

BIG PIVOTS

ENERGY *and* WATER *transitions in Colorado and beyond*

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Seven big pivots in Colorado last year

by Allen Best

In Colorado, there's a saying that you don't have to take down your Christmas lights until the National Western Stock Show wraps up in Denver. As that event is now over, here's a look back at some of Colorado's big pivots in 2021 and a look into 2022. I singled out seven big pivots.

This necessarily is a subjective exercise. The uptick in electric vehicles and installation of charging stations could have been a story. Will Toor, who directs the Colorado Energy Office, told state legislators on Thursday that close to 13% of all new vehicles sold in Colorado in the last months of 2021 were EVs compared to 2.5% two years ago.

Colorado will need to get to 60% to achieve its 2030 goals, he said, but Colorado is ahead of schedule. A torrent of new EV models will soon become available.

Neither is there a deep examination in the following pages of the electric resource plans filed by Xcel Energy and Tri-State Generation and Transmission. These plans will redefine the electrical infrastructure of the next 30 years.

How about climate change? Nary a mention in the following pages, except for

in the story about the Marshall Fire, which I wrote a few days after the fire. Afterward, talking with yet another climate scientist, I think I weighted the factors in that fire just a little bit wrong, not sufficiently acknowledging the unusual confluence of factors that resulted in that extraordinary fire.

That said, climate change was a big story in 2021. Forest fires are natural, but is it natural for the air quality to be so bad that nocturnal walks were for several weeks at a time last summer more harmful to health than beneficial?

Then there were the heat records in June and July in Colorado and beyond. In Portland, people literally baked to death.

The Colorado PUC asked Xcel Energy to do a model run on resource adequacy to handle a similar event in Colorado in 2030.

One final note: I rarely sit in on oil and gas

commission meetings. The following pages reflect a partial view of the rapidly changing landscape.

Happy to hear your thoughts on all of this and perhaps publish them, if we're both willing. I am one voice among many.

(The photo? Just a bit of whimsy, sunflower heads near Cheyenne Wells, Colo., in October.)



Methane emissions gently but firmly get not-welcome-here signals in Colorado

Colorado began dialing back methane emissions in 2021, firmly, but with restraint. In the future, I predict it will be seen as the same sort of pivot as occurred in 2003 when Colorado gained its first wind farm near Lamar and in 2004 when state voters approved the first renewable energy mandate.

Legislators passed four bills governing directly or indirectly the natural gas consumed by buildings. The new laws might best be described as nudges, like a passenger in a low-fare airline marking turf.

They require that state regulators use a new tool, the social cost of methane, similar to the social cost of carbon, when evaluating programs. The idea is to take the long view of the cost of methane, a greenhouse gas with 83 to 87 times the global warming potential of carbon dioxide over a 20-year span. The U.S. Interagency Working Group on Social Cost of Greenhouse Gases has set the cost at \$1,756 per short ton, compared to \$68 for carbon dioxide.

In the concern about the short-term impacts of methane, legislation also revised the financial tools for measuring effectiveness of demand-side management strategies required by HB21-1238. State regulators must take a long view of the payback of these programs. This makes energy efficiency easier to justify.

SB 21-264 requires gas utilities with more than 90,000 customers (there are

three) to develop clean-heat plans that result in fewer emissions.

“Reducing gas emissions in the building sector is what I’ve called the hardest nut to crack, because it will take the longest time to convert the building sector to clean-heat technologies, especially retrofitting existing buildings,” said State Rep. Tracey Bernett, a sponsor or co-sponsor of several of the bills, in a June interview. “That’s why we need to start now.”

Unlike California, there were no local mandates, no deep lines in the sand, such as that in Berkeley, which in 2019 said no buildings could be constructed with natural gas hookups.

A Republican representing Colorado’s oil and gas country sponsored a bill that proposed to quash any such bans by local jurisdictions. It never got out of committee

Will 2021 be remembered for natural gas the same way as 2004, the year that Colorado began its pivot toward renewables?

in the Democrat-controlled Legislature. After all, what problem was that bill trying to solve?

State agencies were given responsibility for administering some of this tamping down of methane. The Colorado Public Utilities Commission held several informational meetings. The social cost of carbon, in particular makes it harder for Xcel Energy and Tri-State Generation and Transmission, the state’s two largest electrical utilities, to justify natural gas plants for production of electricity. New laws also will cause utilities to push harder on demand-side management programs.

Tri-State, on its own, had concluded that building new natural gas plants might not make sense, given how much change is likely in the energy landscape during the next few years. Xcel wants to retrofit Pawnee to burn gas and also add considerable natural gas combustion inventory.



Philip Jeffreys, project development manager for The Hub, the Aspen Skiing Co.'s all-electric employee housing building at Basalt, explains the array of roof-top air-source heat pumps and solar panels that allow the building to perform without need of natural gas.

The Air Quality Control Commission also pushed, at year's end, adopting regulations to step up inspections of what is called the upstream infrastructure of wells and compressing stations to reduce gas escaping into the atmosphere.

Local governments were having conversations and taking some action. This included both the low ends and high ends of real estate. At Dotsero, at the east end of Glenwood Canyon, aging trailers were converted to technology that required no natural gas by an Eagle County program. In Snowmass Village, two-bedroom condominiums in Electric Pass Lodge were selling for \$3.2 million. One of the selling points beyond the location adjacent to ski lifts: all electric, all from renewable energy.

Downvalley in Basalt, the Aspen Skiing Co. completed an employee housing complex that similarly has no natural gas. In Aspen, meanwhile, town officials at year's



end were talking about benchmarking of larger buildings.

Denver has already set out on this path. The city council adopted a law in November that requires buildings larger than 25,000 square feet to get to 30% energy savings by 2030. The law requires a gradual adoption of electric heating and cooling systems to replace gas systems when cost effective.

This matters because commercial and multifamily buildings in Denver account for 49% of the city's GHG emissions.

Colorado Springs, too, is having this conversation about converting gas uses in buildings to electricity. It's still early, said Aram Benyamin, the chief executive of Colorado Springs Utilities since October 2018.

In late August, as the utility burned its last coal before retiring the Martin Drake plant along Interstate 25, near downtown Colorado Springs, Benjamin sat down with me for an interview. The last generation from coal will be replaced by wind and solar and, for reliability purposes, natural gas turbines that will be in place at the same plant for about a decade.

Like other utility chiefs, Benjamin sees an electrical grid increasingly saturated with renewables, a combination of those from somewhat distant places but also development of local microgrids. He also sees electricity supplanting natural gas in buildings.

Benjamin has been out to speak with builders and other stakeholders. Some rejected the idea of building electrification initially. It will never happen, they said. By the second meeting, though, there were questions about how it can happen. Benjamin says it's natural to be leery of relying upon only one source of energy. He is confident this shift will happen during the next 5 to 7 years, maybe 10, when all new buildings become all- electric.

A week after that interview, I was in Redstone to hear about the methane emissions continuing to come from coal mines that have been closed since 1992. Pitkin County, the Aspen Skiing Co., and others would like to figure out a way to capture the methane being emitted by Dutch Creek and other mines, which haven't operated since 1992. The methane emissions in their global warming potential dwarf what is being emitted elsewhere in Colorado—and not just from old coal mines. But it's a sticky situation fraught with complexities.

Even well-conceived ideas can go off their rails. In metro Denver, Norbert Klebl obtained approvals from the city of Arvada in 2008 for a visionary project that would require no natural gas. The process began with strict attention to siting, using

principles easily a thousand years old, married to new technologies, including ample use of PV and energy efficiency.

It took him until 2014 to get financing. Finally, in 2020, after completing 29 units, he was ready to sell the remaining entitlements. He did so, he said, with the understanding that the other units would also be devoid of natural gas.

This was not in writing, though. The buyer has since sold off the remaining project entitlements to builders who want to do what they know how to do. That means housing with natural gas furnaces. Outraged residents of the project, called Geos, got some state attention and a CNN report. Ten years ago, though, CNN would have had no interest.



Looking into 2022

The Public Utilities Commission has begun rule-making regarding the framework in which the natural gas utilities to institute demand-side management and clean-heat plans as specified by two key laws passed in 2021. (This is in case 21R-0449G, if you want to comb the PUC files).

Already there is controversy.

One proposal would have utilities pass the full cost of extension of new natural gas lines on to new customers. Today, and in the past, utilities socialized the cost, meaning that existing customers help pay for the new lines. E-mails in mid-January began pouring into the PUC objecting to this end of socialism from what would seem to me an unlikely source, the Grand Junction area.



What technology will get us 100% clean energy by 2030?

Spaced little more than 25 miles apart along the Yampa River, the coal plants at Hayden and Craig together constitute Colorado’s single largest center of coal-fired generation, 1,724 megawatts of capacity, compared to 1,410 at Pueblo.

Can those assets—the land but especially the electrical transmission and also water rights—be parlayed into the new energy paradigm?

In other words, can the Yampa Valley become the giant battery that is needed to achieve deep, deep penetration of renewables, above 90%?

During 2021, several sets of ideas emerged more clearly into public view. One set involves pumped-storage hydro. Even today, Colorado’s largest battery remains relatively ancient technology, Xcel Energy’s

Cabin Creek project near Georgetown. The water from a reservoir along the road to Guanella Pass is released when most needed to generate electricity, then pumped back uphill when electricity is relatively plentiful and hence cheaper.

At least two, and perhaps more, specific ideas with this same concept were in the early drafting stage in 2021 in the Yampa Valley. There was some tinkering elsewhere in Colorado with the same concept. Alice Jackson, chief executive of Xcel Energy’s Colorado division, reported in a filing with state regulators that pumped-storage hydro remains among the options.

Xcel Energy, in an April meeting with Routt County commissioners, also confided that it was studying the potential for molten salt at the site of its coal plant at Hayden once the plant closes in 2028. (That produced a May story in Big Pivots: [“Salt on the table at Hayden.”](#) Later,

other Colorado media outlets, including Colorado Public Radio and the Colorado Sun, picked up on the same story).

Then there’s green hydrogen (made from renewables), another option for the Yampa Valley—and, well, a lot of places, if

The Yampa Valley downstream from Steamboat Springs today is a place of coal plants. Will it be a place of energy storage by 2030?

costs can be brought down and concerns about safety engineered. Nuclear remains part of the conversation in Colorado, if it brings with it cost and safety concerns, too. Notable are the plans, with money from both Bill Gates and the U.S. government, for a plant in Kemmerer, Wyo., that is to demonstrate new nuclear technology.

Meanwhile, lithium-ion batteries have been making inroads as costs have declined 15% a year. One example is the work conducted by Holy Cross Energy. It went forward on a solar project near Glenwood Springs that will be coupled with 5 megawatts of storage. The cooperative in 2021 also launched a pilot program of six home batteries, the better to figure out how to contour demands around supplies as it moves to 80% renewables.

In addition to storage, Holy Cross sees another necessary to achieve its 100% emissions-free goal by 2030. The task is to integrate Holy Cross and other utilities in Colorado with other utilities across the West—or, perhaps, the Midwest.

The idea is that electricity resources can be shared among utilities to best match supplies with demands. In this way, Xcel Energy does not just depend upon its generating assets in Colorado or those altogether in Colorado. Instead, the assets of Wyoming and Arizona, or Nevada – or Kansas and Nebraska – can be shared.

This is done in steps, and an important but small step occurred on Feb. 1 when an energy imbalance services market was launched with Tri-State, Western Area Power Authority, and several other participating utilities. The big step will be an

organized market along the lines of a regional transmission organization.

A study adopted by the Public Utilities Commission in November, the result of a legislative mandate in 2019, found that greater participation in organized wholesale markets by Colorado utilities could deliver savings of 4% to 5%.

[In December 2021](#), State Sen. Chris Hansen, a prime sponsor of the 2019 bill that mandated the study and an energy expert in his professional life, found that conclusion conservative. He was the prime sponsor of another bill that in 2021 became law. It tells utilities they must figure out how to be in an organized market by 2030.

[In January 2021](#), Chris Clack, of Boulder County-based Vibrant Clean Energy, said that the electrical system will be reinvented. “We would like it to happen in 20 years, but realistically it will be 35 years,” he said. And long-distance transmission will be a big piece of that. “It

makes a lot of things easier,” he said.

Goals of 100% carbon-free energy make for easy headlines, but it’s wonkish policy and infrastructure details like these that will make them attainable.

Looking into 2022

Well, this is a rapidly moving story. After this story was completed but before it was published, Xcel Energy announced it was joining the Southwest Power Pool energy imbalance market, along with Platte River Power Authority and Black Hills Electric, as other Colorado utilities have previously.



Addressing a wound from 1864 still not completely healed

On a day of August sunshine only mildly marred by wildfire smoke, Colorado Gov. Jared Polis addressed a dark time of

Colorado's history. Standing at the foot of the Capitol's western steps, Polis announced that he was rescinding two executive orders that had been issued in 1864 by John Evans, then the territorial governor.

"We are gathered here on a very somber but also, in some ways, celebratory day in that we are finally addressing a wrong of the past," Polis said. Sitting in the chairs that had been set up and standing around were members of the Cheyenne, Arapaho, Ute, Navajo, and likely other tribes.

"In 1864, Territorial Gov. Evans issued two proclamations shamefully targeting and endangering the lives of Native Americans who resided in Colorado," Polis continued, looking out on the western skyline, the 14,265-foot Mt. Evans prominent in that front row of peaks.

Evans had arrived in Colorado in 1862 to fill dual posts to which he had been appointed by President Abraham Lincoln, that of territorial governor and superintendent of Indian affairs. Historians have firmly concluded that he was more zealous about the first job than the second, whose responsibilities included looking out after the best interests of the natives.

As Elliot West and other historians have noted, the tribes were having problems already. The stepped-up immigration from the east upset an already messy apple cart. Peace did not reign before the arrival of the Americans from the east. The diary of John



Charles Fremont from the 1844 expedition tells of being asked by the Utes to come to battle with them against the Arapaho in South Park. (He declined). Residents of the new camp of Denver were horrified to see proud Arapaho returning from battle parading the scalps of Utes.

Relations between the latest immigrants and those of an earlier era worsened in 1862 and 1863. Fears grew along with violence, although a full accounting of who did what to whom is

complicated. Settlers were not without cause to be afraid.

And Indians very clearly had reason to be leery. Some among them had been

to Washington D.C. and New York City. Among those who clearly understood the mismatch was a Cheyenne leader named Little Bear. He had traveled to Washington D.C. in 1863 to meet with Lincoln and other federal officials. In May 1864, he and other Cheyenne were camped at a location about 330 miles east of Denver. Troops arrived, and Little Bear had walked out to meet the soldiers. He was carrying a medallion he had been given in Washington as well as peaceful intentions. He was shot dead. Soldiers then rode up and shot his body again.

Worse came at the start of winter. Evans was absent from Colorado in November, on his way to Washington D.C.,

Governor rescinds proclamations that created platform for the Sand Creek Massacre

when Col. John Chivington led combined forces of a 100-day militia and a unit from the U.S. Army in a pre-dawn attack at Sand Creek, about 180 miles southeast of Denver.

The Indians, mostly Cheyenne but also Arapaho, about 700 altogether, had gathered there, believing with good cause that they had been promised safety.

“Two-hundred-and-thirty Cheyenne and Arapaho, mostly women and children, the young and the elderly, were slain in the Sand Creek Massacre,” Polis said.

The governor did not say, but among those killed was an octogenarian, White Antelope, who had also been to Washington D.C. and New York City.

Historians have agreed that Evans fell short. A report in 2014 by a panel from the University of Denver, one of two institutions of higher learning that Evans had co-founded, went further. The August 1864 proclamation made it “fair game for attack and robbery by vigilantes at the endorsement of the governor.” This with additional actions in effect “did the equivalent of handing Colonel Chivington a loaded gun,” the DU panel concluded. For a full understanding of the proclamations, see the [2014 report by the DU panel](#).

The proclamations, said Polis, were never legal and they have never been rescinded. “Today we are changing that,” he said. “Today we are officially rescinding the executive orders of the territorial governor, John Evans.”

And then there were cheers, hoots, and howls.

Looking into 2022

Evans was forced to resign in 1865 after two Congressional inquiries into the horror of Sand Creek and one military investigation. He remained in Colorado,

though, and substantially completed what he had set out to do, helping develop railroads and real estate and accumulating a large fortune.

In 1895, two years before Evans died, Colorado legislators renamed the peak west

of Denver in his honor. Even then, Evans had never defended his actions leading up to Sand Creek.

Will it now be renamed? Four proposals have been submitted to the U.S. Board of Geographic names:

Mount Blue Sky, Mount

Cheyenne-Arapaho, Mount Rosalie (its former name), and Mount Soule.

Soule was the name of a captain under Chivington who had refused to let the men under his command participate in the massacre. Soon after, he and another officer, Lt. Joseph Cramer, who had similarly held back his men, wrote scathing letters to their commander, Maj. Edward Wynkoop, which led to the congressional and other investigations. Soule was assassinated a few months later in Denver.

In 2020, Polis formed an advisory board to make recommendations to him on what he should recommend to the federal board on this and other renaming proposals. The board has already taken up dozens of proposals. It has recommended that Squaw Mountain, west of Denver, be renamed Mestaa'êhehe (pronounced mess-ta-HAY) Mountain. Among many others, it also recommended changing Negro Creek and Mesa in Delta County. There were many more of the same nature.

The board has yet to take up the issue of Mt. Evans. Another proposal would rename Kit Carson, another 14er, Frustrum Peak, while still another proposal to be considered is whether the name Nuchu should replace Gore, in the mountain range.



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Contributions ranged from \$2 upward, but all are acknowledged here. You helped make the second year of Big Pivots a big success.

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Solar hits maturity in Pueblo where it will power a steel mill

Nowhere was the emergence of solar energy as a prime player in Colorado more graphically illustrated in 2021 than in Pueblo. The city has made its living from

4

burning coal for about 150 years, at first directly in the foundries of the steel mill then called the

Colorado Fuel and Iron Co. When electric-arc steel making arrived, coal was burned to produce that electricity at the nearby Comanche Generating Station.

On a semi-windy day in October, a tent was set up on a hill in a sea of solar panels, part of the 300-megawatt Bighorn project. The solar project is likely the very biggest in the United States east of the Rocky Mountains.

To the south was the coal-fired power plant and to the west and north was the steel mill, now owned by Evraz, a multi-national firm based in London.

Bighorn is to supply about 90% of the electricity needed for production of

quarter-mile rail segments increasingly required by Union Pacific and Burlington Northern-Santa Fe. The two railroads together constitute two-thirds of the U.S. rail market. A new mill is now being constructed at a cost of \$500 million to deliver those long, seamless rails that are equally needed in places where temperatures reach 120 degrees and those where it gets 40 below.

Crucial was the quasi-net-metering deal with Xcel Energy, which was represented on the hilltop by Bob Frenzel, the utility's president and chief executive.

The Pueblo event was part of a broad surge of solar in many locations in

Executives of Evraz pursued solar because of the cost reliability over the next several decades

Colorado, from Aspen to Delta to Fort Collins.

Membership in the Colorado Solar and Storage Association reflects that surge.

Mike Kruger, the group's chief executive, reports a 61% growth in members, from 140 to 230. Across Colorado, solar projects were steadily in the news.

Signs on the hilltop outside warned of serpents amid the sagebrush surrounding the tent. None seem to have interrupted



the celebration of economic and environmental triumphs.

“I feel like I’m witnessing the energy transition right in front of me,” said Abby Hopper, the chief executive of Solar Energy Industries Association, a national trade association. She said that solar, now responsible for 3% of the energy production in the United States, is poised to deliver 30% by 2030.

“This is what policy makes happen, senator,” she said, looking at U.S. Sen. Michael Bennet, who was wearing a green sports jacket, blue jeans, and black cowboy boots. I guess he had prepared for the rattlesnakes.

Bennet, who once worked for Phil Anschutz, an industrialist who made his first large fortune in natural gas, tied his remarks to the warming climate.

“This summer was a rough summer for people across Colorado,” he said. “Here we are pretty used to seeing the mountains. That’s why a lot of us live here, and this summer there were many days you couldn’t see the mountains. There were a lot of days you couldn’t go outside” because of the fires on the West Coast. Further, he said, water supplies are being threatened by the warming climate.

The deal had come together in 2018 and 2019 as Evraz executives pondered how to best remain competitive. The new mill was needed.

The price of electricity was the crucial component in whether to stay in Pueblo. The deal cut with Xcel fixes electricity prices for 20 years.

And in the process, Evraz reduced its carbon footprint in the steel manufacturing process 75%, said Skip Herald, the boss for Evraz operations in the United States. He called it a “21st century success story.”

Kevin Smith, the chief executive for American operations of LightSource BP, the solar company that built Bighorn, called solar energy the most cost-effective energy right now. And Pueblo’s solar resource, he said, rates 8 or 9 on a scale of 10.

In an interview after the formal comments, Jerry Reed, the recently retired vice chief commercial officer, said Evraz was going to lose its rail business if it couldn’t



Jerry Reed, a former executive of Evraz, with the steel mill in the distance.

deliver the long rails. The carbon-free component was an added value, he said.

Reed also shared that this was somewhat more than mere business. He had grown up in southwestern Virginia, amid factories towns that have become part of the rust bucket belt. He didn’t want to see that in Pueblo. “It’s a hard-working group of people here,” he said, describing the fourth, fifth, and even sixth generation steel workers he had met.

“It becomes very personal,” he explained.

Among the third-generation steel mill workers was Pueblo’s current mayor, Nick

Gradisar. His grandfather, a Slovenian immigrant, worked at the steel mill for 50 years, his father for 30. Gradisar himself walked through the gates of the mill daily for three summers while working his way through college.

Gradisar said the project “points to a bright future for this mill and our community.”

Weaving together economics and environment, he explained that the mill was already the largest recycler in Colorado, it recycles one million tons of steel annually.

“And now it will be powered by renewable energy,” he concluded.

Adding further symbolism during the day were the looming towers of Comanche’s three generating stations. The older two units will cease operations in 2023 and 2025. As for the newest unit, Comanche 3, its fate is yet to be determined, and that’s another story.

No sooner than the Bighorn project became a wrap in early October than LightSource BP began work on a second, giant solar farm south of Pueblo, just a whisker smaller than Bighorn, for delivery to Xcel.

Elsewhere in Colorado, solar has been a growing part of the conversation. Just a few in the news in 2021:

- Primergy Solar completed a 5-megawatt solar project near the Aspen-Pitkin County Airport in October, part of the plan by Holy Cross Energy in its drive toward 100% carbon-free energy by 2030.

- Near Delta, an 80-megawatt solar venture is projected to deliver \$10 million in property taxes over 35 years while delivering electricity to members of Delta-Montrose Electric Association.

- Solar plays a large role in the plans by Xcel Energy to achieve its requirement of reducing carbon emissions 80% by 2030 (the plan before the Public Utilities Commission actually could push it to 87%).

Included in the plan being reviewed is potential for more solar in the San Luis Valley.

- In December, Platte River Power Authority, which also has a 100% carbon-free goal for 2030, announced it wanted proposals for solar—leading to conjectures of a 100-megawatt solar farm at the site of the current coal-fired power plant at Craig. After all, the land will presumably be inexpensive and the transmission is there to export the electricity to Platte River and its four member cities: Fort Collins, Longmont, Estes Park, and Loveland.

Looking into 2022

It was a big year – and it’s just possible that this year will be bigger for solar in Colorado, fulfilling the promise that visionaries in the 1980s and 1990s imagined when solar was still too costly for all but space ships.

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A shrinking river and its reservoirs, and what happens next

Brad Udall asked the biggest question in the three days of the Colorado River Water Users Association conference held in Las

5 Vegas during mid-December. How can an average 85% of snowpack, he asked, yield a runoff of less than 30%? It wasn't one of those trick questions, like you see in the memes on Facebook. It is a question that that should interest the 35 to 40 million people who depend, at least in part, on the Colorado River and its tributaries, including most of Colorado's 5.85 million residents.

In his presentation, Udall, a climate scientist at Colorado State University, answered his own question. He said he gets annoyed by people who use the word "drought" to describe what is happening in the Colorado River Basin. More appropriate, he said, is "aridification."

Even when it snows a lot, runoff tends to disappoint—a lot—because of increased evaporation and transportation and then water-absorbing dry soils. Springs have become warmer, the snowpack disappearing more rapidly, hotter summers baking the soil even more.

Those who met 100 years ago in Santa Fe to broadly divvy up the Colorado River assumed more than 20 million acre-feet of annual flows. The compact they delivered identified roughly 17.5 million acre-feet to be shared between the seven states and Mexico with some left over for evaporation. Even in the last century, the river delivered a little bit less than this optimistic assumption. In the 21st century, river flows have dropped 20%.

Lower basin states have reduced their withdrawals, but still the bank account of the reservoirs, 95% full in 2000, are projected to be 30% full by April 2022.

In August, the federal government—as operator of the dams—declared a shortage. In December, speakers representing both the Department of Interior and its sub-agency, the Bureau of Reclamation, the operator of the dams, urged attention to the things that can be done almost immediately to prevent the water in Powell dropping below the level necessary to produce electricity. Despite strong snows in the headwaters, that could happen by 2023, conceivably sooner.

Infrastructure and agreements designed in the 20th century are coming up short. Drought may end, but as Udall has documented, warming that results in aridification almost certainly will not.

"A fundamental mismatch between the 20th century expectations of what the river can provide and the 21st century reality," said two long-time Colorado River observers in a December journal entry called "[Green Light for Adaptive Policies on the Colorado River.](#)"

Anne Castle, a former Interior Department official who is now with the Getches Wilkinson Center at the University of Colorado Law School, and John Fleck, of the University of New Mexico, also point out that new scientific research predicting future climate change impacts on the



Colorado River flows will be even more serious than past modeling had suggested. One study conservatively estimates warming temperatures will cause declines in overall river flows of 20% to 30% by mid-century and 35% to 55% by century's end. This is directly related to warming, not ephemeral drought.

"These types of decreases in flows are well beyond the capacity of existing operational regimes to manage," they wrote.

Castle and Fleck urged state and water officials to "seize this opening, cognizant of its likely limited duration, and cement new agreements that steer river operations in a more sustainable direction."

At the conference in Las Vegas, a water official was asked whether the Colorado River Compact needed to be replaced by a new agreement, one that recognized that the century-old compact was premised on assumptions of water flows in the river that, even then, were unsupported by the scientific record. The water official, Colby Pellegrino, from Southern Nevada Water

Authority, scoffed that this was the sort of thing that journalist and sometimes water lawyers liked to talk about. But earlier, I had consulted Eric Kuhn, the former general manager of the Colorado River Water District in Colorado. He had also long thought reopening the compact was ill advised, because of the risk. But lately, he said, he had begun to wonder whether it was time to start from scratch again.

The afternoon after the conference ended, I drove to the Las Vegas Boat Harbor along the shores of Lake Mead, now far below the bathtub ring representing the high-water mark for the reservoir.

The next day I drove to Glen Canyon, and again I found a boat ramp, the bottom of the concrete far above the water level. Powell was 28% full that day, the lowest it's been since it began filling in the 1960s.

Looking into 2022

What will be the response of Colorado and other basin states to this shifting hydrology of the Colorado River Basin?





Smoke all summer, then the fire came home in December

An aide to former Colorado Gov. John Hickenlooper several years ago observed to me that Colorado’s statewide elections are won and lost in the suburbs.

6 That crystallizes why the Marshall Fire was the biggest climate and energy story of 2021 in Colorado—and likely the biggest story altogether, if such distinctions are admittedly arbitrary and subjective. If this was not the first wildfire in Colorado’s suburbs, it was perceived to be.

That it occurred on the next to last day of the year I believe makes it even more significant. As Senate Majority Leader Steve Fenberg noted in a press conference at the Colorado Capitol on Jan. 10, there is no one separate wildfire season in Colorado any more. The Marshall Fire made it clear that it’s all year long.

The fire also burned nearly 1,100 homes, the most ever, in what was traditionally—if falsely assumed to be—the safe haven of the suburbs.

Marshall, though, wasn’t actually the first suburban fire in Colorado. In 2012, the Waldo Canyon Fire on the edge of Colorado Springs burned hundreds of homes and killed two people. We’ve had large, large fires on the Great Plains, too, if far enough from the Front Range to barely notice.

This fire occurred in the deep of winter in suburban Boulder. If it can burn in Louisville and Superior, might it also happen in Castle Rock, Parker, and Highlands Ranch? This brings wildfire and climate change home in a new way to where 80% to 90% of Coloradans live.

Several national publications made the same point. “How climate is changing which neighborhoods are vulnerable,” is how

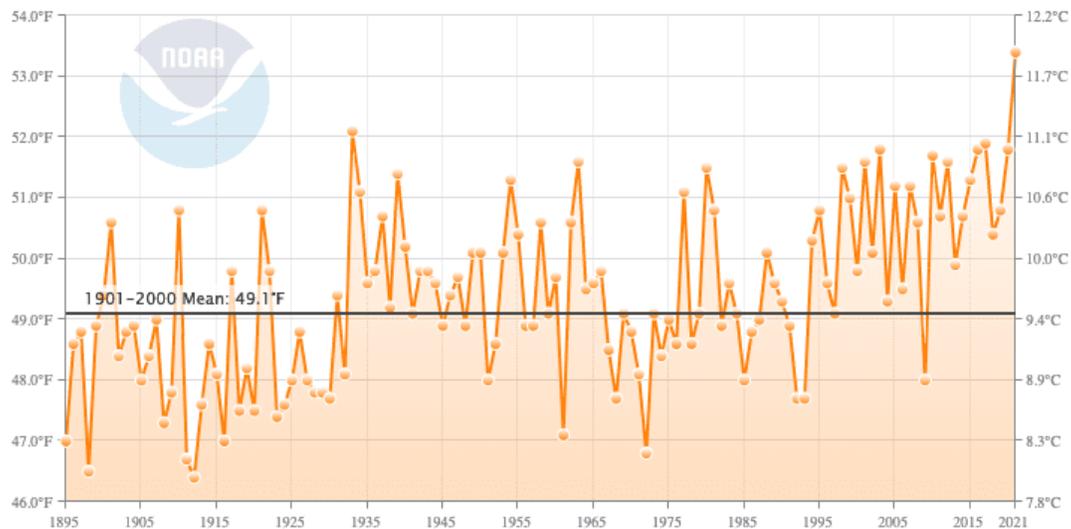
OK, fires happen. It’s not all climate change. But...

Inside Climate News headlined its story. The Wall Street Journal had much the same slant: “The Colorado suburbs of Louisville and

Superior at the base of the Rocky Mountains were always thought to be safely removed from the wildfires that often burned in the foothills above.”

I am most mesmerized by the scattergram that Russ Schumacher, the Colorado state climatologist, assembled in the hours of the fire. It showed both temperatures and precipitation from June 1 to Dec. 29. In that convergence of hot and dry, 2021 was exceptional. Other years have

Colorado Average Temperature
July-December



been hot, others years dry. But this was both, in the top left-hand corner. It was an outlier, but also notable in the scattergrams for Denver, Fort Collins, and Colorado Springs was how frequently the past 20 years showed up in that quadrant of hot and dry. Later came a chart (above) from the National Oceanic and Atmospheric Administration for Colorado altogether from July through December.

“Certainly, climate change is never the only part of the story when it comes to wildfires,” Russ Schumacher told me. “That being said, what we see in these fires and have seen in the last couple of years in Colorado, the changing climate is kind of making us expand our imaginations of what types of destructive wildfires are possible.”

The Marshall Fire expanded imaginations immediately. A friend, Robert Youngberg, who lives in Lakewood, reported being unconcerned about previous small fires in the grasslands where the Great Plains erupt into the Rockies. “At no time during these fires did it occur to us that we might be in personal danger,” he wrote. “That perception has now changed forever.”

Arvada, the city of 125,000 people where I live, similarly spans the space between Denver proper and the space where the flattish lands rise into the foothills. “We are still processing this entire event,” responded Mark Deven, the city manager, when I requested an interview a few days after the fire. “It is certainly clear that we will need to reevaluate how to build a more resilient community as we adjust to drier conditions, mid-winter fires and other impacts.” He added Arvada was not ready to offer additional comment.

This fire came 14 months after the East Troublesome Fire, which similarly expanded our imagination of wildfire risk in Colorado. It covered 100,000 acres in late October, a time when snow normally has chilled mountain slopes, then leaped across two miles of tundra to threaten Estes Park. That was a California-type fire.

All recognize that climate change is only one part of the story. But did I overstate that part?

A scientist affiliated with the National Center for Atmospheric Research who specializes in fire weather and wildland fire modeling and forecasting had an [interesting](#)

[post on Linked-in](#). Janice Coen wrote that it may be most accurate to say several required factors, none of them necessarily unusual or exceptional, occurred at the same time and place.

"Many of the often-cited "climate change" & fuel accumulation ("100 years of fire suppression") factors weren't principal factors here," she wrote.

Patty Limerick, the Boulder historian, also had a perspective worth remembering. In her Denver Post column, she describes the frequent fires that in the 19th century destroyed towns and cities, sometimes several times.

However, I don't believe any of this diminishes my essential argument, which is this: With the backdrop of steadily rising temperatures, larger and larger wildfires, more and more smoke, the wildfire that destroyed almost 1,100 homes on the cusp of New Year's Eve 2021 will alter our course. How can it not?

In July, I published a major story, [Colorado arrives at the dawn of megafires](#), which looked at wildfire risk from the perspective of the fire chief in Vail (and my own perspective as somebody who lived in mountain towns from the '70s into the '90s).

The question I think that needs to be asked is about the outsized impacts of small steps in temperature rise.

Looking into 2022

I think – and I've had legislators agree – that this puts even stronger winds into several legislative efforts already conceived. It makes the arguments that much stronger, the need more evident.

One set of bills would advance the concept of microgrids. Another will propose to elevate building codes. And then there will be a big push using various strategies to improve air quality along the Front Range.

It's not all climate change

Thanks for another informative edition (Big Pivots 5)). I always learn something new and enjoy your insights of the ongoing issues facing our beautiful West.

I want to call attention to your statement regarding "climate change having profound consequences now (best seen in the Colorado River Basin and in our escalating wildfires)."

Statements like this would be so much better received (by those of us more to the center of the political scale) if they included some of the other reasons for profound consequences in our environment as well.

Topics such as gross mismanagement of natural resources and environmental policy, partisan in-fighting, and the ever-increasing budget for battling wildfires (smell any conflict of interest there...?) need inclusion as additional if not more impactful reasons for the threats to our resources than the non-catastrophic rise in temperatures we're experiencing.

I agree that our climate is being negatively impacted by many of our practices and support the shifting of some methods of energy generation. We can do much more to mitigate lax and often toothless pollution policies but curbing CO2 (surely a non-pollutant in spite of what Congress and their asinine opinion says) emissions is not one of them (we kinda need it to live, ya know...).

But to imply that "climate change" is the one and only source for the destruction of our environment is misleading and disingenuous. If you're going to make a blanket statement on how we are decimating our world, let's include more than just one of the culprits, shall we? Lest we scare the young ones into thinking we only have 12 years left...

Thanks again for your good work.

Hal Parteneheimer
Dallas TX

Can Tri-State G&T remain upright if big members jump off?

It's an open question whether Colorado's second largest electrical supplier will survive. Tri-State Generation and

7

Transmission has been rapidly pivoting away from coal and modifying its business structure. Fast enough?

Too slow by far, said United Power, the single largest member of Tri-State, which has 250,000 ratepaying consumers and members. It alone is responsible for more than 20% of all wholesale sales. According to a filing with the Federal Energy Regulatory Commission, United alone has revenues as great as the combined revenues of the 21 smallest electrical cooperative members of Tri-State. Tri-State has 42 member electrical cooperatives.

In August, its chief executive, Mark Gabriel, said that United wanted to work within Tri-State to reform it. By December, though, it was a different story.

"When I came to United Power nine months ago, I was extremely optimistic that we would be able to come to an agreement that lives up to our commitment for past investments and allows us to provide lower cost, cleaner options to our rapidly growing communities in the future," Gabriel said in a press release on Dec. 14.

Tri-State, charged Gabriel, wasn't serious.

"In the last nine months alone, United Power has tendered three formal term sheets and held numerous high-level

meetings," he said. "But leadership at the G&T has been unresponsive to the contract modification requests."

United wants out by 2024.

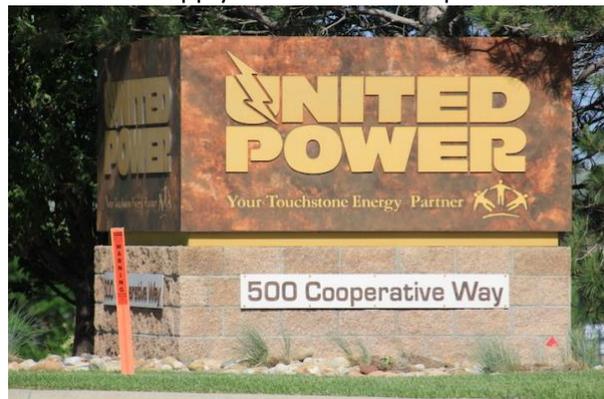
It was a tough week for Duane Highley, who in April 2019 had arrived in Colorado to lead the task of pivoting Tri-State, long a foot-dragging outfit, into the 21st century.

Two days after United's announcement, Poudre Valley REA told Tri-State that it was planning to leave. Poudre Valley, the second largest member of Tri-State, was less definitive in its resolve than United. A letter from Jeff Wadsworth, chief executive of the Windsor-based cooperative, said the notice did not preclude Poudre Valley from pursuing the partial requirements option that Tri-State has proposed. That proposal is pending before the Federal Energy Regulatory Commission.

Durango-based La Plata Electric, the third-largest cooperative in Tri-State's stable, has been eyeing both a full exit and the new partial requirements contract with Tri-State. The idea that was explained in an October 2021 town hall meeting would let La Plata partner with [Crossover Energy Partners](#), one of the new companies that has sprung up in

the clean energy sector, for 50% of La Plata's power. The deal would include help to La Plata in developing local generation. Crossover in 2021 gained the backing of KKR, the giant investment firm. Tri-State would supply the other 50% of power.

United Power in December said in no-uncertain terms it was jumping ship. A negotiating statement or real intent?



Dan Harms, the vice president for grid solutions for La Plata, said last week that nothing has been decided. Talks with Tri-State that seek to provide better understanding of each other's perspectives continue, he said. (La Plata plans a Feb. 10 town hall meeting to provide an update).

United's language in December was different, accusatory.

"Instead of working with us in the pursuit of lower-cost, cleaner options, Tri-State has resisted these developments," said Gabriel in the press release. "Tri-State recently purchased additional coal generation, is limiting our members' ability to add more carbon-free generation, and is penalizing additional storage on our system. They also offer non-members preferable transmission rates over those of us who have invested in the system for decades."

Gabriel had published a book in 2007 called "Visions for a Sustainable Energy Future." At the time, Tri-State was continuing to invest in the dream of a huge new coal plant in Kansas. Tri-State spent at least \$91 million before formally pulling the plug in early 2020.

The coal that Gabriel alluded to in his December statement, though, was a reference to the decision by Tri-State last year for a bigger stake in a Wyoming coal plant called Laramie River Station. Tri-State explained that deal as being primarily

spurred by improved transmission. Tri-State is a minority owner of the Wyoming coal plant.

That Wyoming plant has produced more trouble for Tri-State. At the end of the same difficult December week, Basin Electric, the majority owner of Laramie River Station, filed a lawsuit against Tri-State alleging violation of a contract.

The lawsuit alleges Tri-State breached its contract with Basin Electric by allowing its six member cooperatives in Nebraska to seek to get out of Tri-State. That, says Basin, is in violation of Tri-State's contract with Basin.

North Dakota-based Basin is a G&T, or generation and transmission cooperative, similar to Tri-State, except that it's even bigger than Tri-State and more glued to coal.

Confused? Understandably. A bit of history is useful. Tri-State let the first dissident cooperative, Kit Carson Electric, out relatively easy. It resisted more the exit of Delta-Montrose. When United and La Plata asked how much it would cost them to break their all-supplies contracts before 2050, Tri-State delivered ridiculously high figures. While that was being sorted out Tri-State sought—and obtained—jurisdiction under the Federal Energy Regulatory Commission, or FERC seemingly bypassing the Colorado PUC.

Then Poudre Valley and six other member cooperatives—including those in New Mexico and Nebraska—wanted to know what it would cost to get out. In 2021, Tri-State submitted a new methodology to FERC for determining exit fees. That methodology is still under review. But Tri-State went ahead and told all the member co-ops what it would cost them to leave under this methodology. This is the basis



for the suit filed by Basin. Two Nebraska members had already asked for their exit numbers.

In all this, the example of Kit Carson surely must be noted in board rooms. Luis Reyes Jr., the chief executive of Kit Carson, says he believes other coops in Tri-State expected Kit Carson to flounder or worse after it left Tri-State and took up with Guzman Energy, then a new start-up wholesale provider.

Kit Carson has done anything but flounder. In 2022, it expects to complete the final solar installation necessary to produce 100% of daytime power and also pay off the final debt of its \$37 million exit fee from 2016.

Tri-State, meanwhile, still has considerable debt on its coal infrastructure. A filing in September 2021 with the Securities and Exchange Commission reported \$3.1 billion in long-term debt.

Looking into 2022

I'm keeping my eye on La Plata. Can this new partial-requirements contract serve as a model? And what kind of room will there be for local energy storage? A town hall on Feb. 10 likely will be revealing.

The dispute between United and Tri-State is playing out in the filings at the Federal Energy Regulatory Commission in the case about the proper methodology for determining how much United must pay Tri-State to exit.

Testimony filed with FERC in January by Dean Hubbuck, the chief energy resources officer for United, accuses Tri-State of "hostility" and having a "severely antiquated business model." In his testimony, Hubbuck also points to Tri-State's continued investments in coal generation in Arizona and Wyoming. Tri-State, he said, "does not appear to be in any hurry to transition out of those."

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Also worth watching are the proceedings at the Colorado PUC where Tri-State must now submit its resource plans. A settlement agreement among all parties – including environmental groups and the state — after this essay was written but before it was published bears noting. Tri-State is pivoting—and fast. But fast enough?