

BIG PIVOTS

ENERGY and WATER transitions in Colorado and beyond

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Colorado's attempt to rectify wrongs of the past in the new energy systems

by Allen Best

Now comes the part where the rhetoric about a just transition of the energy economy — paying special attention to disproportionately impacted communities and rectifying past wrongs with the word “equity” in mind — gets tested in the field.

In late July and early August, the three members of the Colorado Public Utilities Commission will take turns hosting six meetings from Lamar to Grand Junction, places selectively chosen because of evidence of disproportionate impacts from energy.

The meetings serve a dual purpose. The commissioners are gathering thoughts about how the state's four regulated gas-distribution utilities will start changing how we heat buildings and water in order to reduce emissions. They are required to submit what are called clean-heat plans.

The four gas utilities —Xcel Energy, Black Hills Energy, Atmos Energy, and

Colorado Natural Gas — must show how they will be able to reduce greenhouse gas emissions 4% by 2025 and 22% by 2030, based on a 2015 baseline.

But the commissioners are also very deliberately meeting in cities that have been identified by mapping tools as having, or being proximate to, disproportionately impacted communities.

Get accustomed to hearing that phrase, now used so often it has been reduced to an acronym in many documents: DIC. Among other things, the commissioners want to better understand how to define equity (as distinct from equality) and what constitutes a DIC community.

It's an early milestone in Colorado's difficult and still new process, one parallel to others underway in several states around the country.

Pushing their investigation are five laws passed by Colorado legislators in 2021 that

collectively seek to put the hands of those communities on the steering wheel in ways that they have not before.

[SB 21-272](#), “Modernize the Public Utilities Commission,” tells the PUC that it must adopt rules that “consider how best to provide equity, minimize impacts, and prioritize benefits to disproportionately impacted communities and address historical inequalities.”

What are disproportionately impacted communities? This law provides a glimpse:

Environmental justice and natural gas rules in six coming meetings from Grand Junction to Lamar

“Certain communities, both in Colorado and internationally, have historically been forced to bear a disproportionate burden of adverse human health or environmental effects, as documented in numerous studies, while also facing systemic exclusion from environmental decision-making processes and enjoying fewer environmental benefits,” says [SB21-272](#).

The law cites a 2021 report from the Goldman School of Public Policy at the University of California, Berkeley. The project, called [Mapping for Environmental Justice](#), attempted to paint a holistic picture of intersecting environmental, social, and health impacts in individual states, including Colorado.

The study found that “communities of color breathe nearly twice as much diesel pollution and are 1.5 times more likely to live near a Superfund site than white communities. The disparity holds across an array of environmental hazards: from wastewater releases to air toxins, Coloradoans of color are consistently exposed to more pollution.”

This same law, SB 21-272, instructs the PUC to “identify disproportionately impacted communities” and host meetings and in other ways invite input from them to ensure that they will have at least

proportionate access to the benefits of retail customer programs, incentives and investments.”

The PUC must go through a rule-making process that governs how the PUC reviews plans by utilities —including not just energy utilities, but also transportation and other sectors it regulates.

The goal is to deliver equity – which will be defined later – in programs and incentives that serve low-income customers and disproportionately impacted communities.

The second law of relevance, [SB 21-264](#), the “Clean Heat Bill,” requires Colorado’s four natural gas utilities to start figuring out how to reduce fossil fuel combustion from buildings. It gives the largest gas utilities, including Xcel, various ways to achieve a 22% reduction in emissions by 2030. They can, for example, help customers convert to electricity through use of air-source heat pumps. Utilities are required to submit clean-heat plans.

This clean-heat bill also has an environmental justice component. That law also calls out the “historic injustices that impact lower-income Coloradans and black, indigenous, and other people of color who have borne a disproportionate share of environmental risks while also enjoying fewer environmental benefits.”

As the PUC goes about creating the rules for evaluating clean-heat plans, it must hold at least two meetings in disproportionately impacted communities.

In planning six meetings, not just two, the PUC obviously aims for a robust compliance with the letter of the law. The PUC has gone a step beyond, and we’ll explain that later in this article.

Yet a third law, [HB 21-1266](#), called the “Environmental Justice Act,” takes direct aim and, unlike the others, delivers more explicit instructions for the Air Quality Control Commission – an agency within the

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state’s health department – to engage with disproportionately impacted communities.

The law incorporates demographic factors but delegated to a new Environmental Justice Action Task Force the work of defining what exactly constitutes a disproportionately impacted community. The law also added transition to a more equitable clean energy economy to the mission of the Colorado Energy Office.

Two more laws deserve mention.

[SB 21-246](#), Promote Beneficial Electrification, requires investor-owned utilities to file plans with the PUC that must include “programs targeted to low-income housing or disproportionately impacted communities with at least 20% of the total beneficial electrification program funding” directed to those communities and income levels.

[HB21-1105](#) modified the eligibility standards for low-income programs

Why did all of this come together in 2021?

Ean Tafoya, of GreenLatinos, who is co-chair of the new task force, says the thinking had been growing for years of the need to “redress” inequities.

In 2019, the first year that Democrats gained a majority in both chambers, as well as the governor’s mansion, the legislators who might have carried the bills were too new to the General Assembly to be effective.

Then came the killing of George Floyd by a Minneapolis police officer in 2020, spurring national protests, including in Denver. This was just months after the covid pandemic descended, hitting minority populations harder.

Those things “helped to galvanize the creation of a more formidable environmental justice coalition,” says Tafoya. This pressure seems to have created “more political room for the politicians to move forward.”

Tafoya also says that this powerful new environmental justice coalition wouldn’t settle for legislation that in early drafts didn’t initially include equity provisions.

In this, he refers to major bills driven by Sen. Chris Hansen of Denver and two Boulder County legislators, Sen. Steve Fenberg and Rep. Tracey Bernett, as well as Rep. Alex Valdez and Rep. Meg Froehlich.

A bill that started out as SB 200 was recreated in SB 1266 with Faith Winter as a primary author. She did not respond to several requests for an interview.



Ean Tafoya

The Environmental Justice Act is sweeping. It requires the Air Quality Control Commission to adopt rules to reduce greenhouse gas emissions from oil and gas operations. It also requires that commission to adopt rules to reduce emissions from the industrial and manufacturing sector in Colorado by at least 20% by 2030 relative to 2015 levels.

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Environmental justice, though, is front and center in the law. It requires the Air Quality Control Commission to promote outreach to disproportionately impacted communities by creating new ways to gather input from communities across Colorado, using multiple languages and multiple formats.

The law also created the task force of which Tafoya is a member with the responsibility to make recommendations to legislators of “practical means to address environmental justice inequities” by Nov. 14.

That task force has met four times beginning in December, and it also has five subcommittees that meet monthly.

Pueblo’s Jamie Valdez, who is also on the task force, describes it as a “very difficult process.” But the goal is to avoid compromising as has occurred in the past.

Members have received much testimony “that there has not been enough consideration or responsiveness to community and too much to industry,” he says.

The table has been tilted heavily to a discussion between industry and regulators, to the exclusion of others, says Valdez, who is paid staff and a community organizer for southern Colorado on behalf of Mothers Outfront, a mothers-funded environmental justice organization whose mission is to work for a livable climate for all children.

The Colorado Public Utilities Commission has also been moving along. The commission held a workshop in February to get insights from participants about how to implement the environmental justice component of HB21-264, the law that requires the meetings in disproportionately impacted communities. In March, the PUC asked the states’ four natural gas utilities – Xcel, Black Hills Energy, Atmos, and Colorado Natural Gas – to identify three ideas for meeting locations.

The 5 bills:

[SB21-272](#) “Measures to Modernize the Public Utilities Commission.”

Requires PUC to identify disproportionately impacted communities (DICs) and to reach out to let them help create new rules.

[SB 21-264](#), “Clean Heat Bill.”

Requires natural gas utilities to begin decarbonizing gas distributed to buildings. Requires PUC to hold at least two meetings in DICs.

[HB 21-1266](#) “Environmental Justice Act.” Instructions specifically to Air Quality Control Commission.

[SB 21-246](#), “Promote Beneficial Electrification.” Requires 20% of program funds be used for low-income households or disproportionately impacted communities.

[HB21-1105](#), modifies eligibility standards for low-income programs.

Xcel identified Grand Junction, metro Denver, and Pueblo. Black Hills identified Montrose, Rocky Ford, and Yuma. Atmos Energy identified Greeley, Lamar, and Craig.

The utilities were advised to consult a data-rich mapping tool created by the Colorado Department of Public Health and Environment called [EnviroScreen](#). This was a result of the Environmental Justice Bill. When I first looked at this a year ago, I found it primitive. It showed the Wildridge neighborhood north of Avon and the Singletree neighborhood of Edwards to be in an environmentally impacted tract. (That all of us should be so unfortunate as to live in such areas.)

A review for this article shows a sophisticated tool, if still not complete. A tutorial explains it was created “to help identify the relative health burdens and



The Suncor Refinery in Commerce City has often been cited as an example of how polluting energy facilities have been located in poorer communities that also have higher percentages of minority populations. Photo/Allen Best

environmental risks facing different communities across Colorado.”

On June 1, the PUC hosted a session on equity initiatives. Kelly Crandell, of the PUC staff, explained the SB 21-272 requirement to promulgate rules that seek to “provide equity and minimize impacts and prioritizes benefits to disproportionately impacted communities that have experienced historical inequalities.”

During the next few months, she said, the PUC commissioners and staff will be focusing on learning things that can be used to shape these new rules, the ones being drawn up to govern how the PUC evaluates plans by utilities.

Crandell carefully distinguished between equality and equity. With the equality, the idea is to provide something to everyone equally. So, your residential rates for electricity will be the same as your neighbors’.

Equity as Crandell explained it has a historical dimension. It recognizes that

things may need to change so that others can participate, that actions of the past such as redlining must be acknowledged to properly rectify going forward.

“It’s challenging to an agency such as ours because conversations more traditionally operated in the vein of equality,” she said.

The legislation, she explained, had three dimensions: 1) recognize why certain communities have suffered, such as because of redlining practices; 2) procedural inequalities. How can the PUC make its process more accessible to the public; and 3) broadly prioritizing the benefits of new energy programs to disproportionately impacted communities.

Most interesting of these meetings may be at Montbello, located in northeastern Denver on the north side of I-70. It will use a new format of outreach.

There, community members will be paid to attend and share their thoughts.

The meeting will be led by the Denver Office of Climate Action, Sustainability and Resiliency. That municipal agency has been hosting community meetings. In this case two community-based organizations have been enlisted to put it together.

“The event will include a listening session on energy priorities within these neighborhoods in addition to a discussion about clean heat plans,” the decision notice issued by the PUC on July 6 says. The event will be presented in both English and Spanish.

Ah yes – the clean heat plans. The natural gas utilities must figure out how to reduce emissions from buildings. A small bit of this can be accomplished by augmenting supplies of methane distributed to homes for heating and cooking with what is called renewable natural gas, such as that harvested from landfills. But there are many other tools – including beneficial electrification, including the use of air source heat pumps to displace or at least augment natural gas furnaces. They’re still relatively expensive, though, with a payback that in most cases will take at least several years.

Tafoya observes that focus groups have already found that tax credits won’t work for lower-income residents. “It’s clear that people want down-payment assistance, not just tax credits.”

Colorado is far from alone in trying to look at utility decisions through the new lenses of equity. A report called [“Advancing Equity in Utility Regulation”](#) issued in

Meetings

July 21: Greeley, Greeley Recreation Center, 11:30 a.m. to 1 p.m.

July 21: Denver, Montebello Recreation Center, 5-7:30 p.m.

July 27: Grand Junction, Colorado Mesa University Center, 11:30 a.m.-1 p.m.

July 28: Montrose, Montrose Event Center, 11:30 a.m.-1 p.m.

Aug. 4: Pueblo, Bessemer Community Room at Steelworks Center for the West, 11:30 a.m.-1 p.m.

Aug. 4: Lamar Cultural Events Center, 4:30-6 p.m.

November 2021 by Berkeley National Laboratory notes an effort in California in 2020 requiring “environmental justice” to be part of the state’s mission. New York and Washington also adopted legislation in 2019, the latter state charging the utilities commission with “ensuring that all customers are benefiting from the transition to clean energy.”

In 2021, Massachusetts, Oregon, Illinois, and Maine all passed somewhat parallel legislation along with Colorado.

Also worth checking out:

Colorado Department of Public Health & Environment [Environmental Justice](#) page

Colorado Public Utilities Commission [Equity Initiatives](#) page

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United Power joins Southwest Power Pool

United Power has joined the Southwest Power Pool in preparation for when it ceases to be a member of Tri-State Generation and Transmission —United believes by May 2024.

The electrical cooperative has 105,000 members in a broad arc north of metro Denver from the foothills near Nederland to the oil fields of Weld County.

“Since United Power is leaving our current wholesale power supplier in 2024, it is important that we seek out memberships and partnerships that will help us assure a reliable power source at the lowest cost possible,” said Mark A. Gabriel, the president and chief executive of United in a press release. He said membership in the Arkansas-based Southwest Power Pool is “one of the critical pieces we wanted in place as we move toward a new energy future for our members.”

SPP aggregates generation resources, dispatching the power where it is needed. Members have an active role in determining where new transmission is built and will be able to have their interests represented directly. This, however, is the first distribution cooperative in the Western grid to be a member.

“Membership matters. Our membership in SPP means we will have a meaningful say in the strategic direction of the organization,” said Gabriel. “Members have an active role in determining how this new energy market develops and how the organization grows. We will be able to directly represent the interests of all United Power members.”

SPP has created an energy imbalance market that has drawn membership from a variety of utilities in Colorado as well as the Western Area Power Authority and utilities in Wyoming and in Utah.

Still a distinct possibility, however, is that other Colorado utilities may align with a different regional transmission organization, the California Independent System Operator, or CAISO – provided that organizations gains some independence from California legislators.

Solar trade group cites Morgan County for its adoption of codes

Like most trade groups, Colorado Solar and Storage hands out awards to those useful to its cause.

For example, this year’s awards go out to the two U.S. senators, Michael Bennet and John Hickenlooper, for lobbying to prevent the tariff on imported solar panels, and to the Laborer’s International Union for its “dedication to workforce development and collaboration with COSSA to align labor and solar.”

Also getting an award this year will be the Morgan County commissioners, who adopted new zoning amendments that govern placement of solar projects in the agricultural lands that dominate Morgan County. Continuing a theme from last year, the award also calls out Nicole Hay, a county planner, “for her collaboration with industry to identify best practices when crafting the new” land use codes.

Hay, a former surveyor, says she arrived into her position after the process had been started. “They knew renewable energy was coming, and we needed to get something in our code” to govern placement. Morgan County consulted work done previously in Kit Carson, Logan, Weld, and Pueblo counties and drew from that work elements that seemed to make the most sense for Morgan County.

There was no opposition, she says, although that could well surface once an active proposal is submitted. So far, solar companies have inquired many times, but none have submitted projects.



A celebration of a third wind farm on the ‘gangplank’

by Allen Best

Completion of the 145-megawatt Panorama Wind Farm was celebrated on Tuesday on the wind-rich but sparsely-populated uplands of geography in northern Colorado that geologists call the gangplank.

For Leeward Renewable Energy, the project developer and operator, this is the third and final project just south of Colorado’s borders with Nebraska and Wyoming. The first project, Cedar Creek, was built in 2007. Another, Mountain Breeze, followed. This third project gives Leeward 600 megawatts in the trio of projects. Now, transmission capacity has fully been allocated.

Jason Allen, the chief executive of Leeward, pointed out that Colorado has now surpassed Texas for wind generation in the company’s portfolio of 24 generating assets spread across nine states.

More is likely to follow in Colorado during the next eight to nine years. Xcel Energy alone has plans – already approved conceptually by Colorado regulators – for new wind, solar, and other assets that,

along with potentially more than 600 miles of high-voltage transmission lines, will cost \$9 to \$10 billion.

Tri-State and United Power, if it succeeds in departing Tri-State, will add more demand for cheaper but also cleaner renewables. Ditto Platte River and other utilities.

The dimensions were emphasized by State Sen. Chris Hansen.

“We will build two or three times more in the next 10 to 15 years,” said Hansen, a Democrat from Denver, of renewable generation in Colorado.

Wearing cowboy boots for the occasion, Hansen described Panorama in the context of the push for renewable energy across Colorado. He said it was a “win-win-wind” situation: Jobs, new property taxes for Weld County, and lower-cost electricity for consumers.

He also described clean energy as a bipartisan effort. He pointed out that 90% of bills that became laws in Colorado in the last session had bipartisan support.

“We should not be depressed about the news we are reading. A lot of things can get done. Let’s stay focused on what we can get done,” he said. “This is the tip of the iceberg as far as I am concerned.”



Chris Hansen

What he didn’t say, but which deserves note, is that some of the big bills, including those that he sponsored, have gotten only one or two Republican votes.

But Hansen has indeed secured Republicans’ support here and there – including testimony from a Weld County commissioner in the last legislative session in support of a bill that, among many other elements, would have created a platform

for payments to farmers for practices that result in greater carbon sequestration.

The bill failed, perhaps because of scheduling problems, but Hansen promises he will return in the next session with an even better bill with many of the same ideas.

That county commissioner, Scott James, a Republican, also spoke at the ceremony conducted under a white tent on the short-grass prairie. He demonstrated why he enjoys success as a podcaster, in addition to being a politician. He was at times funny as he extolled the virtues of Weld County, while also inserting key words common to right-tilting audiences. Weld County, for example, is a place that celebrates both “opportunity and freedom.”



Scott James

Because of its size, comparable in area to Connecticut, Weld County has long ranked as a national leader in agricultural production. More recently, it has become notable for its energy production. It is far and away the No. 1 oil-producing county in Colorado. But it’s not just drill-baby-drill, said James. “We harvest that energy that is above the ground as well as that which is below.”

The electricity from the wind farm, enough to meet the needs of 55,000 homes, is being purchased by Guzman Energy. Since being founded in 2013, the company has been rapidly securing contracts to deliver wholesale electricity to utilities serving smallish towns, electrical cooperatives, and tribes. In New Mexico, the town of Aztec and Kit Carson Electric in Taos were first, starting in 2016. Guzman has more recently begun supplying electricity to the Jicarilla Apache tribal nation, the city of Raton, and the Acoma Pueblo.

In Colorado, Guzman serves power to Delta-Montrose Electric, Holy Cross Energy, the Fountain municipal utility, and the Arkansas River Power Authority. It has also helped customers build out their solar capacity.

Chris Miller, the president of Guzman, identified Morgan Stanley as “giving us great support in being able to develop this.” As impressive as the technology of wind is, he also pointed to the deal-making to make such projects happen.

As for that gangplank mentioned at the outset, it consists of an ancient seabed that has not been eroded. When driving on Interstate 80 from Nebraska through Cheyenne and westward toward Laramie, you are driving up the gangplank as described by John McPhee in his book, “Rising from the Plains.” To the south and north are the two forks of the Platte Valley, both lower in elevation.

Pawnee Buttes is part of that ancient sea bed, and so are those places of northern Colorado. Being higher, they have better wind. For that reason, they were among the first to be developed in Colorado.

The wind farm is named for a geological formation located a few miles north called Panorama Point. At 5,429 feet, it’s the highest point in Nebraska.

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Excerpts from a talk with CEO of Leeward Renewable Energy

After the ribbon was sliced for the Panorama Wind Farm, Big Pivots talked a few minutes with Jason Allen, chief executive of Leeward Renewable Energy.

Transmission & renewables:

The grid that's out there right now does not support rapid growth. That is one place where I see Colorado standing out. They are being much more progressive in new transmission, pursuing new infrastructure. The Xcel and the Tri-States putting in transmission will enable more renewable growth. I do see Colorado standing out where some other states are moving more slowly.



Loss of federal tax credits

The tax incentives are great, but we as a developer need stability. If they're going to be there, great, but let us know what they are. If they're not, that's great, too, because renewable technology can compete head-to-head with whatever's out there. This constant churn is distracting and it hurts the industry. I'm much more supportive of just a stable landscape, whatever it is, with or without tax incentives.

How newer technology could benefit Colorado wind development

There are continual break-throughs in that space. When I first started in wind 10 years ago, the rumor was we'd never get above 2 megawatt machines onshore. They were too heavy, too big, and couldn't be transported. To go bigger, it was going to be offshore.

The manufacturers have found ways around all of that. We bring the components to sites in smaller pieces. They're now doing blades in two pieces. We assemble them. The technology continues to get better and better. The onshore turbines keep getting larger and larger.

Now they're talking about five and six - megawatt onshore turbines. The tower heights continue to get higher. The tower diameters get much larger, and that makes the units much more efficient. They can operate in lower wind regimes where they've never been able to operate before. And we get far more power out of those

turbines than we ever used to.

For example, we have a site in Illinois that was built in 2003. They had 850 kilowatt turbines. We took down the 58 turbines, replaced

them with 29 turbines, and they produce three times as much energy. That's technology advancement in fewer than 15 years.

Repowering Leeward's Colorado sites

Not here—yet. These are newer sites. The Cedar Creek site that's here (completed in 2007) have one-megawatt turbines that I can see as likely candidates for repowering to three, four year and even larger machines during the next five to six years.

New wind going forward

The new projects in Colorado during the next few years, most of them are three megawatts plus. Anything built in 2023 or 2024 is likely to be three megawatts plus. If you look at a couple more years beyond that, the equipment manufacturers are talking about five or six megawatts.

Counties on Western Slope prepare for a surge in solar projects in the next 3-5 years

by Dave Reed

It's time for solar energy to shine in Colorado's energy transition.

In 2021, [according to the U.S. Energy Information Administration](#), Colorado had 1,054 megawatts of utility-scale solar power-generating capacity installed with an additional 750 megawatts of solar power capacity scheduled to come online by the end of 2022.

More yet can be expected, the result of still-lowering prices for solar panels and a raft of requests for replacement generation by utilities as they close increasingly uncompetitive and polluting coal plants.

But there has been pushback, first in denial of a solar project near Delta and then another near Pueblo.

To improve the dialogue with local jurisdictions, the Colorado Solar and Storage Association scheduled sessions for local governments first in the Sterling area and then, in late June, in Rifle, with yet a third planned for Lamar.

At the Rifle meeting, representatives of six counties compared notes and discussed strategies for preparing for an expected surge in utility-scale solar development on the Western Slope. Others who attended included staffers from nearly a dozen solar developers, several nonprofits, the Bureau of

Land Management, Club 20, and Sen. John Hickenlooper's office.

Garfield Clean Energy, a collaborative of major employers that works to accelerate progress toward clean energy goals, co-hosted the event with the Colorado Solar and Storage Association, or COSSA.

"Two years ago this conversation probably would have been premature," COSSA executive director Mike Kruger told attendees. "Two years from now it will probably be too late. That's why we're having this conversation right now."

Alluding to the rejections in Delta and Pueblo counties, Kruger later explained that his members believe local officials need "real knowledge about the technologies. Our hope is that a discussion and open dialogue would ensure that decision-makers, especially county commissioners, have all the information they need prior to deciding on land-use codes and individual projects."

Kruger expects "hundreds of megawatts" of new solar generation will be developed in Mesa, Garfield, and other Western Slope counties during the next three to five years.



Mike Kruger, right, of Colorado Solar and Storage Association, talks with Kevin Smith, chief executive of Lighthouse Solar, the developer of Bighorn, a 300-megawatt solar project adjacent to the Evraz steel mill in Pueblo.

Participants at the Rifle meeting, if coming from different political and ideological perspectives, seemed to broadly agree that an increase in large solar and storage projects was inevitable and that it represented an economic development opportunity for Western Slope communities — if properly planned for.

“This is an ideal county for solar,” said Garfield County Commissioner Tom Jankovsky, who described it as part of an “all-of-the-above approach” to achieving energy independence. A 10-megawatt solar project currently in development near Parachute — the county’s largest to date — has been projected to generate \$1 million annually in property taxes. The project was approved by Garfield County with the expectation of having the project in operation by the end of this year. It also has a storage component.

Drivers of the solar push

Driving this solar land rush, said Kruger, is Colorado’s greenhouse-gas reduction roadmap goals. The roadmap released in January 2020 projects construction of 9 gigawatts of renewable energy by 2030.

Utilities are also motivated by the long-term price stability of renewables, he said, as power-purchase agreements lock in prices typically for 15 or more years.

Most of the investment is going into wind farms on Colorado’s eastern plains, said Kruger, but utilities want to diversify their portfolios with some solar projects in western Colorado.

“Putting them all in the same geographic place, with the same weather, is putting all your eggs in the same basket,” and that isn’t good for grid reliability,” he said.

The potential opportunity for counties is significant, said Katharine Rushton, a renewable energy consultant for Clean Energy Economy for the Region, a Carbondale-based nonprofit.

Rushton cited a 2021 study of the solar and storage potential in Garfield, Eagle, and Pitkin counties that estimated the market potential of community-scale solar on private land in the three counties to be more than 230 megawatts. That’s enough to supply nearly a quarter of current electricity consumption.

Full development of that potential would yield \$26 million in additional property tax revenue, \$31 million to landowners in the form of lease payments, and \$110 million added to the local economy over 30 years, according to the report.

Garfield Clean Energy, a major funder of the study, has played a key role in promoting solar development in that county. In recent years it has organized the successful Solarize rooftop-solar program, helped local governments make their building codes “solar-ready,” and provided technical assistance on projects, including a major installation at Colorado Mountain College’s Spring Valley campus that will benefit Holy Cross Energy.

Solar developments can add to a county’s net bottom line, because they generate property tax revenue without incurring extra costs such as road maintenance, said Page Bolin of AES Clean Energy, a division of AES Corp., a Fortune



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500 company. It has a Colorado office in Louisville. “The solar project just kind of lays there.... You get the revenue without the impact.”

County staff and elected officials had many questions and concerns.

Matt Mooney, vice president of development of Balanced Rock Power, reassured attendees that there’s little risk of rural countryside being blanketed by solar panels. By his calculations, even the massive 4-gigawatt request for proposals that Xcel is expected to release this fall will result in only about 12,000 acres of solar – a “postage stamp” in comparison to the 31 million acres of agricultural land in Colorado.

To the concern that solar could take valuable agricultural land out of production, Bolin responded that the lease income from such projects can actually help farming families hold onto land that they might otherwise have to sell for permanent development. Michael Baute, an expert in regenerative energy and carbon removal with Silicon Ranch Corp., described how animal grazing operations can coexist with solar installations.

Other speakers allayed fears about chemical leakage from broken solar panels (the panels actually contain only inert materials), the fire risk of onsite battery storage systems (they have sophisticated fire-suppression systems and are subject to strict fire codes), terrorism (solar and storage projects actually help decentralize the grid, making it harder to attack) and noise (solar panels make no noise, and storage systems just hum).

A session moderated by Christian Reece, executive director of Club 20, tackled some of the thorniest issues: county codes, permitting, and NIMBYism.

Multiple speakers stressed that the solar industry expects to be regulated, likes it when counties provide clear direction to developers through their land-use code, and prefers to be involved in those

discussions early on so that there are no surprises.

Taylor Henderson of Outshine Energy, who is also a director of COSSA, said that organization is developing a set of best practices for counties to consider in updating their codes. He pointed out that solar and storage development is different in significant ways from the kinds of industrial uses that many counties’ land-use processes are designed to regulate.

Pre-empting the NIMBY impulse

County representatives, for their part, urged solar developers to do a better job of selling the benefits of solar and addressing the general public’s concerns in order to pre-empt the NIMBY (“not in my backyard”) impulses that are often fanned by such proposals.

“If you don’t have the right answers I’m going to have a hard time supporting it, and it’s my job to review these projects,” Mesa County planning manager Sean Norris said.

The conference itself earned high marks from participants for getting the conversation about solar started.

“This (conference) is the kind of thing that we really want to be doing more of, engaging with folks locally,” said Henderson.

Added Rushton: “I think the key takeaway is that when the industry gets together with the people responsible for the future of their counties, there’s a meeting of the minds and a realization that there are some very significant benefits to welcoming solar development in the community.”

Dave Reed is communication director for the [Carbondale-based Clean Energy Economy for the Region](#). [The organization](#) works to accelerate the transition to a clean energy economy.



Solar lipstick on an energy hog

by Steve Andrews
Energy Waves

Our son bought a small house in Denver in early 2020. It fit his budget and, at least on the outside, looked to be an investment in our energy future. It had solar panels on the roof, front and back.

Sadly, we learned that the house was a poster child for how not to “go solar.” It was back-asswards solar.

The problem became apparent during a May heat wave soon after he moved in. The house, our son reported, was very uncomfortable. Once the outdoor temperature hit 95 degrees F, the relatively large and new-ish air conditioner couldn’t keep the house at 78

This older house had solar panels front and back — and new windows, too. But it had deep problems they could not rectify.

degrees even when running 100% of the time.

Thanks to most of the windows facing east and west, the house was a summertime solar collector that would warm into the low 80’s during late afternoons.

The regular home inspection had not revealed that the home was a thermal disaster.

It had no wall or foundation insulation, just three inches of attic insulation, and leaked like a sieve. Also, the ductwork didn’t allow enough airflow for cooling. A thermal inspection using an infrared camera in combination with a blower door-and-duct blaster to test the house and ductwork tightness was necessary to diagnose the problem.

Installing solar panels above an energy sieve doesn’t make financial sense. With an older home, such as this one, built in 1942, the first step should always be to upgrade existing energy features before even

considering adding PV panels. Putting lipstick on an energy pig still leaves you with an energy pig.

Six energy upgrades cut this home's energy consumption for cooling and heating by two-thirds while delivering a much higher comfort level.

The first and easiest happened before the testing was completed. The duct-blaster test showed that the home's return-air system was undersized for what was needed to carry the air conditioner's flows. To correct that, one return-air duct in the floor was doubled in size. The task took just 10 minutes with a reciprocating saw. This allowed the AC to maintain a 78-degree indoor temperature without quite running 100% of the time on the hottest summer day.

The lesson here? Performance testing can guide upgrades.

Next my son and I replaced the attic access door. It was a warped bifold panel in a vertical knee-wall into the attic that never stayed shut (no stops for weather-stripping). The blower-door proved this to be the home's largest single air leak. We replaced it with a tightly sealed, "stopped" and double-latched plywood door.

The next four improvements were all completed by an insulation contractor several months later.

He sealed numerous air leaks, starting with foaming the always leak-prone attic floor. Overall, tightening the home reduced leakage by nearly 75%.

Next he blew R-40 insulation above the existing R-10 attic insulation. The code in Denver is R-38. He also drilled-and-filled closed cathedral-ceiling cavities in the areas above and near the attic hatch.

After that he drilled holes in every exterior wall cavity, through the interior drywall or plaster, and blew in loose-fill insulation. That improved R-0 wall cavity insulation to R-15, which is still a bit less

than the minimum R-19 wall insulation requirement for a new home in Denver.

Finally, the contractor installed a whole-house fan with motorized insulated cover (R-20). Once outdoor temperatures in the evening drop below the indoor temperature, our son opens a few windows and turns on the 1,600 cubic-feet-per-minute fan. The fan uses a small fraction of the air conditioner for cooling. He turns the fan off and closes windows after breakfast, by which time the house is cool enough to coast well into the afternoon. Air conditioning is needed on only the hottest summer days.

Whole-house fans provide limited help in cooling during the July-August monsoon season. During the monsoon, nighttime outdoor air temperatures can be too warm [mid- to upper-60s] and too humid for multi-day stretches of time, to provide effective cooling when circulated within the home.

Misplaced priorities were also evident in the windows. The previous owners had replaced the original single-glazed windows with efficient low-e windows. The big irony here?

Replacing windows is the lowest priority on the energy-saving scale; you can usually only justify window upgrades on the basis of enhanced resale value and improved indoor comfort.

What about HVAC (heating, ventilation and air conditioning) equipment? The furnace was reasonably efficient and almost new. It didn't justify replacement.

The air conditioner was plenty big. It's worth noting that some HVAC contractors, when faced with a comfort problem, blame insufficient equipment size. That answer wouldn't have worked here. A larger AC unit would have instead exacerbated the insufficient airflow and comfort problems.

Nearly \$7,000 was invested in these upgrades. What savings have they produced? Inadequate records by the

previous owner and poor feedback by Xcel Energy, the electrical provider, to solar customers precludes a complete answer. Somewhat anecdotal evidence suggests a two-thirds reduction in annual heating and cooling bills. It is also a more comfortable place to live – and, at resale time, the home should be worth more because the improved energy features can be highlighted, not hidden, from the next buyer.

In the future trend toward “electrifying everything,” would it make sense to convert this home to all-electric? Maybe in 15 years, when it comes time to replace the current AC and furnace units. By that time, the cost to install a high-efficiency air-source heat pump will come down enough to warrant the switch.

An air-source heat pump can both heat and cool a home. It uses long-established refrigeration technology to move heat from indoors to outdoors during the summer and scrubs low-grade heat energy from the outdoors and transfers it indoors during the winter. They were originally developed for climates with higher cooling than heating requirements, but thanks to refinements, they are increasingly efficient in climates with more heating than cooling needs. An upcoming article will do a deeper dive into this technology.

So how smart was the previous homeowner when they chose to install solar panels on this energy sieve? Crazy dumb.

The bottom line here? Don’t even think about either “electrifying” or putting solar on an older home until all cost-effective energy-efficiency upgrades have been studied and installed.

Steve Andrews is a retired energy consultant. His experience included consulting work with utilities, builders, state energy offices, and PBS-TV series, plus freelance writing in the energy sector.

Ryland French joins staff of Aspen-based CORE

Ryland French has joined the Community Office for Resource Efficiency to fill CORE’s new position of senior director of regional climate strategy.

“The communities are saying we need to do more, we want to have a bigger impact, and we need it faster,” said French.

He will coordinate plans across jurisdictions to amplify their impact. He previously had been with the City of Aspen and, most recently, the Aspen Skiing Co., where he designed and managed projects, including the Aspen Energy Challenge and the employee housing Hub at Willits. The latter has no natural gas.

New transmission authority slow to get off the ground

In 2021, Colorado legislators established a new state agency, the Colorado Electric Transmission Authority, or CETA, with broad powers to fill in the gaps of Colorado’s transmission system as it switches from fossil fuels to renewables.

The new authority has been slow to get off the ground. And the first meeting, held on July 8, was suspended after 15 minutes because only 5 of the 9 members had joined the Zoom conference.

The immediate task will be to secure a website developer and general counsel, both duties to be delegated to the chair. Having a quorum, that choice could have been made. But members agreed to postpone that decision with the expectation that another meeting, to be held in late July, will be better attended.

Solar project near Delta has new irrigation plan. Will that revise the vote?

When Delta-Montrose Electric Association finally got its freedom from Tri-State Generation and Transmission in 2020, the electrical cooperative had hoped to leverage its new partnership with wholesale supplier Guzman Energy to develop its solar capacity.

Guzman had previously helped Taos-based Kit Carson Electric gain its independence from Tri-State in 2016 after committing to pay a \$37 million exit fee. With aid of Guzman, Kit Carson immediately set out to develop solar farmers in its service territory in northern New Mexico.

In early June, it achieved both milestones, finishing the final solar project that will allow the cooperative to meet the day-time demands of its members/customers and, on June 30th, it made its last payment to Tri-State (or is it a financier?)

In Colorado, the solar plans for Delta-Montrose Electric have gotten off to a rockier start. In March, Delta County commissioners voted 2-1 to reject a proposal for a solar project on two parcels with a combined 380 acres a few miles east of Delta. The commissioners cited uneasiness about the compatibility of the project with agriculture that dominates the area, but a subtext seemed to be doubts about the plans for irrigation.

Up to 1,000 sheep were to be grazed on the property on which the solar photovoltaic panels were to be placed, and the grass for their grazing was to be grown with flood irrigation. Might that produce problems for the foundations of solar panels?

The solar developer, Citra Power, which is relatively new to Colorado, returned in late June with a new plan. The key

difference lies in how the land would be irrigated.

This proposal calls for three different irrigation techniques instead of flood irrigation, which altogether had a projected cost of \$1.5 million as of late June.

“Sprinklers will be mounted below the solar panels along the supporting structures,” explained Matthew Kosakowski, project manager for Citra Power, in a written response to a request for clarification from Big Pivots. “Gated pipes will be strategically located between solar rows, and drip heads will be deployed as needed in areas requiring additional coverage.”

The project team that had come up with this revamped irrigation plan had consulted with local livestock agents, the Colorado State University Extension Service, and local irrigation engineers, he said. Their feedback was consistent.

The proposal also calls for about 3,850 trees and shrubs around the project perimeter to screen the solar panels.

Crucial to the site selection was the existence of an electrical substation. The solar project will have generating capacity of 102 megawatts direct current.

The land has historically been used for cattle grazing. As such, the property taxes on this project will substantially increase the take by Delta County. Developers estimate the project will deliver \$10 million in property taxes over 35 years. There will also be two full-time positions associated with the solar farm, plus the agricultural component, once construction is complete.

Construction costs are projected to fall between \$75 and \$80 million, with roughly a quarter of that allocated for labor. The project will have 350 to 400 people working over a 9- to 10-month period.

What Alice Jackson sees ahead as she leads Xcel Energy's planning team

*This was published by [Energy News Network](#) on July 15. The longer Q&A from which it was extracted will be published in the next issue of *Big Pivots*.*

The former chief executive of Xcel Energy's Colorado operations has a new company-wide role focused on planning the utility's energy future.

Alice Jackson will have a lead role in coming up with strategies to meet the company's goals of cutting carbon emissions by 80% by 2030 and 100% by 2050 across all its territories, including Minnesota.

A ballerina who performed internationally as a child, she aspired to be a surgeon but instead became a computer programmer. She was working at Enron, her first job after college, when it collapsed, then started making her mark at Occidental Petroleum before joining Xcel in the Texas Panhandle. Along the way, she raised four boys who now range in age from 8 to 19. After arriving in Denver in 2013, she eventually rose to chief executive of the Xcel subsidiary Public Service Co. of Colorado. Soon after, the company made its then envelope-pushing emission pledges in 2018.

In her new role, [announced in May](#), Jackson will lead an Xcel team charged with



Alice Jackson

investigating how to get there. The mission goes beyond that target, though, and includes efforts to decarbonize transportation and buildings through expanded use of electricity. She takes care to call it an energy system, downplaying the distinction between electricity and heating or transportation fuels.

In a recent interview, Jackson said she sees a blurring of roles between customers and suppliers. "Think about rooftop, solar and community solar garden installations, but also electric vehicles and battery storage being added at the distribution level, where customers are making the choices and the batteries of those EVs are potentially becoming not only consumers but also generators," she said.

The changing climate and more extreme weather also factor into planning. For example, Colorado regulators, as part of their review of Xcel's electric resource planning, asked the utility to model its ability to respond to extreme heat waves, such as those that struck the Pacific Northwest in June 2021.

Minnesota and Colorado, both states where Xcel dominates, are among the nation's leaders in pushing the energy transition.

"Colorado typically sees policy changes more quickly," said Jackson, citing the firm push to electrify transportation. "But then Minnesota is catching up quickly on that, whereas they're ahead of [Colorado] on some other things," she said, citing smart meters as an example.

Xcel's resource mix differs in the two states in that it has nuclear power in Minnesota. Colorado's lone nuclear plant, St. Vrain, was converted to natural gas decades ago. Will nuclear play a larger role in the future? Possibly, in the longer term. Jackson said Xcel is watching to see if a small modular reactor under development in Idaho, the first of that technology in the United States, gets across the finish line.

Can it come in at projected cost? “That’s something we’ll watch very closely,” she said.

In the short term, Jackson and her team members will be looking for ways to optimize investments given the changing energy matrix.

“For example, if we go into a neighborhood because a pad-mount transformer is at end-of-life, something malfunctioned, or we had a bad weather storm that caused damages — do you put the exact same one back in, or do you upgrade it in expectation that this same neighborhood is going to have more EVs and more rooftop solar, so you don’t have to come back again? Those are the types of questions that this team is going to be looking at,” she said.

Microgrids are another potential tool. Xcel’s franchise agreement with Boulder, Colorado, identifies an unusual collaborative process for creating the energy systems of the future. One element is the potential for microgrids to shore up some of the canyons on the city’s fringes that are somewhat isolated. Other applications could include fire and police stations, community centers, airports, or industrial districts.

Beyond the physics are the finances. Who pays and in what proportion?

“Does that cost go to everyone on the system or just those that are on the microgrid?” Jackson said. She expects it will take a couple of years to resolve these questions about microgrids. “I know we’re examining the best situations or places to do them first,” she said.

Jackson’s team will also be studying storage. “We need a variety,” she said. “It’s not going to be, ‘Oh, this is the golden ticket.’ It has to be a variety of pieces of the puzzle that come together to build the system.”

She described possibilities including iron-ore-based, long-duration battery

storage [being developed by Form Energy](#), but no clear answers are available today.

“People talk about battery storage. They’re like, ‘Just build your wind and solar using battery storage.’” Lithium-ion batteries will provide shorter-term peaking capacity but not the extended duration that is needed. For the time being, Jackson sees natural gas being necessary, as reflected in the utility’s latest energy resource plan on the verge of approval by Colorado regulators. Those plans can later be adapted to burn zero-carbon fuels, she said.

Hydrogen may play a role, but it’s been five years out for about 50 years, Jackson said. Pumped-storage hydro has a better-proven track record, and the company in Colorado has been exploring the potential for that in Unaweep Canyon, south of Grand Junction. Such exploration is a 10-year process, she said, “but this process we’re in may come to a conclusion sooner.”

Similar to other utilities, Xcel doesn’t have a technology development division itself. It communicates its needs and works with developers. One group it works with is Energy Impact Partners, a venture capital organization that invests in up-and-coming technology companies trying to reduce energy emissions. Xcel also contributes to the Electric Power Resource Institute’s Low-Carbon Resources Initiative.

In Colorado, utilities have been mandated to join a fully organized and regional market for electricity by 2030. Some industry executives say it can happen much sooner. Most talk has been about joining existing markets, either the Arkansas-based Southwest Power Pool or the California Independent System Operator, called CAISO. Jackson called Xcel’s operations in Colorado the “Hawaii of the West. We’re in a bit of a donut hole.”

Along the Colorado border with Kansas and Nebraska is the interface with the Eastern electrical grid, with few DC portals

between the Eastern and Western grids. But there are significant problems in the West, a place of some very large cities but vast spaces between and a tangled history of bilateral agreements governing use of that transmission.

“There’s a higher hurdle to show cost benefits to our customers from the transmission investment that’s necessary to build out a very integrated system,” Jackson said. The creation of the Western Markets Exploratory Group Dialogue last fall by several Western utilities has fostered useful discussion. “We’ve made more progress than I’ve seen in the West in a very long time.”

Xcel’s customers in the eight states it serves have different climates and geographies. They have much in common. Reliability and affordability are the cornerstones, she said, but customers, “regardless of political affiliation, are largely interested in an increasingly clean system.”

“It excites me to think of what does this look like 10 years down the road,” Jackson said. “How do we start preparing for that now?”