

POLICY CHECKLIST		CO
Qualifying States	POLICY CATEGORY RANK	10
28	Renewable Portfolio Standard	●
17	Strong RPS: At least 20% by 2020 or 25% by 2025	●
26	Smart RPS: No Clean Coal	●
28	Smart RPS: No Nuclear	●
18	Smart RPS: Solar/DG Provision	●
23	Energy Efficiency Resource Standard	●
10	State Renewable Fuel Standard	●
34	Climate Action Plan	●
19	GHG Reduction Target	●
10	Membership in Active Cap-and-Trade Market	●
2	Low Carbon Fuel Standard	●
34	State Fleet High Efficiency Vehicle Requirement	●
10	Zero-Emissions Vehicle (ZEV) Requirement	●
8	Mandated Green Power Purchasing Option	●
n/a	Interconnection Law/Policy	3
n/a	Net Metering Law/Policy	4
n/a	Commercial Building Energy Policy	0
n/a	Residential Building Energy Policy	0
20	Grants - Renewable Energy	●
22	Grants - Energy Efficiency	●
48	Loans - Renewable Energy	●
49	Loans - Energy Efficiency	●
46	Rebates - Renewable Energy	●
50	Rebates - Energy Efficiency	●
5	Bonds - Renewable Energy	●
4	Bonds - Energy Efficiency	●
22	Clean-Tech Vehicle Purchasing Incentive	●
32	Utility Revenue Decoupling - Electricity	●
35	Utility Revenue Decoupling - Natural Gas	●
29	Utility Performance Incentives - Electricity	●
20	Utility Performance Incentives - Natural Gas	●
13	Utility On-Bill Financing	●
5	Green Bank	●
31	PACE Legislation	●
34	Third Party Ownership	●
10	Community Renewables	●

Sources include ACEEE, the Building Codes Assistance Project, C2ES, the Coalition for Green Capital, DSIRE, the DOE, EQ Research, IREC, and Vote Solar.

FIGURE 20: TOTAL 2010-2014 CLEAN-TECH VENTURE CAPITAL FUNDING BY CATEGORY: TOP 10 STATES (\$ BILLIONS)



Source: Cleantech Group data with Clean Edge analysis.

Clean-Tech Venture Capital Funding

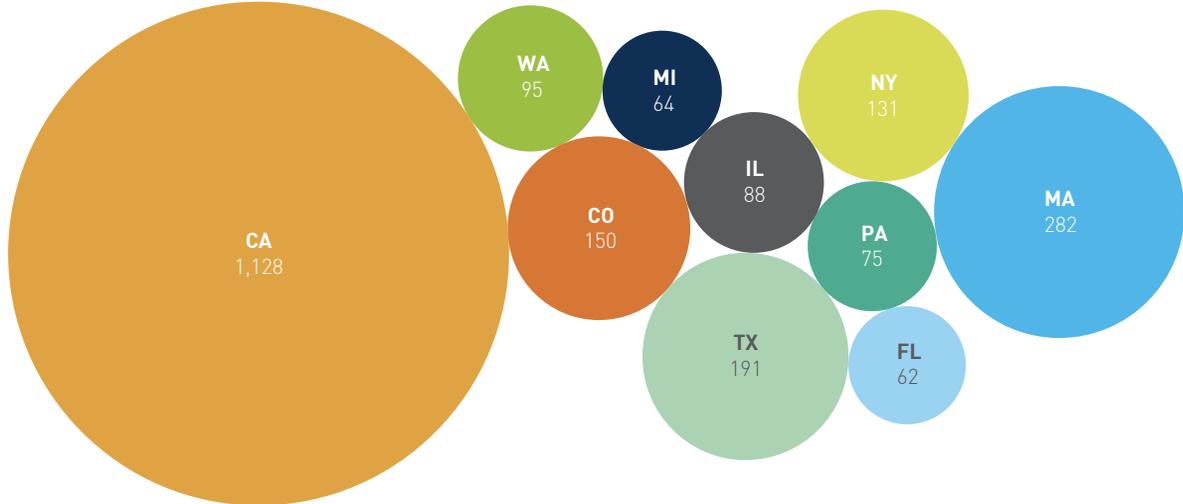
Colorado has consistently been a strong performer in the clean-tech venture capital (VC) sphere. On a dollars per capita basis, Colorado has continued to outperform the average of the top 10 states, although the gap has narrowed considerably, down to about \$7 per person (see Figure 21). This is a function of both falling total VC investment in Colorado (down more than 28% in 2012-2014 versus 2007-2009), as well as the strengthening of the VC sectors in states like Massachusetts and California. Nevertheless, Colorado remains one of the national leaders in clean-tech VC investment, with particular strengths in the biofuels and biochemicals, energy efficiency, and solar industries (as shown in Figure 20). A few Colorado companies that have received significant venture funding in the last three years include energy services management firm Tendril (\$35 million) and biofuel company Cool Planet Energy Systems (nearly \$100M).

FIGURE 21: CLEAN-TECH VENTURE CAPITAL FUNDING DOLLARS PER CAPITA (THREE YEAR TOTALS): CO VS. AVERAGE OF 2014 TOP



Source: Cleantech Group and U.S. Census Bureau with Clean Edge analysis. Note: CO ranked third in this measure in 2014.

FIGURE 22: 2010-2014 TOTAL CLEAN-TECH VENTURE CAPITAL DEALS: TOP 10 STATES

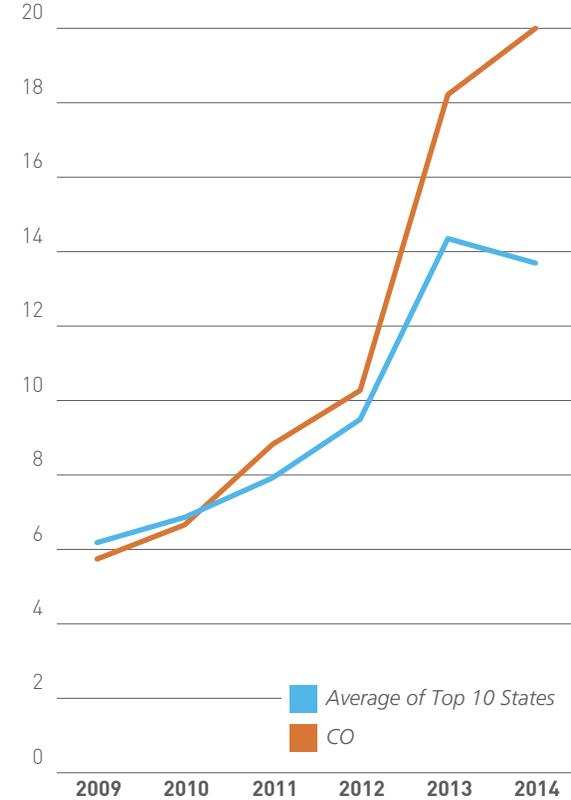


Source: Cleantech Group with Clean Edge analysis. Note: CO ranked fourth in this measure in 2014.

Clean-Tech Venture Capital Deals

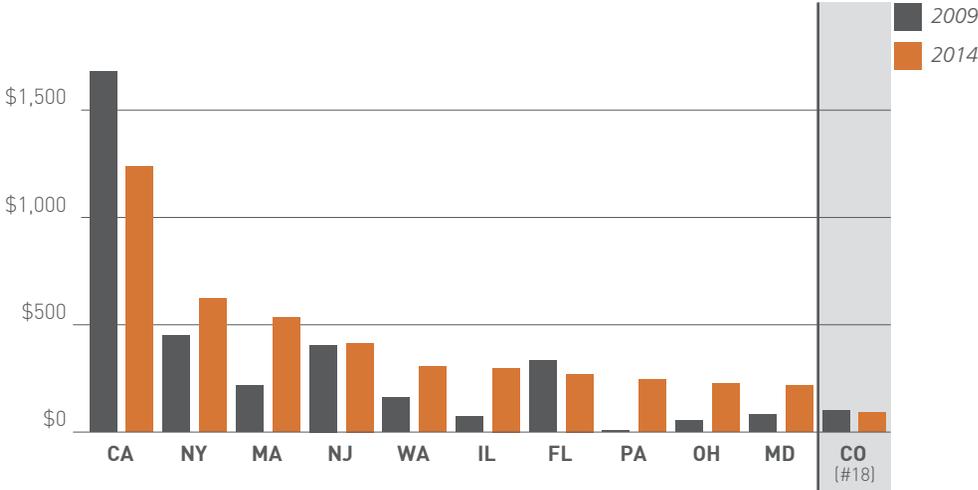
VC deals, on the other hand, have been on a bit of an upswing. As Figure 23 shows, in Colorado, the number of VC deals from 2012-2014 is nearly quadruple that of the 2007-2009 period. This success has vaulted Colorado into second place nationally in per-million VC deals (up from sixth in 2009). However, as shown in Figure 22, Colorado’s number of total VC deals in the 2012-2014 period fell far behind not just California, but Massachusetts and Texas as well.

FIGURE 23: CLEAN-TECH VENTURE CAPITAL DEALS PER 1 MILLION PEOPLE (THREE-YEAR TOTALS): CO VS. AVERAGE OF 2014 TOP 10



Source: Cleantech Group and U.S. Census Bureau with Clean Edge analysis. Note: CO ranked second in this measure in 2014.

FIGURE 24: TOTAL UTILITY ENERGY EFFICIENCY PROGRAM BUDGETS (\$ MILLIONS): 2013 TOP 10 STATES+CO

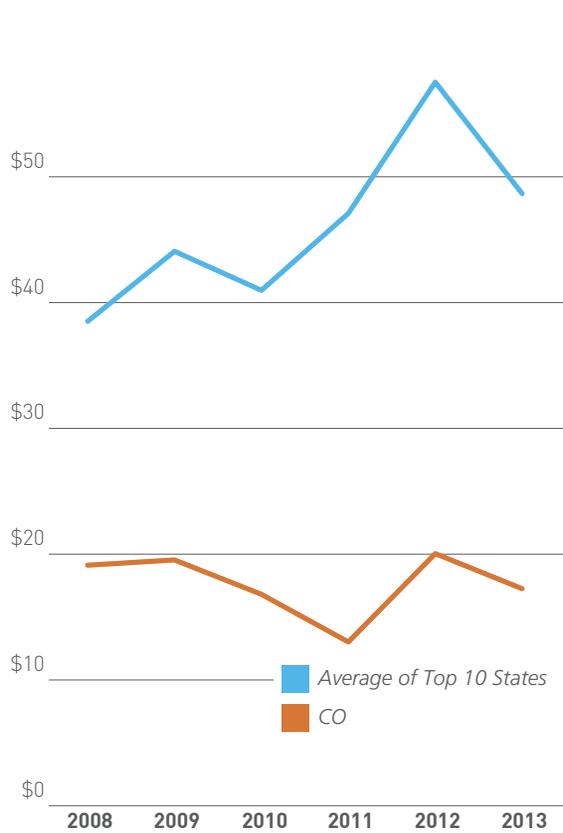


Source: ACEEE with Clean Edge analysis. Note: CO ranked 18th in this measure in 2013.

Utility Energy Efficiency Program Funding

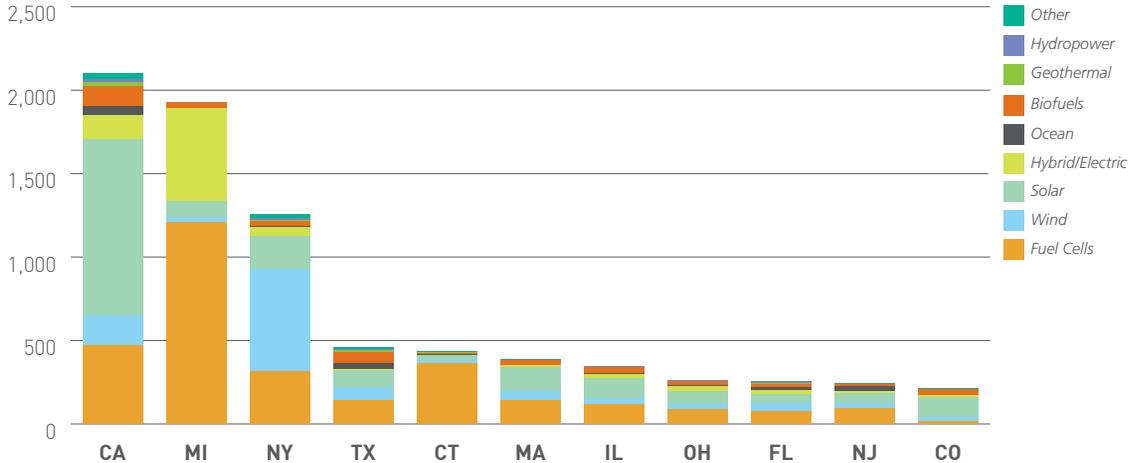
One area that Colorado continues to lag in is utility energy efficiency program funding. It ranks right in the middle of all states (#25) in energy efficiency funding per capita, and 18th in total utility energy efficiency funding. While the top states have generally increased their funding (Figure 25), Colorado’s funding has fallen over the last six years. This could have something to do with why the state’s electric productivity (mentioned above) has not increased as quickly as it has in other states. Colorado, though, is currently working with rural electric cooperatives and large agriculture users to improve efficiency. Utilities are looking at front-of-the-meter efficiency options, as well.

FIGURE 25: UTILITY ENERGY EFFICIENCY PROGRAM BUDGET PER CAPITA: CO VS. AVERAGE OF 2013 TOP 10 STATES



Source: ACEEE and Census Bureau with Clean Edge analysis. Note: CO ranked 25th in this measure in 2013.

FIGURE 26: TOTAL CLEAN-TECH PATENTS BY CATEGORY: TOP 10 STATES+CO (CUMULATIVE, SINCE 2002)

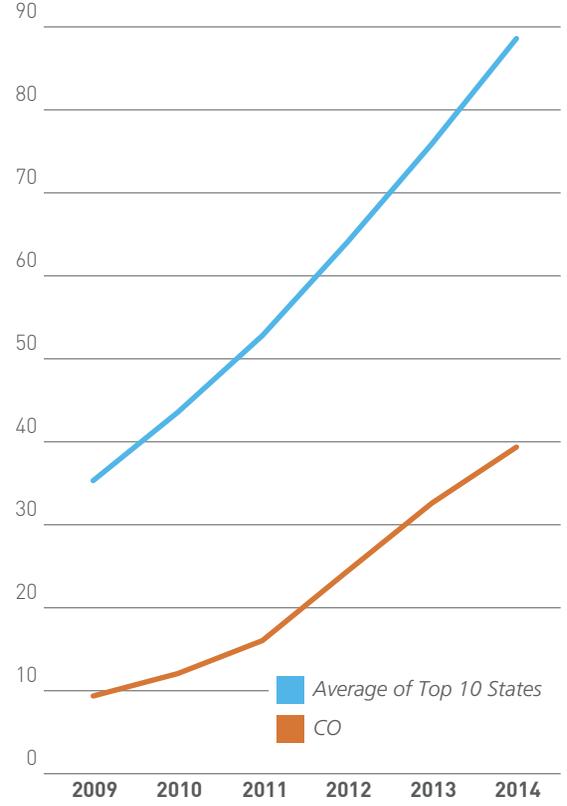


Source: Data from Heslin Rothenberg Farley & Mesiti P.C. with Clean Edge analysis. Note: CO ranked 11th on this measure in 2014.

Clean-Tech Patents

Finally, an area that Colorado has seen significant improvement in is clean-tech patent activity. Over the last six years, Colorado has become a top-10 performer in patents issued (since 2002) per million people; its 37.87 clean-tech patents per million residents in 2014 is more than quadruple its 2009 figure, and has vaulted the state into the ninth position nationally on this measure. Total clean-tech patents have grown at an annual compound rate of 35.77% since 2009, and Colorado is now home to the 11th most clean-tech patents in the country since 2002. Even though California, Michigan, New York, and Connecticut continue to lead the nation in patent activity, Colorado has shown that its investment in intellectual capital is paying off.

FIGURE 27: CLEAN-TECH PATENTS PER 1 MILLION PEOPLE: CO VS. AVERAGE OF 2014 TOP 10 STATES



Source: HRFM and U.S. Census Bureau with Clean Edge analysis. Note: CO ranked ninth in this measure in 2014.

Key Takeaways

There are several key lessons to take away from this briefing. They include:

- Colorado remains a state with a high amount of renewable electricity, and has many policies in place that should allow it to continue progress towards its 2020 RPS goal and beyond. However, the state should continue working with investor-owned utilities and rural electricity cooperatives (such as Tri-State Generation) to push the renewable energy envelope. It should also keep up its efforts to develop small-scale renewables, as well as geothermal power.
- Colorado is also a strong advanced vehicle state, with high electric vehicle purchase incentives and efforts in place to expand charging infrastructure.
- The Centennial State remains a top-performing green building state, although it falls markedly short in smart meter deployment. This represents an opportunity for the state and its municipalities to work with utilities to expand smart meter infrastructure, and more broadly, grid modernization efforts throughout the state.
- Strong public policy has been a linchpin of Colorado's clean-tech success. A next step would be to plan for the 2020 expiration of the state's RPS, including determining whether the market still needs an RPS and how compliance with the Clean Power Plan factors in. The state should also examine other key policies and programs for developing the sector, such as a green bank and/or establishing a price on carbon.
- Energy efficiency funding in the state is low compared to other markets, which represents an opportunity for partnership with the state's utilities to make Colorado's energy system more efficient.
- Colorado is a strong market for attracting clean-tech investment money, leadership, and innovation. The state should partner with the non-profit community, trade associations, strategic investors, and federal agencies such as NREL to encourage new businesses and expand existing ones.

Thanks to Chubb for making this regional clean-tech briefing possible and CCIA for their input and for distributing the findings across Colorado. The data in this report was drawn from Clean Edge's annual U.S. Clean Tech Leadership Index which tracks the clean-tech ecosystems of all 50 states and the 50 largest metro regions. For more information on this report or questions regarding publication, please contact:

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