

# PROGRESS

*Monongalia & Preston Counties*



*Mon & Preston Schools, WVU,  
Coal, Oil & Gas*

2022  
ENERGY &  
EDUCATION

THE DOMINION  
**Post**



EDUCATION

# STEAM-TAC adds to the learning statewide

BY JIM BISSETT  
JBissett@DominionPost.com

That’s the thing about Elephant Toothpaste — it always makes an entrance.

“What do you think about that?” Dr. Frederic Bertley asked, while those gathered in the school cafeteria at Mountaineer Middle whopped and applauded.

“Don’t try this at home,” said the physician, an immunologist by training who morphed into a prop comic for the afternoon.

“Well, do try this at home,” he said, after grinning reflection. “Just not at this volume. It is kind of messy.”

And definitely scientific, in a slapstick kind of way.

The aforementioned “elephant toothpaste” is actually a popular experiment on the properties of chemical catalysis, using some pretty common ingredients.

Take ordinary tap water, dry yeast, liquid dish soap, food coloring and hydrogen peroxide.

Swirl it all together, then watch — as the foamy concoction bursts forth from beakers, in ropes wide enough, and thick enough, for an elephant’s toothbrush, if there were such a thing.

What was really bursting forth on that December afternoon at the middle school in Morgantown was



Frederic Bertley, president and CEO of COSI, Center of Science and Industry, shows the Elephant Tooth Paste experiment to students at Mountaineer Middle School for STEM TAC.

a new avenue in learning for the Mountain State.

It was the launch of the Technical Assistance Center for Science, Technical, Engineering Arts and Mathematics: A multisyllabic, multidisciplinary endeavor in intellect known as “STEAM-TAC,” for short.

STEAM-TAC is affiliated in part with WVU, but it doesn’t have a fixed, formal

office on campus or in Morgantown, for that matter.

What it does have is a fleet of tricked-out vans, driven by committed educators, tooling in the direction of your kid’s school.

As of April, the intellectual sojourners had logged more than 8,000 miles in those vans, Donna Peduto said.

“That’s 8,000 miles and 7,000 middle school visits,”

said Peduto, a former elementary school teacher who is now executive director of the state’s Public Education Collaborative based at WVU.

Her office helps coordinate the STEAM-TAC stints across West Virginia.

“Every school we visited wants us back in the fall,” she said. “And we’ve got lots more visits planned for all the learn-

ing camps this summer.

“Kids don’t forget presentations like this,” she said.

Bertley, he of the elephant toothpaste, has long been known for presentations like this.

As said, he’s an immunologist whose work in vaccines and other preventive medicines took to postings from Arctic Canada to Sudan.

These days, he’s the director of the Center of Science and Industry in Columbus, Ohio. Known as “COSI,” the popular hands-on museum and learning lab has captivated central Ohio kids and students of all ages across the region for more than 50 years.

He and his COSI colleagues were the opening act for STEAM-TAC here.

Bertley loves it, he said, when a laughing student walks up to ask how a guffaw-inducing experiment “really” works.

Thus, the learning, he said.

“STEAM education isn’t about white lab coats and math,” he said that day at the school perched high atop Morgantown on Price Street.

“It’s about music and creativity and the things you do to get kids engaged and excited about learning. And your state is right here.”

**TWEET @DominionPostWV**

**“KIDS DON’T FORGET PRESENTATIONS LIKE THIS.”**

Donna Peduto executive director of the state’s Public Education Collaborative based at WVU.

## MONONGALIA COUNTY SCHOOLS

# School system looks to create new STEM high school

BY JIM BISSETT  
JBissett@DominionPost.com

With more and more high-schoolers nationwide choosing to bypass college for career technical education pursuits, Monongalia County’s school district wants to follow that same trajectory on the graph.

In fact, it wants to create a new intellectual launch with a new high school over the 10 years that would be solely devoted to STEM — the academic and hands-on studies of science, technology, engineering and math.

And that’s exactly what it’s doing.

With the working name, the “Renaissance Academy,” this school is already in writing.

The school, which is projected to cost more than \$70 million, is the showcase of the district’s 2020-30 Comprehensive Education Facilities Plan, or CEFP, a paradigm-shifting, dice-roll updated every 10 years.

Call the CEFP an operator’s manual of district doings, with equal chapters on the practical, pragmatic and visionary sides.



Under the school district’s 2020-30 Comprehensive Education Facilities Plan, a new high school would be solely devoted to STEM — the academic and hands-on studies of science, technology, engineering and math. Meanwhile, the district’s existing Technical Education Center on Mississippi Street would be retrofitted for the same mission, only for middle-schoolers wishing to delve into coding, e-gaming design and other marquee jobs of the 21st century and beyond.

Eastwood Elementary, to date Mon’s only officially certified green school, was the linchpin of the 2010-20 CEFP, in fact.

As Superintendent Eddie Campbell Jr. has been saying for the past year or better — backed by Board of Education members and other district administrators alike — there are those students who simply don’t want to

spend another four years, or better, sitting in another series of classrooms.

Some of them, he said, simply want to join the workforce quickly, with a livable wage, while not being saddled with the fiscal slog of student loans that can take decades to pay down.

The Renaissance Academy will send them rocketing into that new orbit.

Tentative plans call for a learning laboratory and other teaching spaces, with corporate sponsorships and equipment that will put Mon’s students on par with everyone else.

The district, the superintendent proudly noted, does that anyway.

Mon’s schools, he said, are already at the upper echelon in West Virginia, and students who are prod-

ucts regularly survive and thrive at Stanford, Yale and other bastions of higher education.

A standalone STEM school would again make Mon ultra-competitive in another venue of learning and earning, he said.

Meanwhile, the district’s existing Technical Education Center on Mississippi Street would be retrofitted for the same mission, only

for middle-schoolers wishing to delve into coding, e-gaming design and other marquee jobs of the 21st century and beyond.

“STEM is our No. 1 priority right now,” Campbell said.

Pam Loffelman agrees.

Loffelman is an architect and consultant with the DLR Group, which is known nationally for its designs of such schools.

She was a guest at a recent BOE meeting and talked about a similarly designed school in Colorado, where one student was learning how to be a chef and a mechanic at the same time — and under the same roof.

Flipping the spatula will help the budding restaurant entrepreneur in the kitchen, Loffelman recounted, and turning wrenches will help maintain the food trucks that will be part of the operation.

“It’s about your students,” she told Mon County’s elected advocates of education.

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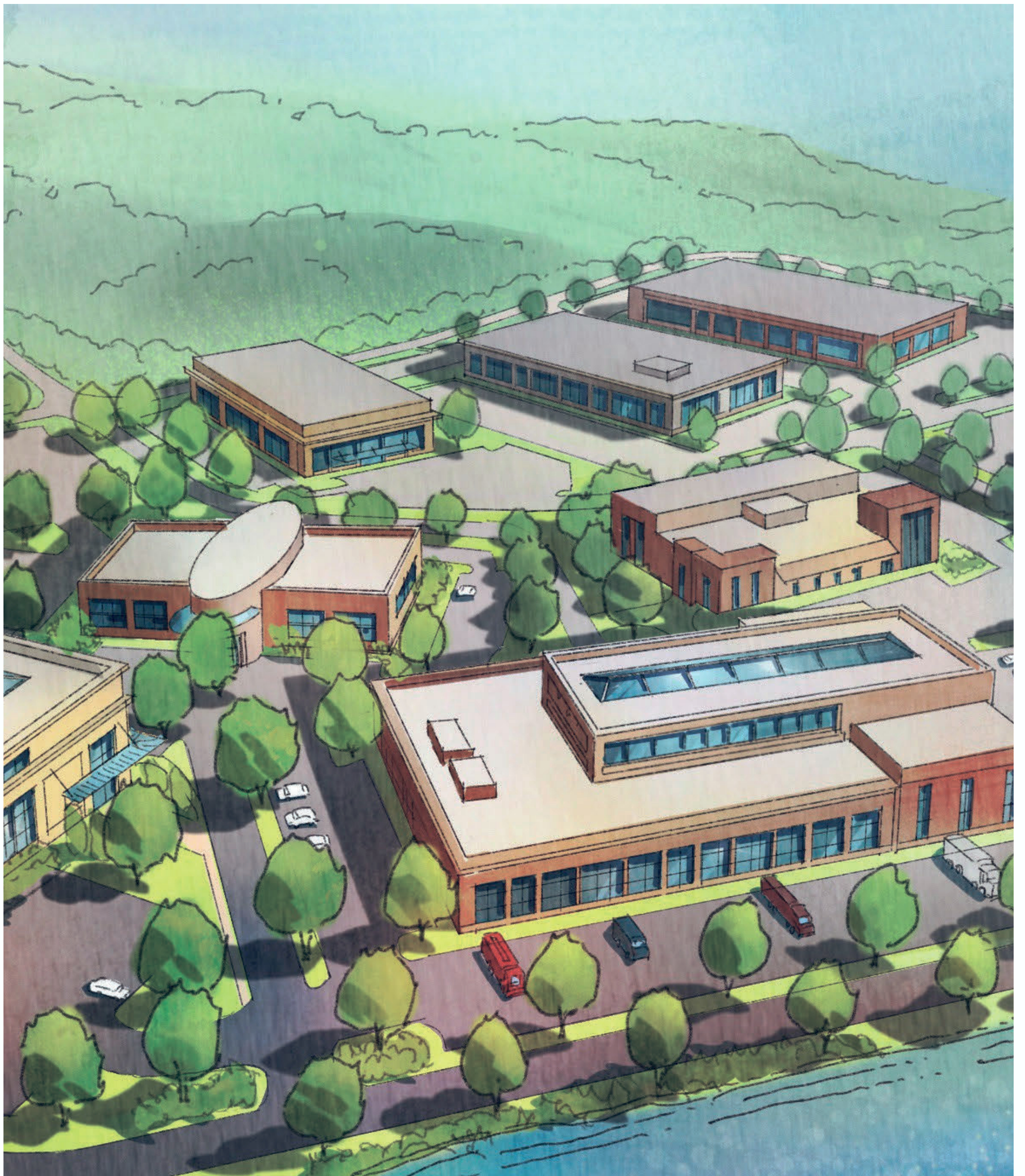
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EDUCATION



WVU Today

The West Virginia Public Education Collaborative has joined forces with the West Virginia Department of Education, the Claude Worthington Benedum Foundation and Marshall University’s June Harless Center to improve the state’s literacy levels through “Sparkling Early Literacy Growth” that will target early learners.

Literacy growth program targets early learners

BY JIM BISSETT  
JBissett@DominionPost.com

Do you remember the first time you realized you actually enjoyed reading? What was the title of the first “book” you actually read and understood — characters, plot, symbolism, narrative? A lot of West Virginians don’t get to enjoy the above. For them, reading is a chore: A laborious slog in which they would just rather not engage. The movie will do just fine, thank you. The current reading proficiency rates for third-graders here hovers around 44%. Which also means 56% of their classmates are being left behind. Educators and aca-

democratic policy makers here want a happier ending. That’s why the project known as “Sparkling Early Literacy Growth” was launched across the Mountain State in 2020, as the pandemic roiled and children were sequestered at home. This tale is made possible by the Claude Worthington Benedum Foundation, Marshall University’s June Harless Center and the West Virginia Public Education Collaborative, which is housed at WVU. All the above linked up, to fund and help inspire a multitude of word-minded endeavors across the state. There’s the WVU School of Medicine, which is using its outlay to train pediatricians in early literacy, so they can bolster low-income parents with at-home learning for their children birth to 5 years old. And Moorefield Elementary School in Hardy County, which began offering workplace tutoring to parents and other caregivers of children for whom English is a second language. Elementary school graduates at West Liberty University are now receiving personalized mentoring in both student diagnostics and individualized learning plans — one more tool in the box to foster reading. “It’s helping change lives,” Donna Peduto said of the grants up to \$50,000, SEE LITERACY, I-10

PRESTON COUNTY SCHOOLS

Consistency moves education forward

BY WILL DEAN  
WDean@DominionPost.com

The consistency of being back in the classroom for the bulk of this school year has helped Preston County’s students to close the gap caused by the pandemic. “This year, we’ve been fairly consistent and so kids have been able to be more consistent,” Superintendent Stephen Wotring said. “And so that’s why I think we’re starting to see those gaps close in those achievement gains that we’re making.” Closing the gap doesn’t just happen during the school year though. “We’ve also been able to have summer school both last year and this year, in an effort again, to try to bridge that gap that we’re seeing attributed to the pandemic,” Assistant Superintendent Brad Martin said. There have been gains in both math and reading in benchmark assessments throughout the year and Wotring said they’re extremely pleased with the results so far. “I think we’ve turned the corner back again and are getting back on track from where we were,” Wotring said. “We’ve met our targets in some places, and we’ve exceeded them in others. So, I think that’s what I’m most excited about is the fact that we’re getting where we need to be.” Extracurriculars, such as concerts, theater and sports, which Wotring said are part of a well-rounded education, have also made a comeback. For the first time, Preston High School competed in the history bowl with two teams doing well. Engaging families has been a focus this year,

Wotring said. Every school has held events to bring in families and they have proven very successful. Wotring said the pandemic was an eye-opening experience for the school system and families alike. Families were forced to take a much more active role in a child’s education while they were learning at home. “I think there’s a greater understanding and the community has even become more supportive of what we’re doing,” Wotring said. “And I think that’s evidenced in the family engagement activities that we’re doing and in the large attendance we’re having at those.” The pandemic required the school system to step up and accelerate its efforts in equipping students with technology, Martin said. Every student has an iPad from K-2 and laptop from third grade to high school graduation. The initial goal was just grades 5-12. That’s given the schools the flexibility to teach remotely when needed and staff are now experienced in doing so, but face-to-face education is still the ideal, Martin said. “We certainly want more engagement with the instructor rather than the online platform,” he said. In July, Martin will take over as superintendent when Wotring retires. “I’m honestly excited that, you know, it’s being passed to Brad, because he knows the system. He knows every aspect of the system. He’s here, he’s invested in this system, and it means a lot to him. So I think that’s key in whoever going to lead this system that they value what this system is,” Wotring said.

He will be the second to lead the school system after the state returned control to the county in 2014. Wotring said he was blessed to land in the role and they’ve worked very hard since then. The fact that the next superintendent, Martin, was hired from within, gives validity to what has been built. The coming years will bring significant challenges, Martin said. The first he mentioned is recruiting and hiring certified and capable teachers. The school has had to look at alternative certification routes and put skilled substitutes in the classroom every day. It’s a trend that’s going to continue based on what higher education is telling the system — there are fewer people becoming teachers. As teachers retire or leave the field, Wotring said there just won’t be people to fill the positions. Martin also wants to deepen the number of substitute bus drivers. There are nine enrolled in a class now and another class is planned for the summer. “But we run into very similar circumstances with new teachers, there’s just a finite number of individuals who are looking to drive a bus because there’s more lucrative opportunities in other industries so that’s going to continue to be something we’ll work towards.” Martin’s goal is to be the best option for education in Preston County. “We want to be the best available option for educational services in Preston County. So, you know, we want to continue to make improvements so that people want to have their kids in our schools,” he said. TWEET @WillDean\_DP

“WE’VE MET OUR TARGETS IN SOME PLACES, AND WE’VE EXCEEDED THEM IN OTHERS.”

Stephen Wotring, Preston County Schools superintendent



The Dominion Post

Preston High School is one of 10 public schools in the Preston County district.



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WEST VIRGINIA UNIVERSITY

Kendricks’ gift to support economics education

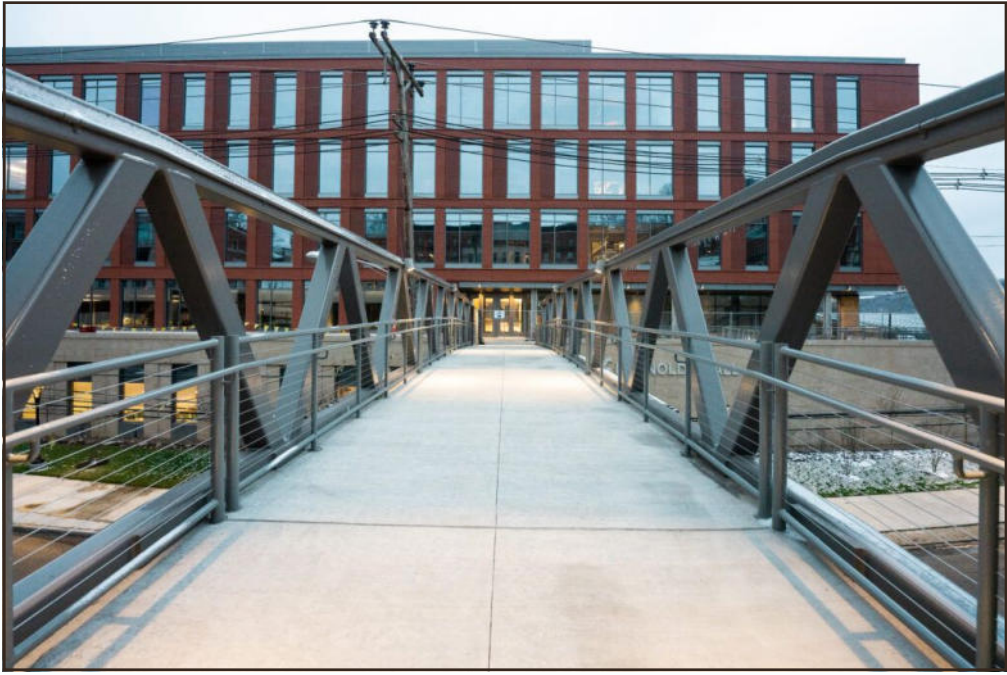
BY EVA MAYS  
Newsroom@DominionPost.com

West Virginia University announced a transformative gift to the John Chambers College of Business and Economics, given by Earl G. “Ken” Kendrick Jr., and his wife, Randy Kendrick.

Ken Kendrick is a pre-eminent software entrepreneur, banking technology industry executive, and sports team owner. A native of Princeton, he graduated from WVU in 1965 with a bachelor’s degree in business administration and appears on the Chambers College Roll of Distinguished Alumni. Randy Kendrick, a graduate of Washington College of Law at American University, is a political donor and activist.

This alliance between WVU and the Kendricks will forge the Kendrick Center for an Ethical Economy, an entity focused on supporting economics education and keeping home-grown talent in the state. In a tweet, WVU President Gordon Gee thanked the couple for the contribution, stating that the project “will help us retain top young talent in line with our land-grant mission by aiding teachers in filling economic literacy gaps that exist for students.”

The inaugural chair of the Kendrick Center is Cathleen Johnson, assistant chair in the Economics Department at WVU. She



Ron Rittenhouse/The Dominion Post file photo

has a long-standing interest in economic literacy education and has traveled throughout the world to give workshops on the topic.

“Economics helps us understand the gears that push the changes we see in technology, institutions and even the environment,” Johnson said. “It helps us predict what is coming our way. Understanding economics is a life skill that keeps us resilient.”

The Kenrick Center,

which will be housed within Reynolds Hall on WVU’s Downtown Campus, hopes to lead the university and state to new horizons by pursuing three key initiatives.

The first is the Kendrick Educators in Economics Program. According to WVU, this program will “create a specialized track for educators within its Master of Science in economics program, offer summer workshops focused on economics education for teachers and

recruit mentor teachers to support Kendrick Educators.”

Secondly, the Kendrick Center will expand access to Economics 201, Principles of Microeconomics, to high school students in West Virginia. This course will invest in local talent by increasing young West Virginians’ economic and financial literacy and emboldening them to pursue higher education.

Johnson said the first cohort of Economics 201 will begin this fall. The cen-



WVU Today photo

Randy (left) and Ken Kendrick’s donation to WVU creates the Kendrick Center in the new Reynolds Hall (at left). This alliance between WVU and the Kendricks will forge the Kendrick Center for an Ethical Economy, an entity focused on supporting economics education and keeping home-grown talent in the state.

ter is in the process of hiring teachers to help shape the program.

The third initiative is the Kendrick Fellows Program, which will serve to inspire high-achieving high school students to bring their potential to West Virginia University, engage them with educational opportunities at the Kendrick Center and encourage them to remain in the state after graduating.

“It’s a very exciting program for 20 high-achieving West Virginia high school seniors each year,” said Johnson. “They can be any major, but they will take a minor that is currently in development. If the students choose to stay in the state, they will have ideas about ethics, economics

and public policy that will help them make West Virginia a better place to live.”

Over the next decade, Ken and Randy Kendrick will dedicate \$20 million to the Kendrick Center. WVU will match that contribution over the same time frame, using repurposed funds, in-kind support and new investments.

“We have a 10-year vision for the Kendrick Center,” said Johnson. “We’re going to be very careful and measure everything to make sure we’re being effective. We want to make Ken and Randy Kendrick’s gift go the furthest it can for West Virginia. It could be that we achieve everything, and it could be that we achieve more. I am hopeful for more.”

ELECTRIC VEHICLES

U.S. Department of Energy announces \$3.1B in funding for battery production

Riley Beggin The Detroit News (TNS)

WASHINGTON — The U.S. Department of Energy announced Monday it would distribute more than \$3.1 billion in matching grants for electric vehicle battery manufacturing and processing.

The funding, appropriated through the bipartisan infrastructure law passed last year, could go to a wide variety of domestic battery projects such as revamping factories to build batteries or mineral processing for use in batteries.

The agency is also announcing a separate \$60 million grant program for battery recycling projects.

“This will help to underwrite the private investment we need in the U.S. to build reliable industrial capacity and, for the first time, have a domestic end-to-end supply chain in electric vehicles and electric vehicle production,” National Economic Council director Brian Deese told reporters Monday.

The Energy Department estimates 16 to 30 projects will be funded through the grant program, depending on the applications they receive from private companies.

The grant money will come from \$7 billion appropriated through the infrastructure law for bolstering the battery supply chain, White House National Climate Advisor Gina McCarthy said.

The announcement comes after President Joe Biden said in late March that he would use the Defense Production Act to spur production of critical battery minerals such as lithium, nickel, cobalt, graphite and manganese.

As automakers ramp up plans to produce electric vehicles, demand for those critical minerals is sky-

rocketing. While the U.S. does produce some of these minerals, it has little power to process them into what’s needed for batteries. In comparison, China controls around 80% of critical mineral processing power around the world.

Asked how the administration can guarantee that the grant funding will go to American companies rather than other companies that are directly or indirectly owned by Chinese companies, given their domination in the market, McCarthy said projects in Michigan and Nevada could be good options for government investment.

“There are opportunities to expand innovations in supply chains in Michigan we already know are available and we can help our automakers increase demand for safer and cleaner vehicles there,” she said.

Energy Secretary Jennifer Granholm is also vis-

iting Michigan Monday to tout the announcement.

The funding announcement also comes as conservative Democrat Sen. Joe Manchin of West Virginia, a crucial vote in passing any Biden administration climate priorities, has repeatedly raised concerns about government support for electric vehicles while the mineral supply chain remains largely under China’s control.

Biden has said he wants half of all new vehicles sold in the U.S. to be electric by 2030 and has been pushing policies that would accelerate the transition to electric vehicles since coming into office, including directing federal agencies to buy only zero-emission light-duty vehicles by 2027 and only zero-emission vehicles fleetwide by 2035.

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PILOT PLANT

WVU expects rare earth production this summer

BY DAVID BEARD  
DBeard@DominionPost.com

The director of WVU's Water Research Institute expects its rare earth element production pilot plant at Mount Storm to start producing product this summer.

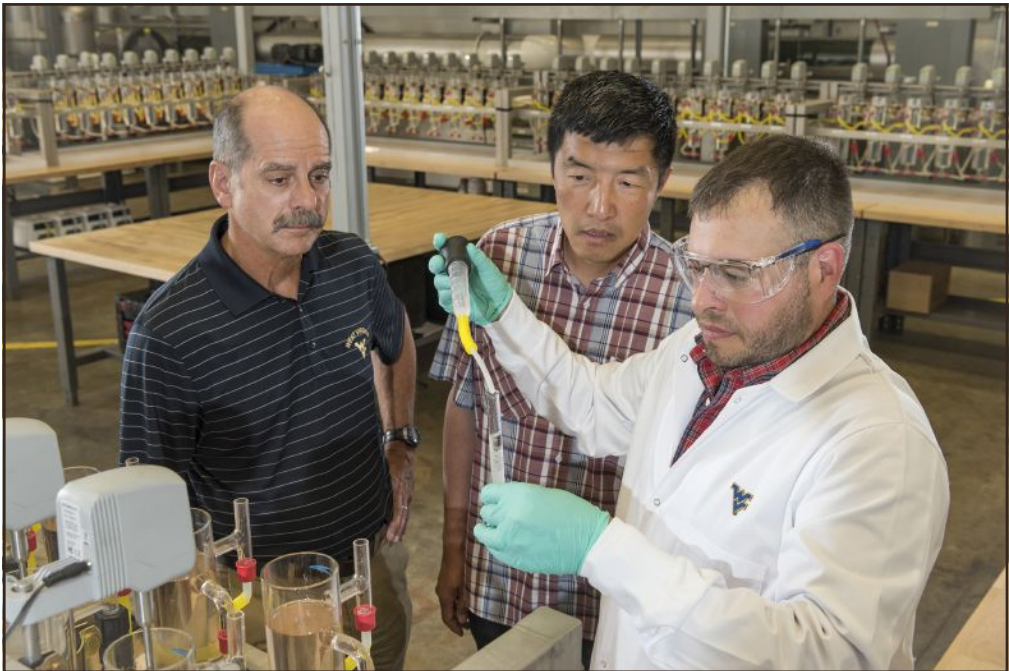
And state legislation passed in March contributed to that effort and could pave the way for a fuller scale operation.

Rare earth elements, according to the U.S. Geological Survey, are 17 metallic elements "necessary components of more than 200 products across a wide range of applications, especially high-tech consumer products, such as cellular telephones, computer hard drives, electric and hybrid vehicles, and flat-screen monitors and televisions. Significant defense applications include electronic displays, guidance systems, lasers, and radar and sonar systems."

About 97% of the world REE production is from China, USGS says.

The Water Research Institute has spent several years exploring how they can be extracted from acid mine drainage.

Institute Director Paul Ziemkiewicz explained that AMD is typically treated by collecting the water and treating it with limestone or some other base to separate out the metals. The sludge is collected and the water is discharged.



WVU Today

Members of a WVU rare earth research team from left, Paul Ziemkiewicz, director of the West Virginia Water Research Institute; Xingbo Liu, professor and associate chair of research, Statler College of Engineering and Mineral Resources; and Chris Vass, facility operator, work in the Rare Earth Extraction Facility at the WVU.

The rare earth extraction process adds a second step. The first step is the same — the pH is raised to precipitate out junk metals. The second step raises the pH again and separates the rare earths. Those minerals can be hauled to a central concentrator and processed like an ore. "All kind of good things happen from that point."

HB 4003, passed in March, allows the state or private entities — mine companies or watershed groups, for instance — to sell rare earth elements

and critical minerals extracted from mine drainage.

It enables parties treating mine drainage to extract rare earth elements and critical minerals from the mine water and use, sell or transfer them. The state Department of Environmental Protection is restricted to deposit its income from water it treats into the Special Reclamation Water Trust Fund or the Acid Mine Drainage Set-Aside Fund. Private parties treating water under a DEP permit may

keep their proceeds.

The idea, Ziemkiewicz said, is to incentivize AMD treatment. The runoff has to be treated anyway and it's a liability. By extracting the rare earths, some money can be made.

The institute just did a feasibility study on a central concentrator, he said. Working with a set of assumptions, they project that the company or agency or group generating the concentrate from the AMD could make \$150 per ton. The concentrator plant could earn an annual 10%

AMD IS TYPICALLY TREATED BY COLLECTING THE WATER AND TREATING IT WITH LIMESTONE OR SOME OTHER BASE TO SEPARATE OUT THE METALS. THE SLUDGE IS COLLECTED AND THE WATER IS DISCHARGED.

Paul Ziemkiewicz  
WVU Water Research Institute director

return on investment.

Rare earths are called rare not because they're actually rare, but because they are found in small concentrations — 1/2 to 1 milligram per liter of water. A conventional rare earth mine may have about 5% to 10% of the valuable heavy rare earths — not all of the 17 are valuable — in what it extracts. AMD concentrate contains about 45% to 50% of the valuable minerals, Ziemkiewicz said.

At Mount Storm, he said, the concrete work is done, the clarifiers are built, the electric line has been run to the building, the lime silo and plumbing are in place. The contractor is now set to put the steel shell on the outside. When that's done, the institute will move the equipment from the lab to the plant. Then DEP will need to get the water running through it.

The plant will process somewhere from 500 to 1,000 gallons per minute, he said, and produce up to two tons per year of valuable rare earths.

Not all AMD has valuable rare earths, he said. The worse the water, the

higher the concentration.

This is a demonstration plant, he said.

"Our next move would be to convince people that this is the way they should be treating, and start generating all this concentrate out in the field that can be stored on site until it gets to a certain level, and then you haul it in to a central processing facility. We want that to be in West Virginia."

The feasibility study anticipates concentrate coming in from all over the country, he said.

A rare earth mine can take five to 10 years to get through prep work and permitting, Ziemkiewicz said. AMD is being treated anyway and all the permitting is done. "We can go into production theoretically tomorrow. ... It's just a matter of how many sites can contribute to this program."

U.S consumption of rare earths is about 15,000 tons per year. Treating AMD could produce up to 2,200 tons per year, and at that scale, the operation will

SEE EARTH, I-7

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EARTH

FROM PAGE I-6

start making money.

WVU reported in 2021 that this project is part of a larger vision exploring a national supply chain with multiple AMD treatment plants sending concentrates to the central facility Ziemkiewicz referred to.

TWEET @dbeardtdp

RARE EARTHS ARE CALLED RARE NOT BECAUSE THEY'RE ACTUALLY RARE, BUT BECAUSE THEY ARE FOUND IN SMALL CONCENTRATIONS — ½ TO 1 MILLIGRAM PER LITER OF WATER. A CONVENTIONAL RARE EARTH MINE MAY HAVE ABOUT 5% TO 10% OF THE VALUABLE HEAVY RARE EARTHS.

Paul Ziemkiewicz  
WVU Water Research  
Institute director

More Progress

This is the first of three Progress 2022 editions to be published by The Dominion Post. Upcoming are Business and Municipalities, May 15; and Health care, May 22.

The Dominion Post

NATURAL GAS

Report: Prices nearing 14-year high

BY DAVID BEARD  
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It's a good time for the natural gas industry from one point of view.

Seeking Alpha and Marcellus Drilling News report prices hit a 13-year high and are approaching a 14-year high.

And the Mountain Valley Pipeline — a 303-mile line from Wetzel County to Pittsylvania County, Va. — may be completed this summer. It's 95% complete and was stalled by some court rulings, but earlier this month the Federal Energy Regulatory Commission approved MVP's request to change how the line will cross a number of water bodies and wetlands.

FERC said at the time, "Mountain Valley's usage of trenchless waterbody crossings will result in fewer environmental impacts than the crossing method that the commission approved under the original certificate, meaning that today's order amending Mountain Valley's certificate will almost certainly represent an improvement over the status quo."

And GO-WV — the Gas & Oil Association of West Virginia — reports that the drilling rig count is up slightly.

On the other hand, said Charlie Burd, GO-WV executive director, "We have an administration in Washington, D.C., that is pretty much anti-fossil fuels. That has had a negative impact not only on West Virginia but the entire country."

On April 20, Sen. Shelley Moore Capito, ranking member of the Senate Environment and Public Works Committee, led Republican colleagues on the committee in a letter to



A typical drilling rig.

the assistant secretary of the Army for Civil Works, saying the Army Corps of Engineers' is engaging in partisan politics in its decision to review Nationwide Permit 12, the corps' general permit for oil or natural gas pipeline activities.

They called the decision "disappointing and perplexing" in view of continued energy price spikes, war in Ukraine and general inflation. "Your decision to formally review NWP 12 is yet another example of creating unnecessary obstacles and uncertainty for development of critical energy projects. Complicated, time-consuming, and most importantly, unnecessary

permitting processes remain one of the biggest hindrances to our nation's infrastructure buildout. The decision to single out and review NWP 12 for oil and gas pipelines is purely political, as this policy action is not required by statute or any regulatory deadlines."

Burd cautioned, as he always does, that GO-WV has no crystal ball, but said, "As long as there is upheaval between Russia and Ukraine and the other European Block countries, I believe we're going to encounter global shortages of oil and a continued escalation of gasoline prices."

That will be slightly exacerbated, he said, by

the annual summer move in some states to change emission standards for gasoline blends, which typically increases prices a few cents.

Burd said he's talked with a number of people about Biden's effort to release 1 million barrels per day from the Strategic Oil Reserve — a total of 180 million barrels over the course of his plan. That's just three days' usage nationally, he said, and may have some minor effect.

But they'll have to replace the stock with more expensive oil, which needs to be considered should we encounter a true emergency.

Burd understands the

move toward green, carbon-free energy. "We have to be an all-in sort of energy state. But the fact is undeniable those sources of energy are intermittent at best. So you always have to have a back-up supply to be there when the wind doesn't blow or the sun doesn't shine," he said.

For a home, that might be a propane-powered generator for when the electricity goes out.

Burd said GO-WV was pleased to be asked to participate in the West Virginia Hydrogen Hub Working Group, which recently submitted its proposal to the Department of Energy to host one of DOE's four hydrogen hubs, funded by Infrastructure Investment and Jobs Act money.

"We're here to assist in any way we can," he said. Hydrogen production offers another natural gas market.

Blue hydrogen is produced by steam methane reforming, which requires burning natural gas to reform methane into hydrogen and carbon dioxide, from which they capture and sequester the CO2. A possible alternate, cleaner way to produce blue hydrogen is microwaves; it can produce hydrogen faster with less energy.

The three members of West Virginia's Congressional delegation who supported the infrastructure act jointly reported that the Act included \$9.5 billion for hydrogen: \$8 billion for Regional Clean Hydrogen Hubs that will jumpstart the production, transport, and use of clean hydrogen across the U.S. economy; \$1 billion for a Clean Hydrogen Electrolysis Program to reduce costs of hydrogen pro-

SEE GAS, I-10

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NATIONAL ENERGY TECHNOLOGY LABORATORY

Researchers working on water, vehicles, more

BY ERIN CLEAVENGER  
ECleavenger@DominionPost.com

After stepping up to help the nation respond to COVID and roll out the vaccine in 2020, the National Energy Technology Laboratory (NETL) was able to turn its focus back to the mission in the energy space in 2021.

The NETL, on Collins Ferry Road in Morgantown, is one of 17 Department of Energy (DOE) national laboratories and one of only three applied national laboratories.

NETL was first established in 1946 during World War II to find efficient and cost-effective ways of gasifying coals to produce synthesis gas and is now a full-service energy innovation center investigating energy technologies related to geological and environmental sciences, energy conversion, computational science and more.

NETL Director Brian Anderson said two sister labs in the energy space are the National Renewable Energy Laboratories, developing things like wind turbines and solar panels, along with a lab in Idaho that focuses on nuclear energy and the advanced nuclear reactor.

“We are the fossil and carbon management laboratory,” Anderson said. “So we have been working on carbon capture technologies and producing low carbon hydrogen, low carbon chemicals and fuels.”

In addition to being a national laboratory, NETL also does project management for the Department of Energy and has scientists, engineers and researchers at the lab in Morgantown as well as a lab in Pittsburgh and one in Albany, Ore., that are developing cutting-edge technologies.

According to Anderson,



Submitted photo

Moderator Bryan Morreale (left), associate laboratory director for Research and Innovation at NETL, leads a discussion at a recent Focus Forward conference with panelists Nathan T. Weiland, senior fellow in Energy Conversion; engineering; Joseph Stoffa, technology manager; and Ruishu Wright, research scientist.

NETL manages projects throughout the DOE, not just fossil energy and carbon management.

“We also manage a big part of the vehicle technology portfolio,” he said. “So a lot of work in heavy duty vehicles and even the battery supply chain for the new electric vehicle supply chain.”

Anderson said NETL was really able to focus on the carbon management part of the mission in 2021, partly because the Biden administration came in with some pretty aggressive goals in decarbonizing society.

Starting with a 2035 goal of decarbonizing the electricity sector, NETL has been called to the forefront

to roll out many of the technologies it has been working on in carbon capture and sequestration and in other parts of the low carbon economy, Anderson said.

“The new administration signed an executive order the first week in office and formed an inter-agency working group with 12 fed agencies to work across the government to try to make sure we don’t leave coal communities behind during an energy transition.”

Anderson said he reminded the group that the transition has already started in West Virginia and some people have been left behind. “So the lab stood up very quickly,

raised our hand and told the administration, including the secretary of energy, we want to help,” Anderson said.

The White House asked Anderson to lead the initiative. “Over the course of 2021, we met with over 5,000 people across the country to make sure the federal government knows the plight of our coal and energy communities,” Anderson said. “Here in West Virginia, we know the impact of closing coal mines.

“It really is a priority of ours to make sure that if we are going to make big investments in, say the solar industry, then we need to reassure manufacturing and make sure that places in Appalachia have an opportunity to build the solar panels, not just install them,” he said.

According to Anderson, \$205 billion has been lined up across the 12 agencies over the last year that is eligible for energy communities.

“Everything from aban-

doned mine land reclamation, oil and gas well plugging, brownfields development funds, as well as community programs,” he said.

So far, \$3.3 billion has been awarded to making sure coal and energy communities have a chance.

That isn’t all NETL has been working on this past year, however. Anderson said NETL was also proud of one of its in-house research teams that developed a multi-functional sorbent technology they call MUST. In a nutshell, the technology can take heavy metals and contaminants out of water.

“It is extremely powerful, so it can basically make some really pure water from some really nasty stuff,” Anderson said. “But it’s also really practical in the way it can be applied and used so it has a lot of attention.”

MUST could be valuable in places like Flint, Mich., with the lead pipe water systems to the acid mine drainage in Appalachia and northern West Virginia.

“It can actually extract some of the critical minerals and critical elements that we need right now that we are sourcing from foreign sources, mostly from China, that we use in every-day electronic devices; permanent magnets for the electric vehicles, for wind turbines, things like that,” Anderson said. “What we are finding and really advanced in 2021 were some of those projects to extract and purify rare earths.”

Another significant

SEE NETL, I-10

“IT REALLY IS A PRIORITY OF OURS TO MAKE SURE THAT IF WE ARE GOING TO MAKE BIG INVESTMENTS IN, SAY THE SOLAR INDUSTRY, THEN WE NEED TO REASSURE MANUFACTURING AND MAKE SURE THAT PLACES IN APPALACHIA HAVE AN OPPORTUNITY TO BUILD THE SOLAR PANELS, NOT JUST INSTALL THEM.”

Brian Anderson, NETL Director



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RESEARCH

# Partnership to explore area’s geothermal potential

BY DAVID BEARD  
DBeard@DominionPost.com

As the nation shifts toward greener energy sources, making better use of geothermal has been on many minds.

WVU, in partnership with the U.S. Department of Energy and local natural gas producer Northeast Natural Energy, will explore the region’s geothermal potential with a test well to be drilled at Northeast’s Morgantown Industrial Park pad — the site of WVU’s MSEEL project — the Marcellus Shale Energy and Environmental Laboratory.

The well will go down three miles and will not produce any energy, said Sam Taylor, assistant director at WVU’S Energy Institute. “The well is completely exploratory.”

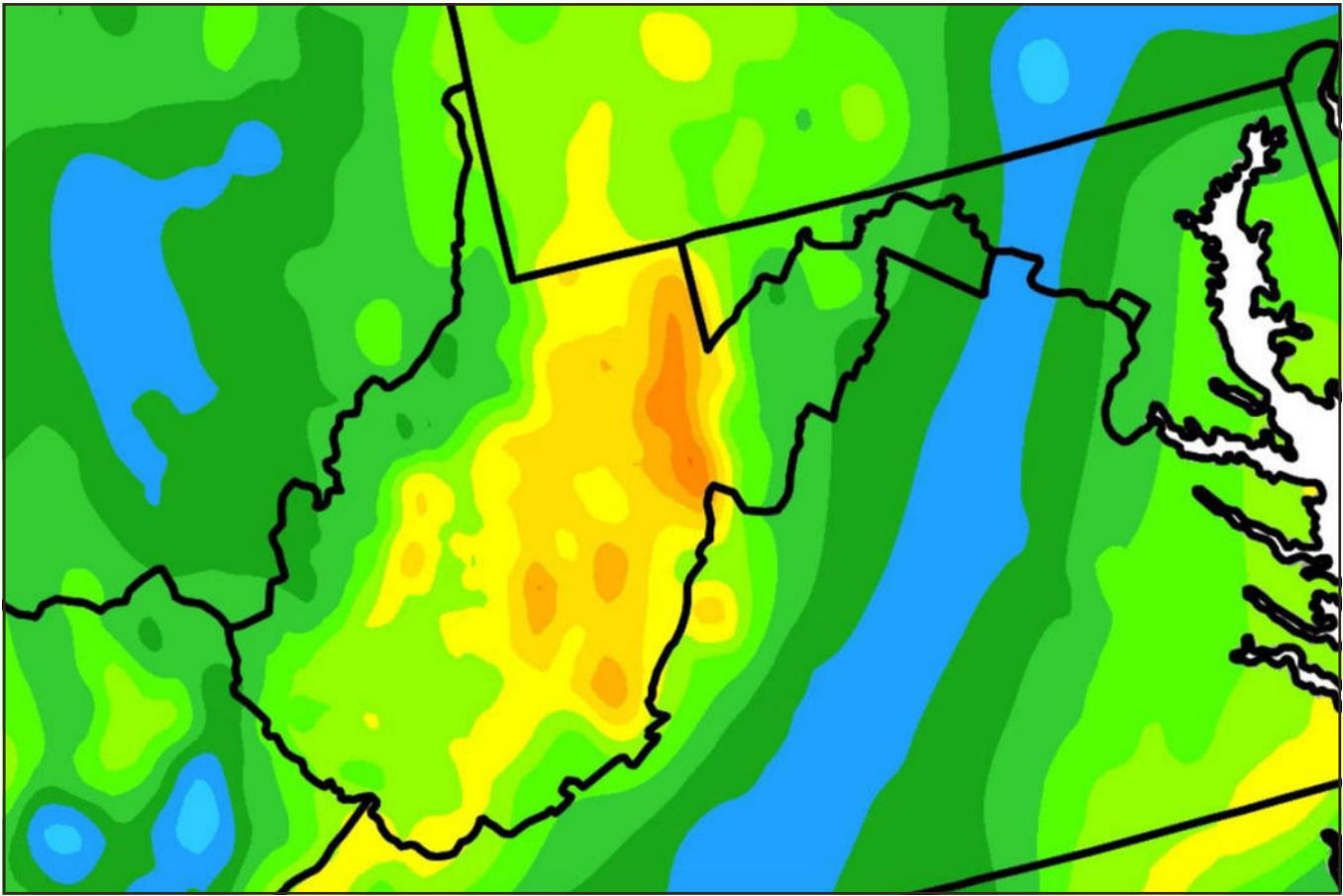
They’ll look at rocks and temperatures and take all kinds of data to determine the potential.

As WVU has reported, most geothermal reservoirs are out West — think of the volcanic range west of the Rockies and Cascades, part of the Pacific Ring of Fire.

But a 2016 study identified north-central West Virginia as a possible deep geothermal hot spot. This is the first effort to see what’s down there. “The idea is this is a de-risking project,” Taylor said, to see what’s there before private investment comes in.

Institute Director Jim Wood said, “It’s striking to me that I’ve heard for six, seven years that we’re sitting over a hot spot and I’m wondering why the heck somebody didn’t look and see what it’s like.”

Now they are. If the heat is really hot — say 300 degrees Fahrenheit — it provides a lot of options for commercial use — heating buildings, drying wood and



Submitted geothermal map

This geothermal map shows where more heat pockets may be under Monongalia County.

so on, they said.

The partnership with Northeast is fortuitous, Taylor said. It will give a look at the temperatures and feasibility of tapping heat under and close to Morgantown for private entities, the potential to heat WVU buildings, and more. And the proximity to WVU saves a lot of money. “For us that’s a great location.”

This is just a three-mile, vertical test well with no laterals, Taylor emphasized. A toe in the water.

“The dome is reasonably big in the maps that we’ve

seen, but the ground truth is still a little thin,” he said. “Are the temperatures what we think they are based on models and other data in the region?”

If the dome is what they hope it is, it might open interest in other parts of the state, he said.

That the dome is under this area, he said, is important because heat can’t be shipped. It has to be used close to where it’s produced. “To use this low-carbon energy source you have to come here. It becomes sort of a business attraction.”

And even if it isn’t as hot as they hope, the data could be useful for other projects — such as ground source heat pumps, for uses that don’t need the high temperatures or have to be drilled as deep.

The well will be cased as though it’s a deep gas well, he said. “We’re just being extra cautious.”

Tied to this project is legislation passed in Charleston in March: HB 4098, the Geothermal Resources Act. It directs the Department of Environmental Protection to develop a geothermal

energy permitting system and it specifies that geothermal energy is not a water or mineral resource and belongs to the surface owner.

“We’re in an undefined area,” Taylor said. “That was kind of what prompted the activity at the Legislature.” It establishes clarity. For example, for a company that wants to drill and use the heat, it defines who to negotiate a lease with.

The DOE awarded WVU \$7.5 million for the four-year project. Professor Nagasree Garapati is leading the research team, which will look at the potential energy supply, storage reservoirs and campus building energy loads, and build equipment that would use the locally produced heat.

Garapati, a visiting assistant professor of chemical and biomedical engineering, has a Ph.D. in chemical engineering from WVU.

Geothermal energy does not produce CO2 emissions, except during the drilling process, Garapati said. It’s also available 24/7 and can’t be trucked out of state — anyone wanting to take advantage would have to come here.

“It doesn’t require thousands of acres of land for (solar) panels and that makes the geothermal more attractive,” Garapati said. “And that’s why we want to see if it is feasible.”

Garapati said her team will collect rocks, core samples and sidewall core samples to analyze for permeability and temperatures.

“We also plan to do pressure testing to know how the fluid flows within the reservoir,” she said.

She has also been learning as much about the area as possible using data on other wells, including historical natural gas wells that fed the glass plant at the Seneca Center.

“We’re looking at using it as an earth battery, so that we can store additional energy, which we’re not using during summer, underneath of the shallow formations,” Garapati said. “And then pull it out during winter when we need more and more energy. So for that, we’re looking at shallow formations as well.”

Taylor said the drilling could start this year — depending on a variety of real-world conditions such

**“THE DOME IS REASONABLY BIG IN THE MAPS THAT WE’VE SEEN, BUT THE GROUND TRUTH IS STILL A LITTLE THIN. ARE THE TEMPERATURES WHAT WE THINK THEY ARE BASED ON MODELS AND OTHER DATA IN THE REGION?”**

Sam Taylor, assistant director at WVU’S Energy Institute

SEE EXPLORE, I-10

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TECHNOLOGY

# WVU researchers to improve the flow of renewable energy to power plants with \$7.5 million in grants

WVU Today

Integrating renewable energy with the power grid continues to be a big challenge for the electrical grid infrastructure in the United States.

While the solution isn't simple, it's not impossible either, and researchers from West Virginia University were competitively awarded \$7.5 million from the United States Department of Energy to help solve a critical part of the problem.

In short, power plants are being asked to do something they were never designed to do — quickly cycle from using fossil fuels to generate power to a renewable energy source, such as wind or solar, when those sources are available.

According to Xingbo Liu, principal investigator of the project, the continuous and unpredictable cycling of varied energy sources is causing severe stress to critical operating systems of the plant.

"Renewable energy is not stable," Liu, associate dean for research and professor of mechanical and aerospace engineering, said. "Wind speed changes every day and solar power is only available when the sun is shining. On the consumer side, no matter what happens, you still want your house to be heated and your air conditioning to be working."

Liu explained that each time a new cycle is initiated, the temperature

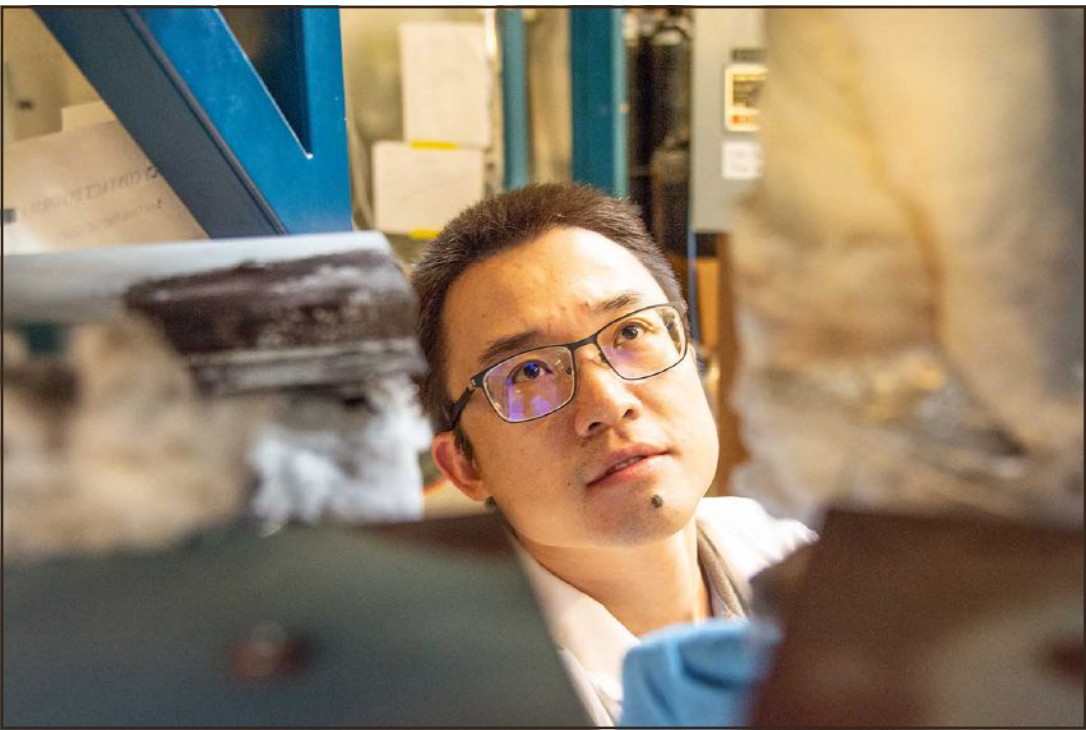
**“RENEWABLE ENERGY IS NOT STABLE. WIND SPEED CHANGES EVERY DAY AND SOLAR POWER IS ONLY AVAILABLE WHEN THE SUN IS SHINING. ON THE CONSUMER SIDE, NO MATTER WHAT HAPPENS, YOU STILL WANT YOUR HOUSE TO BE HEATED AND YOUR AIR CONDITIONING TO BE WORKING.”**

Xingbo Liu  
Associate dean for research and professor of mechanical and aerospace engineering

inside the steam boiler and turbine system is changed as a result. The stark changes in temperature puts stress on the systems joints, which are currently welded together by two different alloys that each respond differently to temperature fluctuations.

"These types of power plants were designed to start and run forever until there was a planned shutdown for maintenance," Liu said. "The problem now is that the plants have much more cyclic operations than they were designed for. When a new cycle begins, it puts stress on the joints and they begin to crack."

For example, when you're driving in a city and forcing your car to start



WVU engineers Xingbo Liu, Kostas Sierros and Wenyan Li (pictured) are developing technologies to upgrade critical components of power plants that frequently fail due to stress caused by continuous cycling of various energy sources.

WVU Photo/Paige Nesbit

and stop quickly over an extended period, your brakes are likely to burnout faster due to stress on the materials. Once your brakes are out, the car is no longer useable. A similar process is happening with the turbine systems of a power plant; however, the stakes are much higher.

To overcome this problem, the Statler College engineers are using 3D printing to create a smooth transition between the two different metals, creating a new composite transition joint that will eliminate this commonly experienced problem with welding dissimilar metals.

"The whole idea is to become more transitional and gentler, to reduce the stress created by hot and

cold starts and frequent shutdowns," Liu said. "In the past, this has been difficult, but now we have advanced manufacturing and 3D printing to do it. We've developed a smooth transition of the two materials, and we are welding the same materials together instead of different ones."

In 2019, DOE selected five research groups to develop technologies to improve the flexibility and reliability of thermal power plants. WVU received \$1.25 million for Phase I. After completion of the first proof-of-concept phase, DOE reviewed the technologies and awarded WVU another \$6.25 million to continue with the research and development

**IN SHORT, POWER PLANTS ARE BEING ASKED TO DO SOMETHING THEY WERE NEVER DESIGNED TO DO — QUICKLY CYCLE FROM USING FOSSIL FUELS TO GENERATE POWER TO A RENEWABLE ENERGY SOURCE, SUCH AS WIND OR SOLAR, WHEN THOSE SOURCES ARE AVAILABLE.**

of the additively manufactured graded composite transition joint.

Kostas Sierros, assistant professor of mechanical engineering, and Wenyan Li, assistant professor of chemical and biomedical engineering, are serving as co-pi's on the project.

Over the three-year duration of Phase II, the researchers will test the new technology in a real testing loop in hopes to bring the mechanization to

the global market. The project team is extensive and is comprised of an entire supply chain — the research is being conducted within the Statler College, tested at Oak Ridge Laboratory, manufactured by General Electric Research and University of Nebraska-Lincoln, and is slated to be commercialized by General Electric if successful.

## EXPLORE

FROM PAGE I-9

as equipment and supply prices. The drill will take just 45 days. The rest of the time will be data analysis and evaluation.

Because DOE is footing the bill, it will own the data and publish it, and it will end up in the public domain, Taylor said.

**THIS IS JUST A THREE-MILE, VERTICAL TEST WELL.**



Photo courtesy of Northeast Natural Energy

West Virginia University is partnering with Northeast Natural Energy to drill an experimental geothermal well at the Morgantown Industrial Park, the same NNE site as the completed WVU Marcellus Shale Energy and Environment Laboratory project, pictured here in 2015.

## LITERACY

FROM PAGE I-4

which are now being awarded.

There's also something else, said Peduto, the executive director of the learning collaborative at WVU. She has a personal and professional stake in the matter.

And she takes it all personally — and professionally.

Peduto began her career in education as a

classroom teacher and reading specialist in neighboring Marion County.

She never forgot what it was like to see students who were once scowling over the printed word smile broadly — when they realized they were actually understanding what they were reading.

Like most educators, she prescribes to that adage about how learning to read begets learning to learn.

Nine projects totaling \$400,000 were awarded in that inaugural year, she said, and a new funding cycle just launched.

"This is exciting and heartening to watch," she said.

Visit <https://wvpec.wvu.edu/events-and-initiatives/early-literacy> to learn more and apply for a grant for your project.

"This is transforming lives," Peduto said.

TWEET @DominionPostWV

## NETL

FROM PAGE I-8

research highlight, Anderson said, has been in the area of microwave reaction technology at the Morgantown lab in what is called the ReACT facility.

"It is a world-class — and people use that term a lot — but it is truly, globally, a one-of-a-kind reaction engineering laboratory," Anderson said. "Folks with big research organizations like EXXON mobile and others come to us to try to use the ReACT facility."

Using the facility, Anderson said they have made some significant advances producing low carbon hydrogen; ammonia, which can be used as an energy carrier; and pathways toward decarbonizing the petrochemical sector using the ReACT facility.

Anderson said 2021 NETL accomplishments also included a bunch of awards such as three R&D 100 awards, which are the Oscars of innovation. One was awarded for the MUST technology, another for an energy data exchange, or EDX, platform built by NETL that is now being used more broadly by the DOE; and the third for a process to make low cost graphene from raw materials like waste coal and coal.

According to Anderson, the process for making graphene has lowered the

cost of the material from around \$10,000 per liter to less than \$1. Of the process, he said it's "an amazing feat of scientific accomplishment."

Historically, NETL has supported four different DOE program offices, Anderson said. They are fossil energy and carbon management, vehicles and energy efficiency program, the office of electricity, and the office of cyber security and emergency response, which secures the energy supply.

With the passage of the infrastructure bill, the DOE has set up a few new program offices, meaning NETL will now also support the grid deployment office working on grid security and reliability and the office of clean energy demonstrations, which is putting \$30 billion toward hydrogen hubs and carbon capture demonstration facilities.

Anderson said they are also working with the vehicle technology office and the development of batteries and assisting the DOE and DOT to set up a new office working to put out electric vehicle charging infrastructure across the country.

"There is no other organization in the department that is serving a broader swath of impactful programs than NETL," Anderson said.

Moving forward, Ander-

son said, they will be hiring more people to help in the deployment efforts for the infrastructure bill.

"Congress funded us to build a director capture center right here at the lab so it's going to be the world's premier center for developing and proving out the technologies for capturing carbon directly from the air," Anderson said they are starting the design of the facility.

They are also in the process of a lab expansion in Morgantown and building a computational science and engineering center, Anderson said.

"I expect a lot out of our researchers this year. They are always going to surprise me. They are working on some amazing technology, including areas like converting natural gas directly into hydrogen and solid carbon," he said. "Hydrogen can be used as a zero-carbon fuel. Solid carbon can be used in valuable materials like the graphene and graphite."

In 2022 and beyond, NETL is working to help move the country and state forward in the energy sector. While Anderson said NETL is "proud to be in West Virginia and proud to be in Morgantown," it should really be the community that is proud to have such a cutting-edge laboratory here.

TWEET @DominionPostWV

## GAS

FROM PAGE I-7

duced from clean electricity; and \$500 million for Clean Hydrogen Manufacturing and Recycling initiatives to support equipment manufacturing and strong domestic supply chains. The legislation also requires one hub be located in Appalachia as the largest natural gas producing region.

Burd pointed out the U.S.

is the world's leading natural gas producer, at 33 trillion cubic feet (tcf) per year, followed by Russia at 22 tcf. The tri-state region of West Virginia-Ohio-Pennsylvania, if it was a standalone nation, would be third in the world, at 13 tcf, followed by Iran at 9 tcf.

"We have a tremendous ability in this state and this region to be a major player in energy security and energy dominance for our country and the world,"

Burd said. Thinking of the MVP and other struggling pipeline projects, he added, "The importance of these pipelines can't be overstated."

Getting natural gas to port aids our allies, including Ukraine, without direct military confrontation. Another challenge, though, is liquefaction facilities are at capacity and the ability to build a new one quickly is hampered.

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