

ENERGYLINES

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SCIENCE SOLUTION

Gypsum, a byproduct of scrubber technology in use at the Merom Generating Station, finds a new life in the resale market.

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A CONVERSATION WITH JOHN TRINKLE

Hoosier Energy Board
Director for seven years.

SEE STORY, PAGE 6



Working in three dimensions

Substation replica details new prototype design

It's always a good idea to see what you're building.

That's what Hoosier Energy CAD Specialist David Hamm thought while working on a new prototype for a substation design. The 3-D computer technology Hoosier Energy's engineers use greatly assists them in designing improvements to the critical infrastructure of the bulk power system.

As advanced as the computer technology is, though, there's nothing like a physical model to really understand how the design will be executed in the field. When a colleague wondered aloud what the prototype might look like, that's all the inspiration Hamm needed to take a "nice-to-have" idea and run with it.

The result is a masterful physical replica of a two-bay distribution substation built to a 1:24 scale. With more than 180 hours in the project, Hamm left no stone unturned – literally as he worked during his off hours to build the masterpiece.

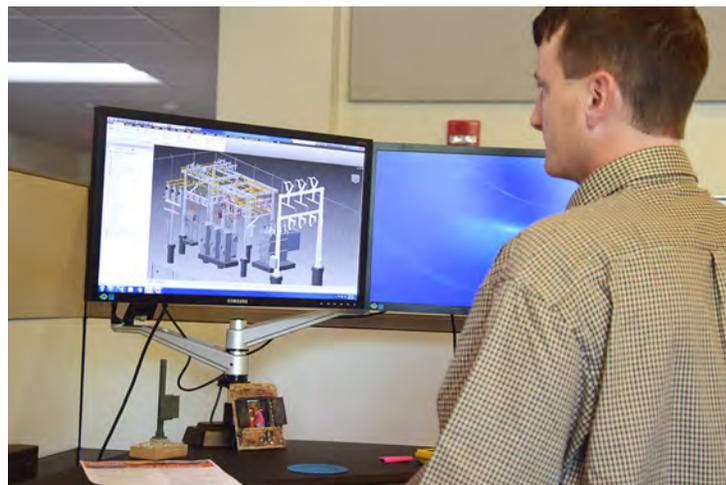
The ¾-inch plywood base is wrapped with cherry wood to form the frame. The foundation was then formed and cut with gray tile mortar while the "ground cover" was made from crushed limestone found in farm fields. The result is a strikingly accurate resemblance to real gravel in a substation yard. Extruded ABS plastic became the aluminum structure that Hamm painstakingly formed, cut, coped and chamfered around all the edges to get the exact angle. Then paint was applied.

The color is an exact match.

"The warehouse supplied me with can of ANSI 61. That's what's used in the field on equipment. I used the same paint on the regulators and reclosers," Hamm said. His attention to detail didn't stop there. He stripped real copper wire down to fine strands that he then braided to mimic different sizes of copper cabling actually used. A 3-D printer in Indianapolis printed some of the pieces such as the high side structure, some of the transfer switches and regulation bypass switches.

The level of detail is both dramatic and uncanny, down to the placement of warning signs on the fence.

"David did a great job on the substation model," commented



HE photo

3-D MODEL MAKER: CAD Specialist David Hamm designed and created a detailed prototype of a two-bay distribution substation.

Dave Sandefur, Vice President of Power Supply. "The project is not only useful for engineering and field crew assessment but was used at the April Annual Meeting for our Board and guests to visualize new substation design considerations."

This working prototype is more than just a nice physical rendition of a new substation design, though. It's a work in progress. Now that it's finished, it's time to change it. Hamm explains.

"The current meter bay design is a new design that hasn't been built in the field yet." The physical replica helps those working in the field understand the design.

"A lot of people are looking at this model. They tell us, 'this is good, but how about moving this over here,'" Hamm said. Perfecting the model helps eliminate expensive field rework and multiple revisions while being constructed in the field.

"It's always going to be a work in progress," Hamm said. "That's what prototypes are for."

ENERGYLINES

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ON THE COVER

Synthetic gypsum produced at the Merom Generating Station is a safe byproduct from air emission reduction technology used by coal plants. Production of synthetic gypsum reduces the need to mine for natural deposits and significantly reduces the amount destined for disposal in a power plant's landfills.



SEND COMMENTS TO

EnergyLines Editor
Hoosier Energy REC, Inc.
P.O. Box 908
Bloomington, IN 47402

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ENERGYLINES EDITORIAL STAFF

Claire Gregory
Manager of Communications
email: cgregory@hepn.com

Trina Pardue
Communications Specialist
e-mail: trina@hepn.com

Eric Neely
Communications Specialist
e-mail: eneely@hepn.com

Mary Lynn Beaver
Communications Specialist
email: mbeaver@hepn.com

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A legacy for a powerful tomorrow

Johnson County REMC Annual Meeting



Submitted photo

More than 1,200 members and guests turned out for Johnson County REMC's annual meeting on the morning of April 23. Russell Moore & Illrd Tyme Out from Nashville, TN, entertained members. Gifts included an LED lighting kit and a solar power bank as well as the opportunity to draw from a barrel for a cash-filled coin holder stuffed with a \$5, \$10, \$20 or \$50 bill. Grand prizes were a John Deere tractor, an iPad or a \$100 bill.

Power for the ages

Wayne-White Counties Electric Cooperative Annual Meeting



Submitted photo

Nearly 1,100 members and guests attended the Wayne-White Counties EC annual meeting on March 11 at Edwards County High School in Albion, Ill.

Highlights from the meeting included a tribute to injured lineman Gerry Kinney, who received a standing ovation for his amazing attitude, determination and inspiration after surviving and recovering from a serious electrical burn that took both of his hands and arms, just below the elbow. He has now been fitted with prosthetic arms and hands. The accident happened last July.

In his annual "state of the cooperative" message to the membership, CEO and General Manager Daryl Donjon reminded members that there would be no residential rate increase for the third year in row, but that the cost of electricity in the future could be greatly impacted by the proposed regulations announced by the EPA on coal-fired power plants.



HE photo

SYNTHETIC GYPSUM: A giant rotary vacuum drum is ready for service. As the drum turns, a vacuum removes water in the material.

PURE AND SIMPLE

How environmental science at Merom helps create gypsum for ag, cement industries

One of the byproducts of modern coal plant operations is a fluffy, cakelike substance called gypsum.

Thicker than sand, but porous, synthetic gypsum is a much sought-after product for the wallboard, cement and agricultural industries. Rich in calcium sulfate, gypsum is manufactured from the very substance that the scrubber system removes from coal plant exhaust gas – sulfur dioxide.

Its chemical makeup, combined with its texture and other properties make it highly desirable as a soil amendment. When wet, it absorbs like those paper towel commercials, preventing runoff and soil erosion. Heat it, then add water and it is rock solid, a desirable attribute for the cement industry.

Gypsum occurs naturally in sedimentary rock formations and has been used by farmers for years. Ben Franklin began applying what he called “land plaster” to his crops in the late 1800s after

returning from a trip to Europe. Thomas Jefferson also reportedly used gypsum on his farm fields, but historically its use has been limited due to mining and transportation costs.

Fast-forward to today’s agri-economy and demand for gypsum has grown. The reason lies in a coal pile.

Environmental scrubber technology used by coal plants to control sulfur dioxide emissions can also produce an environmentally safe byproduct – synthetic gypsum.

Merom began exploring the potential production of resale quality gypsum in the early ‘90s, but the scrubber technology at the time didn’t make it feasible to produce.

Then two things occurred, making this secondary reuse market an attractive prospect.

Upgrades to Merom’s advanced flue gas desulfurization (FGD) process in 2012, which removes about 98 percent of the sulfur



HE photos

ON ITS WAY: A conveyor belt transports the gypsum out into the yard where it is dropped onto a large pile. Trucks load the gypsum for resale to the agricultural and cement industries.

dioxide from the plant's air emissions, made the production of resale quality gypsum more practical. When Indianapolis Power & Light decided in 2014 to convert its Harding street plant on the southside of Indianapolis from coal to natural gas, an opportunity opened in the gypsum supply chain for southern Indiana.

Soon third parties were approaching Hoosier Energy and asking whether the Merom Station could supply the product.

Plant personnel began perfecting the waste center to process the synthetic gypsum separately from fly ash and a new market began to take off.

"We definitely are taking the crawl, walk, run approach to these beneficial reuse markets," says Will Kaufman, Manager of Fuels.

But what started as a crawl quickly turned into a gallop. Production of resale quality gypsum began in March and has already met annual targets for the first year.

For Merom, what was once bound for the landfill is now filling up a holding pile for sale to the cement and agricultural industries. As of June 1, more than 12,000 tons of gypsum had

been sold.

Demand is so great, the plant is turning away business.

"Right now, we try to balance the amount of trucks with amount of pure product that we produce. It's really a kind of just-in-time production," Kaufman says.

During the FGD process, a mixture of water and crushed limestone slurry is injected into the scrubber system where it reacts with exhaust gas from the boiler, effectively removing sulfur dioxide from the gas. Through a process called forced oxidation, the calcium carbonate in the limestone reacts with the sulfur dioxide to form calcium sulfate dihydrate, or gypsum.

The resulting byproduct is not only safe, but rich in calcium sulfate – properties that can turn the claylike southern Indiana soil into more tillable land.

Those environmental benefits aren't lost on anyone at the plant.

Herb Abbott, Area Coordinator for FGD and a 30-year veteran at Merom, says the plant saw the value in perfecting the waste center >>

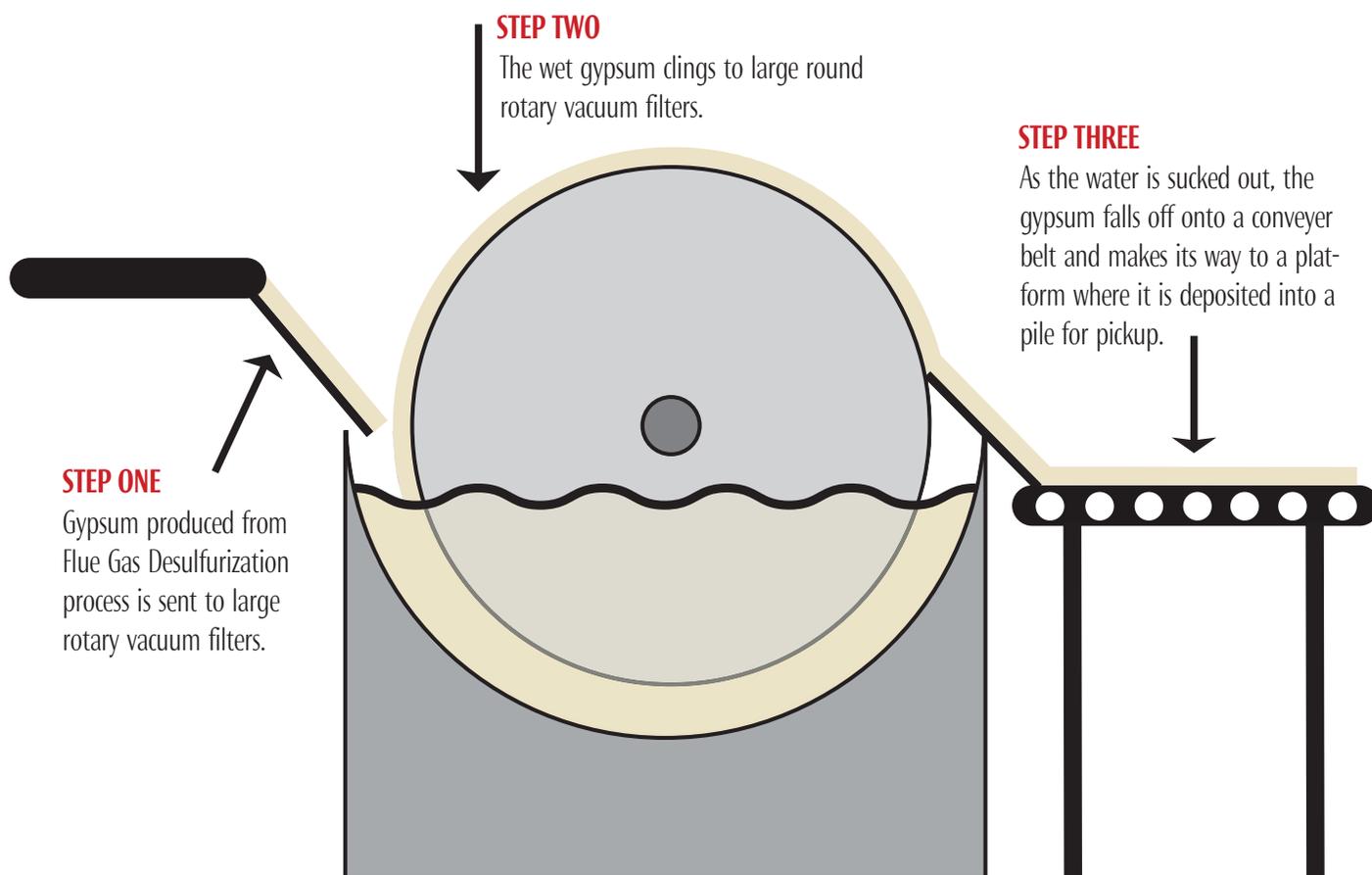
Agricultural benefits of gypsum

- Loosens soil to improve permeability and drainage
- Captures early spring rains for use later in the season, which benefits crop production
- Reduces amount of nutrient runoff in sensitive watersheds
- Helps maintain a balanced soil pH
- Increases nutrient holding capacity of the soil

Source: Gypsoil.com

How gypsum is formed

Synthetic gypsum is a sulfate that results from flue gas desulfurization (FGD) at a coal plant. The FGD process removes up to 98 percent of sulfur dioxide from the power plant's air emissions. During the FGD process, a mixture of water and crushed limestone slurry is injected into a module with exhaust gas from the boiler where "scrubbing" of the impurities takes place. The calcium carbonate in the limestone reacts with the sulfur dioxide in the flue gas to form calcium sulfate dihydrate, or gypsum.



system to separate the synthetic gypsum from fly ash. "A lot goes into removing sulfur dioxide from the flue gas stream of a coal-fired power plant that folks just don't know about," he says.

Both air and waste products from a coal plant, including the byproducts, are heavily regulated, says Lon Petts, Environmental Team Leader for Hoosier Energy. "The beneficial reuse of synthetic gypsum has been recognized by the U.S. Environmental Protection Agency and the U.S. Department of Agriculture," says Petts, adding that research by the Electric Power Research Institute points to the agricultural advantages of applying

synthetic gypsum to fields. "Less runoff keeps phosphate in the soil and the fields improve."

While historically Merom has produced an average of 400,000 - 500,000 tons of gypsum a year, it was used to mix with fly ash and bottom ash and bound for the landfill, which follows strict state and federal environmental regulations.

Now, the gypsum produced through the upgraded FGD process is not only using chemistry to "recycle" what would have been an air emission into an environmentally safe product, but in the process, benefitting society while reducing handling and landfill costs.

At \$1-2 a ton for landfill space and handling, that can add up. "Selling gypsum adds to Merom's cost competitiveness by reducing handling and landfill costs as well as providing agricultural benefits to the communities we serve," Kaufman says.

The more Merom runs, the more opportunity there is for turning waste into environmentally safe products.

"The one thing that amazes me is instead of spending millions to maintain a landfill and cap it, we can now load most of this up on a truck and put it on a field," Abbott says. "It's not waste anymore. It's something good and it came from coal." 

Out of the Board Room

JOHN TRINKLE

John Trinkle arrives at his store in Salem – Heaven Sent – a little late, looking slightly disheveled and a little flush. He’s been serving breakfast with the Lions Club on this first Saturday of June – an annual fundraising event to help support area little league.

“I’ve been mixing up pancake batter. It’s a bit like mixing up mud for mortar, you add a little water and stir. It doesn’t take a mental heavyweight,” he says with a laugh.

Trinkle sweeps away papers on a back room table and pulls up a chair. As he talks, his glasses sit comfortably low on his nose – a signature trait. He peers over the top with intent and heartfelt purpose. He opens up, sharing his story as young man seeking to find his mission in life.

Trinkle was born in 1947 in a Washington County hospital, one of two children of Depression-era parents. His mother had wanted to be a teacher but did not achieve her goal. As a result, she insisted that John attend college.

“I didn’t want to go college. I wanted to be a farmer, but my mother makes me go,” he says. So he enrolls at Purdue University, which he points out is a mere \$165 a semester for unlimited hours in those days. To put himself through school, he bails hay at 25 cents per bail, enough to pay tuition and then some. But in his first year, he finds



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ON A MISSION: John Trinkle is a long-time farmer who decided to lease the farm ground to focus on Heaven Sent - the faith-based Bible, book and gift store he opened in 1981.

that many of his classmates have goals to accumulate wealth and power. Those aren't models of success for John, so he switches colleges, enrolling in a private faith-based college in Lincoln, Illinois. But soon after arriving, he senses he has somehow isolated himself from the mission he has been given. So he returns to Purdue on a promise. "I say, 'OK, God, you've got my life.'"

He graduates with a degree in Agriculture Education and a minor in biology and he finds a wife – a girl he knew in high school. No big moment, no big romantic story to their courtship, he says. But his wife, Cheryl, is working as the cashier in the store on this rainy June morning and with a little prompting, she shares a moment John selectively forgets.

"He is bringing me home from a date and I was barefoot in his car," she says of those young days. In a move of chivalry, John decides to carry Cheryl from the car to the door. He sweeps her up in his arms, turns around in the dark and promptly falls over the lawn mower her father has left in the yard. "We were both banged up. I still have a scar on my knee," she says. Somehow, the two move beyond the mishap. They have been married for 48 years, have three married daughters and seven grandchildren.

As for his career, John starts out teaching science and biology at West Washington High School for three years, also coaching football for a stipend of \$500. He is also a long-time farmer, but decides to lease the farm ground around 1985 to focus on Heaven Sent – the faith-based Bible, book and gift store he opened in 1981 in the former



HE photo

BASS CLEF: Trinkle learned to play musical instruments early in life and was part of a group known as The Country Kids in his youth.

About the series

This is the 11th in a series featuring Hoosier Energy Board of Directors in an "Out of the Board Room" series in EnergyLines. These personal stories are intended to build stronger relationships among us. A different Director from each of the 18 member systems will appear each month.

"Pickle Hammers Hardware" building.

"I bought my first bicycle here in the basement in 1953," he says with fondness. With online ordering, Heaven Sent is not as lucrative as one might hope, but John

doesn't measure the store's success in monetary terms. "A lot of people who come through our doors are hurting, and I'm OK with the purpose we serve."

Among John's talents are gifts of music, whether singing or playing stringed instruments. He learned to play guitar early in life, which lands him and five other schoolmates in a group known as The Country Kids. They have their own brush with fame when they enter a Louisville talent contest. John describes the day with a glint in his eye and a sharp memory for the details.

"It was on the 10th floor of the Brown Hotel; that was higher than I had ever been before. I was looking out the large windows when someone approaches me and nudges me a bit, just to scare me. When I look up, it is Cassius Clay – the

“For the last 10 years, in 5-year cycles, I’ve been teaching the Bible in its entirety to students (sophomore to 20 years of age) at the Wonder Valley Camp.”

JOHN TRINKLE

notorious Mohammad Ali (as he was later known). He has just returned from winning a gold medal in the Olympics. As it turns out, he is a judge in the talent contest and he is the nicest guy,” John says with fond thoughts of the late, great boxer. The group takes second place with a gospel tune, “This World Is Not My Home.”

He continues to play music today – electric bass. On this Saturday, he swings over by a school to help unload sound equipment for a contemporary Sunday worship service and an afternoon practice session, which gives him pause to talk about the single greatest influential event in his life.

“I spent 22 days with People to People, a 4-H group, traveling in Europe. That single event made me see the world differently. Guards and dogs controlling people and secret police pulling film out of our cameras changed my world view. The world suddenly got really big. I began to see things differently,” he recalls.

A short eight miles from the store and just a short distance from Spring Mill State Park, John pulls his black Chevy truck into the driveway of his 400-acre farm, bringing Striker, a 3-year-old family dog, to its feet. Running for all he’s worth, the Golden Retriever races to the driver-side door, eagerly awaiting his best friend’s affection. Inside the house is the fierce defender of the family, three-and-a-half pound Radar, a tiny Yorkie with a bark much bigger than

its body.

The two of them settle into John’s favorite living room recliner. Radar stands guard on John’s chest, pacing up and down as he talks.

By his own declaration, John considers himself to be these five things: content, motivated, busy, a concept person and a giving individual – all descriptives, not titles. “Yes, I’m a farmer, but that’s not who I am, that’s what I do,” he says.

The list of things he does is long. While not complete, it includes 42 years on the Jackson County REMC Board of Directors, and two terms on the Hoosier Energy board. He is currently serving in the fifth year of his second appointment.

John’s penchant to teach or better the education field has never left him. He served from 1996 to 2000 as the Director of the South Central Area Vocational School; in 2000 he wrote a grant for a youth program in Salem and in 2002 the Department of Workforce Development asked him to serve as the liaison to disperse funds from the Careers Management Grant to 10 area schools in Martin, Orange, Lawrence and Washington counties.

“We got a lot of money for the schools,” he says.

Q: If you could go back, what would you tell a 27-year-old John Trinkle?

“The foundation of life is your world view. If you base it on something temporal, you can’t

have permanent success. There are three people you must exam: 1) the person you think you are; 2) the person others think you are; 3) the person you really are. If you’re going to be a success in life, you’ve got to get those three as close together as you can.”

Q: What is the single most important thing you’ve done in your life? “For the last 10 years, in 5-year cycles, I’ve been teaching the Bible in its entirety to students - sophomore to 20 years of age – at the Wonder Valley Camp.”

Q: Have you ever considered being a pastor? He says no, although a lot of what this Mt. Tabor Church member does is a ministry. He considers himself a disciple of Jesus – a follower, and he’s very serious about it. On the other hand, he jests: “My wife, Cheryl, says I do a lot of preaching around here.”

Q: What is something we may not know about you that’s fun? “I played softball right out of high school, first fast pitch then slow pitch until I was 40. I played shortstop, then second base and then I pitched. The older I got, the closer they moved me to the ball.” He laughs. “When I turned 52, they talked me into joining a church league. I got around to third base and realized I couldn’t raise my right arm.” He says wisdom has set in. “I can’t play like I used to, but men have egos. Some of us never grow up and get honest with ourselves.” [E](#)



Lineman training improves safety

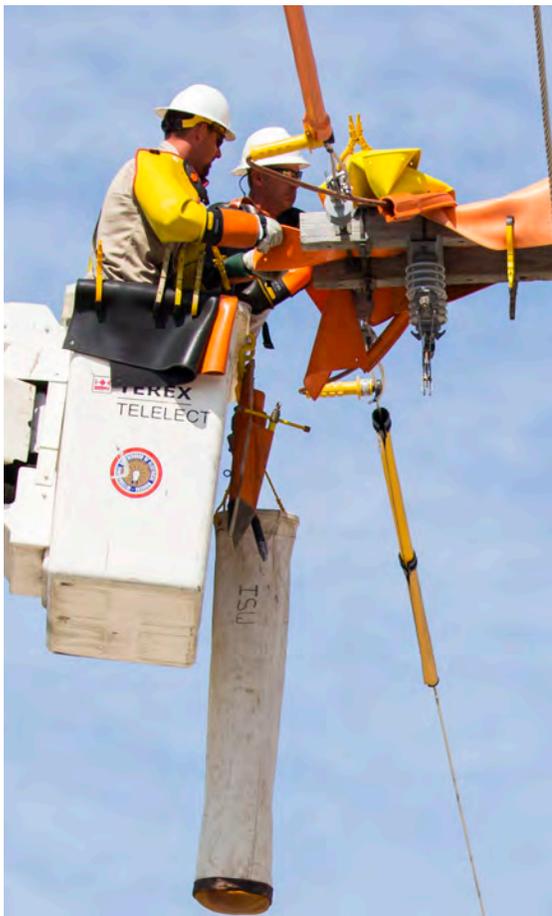
Franklin Training Center provides linemen a place to learn how to work safely. Skills learned help increase reliable service for electric consumers.

As a new generation of electric cooperative employees bring fresh perspectives and skills to keep a cooperative going, training programs are more important than ever to every co-op's mission of providing reliable and affordable electric service.

Hoosier Energy supports member training and skill improvement needs through a variety of programs offered at the specially designed Franklin Training Center, in the field or at other locations.

"I think everybody walks away from these training sessions having learned something they didn't know," said Dave Helton, Hoosier Energy Safety and Training Instructor. "These training programs emphasize fundamentals that most linemen learn during their first few years on the job."

Live-line or rubber-glove training allows apprentices to work on energized lines in a controlled setting with all the required personal protective equipment including hot sticks, rubber gloves and other types of insulated gear.



HE photos

TRAINING TO WORK SAFELY

Cooperative employees work together as they learn how to properly use the equipment needed to work safely on the job at the Franklin Training Center.

Hoosier Energy opened the Franklin Training Center in 2003. Inside the facility, classroom instruction takes place. Outside, towering poles fill the yard where participants can attend a climbing school or learn high-voltage safety processes and procedures.

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Hoosier Energy
P.O. Box 908
Bloomington, IN 47402



Students go behind the scene at electric utility

With an appetite for knowledge, students from Ivy Tech spent a day at Hoosier Energy facilities learning what goes on behind the scenes at a power supplier.

They toured the Worthington Station and the Owen County Operations Center. Manager of Power Delivery Engineering Chris Ware, left, explains components of a substation using a 3-D model.

» Learn more about the 3-D substation model on Page 1.