

**Coal at Sunset: A Colorado Town in Transition
Episode 2: “The Cost”
Presented by the Institute for Science & Policy at the Denver Museum of Nature &
Science along with House of Pod**

KRISTAN UHLENBROCK (narration): I’m standing on the roof of the coal-fired power station just south of Craig, Colorado. It’s a clear day. I can see the rolling hills of the Yampa River Valley, running east toward Steamboat Springs and west toward Dinosaur National Monument. Down below, the town of Craig is sparkling in the morning sunlight. For Tim Osborn, the coal plant manager, the view from up here has special meaning.

TIM OSBORN: I’ve been here for 31 years. It’s home. I was actually born in Craig. I was younger when the place was built, I graduated high school right about the time unit three was coming online. So I got to experience a lot of boom in the town when there were lots of extra bodies around.

KRISTAN (narration): Standing well over six feet tall with a powerful build, Tim very much looks the part of a no-nonsense foreman. He works for Tri-State and supervises over 100 employees. He keeps everything operating smoothly. He also has a sense of humor about some other skills that come in handy.

TIM: I actually have a degree in sociology and a master’s degree in family life, and an MBA in engineering and technology management. In general, I’ll just say I do a lot of parenting.
[laughs]

KRISTAN (narration): We walk over to the edge of the roof. We’re in the shadow of three towering stacks, each corresponding to one of the station’s three operational units. Far below, we see heavy conveyor equipment and rail cars that bring in coal from the nearby mines Trapper and Colowyo. Massive piles of coal have already been unloaded on the ground.

TIM: We have a coal train that comes in every day from Colowyo, about 30 miles south of us here. 100-car train, 11,500 tons. We unload one of those every day into that pile. All the coal from Trapper, somewhere in the neighborhood of 10,000 tons a day is delivered over here under this pile.

KRISTAN (narration): Tim has enough coal on hand to power thousands of homes and businesses for over a month. These reserves can be stored indefinitely and burned as needed to meet electricity demands in any weather, any time of day. Historically, that’s been a selling point for coal compared to renewable energy sources like wind and solar. The sun doesn’t always shine and the wind doesn’t always blow. But coal has always been there.

There are significant downsides, though. Burning coal emits significant amounts of greenhouse gases into the atmosphere, which contribute to global warming. Even the cleanest-burning coal plants still release harmful pollutants into the air. And that’s partly why recent polling shows the public shying away from coal. People want greener energy. Colorado’s 2019 climate action bill was just the latest indication that the state is moving in a different direction.

Tim's employer, Tri-State, is moving on too. In January 2020, the member-owned utility company made the decision to phase out its coal mines and the coal plant over the next decade in order to invest more in renewables. Tim sees what's coming. He knows that the end is in sight.

TIM: The plant is closing down. There will be an effect on the community. The plant is closing. I don't see a pendulum swing in a different direction to allow this to continue. Just don't, don't see it. I don't think that the will of the Tri-State members wants that to happen either. And that's what we're here for, is to provide power for the Tri-State members. The members want cleaner and greener energy on the grid. That's what Tri-State's going to try to do.

KRISTAN (narration): He turns back and looks down at the railyard again, where coal is still being unloaded.

(machines humming)

TIM: You can see this pile has gone down significantly if you'd been here a year ago, but it is energy storage, if you look at it in those terms, we have the ability to use that fuel to produce electricity, so we've got storage here on the ground. It's just...coal. And that's unpopular for society.

(transition)

KRISTAN (narration): This is *Coal at Sunset: A Colorado Town in Transition*. I'm your host, Kristan Uhlenbrock. I work at the Institute for Science & Policy at the Denver Museum of Nature & Science.

In order to understand the ongoing energy transition, we needed to understand more about the science of coal and the changing economics of using it to generate energy. How exactly does a primordial rock mined out of the ground become the electricity we use every day?

(nature sounds)

Coal is very, very, very old. It's found all over the world. Colorado's reserves likely date back to the Upper Cretaceous period, somewhere between 66 and 100 million years ago. Back then, much of what is now North America was covered in swampland. Dead plants fell into those swamps, creating thick layers of organic debris. Over millions of years, more and more layers got added. Eventually, the heat and pressure of the Earth's changing surface compacted all that material so tightly that all the oxygen was forced out and only carbon was left behind. Those ancient deposits are the black coal seams we can find today.

Once humans arrived, we discovered that coal burns really, really well. There's some evidence that early civilizations, including the Aztecs and the Romans, used coal as fuel in a limited capacity. It was particularly useful for cooking and metal working. But it wasn't until the Industrial Revolution in the mid-1800s that coal became a primary source of energy. Coal powered steamships and locomotives enabled the rise of modern commerce. It was used to generate electricity for factories and homes. It's no understatement to say that life as we know it today was built on the energy generated from coal.

(machines humming)

We're about to see the power generation process up close. We follow Tim inside the Craig station. It's dark and cavernous, humming with the sounds of machinery. Remember all that coal we saw outside in a pile? Tim shows us where it's headed next.

TIM: We bring that coal into the plant onto conveyor belt, and drop it through those cars into coal silos. From the coal silos it drops down into the pulverizer. The pulverizer crushes it up. Big primary air fans blow that up into the furnace where we combust it. The coal coming up here, comes up here at about 900 tonnes per hour. So, what does that mean? 15 tonnes a minute.

KRISTAN (narration): Coal creates energy when it's burned. And in order to burn that much of it, you need a pretty big furnace. We're about to look directly inside it. We follow Tim down a narrow walkway until it ends at a metal wall and a porthole.

TIM: We'll look at the fireball a little bit, we'll look at the burner where the coal is actually being injected into the furnace. And we can see what happens in the combustion zone.

KRISTAN (narration): He opens it to reveal an orange inferno, a wall of flame generating so much heat and light that it requires a tinted welding mask to view safely.

TIM: I have a little advantage because I'm a little bit taller. But if you can look through this port at about a 45 degree angle, you can see the tubes go kind of around another hole. And coal is actually being blown into the furnace right here. And you can kind of see that, you can see the immediate combustion. You don't want to look without the mask.

KRISTAN (narration): And let me tell you, it's like looking straight into the belly of a star.

KRISTAN (host): I have a dark screen in front of my face so I can actually look into it. My fingers are on the side and I can feel the super-hot temperature. It's like the hottest day on the beach with the sun beating down on you and the hot sand. And you're like I can't put my foot on this, it's so hot. So what's the temperature down here?

TIM: The temperature right down here I'd say is about 1,600 degrees.

KRISTAN (narration): That combustion creates energy, but it also releases harmful particulates like sulfur dioxide and nitrogen oxides. All three units of the Craig station are equipped with what are known as "scrubbers," which help reduce those pollutants before they escape into the air.

TIM: Low ash, low sulfur, high BTU. Oh, and low mercury. It's low on lots of bad stuff, this coal from this part of the world. Sub-bituminous. It's very good, clean coal if you can see how that can be clean compared to back east.

KRISTAN (narration): That term 'clean coal' came up often during our visit, and it's somewhat controversial. Sometimes, as Tim was using it, it refers to specific chemical attributes of coal, which can vary throughout the country. Other times, the term refers to improved coal treatment technology like the scrubbers. And occasionally, it's just partisan jargon. There is actually no agreed-upon definition. And it's true that coal processes have improved over the years. We no longer see billowing black smoke coming out of the stacks, for example. But it's also true that

coal can't reasonably be called 'clean' compared to most other energy sources. It's an example of language playing a role in how we think about complex topics.

We continue following Tim through the station. All of that fire in the furnace is really intended to do just one thing: heat tremendous amounts of water to create steam. And that means you also need a giant boiler. Most people might expect a boiler to be in the basement. Not here. Try the ceiling.

(machines humming)

TIM: The boiler is that silver line box right there. It's about 50 feet long over there, it's almost square. So, the boiler actually -- it's about 7,550 tons, empty, and it's just hanging there.

KRISTAN (narration): It's suspended from the roof because it gets so hot that it needs room on all sides to expand and contract. Once the water heats, the high-pressure steam spins a series of massive turbines, which generate electricity.

TIM: What's happening here at the business end of the generator is 22,000 volts going out to some transformers...stepping up to 345,000 volts going out to the switchyard.

KRISTAN (narration): And voila: that energy is off to the grid.

As we wrap up the tour, Tim beams with pride about the station and its process. This place has been his life for a long time. But there's a tinge of sadness about the current realities. A decade ago, coal accounted for almost 70% of the electricity generated in Colorado. By 2020, that share had been cut in half. Things are changing, and Tim knows that. He doesn't see any choice but to carry on.

TIM: The industry, it's a tough industry to be employed in, without knowing that there's a lot of controversy about it. It looks different for us now, but we still have to keep the lights on, we're still making power, we're still doing the work. We're still doing this. So I always try to offer some kind of hope.

(transition)

KRISTAN (narration): Across the state, coal closure announcements have accelerated in recent years. Colorado Springs Utilities will close its Martin Drake station in 2023. Xcel Energy plans to shutter coal plants in Fort Morgan and Hayden by 2028, earlier than anticipated. And Tri-State itself retired the Nucla Coal Facility in western Colorado ahead of schedule in 2019.

Suzanne Tegen was curious about what that would mean for Colorado. She's an energy scientist and economist by training, including 14 years at the National Renewable Energy Laboratory. She thinks a lot about the cost of coal.

SUZANNE TEGEN: My projects had to do with the comparison between renewable energy coming into a community and a coal plant.

KRISTAN (narration): But in 2018, she felt like she needed a different perspective. She knew an academic approach wasn't sufficient to understand what the impending end of coal really meant.

SUZANNE: I moved to the Center for the New Energy Economy at Colorado State University where I am now, and became really interested in the growing divides, economic, cultural and political and kind of the intolerance in our country. We at the Center are really careful to work in a bipartisan way, and could see that, you know, political divides and also the rural, urban, divides were, seemed to be growing. And so I was really interested in exploring that, especially in regards to the energy transition.

KRISTAN (narration): Suzanne wanted to get firsthand insight from coal country. So she traveled out to northwestern Colorado.

SUZANNE: I thought, I could talk to people in coal country around here and listen to them, you know, hear about what they think about the energy transition. Do they think it's coming or do they think Donald Trump is going to save the coal jobs, or are they getting ready, you know for kind of for the next phase. But I didn't want to go in there, assuming that I you know had answers because I had a lot of questions for them too and they had the answers, right.

KRISTAN UHLENBROCK: She started listening. And she wasn't sure what to expect.

SUZANNE: At the beginning, there was sort of less of an acceptance that the coal plants in that area might close but soon the announcements came all over the country of coal plants closing, and they became, you know, more, more worried, and also, they were frustrated that they weren't being included in some of the conversations about the changes. So the policymakers were making changes, the utilities were making changes but they really had not involved the local communities that mined the coal and the generated the coal power. So, that was frustrating for them and I can totally understand why.

KRISTAN (narration): It's hard feeling like you're not being heard. That frustration though, also likely stems from the fact that coal isn't the market driver that it used to be. Supply and demand have changed the U.S. electricity landscape dramatically.

SUZANNE: So, for the economics of energy, you know there are a lot of different sides to it, but most people are interested in costs and the cost of energy or cost of electricity, and we've really seen that change in recent decades, and so going back but not going back a century, you know, just going back, 20 years, or even just 10 years, we've seen the cost of natural gas, really decline and that is mostly because of hydraulic fracturing, or fracking, and so the cost of gas, went down really sharply, and at the same time the cost of wind power and solar power has also declined really sharply. And so it started really with the fracking, and that made gas so much cheaper than coal that many coal plants in this country became uneconomical to run. And so even though we're still paying off those coal plants, it's still cheaper to work out a way to pay off those stranded assets or those coal plants and buy cheaper electricity from natural gas, and from wind and solar. And so, you know, today in some areas, even building a new wind farm is cheaper than running an old coal plant, which you would not have seen that 10 years ago, but today, because the costs have come down, you are really seeing that.

KRISTAN (narration): It's not just the dollar value of coal that's changed. Our collective understanding about its other costs has changed too.

SUZANNE: We didn't know back then as much about the pollution that coal would cause and even with all of the controls, the environmental controls that we can put on the stacks. You know, we still emit too much pollution and we're still causing you know the greenhouse gas emissions that have really negative health effects. So even if you can't see it coming out of the stacks, it is coming out of the stacks. That was one of the questions that I got you know in coal country. It is so beautiful in some of these places and the skies are blue and so it's hard to imagine that that pollution is coming out of the stacks, but it is and it gets reported by whoever owns that coal plant. And you can read those reports and see oh yeah you know it is actually emitting these dangerous greenhouse gases and CO2.

KRISTAN (narration): And now, just as coal once displaced wood-burning stoves, it's being replaced by its competition.

SUZANNE: We have had a lot of money, both from industry and government, poured into research and development, and that has greatly increased the efficacy of both, you know, solar and wind. Colorado right now, we're at about 24% wind power, and that is more than the rest of the country. So we're at about a third renewables in Colorado and about a third coal, and a third natural gas. I think we'll phase out of coal in the next decade and we still have natural gas. We'll, you know, phase out of that eventually, too, but not probably, as soon as coal.

KRISTAN (narration): Suzanne made several trips back to Craig over the course of 2018 and 2019, and she helped produce a documentary series highlighting voices from the town. The COVID-19 pandemic has prevented her from going back in person since. But she's still invested in this town.

SUZANNE: I wanted to be somebody who could help out. I know I'm from the outside but I really do want to help, I think the energy transition is going to get us to a better place. But that's not better, necessarily, for each individual, right. It's better for the whole society and for our children, but it's not necessarily better for that particular worker. So what can we do for that particular worker, and that particular worker's family to help them be more resilient, and be able to weather this transition better than they otherwise would be able to.

KRISTAN (narration): There's lots of people who care about this community. But a successful transition for Craig is going to require a lot of trust.

SUZANNE: Somebody needs to work to build relationships on the ground, and then have that person on the ground be able to talk to a decision maker, you know, and have them have a real connection, either by Zoom or in person but yeah. I feel like decision makers are a little bit cut off from rural communities right now.

(transition)

KRISTAN (narration): It was January 10th, 2020, and State Senator Bob Rankin was absolutely beside himself.

BOB RANKIN IN KDVR CLIP: *There will be people crying in Craig, Colorado today.*

KRISTAN (narration): Tri-State had just announced the coal closures in Craig. That news would have major ramifications for his district. At the capitol building that day, he gave a fiery interview to a local TV station:

BOB RANKING IN KDVR CLIP: *We're willing to sacrifice an entire county of human beings so that we can make an ideological symbolic gesture. I don't agree with that.*

KRISTAN UHLENBROCK: That passion is emblematic of Senator Rankin, a Republican who represents much of Colorado's Western Slope. He's built his legislative reputation on getting straight to the point.

BOB RANKIN: So, you know, I did a thirty, forty year career as an engineer and an executive in engineering businesses. And that totally influences the way I think. I just like to solve problems. I've been called a lousy politician, because I look at things in terms of here's a problem that we can try to solve rather than how does it affect me politically.

KRISTAN (narration): The Tri-State announcement likely means the end of hundreds of jobs in his district. It outraged him that day at the Capitol because he was thinking about the well-being of his constituents. Months later, he's more contemplative about the difficult position that Tri-State was in.

BOB: It was just a further acceleration of closure of the mines, not totally unexpected. Although it was a surprise to the locals. I think they did what they had to do. I don't blame Tri-State at all. They're trying to be helpful in the transition as best they can. They had several pressures. They had pressure from the state to accelerate closure, but they also had pressure from their customers, the local rural electric associations, and their clients were pushing them for more renewable energy. So, you know, they had to respond to their clients and to the state. I think they did what they had to do.

KRISTAN (narration): When it comes to energy, Senator Rankin walks the tightrope between aspiration and pragmatism.

BOB: Clearly we're undergoing a transition to renewable energy. You know, I represent probably, I think, most of the coal mines in the state, and about 15,000 gas wells. So I feel I have an obligation to try to balance the pace of transition. At the same time I support it. I do believe that climate change is real. I do believe there's a human contribution, also a natural evolution and contribution. I would argue that those goals should be realistic in the sense of their impact on global transition to renewable energy and control of climate change, greenhouse gases.

KRISTAN (narration): There's another elephant in the room during all these discussions about climate change. Colorado is just one state. And the U.S. is just one nation. Around the world, not everyone is moving away from coal. China and India, for example, are still building coal plants at a rapid rate. Global coal demand is actually projected to increase in 2021, reversing the recent trend.

BOB: Should Colorado be the beacon for the rest of the world or not? Should we take into account what the Chinese are doing every day, I mean, actually coal use worldwide is

increasing. While we have decided to put our coal mines out of business, I mean, that's our strategy. That's the strategy of the state, not my strategy. So we are doing that, and we are transitioning faster than would actually be necessary if we kept pace with the rest of the world.

KRISTAN (narration): Suzanne disagrees. It's not about what others are or aren't doing.

SUZANNE: The United States should definitely be leading the way on carbon emissions reduction, and on building renewable energy. China and India are still building coal, but they're also building wind and solar. And so, in China, they report to have more wind turbines than we do in the United States so those markets are also growing fast. But, of course, the U.S. should be leading the way we use more energy than any than anyone else, I mean per capita.

KRISTAN (narration): Back at the Craig station, Tim Osborn has heard the China argument from his co-workers too.

TIM: I guess what I tell them is that is that is outside of our control. What's outside my control I'm not necessarily going to worry about it too much. I think the U.S. and Colorado in particular is trying to be the front runner in all of clean and green production. And that's good, there has to be somebody with an ideal out there, to achieve. Is that the most beneficial for the population right now? Can't say. That's what I tell them, I just say that I don't have control of that so I'm not going to worry about that necessarily. What we can do here is write our senators have a voice in local, state politics, and just try to have our voice heard somehow.

KRISTAN (narration): Energy is a global challenge. But that doesn't mean we can't work toward solutions.

BOB: As an engineer, I'm fascinated by the developments going on in energy. I believe that we can let the communities that we've talked about benefit from that transition, whether that's using coal for precious metals, whether it's using hydrogen in the existing plant. You know, I think the community can directly benefit from that technology change. So I'm actually excited about working on the energy transition.

KRISTAN (narration): We're going to dive into new alternative energy technologies, like hydrogen, later in this series. But for now I'll say, the move toward renewables could eventually align with job creation in Craig as Tri-State looks for ways to repurpose the facility.

TIM: And I think that's what we need to be looking at, we should be able to repurpose some of this somehow. Some of the technology doesn't exist yet, and a retrofit on a unit like this could be pretty cost prohibitive, but we should still look at it. What are the numbers?

KRISTAN (narration): While new things are on the horizon for the Craig coal plant. We can't overlook the pain that comes with change.

TIM: But I think as plant manager, I'll speak for what I want for the employees first - something sustainable, for them. [sniffle] For me, I get to retire. I'm the right age. Does that make it better? Not at all. I'm looking for something sustainable for me in a way of life. Wide open spaces. Not a whole bunch of people, I like that. But the sustainability to me is what I want for the employees here. If they want to stay here, I want them here. If they want to move on to some other opportunity, good for them. I don't know what Craig's gonna look like, but I'm gonna be here.

(transition)

KRISTAN (narration): In our next episode of *Coal at Sunset*, we'll hear why addressing climate change is kind of like repairing your car, plus hear more voices from Craig and beyond as the transition looms. Be sure to subscribe to this series wherever you get your podcasts.

Coal at Sunset was created by the Institute for Science & Policy, a project of the Denver Museum of Nature & Science, produced in partnership with House of Pod. I'm your host, Kristan Uhlenbrock. This show was written by Trent Knoss. Our producer is Juliette Luini. Our executive producers are Trent Knoss and me, Kristan Uhlenbrock. Our field recorders are Nicole Delaney and Juliette Luini.

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