

# BIG PIVOTS

ENERGY and WATER transitions in Colorado and beyond

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## Climate literacy bill would allow special instruction for 6<sup>th</sup>-12<sup>th</sup> grades

by Allen Best

High school diplomas with endorsements certifying climate literacy would be enabled by a bill to be reviewed by Colorado legislators.

Climate literacy is defined by the bill, [SB-24-014](#), as understanding the essential principles of the Earth's climate system, assessing scientifically credible climate information, learning to communicate about the climate in a meaningful manner, and making informed and responsible decisions regarding actions that may affect the climate.

Prime sponsors for the bill are two Democrats, Sen. Chris Hansen of Denver and Rep. Barbara McLachlin of Durango.

The proposal calls for an approach in Colorado somewhat different from those of other states. It would be voluntary, both for schools and students, authorizing instruction in participating schools for students in grades 6 through 12.

To gain the endorsement, a student would have to complete two courses in the area of climate literacy selected by the local education provider.

Unlike several other states with climate literacy programs, no funding has been proposed to support this added instruction.

Students would also need to complete a final experiential learning project that is approved, supported, and facilitated by a climate literacy learning provider. Local schools would be allowed to collaborate with local businesses, nonprofit organizations, and institutions of higher education in developing these participating projects and courses.

Possibly the most substantial difference between the one proposed in Colorado and those in other states is its attempt to create opportunities to develop technical green skills that will be needed to "support the transition to a low-carbon sustainable economy," as the bill puts it.

The primary thinking for the bill comes from a smallish Colorado nonprofit called Lyra. [The website says](#) it seeks to work with communities to "uplift and foster their bold ideas so that education is more nimble and responsive to students."

Mary Sewell, the chief executive and founder of Lyra, said the legislation was drafted after consultation with the North American Association for Environmental Education.

**"Interestingly, the highest proportion of respondents considered climate-literate was among Boomers at 16.3%, while Gen-Z showed an 11.5 literacy rate."**

“A big part of this is the experiential learning element,” she says. “It is the more hands-on, green-skills piece.” The green economy will need trades people with new skills. So will rural economies. She suggests that schools in more rural areas might want to partner with the Future Farmers of America or 4-H clubs.

Figuring out the partnerships for the experiential learning will take thought. “It doesn’t have to be the (school) district.”

A handful of states from California to Maine have adopted various climate literacy requirements and programs.

“Climate change is the paramount challenge of the 21st century,” says a report issued in June 2023 by the [Center for Green Schools](#) in partnership with [Campaign for Environmental Literacy](#).

“Although education is not the exclusive, nor perhaps even the primary means of addressing this issue, it is difficult to fathom how we could accomplish the extensive and far-reaching societal changes necessary to confront the climate crisis without a broad base of educated and literate citizens, consumers, policymakers, business leaders and other stakeholders,” says the report, [“State-Level Legislation Concerning K-12 Climate Change Education.”](#)

The report analyzed how state legislation, as one piece of a complex puzzle, can help prepare graduates for a future impacted by the climate crisis. It also had this item that goes against prevailing wisdom.

Alliance Research had polled 1,000 people in five countries about their knowledge of the climate, climate policies, and climate actions. The United States stood out

in the polling. Only 5% of American respondents were found to be highly climate-literate and over 55% demonstrated low climate literacy. Counterintuitively, it was older people, not the youngsters, who knew more.

“Interestingly, the highest proportion of respondents considered climate-literate was among Boomers at 16.3%, while Gen-Z showed an 11.5% literacy rate.”

Well – take that, youngsters!

The report told of programs and policies in various states. California led the charge beginning in 2004 with curriculum that broadly talked about how people influence natural systems. In 2018, climate change and environmental justice were added to the list of topics.

Maine legislators in 2022 appropriated \$2 million to create a pilot program for professional development of teachers through partnerships with community groups.

New Jersey incorporated climate change education across curricula in 2020. In June 2023, the state announced that the English language arts and math standards had been



**Schools, including those in the Boulder School District, could choose to offer the climate literacy designation. It would also be voluntary for students, unlike climate literacy certification in some other states.**

updated to include climate change education. The state has appropriated \$5 million toward climate change education in its 2024 fiscal year budget. This funding helps pay for a climate education hub to enable teachers to share instructional materials. Other states, including Connecticut, are trying to follow in New Jersey's footsteps.

A National Public Radio story in 2023 explored the New Jersey program a year after its 2022 implementation. It told of one school where students learn about climate change not only in a ceramics class but in physical education, too. The example was a wellness class at a grammar school in Pennington where students sat in a circle in the gym. Ordinarily, they would have been outside, but smoke from wildfires in Canada kept students indoors. The game they played was designed to help the students understand the impacts of wildfire smoke on air quality and on their bodies.

The NPR story also told of places where there has been pushback on instruction in K-12 schools. In Idaho, legislators repeatedly rejected learning standards that mentioned climate change. In Pennsylvania, after an outcry from the school board, the Kutztown School District banned a popular young adult novel about middle schoolers navigating

disasters. The NPR story also reported that a bill then being considered by Ohio legislators would require public universities and college professors to teach the "scientific strengths and weaknesses" of climate change.

Even in New Jersey, where 70% of residents support climate change education, some oppose it.

## Colorado bill proposes to include nuclear as a clean energy resource

A Colorado legislative committee is scheduled on Jan. 24 to take up a proposal to classify nuclear energy as a clean resource

The bill submitted by Sen. Larry Liston, a Republican from El Paso County, proposes to add nuclear to the list of clean energy resources previously reserved to biomass, geothermal, solar, small hydroelectricity, and wind – as well as hydrogen derived from these.

Liston's bill points out that nuclear currently provides half of the carbon-free electricity in the United States, and that nuclear energy has a capacity factor that is 2 to 3 times higher than wind energy and 4 to 5 times higher than solar energy. Capacity factor is a measure of how much of the time the plant is operating at full power.

This higher capacity factory – sometimes called baseload – will allow it to integrate with "weather-dependent and seasonally variable wind and solar generation, mitigating the potential for brownouts and blackouts in Colorado."

The bill speaks to "high-quality and high-paying jobs" that nuclear can deliver and to the piggybacking Colorado can achieve with federal funding with this reclassification.

The bill has no co-sponsors from either party, which suggests it will not get far, likely not even out of its first committee.



# Solar industry and allies seek changes in electrical systems at the local level

‘Virtual power plants’ mentioned often in legislative conversations

by Allen Best

“We have a mid-20<sup>th</sup> century way of doing things as we hurtle through the 21<sup>st</sup> century.”

That’s how Mike Kruger, president of Colorado Solar and Storage, describes the situation that has spawned a bill almost certain to be introduced into the Colorado General Assembly in coming days that might dramatically rearrange how Xcel Energy goes about its distribution system planning.

The bill has a fancy, forward-looking title: Powering Up Colorado.

“Right now Xcel’s system is not pleasing anybody,” says Kruger. “I think internally they are struggling as well.”

As we expand the use of electricity, we need upgrades in how we distribute electricity at the neighborhood levels. Those costly upgrades can include upgraded transformers and other equipment. Costs can run from \$6,000 to \$10,000. This can discourage lower income residents from electrifying.

Efficiency is also an issue. Instead of one-off upgrades, COSSA wants to see more efficient methodologies used for broad, neighborhood-scale upgrades that will be needed as we expand the use of electricity almost everywhere.

That will take money, but the money now being spent is being done so in neither an equitable nor efficient way, says Kruger.

PUC commissioners have also talked about the need to get a handle on distribution system planning.

Going back to the 1950s, ours was a world premised on large amounts of fossil fuels. Electricity flowed only one direction, from central power plants to consumers.

Now, electricity can flow both ways, including from solar rooftops. Car and truck batteries can be used to power homes. Some homes have Tesla batteries. We’re moving to electrify both transportation and buildings.

There’s much talk about virtual power plants. A virtual power plant, [as defined by the Rocky Mountain Institute](#), is comprised of hundreds or thousands of households and businesses that offer the latent potential of their thermostats, electric vehicles (EVs), appliances, batteries, and solar arrays to support the grid. These devices can be flexibly charged, discharged, or managed to meet grid needs. When these devices are aggregated and coordinated, they can provide many of the same energy services (capacity, energy, ancillary services) as a traditional power plant.

Using the old model, the general task in figuring out how to pay for expansion of electrical wires in neighborhoods was that





those creating the need for upgrades should have to pay for the upgrade.

It made sense, didn't it?

But here's the rub. The person who upgrades now and needs the upgrade can be forced to pay the full cost. That can kill the economics of a new solar roof. The solar industry and allies see need for a fundamental rethink.

To illustrate the problem, Kruger cites a Golden neighborhood, where homes were built in the 1970s and early 1980s. Few felt the need for air conditioning. Almost nobody had a computer. "The biggest load was incandescent lights."

Now we have roof-top solar — and after the third or fourth roof installation, a new transformer is needed.

Another example Kruger cites comes from the Montbello neighborhood of northeast Denver. Abutting the former airport named Stapleton, it was lower income, and residents there certainly had less need for higher performance neighborhood transformers.

"Lower-income individuals don't have \$6,000 to \$10,000 floating around for distribution upgrades. That is part of the system we're addressing. We don't want to leave our low-income individuals behind in Colorado's energy transition."

A third example comes from downtown Denver. The city is driving building owners to electrify and replace natural gas. Building owners have been pushing back because of the high cost of electrical upgrades, in some cases running to the millions of dollars.

But returning to the residential neighborhoods, the cost of upgraded transformer capacity can discourage residents who want to buy electric vehicles, add solar, or electrify their homes. "Those

neighborhoods can see two or three installs (of solar panels) and that's it."

That creates an inequity, says Kruger. Somebody in an affluent neighborhood, say Cherry Creek, can more easily afford the cost of paying for a new transformer than somebody of lesser income. Will they be stuck using natural gas — which is likely to become more expensive as systems have fewer natural gas customers — because of the cost of the electrical upgrade?

A year ago, he says, solar installers were complaining about the inability of Xcel to get systems connected in a timely matter. "Part of the issue was directly related to the grid."

The answer, he says, is more thoughtful distribution system planning, and this bill — it's being carried by at least two of the most savvy legislators as regards energy bills, Sen. Chris Hansen and Senate President Steve Fenberg — would force Xcel to revamp how it goes about distribution planning.

The bill likely would also apply to Black Hills Energy, but Kruger says the situation with Xcel triggered the still-being-shaped legislation. "We don't have the same problems with other utilities. We have not seen the same problem of somebody trying to electrify their building and being told it will be two years before they can do it. A year ago it was a six-month wait for a very simple interconnect."

Working with COSSA in drafting the bill have been the Colorado Energy Office, the Natural Resources Defense Council, the International Brotherhood of Electrical Workers and others. He said he believes proponents have the support of Xcel because it takes into account their concerns.

**"We don't have the same problems with other utilities."**

**Mike Kruger  
Chief executive  
Colorado Solar and Storage**

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**Senate President Steve Fenberg speaks at a legislative town hall in Boulder while State Rep. Junie Joseph listens. Photo/Allen Best**

Green Latinos also has a voice in the proceedings. Ean Tafoya, the Colorado state director, said they want to be sure additional community benefits can be folded into the system planning such as might occur with a new electrical substation.

State Sen. President Steve Fenberg, at a legislative town hall in Boulder on Sunday, described the bill as being “about making big investments in distribution systems,” but couched it a contrast with major investments by utilities.

“You don’t always have to invest in big generation or big transmission. You can actually use the system you have more efficiently and better, smarter. This is one of the big, big energy bills this year.”

Colorado has done much in the past two decades beginning with the voter-initiated amendment in 2004 that created the 10% renewable energy mandate, following by many other steps forward. Now, other states, having learned from Colorado, have surpassed Colorado.

“We basically invented community solar gardens,” he said. “We’ve done a lot, but I would say in the last couple of years, in many ways, states have learned from us and they have well surpassed what we’re doing.”

This year, he said, legislators are taking stock of past achievements but looking how to move ahead.

“It’s great that Xcel Energy has invested more in renewables, but we also know there are probably in many circumstances cheaper and more appropriate ways to get to some of these goals” than huge investments by utility companies, Fenberg said. When the utilities make the investments, he added, consumers pay for them.”

The bill, he said, will potentially incentivize and encourage more distributed generation, battery deployments and virtual power plants, “and all these things that we couldn’t have really imagined would become the norm 10 or 20 years ago.”

Also on the legislative horizon:

### **Community solar gardens**

This is an area where Colorado broke new ground in the nation – but has done relatively little planning. Kruger said that as of early January 110 megawatts of capacity had been built compared to the 425 megawatts awarded.

The idea of solar gardens was in part for low-income people to participate as well as those who live in places — think a condo or apartment house — where they cannot have rooftop solar of their own.

“Basically, right now, community solar is kind of at the whim of how much the big utilities want to do. They get tons of applications from developers to build lots of generation via community solar. And they take a small fraction of them, about a third. So far, there are a lot of companies out there that are like, we have financing. We will build community solar and they turn ‘em down,” Fenberg explained in a brief interview with Big Pivots at the legislative town hall in Boulder.

“At the end of the day, it's a way for more people to have access to renewable energy. And so it would require them to accept more of these applications and allow more capacity on the system for community solar. There's a lot of consumer protection stuff in there too, because there's a lot of door-to-door salesmen selling community solar subscriptions.”

In his previous comments at the town hall, Fenberg had also pointed to federal funding through the Bipartisan Infrastructure Act. The law requires “every community solar investment from now on has to be half or more specifically earmarked for low-income residents.”

The [Community Coalition for Solar Access](#) is said to be working this bill.

### **Can Colorado hit GHG goals?**

Colorado is reported to be behind schedule on achieving its decarbonization goals. What will you do about it, one person asked the legislators. What will be your response?

State Rep. Judy Amabile jumped in quickly. “I am bringing a bill that is about requiring providers to have a plan for getting to a 100% renewables by 2040,” she said. The bill would require utilities to file reports in 2035 “to make sure what what’s happening now doesn’t continue to happen.”

### **Environmental justice bills**

A task force was assembled by legislative order and delegated the responsibility for drafting suggestions for how to execute policies and actions to improve environmental justice. That task force issued its report in 2023, and Tafoya, the chair, said he expects to see legislation. Legislators at the Boulder meeting concurred, but they did not specify exact legislation. They did acknowledge impacts from airports and from bad air quality that tend to affect lower-income neighborhoods most severely.

Tafoya said he expects to see long-term funding for the state’s new Office of Environmental Justice plus additional measures related to air quality. He also expects to see legislation authorizing in-depth analysis of environmental justice impacts, and he suspects the foci of those studies will be Pueblo and North Denver.

### **Heat pumps**

Despite delivering incentives for heat pumps, bottlenecks exist “because a lot of the industry that installs HVAC systems doesn't know about them,” said Fenberg at the Boulder meeting. “They're not comfortable with them or they don't believe they actually perform well in cold weather. I have a heat pump, and it was fine when we were at negative 10 degrees.”

He said the legislation being shaped would create standards so that if somebody were buying an air conditioner, they would have to get a heat-pump (that can also cool; it’s sometimes called a mini-split).

“So there's a lot of things like that, like random areas of the climate world that we're addressing, a lot of the big low-hanging fruit on the utility side. It's not like we're done by any means, but it's in motion.”

### **It's time to build the damn train**

During the Boulder session, Fenberg was most animated on the subject of rail, particularly a desire to push RTD to build the rail line to Longmont (and Boulder).

“We need to think about what is the next generation of our transportation system. That means multimodal transit, overwhelmingly getting a lot of the dollars in the future,” he said. “And I think we need to build that damn train because people said yes. I can't imagine we could go to the ballot and ask for revenue for transportation ever again until we build that train.”

Fenberg also talked about transit-oriented development, a key piece of this year’s land use (and climate) agenda.

## Todd Telesz joins Tri-State, taking place of Pat Bridges as chief financial officer

Todd Telesz will join Tri-State Generation and Transmission Association as senior vice president and chief financial officer, beginning Jan. 29.

Telesz brings decades of financial and cooperative leadership to the not-for-profit wholesale power supply cooperative.

He most recently served as chief executive officer and general manager of Basin Electric Power



Cooperative, leading the 141-member, multi-state generation and transmission cooperative. He served in the capacity for two years before resigning abruptly in June 2023, [according to the Bismarck \(N.D.\) Tribune](#).

Bismarck-based Basin Electric has 141 member utilities in nine states of the upper Midwest, while Tri-State has 42 members in Colorado and three adjoining states.

Before going to North Dakota, Telesz had been in Colorado where he served as senior vice president of the Power, Energy and Utilities Division of CoBank, one of the largest private providers of credit to the U.S. rural economy. Both organizations have longstanding relationships with Tri-State. In that capacity, he had spent more than a decade providing analysis for Basin Electric, [according to Cooperative.com](#).

“Todd joins our leadership team at a pivotal moment in Tri-State’s energy transition,” said Duane Highley, Tri-State CEO. “Todd is an expert financial strategist with a deep commitment to the cooperative business model, and will help us optimize

our financial portfolio to preserve power affordability, invest in reliable and cleaner resources, and drive greater value for our members.”

In a press release, Telesz said Tri-State “is well positioned financially to advance its energy transition, ensuring affordable wholesale rates and meeting the needs of our members.”

Tri-State announced in August 2023 that Pat Bridges, senior vice president and chief financial officer since 2008, would retire in March 2024. Telesz and Bridges will work together in the coming months to ensure a smooth transition.

“Through a period of significant growth, Pat ensured our success as we invested in the resources that have kept our power supply reliable, affordable and responsible,” said Highley. “Pat will leave Tri-State financially strong and prepared for the future. We wish Pat the very best in retirement.”

## Northwest Colorado group gets \$100,000 grant to help imagine life beyond coal

The Associated Governments of Northwest Colorado has been awarded \$100,000 by the U.S. Department of Energy to “repurpose existing energy assets with a focus on collaboration and a pragmatic working style.”

Northwest Colorado has three working coal mines in Routt, Moffat, and Rio Blanco counties. It also has five coal-burning units at Hayden and Craig. The first unit is to close in 2025 and the last by 2030, although Tri-State Generation and Transmission, the operator of the three Craig units, has proposed to accelerate the closing of the last coal unit to 2028.

Tiffany Dickenson, executive director of the council of governments, called the grant a “crucial catalyst for the evolution of Craig as the community transitions away from



coal. It empowers us to explore and implement innovative strategies that will redefine the community's energy infrastructure, promoting sustainable and economic growth."

Routt, Moffat, and Rio Blanco counties altogether have 2,862 jobs related to coal, according to the council. Coal represents 21.7% of gross domestic product in the three-county area. In Moffat County, where Craig is located, it's even higher: 47% of GDP and 19.8% of jobs.

## **Fort Collins utility manager leaves post. Does dispute about natural gas have anything to do with it?**

Kendall Minor, the director of Fort Collins Utilities for nearly two years, has left the position, prompting speculation among opponents of potential plans for construction of a natural gas plant.

Platte River Power Authority, the wholesale provider for Fort Collins and three other Front Range cities and towns, has been studying what to do in anticipation of the closing of Rawhide, its coal-fired power plant, by 2030. Directors from the four municipalities have agreed to begin the permitting process necessary to build a gas plant but have not actually authorized that plan.

Opponents have objected strenuously, most notably in a presentation before the Fort Collins City Council during December. They have argued that Platte River can meet peak demands, whether on hot summer days or windless winter days, without adding new natural gas.

Xcel Energy also wants to build new natural gas generation for the same purpose, and the three Colorado Public Utilities Commission members have concluded broadly that Xcel will be justified in doing so. Tri-State similarly wants to add new natural gas generation as it prepares to close its coal

burning units in Craig. The expectation, at least in the case of the Xcel plants, is that they will be used rarely.

The Fort Collins Coloradoan reported that the city issued a statement that said Minor and Kelly DiMartino, the city manager, "mutually agreed that a change of direction is needed at Fort Collins Utilities." The newspaper cited other controversies beyond that involving natural gas.

Each of the four municipalities have two representatives on the board of directors for Platte River, typically the mayor and the utilities director. Fort Collins is represented by Jeni Arndt, the mayor, and will also be represented by Tyler Marr, the deputy city manager who is the acting director of utilities.

## **Megan Gilman gets another PUC term, into 2028**

Megan Gilman has been appointed by Colorado Gov. Jared Polis to serve on the Public Utilities Commission for another four years, ending in January 2028. She was appointed in March 2020.

Polis also announced the appointment of Bonnie Trowbridge of Berthoud to serve on the Utilities Consumer Council, replacing Susan McFaddin of Fort Collins.



# Carbon capture, an opportunity or a waste of money?

by Allen Best

Carbon capture technologies, policies and funding have been kicked around for at least 20 years. Now they're shaping up as a focal point for arguments in Colorado and beyond.

Speaking in Aspen recently, physicist Joe Romm said he sees no future practical use for carbon capture and sequestration. He was particularly dismissive of the notion of direct air capture.

"Direct air capture, the literature is very clear, doesn't make any sense."

To capture CO<sub>2</sub> at scale will require massive amounts of energy. All of the Houston Astrodome will have one ton of CO<sub>2</sub> in the air. The atmosphere has billions of tons.

Until we quit polluting the atmosphere with combustion of fossil fuels, "you are just squandering money, flushing it down the toilet and misleading a whole bunch of people into thinking that you have a solution to remove carbon dioxide out of the air when you need to stop putting it there in the first place," said Romm, a sharp-tongued senior Research Fellow at the [University of Pennsylvania's Penn Center for Science, Sustainability and the Media](#).

You can be sure that Romm is not on the agenda at a two-day conference in downtown Denver being conducted by the Western Governors Association in early February that will be devoted to direct air capture and other topics falling somewhat

ironically under the heading of "decarbonizing the West."

The event is hosted by Colorado Gov. Jared Polis, although the initiative has been driven by Wyoming Gov. Mark Gordon during his year as chair of the Western governors' organization.

[See agenda here.](#)

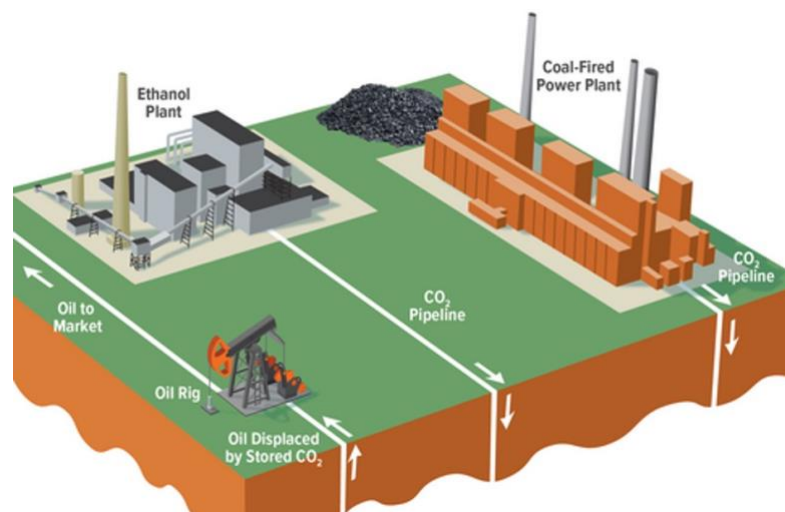
When that conference is held, state legislators a few blocks away at the Colorado Capitol may be getting a peek at a bill that proposes to create the legal governance of pore spaces in Colorado's subterranean, where the carbon might be sequestered.

State Rep. Brianna Titone announced at a meeting of her constituents in Arvada on Saturday that she will sponsor the bill that would create a legal structure for pore-space ownership similar to that of mineral rights.

Titone, a professional geochemist and geologist who worked in the mining sector, pointed out that Colorado has strong geology for carbon sequestration.

Colorado has some sectors, most notably the cement industry, which are hard-pressed to figure out how to decarbonize without sequestration.

Two projects are planned or at least proposed. One would stow the emissions from a natural gas plant on the Southern Ute Reservation near Ignacio. A second involves a cement plant along the Front Range.



Cement is estimated to be responsible for 7% of global greenhouse gas emissions.

Other companies have been looking into alternatives. An Arvada-based company has talked about drawing emissions from an ethanol plant at Yuma at the smokestack and burying it. The same ethanol company also has two other plants in Colorado.

A December 2023 Congressional Budget Office report, “Carbon Capture and Storage in the United States,” says that the United States has 15 CCS facilities operating. They altogether have the capacity to capture 0.4% of the nation’s total annual CO2 emissions.

An additional 121 CCS facilities are being constructed or are in development. If they get completed, they would increase the nation’s CCS capacity to 3% of current annual CO2 emissions.

“Those percentages are small in part because CCS is generally used in sectors that have the lowest costs for capturing CO2 – such as natural gas processing and ammonia and ethanol production – and those sectors account for a small share of total US CO2 emissions.

And then there is this – as was alluded to by Romm in an interview with the Aspen Daily News’ Scott Condon prior to his Colorado visit – almost all CCS facilities recoup some of their costs by using the captured CO2 to force more oil out of partially depleted oil wells.

What drives the CCS sector? Federal funding is at least a major part of it. The Congressional Budget Office points out that the sector received \$5.3 billion annually from 2011 through 2023.

The funding pipeline continues. The 2021 Infrastructure Investment and Jobs Act delivers \$8.2 billion in advance appropriations for CCS programs during 2022-2026.

Then there are the section 45Q federal tax credits. Companies claimed \$1 billion in those tax credits from 2010 to 2019. The reconciliation act of 2022 expanded section

45Q credits. Budget officials project the credits will reduce federal revenues by \$5 billion during 2023-2027.

Direct air capture has been unfolding in recent years, including a prototype at Squamish, between Vancouver and Whistler. A direct-air capture project began operations in the United States recently, receiving what Romm described as massive media attention. It was a PR coup, he added, as it could capture just a few thousand tons among the 5 billion in the atmosphere.

Romm expressed scorn for Bill Gates and other technologists who made their fortunes in software. “That’s the model of bits. We’re in the world of molecules, and that is a completely different world that venture capitalists don’t understand.”

One million apps in no time at all and at no cost at all. That’s what software developers do.

“You want a million direct-air capture plants. That will take a long time. Even if you can build the first one commercially – we have not yet done that,” he said.

The technology is inefficient and wildly expensive.

He dismissed hydrogen with much the same language, pointing out that he had actually written a book about hydrogen. Just too much energy gets devoted to the processing of hydrogen. He also pointed to the volatility of hydrogen that makes it extremely dangerous.

“Hydrogen is literally the last thing you would do if every other possible way of doing it fails,” he said.

You can access a tape of Romm’s remarks in Aspen about carbon offsets, liquefied natural gas and other topics. [The recording is of marginal audio quality.](#)

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## Study examines impacts of wind farms on birds and also fossil fuel drilling

Under the headline “Sharing the Skies,” the Economist in its Jan. 13 issue reported that a new study had found wind turbines are much friendlier to birds than oil-and-gas drilling.

The researcher, Erik Katovich, an economist at the University of Geneva, had studied Christmas Bird Counts conducted by Audubon volunteers across the United States from 2000 to 2020. It was a time of many new wind farms but also many more oil and gas wells.

Production of shale gas produced by hydraulic fracturing of rocks rose from 37 million cubic meters in 2007 to 740 million cubic meters in 2020.

Results show that the onset of shale oil and gas production reduces subsequent bird population counts by 15% even after adjusting for location, weather, counting effort and anthropogenic land-use changes.

“Wind turbines do not have any measurable impact on bird counts,” [said the abstract](#).

[The Economist](#), examining the report published in Environmental Science & Technology, noted that Katovich’s finding held true even when he looked specifically at hawks, eagles, and other large birds.

[Writing in his newsletter for the Los Angeles Times](#), Sammy Roth talked with two scientists with the National Audubon Society. They say that Katovich’s methodology probably resulted in underestimating the impact of turbines. Prior research had found that wind farms are much more likely to kill or injure birds that spend time right near the turbines, they said. But they thought it sounded about right otherwise.

In Wyoming, Erik Molvar, a wildlife biologist who leads the Western Watersheds Project, was more critical of the methodology. First, the data collected by volunteers was imperfect, plus he had not analyzed the number of birds of each species recorded at each location – a crucial measure of biodiversity.

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Molvar also pointed out that wind farms and fossil fuel extraction can affect birds in different ways. Wind farms are more likely to kill birds than displace them. And some birds are more sensitive to wind farms than others.

Katovich, after hearing Molvar's criticism, told the LA Times' Roth he found them thoughtful and informed. But he said that the same way his study could be missing some of the damage to bird populations from wind energy could be underestimating the harm from oil and gas, too.

## **Feds foster innovations in cold-climate heat pumps**

Bosch, Daikin, Midea, and Johnson Controls have joined in the next phase of a federal program expected to involve the installation and monitoring of more than 23 heat-pump prototypes in various cold-climate locations throughout the United States and Canada during the next year.

They join four existing partners: Lennox International, Carrier, Trane Technology, and Rheem.

The U.S. Department of Energy said these additional companies had produced heat pump prototypes that can deliver 100% heating capacity without the use of auxiliary heat and with significantly higher efficiencies at 5 degrees Fahrenheit.

DOE is now turning to partnering states, utilities, and others that had originally committed to participation in the DOE's Cold-Climate Heat Pump Challenge.

"Deploying next-generation technologies like heat pumps is critical to the Biden-Harris Administration's efforts to ensure that Americans have access to more affordable clean heating and cooling options – no matter where they live," said Jennifer Granholm, the secretary of energy.

## **United Power adds 34 megawatts of battery storage to its future**

At his office 25 miles northeast of downtown Denver, Mark Gabriel continues to add components to the electric grid for United Power that he will oversee beginning next May.

It's part of the what Gabriel, the chief executive, calls United Power's "strategy of hyper-localizing generation and storage."

In December, United announced plans for 34 megawatts of battery storage. The batteries will be able to be discharged for up to six hours for a total discharge capability of approximately 74 gigawatt-hours during one year of operation. The battery gives the electrical cooperative the ability to balance load and further integrate renewable resources into its operations.

"The use of batteries on our distribution network is essential to a resilient and responsive power system and we are excited to be moving ahead aggressively with Whetstone to get this system online," said Gabriel. By the measure of total electrical demand, it is the largest cooperative in Colorado, with 110,000 customers stretching from the foothills to the oil and gas fields on the northern fringe of metro Denver.

"These battery arrays will give us the ability to balance our power needs throughout the day and incorporate local renewables more efficiently. This furthers our efforts in hyper-localizing our power supply."

The contract with [Whetstone Power](#), a developer of sustainable energy infrastructure, is good for 20 years. The company expects the asset to be in place during 2024.

The battery system will be located at a United Power substation and grid-charged, enabling the system to be operated as a six-hour solution, allowing it to discharge over a

fairly long duration, thereby providing additional grid stability. This should allow United Power to use more renewable energy, further reducing its carbon footprint while ensuring reliable service to its membership.

United Power was a pioneer in battery storage among Colorado’s electrical utilities. In December 2018 it began using Tesla batteries with 16 megawatt-hours of storage. That remained the largest in capacity until November 2022, when Holy Cross Energy began use of batteries that have more capacity.

United Power has been building a power portfolio ahead of leaving its current power supplier, Tri-State Generation and Transmission, on May 1, 2024. The cooperative recently announced a prior agreement with Whetstone, in addition to agreements with Guzman Energy, OneEnergy, and Ameresco for portfolio assets related to this exit.

Diversity is the defining characteristics of this new generation. There’s solar from the San Luis Valley, wind from Guzman Energy, and this and that.

[In his November blog post](#), Gabriel wrote about selection “of at least nine providers” that will replace Tri-State’s power.



“Over time, we will have more control over our generation costs as we increase the amount of carbon-free resources and deploy and manage one of the nation’s first distributed battery storage systems. These systems will allow us to buy and store power when energy prices are low and use it when the demand is high. As a wholesale energy market comes to Colorado in 2026, we will further be able to leverage becoming a distribution system operator by buying and selling resources across the Western marketplace.”

In his [January posting](#), Gabriel further laid out his strategy:

“As we prepare for our upcoming [power supply transition](#), United Power is adding significant amounts of battery storage, spread across our system. We are locating natural gas peaking units tied in to the distribution — versus transmission — networks and contracting with power supplies closer to the communities we serve. This reduces line losses, improves reliability, and keeps tax dollars local. We will couple this with efficiency programs, support any members who want to generate part of their own power through solar, and expand demand response options now that we will have a realistic peak window,” he wrote..

“Of course, we will continue to get power from generation plants and support efforts to build out the transmission grid as it will continue to have a role in a modern electric enterprise. But, we will focus on what we can do locally.”

## Snow removal’s carbon footprint in Crested Butte

In Crested Butte, there are many calculations to snow removal. The snow removed from Elk Avenue and other streets gets deposited in a gravel pit that acts as a wetlands, for example.

Also part of the calculation, reports the Crested Butte News, is how many greenhouse gases are removed (typically

1,425 kg of CO<sub>2</sub>), according to Shea Earley, the public works director. Removing snow from Elk Avenue, the primary commercial street, causes just more than half of that amount.

Earley told the town council that acquisition of two hybrid loaders had resulted in an approximate 50% reduction in GHG emissions and fuel consumption.

## Time-out in Mesa County for big solar arrays in order to develop regs

Mesa County has on Jan. 10 adopted a six-month moratorium on new commercial solar arrays to give the county staff and area residents time to adopt appropriate regulations governing them.

The [Grand Junction Sentinel reports](#) that the moratorium was supported by solar developers. It came at the behest of several residents, particularly in the Palisade area, who have been upset by new solar arrays.

“Numerous counties across Colorado have developed sensible and sound, pro-growth and pro-business large-scale solar project regulations,” said Lou Villaire, general manager of Atlasta Solar Center, a Grand Junction-based firm. “We are grateful to see that the moratorium is narrowly tailored and is intended to balance the positive that the new businesses bring.”

Commissioner Janet Rowland said this issue differs from natural gas in that many regulations cover natural gas. “It’s very different in this situation, whereas (solar) is not in our code.”

In an editorial, the Sentinel applauded the moratorium while also calling out why solar has been surging. Gov. Jared Polis has signed more than 30 bills since 2021 to accelerate the transition to green energy. Colorado ranks sixth among states in the amount of sunshine it receives. Cooler temperatures – at least compared with Arizona — improve solar panel efficiency.

## Bill proposes a first for developers would have to show sufficient water

Colorado has always had something of a disconnect. A developer of real estate did not actually have to provide evidence of water sufficient for that development prior to submitting plans to local land-use officials.

State Sen. Rachel Zenzinger, a Democrat from Arvada, told constituents at a Saturday meeting that one of her bills would require exactly that. The bill has not yet been submitted, however.

Also in the water or at least sewage realm is a bill that would give the metropolitan wastewater district expanded authority to investigate illegal dumping of really, really bad stuff down the toilet or other sewage drains. The bill, [HB24-1062](#), has bipartisan sponsorship.

The bill allows authorized inspectors of a district to enter and inspect, in a reasonable time and manner, any property for the purpose of investigating any violations of the program. If an inspection is denied, the bill authorizes a district to obtain a warrant from the district court or county court upon a proper showing of the need for entry and inspection.



# What transmission will Colorado need in next 20 years?

Study now underway seeks to deliver answers crucial for state to attain GHG reduction goals.

by **Allen Best**

As Big Pivots has noted any number of times, the hum of electrons from transmissions does not trigger in all but the most rare of people the same murmurs of visceral happiness as does a stream or river of water. That said, for Colorado to meet its carbon reduction goals, improving the flows of these electrons will be critical.

Possibly critical in achieving this orderly flow will be the Colorado Electric Transmission Authority, a political subdivision of the state created by legislators in 2022. A story in Big Pivots during May 2023 called it the [transmission developer of last resort](#), a title that does not fully reflect the array of legislatively assigned tasks. Legislators also gave the agency crucial tools, including the power of eminent domain and bonding authority.

With its feet now under it some 18 months since the first meeting of directors, CETA has commissioned a study to assess what rivers of electricity Colorado needs from 2024 to 2044. The consultant, Energy Strategies, is to deliver a report to the Colorado Public Utilities Commission on or before August. A final report is to be delivered to the General Assembly in January 2025.

In requesting proposals during October, CETA set the budget at \$400,000 to \$500,000.

The to-do list is extensive:



- What transmission capacity will be needed to meet Colorado’s forecasted demand for electricity and achieve the state’s emissions reduction goals?
- How can the flow of electricity in the transmission network can be improved and how can reliability of the electric grid be improved?
- What might be the role of advanced transmission technologies and electricity storage in meeting the needs for expanded transmission capacity?
- How can land impacts of this expanded transmission network be minimized by using existing rights-of-way and reconductoring. That’s the process of stringing new conductors on existing towers using the same rights of way to increase the thermal capacity of the transmission lines.
- \* What new transmission corridors will be needed?





**Both the San Luis Valley, above, and southeastern Colorado’s Baca County are beset by declining aquifers insufficient to continue current agriculture production, and both have superlative renewable resources. They also are maxed out on the transmission capacity to justify added development. *Photo/Allen Best***

This study was specifically required by last year’s massive [SB23-016](#), the bill whose prime sponsors included Sen. Chris Hansen and Rep. Karen McCormick. The first report must be delivered to the Colorado Public Utilities Commission before Sept. 1 with a report to state legislators due in January 2025.

A question: Xcel Energy has already started building nearly \$2 billion in transmission on Colorado’s eastern plains. It proposed another \$3 billion as part of its electric resource plan. PUC commissioners have said that Xcel had failed to justify that much investment. Tri-State Generation and Transmission and the Western Area Power Authority also have ample transmission networks.

Given all this existing and planned investment, why might more be needed?

Maury Galbraith, an economist with broad experience in transmission in the West, was hired to lead the agency in April 2023. He says that the individual utilities are doing the transmission planning necessary to

meet the needs of their customers. They are responsible for specific service territories.

“This study looks holistically at the entire state and asks what are the needs for Colorado to achieve its clean energy goals. We are looking more holistically at a wider geographical footprint. We may find different needs or transmission solutions than Xcel or Tri-State or another incumbent utility might find.”

Galbraith described the study as a “gap analysis.” The study may conclude that the existing utility transmission will be sufficient to meet Colorado’s needs. Or it may find gaps.

“The study acknowledges there is the possibility for duplication. We are going to do a gap analysis to make sure we are not duplicating those other efforts. We want to identify gaps and specific niches.”

**C**olorado has two areas of exceptional abundance in potential renewable energy that are similarly poor in the

transmission needed to deliver the electricity to markets.

The San Luis Valley scores extremely high in solar potential given its higher elevation and rare cloudiness. The only existing transmission is across Poncha Pass.

Southeastern Colorado also has potential renewable energy that cannot now get to urban markets. The Colorado Energy Pathway swings south to the Lamar area before hooking westward to Pueblo, completing something roughly resembling a quadrangle across the eastern Plains.

A transmission line called Longhorn that would extend south from the Lamar area toward Springfield would cost an estimated \$700,000. The PUC commissioners indicated they believe there is merit in this idea — just not yet.

The two areas are also alike in that land now devoted to agricultural production will have to come out of production because of declining water resources. Both have average annual incomes well below the state average.

CETA has asked Energy Strategies to look beyond the four corners of Colorado and also to look at connections to organized wholesale markets, which currently exist east and west but not in Colorado to the degree that legislators have said must occur by 2030.

“Colorado isn’t physically connected with its neighbors in a real robust way,” says Galbraith. “So there is probably some interstate transmission that may pop up in that needs assessment. People are speculating that there is a need for transmission to the Eastern Interconnection Grid, or possibly upgrading the existing interties (In Colorado near Lamar). That could pop up on the radar screen. People are suggesting that Colorado needs to interconnect with the PacifiCorp system in Wyoming. We need to take a look at that.”

How about better connecting with New Mexico? That state has an older agency, the Renewable Energy Transmission Authority that served as the model for CETA. It has produced plans for a transmission line that will run along the New Mexico-Colorado border. What might be the role of Colorado in that or other potential lines?

Those are the sorts of lines that a specific utility might find difficult to explain to regulators or its members but which would serve Colorado’s decarbonization goals more broadly, says Galbraith.

For its very first meeting in 2022, CETA didn’t have enough members present to justify a meeting. Things have improved since then. The board met four times in 2023 but in 2024 will pick up the pace to six meetings.

It has three standing committees who meet independently. One is narrowly focused on finances, the second on transmission planning.

The third, the [Partnership Development Committee](#), has a draft partnership policy that spells out when CETA will work with independent transmission developers – and when not.

The policy sees three levels of partnerships:

- basic, where CETA can provide support and facilitation;
- intermediate, where projects are further along and the developers are interested in partnering with CETA or tapping CETA’s power of eminent domain to acquire rights of way; and
- advanced: a developer needs to access the bonding authority of CETA that was enabled by the 2021 law.

In addition to its authority centered around achieving clean energy, the law spells out CETA’s mission being to boost reliability of electricity and also to deliver economic development.

See more at: [About CETA](#)

**“Colorado isn’t physically connected with its neighbors in a real robust way.”**

**— Maury Galbraith  
Executive director  
CETA**



## Are these three public hydrogen fueling stations in Colorado just the start?

This was originally posted at [BigPivots.com](https://www.bigpivots.com) on Jan. 12, 2024.

by Allen Best

Colorado could have its first three commercial hydrogen fueling stations operating sometime in 2025. The market focus of the stations planned for Fort Collins, Pueblo, and the Globeville area of Denver will be on medium- and heavy-duty trucks.

“This is a historic moment,” said Brian DeBruine, an investor in New Day Hydrogen, a company that partnered with Colorado State University to secure \$9 million in federal funding from the U.S. Department of Energy. “Until we have the first fuel stations, we have no hydrogen in transportation.”

New Day plans to use electricity to create hydrogen from water secured from the municipal utilities of the three cities. DeBruine said restaurants use six times as much water as will be needed for hydrogen

fueling stations that have about as much traffic as the typical neighborhood gas station.

The three cities were chosen for this first rollout of hydrogen fueling stations because Colorado State University has institutions in all three. The locations were also chosen because they will allow for use by commercial vehicles that operate on the Interstate 25 corridor.

Only the location in Fort Collins, at CSU’s Powerhouse Energy Campus on North College Avenue, has been identified. A hydrogen station there has been planned for several decades but was slow to get municipal approval. It now has that approval.

In Pueblo, where CSU has a campus, the city has identified two locations. In Denver, New Day is looking at locations in the industrial area north of the National Western Complex, where the university now has a campus called The Spur.

New Day Hydrogen must also arrange supplies for electricity. No new substations seem to be necessary at the scale and locations planned.

The National Renewable Energy Laboratory in Golden has a hydrogen fueling station, but it is reserved for NREL’s use.

“This is a huge validation of our vision to build early micro-hubs,” said Seth Terry, the chief executive of New Day in a broadcast e-mail. He called it a “rare opportunity to launch three nodes for an emerging hydrogen fueling network along a major interstate corridor — with 80% of project costs covered by the Department of Transportation.”

### **New Day Hydrogen and CSU snag \$9 million in federal funding for fueling stations in Fort Collins, Denver and Pueblo geared toward medium- and heavy-duty fleet vehicles.**



***This hydrogen fueling station has been transported to Fort Collins. Photo/New Day Hydrogen***

Terry also acknowledged an earlier grant of \$250,000 from the state's [Office of Economy Development and International Trade](#).

Hydrogen has been almost unknown in the U.S. transportation sector with the exception of California. There, 60 fueling stations have been installed, mostly with the intent of providing fuel for passenger vehicles.

Buford Barr, the chief operating officer of New Day Hydrogen, said the Colorado project aims for a different approach. New Day hopes to build demand for hydrogen from companies who haul heavier loads and travel greater distances. In time, the company hopes to create demand sufficient to justify many more hydrogen fueling stations in metro Denver and elsewhere.

New Day has executed agreements with four organizations: Via Mobility Services, Fluid Truck, Colorado CarShare, and AAA Colorado. AAA has in mind hydrogen fueling for its service fleets, while Colorado CarShare has an interest in acquiring small commercial vehicles.

A contractor from Cheyenne has been identified as the likely builder of the stations, and NREL has agreed to be an independent third-party evaluator.

Ultimately, New Day hopes to be part of a new ecosystem for decarbonized fuel sources that will include passenger vehicles.

DeBruine cited national polls that shows only a minority of respondents saying they would be willing to buy electric cars, at least in part because of the more lengthy fueling time. Hydrogen vehicles can be refueled in about the same time as is required for gasoline or diesel.

**S**tate funds may also aid in this shift. In 2021, Colorado legislators created sources of dedicated transportation funding, including the [Community Access Enterprise](#). That program is projected to receive approximately \$310 million to support electric vehicle charging and hydrogen fueling infrastructure.

That same law also funded two other enterprise programs, Clean Fleet and Clean Transit. New Day hopes to work with fleet operators to tap money in those programs to help them defray the higher cost of hydrogen-fueled vehicles. Some federal funds will also be available to drive down the existing cost differential.

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Boulder County also reaped a \$4.9 million from the same Federal Highway Administration grant program. That money is to be used for 100 electric charging stations in Boulder County’s low- and moderate-low-income neighborhoods as well as rural areas and high-density neighborhoods.

Independent of the grants, New Day Hydrogen hopes to go forward with a hydrogen fueling station in Boulder in the area proximate to the former Valmont power plant.

These two Colorado grants were among \$623 million announced by the federal agency for projects in 22 states and Puerto Rico. Most of the money went to charging infrastructure, but the single large award, \$70 million, went to Texas, for five hydrogen fueling stations in the quadrangle of Houston, Dallas, Austin, and San Antonio.

California got grants for two hydrogen-related projects, including \$12 million for a project at Barstow, a key gateway to other Southwestern states. A \$15 million grant will support a joint hydrogen and EV-charging project in the New York City borough of the Bronx.

[E&E News reports](#) that tens of millions of dollars were allocated to construct very high-capacity chargers for battery-electric trucks. Those include almost \$64 million in New Mexico for two truck charging stations on Interstate 10 and about \$76 million for two projects along Interstate 5 and I-10.

### What you had to say

Among the responses to this story was that of Fred W. Porter of Carbondale, who on Jan. 15 had this to say:

The wind-to-wheel efficiency of H2 compared to battery-electric is abysmal. (I.e. 3x as many wind turbines or solar modules per fleet.) Until we have exhausted all other avenues for use of otherwise-curtailed renewable output, we need to electrify vehicles with easier electrification profiles

instead; 99.9% of those are still running on diesel.

When we do get to the heaviest and longest-trip trucks, swappable batteries should be considered first. They work on my drill, and millions of e-bikes, scooters and there is expanding deployment for trucks in Asia and Australia.

This is not just from start-ups but Mitsubishi, Isuzu and the giant Chinese CATL battery company. Here it seems to be a “suppressed technology.”

He cited these stories:

[“This Giant Electric Semi Can Swap Out Batteries!”](#)

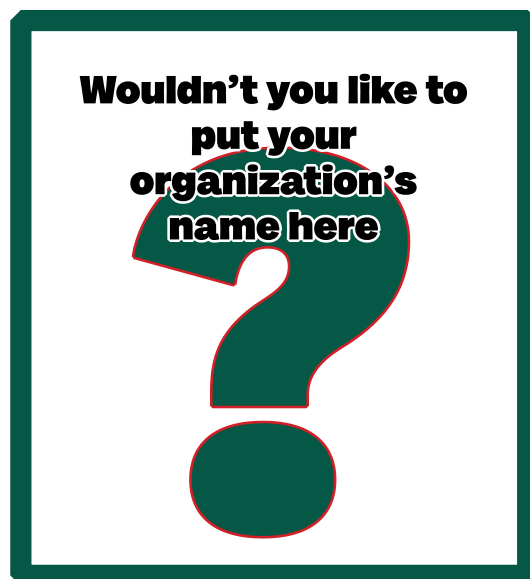
[“Battery Swapping for Large Trucks – Is this the Way to Go?”](#)

[“Battery swapping key for heavy-duty trucks.”](#)

Worldwide, there are multiple stories of van, truck and bus fleets buying H2 vehicles with big grants, etc., and then mothballing them and getting BEVs. Why is this being hyped for Colorado?

[Bavaria Enters Act 3 of Tragicomic Odyssey of the Hydrogen Fleet.](#)

[Hydrogen Van Firm ‘First Hydrogen’ Fated to Fail but What Questions does it Raise?](#)



## A small but first clear step for Moffat County to create an economic foundation after coal

Moffat County has achieved its most tangible step yet in creating an economy to replace the lost jobs and tax base of its three coal-fired electrical plants at Craig Station and the associated coal mines.

The county has received a \$150,000 grant from Colorado's Office of Just Transition. This money is to be used to conduct a socio-economic study of a potential pumped-storage hydro project near Craig. It will be necessary in the application for a permit from the Federal Energy Regulatory Commission.

The project, still very early in the permitting process, has an estimated cost of \$1.5 billion to \$2 billion and could employ 30 to 40 people.

The Moffat County commissioners on Tuesday awarded the job of conducting the study to [SWCA Environmental Consultants](#), a company based in Broomfield. The study is to be done by April.

"I think it's important to understand, when trying to wrap your head around this, that the politics of shutting down a coal plant are not helping us replace 47% of our budget once they are closed," said Tony Bohrer, a county commissioner. "It's not because we're running out of coal."

But it was the county commissioners and their staff, not another agency, that noticed a filing in the Federal Energy Regulatory Commission that a developer was interested in creating a pumped-storage hydro. Moffat County then reached out to the developer to understand what was being pursued and, when the grant opportunity became available, applied.

"If we found another business that was really looking at Moffat County, we would be

doing the same thing, pursuing every avenue to be sure they could be successful here."

Local governments in the Yampa Valley depend heavily upon property tax assessments of the coal infrastructure. The coal-associated jobs also pay well, about \$100,000 a year.

Jeff Comstock, who directs the county's Department of Natural Resources, agreed that this is the most tangible step forward yet for the county as it plans for the future.

"It will take a lot of things to replace what we are losing, and pumped-storage hydro might be one of the bigger tax bases, but we won't know until we get further along in the process."

Moffat County, he added, has been looking at many ideas, and so has the city of Craig.

Xcel Energy announced in 2018 that it was planning to get out of coal but did not give an immediate date for closing the two coal-generating plants it owns and operates at Hayden.

At Craig, one unit was already scheduled to close by 2025 when Tri-State, in January 2020, announced it was also planning to close the other two units. The last coal unit is currently scheduled to close in 2030, although Tri-State recently announced it hopes to accelerate the retirement of the final unit to 2028.

Three years ago, the county commissioners noticed a filing of interest in the Federal Register by a developer in developing a pumped-storage unit. They invited the company, now called rPlus Hydro, to meet with them. The county has also been in conversation with Tri-State. Tri-State has not included the idea in its electric resource plan filing, but the Moffat County officials describe Tri-State as being encouraging.

The key logic to this proposal lies in the existing transmission lines that deliver electricity generated at the three coal-burning units at Craig and two coal-burning units at Hayden to other parts of Colorado and the region.

But electricity generated by wind and solar in other locations could also be transmitted to this pumped-storage hydro site. It is 16 miles from the Hayden plant and 10 miles from the Craig plant.

Even today, as Xcel Energy had started installing battery storage along the Front Range, the company's single biggest storage technology consists of the Cabin Creek project between Guanella Pass and Georgetown. [The two units of Cabin Creek can together generate 324 megawatts.](#) Water is released from the power reservoir to generate electricity as needed to meet peak demands. Then, when electricity is plentiful, it is pumped back up the hill. Very little water is lost in this process.

The same principle would be used in the Yampa Valley. There, the proposal is called the Craig-Hayden Pumped Storage Hydro Project.

Output would be 600 megawatts. That compares with the generating capacity of Hayden Station at 447 megawatts. The three Craig units have a combined capacity of 1,304 units.

As now envisioned, the pumped-storage project would be entirely on private land. The project developer has completed leasing. It would consist of a 600-acre upper reservoir and a 110-acre lower reservoir, joined by a combination of buried pipe and tunnel.

There are alternative configurations that will be studied as the proposal moves forward, said Matthew Shapiro, the chief executive of rPlus Hydro, the developer.

Vertical drop matters. Pumped-storage can be done with just a few hundred feet.

"Generally speaking, the higher the head, the better for pumped storage. And

1,500 feet is an excellent vertical drop. That's what we have here," he told Big Pivots.

Shapiro's company has a preliminary permit, which he describes as merely a place-holder in the permitting process. Next comes an actual application. This socio-

economic study would be required to accompany that application. This could happen during the next year.

Why did neither Xcel nor Tri-State include this project as being among the technologies in their electric resource plan applications with the Colorado PUC?

Shapiro said those plans look out five to eight years – but not longer. "They have to be careful in evaluating

technologies and seeing what projects are maturing and ready to be formally included in an electric resource plan."

So it's possible that this project could show up in plans submitted in the next three to four years.

### See other stories by Big Pivots about pumped-storage hydro in Colorado:

- [Company says it has deal with landowners along the Yampa River.](#) Sept. 23, 2023.
- [Will these projects help Colorado achieve its decarbonization goals?](#) May 10, 2023
- [Thinking about wind and water in Wyoming.](#) June 14, 2022
- [A short rope for Xcel and pumped storage.](#) June 14, 2022
- [Can pumped-hydro helped Colorado utilities integrate more renewables?](#) June 26, 2021.

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