

## Hydrogen fueling station in works for metro Denver

by Allen Best

A partnership has been struck that is expected to yield a hydrogen fueling station along Interstate 25 in Denver's southern suburbs by late 2022 or early 2023.

AAA Colorado has promised to have a tow truck and two support vehicles, such as are used for battery charging or to replace flat tires, equipped to run on hydrogen.

New Day Hydrogen, a Colorado-based company, plans to create the fueling station at one of AAA's locations, either Centennial or Lone Tree. Including the AAA vehicles, the company expects to provide fuel for 5 to 10 light- and medium-duty vehicles to begin this pilot project. A hydrogen fueling station is also being created in Fort Collins at the Powerhouse Energy Campus associated with Colorado State University.

Hydrogen represents a potential fuel for decarbonizing transportation, which has become the No. 1 source of carbon emissions in Colorado and many other states. Batteries are on the cusp of rapidly replacing internal combustion engines in the cars and other light vehicles found at most homes. But batteries have a significant disadvantage that proponents say hydrogen may not, as costs fall and

infrastructure such as the fueling station planned in metro Denver come on-line.

The Colorado Greenhouse Gas Pollution Reduction Roadmap that was released in January mentions hydrogen 14 times, but suggests that hydrogen—like other energy technologies such as carbon-capture and long-duration energy storage—will require further technical innovation and economies of scale to bring costs down and allow deployment at scale.

Fueling infrastructure will also matter. "As zero emissions vehicle truck technologies, including electrification and hydrogen fuel cells proliferate, their success



will depend on a robust network of charging and fueling infrastructure," the roadmap says. "Developing infrastructure to support zero emission vehicles in medium and heavy-duty fleets is critical to their success..."

The Colorado Energy Office is working on a hydrogen roadmap that is expected to be released in October. The study is to examine the opportunities, barriers and the potential steps to overcome them, and

economic potential of low-carbon hydrogen. SB 21-260, Colorado's massive transportation bill passed by legislators in June, mentions hydrogen 10 times but provides no funding.

New Day Hydrogen wants to fill the role of “seeding the hydrogen market in Colorado by integrating infrastructure development with commercial EV use,” the [company website](#) says.

The company is led by Seth Terry, who has a Ph.D. from the Colorado School of Mines and a master’s degree in business from Regis University. Patricia Kelley, the chief legal officer and director of business development, has a law degree from Harvard.

Kelley explains that the company wants to produce only green hydrogen.

“We crack hydrogen from a water molecule with an oxygen by-product, and the only emission is water vapor,” she says. In Colorado, this process can produce hydrogen at rates competitive with diesel—which is not true in California, where there’s a push to make hydrogen viable in transportation.

“We can do this because Colorado electricity rates for solar and wind are excellent,” she says.

The company also has several projects in the works that will provide hydrogen in electrical micro-grids, converting gas turbine power plants to plants that produce hydrogen, and using hydrogen as a process to recover curtailed wind and solar power. Those projects, she says, are both in Colorado and elsewhere.

AAA Colorado is partnering with New Hydrogen Day because it sees limitations with batteries.

“Nobody has come up with the perfect solution for fleets,” says Skyler McKinley, public affairs director for AAA Colorado. The parent organization, AAA, has 14 million members in 14 states and one Canadian province.

“For Colorado to meet its carbon reduction goals, there’s not a silver bullet,” he says. “We cannot replace every internal combustion engine on the road with batteries—nor with hydrogen.”

McKinley expects to have a place along with “other technologies that have not been identified yet.” AAA hopes to see federal and other funding opportunities to pay for the cost of this hydrogen pilot project.

New Day Hydrogen’s Kelley similarly sees conceivably insurmountable problems from battery electric technology.

Their weight poses problems for heavier vehicles.

“Batteries have to weigh 6,000 to 8,000 pounds to drive medium- and heavy-duty trucks,” she says. “The size/weight problem, as well as time for charging, means that fleets will not move to battery-electrical vehicles.”

Kelley also sees problems in the light duty market. She cites the charging problems for those living in apartments and who park on streets, not in garages, and those who drive on steep inclines, such as are found in mountainous areas.

And while fast-charging has become easier and, well, faster, too, it does diminish battery capacity.

Then there is the challenge of delivering enough electricity to the grid to support massive transition.

“After a certain number of vehicles are on the road, the grid won’t be able to handle it, and of course, the life of the batteries is impacted by fast charging,” she says. “For example, 6 Tesla vehicles fast-charging at the same time last summer browned out Glenwood Springs. Battery EVs (I have one myself) are ideal for those that do not have to travel far and can slowly charge their vehicles in their garages overnight.”

But for other users, she says, hydrogen needs to be one of the answers.



## Comanche 3 minority owner sues Xcel Energy

A part-owner of the Comanche 3 coal-fired power plant near Pueblo has sued Xcel Energy's Colorado subsidiary, claiming that the company breached its contractual obligations related to operation and maintenance of the coal plant.

Sedalia-based Core Electrical Cooperative (formerly called Intermountain Rural Electric Association) owns 25% of the coal plant. The plant began operation in 2010, making it Colorado's youngest coal plant by almost three decades and, with 750 megawatts of generating capacity, Colorado's largest.

Core blames Xcel with failure to operate the coal plant in a "manner consistent with prudent utility practices." The result, it says in not quite so many words, has been that what was supposed to be a model of high efficiency has been a lemon. It says the plant has averaged 91 days a year of being out of service, lowest of any of Xcel's generation facilities in Colorado.

The electrical cooperative cites something called equivalent availability factor, or EAF, which was predicted to be 95. In fact, Comanche has had an EAF of

Wind tower segments at the former Vestas factory in Pueblo and the Comanche coal smoke stacks in the background. That of No. 3 is on the left.

71—lower even than the adjoining Comanche units completed in 1973 and 1975.

The complaint is heavily reliant upon reports by the Colorado Public Utilities staff.

In the lawsuit filed in Denver District Court, Core alleges it has lost money because it has been forced to buy power elsewhere at higher cost.

The lawsuit is heavily redacted—even blacking out the ownership of the plant. (Holy Cross Energy owns 8%, although it has consigned the output to Guzman Energy). This is at Xcel's wishes, says Core in a press release, although Core wants the information to be fully available.

Links to the documents can be found on the [Core website](#).

## South Korean company buys Vestas tower factory

A South Korean-based company called CW Window now owns the wind tower factory in Pueblo. The prior owner, Vestas,

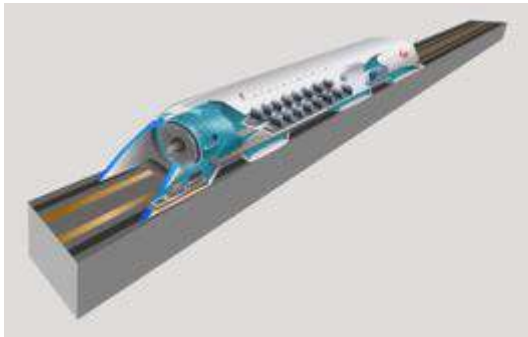
has retained ownership of its other factories in Brighton and Windsor.

A Pueblo Chieftain story laid out the press release basics, but did not probe why Vestas would sell the plant in Pueblo but not the others.

The Pueblo factory, the world's largest for wind towers, is being expanded, indicating a belief in even greater demand. But demand lately has slowed.

"There is a slow down at the present moment, but no doubt we will see a need for what we can produce in the short future," said Knud Bjarne Hansen, the co-chief executive of CS Wind.

The company also has facilities in Vietnam, Malaysia, China, Taiwan, and Turkey.



## Hyperloop testing facility in the works for Pueblo

[Swisspod Technologies](#) has announced that it has linked with two partners to build a hyperloop testing facility at the PuebloPlex, the site of the former U.S. Army Depot located east of downtown Pueblo.

The company in July completed development of Europe's first hyperloop test track.

Hyperloop is an old idea given fresh energy in 2012 by Elon Musk and his prize money of SpaceX. As explained on [Wikipedia](#), his initial concept incorporated reduced-pressure tubes in which pressurized capsules ride on air driven by linear induction motors and axial

compressors. The goal would be to move people or objects at airline speeds while being energy efficient as compared with existing high-speed rail systems.

The Space X competition sponsored by Musk has driven a variety of initiatives, some of which have continued to move forward while others have faltered.

The Pueblo Chieftain says Swisspod, a company founded in 2019, has won multiple awards in the Hyperloop Competition hosted by Musk's SpaceX.

Hyperloop One struck a partnership with Colorado, as the [New York Times reported](#) in 2017. The company later became [Virgin Hyperloop](#). But a [2020 report posted](#) on the Colorado Department of Transportation website said hyperloop was no longer being pursued by C-DOT.

## United Power to host fleet electrification session

With transportation now the single largest sector for greenhouse gas emissions in Colorado, attention is rapidly shifting to what can be done to electrify fleet vehicles.

On Wednesday, Sept. 29, United Power will host a conference from 9 a.m. to 3 p.m. to help managers figure out what they need to know going forward.

"Medium and heavy-duty EV trucks are expected to be a significant share of grid energy usage in the coming decade, so we want to start discussing this topic with our public and private fleet operators now," explained Joe Danforth, energy programs and new business director at United Power.

United expects the infrastructure bill now in Congress to include funding for transportation electrification projects.

Loveland-based [Lightning eMotors](#), which specializes in sustainable commercial fleet vehicles, will give a presentation. It operates on a national level and will have fleet vehicles at United's Carbon Valley Service Center, which is at 9586 E. I-25 E.

Frontage Road, between Firestone and Longmont beginning at 8 a.m.

Also speaking will be representatives from United Power, the Colorado Department of Transportation, and Northern Colorado Clean Cities. They will talk about Colorado's new fleet electrification strategy, resources and funding options for fleet services, the growth and availability of charging infrastructure and the future of electrified fleets.

Pre-conference registration is recommended at the [United Power website](#).

## Colorado Energy Office starts vehicle electrification studies

The Colorado Energy Office wants stakeholders to participate in two new studies, one on EV Equity and the second on 100% Electrification of the Light Duty Sector Roadmap.

The goal of the first study is to identify communities impacted by transportation-related pollution and identify barriers to EV adoption.

CEO is seeking diverse perspectives on EVs and how the benefits of EVs can be distributed more equitably to all Coloradans. To participate, submit information [here](#).

### Coal's declining fingerprint on electricity

In 2020, coal-fired power plants provided **36%** of Colorado's net electrical generation, down from **68%** in 2010.

Natural gas and renewables both grew as coal faltered.

Renewables more than tripled, accounting for **30%** of the state's total generation in 2020.

Source: [U.S. Energy Information Agency](#)

The second study is to develop a plan for nearly 100% electrification of Colorado's light-duty vehicle sector by analyzing policies, programs, incentives, and actions the state could undertake. The first meeting was held Aug. 26, but a webinar will be held Sept. 28. To attend, see information [here](#).

Both studies are expected to be released in early 2022.

## Mona Newton to turn over reins at CORE after 9 years

Mona Newton has resigned as executive director of the Aspen-based Community Office for Resource Efficiency, but will remain as in her post while the trustees of the 27-year-old non-profit search for a new leader and a transition by year's end.



During the past nine years, under Newton's leadership CORE has focused efforts on reducing carbon emissions from buildings, the biggest contributor to greenhouse gas emissions in the community

She was engaged in the work that produced Basalt Vista, the affordable housing project that has drawn national attention because of its absence of natural gas, and the more recent Hub, an employee housing project. She is now focusing on methane escaping from a former coal mine.

Early in her career, she cut her teeth weatherizing trailers and homes for low-income families. Prior to joining CORE, she was at the Colorado Energy Office for five years.

"After 9 years, I'm ready to turn over the helm of this incredibly impactful and innovative organization to someone new to continue this difficult challenge to beat the race against time to reduce climate emissions," she said. "It's the right time, as



we've accomplished so much, and this is a good time in the organization's evolution to bring in a fresh face."

## **Solar panels near Aspen to be two-faced, to capture the snow-reflected sunshine**

Some 13,700 solar panels are now being erected near Aspen in the expectation that the electricity will begin flowing across the transmission lines of Holy Cross Energy by October.

The solar farm is located on 35 acres near the Aspen-Pitkin County Airport on land owned by the Aspen Sanitation District. The sanitation district is getting a 33% credit from Holy Cross on the district's estimated \$280,000 annual electric bill.

The Aspen Times in an Aug. 14 story said the panels are black, instead of blue, to cut down on reflected light on planes flying over. They are also double-sided, so they can absorb energy reflected off the snow during winter.

"Pitkin County and the city of Aspen residents will have the benefit of a local energy source that provides resilience when our only power line becomes threatened by wildfire—as we saw recently with the Lake Christine Fire—or another disaster," said Greg Poschman, a Pitkin County commissioner.

**Will you consider donating to Big Pivots when 501(c)3 status is awarded?**

## **Tesla solar panels go on roof of venture capitalist**

In the Aspen area, Tesla solar roof panels are being installed at the home of Jerry Murdock, a venture capitalist.

Murdock told the Aspen Daily News that he hopes that the solar panels will set an example for his neighbors and others

because he is replacing flammable wooden shingles with solar panels.

"My motivation for doing this was fire and the fact that it's difficult to get insurance, no matter what the cost," he said.

"The majority of my neighbors are absentee second-home owners. What if all of those people got a Tesla roof? A, it would reduce the fire hazard. B, when they aren't around six to eight months of the year, they could donate that energy to the county and the city, and we could reduce a lot of the carbon problem that we've got in this valley."



## **Guzman to buy power from 127-megawatt solar farm in southwestern Colorado**

Guzman Energy has entered into a power-purchase agreement for a 127-megawatt solar project being developed near Cortez, in southwestern Colorado.

The Boutique Solar project being developed by Invenergy will generate enough electricity to power 25,000 homes. The solar farm is expected to be operating by the end of 2025. Over its lifetime, the solar project will generate more than \$250,000 per year in local property taxes. The facility will produce 300 construction jobs and, then for maintenance, 3 permanent jobs.

Guzman supplies electricity to Kit Carson Electrical Cooperative in New Mexico, Delta-Montrose Electric in Colorado, and the town of Aztec in New Mexico. It also has a partnership with Holy Cross Energy and the city of Fountain, both in Colorado.

## A new name for a Colorado agency but also broadened mission in utility regulation

Colorado legislators this year renewed the Office of Consumer Counsel for another 7 years but gave it a new name, the Office of the Utility Consumer Advocate.

Legislators also gave the agency a broadened mission and additional staffing.

[SB 21-103](#) authorizes the agency's director to consider the state's decarbonization goals as well as just transition and environmental justice efforts when deciding whether it is in the public interest for it to participate in a proceeding before the Colorado Public Utilities Commission.

The agency, which was created in 1984, previously had a more narrow mission of looking out after the interests of ratepayers primarily in matters of cost and rates.

For example, this year it has pushed back at the effort by the investor-owned utilities to get major rate increases for electric and gas service provided during the extreme cold on Presidents' Day Weekend. The agency can reliably be expected to be at the table in such discussions.

## Steamboat-based company goes 100% renewable offsets

Big Agnes, a company based in Steamboat Springs named after a local mountain, has committed to buying 100% renewable energy to power each of its three U.S. facilities, the Steamboat Pilot reports.

The company sells sleeping bags and other outdoor gear.

Big Ages has a 6,300-square-foot headquarters in Steamboat Springs, which it leases from the city of Steamboat Springs. With the city, the company jointly purchase 100% renewable energy from the Yampa Valley Association as part of the [Green Choice Program](#).

The company has similar arrangements for its distribution center in Salt Lake City and a warranty and repair center in suburban Salt Lake.



## Bye Aerospace gets order for 3 electric aircraft in Iceland

Bye Aerospace has received orders from a flight academy in Reykjavik, Iceland, for three all-electric training aircraft, the most recent in what the company says have been hundreds of orders. It takes two or three years to deliver the aircraft, which are being manufactured in the United States for Bye Aerospace, which is based in south-suburban Denver.,

The aircraft are used to train pilots. The most recent orders are for a two-seater primary training aircraft and a four-seater advanced training aircraft.

The planes have three hours of flight endurance, including reserves. A press release from Bye says this far exceeds the primary competitors in this new niche market of e-aviation, most of which are limited to only a single hour.



## How Kevin Priola became a reliable vote for climate & energy legislation

by Allen Best

Kevin Priola was at his home north of Denver early one afternoon in January 2015 when he noticed the snow that removed any lingering doubts about climate change.

“I saw these big, fat snowflakes falling. It was like March, the size of the snowflakes,” he says. “I asked myself, ‘What are they doing falling in January? Those are spring snowflakes.’ When it gets warmer there’s more moisture in the air and the snowflakes get bigger and heavier. The colder it is, the smaller the snowflakes. Big, fat snowflakes come in March and April. It brought home everything I had read and digested.”

Many bills have bi-partisan support, but Priola stands out among Republicans

Kevin Priola makes remarks at a bill-signing ceremony in Boulder during June as Senate Majority Steve Fenberg, left, and State Rep. Jerry Valdez look on.

A state senator in Colorado, Priola is unapologetically a Republican, as he has been since he was 17. He thinks Republicans better represent the interests of small-business owners and also guard Second Amendment rights.

If firmly a Republican, he has become a reliable ally of Democrats in legislation to accelerate the clean energy transition. He believes climate change must be addressed. As a pro-life Republican, he says, “It’s more pro-life ensuring that our great-grandkids grow up with the same quality of life on the planet that we have.”

Priola isn’t entirely alone as a Republican in support of energy and climate bills. Many bills have bi-partisan support. For example, a law adopted in 2021 that pushes electrical utilities to become part of a regional transmission



organization, a move that many executives say will be crucial to achieving 100% renewable goals, had strong Republican support. So did [HB2-1290](#), a bill with bipartisan sponsorship that delivered more money for the Office of Just Transition. It passed the Senate 32-2 and the House 48-15. Dissenting votes came from Republicans. [HB21-1052](#), which defined pumped hydroelectricity as renewable energy, had Republican sponsors but was approved unanimously in both chambers.

But a schism remains between the parties in the most aggressive action responding to climate change, and Priola bridges it more often than any other state legislator in Colorado.

This was evident in June when legislators and supporters gathered on a parking garage rooftop in downtown Boulder for remarks before Gov. Jared Polis signed bills into law. The location had been chosen specifically because of the solar panels on the parking garage. One of the bills, [SB21-261](#), is expected to spur deployment of solar in Colorado. The most salient feature allows something called virtual net-metering. With this, a tech giant like Google can have its employees in one location in Colorado and its solar production in another.

Priola was a prime sponsor of the bill along with three Democrats. In his time at the lectern, he described a future in which solar panels and storage become ubiquitous, renewable electricity powers cars and homes, and the business models of utilities will turn upside down.

"I see a day in the future when utilities sell most of their electrons and recover most of their costs in the middle of the night and in the middle of winter," he said. "That will work for them. This (bill) will increase the adoption of solar energy and it will also help our children and grandchildren with benefits to the climate."

He may have been the only Republican on the rooftop.

Priola began reading about climate change when he was in high school in the early 1990s. It was probably in a magazine like Time or Business Week. The family business at Henderson, located along the South Platte River about 16 miles from downtown Denver, was a commercial greenhouse.

The perfect temperature for growing was in the high 60's and low 70's, he says. When it got above about 78 degrees, evaporative losses spiked and it became necessary to pour on the water.

"Growing up and seeing first hand some of the concepts and principles being discussed in the International Panel on Climate Change reports and other studies really kind of colored my perception on the issue as I followed it through the decades," he says.

He didn't expect tangible effects from climate change for 80 to 100 years. "I thought that's when people would start noticing things are very different."

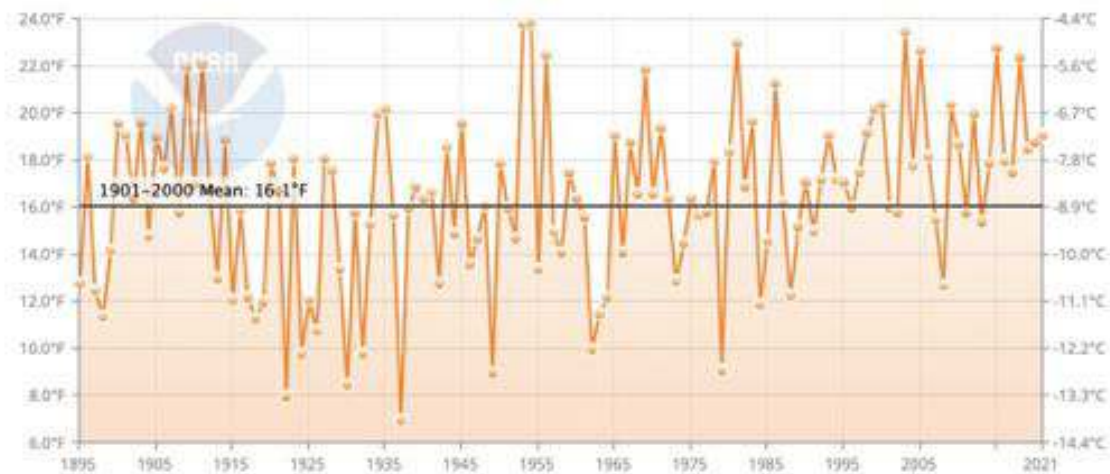
But there were signs. Little ski areas along the Front Range disappeared, probably for complex reasons, not just rising temperatures. An avid downhill skier since he was a boy, Priola thought he noticed the base area of mountain ski resorts getting mushy two to three weeks earlier, perhaps in February instead of March. Farmers in his district told him of longer growing seasons.

Temperature records broadly support the personal observations of Priola. In Colorado Springs, for example, maximum January temperatures increased 1.8 degrees for the 1990-2020 period used as "average" as compared to the period of 1980-2010.

This warming trend can be seen very clearly on a website called ["Climate at a](#)

Summit County, Colorado Average Temperature

January



[Glance](#)” put together by a division of the National Oceanic and Atmospheric Administration. You can choose a statewide total or a county. Summit County, for example, has four ski areas, one of them, Arapahoe Basin, which began operation in 1946. There always have been swings in temperatures, some years warmer, others colder. Since the 1980s, there’s a clear trend of warmer Januarys. Like the children of Woebegone, all are above average.

In January 2015, when Priola saw those big snowflakes, he was reminded of all the reading he had done. Everything came together. He says it was like being in a military cemetery, where all the tombstones suddenly align.

Early in his legislative career, Priola was a less reliable supporter of clean energy. “I will be the first to admit that my voting record back then was spotty,” he says.

“It was partly the nature of the district I represented and partly feeling that maybe there wasn’t quite the precise need then for some of the policy changes,” he says. “Since then I have come to realize that I was incorrect.”

In the legislative session concluded in June, Priola was also a prime sponsor, with Democrats, of [HB21-1286](#). The law requires owners of buildings larger than 50,000

square feet to collect and report on energy use, an effort to improve energy performance. Priola calls it a reasonable measure “because it will improve efficiency and help Colorado achieve its economy-wide carbon reduction goals.”

In the 2019 and 2020 sessions, Priola sponsored a bill, [SB19-077](#), that pushed along the charging infrastructure for electric vehicles.

As evident in his purchases, Priola believes firmly in technological progress. Little more than a century ago, he points out, a woman could barely cross a New York street without dipping her prim Victorian dress in horse poo.

**P**riola today has three Tesla Powerwall battery packs at his home that can store the electricity produced by 71 solar panels. If the electricity goes out, he says, there’s no need to reset 12 clocks.

In 2018, he also purchased an electric car. He declines to identify which model. He will say that economically it’s been a good investment. “I have saved a ton of money by not spending it on gasoline. It’s good for the environment in terms of being better than internal-combustion technology. I’ll have it for a long time.”

In the legislative session beginning in January 2022, Priola wants to move the ball forward on recycling and composting. He points out that several large landfills exist in the eastern part of his Senate district, and some of his constituents are none too happy about it. Why not filch steel, glass and other components from the waste stream, eliminating need for mining? As for composting, it reduces methane, a primary greenhouse gas.

In supporting energy transition legislation, Priola says he is driven partly by what he believes is necessary and also partly by what is politically possible. His voters mostly live in Denver's suburbs, although his district does extend eastward to encompass wheat fields and other farms plus a portion of Colorado's Wattenberg oil-and-gas field. To represent those oil field workers, Priola voted against a bill in 2020 that the industry disliked. But he also points out he has a Vestas factory in his district, at Brighton, that makes nacelles for wind turbines.

Other Republican legislators tend to represent more rural areas, more heavily influenced by the oil-and-gas sector. And some remain skeptical of the human role in the warming climate.

State Sen. Don Coram, a Republican from Montrose, has been a key ally of Democratic legislators at times. Other times he has kept his distance. In the case of one bill this year, he was a co-sponsor but, after it was amended, voted against the bill. It was passed by the Democratic majorities in both chambers.

Notably he voted against the legislation that set Colorado's economy-wide decarbonization goals of 50% by 2030 and 90% by 2040.

"It is down the road, but it won't happen by 2030. I can guarantee you that," he says. "We are a carbon-based society. To say that we are going to totally change our



**Tombstones at Fort Logan National Cemetery**

economy to meet a goal like that, it is asinine. It's crazy."

Those bills that have a "practical chance of success" he will support. "Those that are a dream, I'm not there." (See related story below or on another web page).

Of Priola, he suggests impracticality.

"I like Kevin, but I can't go as far as he does on the all-electric thing. I don't see it working in Class A trucks, which have payloads of about 45,000 pounds. An all-electric truck would use 15,000 pounds for battery storage. Will it change down the road? Yes, but we're not there yet."

But Coram does side with Democrats. That's unlike Sen. Ray Scott, a Republican from Grand Junction, and most other Republican legislators, who can nearly always be counted on as "no" votes.

**F**rom the perspective of one Democratic legislator, members of the two parties start from different viewpoints. One Republican state leader has said he's unsure whether he believes in climate change.

"That animates many of the political positions," says State Sen. Chris Hansen, a Democrat from Denver, of the risk posed by atmospheric greenhouse gas pollution. "I am quite confident which one will be borne out by history."

Priola, when asked whether he thinks he has changed the opinions of his Republican colleagues, says he's not sure. "Sometimes I think it has at least given them pause to look more closely at legislation instead of in a knee-jerk way, but I have yet to have a colleague come to me and say you voted for it and so I'm also going to vote for it."

When he has a reason, though, Priola will remind other Republicans that the party has a long history of supporting environmental protection dating to Abraham Lincoln's signing of legislation that gave Yosemite to the state of California with the express purpose of protection.

"I've never yet met a voter who asks for dirty water and air."

He does have differences with Democrats. "I think sometimes they let big labor extract too much flesh out of whatever proposal and that greatly increases costs to consumers," he says.

In coming years, as even more evidence arrives of the risks posed by global warming, Priola expects fellow Republicans to step up with more solutions.

"It will be hard for policy makers in the future to not have some well-thought-out arguments about how to deal with it," he says. "It won't be arguments whether climate change exists or not. It will be arguments about how to combat it."

Priola sees atmospheric pollution resulting from fossil fuel combustion as a "debt unpaid." It's a bill now coming due. He sees the free market, if given proper motivation, the vehicle to address this and other environmental challenges.

Does that mean a carbon tax? He's unsure. But whatever the mechanism to trigger the free market to create solutions, he's convinced of the ingenuity of private enterprise.

"And then folks who can figure out how to build a better mousetrap and how to be carbon negative will have people beating a path to their door," he says.

## A moderate Republican's take on what constitutes sensible climate policy

by Allen Best

With a strong majority in both chambers, Democratic legislators in the last three years have passed energy and climate legislation that has gained national attention. But what if they lose that majority in one or more chambers? In other words, what would the Republican response in Colorado be to the fast-rising mounds of evidence that climate change must be reckoned with—soon. The latest alarm was sounded by 240 medical, nursing, and public-health journals from around the world that collectively called for urgent action for the sake of public health.

State Sen. Don Coram enjoys a reputation as a moderate Republican, capable of working across the aisle. He calls himself a free-thinker. "I don't know how the hell to describe me," he says. "I just try to do what is right."

"Centrist Republicans and centrist Democrats aren't that far apart," he says, but there is a difference. "Democrats seem to fall in line better and take instruction from leadership. I wouldn't have been a very good soldier."

But what should the Republican response to climate change be? How would it be different from that of the Democratic majority?

In a half-hour interview after an Aug. 4 interim legislative committee hearing at the Colorado Capitol, Coram was asked that question several times. He never answered except in the broadest terms.



Don Coram



“I think we could move forward on a long-term plan, but this is a marathon and we are treating it like a sprint.”

Coram brings up many of the sore points of those resisting the rapid transition of energy systems. He cites American dependence on unpredictable Chinese supply lines, electrical car policies he believes are impractical, and an overstatement about the threat posed by greenhouse gas emissions. Agricultural production has actually increased because of emissions, he points out, as the optimal carbon dioxide concentration for plants is 400 parts per million. (It is now at about 420 ppm.)

**O**n several occasions, though, Coram has teamed up with one of the General Assembly’s most enthusiastic proponents of an energy transition, Sen. Chris Hansen, a Democrat from Denver. “He’s a great guy,” says Coram of Hansen.

Coram and Hansen teamed up as prime sponsors of SB21-072, which created the Colorado electric transmission authority. In the House, the prime sponsors were Rep. Marc Catlin, a Republican from Montrose, and Rep. Alex Valdez, a Democrat from Denver. Among the bill’s strong supporters was Delta-Montrose Electric Association.

Hansen says the key to gaining the support of the Western Slope legislators was the prospect of local economic development and the need of Delta-Montrose Electric for improved transmission access without being reliant upon its former wholesale supplier, Tri-State Generation and Transmission.

“That was a very important piece that I heard from both of them,” says Hansen. “They wanted to support their local coops and their local coops badly needed transmission access.”

On another bill, [SB21-264](#), which seeks to curtail emissions from natural gas, Coram started out as a sponsor but ended up voting against the bill in a Senate

## **Bills that had broad bipartisan support**

These bills that focused on climate and energy passed the 2021 Colorado General Assembly with broad support across the aisle in both the House and the Senate:

- HB21-1180 Measures to Increase Biomass Utilization (House 55-8 and Senate 31-4)
- HB21-1242 Create Agricultural Drought and Climate Resilience Office (House 46-18 and Senate 35-0)
- HB21-1284 Limit Fee Install Active Solar Energy System (House 55-8 and Senate 25-10)
- HB21-1286 Energy Performance for Buildings (House 41-24 and Senate 35-0)
- HB21-1324 Promote Innovative and Clean Energy Technologies (House 61-4 and Senate 34-0)
- SB21-272 Measures to Modernize the Public Utilities Commission (House 40-24 and Senate 28-6)
- SB21-020 Energy Equipment and Facility Property Tax Valuation (House 42-21 and Senate 31-2)
- SB21-072 Public Utilities Commission Modernize Electric Transmission Infrastructure (House 49-15 and Senate 34-0)

*Compilation courtesy of Sen. Chris Hansen*

committee and then on the Senate floor. The so-called clean-heat law focused on a provision to recover methane such as from dairies and coal mines but morphed in the legislative process with broader ambitions. As Coram saw it, the bill over-reached.

Coram says he likes working with Hansen and others in the Colorado Senate because of its collegiality. “We can disagree, but we don’t get disagreeable.”

In the Legislature, more broadly, though, he sees too much overreach by Democrats. He'd like more compromise, as would be necessary if one of the two chambers were controlled by Republicans. Or, perhaps, by more people with gray hair.

Democratic legislators are remarkable for their youth and intelligence. But also, says Coram, for their utopian thinking.

"They never have been through the tough times, and they don't understand how to adjust when it is not going your way," he said. He describes successful ventures and failed ventures, as defined in financial terms. He thinks some of Colorado's legislators would benefit from having failures in their pasts.

## Neither mountain nor rural found in rebranded name of this electrical coop

by Allen Best

Like the name "Tiny" applied to a child who has become a strapping man, Intermountain Rural Electrical Cooperative needed a new, more accurate name.

It was formed in 1938 in the Colorado mountain community of Bailey. It expanded in later decades beyond the foothills onto the Great Plains, taking in small towns that have become some of Denver's largest suburbs: Castle Rock, Parker, and Centennial. The service territory extends from the outskirts of Fairplay on the west to Deer Trail, a community along Interstate 70, on the east.

Core Electric Cooperative, the new name, reflects that geographic and demographic shift but also a broadened mission. Electricity has become more central to the lives of people in the last 75 years, and more changes yet have started.

The new name also reflects desire to provide assurances to companies considering locating in the utility's service territory.

"As our member communities have grown and modernized, we saw that we needed a new name to represent the place we occupy, not just geographically, but in people's everyday lives," said Jeff Baudier, the chief executive of Core (CORE, in the cooperative's preferred style).

"The name better captures where we are in our evolution," said Baudier in an interview with Big Pivots.

Core serves 300,000 people via nearly 170,000 meters, most of any of Colorado's 22 electrical cooperatives. It has doubled membership since 1998.

United Power is Colorado's second largest electrical utility, delivering electricity along the northern flanks of the metropolitan area in the Firestone and Brighton area. It has 100,000 members, a doubling since 2004.

The two giant cooperatives are alike in that they both want to assure their members that they can provide electrical services that their members want.

But with the new name, Core also wants to instill in existing and potential customers confidence that it can

deliver the best in electrical services. In that, it is playing to urban sensibilities that, rightly or wrongly, are suspicious of rural.

"We are trying to show that the cooperative business model is one that might have had its roots in rural communities, but it's just as valid as a

Many bills have bipartisan support, but Priola stands out among Republicans

business model in a city or major metropolitan area for large industrial and commercial customers,” said Baudier.

Xcel Energy, an investor-owned utility that is responsible for 66% of electrical sales in Colorado, has the monopoly on most of metro Denver.

“We are just as sophisticated and reliable—and, in fact, we are more reliable,” says Baudier in a comparison to investor-owned utilities. “And we are affordable. The key difference is that our members have an opportunity to own part of the utility.”

Core has been moving rapidly to take advantage of discounted prices of renewables and expanding opportunity in storage. Solar last year delivered 33% of the electricity distributed by Core to its members. The cooperative plans to roughly double its solar capacity by around 2026.

Storage is also part of the future, in homes and, likely in the next few years, in large lithium-ion batteries.

**A** paradigm shift is underway, not just at Core but many other electrical cooperatives and other utilities. Twenty years ago, electricity flowed one way from mostly giant coal-fired power plants. There was little differentiation in prices. And renewables, of course, were scarce.

The new paradigm is one of more distributed generation. For example, CORE has 4,000 dispersed locations for solar generation by members, mostly rooftops, that collectively have 20 megawatts of generating capacity. The power no longer flows in just one direction.

Greater changes are afoot in customer choice. Nearly all Core’s 170,000 meters have advanced capabilities, the start of a great new interface between consumers and electrical supplies. Those meters



coupled with new pricing policies will allow customers to decide when to use their electricity. For example, demand typically surges between 4 and 8 p.m., and pricing partly reflects this greater demand. Time-of-use pricing allows customers to shut off air conditioners, if they wish, and instead open windows to catch evening breezes — and save money while doing so.

“People now want to be able to say where their power comes from, how much they use, how much they pay,” says Baudier. “The (electrical) industry is going to a much more user-driven space.”

Still to be decided is the future of Core’s single largest generating asset, a 25% share of Comanche 3, a coal plant near Pueblo that was completed in 2010. Xcel Energy is the primary owner, having a two-thirds stake, as well as the operator. Another electrical cooperative, Holy Cross Energy, owns the balance.

In 2010, when it began operations, it was projected to have a useful life to 2070. Now, however, Xcel says it wants to continue operations only until 2040 and at a much diminished capacity.

## New Mexico tries to shake off its oil habit to improve air and knock down GHG emissions

Any discussion of New Mexico's attempt to decarbonize its economy and improve its air quality inevitably must have hand-to-hand combat with this searing fact: 25% to 30% of the general fund revenues for the state's budget come from oil and gas.

State officials were reminded of that fact again in a letter sent them after a new study was completed. The state wants to clean up its air, to meet federal ozone standards (a challenge similar to Colorado's struggle along the Front Range). A proposed regulation would curb routine venting and flaring and would require 98% of gas capture. There would be additional reporting and monitoring through every component of extraction and distribution.

New Mexico has 55,000 active oil and gas wells, most in the Permian Basin on the state's southeastern corner, or in the San Juan Basin in the northwestern corner.

A report commissioned by the state found that leaks or combustions associated with those wells, including production and transportation, were responsible for more than half of all greenhouse gases emitted in the state. Included in that tally are leaks associated with transportation and production, explains the Santa Fe New Mexican.

Now comes a study commissioned by the New Mexico Oil and Gas Association that predicts compliance would cost operators \$3.2 billion in the first year and

\$3.8 billion over five years. That study by John Dunham and Associates concluded the regulations would cause a 12.9% drop in oil production and a 22.8% reduction in natural gas production.

A report in May by legislative staffers noted that the state typically receives \$2 billion in direct revenue from oil and gas production through severance and property taxes and royalty and rental income.

The New Mexican says that James Kenney, the state's environment secretary, disputes the conclusions of the oil-and-gas industry's study. He called the new study "deeply flawed" and pointed out that it was conducted and paid for by the community that is being regulated.

Kenney's agency has an alternative figure of the cost of compliance: \$467 million annually if the proposed rule is adopted without modifications.

"When compared to the publicly available revenue data for New Mexico's oil and gas operators of \$2.3 trillion, the cost of compliance is about 0.02%" wrote Maddy Hayden, the spokeswoman for the Environmental Department, in an e-mail to the newspaper.

The state has 55,000 active oil and gas wells. Applications have been made for 10,000 additional permits to drill on federal land. Most of the applications were filed in the final months of the Trump presidency.

If the BLM approves all those permits, and companies use them within their four-year maximum time limits, the number of working wells would increase by roughly 20%.

In New Mexico, the oil and gas sector produces the largest share of emissions, whereas in Colorado transportation has surpassed power production.

In an op/ed published in the New Mexican, Margaret Wadsworth of Food and





Water Watch called for an end to \$15 billion in subsidies for support of drilling, “which is exactly what we need to stop doing, as the recent Intergovernmental Panel on Climate Change report warned us in no uncertain terms.” She did not identify the sources of the subsidies.

New Mexico, she notes, is in a “peculiar and vulnerable position” because of its reliance on oil and gas revenues. “We’re told that if we want to fully fund social services and public schools, we must essentially root for the polluting industries that harm front-line communities, fuel climate change, and threaten our water supplies.”

## **Farmington makes case for hydrogen to DOE secretary**

U.S. Department of Energy Secretary Jennifer Granholm visited Farmington, N.M., in August, and local leaders made the case that federal dollars should find their way to San Juan County. They specifically want to be part of hydrogen research and production.

John Beckstead, chairman of the San Juan County Commission, said the county wants to serve as the country’s hydrogen center. The Farmington Times reported that Beckstead made the case based on existing infrastructure.

The region has two coal-fired power plants. While there’s a movement to save the San Juan Generating Station by using carbon sequestration, regional leaders said they realize that energy production is changing.

“We want to be part of that transition,” Beckstead said. Granholm listened but cautioned that the federal infrastructure bill that would provide funding has not yet been passed by Congress and, if the money is appropriated, the selection will be based on competitive criteria.

The pitch in northwestern New Mexico closely parallels one involving Northwestern

Colorado, where Tri-State Generation & Transmission has applied to make the Craig Generating Station the focus of hydrogen research and the recipient of federal funding.

See: [“Will green hydrogen research at Craig be part of the answer to the big question?”](#)

Also, [Salt on the table at Hayden?](#)

## **Los Alamos researchers see hydrogen as fuel for trucks**

Los Alamos National Laboratory researchers are working to develop hydrogen fuel cells that they hope will eventually replace the diesel engines used for long-distance trucking.

The Santa Fe New Mexican reports the laboratory is part of a national consortium that includes several companies, universities, and national laboratories operated by the U.S. Department of Energy. Researchers hope to create a fuel cell for trucks that will last about 30,000 driving hours, or roughly 1 million miles.

“Really, the time to get (hydrogen fuel) trucks out on the road is now,” said Rod Borup, lab scientist and fuel cell program manager.

He said that hydrogen is suited for heavy-duty trucks because they don’t require nearly as many fueling stations as the 350 million U.S. cars. Charging the battery of a truck powered by electricity would take a couple of hours, compared to minutes for hydrogen. Then again, batteries on long-haul trucks would add up to almost a third of the load, he said.

The New Mexican asked Travis Madsen, transportation program director for the Southwest Energy Efficiency Project, his thoughts on hydrogen for trucks. He disagrees with the Los Alamos researchers.

“I think the math and practicality of it points to electricity,” he said. He pointed to the much lesser cost of electricity for fueling.



## Wyoming's largest utility plans coal exit by 2039

The economics of renewables defy edicts by Wyoming. The state has several laws that are aimed at forcing utilities to either find buyers for coal plants scheduled for early retirement or extending their lives by adding carbon-capture-utilization-and storage technologies.

But Rocky Mountain Power, the state's largest electrical utility, remains firm that it will completely exit coal in the state by 2039. The plans were reaffirmed in recently filings to state officials.

The Casper Star-Tribune reports that the utility plans to retire its coal-fired capacity by more than 4,000 megawatts and its natural gas capacity by 1,554 megawatts by 2040.

Other than converting 2 of the Jim Bridger units to natural gas in 2024, PacifiCorp – the parent company of Rocky Mountain Power – plans to focus on renewable generation, battery storage, and an advanced nuclear proposal. The company says it expects to reduce emissions 74% by 2030 as compared to a 2005 baseline and 92% by 2040.

PacifiCorp has interests in the coal plants of northwestern Colorado.

The utility plans to add 3,600 megawatts of new wind and more than 5,600 megawatts of new solar, but also close to 6,700 megawatts of storage capacity, plus hundreds of miles of transmission. Also planned: a 500-megawatt advanced nuclear reactor at the

site of one of Wyoming's four soon-to-be-retired coal plans.

## In Wyoming, conversations continue about an economy after fossil fuels extraction

The Casper Star-Tribune had another story about Wyoming's economy beyond fossil fuels extraction, one of many as Wyoming finally starts to grapple with the end of coal. But there's little new to be said.

This story has Wyoming experts saying that Wyoming needs to "identify its comparative advantage—the industry, or industries, that will bolster its economy in the future — and equip new and transitioning workers with the necessary tools."

Many state leaders, the Star-Tribune notes, hope to turn Wyoming into a hub for emerging technologies that use existing fossil fuels in new ways. It cites carbon capture and blue hydrogen.

This, in turn, will likely require Wyoming to end its reliance upon severance tax and possibly adopt a state income tax. Ironically, Colorado Gov. Jared Polis was quoted as saying that maybe Colorado doesn't need a state income tax.

### **First in coal, 8th in oil, and 9th in natural gas**

Wyoming has been the top coal-producing state since 1986 and, in 2019, accounted for about 39% of all coal mined in the United States.

It's also the 8th largest crude oil-producing state as of 2020 and the 9th largest natural gas producer.

Wyoming produces 14 times more energy than it consumes.

*Source: [U.S. Energy Information Agency](#)*



## Studies lay out the future warming of I-70 communities

by Allen Best

In the worst-case scenario, resort communities along the Interstate 70 corridor will become much hotter during coming decades.

The best-case scenario? Warmer, inevitably, because of greenhouse gas emissions already in the atmosphere, but not nearly as much, and then tapering off after 2040 if emissions can be reduced dramatically.

These bookend conclusions apply to both Eagle and Summit counties in parallel studies released on Monday. The studies by the [Rocky Mountain Climate Organization](#) were commissioned by the two counties

and, in the case of Summit County, two of its towns, Frisco and Breckenridge.

Eagle County Commissioner Kathy Chandler-Henry said nothing in the reports particularly surprised her. Previous climate studies have painted the picture broadly of what to expect. But the study—for which Eagle County paid \$15,000—delivers a level of detail for the two counties not previously available.

As a child and young woman in Eagle, Chandler-Henry remembers many days of 30 below temperatures or colder. In summers, it often got into the 80's, even the 90's.

"But it never got to nearly 100 degrees, as it did in June," she says.

By late in the 21st century, high summer temperatures could average 100 degrees at Eagle and highs of 106 could occur if the very worst scenario unfolds. Extreme was defined as 94 degrees in the study's base period of 1970 to 1999.

That high-emissions scenario sees atmospheric concentration of carbon dioxide, now at 420 parts per million, hitting 600 ppm in coming decades.

Scientists think this no-action scenario unlikely, partly because action is now underway, but they haven't entirely discounted it.

The studies examine what may happen with three lesser levels of emissions. Even then, a typical year in the next two decades might resemble that of 2020, a notoriously warm year, but then continuing to warm through the 21st century, but less so than the extreme scenario.

And if the global community can pull actually slow the growth of emissions?

Bad news for a while, as continued warming is baked into the climate system by existing atmospheric pollution. The Avon-Edwards area, for example, is likely to be three degrees warmer in 2040 as compared to the baseline of 1970-1999. But taking dramatic action globally, the heating will level off.

In Summit County, the directions are the same, but the numbers are lower. Again, much depends upon whether the global community tames emissions and by how much. Again, hotter summers are in the cards. At the extreme, there would be 54 days in the Frisco-Breckenridge area by century's end with temperatures above 80 degrees. That compares with only 4 days in the baseline period of 1970-1999.

Joshua Blanchard, a Summit County

**“Unless we quickly and sharply reduce emissions, in about 20 years the mountains in Colorado will become unrecognizably and unacceptably hot.”**

**Stephen Saunders**  
***Rocky Mountain Climate Organization***

commissioner, says the study data “tell us our climate actions goals are important and that we need to accelerate them.” He called climate change a “threat to our way of life as well as our economy and our environment.”

Stephen Saunders, the lead author of the reports, says the takeaway message of the studies is the need for immediate and vigorous action to reduce emissions. “Unless we quickly and sharply reduce emissions, in about 20 years the mountains in Colorado will become unrecognizably and unacceptably hot,” he says.

Climate models for decades have struggled to replicate the rugged topography of Colorado and other mountainous areas in their computer modeling. Modeling has improved in the last decade, but the Gore and Tenmile ranges pose challenges that Kansas or Missouri, for example, do not.

Jeff Lukas, co-author of a major 2020 report called “[Colorado River Basin Climate and Hydrology: State of the Science](#),” says the information in the new reports is not necessarily more accurate than previous, more broad-brush climate reports. However, the scenarios for the I-70 corridor are more accessible and thus more salient and actionable to decisions-makers, says Lukas, now a climate research consultant doing business as [Lukas Climate](#).

Torie Jarvis, who directs water quality and quantity planning for the Silverthorne-based Northwest Colorado Council of Governments, one of the sponsoring agencies of the two studies, says that sharper local focus will deliver that value of accessibility that even the report issued by the International Panel on Climate Change in August cannot.

“For me, I can visualize a very specific temperature, such as Frisco getting to 85 degrees for multiple months, more easily than reading about projections of an increase of 3 degrees in the next 50 years,” she says.

“From our perspective, for a recreational economy, including the impact of warming fisheries, this is a concern,” she says. This year's higher temperatures, which



forced some river segments to be closed, provide a glimpse of the future.

The two reports also examine precipitation, which climate models have more difficulty in predicting than temperature because they fail to do a good job of simulating monsoonal thunderstorms that drive much of Colorado's summer precipitation. Still, the models generally agree that total annual precipitation amounts will increase somewhat, perhaps 10% or less. This is because warmer atmospheres have greater capacity to hold water.

This increase in precipitation is most likely to occur during winter. One study scenario, for example, projects 7% more precipitation on Vail Mountain. Keep in mind that April temperatures rarely yield powdery snow. Expect mushy conditions more frequently through ski season.

More snow and rain do not necessarily translate into more water in creeks and reservoirs. Increased heat means more evaporation and transpiration – precisely the problem, overlapped with drought, that is causing constrictions in the Colorado River Basin altogether.

**I**n Vail, that could be a problem for Gore Creek, which already struggles to maintain its status as a gold medal trout fishery, says Kristen Bertuglia, the town's environmental sustainability director.

Bertuglia always points out another implication to increased warming. Already, air conditioning – something unthinkable in the 1970s – has become a must-have in new construction in Vail and the Eagle Valley. This may well cause a shift in electrical demand, making Vail more like Denver. Instead of peak electrical demand occurring on winter evenings, as now occurs, the peak demand may shift to summer afternoons.

To what value this information? Those involved say these studies will provide a strong case for taking action to both cut

emissions and adapt to the changing climate.

"They help spur action," says Boulder County Commissioner Matt Jones, who worked in the Summit County ski industry in the late 1970s, later becoming state legislator.

Boulder and Boulder County in 2016 also commissioned the Rocky Mountain Climate Organization to conduct a similar study. Susie Strife, director of sustainability, climate action and resilience for Boulder County, says the more localized analysis of future climate conditions has helped galvanize climate action. One indirect result was creation of an advocacy organization called Colorado Communities for Climate Action, which now has 38 local jurisdictions. The organization has become a reliable presence in testimony before legislative committees.

**B**ut high-profile mountain resort communities can have outsized influence. Consider the traffic roundabout that debuted on Thanksgiving 1995 in Vail. Such designs were rare then, which is why Vail struggled with whether to go ahead amid warnings of vehicular pandemonium. Instead, the roundabout was an immediate success that ended the 45-minute traffic backups that had plagued the town at times at the old four-way-stop intersection. Soon other communities near and far were building roundabouts, too.

Thinking foremost locally if also globally – hey, that's why there are all those flags along the South Frontage Road – Vail is now studying how to tame the emissions from its snowmelt systems. The municipality has 13 acres of snowmelted areas in Vail Village, Lionshead, and other areas heated by the combustion of natural gas. It's the single largest contribution to greenhouse emissions, even more than the town's fleet of buses.



## Plant in Colorado Springs has burned its last load of coal

by Allen Best

The Martin Drake Power Plant burned its last load of coal on Friday, Aug. 27, ending more than a century of coal-burning near downtown Colorado Springs for electrical generation.

Closing of coal plants will become a regular thing in coming years. By decade's end, only one plant, Comanche 3, is scheduled to remain in operation in Colorado, if at much reduced capacity. Even that limited use scenario remains in doubt.

What will replace the electricity generated by coal combustion in times when neither the wind blows nor the sun shines or—increasingly problematic—the rivers dry up?

The answers remain unclear. In the case of Colorado Springs, six gas-burning units have been erected at the power plant along Interstate 25. But as Colorado Springs Utilities [has made clear](#), these units costing \$100 million

Like Xcel Energy and Tri-State Generation and Transmission and other utilities, Colorado Springs continues to wait for technological and perhaps political breakthroughs.

Coal has been a mainstay for the last century. At first, the plants were small. A practiced eye can see those brick buildings erected along rivers in Fort Morgan and Fort Collins.

Then, coal plants became larger and then larger yet. Cameo Station, located along the Colorado River east of Grand Junction, had generating capacity of 73 megawatts when it went on line in the late 1950s. At Hayden, the two units that went on line in the '60s and '70s together have 441 megawatts of capacity. Then came the true behemoths at Craig and Pueblo,

Utility sees natural gas as bridge, perhaps to 2030 at Drake plant

the former with 1,283 megawatts of generating capacity and the latter, called Comanche, with 1,410 megawatts.

Now, the closings have started. The smaller and older ones came first, and Cherokee, located north of downtown Denver, was converted from coal to burn natural gas. Hayden will be shut down by 2028 and Craig by 2030.

What a lot of change. In 2010, utilities were still very tentatively clinging to the past, unsure how much renewable generation they could absorb and still ensure your refrigerator had juice. Too, renewables were still expensive.

**T**hen came 2014-2018, during which a profound shift occurred as wind generation became the lowest cost resource, but solar prices rapidly declined, too, both aided by federal tax policies. And now coal has become the expensive fuel in almost all cases.

Utilities also were learning to integrate higher levels of renewables without sacrificing reliability. This was easier done in the middle of the night, when wind was blowing hard across Colorado's eastern plains, but it applied to all hours of the day, too.

A hallmark of this progression came in December 2018, when Xcel Energy assembled Colorado's political leaders, reporters and others at the Denver Museum of Nature and Science to announce a goal worthy of national attention. The company said it would cut carbon emissions from its electrical generation 80% by 2030 as compared to 2005 levels.

A week later, directors of Platte River Power Authority—the power provider for Fort Collins, Longmont, Loveland and Estes Park—announced a 100% goal for 2030, if with a list of caveats.

Tri-State, Colorado's second largest electrical distributor, with 18 member cooperatives from Cortez to Holyoke, in

January 2020 announced closings that will allow it to reduce emissions 80%.

Colorado Springs is a microcosm of this expansion of more than a century and now rapid shrinking of coal-based electrical generation. Electricity was introduced into the town in the 1880s, a light bulb at the end of a dangling cord representing the ritziest convenience in the city, a later brochure said. It was enormously expensive to operate, 6.5 cents per kilowatt-hour. Demand was small: a 60-kilowatt-generation plant met the needs of the 350 customers.

In 1968, when the Drake plant was dedicated, cost of electricity had declined to 2 cents per kilowatt hour, but demand had grown, as a brochure noted, to include everything from color TVs to electric blankets.

In June 2020, Colorado Springs Utilities [announced](#) that first Drake and then the Ray Nixon Plant, the latter a newer power plant, would close. The passage of Drake will be marked Friday afternoon with remarks by Colorado Springs Mayor John Suthers and Aram Benyamin, the chief executive of Colorado Springs Utilities since 2018.

Colorado Springs has been adding solar and wind generation but, at least during the coming decade, expects to remain reliant on natural gas. Natural gas in 2020 was responsible for 49% of electrical generation. In 2030, according to the municipal utility's [current plan](#), it will still be 42%. But on that, refer back to 2011 when some utilities were still theoretically planning to build more coal plants.

**W**hat will it take to decarbonize electricity completely? Xcel says it believes it can hit 100% emissions-free energy by mid-century if the answers are not yet clear about how to reach that last 10% to 20%. Holy Cross Energy, the electrical cooperative serving Vail, Aspen,

and Rifle areas, made its goal of 100% by 2030 unconditional.

Answers must be found. The vulnerability of the electrical grid was exposed by the windless days of February. That winter storm paralyzed Texas, exposing the fallacy of short cuts no matter what the fuel source. Colorado

was not immune, though. Xcel Energy spent \$600 million buying suddenly expensive natural gas. Tri-State spent only \$11 million in extra costs, but turned to burning fuel oil when wind farms that produced an average of 51.2 megawatts of electricity fell to just 0.9 megawatts.

Storage has become the Holy Grail of the 100% quests. Lithium-ion batteries, which have about a four-hour storage life, will be inadequate when the wind doesn't blow several days in a row on the Eastern Plains.

A regional transmission organization that allows Colorado to use electricity being generated in California or Arizona or even wind from Iowa, might help a lot. Tri-State wants such an organization. So does Holy Cross Energy—and, it would appear, so does Colorado Springs Utilities. In 2021 Colorado legislators approved a bill that requires integration of the state's utilities into such an organization within a decade. One energy attorney has called it the most important energy or climate bill among Colorado's 30-plus bills adopted in the 2021.

**O**ther storage technologies may deliver the answers. Xcel Energy says molten salt tops the list of storage technologies when it closes its coal units at Hayden in 2027 and 2028. It also is



considering green hydrogen, which can use electricity—presumably from renewable sources—to create hydrogen from water (venting the oxygen into the atmosphere). That technology faces cost and other hurdles.

Tri-State has the backing of Colorado's state government in seeking to make the power plant at Craig a demonstration site for research and development of green hydrogen, as I explained in some detail in a recent story.

See: [Will green hydrogen research at Craig be part of the answer to the big question?](#)

And also: [Salt on the table at Hayden.](#)

As for Comanche 3, Colorado's youngest coal plant, completed in 2010, and also its largest: Xcel Energy wants to keep it operating until 2040 at about a third of capacity or just seasonally. Pueblo and Pueblo County have also registered their support. They want the tax base.

But will a new energy storage technology make Comanche 3 obsolete? Maybe not, but that's a bet I'd take.

**Will you consider donating to Big Pivots when 501(c)3 status is awarded?**