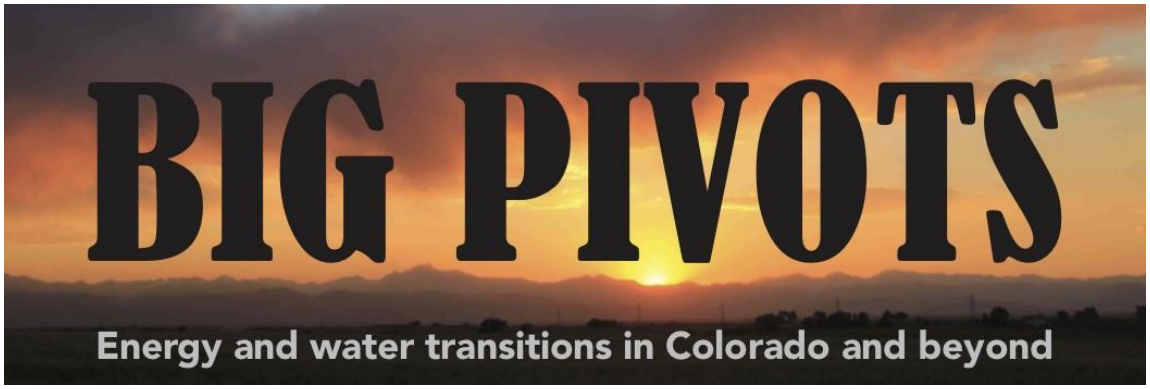

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And now the pivot from natural gas begins in Colorado

by Allen Best

Colorado has started a conversation about how natural gas in new buildings might be curtailed, a difficult but necessary step in achieving dramatic reductions in greenhouse gas emissions during the next 10 to 30 years as specified by state law.

Agreement has been reached among the four distribution companies regulated by the state's Public Utilities Commission and several state agencies, to conduct discussions focusing on future plans for pipelines and other infrastructure projects of more than $15 million.

This could lead to the Colorado Public Utilities Commission drawing up formal policies governing what the four natural gas utilities under its regulation can recover in costs to customers. The four utilities altogether deliver gas to 1.74 million customers, both residential and business, in Colorado. Regulated utilities are permitted to earn profits based on their investments. The settlement agreement proposes to define a long view of 10 to 20 years when considering natural gas infrastructure.

Unlike a toaster or even a kitchen stove, which you can replace with relative ease and cost, gas infrastructure comes with an enormous price tag—and expectation of a long, long time of use. At Basalt Vista, an affordable housing project, the cost of installation of gas pipes was estimated at $30,000 per unit—not counting the furnace and other infrastructure inside the units.

Once in place, the gas infrastructure can also be expensive to replace. As such the conversation getting underway is how to limit additional gas infrastructure – and in the process minimize new greenhouse gas emissions.

Energy use in buildings must be part of the silver buckshot for Colorado to achieve emissions reductions

"Given the long useful lives of natural gas infrastructure investments, the (Colorado Energy Office) suggests that this type of forward-looking assessment should include any significant upgrades to existing natural gas infrastructure or expansion of the gas delivery system to new residential developments," the state agency said in a June 8 filling.

In addition, if the PUC commissioners approve the settlement that proposes the stakeholder discussions, Xcel Energy agrees to inspect its pipelines for leaks every 3 years, instead of the current 5.

A 2019 state law charged the PUC and other state agencies with using regulatory tools to dramatically shrink greenhouse gas emissions from Colorado's economy 50% by 2030 and 90% by 2050.

Utilities in Colorado have said they intend to close most of the coal plants now operating no later than 2030. The coal generation will be replaced primarily by renewables. That alone, however, will not be nearly enough to meet the state's ambitious decarbonization goals. Carbon emissions must also be squeezed from transportation. buildings, and other sectors.

"No single strategy or sector will deliver the economy-wide greenhouse gas reductions Colorado needs to meet its science-based goals, but natural gas system planning is part of the silver buckshot that can get us there," said Keith Hay, director of policy at the Colorado Energy Office in a statement.

"When it comes to gas planning, CEO is focused on opportunities to meet customers' needs that will lead to a more efficient system, reduce overall costs and reduce greenhouse gas pollution."

Roughly 1.47 million housing in Colorado use natural gas as their primary fuel source. That means 70% of Coloradans use natural gas for heating.

In filings with the PUC, two of the gas utilities that are party to the settlement tartly observed that they cannot refuse gas to customers.

However, several real estate developers from Arvada to Pueblo and beyond have started crafting homes and other buildings that do not require natural gas. Instead, they can use electricity, passive solar, and a technology called air-source heat pumps to meet heating, cooling and other needs. Heat pumps provide a key enabling technology.

A glimpse of this low-carbon future can be seen at Basalt Vista, a housing project for employees of the Roaring Fork School District. The concept employed at Basalt and elsewhere is called beneficial electrification.

In setting out to create a path to lower-carbon living, Colorado ranks among the front-tier of states, lagging only slightly work already underway in California, Minnesota and New York.

"Meeting California's GHG reduction goals, a statewide priority and absolute necessity to combat climate change, inevitability means a substantial decline gas through the state," says Gridworks, an advocacy group focused on decarbonizing the grid, in a 2019 report.

With its stakeholder process, Colorado would follow in the footsteps of a similar process launched by New York in March.

Emissions can occur at several places along the natural gas supply chain beginning with extraction. Methane—the primary constituent of natural gas and one with high but short-lived heat-trapping abilities—is commonly found in conjunction with oil in the Wattenberg Field north and east of Denver and also in the Piceance,

Who is directly affected by this?

The Colorado Public Utilities regulates 4 local-distribution companies:

- Xcel Energy, i.e. Public service Co. of Colorado), 1.4 million customers.
- Black Hills Colorado, 192,000.
- Atmos Energy, 120,000.
- Colorado Natural Gas, 25,000.

Total: 1.73 million customers.

Municipal providers can opt out of PUC regulation, and most all of them have.

The PUC also regulates transmission companies that provide transmission within Colorado.

Source: Colorado Energy Office

Also, see map of service territories.

Raton and San Juan basins elsewhere in Colorado. Colorado ranked 6th in the nation in natural gas production in 2018, according to the U.S. Energy Information Agency.

In 2017, according to the Environmental Protection Agency, 4% of all greenhouse gas emissions in the United States were the result of extraction, transmission, and distribution of natural gas.

However, several studies have concluded that the EPA estimate skews low. One striking study in 2018 estimated that methane emissions from the oil and gas supply chain could be as much as 60% higher than the levels estimated in EPA inventories, according to an E&E report published on the Scientific American website.

State regulators in the last year have taken several steps to curb leaks, but officials from the Colorado Department of Public Health and Environment admit that they're only now beginning to get reliable estimates of the extent of fugitive methane emissions. A formal inventory of emissions in Colorado will begin in January.

Social cost of methane?

Sen. Chris Hansen, D-Democrat, introduced a bill in Colorado's covid-shortened legislative session in February that would have created a renewable gas standard, similar to that first specified by voters in 2004 for electricity, with elevating targets of 5%, 10% and 15% for regulated utilities.

In an interview, Hansen said he expects to reintroduce the idea, which ran as SB-150 the last session.

Hansen said he may also introduce a bill that would require the PUC to apply the filter of a social cost of methane to its decisions when evaluating alternatives. This would be similar to the cost of carbon, currently at $50 a ton, now applied to resource generating alternatives.

Natural gas burned in houses and other buildings creates carbon dioxide. An inventory released in December 2019 concluded that combustion of natural gas in houses was responsible for 7.7% of Colorado's energy-related greenhouse gas emissions.

Just how the shift from natural gas to electricity will affect utilities depends upon the company. For Atmos Energy, a company with 120,000 customers in Colorado, from Greeley to Craig, from Salida to Cortez, gas is just about everything. In a June 8th filing, Gary W. Gregory, the president of the company's Colorado/Kansas divisions, said that "continued use of natural gas is fully compatible" with Colorado's goals for emission reductions.

His evidence was a report by the American Gas Association, which relied upon a 2013 study by the Gas Technology Institute, comparing gas against electricity from coal-fired sources.

Xcel Energy, the state's largest utility, sells both gas and electricity. In theory, it will come out whole. But it has been leery about moving too rapidly.

In a May filing, Erin T. O'Neill, the PUC's chief economist, needled Xcel. It had said much about electricity, but little about natural gas, she pointed out.

"Apparently, the company believes its natural gas utility can continue with business as usual into a 'carbon-free future,'" she wrote. "Staff does not see how that is possible."

Jeff Lyng, director of energy and environmental policy for Xcel, responded in a June 8th filing with a rebuttal that said, in essence: Not fair!

Unlike the electric sector, he said, technology advances and costs declines have not yet arrived in the natural gas sector.

Still, Xcel is willing to have the conversation—and there's evidence it's shifting its thinking about the role of technology.

Condominiums at Mt. Crested Butte burn natural gas supplied by Atmos. ***2017 photo/Allen Best***

"We recognize that we have a role to play in emissions reporting and directly assisting our customers in achieving emissions reductions," wrote Lyng.

Lyng pointed to efforts by Xcel to improve efficiency of natural gas use. The company is also participating in industry programs, including One Future, which are trying to limit methane emissions from the natural gas supply chain to less than 1%. For Xcel, he explained, that includes replacing older pipes with new materials that result in fewer emissions. It also means using the company's purchasing power to push best practices that minimize emissions.

The company intends to offer options to customers. One is incentives for electric water heaters programmed to take advantage of renewable energy when it is most readily available. That tends to be at night.

Xcel sees an opportunity to work with builders and developers to design all-electric new building developments to avoid the cost of installing natural gas infrastructure.

"This may require high-performance building envelope design, specifying certain appliances and, especially load management," Lyng wrote. "Load management is key to ensuring these new electric devices interact with the power grid and are programmed to operate as much as possible during times when there is excess renewable energy or the lowest cost electricity on the system."

Not least, Xcel will now concede a role for air-source heat pumps, the crucial piece of technology employed in most places to avoid natural gas hookups. Heat pumps can be used to extract both cool and warm air from outdoor air. Xcel sees the technology being an option when customers upgrade air conditioning units with spillover benefits for heating.

"Through this option, given the cooling and heating capacity of air source heat pumps, some portion of customer heating load can be offset through electrification, while maintaining their natural gas furnace or boiler as a back-up."

This position on air-source heat pumps represents a shift in the last 10 months. Last September Lyng spoke at an event called Colorado's Energy Future held on the Auraria campus in downtown Denver. Heat pumps, Lyng said then, were not quite ready for prime-time.

This flew in the face of the use of heat pumps by Holy Cross Energy at Basalt Vista.

Asked for explanation, Lyng responded with a statement in October:

"We're encouraged by the promise of these heat pumps as a primary heating source and we're watching as the technology continues to evolve. However, for their successful use, they need to provide reliable heat for the coldest of winter days – without any back up.

"When serving our customers, we always plan for extreme weather, such as the bomb cyclone and polar vortex earlier this year. While these heat pumps show promise, there are some concerns about their performance and efficiency during cold weather, which may impact their ability to reduce greenhouse gas emissions.

"We are interested in the advancement of this technology and what it could provide customers. For example, from a cost and system perspective, we see heat pumps working best in new buildings designed specifically for this heat source. Another technology we're pursuing are heat pump water heaters because they have the ability to 'load shift,' or operate during periods when renewable generation is high, which reduces carbon emissions."

Xcel has also explored the opportunities with renewable natural gas. At its most basic level, renewable natural gas involves harvesting biogas from wastewater treatment plants, landfills and dairies. In its first such venture in Colorado, Xcel last fall began getting 500,000 cubic-feet per day of methane from the treatment plant serving Englewood, Littleton and smaller jurisdictions along the South Platte River in Denver.

In May, Xcel asked for interest in other RNG projects across its eight-state service territory. This came after surveys conducted by the company in March showed potential customer interest in a "premium RNG product." Reponses are due July 24.

Longer term, Xcel wants to explore opportunities to produce hydrogen from renewable energy to blend into the natural gas distribution system at low levels or converted back to synthetic gas.

The Sierra Club may push back on efforts to convert to synthetic gas. The organization last week released a report (see: Natural gas questions and tensions) that found significant problems with renewable natural gas, a phrase that is now being used by some companies—not necessarily Xcel—to include far more than the biogas from landfills. The Sierra Club estimates that there's enough "natural" biogas to meet 1% of the nation's current needs for natural gas.

Lyng, in his testimony, warned against trying to ramp up electrification too quickly. In 2019, he pointed out, the maximum daily demand for natural gas had the energy equivalence of 26,000 megawatts of electricity—more than three times the company's electrical peak demand.

There will be implications left and right from this transition from gas to electricity. Lyng pointed out that solar energy will have lower value, because of its inability to deliver replace natural gas on winter nights.

Short-term costs may be higher for electrified buildings. Lyng calls its "challenging."

"This will improve over time as electric technologies decline in cost and as the electric system becomes cleaner," he said. Xcel, he added, favors a voluntary approach: pilot programs that expand.

In the meantime, there are worries of adverse impacts of beneficial electrification to people of low income. The thinking is that as the demand for natural gas declines, the cost will actually go up per individual consumers.

"As a smaller and smaller pool of customers is left to pay for infrastructure costs, the large the cost impact will be for each remaining customer," explained Dr.

Scott England, from the state's Office of Consumer Counsel, in a filing.

The broader, overarching issue for the coming discussions are the pace of Colorado's decarbonization efforts. In setting the goals, legislators delegated the primary authority to create policy to the Air Quality Control Commission.

In the PUC filings, there was a subtle background argument. One side maintained that it was premature to act on natural gas until the Air Quality Control Commission sets rules. The counter argument—and the one that appears to be prevailing at the PUC—is that there's no need to wait for rules from the air commission before beginning a dialogue. What may also matter is that the Air Quality Control Commission has no scheduled rule-making on the issue.

Boulder researcher gets legal fees after dustup about 100% renewables

A Colorado energy researcher stands to get $75,000 after a legal dustup about how rapidly the United States can achieve a 100% renewable energy grid.

Boulder-based Christopher Clack, founder of Vibrant Clean Energy, will recover his legal costs and the Proceedings of the National Academy of Science, or PNAS, is to get $535,000 as per a court order from a District of Columbia Superior Court judge, according to Retraction Watch.

The decision was rendered in April, and Mark Jacobson, the Stanford researcher who had originally filed litigation, asking for $10 million in damages from Clack and PNAS as well as an apology, appealed the decision, but the judge reaffirmed her decision in late June.

What was it all about?

In 2017, the Washington Post's Chris Mooney explained that the dispute "turns on Jacobson's idea, itself published in the PNAS and other journals, that it is feasible to construct a grid for the entire country that would be powered entirely by wind, solar and water energy (hydropower), with additional help from forms of energy storage. 'No natural gas, biofuels, nuclear power, or stationary batteries are needed,' Jacobson and his colleagues wrote in 2015."

In 2017, Clack argued in the same publication, PNAS, that Jacobson's idea was not only infeasible but also that his work used "invalid modeling tools, contained modeling errors, and made implausible and inadequately supported assumptions." He and his co-authors said the transition toward cleaner energy will require "a broad portfolio of energy options," which presumably includes nuclear power, carbon capture and storage, and more.

Claims of errors in modeling was at the heart of the disagreement. That, in turn, revolved a dispute over how much U.S. electricity could be provided by hydropower and how much the current system of dams can be altered to increase their electricity-generating capacity.

Jacobson sued, but the next year dropped the lawsuit. However, he did not drop his argument, as GreenTechMedia reported at the time.

Errata from Issue No. 14

A story in Big Pivots Issue No. 14 misstated the position of Western Resources Advocates in regard to whether the social cost of carbon should be integrated into the PUC's review of transmission planning. The sentence should have said, (Xcel Energy says no, Western Resource Advocates says yes.)

And from Florence, along the Arkansas River in central Colorado, Steve Andrews writes to point out that a stove is not the same as a furnace. A story in Issue No. 14 left room for confusion

Gas from wastewater facility to soon power garbage trucks in Boulder/Broomfield

by Allen Best

BOULDER, Colo. – Seeds planted by Congress in 2005 are now bearing fruit in Boulder. The city is the newest among four jurisdictions in Colorado to use a financing tool created by the federal legislation to create new uses for biogas from wastewater treatment plants, and more such projects are being studied

Boulder's late this month will begin converting biogas from it's wastewater treatment plant into compressed natural gas for use in 38 trash trucks operated by Western Disposal in Boulder and Broomfield counties.

Biogas from Boulder is piped from the plant's anaerobic digester to BioCNG™ System, called Tetra Tech. It removes the (pee-ew!) hydrogen sulfide, moisture, siloxanes, volatile organic compounds and carbon dioxide from the biogas. The cleaner fuel is then piped—in this case using Xcel Energy pipes—to a station for fueling of the trash trucks with the compressed natural gas, or CNG.

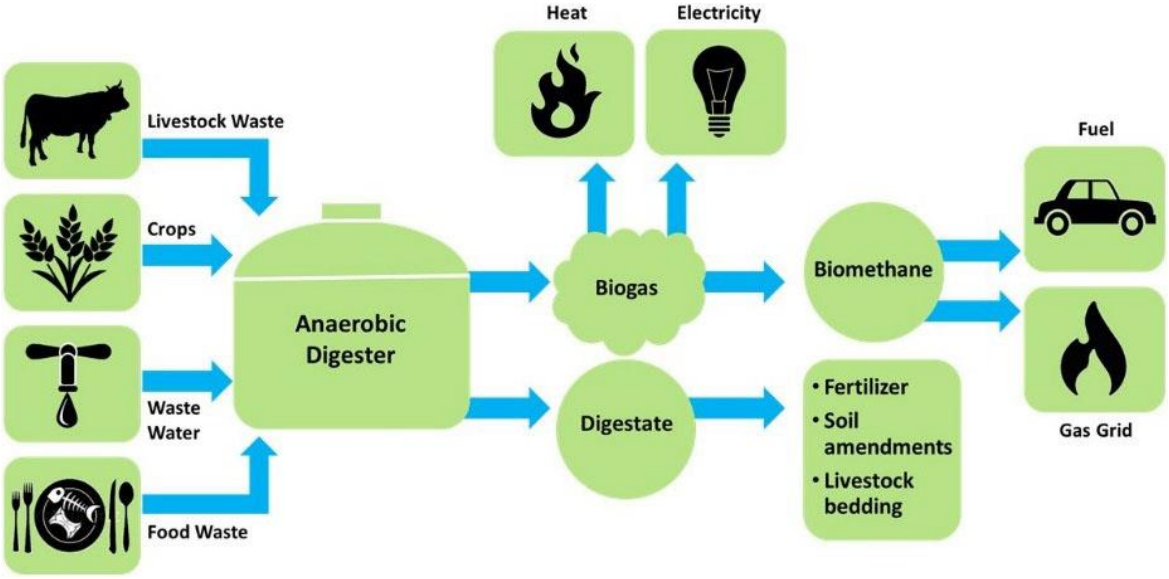
Having a customer for the gas was crucial for Boulder, says Carolyn Elam, Boulder's energy strategy program manager. The city will sell the gas at a 5% discount from the monthly energy index.

Boulder conducted two calculations. One was how much the city's carbon footprint might be trimmed. The net-savings comes to 265,000 gallons of diesel fuel per year.

The other calculation was financial. The biogas had been used to produce electricity, for use at the wastewater plant. That equipment needed to be replaced. Electricity is relatively cheap, and renewable generation has flattened cost increases. The better economics were in creating a transportation fuel.

This takes the money trail back to the Energy Policy Act of 2005 and a 2007 revision, the Energy Independence and Security Act. Congress wanted to instigate greater domestic production of transportation fuels. Keep in mind that this was before application of fracking and other techniques that have allowed the plentiful extraction of hydrocarbons from shale formations.

The most discernible outcome came quickly: a great ramping up of biofuels,



mostly from corn. In Colorado, 32% of corn goes to ethanol plants, the most prominent source being a plant near Yuma.

In its energy legislation, Congress created the Renewable Fuels Standard Program. To implement the intent, the Environmental Protection Agency created the RIN credits, which can be sold to refiners such as Suncor, which is located north of downtown Denver, to satisfy their requirements of meeting the federal obligations to have a percentage of produced fuel from renewable sources. The financial device is called the renewable identification number, or RIN, which operates much like a renewable energy credit, or REC.

These credits come into play at Boulder's program and also the other three biogas projects in Colorado.

Grand Junction was the first city in the nation to create a transportation fuel from its biogas. Before, nearly all the biogas was flared. Around 2006 city employees began asking themselves whether there was a more productive way to avoid the problem of emitting dangerous gases into the atmosphere.

Flaring biogas eliminates methane but produces carbon dioxide. Both are greenhouse gases, but methane has 84 times as much heat-trapping potential in the first 20 years than does carbon dioxide. But then disintegrates, while C02 very slowly breaks down over hundreds, even thousands of years.

"We were wasting a valuable resource," says Kurt Carson, wastewater services manager for Grand Junction.

The thought process included some consideration of the environmental impacts of flaring. Those impacts, if important, can't be monetized. In fact, creating the ability to produce compressed natural gas to power 62 vehicles for Grand Junction has resulted in the reduction of 3 million pounds of carbon dioxide per year. The net effect is to produce the equivalent of 400 gallons of gasoline.

"Each utility will have different financial drivers. For us, the RINs are an important aspect, I couldn't say whether they would make or break the project, but they are a significant factor on the economic return on investment," says Carson.

With aid of the RIN credits and the reduced need for diesel fuel, the return-on-investment of the new infrastructure was reduced to eight years.

Carson also notes that the size of the project influences its feasibility. His district serves a population of 85,000 to 90,000 people.

Two projects along the Front Range went on line last fall.

Longmont also tapped biogas to create what it calls renewable natural gas. Of the city's 21 diesel-powered garbage trucks, 11 can burn the fuel. The remaining are expected to be replaced in 2024,

The city's website lays out the finances: Assuming diesel fuel of $3 per gallon, the city saves $270,000 in fuel costs. The RIN credits produce $150,000 to $250,000 per year. The conversion project completed in 2019 got a $1 million grant from the Colorado Department of Local Affairs.

Colorado's biggest biogas conversion project lies near the intersection of Santa Fe Drive and Dartmouth in southwestern metropolitan Denver. There, the South Platte Renewal Partners treated sewage from 300,000 people in Englewood, Littleton and 19 other, smaller districts. It's the third-largest wastewater treatment facility in Colorado.

Unlike other biogas conversions in Colorado, however, South Platte Renewal Partners produces natural gas that is injected into Xcel Energy pipelines for use in buildings and other purposes. The facility produces about 500,000 cubic feet a day.

Anna Schroeder, an engineer at the wastewater plant, says the district lacked a partner, such as the three municipalities have, for the compressed natural gas. But the payback on this still looks good – perhaps even better than some others: 4 to 6 years, she reported in a telephone conversation. The credits for the renewable fuels standard program were a "big driver."

In the conversion, South Platte had to merge the specialists of "two different worlds, the gas world and the water world," she says.

"There was an initial barrier, where people were more comfortable working within their own sector, to overcome." Once the barriers were overcome and the ground rules established, "it worked pretty well," she says.

Becky Luna, a consultant with Corrola Engineering, says the economics work out best at larger plants. Longmont is relatively small, though, and found a way to make it work, she observed.

RIN payments are crucial to the districts, if finances matter—as they always seem to. Reduction of greenhouse gas emissions is also driver among some districts.

In addition to the four existing biogas conversions in Colorado, two more are being studied. This puts Colorado roughly equal with California in the adoption of this technology and well ahead of surrounding states.

More yet may come if Colorado ultimately adopts a renewable fuels standard. Senate Bill 20-150, which was introduced by Sen. Chris Hansen, D-Denver, would have required Public Service Co. of Colorado, a subsidiary of Xcel Energy, to use 5% renewable natural gas by 2025 and 15% within a decade. The proposal would also required the state's Public Utilities Commission to develop renewable natural gas programs for smaller utilities and require municipal utilities to report emissions from natural gas.

The bill was shelved in the rushed session in May after legislators returned from an extended covid-caused recess.

Hansen says he plans to reintroduce the bill next winter. If it gets adopted, says Luna, it would have result in more and also smaller plants converting. It would also encourage more landfill operators to tap the methane, as Fort Collins and several others already do, instead of flaring the gas.

Bye Aerospace closes $10 million in funding for eFlyer prototypes

Bye Aerospace has received $10 million in funding, the first half from a venture capital group earlier this year followed by a $5 million venture raise.

George E. Bye, chief executive of Bye Aerospace, said the investments have allowed his company to begin work on "Serial #001," the first production-conforming prototype of its two-seat eFlyer 2 aircraft.

The company is based in Englewood, in Denver's South Metro area.

Bye set out more than a decade ago to figure out how to create electric plane that meet market needs of five-fold lower operating costs, zero emissions, and decreased noise.

Bye Aerospace is developing the FAA FAR 23-certified family of all-electric eFlyer general aviation aircraft, starting with the two-seat eFlyer 2, for professional flight training missions and the eFlyer 4 for air-taxi and advanced training uses. The company estimates the eFlyer will eliminate the release of five million metric tons of CO_2 each year for flight training alone.

More questions about whether Colorado can hit emissions targets

by Allen Best

A subtle tension was evident in a subcommittee meeting of the Air Quality Control Commission on July 16. The subcommittee spent an afternoon hearing from state agencies and others about strategies for achieving emissions from the transportation and building sectors needed to meet state carbon reduction goals.

Two days before, Colorado had announced it was part of an agreement among 15 states and the District of Columbia to develop a broad set of strategies for heavy-duty vehicles.

For this, Colorado and the other states are hitching their wagons to California, but trying to use the bulk of numbers to achieve deep market penetration, 100% by mid-century.

A Boston-based group, NESCAUM, says trucks and buses account for only 4% of vehicles on the road but produce nearly 25% of total transportation sector greenhouse gas emissions. Trucks are the fastest growing source of emissions.

In Colorado, as coal plants begin closing and lingering ones get used less, transportation has become the largest source of air pollution. And, if the effects of covid-19 linger, suppressing in-person shopping in favor of deliveries by Amazon and others, it will be "critical that we development a thoughtful and balanced approach," to use the words of a press release from three Colorado state agencies.

Will Toor, director of the Colorado Energy Office, told air commission members that there was a broader strategy, including an effort to replace older and more polluting diesel vehicles. He described an effort to work with stakeholders and perhaps ultimately the Legislature to create the necessary infrastructure that "could have a big impact in the short term."

Is this enough? Or does there need to be something more, a broader strategy to disincentivize pollution while also delivering revenue to Colorado's efforts to decarbonize?

Travis Madsen, who took over transportation program at the Southwestern Energy Efficiency Program from Toor when

Toor joined the Polis administration in 2017, made the case for a low-carbon fuel standard.

"First, we should increase the cost of polluting," he said. That, he added, would increase the advantage of climate friendly options but also generate revenue necessary to accelerate the transition.

The plan that would limit on carbon dioxide emissions from transportation wold require fuel distributors to get permits, so the tax is applied at the wholesale level. The permits would be limited to allow the state to hit a 40% reduction by 2030.The state's goal for 2030 is a 50% economy wide reduction.

This could be done, Madsen said, without violating the Tabor limits on tax revenue. California conducts its programs with a market-based program of credits. This could be put in place as early as 2022-23, he said, causing the gradual replacement of fleets to lower-emission vehicles.

John Putnam, who directs environmental programs for the Colorado Department of Public Health & Environment, responded that the earlier the start, the greater the cumulative benefits, "because it takes a lot of time for the polices to manifest them. You won't see immediate large reductions, but you will over time, especially as you get out to 2030 and beyond."

A study about the low-carbon fuel standard for the Colorado Energy Office iss expected to be completed next week.

Putnam said he believes the air commission has the legal authority, especially given the specific delegation of authority under SB 1361. "The bigger challenge will be the resources to develop what would be a very complicated rule-making, especially the consequences of missing those rules," he said.

"I think it's an interesting concept and one worth exploring, but it's one I don't think we can do without involvement from the Legislature."

Toor also suggested some "real world constraints." He described it as "very complicated and divisive approach to generating revenue." He said he supports a more "straight-forward approach" to revenue whether it's the need for hydrogen infrastructure or incentives for the state to switch to zero-emissions trucks.

Aug 12 session about roadmap

Colorado agencies plan a Zoom conversation about the Governor's Greenhouse Gas Pollution Roadmap on Aug. 12th at 6-8:30 p.m. State staff will provide a brief overview and will take questions and feedback. Comments to: climatechange@state.co.us or at the Colorado Energy Office website.

The subcommittee also took on how the state can move ahead more briskly to lessen emissions from buildings. Toor described several bills that didn't make it through the covid-disrupted legislative session this year that would have sought to reduce emissions. Among them was a bill for benchmarking of new buildings starting at 50,000 square feet. This falls under the heading of performance standards, one that the air commission can move forward on with its rule-making authority.

It was a long session, and Putnam at one point admitted to many small reductions that the state agency hope will yield the numbers. Representatives of several environmental groups I spoke with afterward were unpersuaded.

"It's clear they have a lot of reasons each of these policies won't work and the policies that are left on the table don't add up to the emission reductions we need," said Stacy Tellinghuisen, of Western Resource Advocates

I'll write about this much more deeply in a future issue.

Heading toward a showdown about role of 'renewable natural gas'

by Allen Best

Several years ago, a speaker at the Colorado Oil and Gas Association annual conference became exuberant. At the time, natural gas was hailed as a bridge fuel, one that burned cleaner than coal. That simple fact had produced a tenuous alliance between environmental groups and drillers, who both saw advantages in dismantling coal, with Democratic governors Bill Ritter and John Hickenlooper enjoying support in both camps.

Enough talk about natural gas as a bridge, the speaker at the Denver conference exclaimed. It was the future.

Now, that future is being challenged as renewables, not natural gas, fill the void created in the retreat of coal. And, with climate scientists issuing throat-clearing warnings about the grave risk if emissions are not tamed rapidly, environmental advocates have turned their attention to gas. The bridge, they say, has been crossed.

This new tension has flared prominently in California, where scores of jurisdictions last year banned natural gas in new buildings. None have done so in Colorado—yet. But the Colorado oil and gas industry has taken hurrying to get a ballot measure that would preclude local bans of natural gas.

A new report from the Sierra Club and its legal arm, EarthJustice, warns against the dangers of what's being called renewable natural gas. Better, says the report, "Rhetoric vs. Reality: The Myth of 'Renewable Natural Gas' for Building Decarbonization," is to electrify new homes.

Sierra Club report urges caution even as gas industry pushes for ballot initiative in Colorado to ward off local bans of natural gas such as have occurred elsewhere

The fundamental problem is the tendency of methane, the primary constituent of natural gas, to leak. Methane is far more potent in the shorter term than carbon dioxide. The report cites research published in the journal Science in 2018 that found the leakage rate in the U.S. gas supply chain equaled 2.3% of U.S. gross gas production, 60% higher than the EPA's official estimate.

The Sierra Club is particularly worried about the rise of what it calls fossil gas alternatives, including what some companies are calling RNG, or renewable natural gas. RNG can include biogas, such as comes from wastewater treatment plant, landfills and livestock operations, or—using thermal

gasification – forest and agriculture residues. There's also synthetic gas, in which electricity is turned into hydrogen and then synthetic methane.

Of these, the only one that meets the smell test, so to speak, is biogas, as it would otherwise be emitted into the atmosphere. But the study estimates that only enough methane from landfills, wastewater treatment plants, and similar sources could be captured to meet less than 1% of current gas demand.

"The rest must be intentionally produced and will pose the risk of additional methane leakage that can offset any potential emission reductions."

> "If passed, local and state governments could not enact any laws banning natural gas usage in new construction."
>
> **Protect Colorado**
> ***On Initiative 284***

The Sierra Club report says these fossil gas alternatives have roles, but very limited ones, such as for delivering high industrial heat for steel production or powering air or marine transportation.

"Biogas and synthetic gas as well as other renewable liquid fuels, have several advantages over electricity. Though costly, limited and inefficient to produce, they are energy dense, can be stored and transported more readily than electricity, and work with existing infrastructure that must rely on combustion," the report says.

"In optimizing their use, the advantages of renewable fuels (e.g. flexible, combustible, dispatchable) should be weighed against their disadvantages (cost, leakage, limited supply) and the availability of alternatives such as electrification and demand management. Because heat pumps and electric vehicles offer super efficiency and eliminate end-use air pollution, direct use of electricity should be used to the maximum extent feasible in buildings and transport."

Building electrification is not the same as that which occurred in the 1970s. With the aid of efficient air-source heat pumps, which can extract heat from the outside air, and better understanding of circulation, natural gas is being eliminated from some buildings. Geos neighborhood in Arvada, Colo., is one such project, and Basalt Vista in Basalt, Colo., another. Boulder and Boulder County are using a program called Comfort 365 to encourage fuel and technology switching.

Those are voluntary. Now come bans of new natural gas infrastructure. In July 2019, Berkeley, Calif., adopted the first ban in the country on natural gas in new buildings. By February, when the New York Times took note of the trend, 22 other California cities and counties had also adopted similar bans, as had several jurisdictions across the country.

None have in Colorado, although a climate change task force report to Denver's elected officials issued last week calls for building electrification when natural gas infrastructure fails but also net-zero homes and buildings being part of all new buildings in the 2027 base building code.

In California, battle lines have been drawn. The Los Angeles Times in October 2019 reported that Southern California Gas Co., which has 22 million customers in California, had already started working to convince local officials that policies aimed at replacing gas with electricity would be wildly unpopular. Called SoCalGas, the company had already released a strategy paper that calls for the company to replace 20% of the fossil gas in the company's pipelines with renewable gas by 2030 and later add large amounts of hydrogen and other non-fossil fuels. It makes its case on this web page.

Maximilian Auffhammer, an environmental economist at UC Berkeley, compared SoCalGas' dilemma to that of a

company selling hay to feed horses at a moment in time when horse-drawn carriages were being replaced by cars. Electrification, he said, poses a similarly existential threat to gas utilities.

Colorado looks to be hurrying toward a similar battle over public minds. In a July 6 posting, S&P Global Platts reported that a group backed by the Colorado oil and gas industry is pursuing a ballot initiative meant to prevent local governments from banning the use of natural gas in new residential and commercial developments. The ballot initiative must get signatures from 142,632 registered voters by Aug. 3 to qualify for Colorado's election ballot in October.

Protect Colorado bundles the ballot initiative as a message for consumer choice.

"Initiative 284 prevents governments from removing your consumer choice when it comes to what energy is used in homes and businesses for cooking, heating homes and water, and generators," it says on its website. "If passed, local and state governments could not enact any laws banning natural gas usage in new construction."

The measure has already received support from the dominant newspaper in Colorado Springs, the Gazette. "Stop the fringe from prohibiting natural gas."

But the majority of the Colorado Legislature in 2019 adopted laws calling for rapid decarbonization of Colorado's economy. The first target of 26% by 2025 can be met by closing coal plants and some other measures. Much harder will be the 50% reduction by 2050. For that, decisive steps will be required in the built environment. This is even more true of the 2050 deadline of 90% reduction.

This story was posted to the Mountain Town News website on July 14.

A smidge more about future of Comanche 3

My story about the woes of Comanche 3—and the tentative decision by the Colorado PUC to conduct an investigatory docket in regard to its future operations—was published in the Vail Daily on July 20, in the Summit Daily News on July 21.

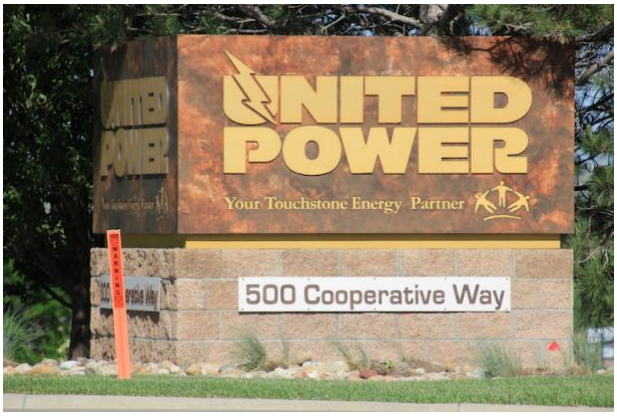
The same story – slightly updated from what was in Big Pivots in May—may be published in several other newspapers.

The most significant update to the story is the confirmed by Xcel Energy that Comanche 3 has been down since early in 2020 and is now expected to resume production of electricity in early autumn.

Meanwhile, the PUC commissioners last week—after the story was submitted to the newspapers—issued a decision in regard the Xcel Energy rate increase request. The written decision hews very closely to oral comments in May in regard to Comanche 3. The PUC commissioners say Xcel is a swell company, but it has some answering to do.

The decision in proceeding 19AL-0268E can be found on the PUC website using this link.

United Power exit fee would be $235 million per preferred formula



by Allen Best

United Power would pay $234.8 million to leave Tri-State Generation & Transmission under a methodology recommended by an administrative law judge to the Colorado Public Utilities Commission.

Using a somewhat similar methodology, Durango-based La Plata Electric would pay a trifle less than $97 million.

United Power is by far the largest member co-operative of Tri-State, with about 93,000 members in Denver's northern suburbs and exurbs and roughly a 15% share of electrical demand. La Plata is the third largest.

Both electrical co-operatives asked Tri-State for what it would cost them to leave short of their contracts, which expire in 2050. They could not agree on what constitutes a fair and just fee, and the two co-ops then appealed to the Public Utilities Commission to arbitrate. The PUC commissioners referred the case to administrative law judge Robert Garvey, who took testimony for nearly a week in May.

In his decision filed on Friday, July 10, Garvey ruled that the methodology recommended by United Power's expert witness, Sandra Ringelstetter Ennis, a consultant with more than 30 years of experience in the electricity industry would provide members of Tri-State a "just, reasonable and non-discriminatory exit charge."

See: 2020-07-10 PUC ALJ Recommended Decision

Key elements are the indebtedness of Tri-State, including the money it owes on coal and gas plants, but also solar and wind farms, minus something called "patronage capital," or what the individual co-ops own of those assets. Subtracting the patronage capital from that member's share of indebtedness would yield a figure that would leave Tri-State in a position had the member never joined, Garvey said.

But most important, he added, this methodology results in exit charges that are comparable to the exit charges paid by Kit Carson Electrical Cooperative and Delta-Montrose Electric Association.

"There is no better evidence of what an exit charge from Tri-State is than the agreed-upon exit charge for two former Tri-State members," Garvey wrote. "The Tri-State Board determined that these charges made it members whole and were just and reasonable. There is no other evidence that is nearly as helpful in determining a just and reasonable exit charge rate."

Kit Carson, a much smaller cooperative based in Taos, N.M., which has fewer customers and hence less demand, left Tri-State in 2016 after paying an exit fee of $37 million. Details of the exit agreement with Delta-Montrose were more complicated, but the bottom-line figure in Garvey's ruling was $62.5 million.

In other words, the judge had two exit fees to study, creating a pattern. The number yielded by the methodology recommended by United's expert witness lined up with those two previous cases.

Tri-State, in a press release several hours after the Garvey decision was filed, provided

numbers that argued that the buy-out was far below what would be appropriate. The most important number cited by Tri-State is that United Power's share of the wholesaler's outstanding debt and other obligations is approximately $762 million.

in a statement, United Power said that Tri-State tried to block United Power from leaving by proposing a charge of $1.25 billion. In a statement in response to the Garvey ruling, United called that that figure a 'discriminatory amount that would have resulted in an unfair windfall to Tri-State's remaining members."

The PUC commissioners will have the final decision. However, Tri-State had also filed with the Federal Energy Regulatory Commission, arguing that that agency should have jurisdiction, not the state, because Tri-State operates in four states and not just Colorado. As such, it should have one decision-making body for exit fees.

Even if the Colorado PUC commissioners accept Garvey's recommendation and FERC does not get involved, it's not certain the two co-ops will be leaving Tri State. Dean Hubbuck, chief energy resource officer for United, said in an interview that the exit fee is one piece of information needed as United evaluates its options going forward. While he and other senior staff members can make recommendations based on studies, the financial decision of whether United leaves Tri-State will be made by elected directors. But it's still early in the process, he said.

The broader issue may be whether Tri-State, because of its size, and organizational structure, can meet the needs of a diverse membership amid the great fluidity of the changing energy landscape. The wholesale cooperative, No. 2 to Xcel Energy among Colorado utilities, has been changing rapidly after a time of stagnation.

The outstanding question as two of Tri-State's three largest members consider their options is whether it's capable of moving rapidly enough.

"Access to today's energy marketplace requires a utility to be nimble and responsive to both the energy mix and the cost of the members at the end of the line," said Hubbuck.

In an interview, he explained that Tri-State has a challenge in both its geographic diversity and the diversity of its member's sizes and profiles. United is a giant and on the edge of a metropolitan area with 93,000 members while some cooperatives have just a few thousand.

"What satisfies one may not satisfy the other, and the utility industry is changing quickly," he explained. With our proximity to the Denver metro area we are seeing change fairly routinely, and we need to be able to keep up with that." One example, he said, is the adoption of electric vehicles. Smaller and more rural member cooperatives may not see the same EV adoption rates for another decade.

The diversities among its members, he said, "make it very difficult for somebody like Tri-State to keep up with those changes," he said.

Tri-State was created in 1952 by several co-operatives to transmit power from the federal dams. Over time, its mission broadened. When the hydropower contracts fell short of meeting demand, it added generation. One major growth was the addition of the assets and members of Colorado Ute in the early 1990s. Assets included the coal-generating plants in Craig.

That model of large, central fossil-fuel power stations has come under assault in the last 10 to 15 years with the arrival of more dispersed and renewable generation assets. La Plata believes it can develop solar resources extensively in its service territory of southwestern Colorado much as Kit Carson has been doing in New Mexico and which is planned for Delta-Montrose.

This story was posted to the Mountain Town News website on July 11.

A hurrah in Colorado for FERC decision about net-metering

There was a hip-hip-hurray or two in Colorado last week after the Federal Energy Regulatory Commission ruled unanimously to uphold existing policies governing net metering. The decision was seen as important for the solar industry.

Will Toor, executive director of the Colorado Energy Office, called net-metering a "crucial tool for meeting the greenhouse gas pollution goals set last year by the Legislature and signed into law by Gov. Polis."

A secretive group called the New England Ratepayers Association had asked FERC to set federal policy for net-metering, taking it away from the states.

In Colorado, net metering was approved by voters in a 2004 initiative adopting a renewable energy standard, or RPS, of 10% on the state's two investor-owned utilities.

Toor said that had FERC favored the group's position, it would have harmed the low-income solar program sponsored by the Colorado Energy Office.

Forbes explained that net-metering began 40 years ago in the United States as a way to compensate small-scale wind and solar owners.

"Since solar panels only generate power when the sun shines, a consumer may end up producing too much electricity during the middle of day and too little in the evenings and at night. Net-metering solve this problem by paying the consumer retail rates for their excess electricity during one portion of the day to offset the costs of power when the sun isn't shining."

Last September, in Pueblo, a solar farm on the Evraz steel mill property was announced in what had been described as the largest net-metering solar facility. Evraz wants to call itself 100% solar powered, but that claim can only be validated through the artifice of net metering.

(I have been unable to confirm that the solar deal, for all the fuss that went into this announcement, is going forward. Sen. Cory Gardner and Gov. Jared Polis sat side by side in chairs assembled on the asphalt parking lot, along with Alice Jackson from Xcel, Pueblo Mayor Nick Gradisar, and others).

Forbes said that utilities have fought net-metering because it costs them money. "When a solar customer is paid retail rates for their excess electricity production, the utility is paying a significant premium above the wholesale power rates it pays to commercial producers."

The second decision by FERC revised rules governing application of the Public Utility Regulatory Policies Act, a 1978 law mean to promote the adoption of small-scale, independent wind and solar projects.

E&E described it as a party-line vote, with the 3 Republicans on FERC supporting the shift and the one Democrat dissenting. Advocates of renewable energy said it will be disastrous for renewable deployment in vertical integrated electricity markets.

The PURPA case was the central focus of a story in Big Pivots No. 14 (July 9 issue). See: Solar more expensive than necessary? The story featured an interview with Michael Milligan, formerly of the National Renewable Energy Laboratory.

Richard Glick, the Democrat on FERC who dissented, issued a lengthy statement that said he believes it is not the role of the FERC to determine whether a statue has outlived its usefulness. He acknowledged questions, but quoted testimony that "resolving these sorts of questions by regulatory edict rather than congressional legislation is neither a durable nor desirable approach for developing energy policy."

Closer but still no cigar for Denver Water in Gross Reservoir expansion

by Allen Best

Denver Water has been awarded its final federal permit for expansion of Gross Reservoir but may still need a permit from Boulder County.

A permit from the Federal Energy Regulatory Commission announced today wraps up all the federal permitting needed to raise the existing 340-foot-tall Gross Dam across South Boulder Creek by 131 feet.

The dam has a hydro plant with a capacity of producing up to 7.6 megawatts.

But the most difficult permit may be the one that it still lacks: a 1041 permit from Boulder County. The Boulder Daily Camera explains that a district court decision affirmed the county's authority to review the project under a 1973 law. That law, commonly known by its legislative bill title, gives local governments land use authority to review major projects by other governments.

Eagle County used that same authority in 1991 to deny a permit sought by Aurora and Colorado Springs to conduct a major water diversion project from within the Holy Cross Wilderness Area near Minturn and Red Cliff. The two Front Range cities fought the denial but lost and ultimately participated in a collaborative process designed to produce a more acceptable solution. That process is ongoing, with many opposed to the lighter, gentler approach. But by any measure, the current proposal in the Homestake Valley would have much less impact upon the wilderness area.

This case of Gross Dam is different in that the water being diverted only passes through Boulder County. The water would come from Grand County via the Moffat Tunnel. The county itself signed off on the expansion after a lengthy collaborative process that was in many ways modeled after what was created in the wake of the Homestake II denial.

Denver Water in this case committed to a collaborative process called Learning by Doing. The intent is to allow Denver to use its water rights in the Fraser Valley and also

in the adjoining Williams Fork Valley but in ways that avoid the harshest of impacts.

The process earned Denver the support of Trout Unlimited, and also some fierce Denver critics such as Kirk Klancke, a Fraser Valley resident.

Some Fraser Valley residents continue to oppose the project. "We don't have any more water to send to Denver," says Andy Miller, a Fraser town trustee, as elected members of the governing council are known. "With the water that is being diverted now, we are barely keeping the system alive."

Miller said additional diversions would mean that at times the only water in the Fraser River will be the releases from the wastewater treatment plants in Winter Park and Fraser. "That's not enough," says Miller, who is also a member of the Upper Colorado River Watershed Group.

Denver began pursuing the expansion of the dam after the drought of 2002 exposed the vulnerability of water delivery to Arvada and other suburbs in the northwest metropolitan area that contract with Denver Water for supplies. The next year, Denver began the federal environmental permitting process. Denver already received approvals from the Colorado Department of Public Health and Environment and the U.S. Army Corps of Engineers in 2016 and 2017.

Colorado's largest water provider, Denver Water provides water not just for the city's residents but a broad swath of the metropolitan area, a quarter of the state's 5.8 million residents.

In a statement, Jim Lochhead, the chief executive of Denver Water, said the FERC permit—it's technically called an order—brings a comprehensive 17-year federal and state permitting process to a close.

Lochhead also characterized the project as a necessary given the increasing weather variability in a warming climate.

"The project provides the system balance, additional storage and resiliency needed for our existing customers as well as a growing population. We are seeing extreme climate variability and that means we need more options to safeguard a reliable water supply for 1.5 million people in Denver Water's service area," he said.

John Stulp says that farmers a solution, not the problem, in global warming

It was probably no accident that former Colorado Gov. John Hickenlooper chose John Stulp to be his "water czar" for 8 years.

He's genial, has a dry wit, and despite being a life-long farmer, could not be accused of having a horse in Colorado's so-called water wars. His farm south of Lamar is dryland, dependent upon what falls from the sky.

Raised in Yuma, Stulp began farming 50 years ago south of Lamar, and there's no doubt the climate has changed, he said in a webinar sponsored by the Colorado Renewable Energy Society.

John Stulp

"There is no question in my mind about climate change," he said. "It's happening and it seems to be accelerating." For example, he said, more corn and soybeans are being grown in the Dakotas than ever before. As for his part of Colorado, droughts have deepened and lengthened and overall precipitation declined.

It has dried out sufficiently in southeastern Colorado, he said, to the point that road runners now think they're home when in Prowers County.

As for the cause of this warming, Stulp talked like the commissioner of agriculture that he was in the administration of Gov. Bill Ritter. “I sometimes think livestock gets a bad rap,” he said. He was talking about cows belching and farting, which is not an inconsiderable amount when you consider that there are twice as many cows in Weld County as there are people.

“Because agriculture is just 2.5% of the population, sometimes I feel we’re getting picked on.”

Rather than the cows, he tends to think people have a problem with food waste. In 2018, solid waste landfills were the third largest source of human-related methane emissions, 17%. Americans annually toss more than 200 pounds of useable food per person, the highest rate of any wealthy country.

But again, Stulp defends agriculture, taking great pride in the advances that have allowed milk production to increase even as the carbon footprint decreases and overall productivity to have gained enormously.

Colorado’s state government has begun to grapple with the emissions from the various sectors. Representatives of the Colorado Department of Public Health and Environment admit that they struggle a bit to get strong numbers they can defend from the agriculture sector. County emissions from a few dozen smokestacks is far more easily done than from the millions of acres of land.

In any event, Stulp hopes to see the effort to drive down emissions being an opportunity for agriculture. Through incentives, more can be done to promote rotational grazing, no-till and other techniques to sequester carbon.

By the way, do you want to send this issue of Big Pivots to somebody – with a reminder they can subscribe for free by going to: Bigpivots.com

Carbondale has public faster-charger for EVs

CARBONDALE, Colo. — Carbondale now has a Level 3 DC fast charger located just off Highway 82, between two hotels. It is capable of charging most EVs to 80% capacity in 20 to 30 minutes.

In a little less than two months, the charging station was used 20 times, but Kevin Schorzman, public works director for Carbondale, said he expects use to increase as people become aware of the station. The cost is $0.14 per kWh for charging.

Holy Cross Energy, the electrical cooperative, covered the cost of the transformer upgrade. In a recent survey, 40% of HCE members indicated they wanted to see more electric vehicle charging stations in HCE’s service territory.

A press release noted that EV sales in Colorado have steadily grown at 28% year over year since 2012, putting Colorado on pace with the state’s goal of 12% of the total population owning EVs by 2030.