

# BIG PIVOTS

Energy and water transitions in Colorado and beyond

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## School bus will have homework to help La Plata cut peak costs

by Allen Best

An electric bus that will begin shuttling students to and from schools in Durango later this year will have its own homework to do.

The school bus will be integrated into the local electrical grid. Between runs, but especially at night, when renewable energy is generally most plentiful, it will be recharged. It can also be recharged during the middle of the day.

Then, when demand for electricity peaks, the batteries in the bus can deliver electricity to the grid, shaving the maximum cost to the local utility, La Plata Electric Association, a cooperative.

Bi-directional charging, also called vehicle-to-grid,

remains rare in Colorado but will likely become more common in the next several years as electrical utilities work to smooth the humps of high demand with supplies of relatively inexpensive renewables. Storage will be crucial.

“This is a really cutting-edge project, not just for this area but for the whole state,” said Jessica Matlock, chief executive of La Plata Electric, which has 34,500 members, fifth most among Colorado’s 22 electrical co-ops.

“Vehicle-to-grid installations are the future because they enable our grid to operate with a higher degree of flexibility,” Matlock explained. “This will equate to big cost savings by allowing La Plata Electric to avoid the purchase of expensive on-peak power while aligning the charge of the bus



with times of less expensive renewable generation.”

Bi-directional charging stations have recently been installed at a recreation center in Boulder and the Alliance Center in Denver, the latter the home to many of Colorado’s environmental groups. This is the first for a bus. Durango School District 9 expects to take possession of the 81-passenger bus from Blue Bird, the manufacturer, no later than October.

**F**or electrical utilities that want to dramatically decarbonize their electrical supplies, bi-directional charging offers one tool among several to better match renewable energy supplies with demands. Many utilities are interested.

“This is a glimpse of the future,” says Dominic May, who wears the unconventional title of “energy resource program architect” at La Plata Electric. He predicts batteries of buses and other vehicles will be an important strategy for figuring out to how to add more renewables into the grid. “I think storage is the key to renewables.”



**Dominic May**

The single battery of an electric car can deliver enough electricity to power a house for a couple of days if some of the major uses, like running the clothes dryer, can be delayed. As such, electric vehicles may help utilities avoid catastrophes such as paralyzed Texas in mid-February when power generation from natural gas plants and renewables was disrupted.

The school district in Durango plans to use the electric bus on in-town routes, partly to give it higher exposure. Following the morning route, the battery will be depleted by about 40%, less in warm-weather months. It can be recharged to full

capacity in two-and-a-half to three hours. Following the afternoon run, it can re-charge for about an hour again.

Then, beginning at about 5 p.m. and continuing to 9 p.m., the battery will be tapped to augment the electricity in Durango. Peak demand charges levied by Tri-State Generation & Transmission, the wholesale supplier, predictably fall sometime in that window. That’s when demand for electricity by its member cooperatives in Colorado and adjoining states peaks.

As demand drops, the battery will be recharged. During the dark of night, when the wind tends to blow on the Great Plains, electricity prices typically plummet. Prices can also decline sharply during sunshine-splashed mid-days when solar panels generate maximum output.

Rates set by La Plata for direct current fast chargers, such as for cars or this bus, strongly encourage off-peak charging. Electricity drawn from the grid during off-peak times is 6.2 cents per kilowatt-hour; it’s almost four times higher during peak periods, 26 cents.

La Plata did its homework before donating \$150,000. This will cover the \$60,000 cost of the vehicle-to-grid fast charger, and help defray the \$384,000 cost of the bus. A service upgrade will also be covered. The total projected cost is \$450,000.

May says the cooperative expects to recoup its cost within 5 to 8 years because of the savings it will yield from lower energy costs charged by Tri-State.

**T**his is just the start. La Plata expects to use this first bus as a learning experience. Ultimately, says May, the cooperative expects to see more electric buses but also electric cars along with bi-directional chargers at home.

“In the long term, I think this will be a game changer,” he says. “The increase in renewables begets the storage question.”

Natural gas-burning peaker plants, can deliver electricity to meet peak demands, going on line in just minutes. However, they emit carbon dioxide and, in the supply line, methane, another and even more powerful greenhouse gas. Like many utilities, La Plata has pledged to decarbonize.

Hydroelectric supplies don't work well except in the limited case of pumped-storage hydro.

Vehicle-to-grid charging offers a "very obvious way to use both sides of the battery," says May.

Holy Cross Energy, another electrical cooperative that serves the Vail-Aspen-Rifle area in Colorado, also expects to make use of bidirectional charging.

In the area of Basalt, a town served by Holy Cross, buses are parked 91% of the time, and most of the time they are parked near places with strong electrical infrastructure, says Chris Bilby, research and programs engineer for Holy Cross.

"It seems like a win for everyone."

Aspen Country Day, a private school in the Holy Cross service territory, will begin using two electric buses this fall, but Holy Cross has no plans to tap their batteries as La Plata is doing in Durango.

Holy Cross instead plans to partner with the National Renewable Energy Laboratory to study the benefits to a microgrid of using mobile storage. The project is called [ReORG](#) and also includes a project in North Carolina.

Lack of standardization of bi-directional chargers holds Holy Cross back. In the case of the two-directional chargers installed in Denver and Boulder, only the Nissan Leaf is equipped with bi-directional charging capacities. In Durango, the bi-directional charger created

by a company called Nuvve will work —at least for the time-being — only with the Blue Bird e-bus.

These chargers are extremely expensive and, given the absence of common standards, have limited pairings. In other words, the vehicles and the

charging equipment have to "shake hands," explains Bilby. Such hand-shaking will come in time, but not imminently.

"I think it's coming, but we don't have anything in the pipeline yet," he

says. For now, he says, the technology has advanced faster than adoption of standards. The International Organization for Standards (ISO) will set standards for this vehicle-to-grid technology, called V2G.

Several school districts across the country have embraced e-buses. One notable example is Virginia, where [Dominion Energy has partnered](#) with school districts to deliver 50 buses. The batteries of the buses can be tapped by Dominion, the electrical utility, to improve grid resiliency. School buses using vehicle-to-grid have also been put into service in California.

For a good overview of electric school bus fleets, the breakthroughs and challenges as of November 2020, [see Green Tech Media story](#).

Bilby has studied the routes of the 250 to 300 school buses used in the Holy Cross service territory. In Aspen, the routes are compact, a maximum of 35 miles. In more rural areas, the routes can be up to 80 miles long.

In envisioning this future of vehicle-to-grid charging with school buses, Bilby also points to another twist. Often, the bus drivers are also teachers. This means that

““This could be a huge win, not just for coops but for all the utilities. I think we all know that. But we’re just waiting.”

**Chris Bilby**

**Research and programs engineer  
Holy Cross Energy**

charging must also consider where the bus gets parked for the night, perhaps at the end of a road.

For now, Holy Cross is exploring a more limited frontier. At Basalt Vista, a cutting-edge project that debuted in 2019 in the eponymously named town, cars can interface with house batteries. As such, the house can draw on the car battery for electricity.

In 2020, Holy Cross began expanding this concept in its [Power + program](#). The concept is largely the same as the school bus batteries except that the Tesla Powerwall 2 batteries are stationary, attached to the houses or other buildings.

Members of Holy Cross—in cooperatives, customers are also owners of the utility—can store energy directly from the grid or energy generated from on-site solar. The batteries can provide backup power for the home. But the agreement with participating members is that Holy Cross can also tap the batteries, but always leaving at least 20% of capacity.

One benefit to Holy Cross is the greater ability to address loss of power supplies caused by wildfires or some other disruptions.

Holy Cross pays for installation costs of the batteries. Members have 10 years to pay back cost of the batteries.

In time, the program could be expanded to car or other vehicle batteries.

“This could be a huge win, not just for coops but for all the utilities,” says Bilby. “I think we all know that. But we’re just waiting.”



**Chris Bilby**

## Platte River says solar farm will get it halfway to 100% renewables

Platte River Power Authority put online one solar farm in March, a 22-megawatt solar array adjacent to its coal-fired power plant north of Fort Collins, coupled with 2 megawatts of battery storage.

It has another solar farm coming in 2023. Called [Black Hollow](#), near the reservoir of the same name east of Fort Collins, it will have 250 megawatts of generating capacity, of which 150 MW will go to Platte River and its four member municipalities: Fort Collins, Loveland, Estes Park, and Longmont.

In all these cases of new generation, Platte River is buying the power from independent producers, who are able to realize benefits of the federal tax credits that Platte River, as a municipal provider, cannot.

With other wind, solar, and hydroelectric generation, this will push Platte River to 50% of its goal of achieving complete decarbonization by 2030, says Jason Frisbee, the chief executive.

An [announcement](#) posted by Platte River said that Black Hollow will allow the utility to no longer need power from the Craig Generating Station, of which Platte River is a part owner. The first unit there is to cease operations by 2025.

### And a nifty website feature

Platte River Power Authority has a [nifty page on its website](#), one that shows the sources of current energy production as well as the energy production as it has shifted over the previous 24 hours.

“We got the idea from Austin Power but we wanted to show a little more information on our site,” says Steve Roalstad, Platte River spokesman. “It

illustrates fairly well how we integrate non-dispatchable sources as they are available and the growing percentage of our energy deliveries.”

Platte River still has a long way to go. Nearly 80% of electricity on Tuesday noon, a rainy day with little wind, came from coal.

On Sunday, it was a little less carbon-drenched: Coal was responsible for almost 62% of electrical generation and wind a bit more than 28%. Solar was responsible for 4.9% and hydro 4.8%.

## **Jigar Shah says politics matters more than R&D in decarbonizing efforts**

Jigar Shah, the executive director of the U.S. Department of Energy Loan Program and formerly a successful entrepreneur in the clean energy sector, says technology isn't holding the United States back from more aggressively tackling the challenge of climate change. Rather, it's a matter of deploying the solutions at scale. And that's where politics come in.

“The vast majority of the technologies we need to decarbonize our economy ... are already invented,” he said on an April 30 webinar hosted by Getches-Wilkinson Center for Natural Resources, Energy, and the Environment.

The event was covered by the Boulder Daily Camera, from which this is extracted.

In the clean energy space, the libertarian, hands-off approach to the market isn't going to get the United States to a place where this meaningful



**Jigar Shah**

environment is possible, he said. The government has an important role to play, not just in fostering innovation but in controlling the climate change narrative.

“You can only ask utilities to do the right thing for so long until you have to force them to do it,” he said. “Due to lack of buy-in from utilities, grid management technology developed in the U.S. is being used in countries all over the world, but not domestically,” he said.

In Shah's Linked-In bio, he says he has spent most of his career bringing climate solutions to scale. Most recently he was president and co-founder of Generate Capital, a company with the goal of bringing scale to distributed energy storage, microgrids, fuel cells, electric vehicles, and organic waste management.

Shah also founded SunEdison, which developed one of the first major solar farms in Colorado, in the San Luis Valley.

After that, he was the founding CEO of the Carbon War Room, a global non-profit created to help entrepreneurs address climate change.

## **A vision formed long ago being realized near Delta**

The late Ed Marston comes to mind with this announcement from Delta-Montrose Electric Association.

Delta-Montrose and its wholesale supplier, Guzman Energy, has submitted plans to local authorities for an 80-megawatt solar energy project to be located near Delta. The project is expected to go on line in early 2023.

Delta County will receive \$10 million in property taxes over the projected 35-year life of the project, and the solar farm will help Delta-Montrose reach approximately 20% of local power generation.

Guzman Energy, the project developer, became the wholesale supplier for Delta-Montrose as of July 2019.

“When we started serving DMEA, we made a commitment to building local solar,” Chris Riley, the chief executive of Guzman Energy. “The Garnet Mesa solar project, which will serve DMEA and other Guzman loads, demonstrates our promise to our customers. We will continue to tailor power solutions for our customers, leveraging both owned and contracted energy sources, to provide the communities we serve with affordable and reliable power.”

If Delta-Montrose officially separated from Tri-State Transmission and Generation less than 2 years ago, the issues that caused the separation can be traced at least to 2005, when Tri-State set out to build a new coal-fired power plant in Kansas. Despite having several coal mines in its service territory, Marston and other directors of Delta-Montrose had a different vision.

Once, about a decade ago, I called Marston and asked him about the basic dispute.

“Because I don’t want to keep on sending checks to Craig,” he said, a reference to the source of most of Tri-State’s power generation at the time.

## **200-MW solar farm planned west of Pueblo**

Black Hills Energy has committed to purchasing the output from a 200-megawatt solar farm planned between Pueblo and Canon City.

Renewables Now reported that the developer is 174 Power Global Corp., an affiliate of South Korea’s Hanwha Group.

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The agreement is for 15 years of production from the Turkey Creek Solar project.

## **CORE in line to get \$1.2 million from Aspen**

When it was created in 1994, the Community Office for Resource Efficiency had a strong funding model. Those building homes in around Aspen had the choice of offsetting the energy consumption from heated driveways, outdoor swimming pools, and big, big houses by installing renewable generation themselves or paying in-lieu fees.

At the start, few people wanted to be bothered with solar panels. Most paid the in-lieu fee, which gave CORE a steady stream of income for energy efficiency and renewable energy projects in the Roaring Fork Valley—and even beyond.

But the revenue stream has tightened as homeowners have chosen to add renewable energy. More important, Pitkin County, where most of the new buildings are constructed, has tightened its building regulations. Out went the possibility of building gigantic castles. In May 2020, the county adopted its boldest regulations yet that require new buildings to attain relatively low HERS (Home Energy Rating System, an index of energy efficiency) and then more, including batteries.

The Aspen Daily News and Aspen Times report a request from CORE for \$1.2 million from the city to help the organization meet its projected \$2.1 million budget. It’s not certain Aspen will provide the money, but the Daily News reports a round of praise among Aspen City Council members for progress achieved.

In the last several years, CORE has provided important grants for two new affordable employee housing projects, Basalt Vista and Willits—that have no natural gas connections.



## ‘Greenhouse’ shows up in transportation bill 42 times. What does that say?

**Analysis/photos by Allen Best**

The social cost of carbon is mentioned twice in the 196-page transportation bill that was introduced into the Colorado’s legislative session in early May. It’s not clear exactly how it will have any more effect than the 55-mph speed limit on one of the interstate highways through Denver. Likely, if this bill passes, it’s part of a bigger puzzle.

But the mention frames transportation differently than ever before in Colorado. Transportation always was about the balance between mobility and the ding to the public treasury, the taxes we pay. This adds a new metric to the discussion, a new dimension of costs.

I wouldn’t advise wading through the 107-word sentence in the bill where social cost of carbon is first mentioned. It’s not exactly the sort that Gabriel Garcia Marquez would craft. The gist is that our vehicles pollute, and the pollution has a social cost. It goes on to instruct the methodology of the social cost of carbon be employed, to get an assessment of the environmental costs over time and put into dollar figures. Alone, this does not alter Colorado’s path on transportation, but it does set a new tone.

More telling is “greenhouse,” a word that shows up 42 times in the bill along with 3 mentions of “ozone,” a component greenhouse gas and part of the unhealthy air found along the northern Front Range.

**T**his is a climate bill. It has to be. Transportation will become the No.1 source of greenhouse gas emissions in Colorado as the big coal-fired power plants begin closing in 2022. Gina McCarthy, speaking at the recent 21st Century Energy Transition Symposium, called transportation the “big kahuna.” She was

speaking from her federal perch as Biden’s climate advisor, but it’s also true in Colorado.

Colorado has taken steps to produce small waves in decarbonization of transportation. Now it needs a big wave, say those involved in transportation efforts, and this is it.

It’s also a congestion bill. I’m guessing I heard the word “congestion” used or alluded to a dozen times when Gov. Jared Polis, legislators, and several others spoke on the interior steps of the Capitol on May 4. Alec Garnett, the House speaker, talked about the ability to immediately tell you’re leaving Utah or Wyoming when entering Colorado. This bill provides for new funding sources that aim to deliver more asphalt and concrete.

The bill is also a compromise, as was best described by Colorado Springs Mayor John Suthers, a Republican. He talked about highway expansions he wants to see in Colorado Springs, the widening of Powers Boulevard and more. “These simply cannot be accomplished without a much greater infusion of state and federal dollars,” he said. Suthers, a former state attorney general in Colorado, also said he is a political realist—suggesting compromise is inevitable.

“Transportation can’t be a partisan issue. It’s too important to the quality of life of our residents in Colorado Springs,” he said.

Kevin Priola, a Republican state legislator from the Brighton area, also spoke on behalf of the bill. He’s been a big booster of transportation electrification in Colorado, showing up at a bill signing with Gov. Jared Polis in 2019 near East High School in Denver.

At the Capitol, he spoke about congestion on Interstate 76, now bumper to bumper instead of the occasional car that he saw from his grandfather’s farm

when he was a boy. But highway widening cannot be the whole answer. “We can’t just continue to bulldoze mountains and widen lanes,” he said.

Most bills run 10 to 20 pages. This one runs to 196 pages. This is Long’s Peak, not Rabbit Mountain outside of Lyons. Or, for those in Durango, Engineer Mountain instead of Perins Peak. It’s sweeping, with a little bit for everybody, most fundamentally new ways to collect revenue. But there’s a distinct shift in



**A mountain jam near Telluride.**

direction, a big pivot, if you will.

Are there comparable pivots? Others might point to funding changes of the last 30 years, including 1992, the last time Colorado passed a gas tax increase. A case may be made for 1973, the year when the first bore of the Eisenhower Memorial Tunnel Complex was opened, followed by the second bore in 1978.

I’d make the argument for 1930. That’s the year that the state began plowing snow on Berthoud Pass, a clear recognition of the ascendancy of the automobile. Before, there was no way to drive across the Continental Divide during winter.





**Part of the Amazon fleet at a warehouse along I-70.**

Now the pivot is toward electrification and, more broadly yet, decarbonization through a variety of pathways. And, in an odd reversal of my thesis about 1930, it opens the door partway to the idea of a Front Range passenger train. Carl Smith, representing the railway workers' union, pointed out that rail workers losing their jobs on ferrying coal from mines to markets could transfer their skills to passenger rail.

Elise Jones, executive director of the Southwest Energy Efficiency Project, emphasized electrification of transportation. The bill proposes to put more than \$730 million toward electric vehicle solutions. That, she said, represents "one of the biggest investments in transportation electrification by any state anywhere in the country."

The bill, said Jones, recognizes the scale of the challenge as Colorado seeks to expand the number of electric vehicles – currently 36,000 on state highways – to nearly a million by the end of the decade.

"To support these new EVs, Colorado will need 111 times more charging stations by 2030, and this bill would put a significant down payment on that infrastructure," she said.

Jones also noted the funding proposed by the bill for all types of electric mobility, from electric bikes and transit to school buses and trucks, but also rideshare vehicles like Uber and Lyft. "It includes money to replace the dirtiest vehicles on the road with zero-emissions buses and delivery trucks."

**T**ravis Madsen, who runs the transportation program at SWEEP, elaborated on this theme when I talked to him. "I think the bill is an essential piece of achieving Colorado's climate targets," he said.

"We need to step up the pace, and this bill will provide some needed juice to get this (transition) moving faster," he said.

Madsen directed my attention beyond our cars to the fleets of trucks and delivery vehicles. Section 11 of the bill proposes a



**Middle-class mini-mansions at Leyden Ranch, in Arvada.**

clean-fleet enterprise within the state’s Department of Public Health and Environment – the agency given the most significant responsibility for creating rules to decarbonize the economy – to provide incentives for the shift in fuels. This new clean-fleet enterprise will be allowed to “impose a delivery fee to be paid” by those getting the goods by delivery of motor vehicle. Nudge, nudge.

A personal aside here: I live on the edge of one of metropolitan Denver’s small but up-and-coming commercial areas. There’s a daily parade of diesel-powered trucks delivering wine, beer, fruits, and all other manner of items to be consumed in the restaurants of Olde Town Arvada. Moreover, I have wheeled around the warehouse districts along I-70 and I-76 on Denver’s east and north side. The size of the fleets of Amazon and others astound me.

But then there’s the issue of how we wheel about on a daily basis. In September 2020 the Denver Regional Council of

Governments issued the [2019 Annual Report on Roadway Traffic Congestion in the Denver Region](#), which noted that vehicles miles traveled per capita had actually declined in 2019, a second straight year. On weekends, the VMT per person was down to 25.4 miles.

Of course, with population growth of 1.4%, there was just as much travel.

Some people seem to think covid will dent this, perhaps permanently. I’m skeptical.

**T**his transportation bill aims to deliver leverage. Section 28 would require the Colorado Department of Transportation and metropolitan planning organizations (think RTD) to “engage in an enhanced level of planning, analysis, community engagement, and monitoring with respect to transportation capacity projects and specifies what that entails and also requires CDOT to conduct a road usage charge study and an autonomous vehicle study.”

To me, this doesn't say I'll have to ditch my car. But there's some jostling here. Madsen sees this as a crucial section, along with the AQCC rulemaking on transportation emissions that is expected this summer. "I think there's going to be a lot of push and pull over whether and how Colorado invests in transportation differently to reach the GHG roadmap targets," he says. He points out that the state roadmap calls for growth in vehicle travel to be cut in half.

In Denver itself, densification is rapidly underway. Some people don't feel the need to have their own cars. "That will be an important way we can accommodate more people without causing a dramatic increase in everyone driving," says Madsen.

I'm skeptical—not about the goals, but whether local governments can be nudged into making land use decisions that actually impact greenhouse gas emissions from transportation. I've been hearing this conversation for decades with no real gain

**A** couple of weeks ago I drove to the western precincts of Arvada amid the rolling hills just short of Highway 93, the road between Golden and Boulder. These huge projects — Candelas and Leyden Ranch—have wonderful open spaces and uplifting views, exactly what people from elsewhere expect in Colorado. (If you don't mind some wind occasionally).

These housing projects are also absolutely car centric. They're VMT disasters. In this, they are more typical than not among the 40,000 to 50,000 houses being built in Colorado annually, the number of which have been going up during the last 4 or 5 years.

The bill got its first legislative hearing on Monday, dragging on for 7.5 hours in the Senate Finance Committee before being passed, with amendments, on a 4-3

party-line vote. So much for Sutherland's pitch for bipartisanship.

The social cost of carbon mention remained intact. Colorado first began using that metric as a result of 2019 legislation, which requires the Public Utilities Commission to evaluate electrical generation projects with the federal social cost of carbon, which was then \$46 per ton of carbon dioxide emissions. This tilts the table against coal generation, although as a practical matter, the table is heavily tilted toward lower cost renewables. Two other bills being considered by legislators this session would also add social cost of carbon to the PUC matrix when evaluating programs that would reduce natural gas use in buildings and elsewhere.

But the practical effect of social cost of carbon in the transportation bill?

In response to my questions, Will Toor, executive director of the Colorado Energy Office, said the goal of the social cost of carbon is to provide "a consistent approach across relevant agencies. We are ensuring that we are doing cost benefit analyses and accounting using an appropriate social cost of carbon and making sure in multiple pieces of legislation that we use the same social cost of carbon at the PUC, C-DOT, CDPHE, etc."

Madsen—who took Toor's job at SWEEP when Toor joined the Polis administration in early 2019—said he thinks the practical effect will depend on a future rulemaking at the Air Quality Control Commission. That may occur later this year.

"The social cost of carbon will help illustrate the value of reducing emissions (either through transportation and land-use planning to reduce overall vehicle travel, or through electrification measures)," he said.

*Have a different take on this transportation bill? Happy to publish other viewpoints. [allen.best@comcast.net](mailto:allen.best@comcast.net)*

# Nation's journalists seek out expertise of HFC specialist in the nation's icebox

by Allen Best

For a day, Fraser's Kirsten Taddonio's expertise seemed to be everywhere.

On Monday, May 3, I saw her in a paragraph in the New York Times. The Environmental Protection Agency had announced a new rule that targets hydrofluorocarbons, or HFCs, a greenhouse gas widely used in residential and commercial refrigeration, air conditioning, and heat pumps.

"This is incredibly significant," she told the New York Times, the first expert cited in the newspaper's story. "By taking fast action on these short-lived climate pollutants, of which HFCs are the most potent, we can buy ourselves some time and actually help avoid climate tipping points."

Wondering how the New York Times had found her in Fraser, I wrote to her. She subscribes to Big Pivots—and, by the way, is secretary of the Mountain Parks Electric Board of Directors, the electrical cooperative serving Middle and North Parks (Grand and Jackson counties).

She pointed me to a PBS segment that was broadcast that same day and further confided she had been interviewed roughly a dozen times.

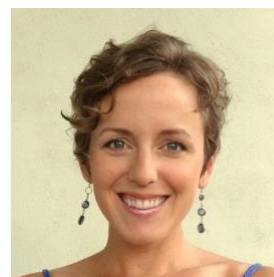
"We have all heard about carbon dioxide, or CO<sub>2</sub>, and we know that it is responsible for much of the world's warming," she told PBS in a segment posted May 3.

"However, there are these other classes of climate pollutants called short-

lived climate pollutants, of which HFCs are one of the most potent.

"So, if you go out today and emit a pound of CO<sub>2</sub>, that creates a certain amount of warming. If you go out and emit a pound of HFCs, it is thousands of times as potent as CO<sub>2</sub> at warming the globe. So that's why it's so important to be phasing these chemicals down."

The EPA—where Taddonio had once worked when living in Washington DC., along with a stint at the Department of Energy—had alerted major news outlets on the Sunday prior to its impending announcement.



**Kristen Taddonio**

Taddonio works remotely as the senior climate and energy advisor at the Institute for Governance & Sustainable Development, which has headquarters in Washington D.C. and in Paris.

The institute, she told me, "is known as the go-to source on HFC and non-CO<sub>2</sub> climate pollutant issues. Our president, Durwood Zaelke, is quoted in tier-1 media all the time."

**D**espite her connections in Washington, the announcement caught Taddonio off guard.

"I had no advance warning and zero time to prepare," she said. "The flurry started Sunday when EPA gave journalists an embargoed copy of the press release on their rulemaking, and I had to talk to about a dozen outlets Sunday-Monday. We did the PBS News recording in one take, which Joe (Smyth, her husband) tells me is pretty impressive given my general lack of TV experience before, so I'm pleased with that."

She had shared her expertise earlier this year in a webinar organized by 350.Colorado.

The NY Times and PBS segments were of the same length, covered the same major points, the PBS with an easier format through the filter of just Taddonio's expertise while the Times had the voice of 6 experts and added more complexity.

You can see the New York Times story [here](#), and the PBS transcript [here](#). And you can see her fuller bio at the Mountain Parks [website](#).

Colorado was not mentioned in the reports, but Taddonio tells Big Pivots that Colorado was at the forefront by limiting HFCs allowed in new products, along with several other states (see full list at [HFCbans.com](#)).

Colorado also joined the Institute for Governance and Sustainable Development and the Natural Resources Defense Council in petitioning the federal government to make HFC limits on new products apply nationwide.

"The brilliance of what EPA is doing now —with instructions from Congress—is that they're going after HFCs at the source, focusing on capping production and imports. They're turning down the tap, so to speak," she says.

"Too often environmental policies only focus downstream, on emissions. That can quickly become an enforcement nightmare when you have so many distributed sources. Going upstream is smart."

Until I sat down to write this, the irony had not dawned on me that one of the nation's experts on the substance used in refrigerants, including air conditioning, lives in a place that may well still have none. At least when I lived there 40 years ago, the idea of an air conditioner in Fraser would have seemed preposterous. Maybe it still does.

## What you had to say

### Chillin' in Hades

In response to ["It's not drought, but what do we call it?"](#) from Big Pivots No. 35

"How about 'desertification'? Or Brad Udall's word isn't too scientifically wonky: 'aridification'.... But I also know that you know those words.... So if you're looking for something simpler, how about, 'Ongoing dry spell that will last till hell freezes over....' (Although if Texas freezes over, can hell be far behind?)

George Sibley  
Gunnison, Colo.

*George Sibley is the author of "Water Wranglers" and several other books*



### More about dinner parties

In response to ["If methane were at a dinner party..."](#) from Big Pivots No. 36

"I've been to dinner parties where methane's shown up uninvited... and it doesn't end well for anyone."

James Eklund  
Denver, Colo.

*James Eklund is a water attorney and former director of the Colorado Water Conservation Board.*

# Gov. Polis's climate crossroads: A time for hard choices

by Roger L. Freeman

In 1974, a report titled “A Time to Choose: America’s Energy Future” shook the energy establishment. [The report](#) cited the threat of climate change and challenged the belief that economic growth must be coupled with energy expansion, then offered groundbreaking recommendations on conservation, renewables, utility reform, and future energy production. It became the foundation for President Carter’s energy policy and spurred such programs as the CAFÉ vehicle standards, Colorado’s own NREL, and the Public Utilities Regulatory Policies Act.



Roger Freeman

The principal author was my father, S. David Freeman, who passed away at 94, exactly one year ago. Affectionately known as the “Green Cowboy,” he devoted his life to championing renewable power and conservation programs. With his legacy in mind, I want to address an emerging controversy that is central to the work that he pioneered and to Colorado’s future.

Gov. Jared Polis has publicly opposed and threatened to veto [Senate Bill 21-200](#), which is progressing through the State legislature. The bill would provide a pathway for significantly reducing greenhouse gas emissions by setting sector-specific caps and authorizing emission fees. This would support the carbon reduction goals already embraced

by Gov. Polis and identified in [HB 19-1261](#). The bill, which also incorporates environmental justice considerations, would task the Colorado Air Quality Control Commission, or AQCC, with developing and implementing regulations.

I first met Gov. Polis over 20 years ago, when he joined the Board of Directors of Conservation Colorado (then called Colorado Conservation Voters). As an early supporter of his gubernatorial campaign, I helped vet the 2018 climate and energy policy that defined his overall platform. The Polis Administration has since advanced this agenda through a series of laudable executive orders, legislative fiats, and administrative actions. Gov. Polis’s heart—and the priorities of his excellent team—are clearly in the right place.

But his resistance to so-called government “mandates,” reflected in his approach to other controversial topics (e.g. vaccines), fails to account for the urgencies of the climate crisis. Despite all recent efforts, the ultimate arbiter—Mother Nature—is unimpressed by our progress, and increasingly angry. We see this in countless scientific studies and projections, frightening weather and droughts, and numerous other barometers.

**F**ifteen years after Al Gore’s “An Inconvenient Truth,” the sad reality is that we need dramatic and immediate action to stem the worst of the tide of global climate impacts. We may be progressing towards long-term carbon cutbacks in the energy sector, but the majority of emission cuts still lie ahead, requiring transformation of our transportation, heating, building, waste handling, and manufacturing sectors. In short, our overall way of life has to change, and quickly.

Which leads back to SB 21-200. The Administration’s view is that imposing emission fees and binding sectoral limits could foster a cap-and-trade system that is

less efficient than the state's current decarbonization approach, especially when it comes to transportation and buildings. But the State's current approach lacks teeth in these and many other areas, relying on market-driven shifts and voluntarily reductions.

Sadly, like Dad's long life, time has run out. We need all the policy hammers in our toolbox. Turning the "goals" that the Administration is proud to champion into enforceable sector standards will complement and jump-start current initiatives and support long-awaited national reforms. Imposing caps and fees may not be the perfect or the ultimate solution.

But we need policy reinforcement against the climate disaster—"feedback loops," if you will—to counteract the array of climate impacts that even the best scientists cannot foretell. And if we are truly on track to reach long-term climate goals under the Administration's plan (despite Colorado's spiraling growth), the AQCC's job will be that much easier.

Gov. Polis also believes that the bill would give "dictatorial authority" over our economy to one unelected board (AQCC) that lacks the requisite power and expertise. Yet, through Gov. Polis's executive orders and recent legislation, the AQCC has already been tasked with a number of critical rulemaking fiats, many of which dovetail with SB-200 requirements (e.g., refinement of Colorado's methane rules, touted as a national model). Implementing SB21-200 presents a daunting challenge, but there is a no-more qualified body available.

Under established administrative procedures, the AQCC will get extensive direction and support through public, technical, economic, and scientific testimony and submissions. This delegation and deliberation process, a hallmark of environmental policymaking, will be far from "dictatorial."

During the campaign, I gave Gov. Polis a copy of dad's last book, ["All Electric America: A Climate Solution and the Hopeful Future."](#) Written in 2015, it contained a sector-by-sector plan for decarbonizing our entire system, using mandated reductions. It voiced the need for courage and leadership, especially among "intelligent deniers" – those who recognize the severity of the climate crisis, but come up with rationalizations to avoid making the hard choices.

Dad's last book drew from many historical teachings; one that was ever-present in the family den, and cherished by my father, was ["Profiles in Courage"](#) by John F. Kennedy. In those days, perhaps the most notable example of such "chutzpah" was the notion that we might someday place a man on the moon.

I hope Gov. Polis still has his copy of Dad's book. It might be time to re-examine the administration's aversion to government "mandates" in this context and its reluctance to present the hard truths to Colorado's citizens and industry about the role government must play in fighting the worst of the climate crisis.

Also I hope that the parties involved are able to fashion an acceptable way of enacting the basic requirements of SB21-200, and move forward.

Otherwise, we will take one giant leap (backwards) on mankind's latest mission—not to reach the moon, but to save the earth.

*Roger L. Freeman is a longtime renewable and environmental lawyer and advocate, based in Lakewood, Colo. He serves on a number of boards and works with a number of solar entities and other institutions, but the views expressed herein are solely his own.*



## Transmission enough for Crossing Trails, but what about additional wind & solar farms?

by Allen Best

Tri-State Generation and Transmission in early May added generating capacity from a new 104-megawatt wind farm called Crossing Trails, which is located on wheat fields and pasture lands 150 miles southeast of Denver, between the towns of Seibert and Kit Carson.

What remains unanswered is how Tri-State will connect the thousands of megawatts of new generating capacity it will need from wind and solar resources during the coming decade to its customers in Colorado and three surrounding states even as it shuts down existing coal plants at Craig. A possible deal with Xcel Energy isn't going forward.

Xcel in January announced a \$1.7 billion loop of high-voltage transmission lines in eastern Colorado. The high-voltage transmission lines Xcel calls [Colorado's Power Pathway](#) would loop eastward from Denver in a semi-loop ending at Pueblo. An extension south to the Walsh-Springfield area of southeastern Colorado is also a possibility.

In that early March announcement, Xcel said it was negotiating with other utilities in Colorado, Tri-State included, about participation.

Those negotiations with Tri-State have produced no agreement.

### No buy-in to Xcel Energy's \$1.7 billion transmission plan for eastern Colorado

"Tri-State worked closely with Xcel Energy to try to reconcile how Xcel's project, which is primarily designed to bring renewable resources from eastern

Colorado to the Front Range, could also effectively serve the reliability, clean energy and interstate system needs of rural electric cooperatives and the communities served," said Mark Stutz, a spokesman for Tri-State, in an e-mail.



“These differing needs could not be reconciled in a single transmission proposal with Xcel Energy, and Tri-State will not be participating in Xcel’s project,” he said.

Tri-State is now working with other utilities and stakeholders to consider other options, Stutz said. Last year, Tri-State announced it would join an energy imbalance market with the Western Area Power Authority and other participants.

This market is considered a first-step into a fully organized market with benefits that can produce lower electricity prices and better match renewables with demands.

Duane Highley, the chief executive, has also been a strong proponent of Tri-State joining a regional transmission organization, or RTO. He favors one operated by the Southwest Power Pool, which currently operates on the Great Plains—but not in Colorado. Xcel has indicated it favors CAISO, the California-operated RTO, but has questioned whether an RTO is needed at all.

Xcel Energy had no comment about the status of its negotiations with Tri-State and other utilities as regards its project in eastern Colorado by Big Pivots deadline.

**B**ased in suburban Denver, Tri-State serves 42 member cooperatives across Colorado and three other adjoining states. Of them, 16 are in Colorado. The Colorado coops represent a large majority of Tri-State electrical demand.

Tri-State has been rapidly shifting its generating capacity in the last two years, the result of impossible-to-ignore low costs of renewables and impatient state policy mandates in Colorado and New Mexico.

In January 2019, Highley announced 1,000 megawatts of new wind and solar

and the closing of Craig Generating Station by 2029.

Crossing Trails, the new wind farm, is part of that push into renewables. It consists of 25 wind turbines, all produced by Vestas, primarily at the company’s manufacturing plants at Windsor, Brighton, and Pueblo. A release from Tri-State said the blades stretch more than 240 feet,

making them among the largest and most advanced turbines installed in Colorado so far.

The 20 larger wind turbines have a generating capacity of 4.3 megawatts. As for the 5 smaller turbines,

they can generate 3.6 megawatts each.

When all are operating at full capacity, the wind farm in eastern Colorado can power the equivalent of 50,000 homes, assuming the turbines are generating 45% of the time.

The wind farm is owned by EDP Renewables, an international firm with North American headquarters in Houston. Tri-State is purchasing the wind power from the company, which can benefit from federal tax credits available to private companies. Tri-State, as a creation of its member cooperatives, cannot benefit from those tax breaks.

The wind farm will also benefit rural economies of eastern Colorado. More than \$20 million will be paid to landowners during the project’s life while still allowing substantial agriculture production from the lands.

Property taxes of \$12 million will be paid during the project’s lifecycle to the local governments in Kit Carson (Burlington) and Cheyenne (Cheyenne Wells) counties.

The project has also yielded 6 to 10 permanent jobs.

## Crossing Winds

**25 turbines**

**\$104 megawatts capacity**

**\$20 million to local landowners**

**\$12 million property taxes**

**6 to 10 permanent jobs**

**\$166 million capital investment**

# EVangelist Zeid hopes to share his expertise

by Allen Best

Nigel Zeid has been a fixture for the last 12 years on the sales floor of Boulder Nissan, where he shares his passion for electric vehicles. But he has now taken his leave from this position. He has broader ambitions.

"It's very scary, to be honest, but it has to be done," he said recently after announcing his move in a Facebook post.

Zeid wants to find a new home or, he would prefer, many homes, where he can share the knowledge he has accumulated about electric vehicles. It doesn't have to be Nissan.

Automotive transportation has not fundamentally changed in a half century, maybe more. But now electric vehicles will soon begin elbowing internal-combustion engines out of the marketplace, a shift that could be summarized as ICE > EV. Zeid says those selling cars—which, he points out, don't have a very favorable reputation anyway—are almost totally unprepared.

"How do you change people from range anxiety to range serenity? How do you tell them it will work for them? You have to ask (the customers) questions," he says.

For example, if they don't go on a long road trip but once or twice a year, why should the range constraint of 200 to 250 miles of most existing cars matter?

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Nigel Zeid

The charging infrastructure—if still not adequate for what lies ahead—can take people many places even now. It may take 20 or 30 minutes for a fill-up of electricity unlike the 5 minutes necessary to fill up with gas. So there will be adjustments. In time, the 400-mile batteries will arrive.

"We are pitiful at educating people about EVs, just pitiful," he says.

A native of North London, the dialect of his origins still rolling off his tongue after 26 years in the United States, Zeid began selling Nissan cars in 2007. But then he got a job with Tesla for 2 years when it had a showroom in Boulder. That's when he got excited about electric cars.

Consistently through these years Zeid has seen a reaction when taking potential customers out on their first drive of an EV. "I've never not seen them smile," he says. "I've never had anyone say, 'This is rubbish.'"

Boulder County has consistently led Colorado in sales of EVs for the last decade, and Boulder Nissan was part of that front trickle. Sales remain a trickle.

Colorado had 36,171 EVs on the road as of May 1, according to the Colorado Energy Office's [EVdashboard](#). That's 6.54 EVs per 1,000 people.

Expect a flood within the next few years.

Gov. Jared Polis, in his first executive order upon taking office in 2019, set a goal of 940,000 EVs by 2030. Colorado legislators several months ago created a mechanism to help realize this goal by requiring Xcel Energy and Black Hills to adopt plans to install charging infrastructure. Public Utilities Commissioners in December approved Xcel's plans for spending more than \$100 million.

Tesla has done much to push the market in the last decade. Other manufacturers in the days after the election of Joe Biden (don't tell Donald Trump) pledged to briskly transform their offerings to electric models, in the case of GM 100% by 2035.

It's about time, says Zeid. And he is eager to see manufacturers rapidly move beyond the luxury market, the fixation on the acceleration from 0 to 60, and deliver models below \$40,000 and for a variety of uses: minivans, trucks, and other niche markets.

"You need to build what people need," he says.

But manufacturers work from the top down. In the local dealerships, those in the sales forces typically get little respect or kindnesses. Zeid fears that same will hold as dealerships move into the age of EVs. If you see a slot for him, he can be reached at 720 878 6757 or at [nigelzeid@gmail.com](mailto:nigelzeid@gmail.com).

Just one final question, Nigel. As we move to electric cars, what will become of those who insist upon announcing their arrival to anyone within earshot of a few blocks to a few miles by unleashing the sound of internal-combustion engines?

Whatever will they do without their noise makers?

In this, Nigel has a sanguine view. He thinks the noise-making impulse of motorists will pass as a younger generation grows up without the internal combustion engines. "The generation that knows that sound is dying," he says.

In time, it will be a like stick shifts.

## People in many places like to read Big Pivots

"Hope all is well, I enjoy your Pivots. I've appreciated the detail you put into each article. Keep up the good reporting."

John Stulp  
Lamar, Colo.

*John Stulp was secretary of agriculture in the administration of Gov. Bill Ritter and the governor's special water advisor in the administration of Gov. John Hickenlooper*

"Your stuff is well read by the La Plata Electric Association board and staff."

Joe Lewandowski  
Durango, Colo.

*Joe Lewandowski is a member of the LPEA board and of the Durango Planning Commission*

"A quick note to say how much I'm enjoying Big Pivots. You're doing a great job."

Jonathan Schechter  
Jackson, Wyo.

*Jonathan Schechter is a member of the Jackson Town Council and economic and demographic analyst whose work can be found at [Charture Institute](#)*

"I enjoyed this issue as well."

Jennifer Holloway  
Craig, Colo.

*Jennifer Holloway is executive director of the Craig Chamber of Commerce & Moffat County Visitor Center*

“Great issue, Allen!”

Ellen Howard Kutzer  
**Boulder, Colo.**

*Ellen Howard Kutzer is senior staff attorney  
with Western Resource Advocates*

“I like the stories you’ve written, I don’t see  
much coverage elsewhere of these issues.  
Keep up the good work!”

Mike McKibbin  
**Lakewood, Colo.**

*Mike McKibbin writes for various  
publications*

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“We have crossed paths a few times over  
the years, and I wanted to say that I really  
appreciate your work. Your reporting work  
is some of the best when it comes to the  
energy transition in Colorado and the west,  
especially with regard to cooperative and  
municipal utilities that need the coverage  
and light shed on their work. Would you  
mind adding my email to your distribution  
list for all energy related material?”

Phil Armstrong  
**Boulder, Colo.**

*Phil Armstrong is a principal of North Star  
Renewables*