LET THE SUNSHINE IN(DIANA)

By Charlee Beasor

If you're looking for an up-and-coming industry in Indiana, just look up (though you might need to squint).

While other sunnier states might initially come to mind when thinking of solar power, the impact of the sun on Indiana's energy landscape is growing.

Though the overall percentage of the state's electricity generation from solar is only 0.28%, Indiana ranks 22nd nationally for solar power produced (up two spots from 2016), according to the Solar Energy Industries Association (SEIA).

The Solar Foundation's 2016 *National Solar Jobs Census* reveals job growth in the solar industry in Indiana as well. Almost 1,200 jobs were added in 2016, a growth rate of 72% over the prior year.

Other SEIA examples of economic potential:

- There were 84 solar companies in Indiana and 2,700 solar jobs in 2016
- The total solar investment in the state to date is $358 million, with over $100 million invested in 2016 alone

The census also gives national context: The solar industry employs twice as many Americans as the coal industry and as many as the natural gas industry. Additionally, the national median wage for solar installers is $26 per hour, and 67% of solar jobs don't require a bachelor's degree.

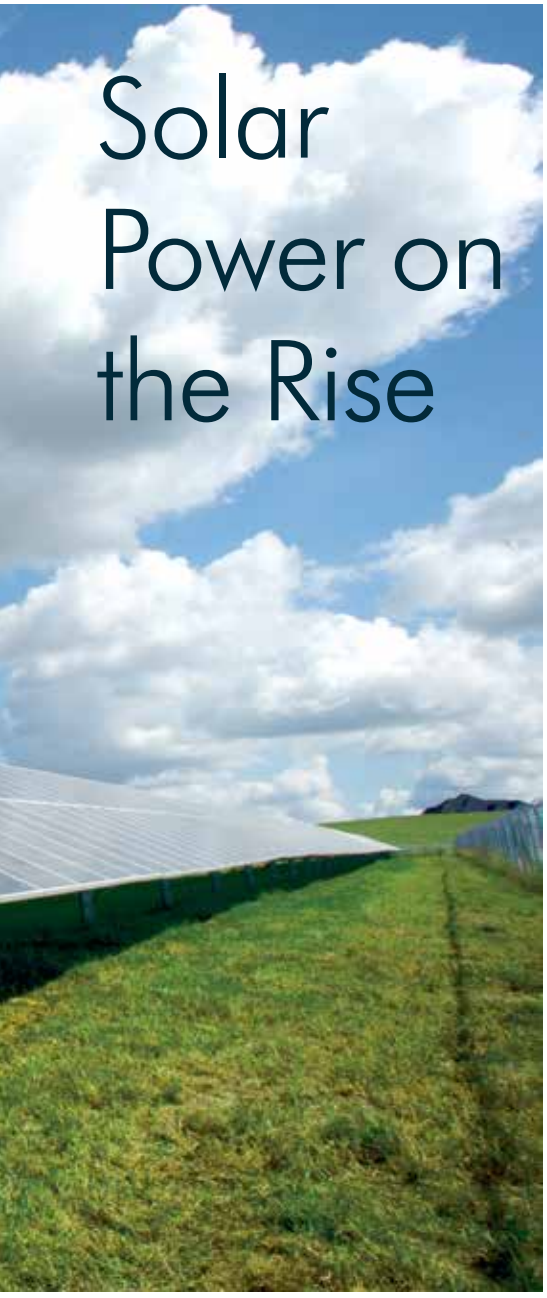
SEIA reports that solar prices (for consumers and utilities) in Indiana have declined considerably over the last five years. It also projects growth of 623 megawatts (MW) over the next five years in Indiana, ranking 24th nationally (total installation to date is nearly 217 MW).

Indiana might be a four-season state with the challenge of intermittent solar power, but the outlook for the solar industry is sunny.

Shining examples

Lower solar energy prices, less expensive material costs and environmental regulations have contributed to the growth.

Solar Power on the Rise



Indiana Municipal Power Agency (IMPA) Executive Vice President and Chief Operating Officer Jack Alvey (right) highlights one challenge of putting solar farms in each of the company's 61 Indiana communities – finding the proper land to acquire, especially in the smaller towns. The broad reach is a goal of IMPA President Raj Rao (left) and the organization's board of directors.

While you might not be able to see it from the road, the new IKEA store under construction in Fishers is getting a solar rooftop that will power the building when it opens this fall. It will be the largest retail solar rooftop in the state. IKEA has installed solar rooftops on each of its U.S. locations.

Communities are also investing in solar. Three Indiana cities – Goshen, Indianapolis and Nappanee – participated in the 2016 SolSmart Cities Challenge. The National League of Cities challenged cities to tally the solar-friendliness of their local policies. Of 16 participants, two – Fremont, California, and Kansas City, Missouri – were selected as winners.

The U.S. Department of Energy-funded SolSmart solar-friendly communities program also honored Indianapolis with a silver designation (the program rates cities gold, silver and bronze).

Additionally, the city of Goshen (in an effort to attain a future SolSmart designation) has recently changed zoning rules to make it easier for citizens to install solar power systems.

And the investment from utilities in solar arrays keeps coming as well. Vectren Corporation in Evansville recently announced its first two solar projects – one in cooperation with the city of Evansville – as its entry into the solar game. (Read more about Vectren's plans and how utilities plan for the future in the sidebar on page 46.)

Lighting the way

The second largest solar farm in the state came online in February (second to the 87,000-solar panel operation completed in 2014 at the Indianapolis International Airport).

The Duke Energy Indiana large-scale solar power plant located at Naval Support Activity-Crane (NSA Crane) is a 17MW solar array comprised of about 76,000 panels across 145 acres. The $41 million project came online in February and a ribbon-cutting ceremony took place in mid-May.

"Since 2005 we have been reducing our carbon emissions, so when we've found opportunity to replace or retire coal generation with economic renewable options, we did," offers Duke Energy Indiana President Melody Birmingham-Byrd. "We're reducing our carbon every single year and working to find economic renewable opportunities."

She feels Hoosiers should take pride in the new energy resource at NSA Crane.

"It was a privilege working with the Navy and the more I think customers and Hoosiers learn about this base and what they do – not only for the state, but for the country – not that they would appreciate this project, but they would appreciate this gem we have in this state."

The solar system offers the Navy more energy security and independence, should it ever need to disconnect from the grid, Birmingham-Byrd observes.

"If our mission is to help others achieve their missions, especially (the Navy's mission) – we support that effort," she declares.

"We have a great track record of providing renewable generation and we are committed to reducing our carbon emission footprint over the next 10 to 20 years. As we reduce our carbon footprint, we know that would be accomplished with the help of additional solar projects, additional hydro, wind, battery storage," Birmingham-Byrd continues. "We continue to assess those opportunities."

Bright ideas

If you're looking for low-maintenance energy generation, look no further than solar. Jack Alvey, senior vice president of generation for Indiana Municipal Power Agency (IMPA), highlights the upfront investment costs of solar construction and installation as the most expensive part of the process.

Utilities Plan for Diversified Mix

By Charlee Beasor

Indiana's energy portfolio has changed significantly in the last 10 years.

A reduction of coal-generated electricity and substantial increases from natural gas and wind sources have been the largest factors shaping Indiana's increasingly diverse energy mix.

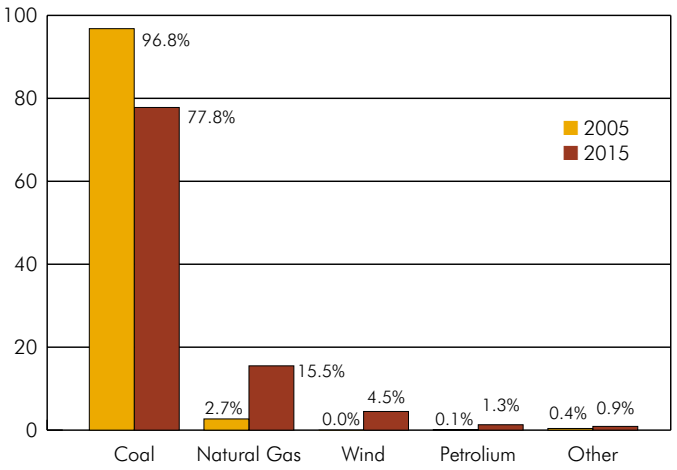
The February 2017 edition of *Stateline Midwest*, a publication from the Council of State Governments, includes a chart of net electricity generation sources for Midwestern states from 2005 to 2015. Indiana's highlights include (see graphic):

- Almost 97% of the state's electricity in 2005 was generated using coal; in 2015, the percentage had dropped to 77.8%
- Natural gas produced just 2.7% of the state's electricity in 2005; it was up to 15.5% in 2015
- Wind power accounted for zero of the net electricity generation in 2005; that number climbed to 4.5% in 2015

The *Wall Street Journal* reported in May that the push for renewable sources such as wind and solar is extensive across the country, due in part to lower costs (prices are 57% lower than in 2010 for both types of power) and compliance with state and federal emissions regulations.

Indiana's Changing Energy Mix

2005 vs. 2015



Source: Council of State Governments

Long-term planning, public process

Utility companies serving Indiana have actively pursued greater investment in renewable energy.

Those investments are recommended and reflected in public, 20-year energy plans that utilities file with the Indiana Utility Regulatory Commission (IURC). Known as Integrated Resource Plans (IRP), they were previously filed every two years, but a 2015 ruling changed the requirement to every three years.

Marc Lewis, vice president, regulatory and external affairs for Indiana Michigan Power (I&M), notes that an IRP is a helpful resource for long-term planning.

"An IRP is a tool that management uses to make decisions about the future of the company and how it affects our customers. It's not the end all, be all. … This is a process we go through that is very live and dynamic and we are constantly evaluating what the options are for what our load is," Lewis explains.

Stakeholders – utility customers, community leaders and local governments, among others – can file public comments with the IURC.

"We find the stakeholder input to be valuable. We want to serve customers the way customers want to be served," Lewis reveals. "In the 2015 IRP, we made some changes in part based upon our stakeholder feedback."

He adds that customer cost is one of the most important considerations when determining how to move forward for the next 20 years.

"We're mindful of the fact that our customers have a lot of things they have to use their income on … and we try to keep that in mind as we look for cost-effective solutions," he contends.

Natalie Hedde, director of corporate communications for Vectren Corporation in Evansville, acknowledges that while pleasing everyone is not possible, the IRP dialogue is given strong consideration.

Vectren's 2016 preferred portfolio plan emphasizes energy efficiency and the construction of a new combined-cycle gas turbine, as well as its first solar projects. It's a contrast from previous coal-heavy recommendations.

"Depending on what individuals or what different groups are passionate about, we heard everything on the board from, 'We're glad to see Vectren taking a step, but why would you not do more?' Others are on the coal side. It would be impossible to have a plan every stakeholder would be satisfied with," she maintains.

The answer to "Why not more?" Hedde says, is about balance.

"We are very much responsible for the sustainability of the portfolio we choose and how secure that is going to be. The sun isn't going to shine all the time," she states. "Whatever direction we choose is (going to be) very, very reliable."

Starkly different recommendations

I&M, with headquarters in Fort Wayne, serves over 460,000 Indiana customers and 128,000 in Michigan. The utility's preferred portfolio plan for its 2015 IRP includes maintaining its coal-fired power plants, continuing operation of its nuclear plant and adding large-scale solar resources, wind resources and natural gas combined-cycle generation (which burns natural gas in combination with steam).

Going back two decades, Lewis notes, one will find a much different IRP.

"The resources have changed considerably. When you look back maybe 20 years ago, we still had three different coal-fired plants, some nuclear and a little bit of hydro," Lewis recalls. "Things have really changed. It is more diverse and we are looking at more renewables."

Energy efficiency, new construction

Vectren also released in February a seven-year energy infrastructure modernization plan, which calls for upgrades to the electricity grid to meet the needs of advancing energy technology. The company serves over 144,000 homes and businesses in southwestern Indiana.

While environmental regulations in 2015 (the Obama

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RESOURCES: Indiana Utility Regulatory Commission: Integrated Resource Plans at www.in.gov/iurc/2630.htm | Natalie Hedde, Vectren Corporation, at www.vectren.com | Marc Lewis, Indiana Michigan Power, at www.indianamichiganpower.com

Hoosier Energy contractors install panels at a solar site on Interstate 74 near the Greensburg interchange. The 1MW array is one of three under construction and will be one of the 10 in the organization's coverage area in southern and eastern Indiana *(Hoosier Energy photo)*.

"There's no fuel cost. For the operation and maintenance, there's no moving parts and rotating machinery is minor. The biggest operating cost is just keeping the grass mowed," he quips.

IMPA serves 61 Indiana communities and one in Ohio, with its largest population centers in Anderson and Richmond. Its energy portfolio is a mix of coal-fired and natural gas generating plants, along with long-term power purchase agreements for wind and nuclear power.

Additionally, the company has installed 13 solar parks since 2014 and four more are under construction. IMPA's solar power is about 2% of its energy portfolio; all renewables make up about 4.5%.

"We've been putting in roughly 10MW per year," Alvey explains. "We have four more projects that are underway and those are in Anderson, Greenfield, Flora and Spiceland."

IMPA's investment in its 8MW solar project under construction in Anderson (the largest for the utility) is between $11 million and $12 million. The 3MW farm in Greenfield costs around $4 million. Its smallest solar project is in Waynetown with a .25MW-sized park.

"The goal is to have a solar park in each one of the communities (IMPA serves). We're working toward that," he comments.

Alvey says local communities have been receptive to the various solar projects.

"The local government has been very supportive and the vast majority of the customers have been supportive also. They look it as innovative, like this new power supply that's clean and quiet in their town."

Solar power in local communities also spurs economic development, Alvey contends.

"We work with the economic development groups. … They get these inquiries from prospective businesses and a number of times the question has been asked, 'What percentage of your power supply is renewable?' Our program has helped them give probably a more favorable answer for what some of these companies are looking for."

'Cloudy as a crystal ball'

Bloomington-based generation and transmission cooperative Hoosier Energy is owned and operated by 18 member systems in southern and central Indiana. As a cooperative, its customers are also the owners.

And they're not wasting daylight when it comes to their solar and renewable energy plans.

Heath Norrick, manager of renewable energy at Hoosier Energy, explains that the company's resource mix has changed

Duke Energy and the Department of the Navy partnered to install Indiana's second largest solar farm at Naval Support Activity-Crane. The company is also funding $1 million in research into battery storage at the Battery Innovation Center.

dramatically over the last two decades. Its portfolio is about 55% to 60% coal, 35% natural gas and 7% renewable energy.

"That's changed drastically," he emphasizes. "When I started in the year 2000, we were 100% coal. In the 17 years I've been here, the diversification has just been incredible."

The push for the diversification has come from the Hoosier Energy board of directors. They set a goal of 10% renewable energy sources by 2025 for the portfolio.

"Each member system has a director that sits on Hoosier Energy's board, and they all get a vote to the direction of the company," he offers. "They've been visionaries now for well over a decade and implemented the renewables policy back in 2006. It wasn't a popular topic at all back then."

Norrick notes that the rural, agricultural background of many of the member communities is behind the renewables push.

"It's a voluntary goal for us to be able to do that outside of state or federal government mandates. It's part of the co-op culture to focus on the environment," he adds.

How much of that 10% will end up being solar is not certain.

"Solar is a very small portion; it's less than 1% right now. It's as cloudy as a crystal ball," Norrick remarks. "I think solar is going to be a really important part of getting from 7% to 10%. As solar costs go down, and it matures and develops … it will be an important piece of our portfolio going forward."

Hoosier Energy has 10 solar projects (1MW each) in its service area, including in Spencer, Henry and Clark counties along with three in the Johnson County REMC area. Three are currently under construction, including the first solar farm for Bartholomew County. Each costs approximately $2.7 million.

Jackson County REMC general manager Mark McKinney explains that educating REMC members is one of the most important pieces of the Hoosier Energy renewables goal.

Educating current and future customers about investments in solar power and other sources is one task for utilities as the impact of renewable energy grows in Indiana.

"I think people have the tendency to flip the light switch on and don't take into consideration (the source). It charges us to make sure our members understand because we feel like it fits … trying to offer multiple sources into the portfolio and educate our members about that."

Large-scale solar operations, such as the Hoosier Energy projects, are a cost-effective way for customers to use solar power, McKinney offers.

"We support solar. … What Hoosier Energy has been doing for the member systems is providing a large-scale solar option which drives those costs lower. It is a visual for our members to see what it really is and the difference between a rooftop system and a utility-scale system," he says.

Save it for a rainy day

While all acknowledge Indiana will most likely never exist primarily on solar power, there is potential for continued growth in the industry.

"One of the challenges is the fact that as you look at solar in general, we have to balance the desire for renewable energy with the fact that it is an intermittent power source. We still have to produce energy around the clock," Birmingham-Byrd maintains.

One opportunity for more solar capability is battery storage of solar power. Duke Energy Indiana is actively involved in researching such possibilities.

"We have invested $1 million at the Battery Innovation Center, which is also another great asset in the state of Indiana, to research how we in the industry could better store this energy that we are able to generate using renewable resources," she adds.

"We're hoping we'll be able to bring down the cost of renewables and make renewable generation more sustainable and reliable, and help provide energy when the sun isn't shining and the wind isn't blowing."

RESOURCES: Jack Alvey, Indiana Municipal Power Agency, at www.impa.com | Melody Birmingham-Byrd, Duke Energy Indiana, at www.duke-energy.com | Heath Norrick, Hoosier Energy, at www.hepn.com | Mark McKinney, Jackson County REMC, at www.jacksonremc.com | Solar Energy Industries Association at www.seia.org | The Solar Foundation at www.thesolarfoundation.org

Utilities Plan

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administration's Clean Power Plan, among others) and low natural gas prices are factors taken into consideration in the IRP, balancing its energy generation between customer impact and safe and reliable generation are the highest considerations of the utility's planning, Hedde notes.

Vectren also recently announced two 2MW universal solar projects – the utility's first – which will be operational in 2018. One is in coordination with the city of Evansville and will be constructed on unused city land; the other will be constructed along Highway 41.

"I think the world just continues to evolve. That's why the IRP is a process that is not done once and revisited for another 20 years. The whole purpose is to evaluate the world as it is at the time. The world continues to change, Vectren is going to evolve with it," Hedde concludes.