

BIG PIVOTS

ENERGY and WATER transitions in Colorado and beyond

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Lake Powell dips into target zone, but no loss of hydropower just yet

Lake Powell dropped below elevation 3,525 on Tuesday. The reservoir will have to drop another 35 feet before it can no longer produce electricity. But it needs to snow hard for the next month.

The level 3,525 is best understood as an aspiration level—and breaching it a reflection of another subpar winter in the upper Colorado River. The minimum pool level is 2,490.

To avert low levels in Powell, Reclamation last year released unusually large volumes of water from Blue Mesa and Flaming Gorge reservoirs, and this winter it released less water to flow downstream to Lake Mead.

“Reclamation is not planning to take further action to address this temporary dip below 3,525 feet because the spring runoff will resolve the deficit in the short term,” said Wayne Pullan, Reclamation Upper Colorado Basin Regional director. “However, our work is not done. Lake Powell is projected to drop below elevation 3,525 feet again later this year.”

Electric utilities in Colorado and elsewhere that are

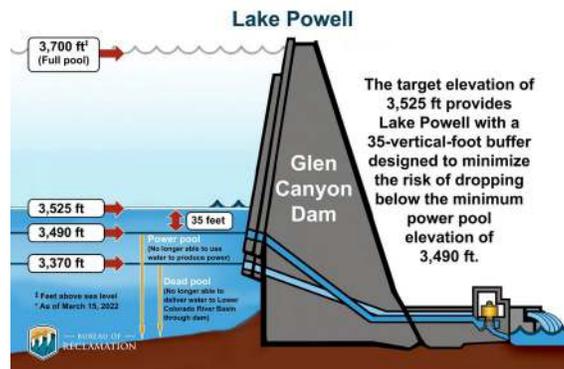
not privately owned have access to varying amounts of power from Glen Canyon and other dams upstream of Powell. Loss of hydroelectric production has already caused an upward pressure on wholesale power costs. Prices would escalate far more if production ceases altogether.

Hydropower also contributes more broadly to grid resilience. It can be used to restart the electrical grid when a “black start” is required. Diesel generators can be used to do this, but hydroelectric power plants are often designated as black-start sources to restore network interconnections. [See the explanation offered by Wikipedia.](#)

See also a February report, [Hydropower’s Contributions to Grid Resilience.](#)

Tonya Trujillo, assistant secretary for water and science at the U.S. Department of the Interior, on Thursday described Glen Canyon’s hydroelectric production as delivering a “huge benefit in electricity in a large area of the Mountain West,” including the ability to bolster grid resilience during blackouts and other emergencies.

Anne Castle, speaking at the same forum, the Stegner Center’s “Colorado River Compact: Navigating the Future,” said Glen Canyon power sales deliver \$150 million in



revenues that have been used for a wide variety of programs.

Brrrr... it got cold in late winter. What does this say about global warming?

by Allen Best

Colorado's Front Range, eastern plains, and other areas had a couple of cold snaps in February and early March. A new record cold was set one night at DIA.

Some people even began wondering if it was cold enough to kill bark beetles. (Mostly no, as temperatures need to plunge to 30 below and stay cold, like those days in the 1970s and 1980s when the temperature never got above zero).

In the context of a warming climate, though, these cold snaps were blips.

This winter—defined as December, January, and February—“still ended up well warmer than average, mostly because of the incredibly warm December,” reports Russ Schumacher, the Colorado state climatologist.

Februaries of late have bucked the overall warming trend. Statewide, the last four Februaries have been colder than the 20th century average, he says.

“But these have not been record-level cold months,” he added in an e-mail.

The [February State of the Climate summary](#) issued by Schumacher's office at Colorado State University reported that February was 4.1 degrees Fahrenheit below the 1991-2020 average. That was good enough—or at least cold enough—to rank 30th coldest in the 128-year record.

Jeff Lukas, a climatologist based in Lafayette, Colo., points that “late winter and early spring weather in eastern

Colorado has always been subject to large daily to weekly fluctuations in temperature as air masses from the Canadian Arctic periodically intrude from the north.”

The Arctic is also warming, even more rapidly than the continental United States, he adds, but still gets very cold during winter.

Lukas also points out that Denver during the last few decades has had similar or even more severe late-February cold waves in 2003, 2006, 2018, and 2021.

The cold of early March was actually exceeded by one in 2002. You might remember that year. Spring was warm and windy, and three major wildfires broke out during the first week of June. The Hayman Fire remains the 4th largest and Missionary Ridge the 7th largest in Colorado's recorded history.

Winter is still winter, and it can sometimes be severe. The New York Times reported about two teachers and their children from India hoping to cross the Canadian border into North Dakota who froze to death. The trend, however, is to moderation.

In a recent column in the Washington Post Becky Bolinger, the assistant Colorado state climatologist, directed attention to updated state climate summaries that tell of decreased nights classified as very cold, especially since the 1990s. That includes Colorado.

“In addition to the overall trend of higher average temperatures, the number of very hot days has been above average since 2000 and the number of very cold nights has been near or below average since 1990,” Colorado's summary says.

In snowpack depth, according to that same report, there have been slight declines in northern Colorado. Southern Colorado had a much greater decline. The average April 1 snow-water equivalent has been 9.7 inches since 2000. That compares to 12.3 inches for 1937-1999.



Will the oligarchs keep their keys to the steel mill?

by Allen Best

In the early 20th century Pueblo's steel mill was owned by American oligarchs, John Rockefeller Jr., the descendants of Jay Gould, and others. Might ownership of that steel mill—and Colorado's largest solar array—revert to American ownership as a result of the Russian war against Ukraine?

Now called Evraz, the steel mill is owned primarily by Russian oligarchs, with Roman Abramovich having the largest stake.

The United States has not yet imposed sanctions on Abramovich, unlike the United Kingdom and Canada. That leaves his ownership stake in the Pueblo steel mill

intact as well as his ownership of two houses in Snowmass Village.

In Pueblo, there are doubts that the mill could end up being cut off from its Russian owners because the product is for the domestic consumption, not for export.

But then Chelsea, the soccer club in London that Abramovich owns, is no longer selling tickets, the result of sanctions applied last Thursday by the United Kingdom. As long as Russia's war against Ukraine continues, ownership of the plant in Pueblo will remain an active question.

Evraz North America, which operates the steel mill, is a wholly owned subsidiary of Evraz, a company incorporated under laws of the United Kingdom, with shares traded on the London Stock Exchange—until last Thursday.

In sanctioning Evraz, the [British government accused](#) Roman Abramovich, the largest shareholder, of being a “pro-Kremlin oligarch” who has received preferential treatment and concessions from Putin and the Russian government and “is or has been involved in destabilizing

Ukraine and undermining and threatening the territorial integrity, sovereignty and independence of Ukraine.”

The statement also accused Evraz of “potentially supplying steel to the Russian military, which may have been used in the production of tanks.” In response to a [Financial Times inquiry](#), the company insisted it only made steel for the “infrastructure and construction” sectors, the Financial Times reported.

The Financial Times last Friday also reported that 10 members of Evraz had resigned after the United Kingdom’s action.

Canada last Friday also imposed sanctions on Abramovich.

Within hours of the Russian invasion of Ukraine, the United States imposed actions against several Russian oligarchs and institutions, but not Abramovich nor Evraz.

Five Russians own two-thirds of Evraz’s shares. Second to Abramovich in holdings is Alexander Abramov, a former scientist who founded Evraz in 1992. The other three are also Russian oligarchs, [reported the Pueblo Chieftain in a March 5 story](#).

An oligarch is defined as a very rich business leader with a great deal of political influence. An oligarchy is a country ruled by oligarchs. [Forbes in 2021](#) ranked Abramovich as 12th wealthiest among Russia’s billionaires, with a net worth of \$14.5 billion.

Evraz also has steel, mining, and vanadium operations in Russia, the Czech Republic, and Kazakhstan.

In the United States, Evraz has mills in Pueblo, which has 1,100 employees, and in Portland, Ore. It also has five mills in Canada, three in Alberta and one in Saskatchewan, [according to its website](#).

Evraz also has scrap operations, including one along the South Platte River north of downtown Denver.

Nowhere has there been even a suggestion that the Pueblo steel mill or

other operations in North America have directly supported the Russian war effort.

The Pueblo mill primarily uses recycled steel to make its products, which requires a lower temperature than is necessary when using iron ore and other raw resources. Foundry operations became electrified in the early 1970s, the result of construction of the nearby Comanche 1 and 2 coal-burning units.

Early last November, a 298-megawatt solar farm was completed on land owned by Evraz between the steel mill and beyond the Comanche units. This allowed the steel company to proclaim that it had become the first solar-powered steel mill in the world, [as Big Pivots explained](#). Financial and other details of that claim have never been made public.

The investment in the solar farm hinged upon plans to go forward with construction of a \$500 million mill that will make quarter-mile rail segments that Union Pacific, Burlington Northern-Santa Fe, and other railroads want. The construction project employs 400 to 500 people.

Jeffrey Shaw, chief executive of the Pueblo Economic Development Corporation, says the impact to Pueblo and the steel mill there appears to be nil.

“We have asked what the impact of the global geopolitical front will be to the facility, and the answer we have gotten back (from Evraz) is—consistent with what has been reported—that they are moving forward with the facility,” he says. He also points that the market for the products of the steel mill is domestic, not foreign.

Driving by the mill, construction work continues with no evidence of slowdown. “We’re very optimistic that it will carry on” as planned, he added.

The Pueblo Chieftain story by editor Karin Zeitvogel reported no changes evident at the steel mill in early March. “We haven’t seen anything yet, and everything is just like it was a week ago,” said Eric Ludwig,

president of the United Steelworkers 2102 Union, a week after the invasion.

The [Evrax annual report for 2021](#) noted the cloudy global horizon, referring to Ukraine five times and potential for sanctions nine times. The report mentions the “worsening situation relating to Ukraine and heightened risk of the economic sanctions.”

In modeling, the company also described a “severe downside scenario” that could cause it to reduce capital spending by \$500 million a year.

Might that include the work on the new Pueblo mill? No mention there.

Abramovich was the focus of a [lengthy New York Times article](#) on Sunday that explored his ties with the United States and other western countries. An orphan who grew up in a town along the Volga River, he dropped out of college and then emerged from the Red Army in the late 1980s just as the Soviet leader Mikhail Gorbachev was opening new opportunities for private enterprise. Abramovich, says the Times, thrived as a trader—of almost anything and everything, it would seem.



Roman Abramovich

The big break for Abramovich came in the mid-1990s, when he and a partner persuaded the Russian government to sell them a state-run oil company for \$200 million. In 2005, he sold his stake back to that government for \$11.9 billion.

His holdings include the Chelsea soccer team in London, which he bought in 2003 and which he was frantically trying to sell last week before the UK sanctions. The sanctions prohibit the club from selling tickets to matches.

The Times said leaders of cultural, educational and medical institutions, along with a chief rabbi, had sent a letter urging the United States not to impose sanctions on Abramovich, a major donor to Jewish and other causes.

A request to the American ambassador to Israel “reflects the extraordinary effort Mr. Abramovich, 55, has made over the last two decades to parlay his Russian fortune into elite standing in the West,” said the Times, going on to describe his houses, his art works, his yachts, his private 787 jet, and more.

That includes real estate in Colorado’s most elite resort community. The [Aspen Times on March 1](#) explained that Abramovich has owned two houses in Snowmass Village since 2008. One 12,859-square-foot house has 11 bedrooms and 13 bathrooms and sits on 200 acres of land. The smaller 5,492-square-foot house sits on 1.8 acres of land.

Abramovich’s name is also prominent in Aspen, reported Rick Carroll of the Aspen Times. Lettering on the outside of a synagogue on Main Street in Aspen suggests Abramovich and his now ex-wife Dasha were major donors.

Russia’s oligarchs have “used their ill-gotten gains to try to launder their reputations in the West,” Thomas Graham, a Russian scholar from the Council on Foreign Relations, told the New York Times. “But the message of these sanctions is, that is not going to protect you.”

Michael McFaul, an American ambassador to Moscow during the Obama administration, described disingenuous behavior on several sides. He told the Times that while Putin’s government claimed to despise the United States and its allies, his foreign ministry was constantly trying to help the oligarchs around him, including Abramovich, obtain visas so they could ingratiate themselves with the Western elite.



“On our side, we have been playing right along,” he said, overlooking ties of the oligarchs to Putin and welcoming them and their money.

Sources also told the Times that the relationship that Abramovich and other oligarchs enjoyed with Putin cut both ways. After Putin was inaugurated president in 2000, he quickly moved to dominate the billionaires who had profited from privatization, sending a message by jailing the richest and most powerful oligarch. Abramovich is one of the few early elites who remained in Putin’s circle.

Putin’s display of force, however, also gave oligarchs freedom to establish ties in the West—as potential places to land.

As for Pueblo, it’s had ups and downs in the last 141 years it has been making steel. The mill was a consequence of Pueblo having rail connections, water, and proximity to coal, iron ore, and limestone. Coal mines at Crested Butte, Redstone, and elsewhere supplied the smoke-belching mill that was then called Colorado Fuel & Iron.

CF&I was owned by American-born oligarchs of their day, notably John Rockefeller Jr. and Jay Gould. A smaller figure was John Cleveland Osgood.

There have been downsides for Pueblo, too, including a bloody strike in the coalfields south of Pueblo in 1913-1914. The strike culminated in the deaths of 21 miners and their families, including 2 women and 11 children in what is remembered as the Ludlow Massacre. In 1921, a flood killed at least 78 and likely many more while swamping the downtown district and other low-lying areas.

The steel mill at one time employed 12,000 people and, by the 1970s, paid handsomely and gave months-long vacations to employees with greater seniority. Going into 1990, CF&I teetered into bankruptcy. It was acquired by Oregon Steel in 1993 and the name was changed to Rocky Mountain Steel Mills. In 2007, it and other Oregon Steel holdings were acquired by Evraz for \$2.3 billion.

Steamboat gets its first electric school bus, but many more will come across Colorado

by Allen Best

The school district in Steamboat Springs recently took possession of an electric bus, and it was a wonderful thing, reports the local newspaper, the Steamboat Pilot.

Instead of shouting to be heard, the youngsters on the yellow bus could talk more or less normally. It was quiet enough to hear the turn signal.

Too, the new bus improves the air quality, points out Aaron Viles, director of campaigns for the [Electrification Coalition](#), an advocacy group. The comparison of emissions against the conventional diesel-burning buses is stark.

“These school buses are dirty, and they’re carrying our most precious cargo,” he says of the diesel buses. “Anything we can do to speed the transition and get those kids into safer transportation sooner rather than later will pay huge dividends for Colorado.”

Viles sees Colorado primed to pivot its 4,000 school buses from diesel to electric.

The budget proposal submitted to the Legislature by Gov. Jared Polis calls for allocation of \$150 million for purchase of electric buses by school districts for transport of the state’s 300,000 school-age youngsters.

The potential grows if Colorado’s money is leveraged against the \$2.5 billion in federal funds allocated for bus electrification by the Infrastructure,

Investment and Jobs Act that was passed by Congress in November. There are other federal funds available for various components related to bus electrification.

The same November law also allocated \$2.5 billion for low-emission fuels such as propane and natural gas for transportation.

Neither state nor federal funds are a sure thing. The Polis budget must be approved as proposed by legislators, and there are always competing priorities. States will be competing for federal funds.

Viles suggests Colorado may be able to see additional gains by applying for grants earmarked for heavily polluted places. Colorado’s northern Front Range, from metro Denver to Fort Collins and Greeley, has failed to meet federal ozone limits.

Colorado has a broader reason for nudging along electric buses.

Transportation has overtaken power plants as the largest single sector of greenhouse gas emissions. The same was true nationally in 2019 when transportation accounted for 29% of U.S. emissions, electricity 25%, and industry 25%.

Medium- and heavy-duty vehicles, including school buses along with delivery vans and trucks and tractor-trailer trucks,

represent 11% of vehicles on the road but produce 29% of greenhouse gas emissions.

The 2020 Colorado EV Plan directed state agencies to work with the Regional Air Quality Council

to develop strategies to support adoption of zero-emission school and transit buses by tapping the Volkswagen settlement money Colorado received. Approximately \$30 million was allocated for transit buses and \$21.5 million for trucks, shuttles, and school buses.



Steamboat’s new school bus and four more buses that have been ordered by the school district are a direct result of this program. Total state aid for the Steamboat school buses through a program called Alt Fuels Colorado will come to \$2.4 million.

The Hayden School District has tapped the same program for a school bus expected to arrive this summer.

A 2019 state law also required Colorado’s two investor-owned utilities to devise a transportation electrification plan. The plans by Xcel Energy and Black Hills Energy include support for school bus electrification.

Today just a few school districts have electric school buses: Durango, Boulder, Denver, and, most surprising of all, Kremmling.

Kremmling can get cold, though not nearly so much as the 62 degrees below zero that a local filling station registered one morning in 1979. Across Rabbit Ears Pass, Steamboat Springs similarly doesn’t get the same deep freeze as in years past. Still, it was 23 below when the new Blue Bird Vision electric bus was demonstrated in late January for an audience that included Sen. John Hickenlooper and others.

This, said Viles, demonstrated that electric school buses can operate in cold-weather climates.

Steamboat’s electric buses have ranges of 100 to 150 miles but will be used exclusively for in-town routes. The school district is also gaining four high-speed

chargers. In addition to the one it now has and the four ordered, it plans to order two more.

Electric school buses do cost more than their diesel counterparts, about three times as much, says Viles. Lower costs of maintenance of an electric engine versus that of an internal-combustion engine and other reduced costs will allow school districts to recoup costs over the life of a bus, which is typically 10 to 15 years, he says.

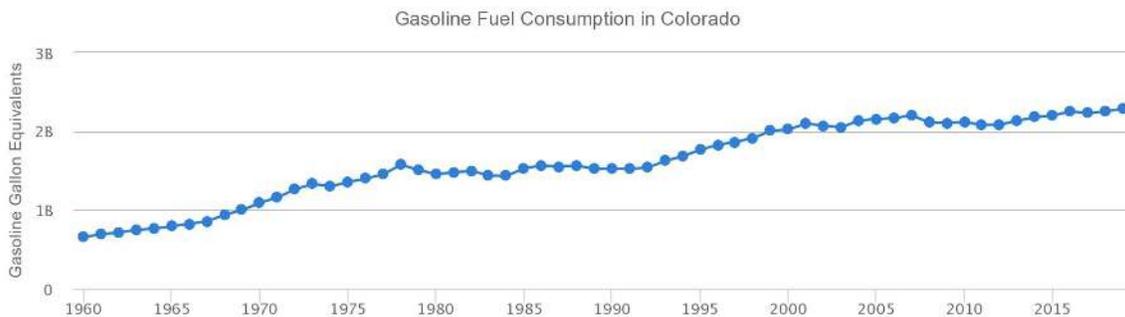
A 2020 study by EY, a consultancy, found that in Colorado electric school buses would achieve cost parity with diesel buses in total operating costs by 2026. In other states, the same study showed, the cost parity will come later. Colorado has relatively low costs of electricity.

This is the very, very early stage of electrification. Nationally, fewer than 1% of school buses are electric, reported the World Resources Institute in a February 2020 posting.

But the vehicle market is fast pivoting, not just for medium- and heavy-duty buses but even more clearly in the market for passenger cars.

Three years ago, Viles remembers just one advertisement for electric vehicles during the Super Bowl. This year the EV ads came one after another.

“We’re in an EV moment right now,” he says.





Comanche 3 to make 20 years?

by Allen Best

Retirement of Comanche 3, the troubled coal plant at Pueblo, was originally projected to operate for 60 years. It may not make 20.

A year ago, Xcel Energy, the operator and primary owner, submitted plans to state regulators calling for retirement by 2040. In November, Xcel and a variety of parties submitted a proposal calling for the plant to be operated only seasonally for some years before a 2034 retirement.

All three members of the Colorado Public Utilities Commission on Monday indicated they are open to an earlier

retirement of the 750-megawatt unit, Colorado's largest that began operations in 2010. Two commissioners strongly indicated they favored 2029.

The third, Eric Blank, the chairman of the commission, was more cautious, indicating his opposition to locking in a retirement date.

"I just urge you to think long and hard before we do anything that sort of forces more requirements and early retirement," he said.

No decision was made, and one compromise that Blank argued for would allow the decision to be punted for a year or more to when more information is known.

"To me, there's just too much uncertainty around fuel prices, new technology, clean energy economics, environmental policy, and the company's

State regulators split on future of Colorado's largest and newest coal plant

ability to effectively operate the project,” said Blank, an attorney.

That last point was a reference to the repeated problems that Xcel, the operator and primary owner of Comanche 3, has had in its 12 years of operations. The plant was down for repairs for most of 2020. Earlier this year, [it went down again](#).

Those problems were the basis for Commissioner John Gavan’s call for ordering Xcel to decommission the plant by 2030 or sooner. “I am looking through the lens of reliability,” he explained. “The record is robust enough to raise major concerns about reliability.”

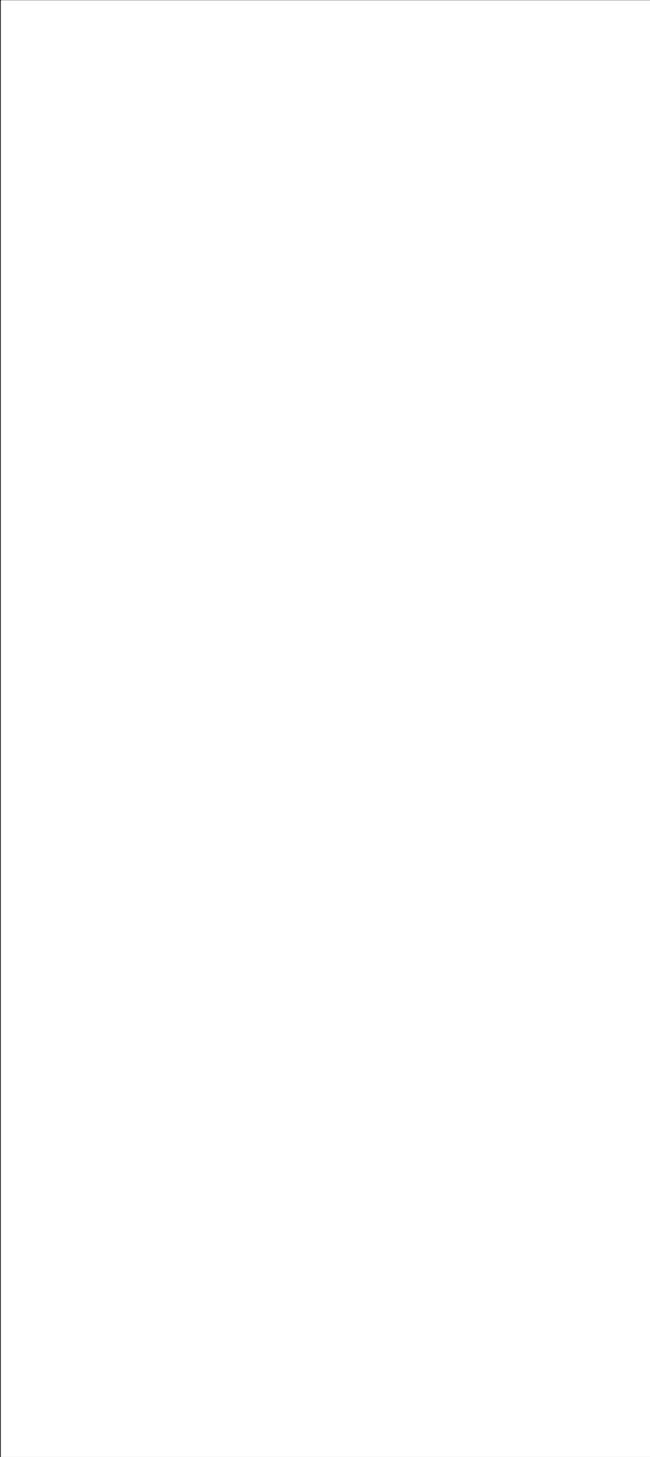
In other words, Xcel says it wants to keep the coal plant in its fleet to ensure reliability to meet peak demands.

Blank doesn’t want to hinder the company’s ability to make good on that reliability if it needs the coal plant to deliver it. For the PUC to make that judgment, he said, would be a precedent—and shift responsibility from Xcel to the PUC for ensuring reliability of electrical deliveries.

Gavan says that the record of Comanche shows it has been anything but reliable.

In the middle, Commissioner Megan Gilman said she strongly favored a 2029 retirement. She said enough evidence has already been presented that retirement by 2030 would both lower costs to Xcel ratepayers and reduce carbon dioxide emissions. Gilman did concede additional modeling—but only if that modeling isn’t constructed in a way to favor continued operations until 2034.

Regardless of when Comanche 3 is retired, the commissioners showed solid agreement that they want Xcel—ultimately its ratepayers—to pay property taxes for the coal plant to 2040 minus whatever new tax base results from solar and other



infrastructure added in the interim. The intent is to keep Pueblo and Pueblo County taxing districts whole through the energy transition.

Blank advised his fellow commissioners that there might be tradeoffs. Removing

Comanche 3 earlier might result in more gas combustion that might be around for decades.

Xcel also proposes 800-megawatts of new natural gas combustion plants at a cost of close to \$1 billion.

This was the first of several meetings where commissioners, prohibited by law from communicating outside of meetings, began comparing notes. One thing they quickly agreed upon was that they weren't going to endorse all parts of the settlement agreement submitted last November by Xcel along with the Colorado Energy Office, Pueblo County, and some industry, labor, and other groups.

In Colorado, the PUC regulates investor-owned utilities and, in slightly different fashion, Tri-State Generation and Transmission. Parties with an interest in the outcome can file testimony, and many thousands of pages were filed in this case about how Xcel intends to pivot its energy generation during the next three years. It files such plans every three years.

The utilities have an interest in reaching agreement with others at the table in advance of deliberations by the commissioners. In this case, only a partial and non-unanimous agreement was reached. Most significantly, the Sierra Club, the Natural Resources Defense Council, and the Western Resource Advocates all objected to several provisions, including the 2034 retirement of Comanche 3.

"The settlement makes at least three choices that will both increase costs *and* increase emissions," wrote the Sierra Club and Natural Defense Council attorneys in a joint filing submitted in January. That filing called for either an earlier retirement date now, as Gavan favors, or deferring the issue to what is called phase II, next stage of the process in 12 to 18 months. That's the compromise favored by Blank, who has also been a wind and solar developer—including



Comanche 3 in 2010. Photo/Allen Best

a solar project adjacent to the coal plant in Pueblo.

Ellen Howard Kutzer, an attorney with Western Resource Advocates, said the rejection of the settlement agreement itself was an important message.

"You are seeing an independently minded commission that will not necessarily rubber stamp a settlement agreement, particularly a non-unanimous settlement agreement," said Kutzer. That breaks with the tradition of at least recent years, she added.

A second major element of the PUC discussion was a proposal by Blank to offer Xcel the opportunity to spend money short of construction on projects that have not yet been fully approved. The strategy he described would allow the company—with PUC oversight—to move quickly, if necessary, such as in creating a pumped-storage hydro project west of Delta.

The premise is that Colorado wants to continue to rapidly decarbonize its electrical generation, but there are so many moving

parts. Among them are the advancing technology that he had mentioned, plus the relatively imminent arrival of greater integration of electrical supplies across broader regions, and rising demand for electrification of transportation and buildings.

In essence, he proposed to give Xcel the ability to hedge its bets. That idea will be worked over in a future meeting, probably in April.

Also on the table is the question of whether Xcel wants to take full advantage of a financial device called securitization that would allow it to close its fossil generating assets more rapidly without taking a financial hit.

Xcel several years ago laid out plans to close its two older coal-burning units in 2024 and 2025.

In this plan before the PUC, Xcel proposes to close its coal-burning units in Hayden in 2027 and 2028 and convert Pawnee, its coal-burning plant at Brush, to natural gas by 2026.

San Miguel Power directors advised to go the partial path

Directors San Miguel Power Association will meet March 29 to consider whether to go down the same partial-requirements path on which the La Plata Energy Association has started.

Both electrical cooperatives on the flanks of the San Juan Mountains are supplied by Tri-State Generation and Transmission.

The proposal calls for Ridgway-based San Miguel to supply 35% of its own power for peak demands, compared to 5% now. This is a maximum 15 megawatts.

In 2020, San Miguel asked for proposals, and it now has four that

directors are being asked to consider as part of this package.

Brad Zaporski, the chief executive, pointed to Tri-State's wholesale power increases since 2000. Tri-State disputes the numbers that Zaporski cited. Although Tri-State has had one rate decrease and another is promised, projections by Tri-State released in February make a rate increase in 2023 difficult to avoid, said Zaporski. Meanwhile, San Miguel has rising costs of its own, most notably fire mitigation, grid reliability, and a sharp rise in material costs due to national and international inflation.

Like La Plata, which plans to get 50% of its power from a new company called Crossover Capital, San Miguel sees Tri-State having continued value, most notably its transmission.

Tri-State disputes Zaporski's description of a annual cost increase. "Tri-State's wholesale rate has been flat or decreased over the last five years (since 2017), and the lower wholesale rate we have in place today is forecast in our long-term financial forecast to remain flat through 2027," says Tri-State's Lee Boughey.

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A reliably loud buzzing around Xcel monopoly

by Allen Best

All who have paid attention to Colorado's energy transition during the last 20 years will likely agree that Leslie Glustrom simply cannot be ignored. She makes too much noise. She's a constant buzz of energy, always swirling around the energy transition, but especially Colorado's largest electrical and gas utility, Xcel Energy.

For the record, she has sometimes said nice things about Xcel Energy or at least its people. More often she uses her voice to challenge the corporate motivations, to urge state regulators to require the monopoly utility to hew to alternative paths.

Much of this argumentation can be read and occasionally heard in proceedings

of the Colorado Public Utilities Commission. There she's an anomaly in three ways. She's a biochemist whereas most of those writing arguments are lawyers. She also speaks as an individual without the foundation of a large trade organization or advocacy group. Third, and perhaps most remarkably, she does all of this and more as a volunteer.

In these proceedings, Glustrom is prone to multiple exclamation marks and other attention-getting typographic devices. Hers is the voice and style of an activist. But what also emerges is her deep research. She has spent time grappling with her topics.

Here, and perhaps elsewhere, she gives space to mainline environmental groups, with her views causing others to be seen as more moderate. What separates them somewhat is her deep distrust of the business model of Xcel. Others don't necessarily have the same level of distrust of Xcel because of its need to show profits to investors

In describing her relationship to Xcel, I am reminded of the story of Socrates, as told by his pupil Plato. In defense of his life, Socrates described himself as being an uncomfortable goad in the Athenian

political scene, like a spur or biting fly, a gadfly arousing a sluggish horse.

Today publications like the New York Times sometimes still use that word to describe a person who interferes with the status quo of a society or community by posing potentially upsetting questions, usually directed at authorities.

She was a founder of a Boulder-based group called Clean Energy Action and has formed or participated in several other citizen groups engaged in climate change advocacy and the energy transition in Colorado and elsewhere.

Big Pivots interviewed Glustrom by email.

Big Pivots: Leslie, were you born an activist? Or did you have an early mid-life epiphany? What got you to where you are now in this sphere?

Leslie Glustrom: A combination. Since I was a young child, I've loved the beauty of nature. One of my first memories is while walking home from kindergarten, watching a butterfly die. In my memory it was a monarch. I was too young to understand the role of death in nature and evolution, but I was deeply moved by the beauty of the butterfly. Now I am enamored with the miracle of life at every level, from the ecosystem to the sub-molecular.

In college I focused on chemistry and biochemistry, but I had a strong interest in the interface between science and society. I gave up a full-ride graduate fellowship that likely would have yielded a Ph.D. in biochemistry to instead work with a remarkable state legislator in Wisconsin, Rep. Mary Lou Muntz, who crafted some of the strongest environmental legislation in the country. She had a profound dedication to consensus, and her bills often passed on 99-0 votes.

Over the last five decades I have worked on issues as diverse as radioactive waste disposal, artificial sweeteners, a hazardous material right-to-know law and public lands

management. All of this was before the current chapter of climate activism.

To answer your question, I think a person's life path is always a combination of inspiration and dedication.

Pivots: Why did you take that fork in the road in Wisconsin? What was lacking in that imagined future of Dr. Glustrom, biochemist?

Glustrom: It didn't make sense to me to spend my life studying the molecular secrets of life when the decisions that humans have been making threaten life as we know it. I wanted to help humans make better decisions at the interface of science and society.

A career in biochemistry would have delivered more prestige and income, but I would have always felt I wasn't doing the most important work I could. So far, we haven't starved.

Pivots: How has your training as a biochemist influenced your work in public policy?

Glustrom: Biochemistry reinforced my deep sense of the miracle of life and of our sacred duty to take care of this incomparable planet. Biochemistry also helped me understand the importance of minimizing the flow through of energy and materials in our economy if we are to minimize the creation of entropy which we register as "pollution." Now this is referred to as creating a "circular economy," which I'm strongly in favor of.

Pivots: What path did you follow from Wisconsin to Boulder?

Glustrom: After working in the State Legislature in Wisconsin, my husband and I moved to a town in northern Arizona called Prescott. There we raised our two children and taught at the local community college. I also did a lot of work on national forest management and issues like mining, off-road vehicles, and livestock grazing.

Things got very tense for us in the late 1990s, as was the case with many grazing activists in rural areas of the West. We took refuge in Boulder where I worked as a research biochemist at the University of Colorado in Boulder.

Pivots: Was there any single thing that caused you to engage in climate change. A speech you heard? A book you read? A hurricane?

Glustrom: In the early 2000s the bark beetle was ravaging forests first in Arizona and then in Colorado. This drove me to take a hard look at the science of climate change. I learned that climate scientists had long predicted that we'd lose significant percentages of our forests and that we'd quickly pass various "tipping points."

I decided that I was no kind of mother if I didn't do everything I could to address our country's heavy reliance on fossil fuels. In 2004 I resigned from my biochemistry research position at the University of Colorado-Boulder to work full time on climate change and clean energy.

Big Pivots: How did you become engaged?

Glustrom: I began by putting on a conference entitled "Climate Change and the West" in June 2003.

Pivots: And next?

Glustrom: In early 2004, Xcel proposed building a big new coal plant in Pueblo, what is now Pueblo Unit 3. Xcel calls it "Comanche 3."

I was appalled. We need to do thousands of things to address the climate crisis, but the first thing to do is to stop building big new sources of carbon dioxide like coal plants. Unit 3 was supposed to burn coal to 2070. Many citizens understood how absurd that was even then.

We organized, testified, demonstrated and used every tool we could to try to stop the Pueblo Unit 3 coal plant. We took the air permit and the rate increases for the

Pueblo Unit 3 coal plant to court three times. Each time we lost. Unfortunately, like a head-strong child determined to run into the street in front of a bus, Xcel was able to prevail. Now they have a billion-dollar coal plant that isn't functioning well. Now everyone has recognized that this billion-dollar coal plant will be retired long before it is paid off leaving Colorado with a very expensive stranded asset.

Pivots: You make a point of excluding the name "Comanche" from the coal-burning units in Pueblo. Why?

Glustrom: I think it is highly unlikely that Native American tribes want coal plants named after them, so I think it is more appropriate to just refer to the coal plant by the community where it is located.

Pivots: You've been a steady presence at the PUC in the 12 or so years that I've been checking in on proceedings. Like a court of law, it's arcane. And like courtrooms, most of the talking is done by lawyers. Tell me—briefly, please—what it's been like for you to participate as a non-lawyer.

Glustrom: The PUC has, shall we say, not been a welcoming venue. I've been generally appalled by the level of critical thinking that occurred at the Colorado PUC over the last 15 years. Commissioners and staff have generally deferred to Xcel—even when hundreds of citizens could see that spending close to \$2 billion for new and old coal plants was a severe mistake. It has been massively frustrating to see the PUC commissioners who were generally paid more than \$100,000 a year just engage in a "group think" process with little willingness to make the right decisions for Xcel's customers, our state and our planet.

Pivots: But as a non-lawyer. What is that like?

Glustrom: Well there are some things to learn procedurally, but I just watched what the other attorneys (especially Paula

Connelly from Xcel) were doing and figured I'd just do it the way they did. Way too much effort is put into the PUC on legal procedure and not enough on deep thinking on key issues like the climate crisis, how to avoid stranded fossil fuel assets, and how to make the clean energy transition as cost-effective as possible.

Pivots: Is this a paying job. Or is this volunteer?

Glustrom: I am profoundly concerned about the fate of future generations and other species, so I wanted to do the work that I felt was critical, even if it wasn't popular. I also didn't want to worry about getting approval from funders who, when I began, tended to support false solutions like "clean coal." My husband, a college teacher, took extra teaching assignments to make all of this possible, so I owe him a very large debt of gratitude!

Pivots: For it seems like a decade you've been saying that existing coal plants are in danger because coal will not be available for the plants. What led you to that conclusion?

Glustrom: After reading Jeff Goodell's 2006 book, "Big Coal," a footnote led me to the U.S. Geological Survey's studies of coal

supplies. It became apparent that most of the coal left in the United States is buried too deeply to be mined at a profit.

I wrote two detailed reports, the first in 2009 and the second in 2013, and spoke at venues all over the country on coal supplies. I predicted coal companies would go through serious financial troubles in the mid-teens—and they did. All of the major coal companies and dozens of minor ones began filing for bankruptcy in the 2010 to 2017 time-frame, as I'd predicted. We are likely to see further structural decline in the U.S. coal industry in the 2020s. Once you understand the financial situation facing the US coal industry, you wonder who will be mining coal in 2030 given the geologic, economic and climate factors at play.

Pivots: Doesn't this just hasten the switch to renewables?

Glustrom: Yes, the geologic factors facing the US coal industry can help accelerate the transition beyond coal, but if you aren't paying attention, then you'll spend close to \$2 billion in coal plants as we've done in Colorado just assuming that coal will show up for several more decades—not a good assumption.

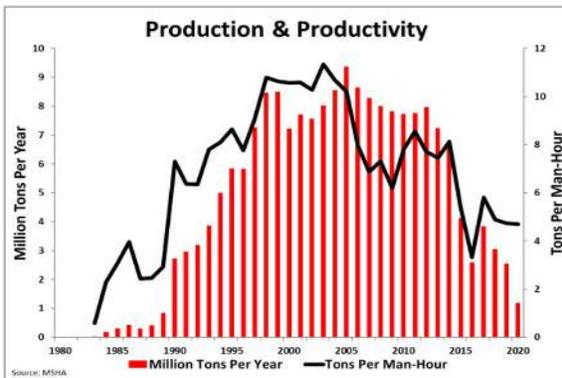
Failing to understand the structural decline of the US coal industry risks leaving Colorado utility customers paying off poor investments in coal plants. Paying off these "stranded" coal plants is the issue currently before the PUC with respect to the big coal plants in Pueblo and Brush as well as the western Colorado communities of Hayden and Craig.

Pivots: Hayden and Craig plants are supplied by local mines. The research you delivered in your PUC filing in late January is all about Wyoming's Powder River mines, which supply coal to the Pawnee and Comanche plants in eastern Colorado. Are the same concepts true for the Colorado coal mines?



Glustrom: Yes. There is lots of coal left in the ground everywhere, but it is generally buried too deeply to be mined at a profit. Colorado coal production has dropped from almost 40 million tons in 2005 to under 15 million tons in recent years.

While coal production is always the result of the complex interplay of the forces of supply and demand, the clear drop off in productivity (tons/person-hour) is an indication that the easily mined coal has already been mined and that now the mines are starting to “scrape the bottom of the barrel” of easily accessible coal.



Foidel Creek/Twentymile Mine

From Appendix F to Volume II of Xcel's 2021 Electric Resource Plan, Proceeding 21A-0141E

This is true for the Powder River Basin in Wyoming and it's also true for Colorado coal mines like the Twentymile/Foidel Creek mine that serves Hayden and the Trapper and ColoWyo coal mines that serve the Craig coal plants. Below is a graph of the production and productivity for the Foidel Creek/Twentymile mine that serves the Hayden Coal plant. Clearly, both mine production and productivity started falling off dramatically in the early 2000's. There are similar curves for the other Colorado coal mines as well as all the Powder River Basin mines—which are also playing out.

Pivots: In your testimony to the PUC, you use the word “boneheaded” frequently to

describe decisions made by PUC commissioners of the past. But Xcel will be out of coal by 2034 at the latest and with much reduced demand within the next three years. So why does this matter?

Glustrom: My point is that it is “boneheaded” to just assume that coal will mine itself and show up for as long as Xcel or the Colorado PUC thinks it should without taking a hard look at the mines supplying Colorado's coal plants and the structural decline of the U.S. coal industry.

Pivots: I believe you now or at least formerly owned stock in Xcel Energy. To what purpose?

Glustrom: Owning stock allows you to attend Xcel's annual meetings, where you can speak to the board of directors and often have side conversations with top Xcel executives. I've travelled to lots of obscure places like Amarillo, Texas, and Becker, Minn., to attend Xcel's annual meetings to try to accelerate their thinking about the climate crisis and their still heavy reliance on fossil fuel generation.

Pivots: In your recent testimony to the PUC, you say that the coal-burning unit you call Pueblo Unit 3 approved by PUC commissioners in 2005 was never really needed. Tell us your theory about why this plant was built.

Glustrom: There are many reasons to believe that Xcel built the Pueblo Unit 3 coal plant, not because this was the best decision for Colorado, but that it was a good way to boost Xcel's profits.

Xcel began planning to build a coal plant in Colorado about a year before they submitted their 2004 resource plan. That is the wrong sequence. Utilities are supposed to do the resource plan first and then go out to bid for resources and decide based on those bids what to build.

Xcel's stock price dramatically dropped in 2002 after an unregulated subsidiary went bankrupt, which cost the company

more than \$700 million. The way to increase earnings after something like that is to make a big capital investment—like a coal plant.

All of this has been extensively documented in my 2009 report, “Colorado’s Billion Dollar Mistake,” which is based on Xcel’s own documents and other PUC filings. The report details how the coal plant was never really needed to meet Colorado’s demand. It was excess capacity on top of a generous reserve margin.

Rather it is clear that the coal plant was designed to drive up Xcel’s profits which it has done very effectively. Xcel’s Colorado load has increased less than 10% since 2006 while their Colorado profits have more than tripled from \$211 million after taxes in 2005 to \$660 million in 2021. These profits were driven in large part by rate increase after rate increase that was granted while the Pueblo Unit 3 coal plant was being built and brought into service.

Pivots: Most readers of Big Pivots will understand your argument here, but you need to spell it out more for those who don’t spend their late nights reading PUC filings. You are saying that Xcel built Comanche 3 to have it added to its rate base. Why does this matter?

Glustrom: Large capital expenditures like the Pueblo Unit 3 coal plant are typically added to a utility’s “rate base.” The larger the rate base, the greater the profits. Colorado didn’t need the electricity from the Pueblo Unit 3 coal plant, but Xcel needed the profits from the plant to help rescue their stock price, which had plummeted in the summer of 2002.

Pivots: Is this method of determining the rates that can be assessed Xcel’s customers set up in Colorado law?

Glustrom: The details of utility rate-making is not specified in law. Colorado law just says rates need to be “just and reasonable.” The details on utility rate

setting are established through precedent at the Colorado Public Utilities Commission and around the country.

The key concept is that unlike other businesses, Xcel and other investor-owned utilities are allowed to have monopolies in exchange for a willingness to, in theory, be “regulated.” They are highly motivated to make capital expenditures (think things that require concrete and steel) because those go into the “rate base,” drive up the rates and allow Xcel to increase its “earnings per share” to its stockholders.

Rate-making in Colorado has now gotten so complex that even the experts that are supposed to oversee Xcel’s rates (and those of Black Hills, which serves Pueblo and surrounding areas) have a hard time following it all.

Pivots: Xcel has plans for massive investment in renewable generation and a comparable investment in transmission in eastern Colorado. You filed testimony questioning the full need. Why are you dubious?

Glustrom: Colorado and Denver’s populations have grown dramatically over the last decade, but Xcel’s load has stayed close to flat. Offsetting load growth are efficiency measures and self-generation by homes and businesses, so it is hard to say with certainty what will happen to Xcel’s future load.

Also, I believe we will be wiser to build smaller, more distributed electrical networks (like microgrids) so that we aren’t so dependent on long transmission and distribution lines that keep failing during the increasingly extreme weather events that result from a warming planet, including fires, floods, ice storms, bomb cyclones and more.

Pivots: You took issue with this statement in Big Pivots 52:

“Xcel’s plans for transmission coupled with a concurrent proposal

for new wind, solar, and other resources could deliver investments approaching \$9 billion in coming years. This will allow Colorado's largest electrical utility to close coal plants and likely will slow rate increases or possibly halt them altogether. Some utilities have actually been able to lower rates as they have pivoted to renewables."

I used the word "likely," which admittedly is a squishy word. Even so, you believe I suggested more certainty than exists. Where do you think I went wrong?

Glustrom: You have suggested that Xcel will use the savings from renewable energy generation to benefit their customers through avoided or delayed rate increases, but Xcel has made it clear time and again that they plan to keep raising our rates no matter how cheap the cost of wind and solar generation become. Unlike an entity like Tri-State, which has no profit motive, Xcel is driven to keep increasing their shareholder earnings.

If there were market forces at work or Xcel's customers were served by a non-profit public power entity, then your statement might have had validity. After watching Xcel drive up our rates for close to 20 years and knowing that Xcel plans to spend more than \$9 billion in Colorado in the next five years alone, I think any expectation of rate relief from Xcel is poorly placed.

Pivots: Final question. Name three individuals in the climate and energy movement who you admire, in Colorado or elsewhere, and in a sentence or two, why?

Glustrom: I am so proud of the climate movement that has been built in Colorado. There are hundreds of thoughtful, dedicated people who are working to move Colorado forward in addressing the climate crisis. I am inspired by everyone that I work with. Here are a few of the most exceptional leaders in the West.

Micah Parkin, executive director 350 Colorado, has built a remarkable organization that is doing everything possible to move Colorado beyond our reliance on fossil methane and to address the many environmental justice issues facing our state, starting with the Suncor refinery. Micah is incredibly sweet and very effective—a rare combination. We are so very lucky to have her in Colorado!

Jeremy Nichols, the director of climate and energy programs at Wild Earth Guardians is wickedly smart and unbelievably hard working. He has probably done more to keep fossil fuels in the ground and reduce greenhouse gas emissions in the West than anyone else I know.

Shannon Anderson is an attorney with the Powder River Basin Resource Council in Wyoming. She has waged one courageous battle after another in the midst of Wyoming, perhaps the state that is the most dependent on fossil fuel production. Shannon is a quiet heroine working under very difficult circumstances!

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