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Another proposal for pump-storage in Yampa Valley

by Allen Best

A second proposal for a pumped-storage hydropower project in the Yampa Valley has become public.

A Florida-based company is seeking a preliminary permit from the Federal Energy Regulatory Commission for a project involving the Twentymile Mine. A project in the Craig-Hayden area is also on the FERC processing table but at a more advanced stage.

The 250-megawatt Twentymile Pumped Storage Project would use the existing tunnels, galleries, and other subterranean workings of the coal mine in Twentymile Park as the lower reservoir. The water would be pumped 1,300 vertical feet to a new reservoir on a nearby bluff.

The two reservoirs would be connected by a 16-foot-diameter concrete-lined tunnel.

A 100-foot-high dam would be needed to create the higher 20-acre reservoir. It would have a capacity of 1,550 acre-feet.

[The letter to FERC filed in March 2023](#) explained that the stored water could

operate at full-power generation for up to 6 hours per day.

The application was first reported recently by the [Yampa Valley Bugle](#).

If approved by FERC, the developer can conduct a feasibility study on the project and will have exclusive rights to seek a full permit for the project.

Who is exactly behind this proposal? The Bugle pointed out that the West Palm Beach address matches that of [Rye Development](#). Rye describes itself as

“leading a new generation of pumped storage hydropower in the U.S. and helping create a more reliable energy grid.”

One of its projects is [Lewis Ridge](#), which is to get \$81 million in federal

funds to use a former coal mine in eastern Kentucky. Among the news stories noted on Rye’s website is an [AP story from March](#) that explained the Department of Energy is making \$475 million available for clean-energy projects on mined-land sites.

Another project, [Swan Lake](#), is near Klamath Falls, in Oregon. Yet another project, [Goldendale](#), would be on the Oregon-Washington border. The company also cites several run-of-the-river projects in Pennsylvania and other eastern states.

Peabody Coal owns and operates Twentymile Mine. It supplies coal to the Hayden Generating Station and possibly to

Latest project would employ the tunnels of the Twentymile Mine and a new 20-acre reservoir above the mine



Peabody Energy has not said whether it plans to continue operating the Twentymile Mine after the nearby coal plants in Hayden and Craig shut down in 2028. Photo/Allen Best

Craig and conceivably to other locations. It's hard to track the shipment of coal.

Peabody has not clearly laid out its plans. The most [recent presentation to investors](#) reported that the mine is producing 1.3 million tons annually and has reserves of 9 million tons.

Work continues on a different project east of Craig in Moffat County. This would be 25 to 30 road miles from Twentymile.

A company called [rPlus Hydro](#) has received FERC approval to move forward with its feasibility plans. It has purchased private land, which will lower the permitting bar as compared to a project involving federal land. The company says it hopes to

have the pumped-storage hydro project completed by 2033.

rPlus projects that Craig-Hayden Pumped Storage will have 600 to 800 megawatts of generating capacity. Cost has been estimated at \$1.5 billion to \$2 billion. That pumped-storage project will need 30 to 40 employees.

Matthew Shapiro, the chief executive, tells Big Pivots that the next engineering study is nearing completion. It will provide recommendations about the location of the underground powerhouse, dam types, and other specific features.

A second FERC pre-application document is being prepared. Shapiro said he expects to submit it late this year or early in 2025. This is the next step toward

preparation of exhibits for a license application.

A socio-economic impact study is well underway and will likely be completed in October. That study was funded with a \$150,000 grant from the Colorado Office of Just Transition. A Broomfield consultant, [SWCA](#), has been retained for the work.

rPlus Hydro has at least 12 projects in various stages of development in Utah, California, and other states, mostly in the West.

Most projects involve construction of new reservoirs, as is the case in Moffat County. In Wyoming, however, rPlus wants to use an existing reservoir, [Seminole](#). rPlus hopes that FERC will accept the final license application during the next six months. That would kick off the FERC-led environmental review process required by the National Environmental Policy Act, or NEPA. The company hopes to have that project on line in 2032.

Also among rPlus's projects is Sweetwater, in the northwest corner of New Mexico.

Colorado has several pumped-storage projects. Most prominent is Cabin Creek, Xcel Energy's project between Georgetown and Guanella Pass.

It began electrical production in 1967. In this closed-loop system, water from the higher reservoir is released through a three-quarter-mile tunnel to the second reservoir 1,192 feet lower in elevation. This can generate a maximum of 324 megawatts to help meet peak demands or to provide power when it's dark and if the wind suddenly stops. When electricity is more freely available, the water can be returned to the higher reservoir. Very little water is lost, except at elevations of 10,000 and 11,000 feet, a small amount of evaporation.

Colorado has a second pumped-storage project at Twin Lakes with a more modest elevation difference. The units can generate up to 200 megawatts of electricity.

Renewables 39% of power

- Coal-fired power plants accounted for 32% of Colorado's total in-state generation in 2023, down from 68% in 2010.
- In 2023, renewable sources of energy accounted for 39% of Colorado's total in-state electricity net generation, with wind power accounting for 70% of renewable generation.
- Colorado accounted for almost 4% of total U.S. crude oil output in 2023, fourth among all states and was 8th in extraction of natural gas.

Source: [Energy Information Administration](#)

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How much would a Trump victory slow Colorado's clean energy train?

By Allen Best

The polls foretell a very close presidential election. What if Donald Trump is elected president again—and carries with him Republican pluralities in both the House and Senate?

How much might a Republican supermajority slow Colorado's progress toward its clean energy goals?

I asked that question of Will Toor, who directs the Colorado Energy Office. He said he suspects that Trump's election will do little to slow Colorado's big pivot in energy.

"On the regulatory side, most of what we do in this space is very strongly within state powers. Think about SB19-236," he said, referring to the foundational bill adopted in 2019 that set the target of 80% reduction of carbon dioxide emissions by Xcel for 2030 and 100% by 2050.

"The one place in the regulatory arena where the federal government can make a real difference lies with our vehicle standards," he continued.

Colorado's zero-emission vehicle standard and the advanced clean-truck standard both rely on a provision of the Clean Air Act that allowed California to adopt its own standards and other states to piggyback on those rules. Seventeen states have – including Colorado.

When he was president, Trump revoked the waiver, which produced a court battle. Joe Biden restored the waiver when he became president.

"That's the one place where there would be the biggest regulatory uncertainty for us," said Toor.

"The other big question is what would happen with various (federal) clean energy tax credits," he continued. "Those have really put wind in the sails in just a bunch of areas."

The Inflation Reduction Act of 2022 provided great amounts of money for the tax credits – and Colorado has been getting substantial sums in this program and that. Just the week prior to our conversation, both U.S. senators from Colorado had been at the Environmental Protection Agency headquarters in Denver to talk about the \$329 million in grants to Colorado.

Those grants and other programs will go under contract this year.

"I think a lot of the IRA funds that are actual direct allocations will essentially be committed in ways that would be very, very difficult for the federal government to somehow claw those

back," Toor said.

"Even if you had a Republican House and Senate, would they really want to repeal those tax credits that have benefits in just about every state in the country? You are supporting a lot of domestic investment, much of it happening in red states. I think the area that might be most at risk would be the electric vehicle tax credits.

"But there's so much EV manufacturing investment going into red states. Would the senators in those states actually support repealing tax credits when they've got billion-dollar factories being built that kind of rely on the demand from those tax credits?

"The structure of the IRA provides so much benefit to every state in the nation that I think it becomes a lot harder to repeal." The last time around, Trump came in wanting to repeal the Affordable Care Act. It turned out to be really hard to do because so many people around the country benefit from it.

'I think the area that might be most at risk would be the electric vehicle tax credits.'

“Tax credits are very important to accelerating clean energy deployment in Colorado and everywhere else. But I just think that they would be hard to repeal, because they provide such strong benefits to every state in the country.

“Easy to talk, in theory, about repealing them, as sort of a culture war anti-climate thing, but I think it’s a lot harder in practice when you have ratepayers who are benefitting from billions of dollars of investment that is lowering their costs or businesses that are investing in new manufacturing facilities in red states. They are not going to be supportive of removing those tax credits.”

Virtual power plants as alternative to massive Xcel Energy spending?

Eric Blank, the chair of the Colorado Public Utilities Commission, was on a recent national webinar, “How Virtual Power Plants are Bringing Power to the People and the Grid.”

Before his appointment to the PUC 3.5 years ago, Blank spent 15 years running a national renewable development company that he co-owned and co-founded.

Blank prefaced his comments with this report about Xcel Energy Colorado. The utility, he said, is telling the financial community that it needs to spend something like \$10 billion over the next five years to meet system needs:

- \$5 billion for new distribution to meet needs between 6 p.m. and 9 p.m. during summer months.
- \$3 billion to get new power, including new transmission, into the constrained Denver metro area, again mainly for the hours of 6 to 9 p.m.
- Maybe \$3 billion in new generating capacity, again for that summer peak demand.

Xcel Energy is scheduled to file its Pueblo Just Transition electric resource plan in mid-October. Some of those numbers may be in it.

Blank went on to say that he defines virtual power plants as aggregated dispatchable or otherwise controllable resources interconnected to the distribution system in ways that reliably meet our system needs.

From a developer’s perspective, performance incentives are needed. “If you fail to perform, you’ve got to be subject to liquidated damages. ... The utility needs to be able to control and dispatch the resource like we do with utility scale batteries.”

Virtual power plants must have strong time-of-day and locational components.

“For us, the transmission needs can only be avoided if it’s in the Denver metro area. If we’re going to avoid distribution, it needs to be even more targeted locally,” he said.

“And I’d also like to see it increasingly in front of the meter. I just think financing off utility credit support may be 150 to 200 basis points cheaper than customer credit support. For me, it’s defined by the grid needs, not by customer choice or developer business plans.”

Blank also said that it’s “not just incentives to the provider, but also to the utility. This lost revenue has significantly limited energy-related to demand-side management.”

Currently, in Colorado, there are no penalties to perform in demand management. “If a customer doesn’t show up, there’s no consequence to the customer or, really, the utility. It has limited the ability of our system dispatchers and the regulated system to count on it.”

To make VPPs (yes, the acronym is becoming universal in certain circles), you need:

- to move from a lost revenue environment to more of an in-front-of-the-meter environment
- Liquidated damages needed for failure to perform.

- a shift from a standalone demand-side management to more. “It’s not just generation and transition. It’s also distribution. So you have to somehow link the distribution system planning, to the generation and transmission planning.”

Blank also spoke to the need for “large-scale competitive bidding for demand response anchored in meeting system needs – mainly on the generation side, not even down to the transmission and distribution level.”

“We have transmission system operators and SCADA (Supervisory Control and Data Acquisition) systems that optimize the transmission and generation system on a second-by-second basis, but although we have smart meters out there, we have nothing comparable on the distribution system side.

This will take two or three years and probably tens of millions of dollars of investment to start moving to the distribution system operator level.

Blank had one final thought. It had to do with Colorado’s goal of having 940,000 EVs on the road by 2030. “If we do that, the power demand will be something like two or three times greater than the entire coincident peak demand of the state,” he said. “The numbers are just off the chart. And if we lose control of that, and everybody charges at the same time, it’s a \$10 billion problem.”

Tri-State gets green light on partial-requirements option; rate increase is provisional

Tri-State Generation and Transmission Association has received approval from the Federal Energy Regulatory Commission for its partial-requirements contract, called Bring Your Own Resource.

The program, which was several years in the making, allows participating member cooperatives to supply up to 40% of their own power needs.

Under the program, members can individually or together propose projects during a regular program cycle for assessment by a third-party evaluator for reliability, economic and environmental criteria.

The 2024 program cycle cap is expected to accommodate about 350 megawatts of resources coming online prior to July 2028.

Following the initial program cycle beginning this fall, subsequent program cycles will occur every two years.

“We are thrilled about the prospect of developing a sizable renewable project, one that promises to create a lasting legacy for our members,” said Jeff Wadsworth, chief executive of Fort Collins-based Poudre Valley Rural Electric Association.

“This endeavor is more than just a project; it’s a commitment to a future shaped by our collective vision and dedication to a brighter tomorrow.”

“Tri-State’s BYOR Tariff is hereby accepted, effective Aug. 6,” said the commission order on Aug. 2.

In a different matter, after 7.5 years of flat and lower wholesale rates for members, Tri-State increased member wholesale rates an average 6.3% effective Aug. 1.

This rate increase proposal was accepted by FERC but is subject to refund, depending upon a future ruling by FERC. In other words, FERC accepted the proposal but has not approved it. It has also accepted previous new rate proposals from Tri-State but ultimately rejected them as violating rules governing FERC-eligible utilities. Tri-State had sought FERC regulation in 2019.

“Tri-State’s members worked together to develop and support our new wholesale rate,” said Duane Highley, Tri-State CEO. “Importantly, Tri-State can recover the costs necessary to reliably and affordably advance our clean energy transition, even as we manage costs and increase our competitiveness.”

Wall Street smiles on Tri-State after financial frowns

Finally, some good news for Tri-State Generation and Transmission Association from financial analysts after several years of arching eyebrows.

S&P Global Ratings has raised Tri-State's outlook to stable and affirmed the cooperative's long-term rating at BBB and commercial paper rating at A-2. Global had previously assigned Tri-State a negative outlook.

Other analysts had also downgraded Tri-State's credit worthiness, although Tri-State has continued to maintain investment-grade ratings with all three rating agencies.

"The raising of our outlook acknowledges the progress we are making to meet our membership's needs for decades to come," said Duane Highley, Tri-State's chief executive officer, in a [Tri-State G&T news release](#).

In raising Tri-State's outlook, S&P noted several factors, but topping the list was some stability in its membership. United Power, its largest member, left on May 1, paying \$629 million to break its all-requirements contract with Tri-State. The contract was to expire in 2050.

[David Bodek, the S&P credit analyst, said](#) the contract formula agreed to by the Federal Energy Regulatory Commission will act as a "potential disincentive for additional member distribution cooperatives to sever their ties with Tri-State."

Six or more will have by left by March 2026 as compared to the 44 of a decade ago. Mountain Parks and La Plata Electric in Colorado and one public power district in Nebraska have already served notice of their intentions to leave.

S&P's analysis also noted the \$627 million from United Power will help stabilize Tri-

State's finances. Tri-State managers indicated they plan to use the money to offset portions of the \$2.6 billion, five-year capital improvements plan and to reduce the \$3.4 billion in existing debt by about 13%.

Also producing a stable outlook are Tri-State's reduced carbon exposure as it exits coal in Colorado in 2028 and in Arizona several years later. It hopes to get federal aid through the Inflation Reduction Act for its stranded assets. Tri-State has never said publicly how much it is seeking, but the maximum would be \$970 million.

A final factor is the 6.3% wholesale rate increase in the cost of electricity to Tri-State member cooperatives and public power districts, which will produce increased revenue.

Evidence of a retreat to more solid ground

Footnotes to this:

- United Power paid \$627 million. But United believes some of that will be returned. Mark Gabriel, the chief executive, says that \$448 million is allocated to contract termination, but \$179 million is the prepayment/loan that United made on transmission.

"That gets paid back over 40 years to us with interest," he explained by e-mail. "There is still a question on the proportion of the prepayment to termination. We believe the prepayment will be higher (and thus more returned to us with interest).

* On Dec. 1, Tri-State [filed a transformative electric resource plan](#) with the Colorado Public Utilities Commission. The preferred plan calls for:

- 500 MW of wind resources;
- 200 MW of wind resources with storage hybrids;
- 310 MW of storage, including standalone 100-hour iron-air batteries, standalone 4-hour batteries, and 4-hour batteries with wind and storage hybrids; and
- 240 MW of solar resources.

United Power will add a gas plant to its generating mix

by Allen Best

United Power will be gaining access to 162 megawatts of natural gas generating capacity to be constructed near Keenesburg.

United estimates it will use the plant less than 15% of the time and even then not necessarily all six units.

“These are simple-cycle quick-start units,” explained Mark Gabriel, the chief executive of United Power in an e-mail. “They are able to come on within 5 to 10 minutes. Since they are modular, we can start just one or all six as needed.”

United will buy the power from [Kindle Energy](#), the owner, through a power-purchase agreement. United says it expects the plant, called Mountain Peak Power, to be ready to produce electricity by June 2025.

An electrical cooperative, United Power has 112,000 customers spread out from the foothills west of Arvada to the oil-and-gas wells of the Wattenberg Field northeast of Denver. It also has a burgeoning warehouse and industrial sector clustered along Interstate 76.

United on May 1 became independent of its long-time wholesale supplier, Tri-State Generation and Transmission Association. It had been laying out its plans for independence for a couple of years and has been rapidly implementing elements of

what Gabriel calls a hyper-localization strategy.

“Our hyper-localization strategy keeps power supply close and directly hooked to the distribution system, avoiding transmission costs and line losses,” he explained.

“It is just one more tool in our toolbox that will help us better meet the varied needs of our members and provide more predictable costs in the future,” Gabriel said in a press release.

Batteries are another tool for that hyper-localization strategy of maintaining reliability. Several days before United announced the natural gas agreement,



United had hosted a “flip-switching” ceremony at one of its eight new battery installations. The batteries will be able to store electricity, including relatively cheap renewables. About 10% of United’s members have rooftop or other solar.

Then, when demands are high and so are costs of electricity from other sources, the batteries can be tapped. They have the capacity to supply up to 13% of total demand. Such times of high demand occur especially on hot summer evenings but also increasingly during winter evenings. Winter storms, such as occurred in 2021 and 2022, can also drive up prices of electricity. One of United’s eight battery installations will be adjacent to the new natural gas plant near Keenesburg.



Mark Gabriel has a bunch of batteries – and he’d like to have even more

by Allen Best

Batteries were all around when directors of United Power and others gathered under a white tent set up along an industrial site in Brighton.

Small power banks, such as you might insert in a shirt pocket in case your mobile phone needs juice, were lined up on a table, mementos for the occasion offered by United and its partner, Ameresco.

Next to it was a United Power Ford F-150 Lightning truck, whose battery delivered the electricity that amplified the voices of the speakers who issued the stream of acknowledgements and congratulations.

In the distance was a humongous 1.3-million-square-foot warehouse, a former Costco distribution center being retrofitted to enable Amprius, a California-based company, to produce what the company calls next-generation lithium-ion batteries. [Amprius projects](#) that operations will begin in 8 to 14 months.

Central to the occasion were other batteries, made by Tesla and located behind a high chain-link fence and next to the older Bromley Lane electrical substation. It was one of eight new battery installations set up among United Power’s substations in partnership with Ameresco.

Together, the batteries have 78 megawatts of capacity, or 313 megawatt-hours, explained Jonathan Mancini, senior vice president of Ameresco, the owner of the Tesla batteries. They can smooth out the grid by being able to deploy this power at certain times to help with price fluctuations.

United Power has a 20-year contract for use of the batteries. The batteries were ordered in late June 2023. Such batteries are

not plucked off Costco shelves. They arrived relatively expeditiously.

Mark Gabriel, the chief executive of United, took the microphone.

“What you’re seeing here is the first wave of what we believe is the future for distribution utilities,” he said. And it was built for days exactly like this, he added, with temperatures forecast to reach the high 90s.

“This week will probably be the record load (demand) for United Power,” he said. (It was). “And one way to manage that is by having storage close at hand.”

Other utilities have large amounts of storage, Gabriel acknowledged, but likely none have it spread out across their service territories.

“To my knowledge, it’s the first time it’s been done in the country,” he said. “Now, of course, the marketing staff is just shaking their heads, because we can’t prove that. But I do know from talking with other CEOs on a very regular basis that this concept of bringing storage to the distribution system is unique. We believe this is the future as we work to meet the needs and demands of our members.”

Then, after a ceremonial flip of the switch, we were free to roam among the batteries. There wasn’t much to see. What they do is plenty interesting.

In the shade of the tent, Gabriel further explained to me the value of the batteries. They allow United to buy electricity at low prices and have it when prices are high.

“Right now in the Western United States, there’s a lot of energy and a shortage of capacity,” he said. “That’s not going to get better as we close coal and some other power plants.”

The batteries count as capacity. That gives United Power additional value.

The Ameresco representative had described it in similar terms. He cited the opportunity to “leverage arbitrage,” which I interpreted to mean that United can deliver value to the Southwest Power Pool — a

regional transmission organization — day-ahead market. United is a member. That stored electricity may be worth something to other utilities. It’s something on the margins of this energy transition, how batteries can help pay for themselves.

“A megawatt this afternoon in this market will be north of \$120 a megawatt-hour,” Gabriel said. “Okay, I can tell you the battery (cost of electricity from the battery) is less than a third of that. We have 78 megawatts of (electricity stored in) batteries as opposed to me going and buying 78 megawatts at a very expensive price.”

Ameresco will own the batteries and United the land underneath. Gabriel did not divulge the precise price, but did say it was less than half of what they had been paying at \$75 a megawatt-hour deliveries.

One board member of United earlier had described the power-purchase agreement with Ameresco as a “measured risk.” Gabriel conceded there is risk, but downplayed how much. “There’s always some risk, particularly when you’re starting a project,” he said.

Other utilities in California, Arizona, and Texas have put in big single-site batteries.

“We don’t believe that makes the most sense for us. You talk about risk. You put all your risk in one physical location. No. 2, it requires transmission-level power (and



transmission costs money), and No. 3, it doesn't help the local residents of the grid. (The batteries) build resilience on the grid."

United got into the battery game in 2018, the first at any scale in Colorado. This was three years before directors hired Gabriel away from his position as regional administrator for the Western Area Power Authority. But, much like Bryan Hannegan, who left the National Renewable Energy Laboratory to transform Holy Cross Energy, Gabriel had spent time contemplating the grid of the future, even writing a book published in 2009 called "Visions for a Sustainable Energy Future."

I asked Gabriel whether ultimately he might look to install batteries at all 25 substations.

"Ultimately, yes," he answered. "I'm worried about meeting the load that's growing here in our footprint."

Transmission may ultimately allow energy to be shipped around the country. Under the best scenarios, it will take time.

"I'm asked once a week to sign and support somebody building transmission," said Gabriel. "I always raise my hand and say, 'Give it to me.' But the earliest we're going to get new transmission in this part of the country is 2030 to 2031. And if I'm right about our growth, we'll be twice our size by 2030."

Won't the Colorado Power Pathway be delivering oodles of wind and solar, too, from the Eastern Plains of Colorado to the Front Range by 2028?

Gabriel sidestepped exactly what Xcel's 345-kV transmission lines will deliver to United.

"Hope is not a strategy," he said, citing a former boss.

"What I have to do is figure out how am I going to meet the needs of my members today."

I asked him specifically about resource adequacy. He had said he was worried. United gained 3,000 members last year — and this year is already at 2,000 new members.

The subdivisions of lots and houses both large and small continue to sprawl across former farmland near Brighton and other areas of its service territory. Along the major highways the industrial expansion



continues. BNSF had been securing permits for a giant new Intermodal Facility and Logistics Park, a place for offloading of goods from trains for distribution in metropolitan Denver.

United last year had a peak demand of 634 megawatts. On Friday, it set a new record of almost 650 megawatts. By 2030, though, Gabriel expects demand to rise to 1,200.

"This is a resource adequacy play right here," he said, nodding at the lithium-ion batteries.

Then we talked about data centers. Some in Colorado, most notably former PUC commissioner John Gavan, have warned about the danger posed to Colorado's carbon reduction goals by surging demand from data centers. Gabriel doesn't buy the worry.

"It's like anything else: With enough lead time and enough cooperation,

anything can get done. A data center is no more worry for me than another housing development other than I need to know enough in advance so that we can get equipment ordered which, by the way, they pay for.”

Gabriel said United is talking with a large company – he declined to name it – that has four data centers being planned. United wants to know whether they have the money up front to pay for what is needed, what their time frame is, and how can United contract for the power they will need separate from other members. “Because I’ve got to protect our membership,” he said. “All of those are solvable problems.”

I asked him about a major tech company that has land near DIA.

“I cannot comment, but I’ll give you the perfect example. When this particular data center group came to us, they said, ‘Hey, we’re looking at 24 different sites,’ And we said, ‘20 of them don’t work. But these three...’ That’s what I mean by cooperation. We said, if you put it here, here and here, we can help you. If you want to put it in any other site, we can’t help you because of the location.”

Data centers, he added, provide great load for utilities “because they run 24/7. They’re got a high power factor. They don’t cycle up and down. You know, homes are not efficient load. Data and oil and gas are very good loads.”

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New CEO at CORE Electrical Cooperative rises from within

CORE Electric Cooperative, which serves more than 180,000 members in a broad swath of land on and near Denver’s south metro suburbs and exurbs, has promoted from within for its new chief executive officer.

Pam Feuerstein has more than 25 years of experience in the energy industry as an executive and engineer. She joined CORE in 2010 and most recently served as chief operating officer nine years.



Prior to CORE, she held leadership positions at a global engineering consulting firm for more than 15 years, focusing on electric infrastructure design. She was also instrumental in developing CORE’s power supply transition and securing resources for CORE’s clean energy future.

Based in Sedalia, CORE owns 25% of what will likely be Colorado’s last coal-burning unit, Comanche 3.

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Nuclear cheerleading is fine but how about the cost?

True, nuclear can deliver high-paying jobs, good tax base, and emissions-free energy. Rarely do proponents mention the risks.

by Allen Best

I'm mystified by this fervid belief in nuclear energy that I see in Colorado. The commissioners in one Western Slope county added their support for nuclear, citing a poll that showed 65% of residents of northwest Colorado support nuclear. Conferences in Montrose and Pueblo devoted ample time to nuclear cheerleaders. They promise high-paying jobs and ample tax base.

Well, heck, I believe it would be nice to have a Lamborghini when I replace my used Toyota Prius in a few years. But can I afford a \$300,000 car?

Nuclear has a horrible track record of cost overruns. In Georgia, two units recently completed cost \$35 billion, [more than double original projections](#). Cost overruns [halted construction of two reactors](#) in South Carolina in 2017. Much hope was pinned on small modular reactors, but then [Utah utilities in 2023](#) pulled the plug on NuScale.

Bill Gates recently flung a shovel of dirt in Wyoming. There, TerraPower hopes to deliver a nuclear reactor by 2030. Gates has committed \$1 billion, plans to invest another \$1 billion, but [told a TV interviewer](#) that he expects the project to ultimately cost \$10 billion.

Could Colorado's largest electrical utilities justify investing \$10 billion in a reactor or two after they close their coal-burning units in Craig, Hayden and Pueblo in the next five to seven years? Chief executives say they can

conceive of nuclear being part of Colorado's energy future – but not until costs come down.

Duane Highley, chief executive of Tri-State Generation and Transmission Association, Colorado's second largest electrical generator, [said recently](#) he sees nuclear becoming competitive somewhere between 2035 and 2040. "We need to see a couple of these built and prove that they can be built cost-effectively, then everyone will be lined up. Everyone wants to be the first in line to be serial No. 2 – including us," he said.

Robert Kenney, the chief executive of Xcel Colorado, [told me](#) he does not see nuclear as an option for at least several years. The federal government may need to backstop it,

he said, limiting risk to individual utilities.

Fair enough. Federal subsidies [have helped](#) wind and solar get on their feet as they did fossil fuels before. Nuclear has also received help.

Renewables can take us far toward 100% emission-

free energy, but we also need other answers. A [study commissioned by the Colorado Energy Office](#) last year sees natural gas plants delivering a small but vital component to maintain affordability and reliability. We know the technology. It's not cheap. But neither is it a \$10 billion experiment.

New ways to store excess renewable energy could help. Xcel is likely to participate in a test of iron-air technology at Pueblo. It could store excess renewables for 100 hours. Both Xcel and the Polis administration have shown keen interest in green hydrogen, which uses renewable energy and water. Pumped-storage hydro power projects near Steamboat and Craig could help in another decade.

Geothermal could help, too. Conventional ground-source geothermal taps the near-constant 55 degree heat found about 10 feet below ground to heat and cool buildings.



Colorado Mesa University heats and cools 800,000 square feet with the technology.

A different geothermal that goes far, far deeper underground can generate electricity, as it does in Iceland. California gets 10.1% of its electricity from enhanced geothermal. It also has a hotter subterranean. Volcanic eruptions last occurred there in 1917 (Lassen). Colorado's most recent volcanic eruption (Dotsero) was 4,000 years ago.

Gov. Jared Polis [contends](#) that geothermal can deliver 4% to 8% of Colorado's electricity by 2040. He cites the ingenuity of drillers at unlocking oil and gas deposits. Other see enhanced geothermal as a stretch for Colorado – like nuclear.

Who knows which among these emerging technologies will triumph, but they won't be \$10 billion gambles. Cheerleaders for nuclear need to acknowledge that risk. And then we can talk about the problem of waste disposal.

A longer version of this column was originally published in at BigPivots.com and both shorter and longer versions were published in various newspapers and other media in Colorado. Among the reader responses were:

It has been figured out

I read your article printed in the Aspen Times on August 4, 2024 entitled Nuclear Cheerleading.

For centuries scientists have been in search of the formula/equation for Nuclear FUSION not to be confused with Nuclear Fission.

In 2023 they figured it out. It is probably the greatest scientific discovery of the 21st century and estimated once fully developed it will provide clean, free energy for the entire planet for as long as Earth exists.

It got a small blip on one network and nothing anywhere else. At least not that I saw. Only one professor at Pepperdine University was as excited as I was. They rest

looked at us like we were out of our minds and talking gibberish.

Here is the disappointing part, the US used to be the leader in this discovery. We have now been replaced by China and North Korea.

I couldn't help but reach out to let you know there is an exciting new forefront for Nuclear energy.

Take a look, it might change your mind.
Thank you.

Nikki Hennings

You're incorrect, say Amory

"Renewables will take us much of the way to 100% emission-free energy, but nobody thinks they will take us all the way" is incorrect.

You could start with:

[On the History and Future of 100% Renewable Energy Systems Research](#)
[Batteries or hydrogen or both for grid electricity storage upon full electrification of 145 countries with wind-water-solar?](#)
[Reliably integrating variable renewables: Moving grid flexibility resources from models to results](#)

Also on [YouTube](#)

Amory Lovins
Old Snowmass

Amory Lovins is the co-founder of the Rocky Mountain Institute and today is a half-time instructor at Stanford University.

Awesome

Awesome. Thanks! Appreciate all your work—always!

Leslie Glustrom
Boulder

A biochemist by training, Leslie Glustrom is a board member of Clean Energy Action.

And also on geothermal batteries

Good article, Allen. I think cost issues will remain for some time to come for nuclear. I remain confident that nuclear waste issues are not critical, especially as I watch Finland

proceed with their site. They were always my candidate for first to dispose of spent fuel when I worked at Yucca Mountain.

I also think there is potential for capturing and storing excess wind/solar energy in “geothermal batteries” – finding reservoirs whose water can be heated and stored and produced for either power generation or thermal energy when wind/solar are not performing. This can bridge overnight easily, but also seasonally.

Cost will also be an issue for geothermal, but the numbers may be a bit better and the need for technology demonstration and advancement easier.

**Jeremy Boak
Littleton**

Jeremy Boak is geoscience advisor at Teverra and was previously consulting geologist with Hurricane Peak Geoscience and director and state geologist of Oklahoma and before that he was at the Colorado School of Mines.

What they also don't say

They also rarely discuss consumptive water use (a bit better than coal, 40% net efficiency), so still a lot). Though the reactor is “sodium-cooled” the Kemmerer power plant is a slightly separated steam turbine/cooling tower; that separation is why that conventional stage can be built now. The reactor still awaits approval. “No pressure” on the regulators.

Vail and roundabouts

A story about geothermal in Big Pivots 90 said that Vail innovated with the nation's first roundabout in 1994. The story should have said first “modern roundabout.” Or at least that is how it was represented in Vail at the time. It was different from a traffic circle in that traffic enters the circle at an angle. Two readers have written to say that there were many such roundabouts in the Eastern states long before Vail.

They don't discuss the inability to stop and start, which is what we will need more and more and get with the kind of aeroderivative gas turbine in Platte River Power's last IRP.

The “perfidious belief” comes partly from a kinda lame “just transition” so far. Clearly coal-nuke repowering preserves those pipefitter/steam operator jobs in the same location. “Enhanced” geo-electricity generation preserves drilling & fracking, maybe in the same spot, maybe not. (Sadly, our heat isn't as hot as Great Basin heat, so that generation is too inefficient and expensive.)

We should have been moving miners to building pumped hydro closed circuit energy storage 15 years ago. Drillers and gas piping contractors to geo heat, whether closed loop “thermal networks” or actual hot water.

In my perfect world we would be able to build manufacturing workshops for industrial heat pumps in Pueblo and Craig. Pipefitters and steam operators could build compressors and evaporators instead of turbines and condensers. Their skills would work with the natural refrigerant big three: Propane (flammable), ammonia (toxic) and CO2 (very high pressure.)

Lots of other half-baked reasons for “perfidious belief” in nukes oozing out from Silicon Valley's macho nerds and DC's “arsenal of clean energy” folks and their Twitter fans.

It's not being adequately countered by those of us who want to put our heads down and get on with the business of integrating/storing another 50% wind/solar into the electricity system and using those green electrons to clean up heat and vehicle power.

**Fred Porter
Carbondale**

Fred Porter is a commercial energy advisor for the Clean Energy Economy for the Region and before that was a principal engineer for NORESO for 33 years in Boulder.