BIG PIVOTS

ENERGY and WATER transitions in Colorado and beyond

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Now comes a new chapter in how we wring emissions from our economy

by Allen Best

Colorado is starting another chapter in what could be a future history book, "How We Decarbonized our Economy."

In that book, electricity will be the easy part, at least the storyline through 80% to 90% reduction in emissions as we switched from coal to wind and solar, increasingly coupled with new and improved storage technologies.

That chapter is not complete. The challenge is 100% emissions-free electricity, and we may not have that on a broad scale for a couple more decades. Will enhanced geothermal play a role in ensuring reliability? Maybe some nuclear, although I doubt it. Certainly we should expect more high-voltage transmission lines knitting the continent together much like our highways do already. Natural gas will likely play a lingering role.

While the electricity chapter remains incomplete, Colorado is starting another one. This new chapter is about tamping down emissions associated with buildings. This plot line will be more complicated. Instead of dealing with a dozen or so coal plants, we likely have hundreds of thousands of buildings in Colorado, maybe more. Most burn natural gas, but also propane, to heat space and water. Retrofitting will be a long, drawn-out process.

Meanwhile, we're still digging the hole deeper with the tens of thousands of new houses we erect every year, most designed to burn gas and produce emissions. Only in 2022, after a new state law was adopted, did Colorado remove the subsidy for extension of these natural gas lines that, once installed, are expected to have use for the next 60 years.

I would start this chapter on Colorado Day. That's August 1, the day that Xcel Energy and Colorado Springs Utilities are scheduled to deliver the nation's very first clean-heat plans to state regulators.

Those clean heat plans, required by a 2021 law, SB21-264, will tell state agencies how they intend to reduce emissions from the heat they sell to customers. The targets are 4% by 2025 and 22% by 2030.

Wouldn' it be nice to have a sex scandal to weave into this chapter or at least something lurid, maybe a conspiracy or two. Think Jack Nicholson and Faye Dunaway in "Chinatown."

What I see right now are still polite arguments as utilities, Xcel especially, parry those of Western Resource Advocates and its allied environmental organizations.

Both sides recognize the need for new technologies. The disagreements are about where to place the bets, what will be the most prudent investments over time.

The environmental groups see great promise in electrification, particularly the use of air-source heat pumps. Heat pumps milk the heat out of even very cold air (or, in summer, coolness from hot air).

Good enough for prime time? I know of people in Avon, Fraser, and Gunnison who say heat-pumps deliver even on the coldest winter days. Fort Collins, Denver, and Westminster, too.

This elevates electricity costs but eliminates need for natural gas. And there are higher front-end costs, now reduced by federal and other incentives.

Xcel says that heat pumps have a role—but cautions that cold temperatures and higher elevations impair their performance by about 10% as compared to testing in coastal areas. They will need backup gas heat or electric resistance heating. Continuing a partnership with the National Research Energy Laboratory, which has tested the heat pumps at its Golden campus the last two winters, Xcel and NREL will test the heat pumps in construction trailers at Leadville, Colorado's Two-Mile City.

Xcel also frets about adding too much demand, too quickly, to the electrical grid.

Another, perhaps sharper, argument has to do with other fuels that would allow Xcel to use its existing gas pipelines. Xcel and other gas utilities have put out a request for renewable natural gas, such as could be harvested from dairies.

Xcel also plans to create hydrogen from renewable resources, blending it with natural

gas. It plans a demonstration project using existing infrastructure in Adams County, northeast of Denver.

Jeff Lyng, Xcel Energy's vice president for energy and sustainability policy, talks about the need for a "spectrum of different approaches." It is far too early, Lyng told me, to take any possible technology off the table.

In its 53-page analysis, Western Resource Advocates sees a more aggressive role for Xcel and state regulators in spurring market transformation, a greater role for weatherization and other measures to reduce demand for gas. It has little faith in renewable gas, in particular, but also hydrogen. It sees them as more costly and slowing the pace of the broader market transformation.

"I think there's a real tension that came out between different visions of a low-carbon future when it comes to the gas system," Meera Fickling, an economist with WRA, told me.

We already have a huge ecosystem of energy, a huge investment in natural gas. Just think of all the natural gas lines buried under our streets. No wonder this transition will be difficult.

"It's more difficult because everything you do in the gas sector now has a spillover effect in the electric sector," says Jeff Ackermann, the former chair of the Colorado Public Utilities Commission. "Each of these sectors move in less than smooth, elegant steps. We don't want people to fall off one and onto the other and get lost in the transition. There has to be sufficient energy of whatever type."

Too, the utilities need to remain viable. While the transition from gas occurs, what happens to the for-profit company behind that system? "You need them around and viable long enough to keep the system going, all the while trying to reduce the carbon footprint," Ackermann says.

Even before the 2021 law that required a course correction by Xcel and other gas-delivery utilities, PUC commissioners and others had been questioning investments in natural gas infrastructure. Ackermann points to the questions raised by PUC Commissioner Megan Gilman soon after her appointment to the PUC in 2020 about whether the PUC was approving "really bad long-term capital investments in the gas infrastructure that couldn't be justified in 20 or more years."

(The current PUC chair, Eric Blank, also raised the issue in an interview with Big Pivots in August 2020, several months before his appointment. See: "The next energy frontier.")

Getting back to the book chapter. Colorado has nibbled around the edges of how to end emissions from buildings. With these proceedings, Colorado is moving headlong into this very difficult challenge. The foreplay is done. We're now moving directly into the plot.

Mystery remains. What all can agree upon is that innovation will be needed—and that this will take time.

Xcel, in its May filing, talked about a decades-long transition. "As we engage in this transition, we need to understand realistic limitations in regard to both technologies and circumstances, maintaining and honoring a voluntary approach for our customers, with a balanced set of options provided to existing and new customers."

In all this, I wish I could figure out a role for Jack Nicholson. Even if I can't, for some of us, this is a most interesting time.

A round of hurrahs as Colorado takes step to verify emissions from oil and gas

by Allen Best

As the Colorado Air Quality Control Commission considered new methane-testing requirements for oil and gas operators on July 20, an observation was shared frequently during testimony and then among the commissioners as they prepared to affirm the proposal.

"We're teaching the country and the world a little bit about finding consensus," said Jon Slutsky, a now-retired dairy farmer from Wellington, in northern Colorado, and one of the nine commissioners.

> "We are congratulating each other, but my gosh, there is a lot of work to be done…"
>
> **Martha Rudolph**
> ***Chair***
> ***Air Quality Control Commission***

If Colorado is to achieve reductions in greenhouse gas emissions that were identified in a 2019 law and expanded in a 2023 law, the state must curb methane emissions. Methane has a global warming potential 80 times greater than carbon dioxide over a 20-year period.

Methane and other emissions produced during extraction of fossil fuels are also important contributors to degraded air quality, particularly a problem along the northern Front Range (Castle Rock north), where more than half of Colorado's 5.9 million residents live.

In 2021, the Air Quality Control Commission adopted nation-leading regulations. But what good are those regulations if the reductions in emissions cannot be verified?

That was the point of this rule-making, to figure out the best approach for ensuring the intent of the law is honored but in the most practical way. Trust but verify, Ronald Reagan famously said of nuclear disarmament by the Soviet Union.

The rule requires that the quantity of methane emissions at production sites be directly measured. The measurement data must be publicly reported. It also empowers the Colorado Air Quality Control Division to ensure compliance.

In short, the rule allows verification.

The process began more than a year ago. Several oil-and-gas industry groups and private companies, the Environmental Defense Fund, and other environmental groups, plus several local government groups and the staff of the state agency spent some months working through the issues. The key question was how could the methane emissions caused by the extraction, processing, and transport of the gas to consumers be verified? How do we know that the reductions are indeed happening?

The negotiations and discussions were described by one participant as a "little bit rocky." Over the months, agreement emerged that centered around a proposal to the Air Quality Control Commission—the eight person board responsible for setting policy that the division staff executes—that satisfied the insistence of the environmental community for the level of verification needed, but left oil and gas operators with the flexibility they wanted.

The hearing was scheduled to bleed over into the second day. In fact, it was a wrap by mid-afternoon of the first day, a testament to the consensus that had been achieved.

"It's great that Colorado is a leader. It's really important," said Elise Jones, a commission member, in suggesting that Colorado's innovation can help other jurisdictions in figuring out how to meet their greenhouse gas reduction targets.

Patrick Cummins, who had driven five hours that morning from his home near Durango, reported being struck at the rapid development of technology that may allow for reduction of emissions from oil and gas operations in the Denver-Julesburg, Piceance, and other basins in Colorado.

"It really excites me," he said.

Martha Rudolph, chair of the commission and former director of environmental programs for the Colorado Department of Public Health and Environment, the parent agency for the AQCC, was more cautious.

Martha Rudolf

"We are congratulating each other, but my gosh, there is a lot of work to be done and a lot of discussions, probably a lot of argument and disagreements and throwing up your hands and wondering what we can agree to," said Rudolph. "I think we all recognize that this is just the beginning step for a lot of work and hopefully a lot of progress."

Colorado began reforming its governance of oil and gas operations in 2007. In that year, the first year of the administration of Gov. Bill Ritter, the state held a hearing at the Paramount Theater in downtown Denver. A Denver newspaper reported dark muttering and other evidence of indignation expressed by many oil and gas operators. It had long been the Wild West.

State regulation was just getting started as the arrival of hydrofracturing and other advanced technologies made oil deposits, in particular, from the Denver-Julesburg Basin of northeastern Colorado more commercially accessible. State regulation continued to tighten to tame the unhappiness when drilling rigs arrived at the suburban and exurban edges of the northern Front Range.

Concurrent with this were questions about the role of oil and gas operations in the unhealthy air most demonstrably manifested in surging ozone levels on hot summer days along the northern Front Range. By some measurements, oil and gas contributes to roughly half the air quality problems. Emissions from cars and trucks, of course, also contribute significantly.

Colorado actually began regulating methane specifically in 2014.

Then came the 2019 state law, HB 19-1261, Climate Action Plan to Reduce Pollution, which set specific greenhouse reduction goals for 2025, 2030, and 2050.

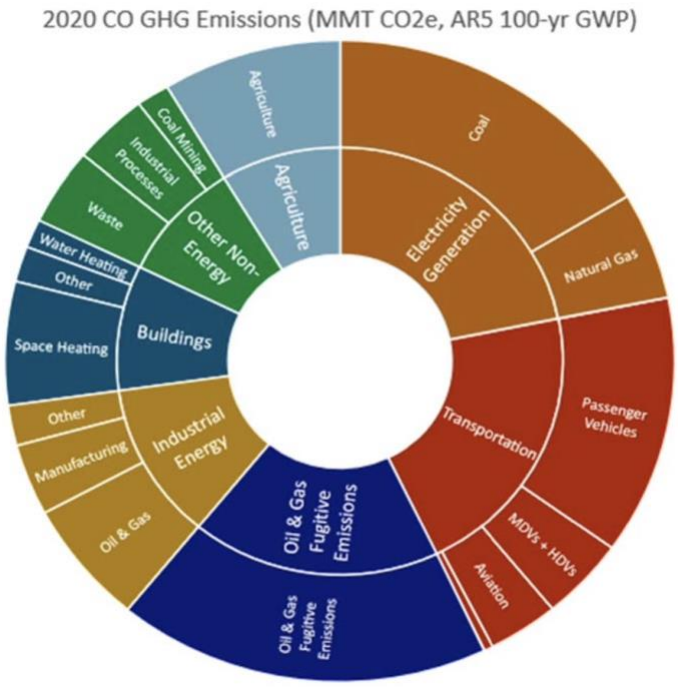
The state's pollution reduction roadmap in January 2021 said achieving those goals depended not just on shifting electrical generation to renewables but also upon "deep reduction in methane pollution from the oil and gas industry, which makes up the largest source of non-combustion emissions in the state."

Based on conclusions reached by the Air Pollution Control Division, state legislators in HB21-1266, Environmental Justice Disproportionately Impacted Communities, ordered that greenhouse gas emissions from oil and gas exploration, production, processing, transmission, and storage operations be reduced by at least 36% by 2025 and 60% by 2030, relative to 2005 levels.

In December 2021, the air quality commission adopted that greenhouse gas intensity verification program. The primary purpose was to require owners or operators of oil-and-gas infrastructure to demonstrate to the state how they intended to meet the 2025, 2027, and 2030 targets.

Colorado "has kind of led the global conversation on methane emission reductions from the oil and gas industry over the last several years," said Will Toor, director of the Colorado Energy Office, in a webinar session July 18.

But work remained—including the verification piece. The Environmental Defense Fund has been the pre-eminent environmental player in this space. In a March 2023 post the group declared that methane emissions from the oil and gas industry topped the global climate agenda.



"Investors are increasingly concerned with financial, regulatory, and reputational risks associated with this potent source of climate warming. But one stubborn challenge has persisted for operators, regulators, and investors alike: quantifying how much methane is emitted from where."

People commonly understand that carbon dioxide is a problem. The organization has been focused on getting people to understand that methane has immediate and great impact—and hence the solutions for curbing them matter so much.

EDF also made the case that Colorado needed to accelerate its actions if it hoped to achieve its greenhouse gas reduction goals.

In a September 2022 filing with the Air Quality Control Commission, the organization reported finding a "persistent gap between projected emissions and the state's near-term targets for 2025 and 2030." Might the recently passed Inflation Reduction Act provide the necessary traction? Perhaps. Rhodium Group, a research group, at the time had predicted a national impact of 32% to 42% emissions reduction by 2030 as compared to 2005 levels because of the law.

But the precise impact on Colorado was unclear, said EDF's Katie Schneer and Alex DeGolia. They insisted that Colorado was on a trajectory to fall short of its 2025 goals by 18% and its 2030 goal by 35%.

In other words, Colorado could not afford to lag in efforts to curb methane emissions. If the Air Quality Control Commission had created "nation-leading direct regulations to cut methane emissions from the oil and gas sector," it still lacked a "robust verification program that includes the direct measurement of emissions."

The EDF continued to argue its case in a 2023 filing: "Absent requirements to measure and verify real-world methane emissions data from oil and gas operations, the Division and public will have no way to know whether operators are making the required reductions to meet the intensity targets and whether the state is on track to meet or exceed its GHG reduction targets from the oil and gas sector."

By then, a consensus had emerged around a proposal rule, the one now adopted. It gave operators two options for compliance, one a state-developed default. But companies could also develop their own operator-specific plan subject to approval by the Air Pollution Control Division. The expectation is that these methods will need to be updated over time.

This will be good for cutting emissions. It can also be good for the bottom line.

That was one takeaway of a June analysis by the air quality division staff. The new verification standards would allow certification of "responsibility-sourced gas" that could be of greater value in the marketplace. That, combined with the value of the gas saved by stanching the leaks in methane infrastructure, can offset costs. The report nodded to something called The Colorado Molecule, a fact sheet assembled by Colorado Oil and Gas Association to promote the idea that oil and gas molecules processed in Colorado "are among the cleanest in the world."

The staff report also laid out the math for long-term benefits to the globe. By 2030, the report said, the net value of benefits minus cost would be $337 million.

Technology lies at the heart of the proceeding. Satellites can now detect methane. This is how the methane plume in the San Juan Basin of Colorado and New Mexico was discovered about a decade ago. And the Environmental Defense Fund plans to launch its own satellite during the next year to provide information about methane emissions from oil and gas operations across the world.

"MethaneSAT (the satellite) will fill these capability and data gaps. It will have a wide field of view, high level of precision, and fine spatial resolution that will be able to quantify methane emissions from the vast majority of global oil and gas production regions – determining from where and at what rate methane is escaping. Together, these measurements can help companies and governments prioritize where emission reduction efforts should be focused," explained EDF in a March 2023 posting. In a July 12 post, EDF cited a report from Datu Research that concluded that the "methane measurement industry is ready to scale up to meet the demand for accurate, real-world data."

Commissioners were told that at least 20 non-regulatory initiatives have been created to promote emissions reductions in the industry, one of them developed in part by Colorado-based Rocky Mountain Institute. It's called MiQ,

The oil and gas industry's main driver was to ensure flexibility.

"These technologies are rapidly evolving," said the Colorado Oil & Gas Association, the American Petroleum Institute, and the West Slope Colorado Oil and Gas Association in a June filing. "As a result, operators should be able to select from a range of technology options and choose technologies appropriate for their facilities."

EDF emphasized the need for direct measurement, meaning that that the role of modeling would be less.

"One of the things that we're hoping for from this rulemaking about verification is to be able to analyze the data quicker and without as much extrapolation, to have more direct measurement," Nini Gu, EDF's regulatory and legislative manager for the Western U.S., told me in an interview the day before the commission's hearing.

"So we know exactly how much methane is being emitted, and so we can understand exactly the cuts that need to be made," she further explained. "Because as it is, there's a lot of very, very educated analysis, but we don't have as much direct measurement where we're actually counting the gas."

Gu said operators are already seeing the value in getting an accurate sense of how much methane they're emitting. "The goal of the rules will be to create a standard framework that can also be applied to smaller operators. Our argument is that it will all run more smoothly once we get like a standard railroad gauge."

The Environmental Defense Fund hopes to see Colorado as the beginning domino in a sequence with global repercussions. Important is the fact—apparently common knowledge—that the Environmental Protection Agency has closely followed Colorado's work. If Colorado can demonstrate the viability of its approach, the EPA can then use it to convince some problem areas (think Permian of Texas). And then, perhaps, the European Union will follow the U.S. example to tame its methane emissions.

"Our hope is to build a lot of momentum with this," explained Jack Alber, a communications specialist for the EDF.

"Now, Mike Tyson had that quote about plans and getting punched in the mouth. ('Everybody has a plan until they get punched in the mouth.'). So we're obviously not expecting everything to go perfectly swimmingly, but we believe that this is a viable step-by-step path to dramatically cut global methane emissions."

Much work remains, as Rudolph, the chair of the commission noted. That's the same viewpoint of EDF.

"I think we should all celebrate this victory of getting a consensus rule, but let's not take our eyes off the prize, because we still have to work on the protocol," said EDF's Gu. "Tomorrow's a big day, but it's not a mission accomplished."

The verification protocol will outline key guardrails to rule implementation. This includes Division pre-approved monitoring programs and minimum criteria for selecting and deploying measurement technologies for operators. EDF describes the air commission hearing as the "what." The protocol will be the "how."

That evening, the air commissioners took testimony. There were people from Wheat Ridge, Denver, Erie, Fort Collins, and a dozen other places.

Among them was John Clark, a computer specialist who relocated from Boulder to Ridgway, where he is now the mayor. In his two minutes, he said he liked the idea of the proposed verification.

He later explained that he gets solicited frequently to testify by various groups, and he's happy to do so, even if he does not have time to probe into the intricacies of all that is involved.

"I have a real job," he said, mentioning that the mayoral position is without pay. "I wear a number of hats. I don't have a whole ton of time," he explained. But for things like this, I do obviously care about the climate catastrophe, so I try to do as much as I can."

"I just think we are fortunate in Colorado to have the political makeup of the state that we have, that we are actually able to make a difference, unlike some other, much more red states. I think it's worth taking the time to try to get these things accomplished."

Boulder council wants to see natural-gas ban option on the table for new construction

by Allen Best

In a straw poll, eight members of the Boulder City Council indicated support for banning natural gas in new buildings. The ninth member indicated only partial support.

The Boulder Reporting Lab reported that Mayor Aaron Brockett called for the straw poll about whether to request that the city staff bring to council an all-electric option as the city updates its energy and other building code elements. He said the city staff was unclear whether to proceed in the full-electrification direction, which is why he wanted to confirm the council's intent.

Brockett said he believes that the Boulder community, for the most part, wants the council to push for electrification.

"People understand that the buildings we're building now are going to be with us for decades," he said. "And if we don't get that energy efficiency and energy use right now, that's a lost opportunity for the next generation."

The city staff is scheduled to deliver its recommendations in November.

Emily Sandoval, a city spokeswoman, stressed that the straw vote occurred in a work session. She told Big Pivots that the city staff will now start reaching out to architects, developers, and the community at large.

Because Boulder is land-locked, with almost no remaining lots for development, it has only a handful of new builds each year. The m0uch larger impact will be in cases where existing housing is scraped and rebuilding occurs.

The no-gas requirement, if adopted, would apply to less than 1% of Boulder's housing stock. Because it has a limited-growth boundary, almost all of that is the result of demolition and rebuilding and a limited amount of infill.

Crested Butte was the first jurisdiction in Colorado to make that move, voting last July to make the ban in the town's 60 remaining lots. It made an exception for restaurants.

See: A big step for a small mountain town," Big Pivots, Aug. 12, 2022.

Mayor Ian Billick reports that Crested Butte has had few building permits pulled since the ban went into effect. The town plans an all-electric affordable housing project, but it is trying to make the numbers work as air-source heat pumps cost more. As for the efficiency of the technology, he sees no problems. The decline in efficiency of heat pumps in colder temperatures and higher elevation "has been manageable," he said.

In June, the municipality of Lafayette banned natural gas in new construction, also

with some exemptions, including large systems, hospitals, labs, and industrial. The code takes effect on Aug. 1. See details here.

Lafayette is notable because, unlike Boulder or Crested Butte, it has the land available to make this regulation apply to buildings at a much larger sale. It expects 3,000 to 4,000 new residential units in the next 20 years and has 205 acres zoned for commercial development.

Other Colorado jurisdictions have flirted with the idea of requiring all-electric construction. Aspen, for example, considered that option but decided to wait at least a year.

Golden's elected officials in February gave a yellow light toward a more ambitious agenda. See: "Golden moves on path to all-electric in new buildings." Big Pivots, Feb. 17, 2023.

Instead of a simple all-electric code, the proposal on the table is to also require on-site renewable generation.

Ken Jacobs, one of the community members at the table, reports stalled progress. "My sense is that it has slowed as a result of one part developer opposition but two parts bureaucratic inertia," he says.

"There is still an ongoing conversation yet to be settled as to whether we fall back to simply saying all-electric and drop the net-zero/on-site renewable requirement, which really does go beyond what other communities are doing, or whether those more aggressive goals will remain part of the package."

That added component might be part of a second phase, he suggests. He is dubious any code update will occur yet this year.

Other jurisdictions are still not quite sure exactly what direction they will take. One option is a code that does not ban natural gas but, through incentives, makes all-electric construction the easier path going forward.

Regardless of the code requirement, though, individual players are moving. Elevation Hotel at Snowmass Village, for example, is all-electric. Several affordable housing projects in Basalt preceded it.

In the Eagle Valley, several government buildings and at least one affordable housing project.

Other jurisdictions—including Northglenn and Erie–have adopted electric-preferred building codes for residential construction. Denver and Louisville have requirements for all-electric commercial new construction.

Denver has a ban on gas for space and water heating in commercial construction starting next year.

While Xcel Energy, Colorado's largest gas-distribution utility, has raised questions about the adequacy of the heat-pump technology in Colorado's most extreme weather, some jurisdictions question whether the workforce exists to implement all-electric building on a large scale.

Lafayette's gas ban would affect 3,000 to 4,000 residential units during the next 20 years.

Some elected officials think we need to move forward more rapidly despite these concerns.

As mayor of Louisville, Ashley Stolzmann pushed for a gas ban but couldn't convince a majority of council members.

Now a Boulder County commissioner, Stolzmann told the Boulder Reporting Lab that even for Boulder County to reach its 2030 goal for emission reduction – a goal that is less aggressive than that of the city of Boulder—it can't approve more buildings that burn natural gas.

"And we would need to do significant amounts of retrofitting by 2030. So this is going to take something different than business as usual," she said.

Pushing and pulling Colorado toward fewer emissions from its building sector

by Allen Best

Colorado has been both pushing and pulling local jurisdictions to higher standards for buildings, the state's fifth largest source of greenhouse gas emissions. Helping in this has been $4 million allocated by state legislators, now bolstered by $5 million in federal grants.

Colorado has 64 counties and 271 towns and cities, all with the authority to enact building codes. Some have not, and they will be permitted to continue to be without codes. But a 2022 law, HB 22-1362, "Building Greenhouse Gas Emissions," created a pathway designed to help the state's buildings reduce their emissions.

State has $9 million in grant money available to help local governments improve building performance

It allowed the local governments to adopt a more recent building code before July 1 of this year. Some did—and that includes at least a few places that had never had building codes before. For example, Alamosa and several other local counties and cities in the San Luis Valley united to adopt the 2018 International Energy Conservation Code.

Another 20 to 25 jurisdictions went in the opposite direction, going above and beyond the 2021 International Energy Conservation Code. Crested Butte stands out, with its decision to ban natural gas in those buildings yet to be constructed. Aspen elevated its code, but stopped short of banning natural gas in new buildings. Eagle County and most of its members towns and cities are in the process of adopting codes, but critical decisions remain to be made.

For those jurisdictions that lagged, legislators in 2022 set a deadline of July 1,

2023. After that, they said, municipalities and counties were required to adopt and enforce a code that meets or exceeds the 2021 International Energy Conservation Code and also the state's model electric-ready and solar-ready code when updating any other building code.

The law required a new Energy Code Board to develop model electric- and solar-ready codes before June 1, 2023. The board met its deadline. The code requires new and substantially renovated buildings to include pre-wiring for roof-top solar panels, high-efficiency electric appliances, and electric vehicle charging infrastructure.

This code will be the new minimum code for jurisdictions that have not already upgraded.

Adam Berry the senior program manager for building codes at the Colorado Energy Office, says the new codes require wiring necessary for rooftop solar but will not require the solar. "Those preparations could also benefit other uses," he says. "If, for whatever reason that solar is not the ideal path, they can still use it to support other technologies being used in the buildings as needed."

There will be another model code, this for carbon, that must be adopted by the energy board before July 2025.

Those local jurisdictions have from July 1, 2023, to July 1, 2026, to update their building codes to these higher specifications now adopted by the state. In 2026, they will have the elevated task of adopting the low-energy code.

To help local jurisdictions pick up the pace, legislators also allocated funds to assist local governments hire consultants and so forth. The Colorado Energy Office now has $2 million available. Jurisdictions can apply individually for grants of up to $125,000.

The Colorado Energy Office hopes to find applicants that offer simultaneous benefits across multiple communities through partnerships. Think a county and all or at least most of its towns. Or as in the case of the San Luis Valley, multiple counties and towns. Those partnerships can receive up to $250,000.

"With so much new construction in Colorado, it's especially important that new buildings are built to maximize energy efficiency and accommodate clean energy technologies, such as rooftop solar, electric appliances, and electric vehicle chargers," said Will Toor, executive director of the energy office.

"This funding will ease the cost burden on local governments of adopting and enforcing these energy codes, which will accelerate the adoption process and ensure new homes and buildings across the state are ready for Colorado's clean energy future."

Colorado's $5 million in federal grants come via the 2021 Bipartisan Infrastructure Law toward adoption of elevated building codes and to support implementation of Colorado's building code and performance standards requirements.

Implicit in the Colorado law was the knowledge that requiring new buildings to install the infrastructure necessary to support clean energy technology during construction would be less costly than retrofitting the buildings in the future.

A 2022 study by the New Buildings Institute calculated that an all-electric single-family home is $7,500 to $8,200 less costly to construct than the baseline code home. It also reported that electric-ready construction saves the homeowner thousands of dollars compared to retrofitting to accommodate electric equipment replacements.

"Whether on-site renewables or electric vehicles or electric appliances, there are a lot of opportunities to directly reduce emission from our buildings—as we are in parallel working with our utilities to drive down emission from the electric sector 80% by 2030," the New Buildings study reported.

Windsor chosen for Microvast lithium-ion battery factory

by Allen Best

Texas-based Microvast Holdings has announced plans for a lithium-ion battery factory at a building in Windsor with nearly 100,000 square feet of production space. The company describes the location as having ample room to add production lines for its energy storage systems as needed.

The company did not describe the manufacturing capacity or employment numbers but did say it expects the company to be in operation later in 2023.

Microvast opened a Technology and Testing Center in nearby Timnath during December 2022.

Founded in 2006 by Yang Wu, a naturalized American, the company specializes in high-performance utility-scale batteries and batteries for commercial transportation. In December, it announced it had won a contract for a 1.2 gigawatt-hour battery energy storage project located with a solar facility somewhere in the United States. The announcement did not identify the location or the project.

The company produces a 20-foot battery container that features what it calls an industry-leading 4.3-megawatt-hour energy density. It maintains functionality for more than 10,000 cycles. Higher density translates to fewer containers, a smaller footprint, and easier installation, plus reduced maintenance, the company says. In an October 2022 post, the website Solar Industry further explained that the container is designed for energy shifting applications such as renewables integration, peak demand, and capacity support.

Why Windsor? Because of what the company described as its "strategic location," which it said will allow it to optimize its supply chain and reduce lead times. "This improved logistical capability is expected to strengthen our competitiveness and help us transport our product efficiently," said Zach Ward, president of the Microvast Energy Division, in a press release.

Company became a focal point for tensions about Chinese and American supply chains

Company representatives did not respond to requests for employment numbers or clarification of why Windsor's location matters.

The new factory is part of a growing ecosystem of energy in the northern Colorado triangle of Greeley, Loveland, and Fort Collins.

Windsor is roughly 30 minutes from all three. In 2008 it became home to a Vestas factory that manufactures blades for wind turbines. That factory occupies 660,000 square feet of space. In nearby Loveland, Lightning eMotors manufactures electric fleet vehicles.

Audrey Herbison, director of economic development for the Greeley-based Upstate

Colorado, described the battery factory as a tangible manifestation of federal legislation — both the Bipartisan Infrastructure Act of 2021 and then the Inflation Reduction Act of 2022 – designed to push the energy transition. This, she said, is the biggest project of which she is aware.

While Weld County remains well known and deservedly so as a base for oil and gas extraction, this indicates a diversifying economy. "In economic development, diversity is the name of the game," she said.

A 2020 report by the organization found a 10% growth in payrolled business locations in the Weld-Larimer area over the previous five years and projected an 8% growth from 2020 to 2025.

Microvast's battery manufacturing began in 2010 at a plant in China. Microvast went public in 2021 through a merger with a special-purpose acquisition company.

The company has factories in Tennessee as well as in Germany and China. It also had plans for a factory in Kentucky that were upended.

In May 2023, the company drew national attention. It was a candidate for a $200 million grant from the U.S. Department of Energy. Politico, in a May 23 report, said that Republicans had pointed to the company's Chinese subsidiary as evidence that President Biden's climate and clean-energy spending will benefit Beijing. The money for Microvast would have come from the 2021 Bipartisan Infrastructure Law.

"These funds are intended to strengthen America's battery production and supply chain, not to tighten China's stranglehold on these supplies," said Rep. Frank Lucas, a Republican from Oklahoma who chairs the House Science Committee.

The Department of Energy, somewhat confusingly, said the company had been selected but had not been awarded a grant. U.S. Sen. John Barrasso, a Republican from Wyoming, said the Biden administration should "immediately eject other applicants with similar ties."

On its website, Microvast posted a page of FAQs on June 21. It said it was "surprised" by the cancellation of the grant. "Despite the misleading rhetoric, Microvast is and will continue to be an American company deeply committed to doing business in the U.S. and creating American jobs, boosting the American economy, and securing battery manufacturing in the United States."

The statement also said that Microvast has "no ownership or control by the Chinese government or the Chinese Communist Party."

In a June 23 story focused on electric vehicles, Politico cited the cancelled grant and had this to say: "The new instinct for many lawmakers in Washington is to jump at even the appearance of Chinese influence — a choice that paradoxically could hinder the development of a U.S. battery supply chain, a chief goal of the landmark climate law that Congress passed last year."

United Power pushes ahead on storage with plans for 313.34 MWh

Preparing for its plans to become an independent utility, United Power has announced an agreement with Ameresco to install eight sets of batteries at strategic

locations across the electrical cooperative's service territory in northern Colorado.

The agreement calls for 78.3 megawatts/313.34 megawatt-hours of battery storage.

(Storage duration is the amount of time storage can discharge at its power capacity before depleting its energy capacity. For example, a battery with 1 MW of power capacity and 4 MWh of usable energy capacity will have a storage duration of four hours. – For more information, see this explainer from NREL, "Grid-Scale Battery Storage.")

These batteries, explained Mark Gabriel, chief executive of United Power, are "essential to a resilient and responsive power system." The batteries will enable United to balance its daily power needs and incorporate local renewables more efficiently.

Gabriel said batteries have become very competitive thanks to funding provided by the Inflation Reduction Act and tax credits that cover 30% to 50% of the costs.

United serves nearly 110,000 meters in its service territory on metro Denver's northern side. That territory extends from the foothills west of Arvada to the proliferating housing tracts around Firestone and Brighton and to the oil-and-gas fields of Weld County.

In late 2018, United became the first utility in Colorado to have a storage battery. Installed behind the utility's office between Longmont and Firestone, the Tesla batteries have 4 megawatt-hours of storage. It also has a smaller battery installation at its headquarters in Brighton.

In November 2022, that capacity was finally surpassed in Colorado by the 15 megawatt-hour capacity installed in conjunction with a solar project for Holy Cross Energy. In June, Xcel Energy added battery-storage that dwarfed that of Holy Cross. Next Era Energy Resources described the capacity of the battery storge for the Thunder Wolf Energy Center as 100 megawatts. See also: "Colorado's newest biggest battery."

As for United, it currently gets nearly all of its electricity from Tri-State Generation and Transmission. That contract ends in 2050. However, United wants out and expects to be out by May 1, 2024.

The major remaining hurdle is figuring out how much it must pay Tri-State and its remaining 41 members to leave them whole. The formula for determining those costs is expected to be ruled upon by FERC later this year.

Another solar factory, in Colorado Springs

Meyer Burger, an industrial manufacturer of solar cells and solar modules headquartered in Switzerland, plans to begin production at a plant in Colorado Springs during the second half of 2024.

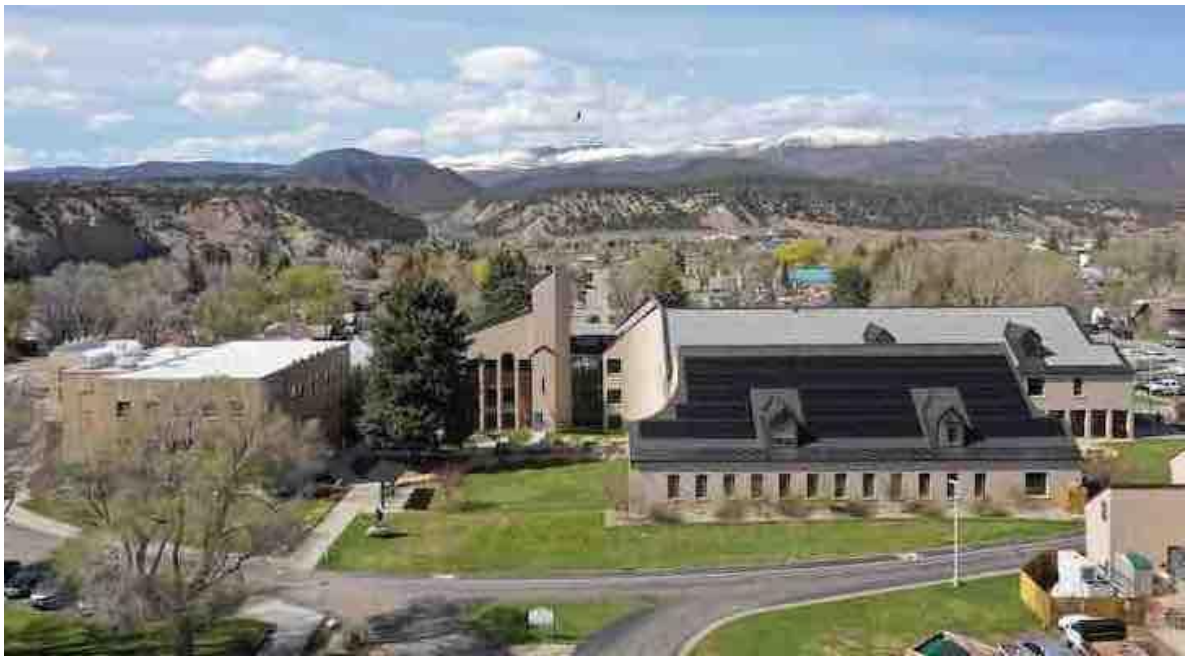
The company says it expects to create 350 new jobs at an average annual wage of $77,842, which the administration. of Gov. Jared Polis says will be 129.4% of the average annual wage in El Paso County.

In siting the plant in Colorado, Meyer Burger will use benefits from the federal Inflation Reduction Act.

The factory will have an initial production capacity of two gigawatts of solar cells per year to supply the company's solar module production facility in Arizona.

The Polis administration cited the arrival of the new company as evidence of Colorado's prominence in the energy transition.

"Colorado has made a bold commitment to 100% renewable by 2040, and cleantech companies are taking note," said Eve Lieberman, executive director of the state's Office of Economic Development and International Trade. "Meyer Burger joins a growing number of companies choosing our state for the collaborative cleantech ecosystem."



Eagle County is almost certain to go forward with geothermal for an aging bus barn, but it is also thinking about geothermal for its administrative building and old courthouse. ***Photo/Eagle County***

Geothermal for a bus barn in Eagle Valley an easy decision with a $1.5 million grant

by Allen Best

In trying to take the long view, which all governments should, Colorado's Eagle County has concluded that geothermal will most economically heat its 14,000-square-foot bus garage.

It helps that the county has now received a $1.5 million grant from the federal government.

The bus barn is located in Gypsum, about a mile off Interstate 70, near the west end of the runway at Eagle County Regional Airport. Buses housed in the building belong to the Eagle Valley Transit Authority. They ply routes from Dotsero to Vail and somewhat beyond to Leadville.

The project will not change the shell of the building. The concrete floor was replaced several years ago, and when it was, Eagle County installed tubing that allows heating via heated water.

Water can be heated in various ways, most commonly with electricity and by burning natural gas. A study of the comparisons showed a much steeper upfront cost for geothermal but much lower fuel costs over time.

A field of geothermal wells of about 500 feet in depth will be able to yield the necessary heat at an annual cost of $12,000 to $14,000, according to preliminary engineering estimates. That is the cost of the electricity needed to pump the water and compress the heat (or coolness in summer).

This compares with $60,000 to $70,000 annually for the cost of electricity to fire boilers.

The geothermal heating also fared well compared with natural gas-fired boilers, in part because of the sturdiness of the geothermal system, with a projected life of 60 to 80 years.

Jesse Meryhew, the facilities manager for Eagle County, says he has been persuaded

partly by the those who already have geothermal.

Foremost is the example of Colorado Mesa University in Grand Junction, where many of the buildings, both classrooms and some dormitories, are heated and cooled by a field of geothermal wells.

Also instructive is a building in Gunnison County comparable in size to the bus barn in Gypsum, that has been heated with geothermal. Gunnison is far colder than Gypsum.

"Geothermal is not a new technology, which is something I personally like," says Meryhew. "It's a proven technology. It's very efficient and it has longevity. As a government entity, that's something we are looking for. We are looking for systems that last and systems that are simple to work on. It's really a valid long-term solution."

There is the upfront cost. Would they have done this project without the grant funneled through the Federal Transit Administration?

"It would have been a lot more challenging without the grant for sure," he says. Final engineering has yet to be complete, but cost is likely to be around $2 million.

Eagle County is also looking at potentially using geothermal for its administrative building and adjoining old courthouse. The air conditioning for the building is nearing its end of life, and a replacement will cost close to $500,000. The campus has two acres available for wells. Meryhew expects a decision in the next 6 to 8 months.

There has also been talk about creating a district heating-and-cooling system that includes a nearby library and a senior housing complex. Meryhew points to Colorado Mesa University as an example for potential expansion over a number of years.

Tri-State asks FERC to cancel consideration of buy-down formula

How much will it cost San Miguel Power and Poudre Valley Rural Electric Association and several other electrical cooperates to be able to generate a significantly larger portion of their own electricity?

That remains in question. Tri-State Generation and Transmission on June 29 filed a request with the Federal Energy Regulatory Commission to cancel its proposed consideration of the buy-down payment methodology.

In 2020, Tri-State and its members agreed to a flexible partial requirements membership option of up to 50%. Three Colorado members (Durango-based La Plata Electric, Fort Collins-based Poudre Valley, and Ridgway based San Miguel) expressed interest in this "open season."

In 2022, three more members (High Plains Power of Riverton, Wyo., Jemez Mountain Electric of Espanola, N.M., and Mountain Parks Electric in Granby, Colo.) also showed interest.

Altogether, Tri-State allocated 300 megawatts of self-supply capacity among these members. Mountain Parks in January, however, announced its plans to leave altogether.

But if they're buying less power from Tri-State, how does that leave other members? Obviously, they must pay something to break their full-requirements contracts. They intend to remain with Tri-State, but get larger amounts of their electricity from other source. FERC must rule on the buy-out methodologies for both full and partial exits.

In April 2022, agreement was reached with several members. However, United Power opposed that requirement, and the settlement was scuttled in December 2022.

The filing by Tri-State says it has been "continuously engaged with its members"

during the last three years to "reach a better methodology to implement partial requirements service." Tri-State has concluded that the proposed methodology falls short of what is needed, and it says it filed this request without support or at least without opposition of the members who are engaged in this proceeding. That includes United.

Lee Boughey, vice president for communications at Tri-State, said in an e-mail that United Power's opposition and FERC's subsequent rejection of the settlement "had the effect of delaying the shift to partial requirements by our members and returned the matter to hearing procedures scheduled for later this year." United, he added, was alone in its challenge.

"Rather than continue to litigate the tariffs, which results in continued uncertainty for members seeking partial requirements membership, we recently asked FERC to cancel the tariffs."

Further clarification was provided via the report by Duane Highley, chief executive of Tri-State, in a June summary filed with the La Plata Electric board documents. See here.

"We discussed a new approach to partial requirements memberships that utilizes an annual equalization payment, rather than an upfront buy-down payment. This approach is cost based, not forecast based, and trued up annually. Tri-State would utilize its scale and skills to market power to cover the fixed and stranded costs the members' partial requirements membership created. In a strong market, there would potentially be a credit to the partial requirements member, and in a soft market, the member would make an equalization payment. We are working on the concept with the members that participated in the open season, and we are engaged with ACES to assist with technical requirements for marketing power. A white paper on the concept was provided to the membership this week, and if the board approves the approach, we have targeted a FERC filing in August."

Asked for comment, Jeff Wadsworth, the chief executive of Poudre Valley Electric, offered this:

"Tri-State leadership committed to us that they would develop an updated partial requirements formula in short order to allow for the consideration of self-generation. Unfortunately, the original filing and resulting settlement encountered protests within the FERC process. We are hopeful a new filing will allow for the continued consideration of meaningful self-generation that both meets FERC requirements and is fair and reasonable. We are cautiously optimistic that a new filing will be made by Tri-State in the coming months."

Poudre Valley is considering up to 117 megawatts of renewable resources from among Tri-State's 300 available pool. This could constitutes anywhere from 7% to 15% of the cooperative's total energy needs, Wadsworth added.

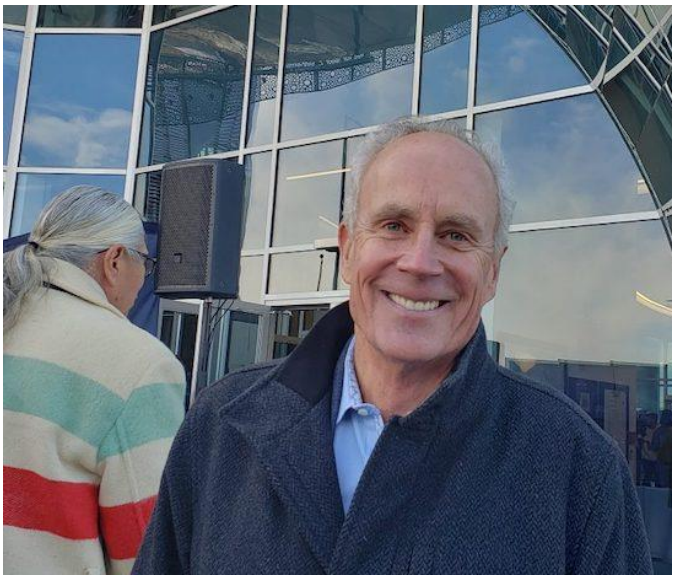
Colorado's largest electric cooperative recognized for use of GIS technology

CORE Electric Cooperative, the largest in among Colorado's 212 electrical cooperatives, has been recognized for its use of geographic information system technology to understand vast amounts of data and solve complex problems.

Esri, a company specializing in location intelligence, cited the work by CORE's GIS team. It has combined several complex location mapping systems into one platform solution that allows for organization-wide visibility, data ownership, and maintenance across departments.

This, according to CORE, makes its systems and processes more agile for wildfire mitigation, operation efficiencies, equipment maintenance, and regulatory reporting.

It also creates a foundation for future advanced system technologies.



Jim Lochhead reflects on the Colorado River and other topics as he plots his next move

by Jerd Smith
Fresh Water News

Veteran Colorado water attorney Jim Lochhead has been part of most of the history-making Colorado River deals crafted over the last 30 years including California's landmark 2003 quantification settlement agreement, where the state famously agreed to cut back its overuse of the Colorado River. For decades, he advised state and local agencies on Colorado River issues. He also directed the Colorado Department of Natural Resources under Gov. Roy Romer from 1994 to 1998.

But in 2010 he moved into a decidedly different role: running Denver Water, a 1,200-employee agency that serves more than 1.5 million customers in the Denver metro area and which operates as an independent government agency.

Leaving Denver Water after 13 years at the helm

Under his leadership, Denver Water launched a major capital investment program, which included a new, hyper-green operations complex. It built a new water treatment plant and battled on many fronts to expand Gross Reservoir. The agency also launched one of the largest lead-pipe replacement programs in the country.

Lochhead, who announced he was leaving Denver Water in December, has a departure date of Aug. 7. Alan Salazar, chief of staff for the city of Denver, will take over as interim CEO for the next year, until a permanent hire is made.

But is Lochhead, 71, planning to retire? Not just yet. See what this high-profile water veteran has to say about the state of the Colorado River these days and what his future may hold. The interview has been edited for clarity and length.

Fresh Water News: Why leave now, when issues on the Colorado River are just getting interesting?

Jim Lochhead: I think as a CEO you need to realize what your shelf life is. I've accomplished what I was hired to do. When I came, Denver Water was right in the middle of negotiating the Colorado River Cooperative Agreement [a deal that resolved many, though not all, conflicts between West Slope Colorado River water users and those on the Front Range, including Denver.]

I was really brought in to move Denver Water forward in terms of being a trusted leader in the water industry and in serving customers, and to focus us on the sustainability of our water supply and the health of our watersheds. I'd like to leave Denver Water in a good place, and I feel like we're in good a place.

This summer critical negotiations begin on how to operate the Colorado River system and the two major reservoirs on the river, lakes Powell and Mead, in ways that

stop overuse and allow the system to operate more efficiently. Have you heard any great ideas that you think would solve its problems?

Unfortunately, no. What we need is a path forward that includes the tribes in the basin. We need a process that is not so onerous for participants so that we can collaborate and come to solutions. It's going to require tremendous leadership.

Lakes Powell and Mead operate under different agencies, in some cases use different calendars, and serve different regions. Some have suggested that the two lakes should be operated as one, to simplify management and improve operational efficiencies. Do you support this idea?

It's worth exploring. We need to be looking at totally different ideas about how the system is managed.

Others have suggested that any new reservoirs or dams should be stopped, that the seven-state Colorado River Basin should be closed to new water development. What are your thoughts on this?

I don't even know how you would do that. There is no authority. In Colorado [and the other Upper Basin states of New Mexico, Utah and Wyoming] the prior appropriation system is self-limiting. [The system delivers water in times of scarcity based on which water right is the oldest. Any newly claimed water rights, in practicality, would never receive water.] All of our rivers are over-appropriated. If you are going to do something new you have to buy an existing water right. You would just be shifting use between sectors.

And in the Lower Basin [Arizona, California and Nevada] the amount of water that is taken is limited by contract and federal law to 4.4 million acre-feet in California, 2.8 million acre-feet in Arizona, 300,0000 in Nevada and 1.5 million acre-feet in Mexico. The big problem is that river [transit] losses and evaporation sit on top of all of that.

Farms and ranches use as much as 80% of the water in the Colorado River Basin. What could be done to reduce agricultural water use while protecting the farm economies and food supplies?

The fundamental dilemma that we have is the conflict between the priority dates of long-established irrigation districts in the Lower Basin and the Upper Basin under the priority system versus new development and growth that is occurring that is junior in priority.

If we strictly went by those priorities, you would literally be cutting off the Central Arizona Project, as well as Las Vegas, Denver, and the Metropolitan Water District [of Southern California]. That's just not going to happen. So how do we equitably manage through that dilemma, so that ag economies and the communities that have grown to depend on those priorities grow and can rely on that supply? And how do we have security of water for the 40 million people who live in this basin?

It is going to result in a shift of waters. The Lower Basin has asked for $1.2 billion to reduce demands. I don't have a silver bullet, but to me that is the heart of the negotiation that is going to have to occur.

A number of people have suggested that a new forum of some kind needs to be created to help solve the Colorado River's problems now. You've said that you don't plan to retire. If you were offered the opportunity to run that new entity, would you take it?

Going out to pasture is not my nature. I would have to think about it. I would love to stay involved.

Jerd Smith is editor of Fresh Water News*, an independent, nonpartisan news initiative of Water Education Colorado. She can be reached jerd@wateredco.org or @jerd_smith.*

Colorado ranks high for decarbonization in two new national analyses

Two new reports have identified Colorado among the top states for decarbonization work.

Continuing a now familiar theme, both analyses place Colorado as something of an island in the nation's interior, with nearly all other top-contending states being along the coasts or proximate to them.

For transportation, the American Council for an Energy Efficiency Economy ranked Colorado third, behind California and New York.

California came in high above all others for the second year in the ranking as it excels in advancing equity, establishing electrification standards, and preparing the grid for increased EV sales, said ACEEE.

Colorado, according to the 2023 State Transportation Electrification Scoreboard, showed the most improvement in scores.

California received 88 points, New York 62, Colorado 61, while Massachusetts and Vermont were at 57.

"Third-place Colorado performed well overall and scored particularly well in optimizing its electricity grid for EVs," said ACEEE. "It performed well in most categories and is investing considerably in electrifying HD (heavy duty) vehicles, including its transit bus fleet. Colorado also adopted Advanced Clean Trucks (ACT) for HD EVs.

Alphabet soup anyone?

See the report here.

Colorado scored well in an analysis by the Rocky Mountain Institute for the progress made toward national emissions reduction targets. See that report here.

"Washington, New York, Massachusetts, and Colorado are leading the charge with comprehensive, economy-wide climate coverage," says RMI under the heading of "economy-wide polices in leader states."

"Washington has a carbon-pricing program, and Colorado recently passed a slew of tax credits to accelerate the uptake of clean technologies across sectors."

RMI also cited Colorado for demonstrating leadership by "incentivizing the use of clean hydrogen in high-impact industrial end uses." It also said that those states not keeping pace should look to Colorado, which it said is about 65% of the way to a NDC (nationally determined contribution)-aligned goal. It pointed to significant work to contain emissions in the oil and gas sector.

Time for self-congratulations? Not exactly. If you study the RMI analysis more deeply, its models project that Colorado's economic wide emissions in 2030 will be 34% below 2005 levels based on current policy. That's significantly less than Colorado's goal of 50% reduction by 2030. See the RMI analysis here.

Ari Rosenblum, communications manager for the Colorado Energy Office, pointed out that RMI's scorecard does not take into account new policies adopted by Colorado legislators in their 2023 session. Nor, he added, did it account for future rulemaking.

"Implementing these policies will continue to reduce emissions from Colorado's most polluting sectors," he wrote in an e-mail.

Colorado is also currently working with RMI to develop a more state-specific assessment of Colorado's progress toward its 2030 emissions reduction goal. That assessment will help identify additional steps the state can take to meet post-2030 emissions targets and ensure Colorado stays on track toward achieving net-zero emissions by 2050.