



Changes to Put CAISO Market Monitor Under Full Board Oversight



CAISO General Counsel Roger Collanton | © RTO Insider

By Robert Mullin

CAISO's Board of Governors last week approved a measure investing the board with complete oversight authority over the grid operator's internal Market Monitor.

The change comes in response to FERC's recommendations in a 2016 audit report that found that SPP executives had "inappropriate" involvement in the oversight of that RTO's internal Market Monitoring unit. (See [FERC Calls for Changes to Protect SPP Market Monitoring Unit Independence](#).)

"This is our response to FERC guidance on

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RTO Insider/SAS ISO Summit 2017



RTO Insider Editor Rich Heidom Jr., PJM CEO Andy Ott and SPP CEO Nick Brown listen as former FERC Commissioner Tony Clark speaks via phone at the RTO Insider/SAS ISO Summit last week. | © RTO Insider

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Ott Seeks 'Resilience'; Clark Handicaps ZECs

By Rich Heidom Jr.

CARY, N.C. — PJM CEO Andy Ott said last week the RTO will look for ways to incorporate "resilience" in its markets and system operations, providing hints at a

white paper it will release later this month on the issue.

Speaking at the RTO Insider/SAS ISO Summit last week, Ott said the initiative was sparked by fuel security

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RTO Insider Contributing Editor **Ted Caddell** (above) took the photos of the opening session of the ISO Summit, featuring PJM CEO Andy Ott and SPP CEO Nick Brown. Ted sadly passed away overnight during the conference. See our tribute to him on [page 3](#).

Connecticut Moves Closer to Equating Nuclear with Renewables

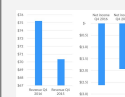
By Michael Kuser

Connecticut legislators last week unveiled a bill that would put the state's only nuclear power generator, Millstone Station, on equal footing with renewable energy resources.

The bill would allow Dominion Energy's Millstone to bid into the state procurement process now reserved for renewable energy resources such as large-scale hydropower, solar, wind and trash-to-energy facilities. The bill also would increase the share of

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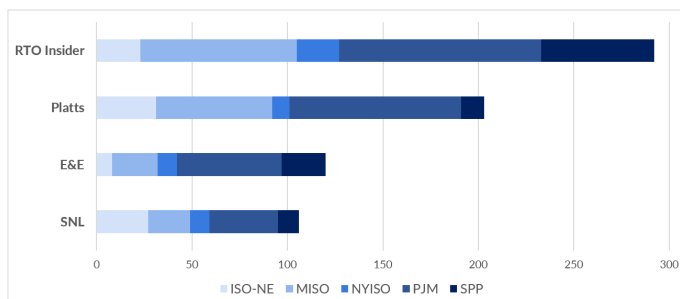
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Who's Watching Your Back? We Are.

RTO Insider provides independent and objective reporting on RTO/ISO policy making. We're "inside the room" alerting you to events in ways our competitors don't.

Want proof? Between July and December 2015, we published nearly one-third more content about the RTOs and ISOs than Platts and more than twice as much as E&E and SNL*.



For information, contact Marge Gold at Marge.Gold@RTOInsider.com or 240.750.9423

Ted Caddell 1960-2017 An Appreciation

By Rich Heidorn Jr.

CARY, N.C. — *RTO Insider* the publication has lost its wittiest voice. *RTO Insider* the company has lost its centrifugal force, its welcome wagon, its sage, its ultimate team player and certainly part of its soul.

Ted Caddell, *RTO Insider's* longest-serving staffer — and the voice of our daily emails and frequently our social media postings — passed away overnight Tuesday, March 14, hours after helping to cover the ISO Summit here. He was 56.

Ted, who formerly lived in Wilmington, Del., and Charlottesville, Va., moved to Chapel Hill, N.C., about five years ago, following his companion, Leslie. He picked me and *RTO Insider* co-founder Merry Eisner up from Raleigh-Durham International Airport on Monday night. We then ate dinner with him and Leslie in Chapel Hill, where he told us how he would not eat shrimp that wasn't North Carolina wild — no farm-raised seafood for him!

I ordered the North Carolina shrimp and was not disappointed.

On Tuesday, he took photographs and reported on the opening session of the RTO Insider/SAS ISO Summit with PJM CEO Andy Ott, SPP CEO Nick Brown and former FERC Commissioner Tony Clark.



Ted and his granddaughter, Charlotte, in February. His comment on Facebook on the photo: "I have NO idea why this child is crying. Honest!"



We expected him last Wednesday morning for the second day of the summit and were concerned when he did not appear. While I was moderating the first panel of the morning, Merry got a phone call informing us of his passing.

Merry informed me of the news during a break, and I was on stage for a second panel when my phone rang with a call from Charlottesville, where I knew his brother Ray — a bandleader for whom Ted had previously worked as a roadie — lived. I handed the phone to Merry to take the call.

After the Summit ended, I went back to my hotel room, let the tears flow and tried to pull myself together enough to help compose a tribute worthy of the man.

I have known Ted since the late 1990s, when I was covering electric deregulation for *The Philadelphia Inquirer*, and Ted, a former reporter for *The News-Journal* in Wilmington, was a spokesman for what was then Conectiv Energy, a Delaware-based subsidiary of Pepco Holdings Inc. There are good, bad and mediocre spokespeople, and Ted was undoubtedly one of the best. Funny, personable, self-deprecating. Even if it wasn't a big story, I never remember a day that wasn't better for having talked to Ted.

We hired Ted at *RTO Insider* in January 2014, less than a year after our launch. But I wouldn't actually meet Ted in person until about a year later, when he was in Wilmington visiting his daughter Nicole and newborn granddaughter, Charlotte.

Ironically, as we joked over dinner last Monday, we had covered the same story for our competing newspapers in 1996: the execution of Billy Bailey in Delaware, the last hanging in the U.S.

At *RTO Insider*, we have made it a priority to hire reporters near the headquarters of all of the ISOs and RTOs in the U.S. In Chapel Hill, Ted was nowhere near any of them. But he nonetheless made himself immediately indispensable as the first editor of our Briefs

columns and as the lead reporter on many breaking news stories. He was particularly knowledgeable about generation, having done public relations for Exelon's generation unit after leaving Conectiv.

As he wrote for his bio on our [About Us](#) page, Ted had an English literature degree from the University of Delaware, "which may explain why he's also worked as a commercial fisherman, a roofer, landscaper and spent three years as a roadie for a swing band and orchestra."

In January, when we launched our daily email alerts, he was our voice, and he had an immediate impact. Some people, frankly, did not appreciate his witty "lead-in" and preferred to go right to the summaries of our latest content. A handful of people were offended when he got a bit risqué or political.

They were in a decided minority. More common were comments like these:

I read five or six energy newsletters a day, which are typically quite boring. The daily opening commentary of *RTO Insider's* newsletter is incredibly entertaining and I look forward to reading it every day. — **Nick Esch**, Smart Electric Power Alliance

Ted, thanks for really taking the "readability" factor up a notch! I look forward to your musings every day. — **Joe Leingang**, fuel & transport superintendent, Basin Electric Power Cooperative

I just wanted to say that I truly enjoy Ted Caddell's summary emails each day. I always love the random other news he provides. It's quite hilarious. — **Jen Clements**, Xcel Energy

I love the changes that *RTO Insider* has made this year. I look forward to

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Ted Caddell 1960-2017

An Appreciation

Continued from page 3

reading the quips and punchy, but newsworthy, introductions each day. I also enjoy that it's not always related to our industry — a teaser of sorts before getting into the day's news. — **Tia Elliott**, NRG Energy

Hey — I don't know who comes up with these little nuggets at the beginning of the Insider. But I enjoy them tremendously. Thank you! — **Marguerite Wagner**, ITC Holdings

And here were the reflections of some of his colleagues:

From **Bill Opalka**, our former NYISO/ISO-NE correspondent, who just left us for a job with the New York State Energy Research and Development Authority:

Newsrooms are places that are full of characters, and in his day, Ted must surely have been one. He always had a quip at the ready and was full of oddball insights about the world, life and even the news. Although we were based 600 miles apart and never met face-to-face, I felt like I knew him better than most of the colleagues with whom I shared office space. He was that open and had a killer wit that got us through any crisis too.

But underneath the jokester façade, Ted was a serious newsman always looking for the next story and ready to jump in when colleagues were busy chasing other news. He'd often call with the latest scoop: "Did you hear about the Massachusetts pipeline? What's going on at Indian Point?" And most of the time I'd reply, "Thanks, Ted, I'm already on it," and he'd seem a little crushed that he couldn't help.

Ted, you'll be missed.

From **Julie Gromer**, our current Briefs editor, who joined us in September 2016:

The impact that Ted had on my life in such a short time period is pretty incredible.

Words cannot express my sadness. When I joined *RTO Insider*, Ted was the first person to reach out to welcome me to the team — and to offer any assistance that I needed. Over the past

seven months, he became my online friend — checking in every day to see how I was doing, sharing news of his family and grandchildren, laughing about world events, and always offering encouragement — both in my professional and personal life.

I feel honored to have known Ted. I will miss his friendship, his "can do" attitude and his unique brand of wit.

From **Tom Kleckner**, our SPP and ERCOT correspondent, based in Little Rock, Ark.

I never met Ted in person (though our paths may have crossed at one point), but I felt like I did. That may be all you need to say about Ted.

We did share direct messages and Facebook posts, and had several long phone conversations. I know I would have enjoyed Ted's company. Check out his Facebook photos. Unless he was acting on stage, he always had a smile on his face — and an unruly head of hair that apparently didn't get along with caps.

Ted's writing reveals that same good nature. He was always looking for the off-beat stories that helped show what our world is really about.

From account executive **Marge Gold**:

As I sit here with my eyes swelled up, it is hard to see clearly to even type. But, clearly Ted made me smile every time I saw him on our weekly video calls, with his Starbucks in hand. He was a unique man, that I will not soon forget.

From **Michael Brooks**, our production/copy editor and D.C. reporter:

Ted was just as friendly as he was funny — and he was hilarious. Unfortunately, I mostly experienced that friendliness online. The Internet enables a company like ours to function even though we live in different parts of the country, but because of that, I was only able to ever meet Ted in-person once. I am truly saddened that I will not be able to have another laugh with him that isn't online.

Suzanne Herel, our former PJM correspondent, recalled his motto:

"Every day's a holiday, every meal's a feast." I miss you dreadfully, Ted.

From MISO correspondent **Amanda Durish Cook**:

Whenever I approached Ted with a technical question, he'd make sure to weave some humor into the explana-



Ted and his granddaughter, Mayble

tion. He just made it delightful. I always enjoyed collecting news stories to pass to him for the repartee.

From CAISO/WECC correspondent **Robert Mullin**:

With your co-workers spread across the country, you can miss out on some aspects of easy friendship that can develop with people you happen to share space with seven or eight hours a day. Ted was someone who sought to close that distance. When I started with *RTO Insider*, he would call just to check in, see how things were going. There was usually nothing specific to talk about, and during those conversations I learned a little about his life, his partner, Leslie, his kids, and his two young granddaughters Mayble and Charlotte — just a bit younger than my own son.

Let me direct my last comments to you, Mayble and Charlotte: Your grandfather was sharp-witted, blunt, warm-hearted — irrepressible in his opinions, but thoughtful. Salt of the earth. I wish I could've had more time to get to know him better. I wish you could've too. I hope you carry a little bit of him with you into the future.

Ted often returned to Wilmington to visit his daughter, Nicole Wample, and his beloved granddaughters, Mayble, 3, and Charlotte, who just turned 2 on Friday. He is also survived by his partner, Leslie Udry; his mother, Sally, of Avon Park, Fla.; his older brother, Ray, of Charlottesville, Va.; and his son, Michael, of Philadelphia.

Memorial arrangements are pending. We will update this story [online](#) when they are available.

"He loved his job," said Ray. "It was good for him."

He was good for all of us too.

Ted Caddell 1960-2017

An Appreciation

When *RTO Insider* launched our daily emails in January it followed several weeks of “dress rehearsal” emails that were never published. Here’s a couple of our favorites from the lost quips of Ted Caddell.

Get an Amazon Echo for Christmas? You might want to turn it off before you murder that guy in your hot tub.

The Washington Post (and oh, so many others) are reporting that police in Bentonville, Ark., are investigating a homicide at a house equipped with the whole-home smart monitoring system and have asked Amazon to release whatever the Echo may have recorded that night.

Amazon, so far, has refused to release any customer information from the suspect’s Echo account.



Ted the roadie, second from right, with Rat Pack impersonators. | Photo courtesy Ray Caddell

This just in from [TechCrunch](#): news that Amazon has patented a flying warehouse blimp that will hover overhead and then launch delivery drones down to bring us the things we absolutely, positively have to have within hours.

One possible use is to hover over sports stadiums and deliver food to spectators. With drones. Drones with whizzing, sharp-bladed rotary wings delivering beer and hot dogs to drunken football fans.

What could possibly go wrong?

Let’s see: Trump transition team requests names of Department of Energy employees involved in climate research. DOE says they’re not going to give up the names. A man who couldn’t remember the name of that department looks to be the pick to head it. And of course, a man who has sued the EPA is going to lead THAT department.

Meanwhile, scientists are frantically backing up all their climate research files, in what appears to be an as-yet unsupported fear that the Trump administration will hit the giant “Delete” button when it takes over.

Say what you will about the energy business, it ain’t dull.



RTO Insider staff in Wilmington, Del., after a PJM Markets and Reliability Committee meeting in March 2015. From left to right: Michael Brooks, Ted Caddell, Suzanne Herel, Merry Eisner and Rich Heidorn Jr.

RTO Insider/SAS ISO Summit 2017

Industry Gets Tips on Turning Data into Intelligence

By Rich Heidom Jr.

CARY, N.C. — Thanks to smart meters, phasor measurement units (PMUs) and the forecasting challenges of renewable generation, utilities and RTOs are becoming increasingly voracious consumers of data.

“Instead of getting SCADA data every four seconds,” notes Stephen Rourke, vice president of system planning at ISO-NE, “we’re getting PMU data every two cycles.”

But some are not using the information as well as they could, speakers said at the RTO Insider/SAS ISO Summit at SAS headquarters last week.

“The amount of operations data that’s being created is just incredible,” said Bill McEvoy, industry principal for OSIsoft. “And a lot of it is still being created in silos.”



Jill Dyché | © Cassandra Wilson, SAS Institute Inc.

That’s a mistake, said Jill Dyché, vice president of best practices at SAS. While many companies perform only “random acts of analytics,” forward-thinking organizations have created analytics “Centers of Excellence,” she said.

“Analysis is a collection of very distinguished skill sets that may not exist elsewhere in the organization, so there’s an argument for leveraging those in a sustained way through some kind of COE or marketplace,” she said. “For energy companies, the potential is not just in optimizing our business but also becoming data businesses. There’s a huge potential in using our data in fresh new ways.”

Data Quality

Most companies fail to measure the cost of

poor, missing or inaccurate data. “Typically when I get a ‘yes’ on that question, it’s after the fact,” Dyché said. “We realize that a business initiative failed because we didn’t have the data, or the data was wrong,” she said. “Data quality can make or break some pretty serious decisions these days.”



Brad Lawson | © Cassandra Wilson, SAS Institute Inc.

“I think it’s wise to watch where your numbers come from,” said Brad Lawson, a SAS industry consultant. “Working in the utility industry, we could never get customer numbers to match. You went to one group and there was a customer count of whatever. The next group may be 10,000, 15,000 more. So we finally got a group together to talk about, what is a customer? What we found within this utility was that we had about seven different definitions of ‘customer.’”

Similar disparities exist in data on solar capacity and generation, he said, complicating utilities’ forecasting challenges.

Forecasting EV Charging

Electric vehicles are a growing concern for utility forecasters, particularly in California, which has more than 40% of the EVs in the U.S.

“The utilities would like to be able to manage that charging,” said Ralph Masiello, senior vice president of Quanta Technology. “In other words, if everyone comes home from work [and] plugs the car in at 6 p.m., that’s right when that duck curve is ramping the worst. So it’s the last time that you want another 1,000 MW of EV charging.

“The big data need for the utilities is how do they know when those customers are going to plug in? And the answer is they’ve got to



Ralph Masiello | © RTO Insider

monitor [the California Department of Transportation] for traffic conditions. Because a traffic accident on Interstate 405 can mean 1,000 Teslas plugging in a half-hour later than they normally would.”

Data Volumes Taxing Hardware

As one of the biggest users of data analytics at ERCOT, Manager of Demand Response Carl Raish is looking forward to a refresh of the ISO’s hardware platform. “I’m hopeful that this hardware change is going to make my life better. I’ve done what I could with software in terms of trying to leverage capabilities that are in SAS to make code run better. But it’s really the volumes of data [that are challenging] at this point.”

Helping to provide answers to RTOs’ challenges is the Electric Power Research Institute. EPRI’s Market Design research group has created webcasts and an ISO/RTO Market Design Tech Forum, in which technical market designers discuss the challenges of changing markets. Its Market Design and Operations Research Program provides analytical support for research projects.

Erik Ela, senior technical leader of EPRI, said the organization is tackling the industry’s biggest research and development challenges, including providing adequate compensation to prevent retirement of resources that are not used often; incentives to encourage system flexibility; pricing schemes; and incorporating policies that favor technologies for reasons other than cost.

ISO markets currently dispatch resources

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RTO Insider/SAS ISO Summit 2017

DERs Increasing RTOs' Data Challenges

By Rich Heidorn Jr.

CARY, N.C. — Stephen Rourke, vice president of system planning at ISO-NE, worries distributed energy resources will force RTOs to change their focus.

"We're so used to operating at the wholesale level. We dispatched 350 generators for the last 40 years. Now there's 108,000 solar installations. So we're kind of getting dragged, whether we like to or not, from a wholesale view of the power system, to a retail view," he said during the *RTO Insider-SAS ISO Summit* at SAS headquarters last week.

"What we won't have [visibility of] is if everybody who has solar panels in their houses puts a 4-kW battery in their garage — and there are hundreds of thousands of those. So that's going to be a data challenge.

"If you're 5 MW or greater, you need a [remote terminal unit], you have to have a leased telephone line. Those are thousands of dollars to buy and hundreds of dollars a month to lease the phone line. Your 500-kW solar panel can't afford to do that, but we have thousands of them. So how do we get the data and how do we process the data? It is ... a challenge for us. So we're going to need help from others certainly with the technology platform."

'Layered Control Structure'

Lorenzo Kristov, principal for market and infrastructure policy at CAISO, says it doesn't have to be the RTO's headache. He has proposed what he calls a "layered control structure" in which the distribution utilities would aggregate DER data for their RTOs.

"Each tier in this hierarchy only needs to see interchange with the next tier above and

below, not the details of what's going [on] inside because the optimization is happening locally," he explained. "The ISO then focuses on bulk system integration, while the distribution utility ... coordinates the operation of the DERs. The layered control structure reduces complexity, allows scalability and increases resilience and security. And finally the fractal structure mimics nature's design of complex organisms and ecosystems."

Kristov urged DER aggregators to bring "use cases" to CAISO to aid it in updating its market rules.

Currently, the ISO uses one of two models for DER: the demand response model and the non-generation resource used for storage. "When you're charging, you're using energy at retail; your ability to provide services to the ISO is very limited.

"Several parties have signed up as [DER] aggregators, but they haven't brought in the resource yet," he said. "Part of what we're trying to figure out is what do we need to do to improve those rules. So I would say more active engagement in our stakeholder process [is needed] to bring us specific use cases. How do we want to operate in your markets? What is it we want to do? What are our capabilities? There's a lot of technical detail that we can't figure out because it's the developers who have these things in mind."

Standards Needed

DER also needs standards, said Ralph Masiello, senior vice president of Quanta Technology. He cited the aftermath of Superstorm Sandy in New Jersey in 2012.

"Too many of those [solar] installations did not disconnect when the distribution circuit went dead and so restoration was held up by the need for utility linemen to come verify



ISO-NE's Stephen Rourke (left) and CAISO's Lorenzo Kristov | © RTO Insider

that the line was dead before the tree crews could start clearing the debris," he recounted.

"Normally the utility knows from its SCADA that the line is dead. But if you have just one ... PV panel that didn't de-energize, it's enough to put high voltage on a downed line and make it dangerous. So there's kind of a big data opportunity there. The utility needs to know where are those panels and what is their status."

Solar PV could create a role on distribution systems for synchrophasors that previously have been used mainly in transmission, Masiello said, citing a Department of Energy project testing whether PV panels can be used to develop "synthetic inertia."

"Can you take a smart inverter on PV — it's already got communications and ... time-synch capability — and build the synchrophasor into that smart inverter? And then you can use it as a key to developing local synthetic inertia from the panels."

Masiello also said his company is beginning to get requests to do forecasting on the distribution systems.

One need, he said, is identifying distribution lines subject to solar "backfeeding" onto the transmission system, as has become common in Germany and begun happening between 10 a.m. and 2 p.m. in Hawaii.

"In other words, there's not enough load on a segment of line to be able to absorb all of the solar that's being generated," he explained. Utilities "may have to move some customers from one distribution segment to another."

Industry Gets Tips on Turning Data into Intelligence

Continued from page 6

based on reliability and cost, Ela noted.

"But there are a lot of other things that we don't do at the ISO. We don't have an

environmental [input in market clearing engines]. We don't care about job preservation. ... Fuel diversity is very hard to quantify. So there's a lot of these other aspects out there that a lot of the states have a lot of incentive to try to keep ... [But] that's not built into the way we clear our markets.

"So how do we interact with these policies in the way that we are running the markets? That's a big area and [one] I think that we'll see more and more questions about." (See related story, *Ott Seeks 'Resilience'; Clark Handicaps ZECs*, p.1.)

RTO Insider/SAS ISO Summit 2017

SPP Nearing Wind Limit; Planning Single Market with Mountain West

By Rich Heidorn Jr.

CARY, N.C. — SPP cannot absorb much more wind power within its footprint, CEO Nick Brown told the *RTO Insider/SAS ISO Summit* last week.

"I believe we're at a saturation point in terms of the appetite of load within our footprint to want more wind," said Brown. "How much is too much? I think we're nearing that, although the [generator interconnection] queue is still full and we are seeing more and more and more wind interconnected. So what happens when we can't accommodate anymore? We'll curtail it for reliability reasons."

On March 14, the day of the panel discussion, SPP was getting 55% of its electricity from coal, with about 18% each from wind and natural gas and 7% from nuclear.

On March 19, the RTO announced it had set a new wind-penetration record of 54.22% early that morning, with 12,078 MW produced.

"How can it keep growing? ... There is going to have to be a demand for wind outside our footprint. And so far, we're not seeing re-

quests for that. We're not seeing people come in to our transmission queue and say 'I want transmission service to move wind from the western part of SPP footprint the east or to the west,'" Brown said. "[Wind] is incredibly efficient in how its produced, but if we don't see that demand to the eastern load centers, it will saturate."

The variability of wind has provided its own challenges.

On some days, SPP has seen 10,000 MW of wind disappear and reappear. "That's the equivalent of 10 nuclear units," Brown noted. "We are becoming so much more dependent on big data. Tons and tons and tons of granular information from all the wind in the footprint across 14 states."

Update on Expansion

That footprint may be expanding with the potential addition of the Mountain West Transmission Group, a partnership of seven transmission-owning entities within the Western Interconnection, including the Western Area Power Administration's Loveland Area Projects and Colorado River Storage Project. (See [Mountain West to Ex-](#)



Brown | © Cassandra Wilson, SAS Institute Inc.

[plore Joining SPP.](#))

"As we continue to work through the details of integrating them into our wholesale markets, it will create new technical challenges operating a market across two interconnections tied together by four DC ties," Brown said.

Brown said SPP has considered both operating two separate markets and solving a single market across the two interconnections. "We're mostly leaning towards a single [market] across the entire footprint constrained by the DC ties," Brown said.

PJM, SPP Chiefs Share Frustration with Order 1000

By Rich Heidorn Jr.

CARY, N.C. — PJM CEO Andy Ott and SPP CEO Nick Brown said last week that FERC Order 1000 is causing their staffs headaches while doing little to encourage transmission development.

"I think the driver behind Order 1000 was to get more people wanting to invest in transmission," Ott told the *RTO Insider/SAS ISO Summit* last week, where he appeared on a panel with Brown and former FERC Commissioner Tony Clark, who participated via phone after snow canceled his flight from D.C. "We haven't had any shortage of [interest]. In fact, everyone wants to invest in transmission because it's a pretty safe investment. [Order 1000] was almost like a solution in search of a problem. ... It's actually creating more challenges to investment."

"It created more overhead and more uncertainty at a time when we didn't need more overhead in order to invest in transmis-

sion," said Brown. "I am thankful that we completed the vast majority of our transmission buildout in a pre-Order 1000 environment."

Ott said enforcing cost caps on competitive projects and allocating costs for them are tasks that RTOs are ill-equipped to handle. "We're not a regulator," he said.

Clark, who joined the commission after the order was issued in 2011, said the intent of the initiative was good, noting that it has pushed regions to conduct joint planning.

"The concern that I always had ... is that there is so much process built into Order 1000," each step of which becomes an opportunity for litigation and delay, Clark said.

"What you end up with is just what Andy and Nick were talking about, which is actually less investment happening than would otherwise happen organically on its own because you're doing so much to meet the burdens of the process in Order 1000 that



Ott | © Cassandra Wilson, SAS Institute Inc.

you're sort of losing the forest for the trees."

Clark said it's too soon to determine whether the order will be successful in introducing competition into transmission development. "Incumbents have so many natural advantages in terms of building large infrastructure projects within their footprint that I don't know that that's something you can regulate away. Nor should we necessarily try to."

RTO Insider/SAS ISO Summit 2017

Ott Seeks 'Resilience'; Clark Handicaps ZECs

Continued from page 1

concerns — the risks of sabotage or cyberattacks on grid assets or gas pipelines — and a desire to recognize the reliability value of baseload nuclear and coal plants struggling to compete in the PJM market. Later in the panel discussion, former FERC Commissioner Tony Clark — participating via phone after snow canceled his flight from D.C. — forecast how the commission and the courts may rule on zero-emission credits that provide additional revenues to nuclear plants.

Ott said one possible shift in PJM would be changing contingency plans from replacing the largest single generator to ones that consider the loss of a gas pipeline supplying multiple generators.

"All the generation connected in a certain section of that pipeline could go off very quickly if it loses pressure because of an explosion or some event. Maybe we should be operating to the loss of that and look at that operational risk inside the market and price that in so the units that didn't have that kind of fuel security risk would be worth more money," Ott said. "That would help, of course, the resources that are less dependent on just-in-time fuel" such as nuclear and coal. Ott also said PJM will seek to become more "dynamic" in its management of operations.

Concern over Pipelines, Transmission Corridor

"One obvious [example] is to look at the way we deploy synchronized reserves or operating reserves and expand the contingency set that you're looking at to include pipeline contingencies. ... Or if you have a transmission corridor that you're very worried about — potentially include that as part of your constraint set. So when you're dispatching generation or deploying demand response, you're essentially recognizing that double contingency or triple contingency as part of operations in certain circumstances. Not 8,760 hours [per year] but when you think that vulnerability exists, you can price it in."

It also could mean system restoration plans becoming less dependent on individual transmission lines or fuel sources, Ott said.

Ott did not offer details on how fuel security

would be priced into the markets. The RTO has already taken steps to address reliability concerns with its Capacity Performance rules, which increased penalties for nonperformance and rewards for overproduction during emergencies.

Coal Group Petitions PJM, MISO

On Friday, meanwhile, the American Coalition for Clean Coal Electricity (ACCCE) sent Ott a letter calling on PJM to take steps to prevent further retirements of coal-fired generation and "take into account the likelihood of changes to federal environmental policies."

"We are confident the new administration will withdraw or rewrite environmental regulations that are causing, or could cause, more coal retirements," ACCCE CEO Paul Bailey wrote. "These rules include the Clean Power Plan, Coal Combustion Residuals, Effluent Limitations Guidelines, Cross State Air Pollution Rule and Regional Haze."

Bailey said the Capacity Performance rules were helpful but insufficient. "We do not think these changes go far enough in recognizing the advantages of baseload coal-fired generation. In particular, the changes have not led to higher capacity prices that are necessary to keep coal plants from prematurely retiring," he wrote.

ACCCE says 121 coal-fired generators totaling 20.1 GW have retired in PJM, most because of environmental regulations, and another 28 plants (8.9 GW) have announced plans to shut down.

The group also sent a letter to MISO CEO John Bear asking the RTO to change rules "to ensure the reliability attributes of coal-fired generation ... are properly valued." MISO has lost 103 coal-fired generators (8 GW), with another 45 retirements (10.5 GW) pending.

Former Commissioner: FERC May Reject ZECs

Former Commissioner Clark, now a senior adviser at Wilkinson Barker Knauer, said zero-emission credits approved for nuclear plants in New York and Illinois — and under consideration in Connecticut and other states — may be rejected by FERC or the courts because of their impact on wholesale market prices. (See related story, *Connecti-*

cut Moves Closer to Equating Nuclear with Renewables, p.1.)

Clark called ZECs the third iteration of states' efforts to build or preserve generation within their borders. Last April, the Supreme Court rejected Maryland's contract-for-differences with the developer of a combined cycle unit, saying that by tying the contract to PJM capacity prices, the state had violated federal jurisdiction.

In May, American Electric Power and FirstEnergy withdrew power purchase agreements that Ohio regulators had approved with their unregulated generation after FERC indicated it would review the deals for violations of affiliate abuse rules. "The merchant generators basically did a very surgical strike in [their] filing at FERC" in requesting the affiliate review, Clark said.

With ZECs, "the states ... have really gotten craftier about how they can [preserve at-risk generators]," said Clark, noting that they were designed to be similar to state renewable energy credits (RECs).

"Merchant generators have ... said these RECs are an out-of-market subsidy [that] distort prices. And the commission has said, 'OK, theoretically we understand what you're saying.' But there wasn't enough provable harm for the commission to really do anything about it," Clark said. The RECs "were either conceptual at the time of the challenge ... or it was a small enough part of the market ... that it didn't seem like it was a big enough issue that the commission could act on. So effectively the commission could punt on that issue."

"Now if you're talking about certain regions of the country where nuclear units are 20%, 30% of the market, or if you're talking about other out-of-market interventions like in the Northeast — you've heard about long-term power contracts ... with Canadian hydro — that might be 30% of the state's energy needs."

"Well that does have a very material impact on the market themselves, so that will be a challenge for the commission to see if this is a zero-sum game, or the commission will have to declare in some ways these things federally jurisdictional and carve the states out. Or is there a way to thread the needle? That's what each of the ISOs that's dealing with this is doing."

"Here's where it will get to be very tricky for the commission," Clark concluded. "I'm not sure exactly how it will end up dealing with it."

RTO Insider/SAS ISO Summit 2017

Overheard

CARY, N.C. — Despite a late spring Nor'easter that closed airports and forced some speakers to participate via phone, dozens of RTO and ISO officials journeyed to SAS' snow-free campus in North Carolina last week for a discussion on data and technology challenges. Here's some of what we heard at the *RTO Insider/SAS ISO Summit*.

Duck Curve, Meet Armadillo Shell

The duck curve — which came out of California to describe the ramping challenge provided by solar resources — has since been adopted as a term by other regions, including ISO-NE. (See “New England’s Duck Curve,” [Overheard at NECA Renewable Energy Conference](#).)



Kenan Ögelman | © RTO Insider

But not in Texas, if **Kenan Ögelman**, vice president of commercial operations for ERCOT, has his way. Texas, which has led the nation in wind development, is starting to make strides with solar as well.

So Ögelman is pitching an alternative description: an armadillo on its back. “The belly of the duck is the shell of the armadillo,” he explained.

As in California, solar generation stops just as demand is rising to its daily peak. But Texas' width may make it a bit easier to manage the ramp. “Because most of our load centers are in the center and the east ... of Texas, and most of the highest potential solar is in the west, we might be able to buy ourselves ... an extra hour there potentially because Texas is so big.”



From left to right: Tim Fairchild, SAS; Chris Hendrix, Walmart; and Lorenzo Kristov, CAISO. | © RTO Insider

When solar is wanting to dispatch and use the grid, that isn't necessarily overlapping with wind as much so there might be some ... complementary ability to use the grid.”

California, meanwhile, will be releasing a new version of the duck curve soon, said Lorenzo Kristov, principal for market and infrastructure policy for CAISO.

The new curve is necessary, Kristov said, because solar has grown so fast that the duck curve is playing out four years ahead of projections.

“We actually hit 11,000 [MW] net load last year — that's just below what we forecasted for 2020,” he said. “And we actually hit this very steep ramp — the 13,000 [MW] that was ... the projection for 2020 — we hit it in December 2016.”

The California Energy Commission's 20-year forecast for rooftop solar adoption is updated every two years. “And invariably the forecast they did two years ago is way lower than the forecast when they revise it two years later,” Kristov said.

One other development: Peak demand is coming later in the day. “The solar starts to reduce the magnitude of the normal peak hours, leaving a residual peak that happens a little bit later because the air conditioning is still running, but the sun has now gone down,” he said.

RTOs, Retail Choice Help Walmart Meet Renewable Goals, Cut Costs

As Walmart's director of markets and compliance, Chris Hendrix is charged with controlling energy costs while meeting the retail giant's goal of obtaining half of its electricity needs from renewable power by 2025.

That has led the company to set up its own energy supply company to power its 4,500 Walmart and Sam's Clubs locations in the U.S. It also has invested in more than 400 renewable generation projects, including wind in Texas and solar in California, Arizona, Massachusetts and Connecticut. “In ERCOT, about 30% of our load is [served by] wind. It's going to grow over time,” Hendrix said, citing two projects under construction.

“Not only are we buying power, we're also a market participant in all the ISOs. ... We have a retail supply license in 11 states, plus the U.K. We just act like everybody else, your Direct Energy, your Constellations of the world. The only difference is ... I don't have a sales force and I don't have customer parallel on the backside.” His customers are the store managers.

“Every single market, every single co-op, every single utility, we're there. So we have a good cross-section of the U.S. markets,” he said. But only ISO/RTO markets and states with retail choice give him all the tools he needs to do his job, he said.

“The only way that we're able to buy large-scale renewables is through an ISO,” he said. And ISOs and RTOs with retail choice provide transparent LMPs that allow price hedging.

“Where we run into problems is in parts of California, where we don't have choice, [and] SPP [and] MISO, where we're exposed to an average price. It may not even be a time-of-use price. ... So that's not really setting the right price signal for us to implement renewables or energy efficiency or demand response, because all I have is a flat price of 7 cents/kWh.”

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Overheard

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Alberta Capacity Market to Create New Forecasting Challenge



Steven Everett | © Cassandra Wilson, SAS Institute Inc.

There will soon be one less energy-only market in North America. The Alberta Electric System Operator is planning to introduce a capacity market to ensure it has sufficient firm generation supply as the province seeks to add renewables and eliminate coal generation by 2030.

That means new challenges for Steven Everett, forecasting manager for AESO.

“Whether it’s two or three or five [years] — or however many years out our capacity market is — our load forecast will determine what will be the size of that market,” he said. “So there’s going to be new layers of scrutiny on that forecast.”



Rich Dewey of NYISO (left) and Stu Bradley of SAS | © Cassandra Wilson, SAS Institute Inc.

NYISO Teaching QA Staff Hacking Skills

No electricity conference is complete without a discussion of cybersecurity. Top technology officials from PJM and NYISO took part in a conversation with moderator Stu Bradley, vice president of SAS’ cyber business unit.

Jonathon Monken, senior director of system resiliency and strategic coordination for PJM, noted that an RTO’s challenge is different from that of utilities.

“We are very, very [information technology] heavy. We have a very small amount of physical infrastructure at PJM and a massive IT infrastructure. What that means ... is that the attack surface area is significant. It’s huge.”

NYISO Executive Vice President Rich Dewey, who oversees operations, markets and information technology, said the ISO is spending more on training to enhance its defenses and address the shortage of IT security experts.

“Typically in the energy space, 5% of your IT budget is kind of the norm [for training]. ... We actually spend probably a higher percentage of our budget on training in the security space. We look at it from two areas: One is trying to close that skill gap of trying to find qualified individuals on the market. There’s not a lot of them.”

The ISO also is training some of its quality assurance team, which tests software before it is put into production, “how to hack,” Dewey said.

“Every time we’re getting ready to put a new piece of software into production, they try to break into it. They try to go through the

standard list of the most well-known vulnerabilities and try to see if they can actually get into the system and compromise the security of the system.

“It’s been kind of eye-opening. ... We’ve taken delivery of production-ready software. We set it up in our QA environment, we let our QA guys loose on it and before you know it we’ve discovered five or six vulnerabilities — pretty common vulnerabilities — that they didn’t even realize that their own software had. And we work with them to patch those [holes].”

Monken said the electric industry is working with the Defense Advanced Research Projects Agency (DARPA) on a “rapid attack detection and characterization system” for industrial control systems. “That’s something that [the Defense Department] has the money and time to invest in because they see it as a threat factor for national defense. It might not be a tool that we use with great frequency, but being able to provide some tactical expertise from the industry side to the development side tool is something that has significant benefits to us later on as that moves past the prototype stage and into something that can be utilized in the industry.”

Tips for Winning Regulatory Change



ToNola Brown-Bland | © Cassandra Wilson, SAS Institute Inc.

North Carolina Utilities Commissioner ToNola Brown-Bland said those seeking regulatory changes to accommodate new technologies should consult with regulators to seek tailored solutions.

“The lawyers in the room and the regulators

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Overheard

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don't want to be 'No.' We want to help get to 'Yes.' But ... the current regulatory regime [has] served us very well. ... You don't necessarily want to throw it [all] out."

Solar for All: San Antonio's Strategy

Tim Fairchild, director of SAS' Global Energy Practice, asked CAISO's Kristov how to make solar more than what Microsoft founder Bill Gates has termed "a toy for rich people."

"There are a lot of things that don't make sense from a societal perspective, one of them being the incentive to size your solar installation to the needs of your house," responded Kristov. "Many houses have shade trees. We don't want you to cut down shade trees to put on solar panels. But if you have sunny rooftops, why not make those a resource for the entire community, sized to the maximum size you want, and sell the excess?"

That's the approach San Antonio's municipal utility has taken. "Essentially, they viewed all sunny rooftops as an asset and they paid for the solar panels — paid rent in the form of a per-kilowatt-hour [fee] to the residents of the house. And then all the energy generated just became part of the supply resource portfolio of the utility."

Storage

Although California was the first state to



Mike Smith, SAS | © Cassandra Wilson, SAS Institute Inc.

mandate utilities obtain energy storage, the "value stack" compensation method for DER is still a "work in progress" at the state Public Utilities Commission, according to Kristov. New York regulators this month introduced the "value stack" concept to replace net metering for distributed energy resources. (See [NYPSC Adopts 'Value Stack' Rate Structure for DER.](#))

"If [storage is used] for peak shaving and capacity deferral on a distribution feeder — to put off the day when you upgrade the conductors — you need to be able to use it off-peak on something else to get a little extra funding for it," said Ralph Masiello, senior vice president of Quanta Technology. "You see that in study after study. One or 2 or 3% of the feeders can be justified on capacity deferral alone. But if you can do the capacity deferral plus time arbitrage year-round — even when you're not overloaded



Erik Ela, Electric Power Research Institute | © RTO Insider

— then the economics improve to 10% of the feeders or more.

Meanwhile, "storage is on a declining cost curve, as PV was, and it will become more and more attractive for more applications. Today we're adding storage to the market models in an incremental fashion — not changing the paradigms; making it look like a generator."

"But if we thought more broadly and towards the future when it was cheaper and more plentiful, this needs to be part of a capacity planning exercise. Ask the question: How much storage is good, is right, for a given market?"

Kiran Kumaraswamy, market development director for AES, foresees storage displacing peaking plants with 4 to 5% capacity factors. "Based on what we're seeing in the solar space, I think there's going to be utility-scale storage and there's going to be consumer storage as well," he said. "Exactly to what level it's going to happen in the future is anybody's guess."

Plug for EIA

The Trump administration's proposed federal budget announced last week would cut the Department of Energy's spending by 6%. Chuck Newton, president of Newton-Evans Research, said it is essential that the department protect its Energy Information Administration. "It's very important that we give good data to Congress," he said. EIA "has to continue in place."

— Rich Heidorn Jr.



© RTO Insider

IRC: Renewables' Future Depends on Grid's Ability to 'Accommodate'

By Tom Kleckner



North America's independent grid operators released a report Thursday that concludes the "ongoing effectiveness" of renewable technologies will depend directly upon the electric system's ability to "accommodate them."

The ISO/RTO Council (IRC)'s report, "Emerging Technologies: How ISOs and RTOs can create a more nimble, robust bulk electricity system," concludes the future of the North American power grid depends on effectively adding renewables, the accuracy and availability of data from behind-the-meter resources and coordinating these distributed energy resources at the grid-operator level to preserve reliability.

The report captures the results of a study conducted by the IRC's Emerging Technologies Task Force (ETTF), which was formed in 2015 to review the deployment of new technologies and identify where that deployment intersects with operational and policy considerations.

The report notes more than 80% of North America's wind and solar capacity lies in regions served by IRC members. These technologies face a serious challenge, the report said — the electric system itself.

SPP CEO Nick Brown, the IRC's current chair, noted grid operators from different geographic regions "overlap ... in their thinking" of the role emerging technologies will play.

Technology Precedes Policy

"Here's the challenge: Technology always precedes policy," Brown said during a panel discussion last week at the *RTO Insider/SAS* ISO Summit. "And as technology presents things, then we have to understand how to manage them [through] appropriate policies."

The IRC is an affiliation of nine nonprofit grid operators that serve two-thirds of electricity consumers in the U.S. and more than half in Canada.

"Any time the IRC speaks with strong consensus on a matter like it has done here, I hope our industry takes notice," Brown said in a news release.

"Each of the IRC member organizations is unique," said ETTF Chair Edward Arlitt, of Ontario's Independent Electricity System

Operator. "One ISO or RTO may have greater solar capacity in their region, another may be farther along in their handling of DERs, and all of us have regulatory and operational constraints unique to the provinces, states and regions in which we serve."

The task force used a straw poll to determine that handling emerging technologies was the highest-ranked priority among IRC members.

'Imperatives'

The task force's research produced what it called imperatives necessary to ensure the grid's continued reliability and efficiency as the penetration of emerging technologies increases:

1. Manage the variability of supply and increasing levels of renewable integration enabled by emerging technologies. Is there enough "cohesive innovation" happening to integrate renewable generation, grid-scale energy storage and microgrids' disparate components into the Bulk Electric System?

The IRC said while it is agnostic to specific technologies that may facilitate renewable integration, it supports policies that "accommodate emerging renewable integration technologies" and pursuing "continentwide consensus" on how much integration will be achieved through regional or inter-regional trade.

The report recommends avoiding committing too early to specific technologies and calls for a "suitable policy environment" to ensure new technologies and approaches continue to be developed, tested and applied to renewable integration.

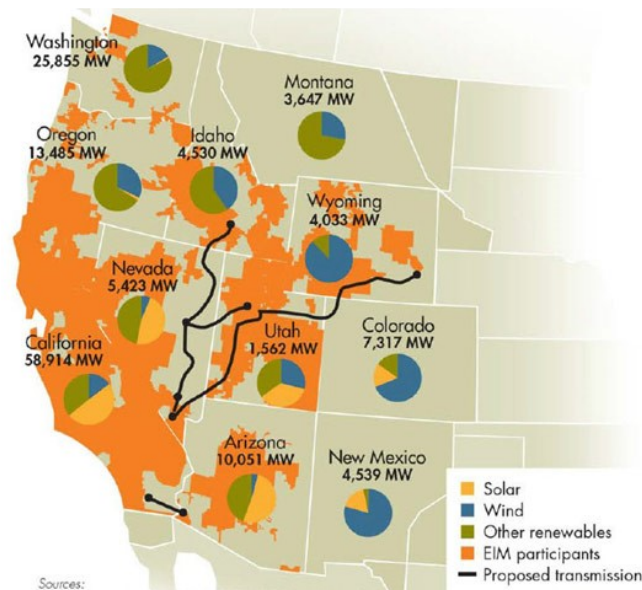
2. Address the IRC members' lack of consistent, reliable, DER-related data as the grid becomes more distributed and less predictable.

The report says the lack of consistent and reliable data — such as between SCADA systems and new phasor measurement units (PMU) — should not constrain "situational-awareness arrangements" across transmission/distribution connections. It also says RTOs should have access to basic, static DER data series in their service territories. The task force said location, size and technological capabilities are examples of data needed to manage an increasingly distributed system.

The task force recommended developing an operations data framework flexible enough to handle local differences in DER penetrations.

3. Noting FERC's November 2016 Notice of Proposed Rulemaking, which would require wholesale markets to accommodate energy storage and DER, the IRC suggests a formalized framework to help RTOs "harness the capabilities and manage the risks" of intermittent DER growth. (See [FERC Rule Would Boost Energy Storage, DER.](#))

The task force recommends jurisdictions with distribution system operators (DSO) conform to standards that allow safe interaction between DSOs, non-utility entities and the Bulk Electric System. It said it supports policies that ensure if distribution-level variability poses risk to system reliability, RTOs have "appropriate authority" over DERs or mitigate their impact on the grid.



Computer-modeled load profiles for CAISO under various future scenarios of 20%-50% PV penetration. | ISO/RTO Council



Board Approves CAISO Small TO Generator Interconnection Plan

By Robert Mullin

CAISO's Board of Governors last week approved a proposal designed to prevent smaller transmission owners from footing the costs for network upgrades needed to interconnect generation serving load outside of their service territories.

The plan was the product of seven months of work by CAISO staff and stakeholders to address a situation facing Valley Electric Association — one that could also apply to other small utilities that join the ISO in the future. (See [CAISO Issues Final Proposal for Small TO Interconnection Costs](#).)

Valley Electric, a Nevada-based cooperative serving about 18,000 electric customers in a sparsely populated area along the California-Nevada border, has recently been targeted as a promising site for developing solar projects intended to help California achieve its 50% by 2030 renewable portfolio standard.

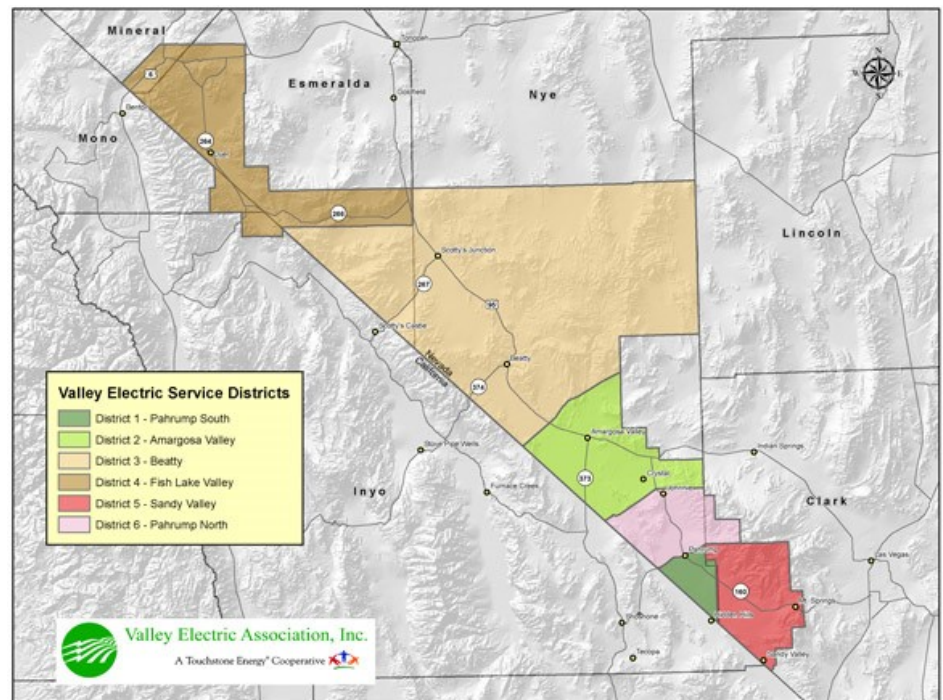
Avoiding Rate Shock

"This proposal addresses the rate shock that would happen for a small [TO] and would have *de minimis* impact on larger [TOs]," Stephen Rutty, CAISO's director of grid assets, told the board during its March 15 meeting.

Rutty pointed out that only a handful of CAISO stakeholders opposed the proposal, which would require the ISO to determine on a case-by-case basis whether a candidate TO could be allowed to fold low-voltage generator interconnection costs into high-voltage transmission revenue requirements, thereby spreading costs among the ISO's entire ratepayer base. San Diego Gas and Electric demurred, citing a concern that CAISO's solution did not meet FERC cost allocation rules.

The proposal requires that an eligible TO be very small relative to others (with a gross load of 2 million MWh or less), located in a renewable resource-rich area gaining "elevated" interest for generator procurements and not in need of the new interconnecting generation to meet an RPS.

CAISO has estimated that a single \$10 million network upgrade required by new



generation would increase Valley Electric's combined high- and low-voltage transmission access charge (TAC) by nearly 14%.

"However, if they are allowed, under this proposal, to put it into their high-voltage TAC, their increase would be about 0.04%, and the rest of the [participating TOs] would see a very similar *de minimis* impact," Rutty said.

150 MW New Generation vs. 130 MW Load

Valley Electric representative Josh Weber, an attorney with Davison Van Cleve, sought to provide some additional context for the board.

"Valley's peak load, out there in the desert when the air conditioners are all running and it's 114 degrees outside, is somewhere around 130 MW," Weber said, adding that the cooperative is currently negotiating about 150 MW worth of generator interconnection agreements. Those deals alone could incur \$6 million to \$9 million in upgrade costs for the 138-kV lines that would be subject to the proposed rule.

"So that means that the generation that Valley is working hard to interconnect is

much, much more than Valley's entire peak load," Weber said. "I think that kind of speaks to the magnitude of the cost shift that we're talking about here."

Speaking on behalf of the Large-scale Solar Association, California Wind Energy Association and Independent Energy Producers Association, attorney Joe Karp offered his support for the proposal.

"Several options were considered, and this option is a narrowly tailored option that addresses a unique issue," Karp said. "We believe the solution here is consistent with general FERC and [CAISO] policy on allocating infrastructure and upgrade costs."

Catherine Hackney, director of state legislative policy for Southern California Edison, provided an additional endorsement, saying her utility appreciated the ISO's efforts to narrow the proposal to fit Valley Electric's circumstances.

Cost Allocation Concerns

SoCalEd's neighbor to the south, however, took a contrary position.

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CAISO RMR Designations Meet with Board OK, Stakeholder Criticism

By Robert Mullin

CAISO's Board of Governors last week approved an ISO request to designate two Calpine natural gas-fired plants in Northern California as reliability-must-run despite criticism from several stakeholders. Acknowledging concerns, ISO officials pledged to avoid "case-by-case" designations in the future.

At the board's March 15 meeting, Carrie Bentley, a consultant speaking on behalf of the Western Power Trading Forum (WPTF), said the organization "does not at all oppose" designating the units as RMR.

"Obviously, though, after years of the ISO saying they're not going to use the RMR Tariff authority anymore — and that they're going to rely on the capacity procurement mechanism — we were really surprised," Bentley said.

CAISO sought RMR designations for Calpine's Yuba City and Feather River plants after determining that both 47-MW peaking facilities would be needed to support local grid reliability after they fall off their current contracts with Pacific Gas and Electric at the end of the year. (See [CAISO Seeks Reliability Designations for](#)



Feather River Energy Center | Calpine

Calpine Peakers.

Calpine had informed CAISO in November that capital planning requirements required that it be appraised of any reliability need for the plants before this fall, when the ISO releases its 2018 resource adequacy (RA) assessment. The assessment will determine what plants would be eligible for longer-term resource adequacy payments under CAISO's capacity procurement mechanism (CPM).

'Purgatory'

"When a unit is facing retirement, or a continued need for operation, we're in a state of purgatory," Mark Smith, Calpine vice president of government of regulatory affairs, told the board. "We're in a position

where we can't make investments that we know that we will never recover and we may not be able to take actions to redeploy those assets elsewhere where they might be more valuable."

Neil Millar, CAISO executive director of infrastructure development, emphasized that the ISO would seek to implement the RMR contract for Yuba City only if it is not shifted into the CPM program following the assessment.

Feather River will not be eligible for a CPM designation because it is not needed for capacity but to provide voltage support for its local area by absorbing reactive power from the system. Millar said the ISO is working with PG&E to develop "longer-term mitigations" on both the transmission and distribution to come up with a way to reduce reliance on gas-fired generation for voltage control in the area.

"We do need a better process moving forward than bringing these [RMR proposals] forward on a case-by-case, one-off basis," Millar said.

Bentley recounted recent steps taken by CAISO that should support RA prices, including submitting comments to the

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Board Approves CAISO Small TO Generator Interconnection Plan

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"San Diego Gas and Electric agrees with just about everybody that something needs to be done, but I think the solution here that's been identified is, frankly, inconsistent with FERC's policy on cost allocation," said Jan Strack, SDG&E's manager of transmission planning.

FERC has been "pretty clear" that costs for transmission projects should follow benefits, Strack said.

"Instead, what we have in this proposal is a one-off kind of allocation mechanism where the size of the entity suddenly takes on great weight," he said. "Nowhere in FERC's cost allocation principles do I see any principle that size matters."

Strack said the ISO still needs to determine

the best way to establish a linkage between benefits and costs of transmission projects.

"I think until that exercise has been gone through, it will be very premature to go forward with this one-off, unprincipled approach to allocating transmission costs just on the basis of the size of the entity," he said.

Strack contended that all electricity users benefit from the reduced carbon emissions and lower prices fostered by new renewable generation.

"Pretty much everybody realizes benefits from these connections, so to divide this up between low- and high- [voltage] — even in the way the ISO is proposing here — is a mistake, and I don't think it's going to survive a test at FERC," Strack said.

"Size was not the only criteria here,"

countered Keith Casey, CAISO vice president for market and infrastructure development. "The other piece of that was that [Valley Electric] did not have an RPS [and] did not benefit from renewables connecting to its system."

Casey agreed that FERC's principles require costs to follow benefits, but he said that Valley Electric's lack of benefits from the new generation would provide a "principled" argument to FERC.

He also contended that FERC must in this case consider the issue of "just and reasonable" rates.

"Imposing that cost on a small number of customers when you're looking at a 14% increase in just one year — we think there's an issue there around the just and reasonableness of that," Casey said.



CAISO RMR Designations Meet with Board OK, Stakeholder Criticism

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California Public Utilities Commission supporting a reduction in the amount of wind and solar that can count as RA and a 2018 local capacity requirements study showing increased capacity needs in some local areas.

“WPTF therefore encourages the board and ISO leadership to take this as an opportunity to step back and ask if there’s anything else the ISO already has Tariff authority to do to help orderly economic retirement and support the RA bilateral market prices,” Bentley said. “A turnaround in prices can only occur in a functioning bilateral RA market.”

‘Sufficiently Visible’

For “sufficient prices” to materialize, Bentley contended, market signals must be “sufficiently visible” to both suppliers and load-serving entities.

Eric Eisenman, director of ISO relations and FERC policy at PG&E, agreed that there was a reliability need for the two plants and that the ISO was the “appropriate venue” for addressing the matter.

“With that said, PG&E encourages the ISO to work with stakeholders [and] PG&E to enhance and improve the process for analyzing and reviewing risk-of-retirement issues for generation,” Eisenman said. “The expedited process of the last two weeks was, quite frankly, not ideal. We all need to do a better job at that.”

Eisenman said his company wants to more closely examine the trade-offs between the CPM and RMR processes.

“I’m actually encouraged by what I’ve heard here today — to some extent,” said Jan Strack, transmission planning manager at San Diego Gas and Electric, adding that the RMR matter was something warranting a deeper look.

Strack noted that the ISO has a lot of aging gas-fired generation. “We’ve got to figure out a way to let that stuff go,” he said, adding that RMR contracts should be “a measure of last resort.”

“In the current instance, I think we feel there has not been enough light shined on all the various alternatives that could be looked at, rather than just going into an RMR contract,” Strack said.

Millar called the Feather River decision “strictly a matter of timing,” with the RMR providing CAISO time to determine the best solution for local voltage support.

“Putting it bluntly, three months with no opportunity for any stakeholder process doesn’t give us that time,” Millar said, referring to the “compressed timeline” in which the ISO needed to notify Calpine about the RMR decisions. The company had requested a decision by the end of March in order to have adequate time to draw up a cost-of-service proposal and perform the required capital maintenance.

Signs of Market Failure

Governor Ashutosh Bhagwat wondered if there were any other ISO mechanisms available to ensure the plants’ availability other than RMR.

Keith Casey, CAISO vice president of market and infrastructure development, said the RMR option provided CAISO more flexibility in dealing with Calpine’s near-term need to make capital investments than the CPM, which functions as the ISO’s standard “backstop” for needed plants at risk of retirement. Still, Casey said it would be “unfortunate” for the ISO to find itself facing a “proliferation” of RMR agreements.

“If we now find ourselves ramping up in that, that’s a sign we have a market failure,” Casey said.

CAISO CEO Steve

Berberich said the RMR issue was “symptomatic” of the fact that the RA processes that both the ISO and PUC have in place “are starting to fray at the edges a little bit.”

“Of course, the ISO has advocated for a longer-term resource adequacy program so that we don’t have this year-by-year emergency situation that we always have to go through,” Berberich said.

Berberich pointed out that the current RMR issue is part of an “evolving grid.”

“Take a step back — why is voltage high at Feather River?” Berberich asked rhetorically. “The voltage is high because of light-load conditions. We have substantial distributed generation on the system.”

He suggested that the voltage issue — rooted in distribution-level changes that are affecting the low-voltage network — could possibly be better managed by a distribution-level solution rather than a transmission-connected resource such as the Feather River unit.

“This is a very complicated issue,” Berberich said. “I’d like to tell you that this is the last time we’re going to talk about RMR, but I don’t think that’s going to be the case.”



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CAISO Preparing Responses to Spring Oversupply

By Robert Mullin

CAISO market operators are preparing to deal with an inevitable flood of energy oversupply this spring, when unusually high levels of hydroelectric output are expected to compound the impact of growing solar penetration on the California grid.

One likely outcome: forced reductions in self-scheduled power deliveries throughout the season.

The ISO is already experiencing the effects of oversupply — in the form of economic curtailments — months ahead of the spring melt in the Sierra Nevada mountains, where snowpack in some areas stands at more than 175% of normal, according to the California Department of Water Resources.

“Altogether, [we] can see that wind, solar and hydro are making up a lot of generation in the first two months of the year,” Guillermo Bautista Alderete, CAISO director of market analysis and forecasting, said during a March 14 Market Performance and Planning Forum (see graph).

“If you just compare against the same profile for one year ago, you can see that we are well over the historical levels [for hydro] — and this is just January and February,” Bautista Alderete said.

And while hydro has so far been the biggest contributor to the mix, solar output will become an increasing factor, with the longer days and more intense periods of sunlight in spring and summer.

“The big story here is the year-over-year change that we’ve seen going back to 2013, when we didn’t have a lot of solar on the system,” said Gabe Murtaugh, a senior analyst with the ISO’s Department of Market Monitoring.

Murtaugh pointed out that 2015 was the first year in which large-scale solar became the most significant source of renewable power on the ISO system — with output last year surging again by 33% to more than 20,000 GWh as installed capacity climbed to about 9 GW.

That capacity figure doesn’t include rooftop installations, which the ISO estimates stand at 5 to 6 GW — or about 12 to 15% of

average system load, according to Amber Motley, CAISO’s manager of short-term forecasting.

“Current solar capacity is capable of increasing oversupply risk without factoring in wind and hydro,” Motley noted in her presentation to the forum.

Based on that risk, the excessive solar, wind and hydro output on the horizon will translate into a significant number of curtailments by the ISO this spring. (See [High Hydro, Increased Solar Point to Spring Curtailments for CAISO](#).)

The evidence is already coming in. Curtailments have been on the rise this winter, with about 60,000 MWh of solar output being cut off in February — the largest amount for any month since the beginning of 2016.

Bautista Alderete explained that, under its current staged approach to oversupply, CAISO first exhausts its regulation service, which ramps down output from participating resources, followed by economic curtailment of price takers in the market.

“You keep going through the bid stack to the point until you find the balance of supply and demand,” he said.

Once economic bids are spent, the ISO begins to curtail self-scheduled energy deliveries.

“So you exhaust your regulation before you cut into the self-schedules?” asked Seth Cochran, manager of market affairs and origination at DC Energy.

“This is something we’re going to revisit,” responded Mark Rothleder, CAISO vice president of market quality and renewable integration. “If, for short periods of time, we’re going into the regulation stack, it’s OK. If we’re persistently going into the regulation stack, that’s a problem.”

He said the ISO is considering reducing its reliance on regulation during oversupply periods, a move that would require more



Production by renewable resource in CAISO | CAISO

frequent curtailment of self-schedules.

Rothleder speculated that on a warm, sunny and breezy weekend day in the spring when hydro is spilling at a high rate, CAISO would move quickly through its bid stack of an estimated 1,500 to 2,000 MW of curtailable renewables and begin to confront reductions in self-schedules.

“The next question is: How far?” he said.

To illustrate the potential scope of reductions, Rothleder highlighted system conditions on the previous Sunday, March 12, when the ISO saw its net load (which represents total system load minus output for variable renewable generation) fall to about 10.9 GW with 15 GW of available generation. With a maximum of 2 GW of economic bids poised for curtailment, the balance, he said, would come from self-schedules.

Bautista Alderete said CAISO is seeking to be “proactive” in alleviating the oversupply problem, pointing to Motley’s work to improve short-term forecasting of oversupply conditions.

Motley has been seeking to discern indicators of potential oversupply in the day-ahead market.

One such indicator: negative pricing in the energy component of the LMP.

Another: a forecast of about 5 GW of renewable generation paired with a load forecast of about 25 GW — an average for this time of year — leaving a net load of 20 GW.

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Changes to Put CAISO Market Monitor Under Full Board Oversight

Continued from page 1

oversight of the Department of Market Monitoring,” Roger Collanton, CAISO general counsel, said during a March 15 meeting of the board. “In particular, [we’re] giving the board more direct oversight over the administrative functions of market monitoring in order to enhance the appearance and, in fact, the independence for market monitoring.”

CAISO’s Tariff currently outlines a “dual” reporting structure in which the department is subject to direct board oversight for its “core” monitoring responsibilities, while at the same time reporting to the ISO’s CEO for administrative purposes, which include budgeting and staffing matters.

The new arrangement calls for the establishment of an Oversight Committee to be staffed by governors Ashutosh Bhagwat and Angelina Galiteva. It will be charged with overseeing the department’s administration and operations, including determining staffing levels and compensation, setting departmental goals, approving budgets and ensuring that the ISO is providing adequate corporate support. The committee will operate under a newly created charter.

“I just want to emphasize that we’re very supportive of this.”

Eric Hildebrandt, CAISO Department of Market Monitoring

“The arrangement will still allow for the Department of Market Monitoring staff, as well as the director, to communicate directly with the [full] board as they need,” said Greg Fisher, senior counsel with the ISO. “However, the Oversight Committee will be something that they can reach out to for various issues.”

Fisher said the proposed changes arose out of a review of the recommendations from FERC’s audit of SPP, discussions with FERC staff currently auditing the ISO and consultation with DMM Director Eric Hildebrandt.

“I just want to emphasize that we’re very supportive of this,” Hildebrandt said. “We’re looking forward to working with the Oversight Committee, but as [Fisher] mentioned, this is really just to bring our organization in line with what FERC identified as best practices based on some other ISOs.”

Hildebrandt went on to laud CAISO CEO Steve Berberich for supporting the Monitor’s independence and for “always” having providing the necessary resources and staffing for the department. Hildebrandt called the prospect of direct engagement with the CEO and the Oversight Committee “the best of both worlds.”

“I support these [changes] under one condition, and that’s that I can continue to have that kind of relationship with [Berberich] and interface with him,” Hildebrandt said. “I think that’s very helpful in just our working as an internal Market Monitor.”

“The charter is designed with that type of flexibility in mind, so that the Oversight Committee has full ability to delegate responsibility as it sees fit to management, as well as anticipating that same type of collaboration and interaction with management,” Collanton said.

CAISO Preparing Responses to Spring Oversupply

Continued from page 17

Even with no wind output, the 9 GW of solar on the system has the potential to push the system into oversupply under those load conditions.

Motley said historical hydro schedules, while factored into the forecast, will not be the most reliable indicators of oversupply because of the year-to-year difference in hydro conditions. Hydro operators are likely to have less flexibility to ramp down output this spring with

increased flows.

The forecasts might occasionally compel the ISO to reach out to market participants outside normal market channels.

“On days when we go below 20,000 MW [in net load] on average, we may have a phone call [with scheduling coordinators] ... to state our oversupply risks,” Motley said. “We don’t want to use those all the time, because some of these factors are going to be there every weekend, but when we see more extremes, we may use that coordination phone call.”


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ISO-NE NEWS



Connecticut Moves Closer to Equating Nuclear with Renewables

Continued from page 1

Class I renewable energy in the state's total energy production through 2040 by easy-to-remember increments: 20% by 2020, 29% by 2029 and 40% by 2040. It would mandate an additional 3% each year from Class I or Class II renewable resources, i.e., hydropower or trash-to-energy.

The General Assembly's Joint Committee on Energy and Technology considered the bill, S.B. 106, on Friday along with related legislation, Raised Bill 7247, which aims to establish a carbon price for fossil fuels sold in the state.

The bill supporting Millstone revives a similar measure that passed the Senate at the end of last year's legislative session, but which the House of Representatives did not have time to consider.

Connecticut lawmakers are riding a trend, as New York approved zero-emission credits for three upstate nuclear plants and Illinois did the same for two plants.

Three other states, New Jersey, Ohio and Pennsylvania, also are considering plans to subsidize their nuclear power generators, which have seen their profits squeezed by



Millstone Station | Nuclear Regulatory Commission

low-cost natural gas and renewable generators.

Millstone is New England's largest power plant and has been owned by Dominion since 2001. The plant has a total generating capacity of 2,111 MW; Unit 2 at 882.5 MW is licensed to operate through 2035, while Unit 3, with 1,228 MW of generating capacity, is licensed to operate through 2040. Millstone produces more than half of the electric power used in Connecticut and about one-seventh of New England's electric power.

Kevin Hennessy, Dominion's director of state policy for New England, has been publishing op-ed pieces throughout Connecticut this year to make the company's case that the proposed legislation cuts out the "middle man" and represents a good deal for state electric power consumers. In an op-ed in the New Canaan News on March 10, Hennessy said that current regulations result in power to consumers being priced high, despite wholesale prices having dropped notably.

Continued on page 20

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ISO-NE NEWS



Connecticut Moves Closer to Equating Nuclear with Renewables

Continued from page 19

"When oil prices drop, we all expect to pay less at the gas pump," Hennessy said. "Why should electricity be different?"

The early draft of the legislation said its purpose was to provide a mechanism for zero-carbon electric generating facilities to sell power to electric utilities. Sen. Paul Formica (R), committee co-chair and lead sponsor of the bill, said it creates opportunities for the state to get its energy mix right.

"We're trying to juggle and balance the pieces in the energy puzzle," Formica told the *Hartford Courant*. Formica's district includes Waterford, where Millstone is located.

Not All in Favor

Testifying on March 13 before the Assembly's Environment Committee, Dan Hendrick, director of external affairs for NRG Energy, said, "One of the most hotly debated issues before the General Assembly this session is Senate Bill 106, which would create a new clean energy [request for proposals] and allow a large, existing nuclear plant to compete against wind and solar

S.B. 106 "would burden only Connecticut ratepayers with the extra costs of an RFP designed to provide unjustified additional revenues to a single nuclear generator."

Dan Hendrick, NRG Energy

for the first time."

NRG operates 28 generating plants in Connecticut with a combined capacity of 1,900 MW, of which 925 MW is natural gas and liquid fuel-capable. NRG this year joined Calpine, Dynegy and the Electric Power Supply Association in funding "Stop the Millstone Payout," a campaign to derail the bill.

Hendrick reminded the committee that policies set in Connecticut will affect the other five states in the ISO-NE wholesale market. The RTO is trying to align the electricity markets and state policy proposals through the NEPOOL Integrating Markets and Public Policy (IMAPP) initiative.

"That being said, the three-state threshold of this bill reaches approximately 80% of the electricity load in ISO-NE," Hendrick said, referring to a provision in the carbon price bill that requires the enactment of similar

legislation in Massachusetts and Rhode Island. "Contrast this approach with Senate Bill 106, which would burden only Connecticut ratepayers with the extra costs of an RFP designed to provide unjustified additional revenues to a single nuclear generator."

Opponents also question the need for state-sponsored financial aid to Dominion and Millstone.

"Nowhere has [Dominion] claimed that Millstone is not profitable, and the company is too cute by half in its arguments as to why it needs special treatment," said Tom Swan, executive director of the Connecticut Citizens Action Group, in a March 8 letter to the editor of *The Middletown Press*. "Connecticut ratepayers should not be asked to subsidize a profitable company and we definitely should not weaken our commitment to a renewable energy future by reclassifying nuclear as 'clean energy.'"

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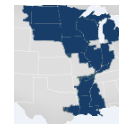
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MISO NEWS



MISO's Competitive Tx Evaluation Costs \$1.3 Million

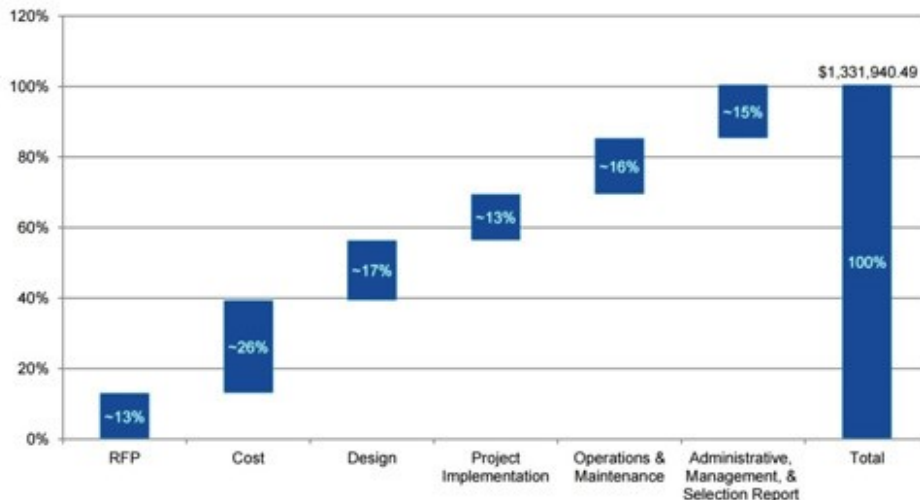
CARMEL, Ind. — MISO spent \$1.3 million to evaluate construction bids in its first competitive transmission process, including administrative costs for issuing the request for proposals and drafting a post-selection report.

The work was funded entirely by the 11 developers that submitted proposals. Brian Pedersen, senior manager of competitive transmission, said MISO required a \$100,000 deposit from each of the 11 developers to fund the cost of Duff-Coleman bid evaluation, but the RTO had to bill each of them another \$21,000 to make up for all evaluation costs.

Stakeholders asked how the process could be streamlined to reduce costs.

“There aren’t a whole lot of economies to scale, since we still have to evaluate everything,” Pederson said at the March 15 Planning Advisory Committee meeting.

The RTO and stakeholders would discuss evaluation criteria and process transparency during the April meeting of the new Competitive Transmission Task Team, he



Summary of incurred costs by competitive developer selection process | MISO

said. May’s meeting will focus on possible improvements to MISO’s developer qualification process.

Pederson also said MISO will publicly post information from Republic Transmission’s

first quarterly report on the Duff-Coleman project sometime during the second quarter. (See [LS Power Unit Wins MISO’s First Competitive Project.](#))

— Amanda Durish Cook

FERC Staff OKs MISO Mitigation Changes; Refunds Possible

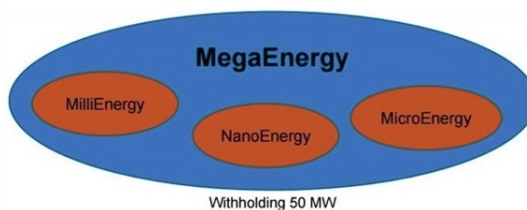
By Amanda Durish Cook

With FERC staff’s hesitant nod, MISO will apply a more stringent physical withholding rule and remove demand response and energy efficiency from market monitoring in next month’s Planning Resource Auction.

The commission released a short delegated order March 15 that accepted and suspended MISO’s proposed changes subject to refund (ER17-806).

FERC Director of Electric Power Regulation Penny Murrell, using authority delegated to her in the absence of a FERC quorum, said the commission’s preliminary review had not concluded the changes were just and reasonable and that the tentative approval was subject to further commission order.

The order will allow MISO to apply a 50-MW minimum for physical withholding rules to affiliated market participants collectively,



Proposed physical withholding framework | MISO

rather than individually to each affiliated company. MISO’s Independent Market Monitor had recommended the change in its 2015 State of the Market Report, saying that as “capacity margins fall in MISO, the market will become more vulnerable to physical withholding.”

The order also allows MISO to exempt DR, EE and external resources from PRA mitigation measures. The RTO said DR and EE resources are too small to have market power.

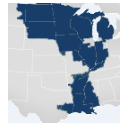
The rules will “provide stakeholders with

greater certainty, prevent large suppliers from circumventing MISO’s mitigation provisions and encourage the participation of demand resources, energy efficiency resources and external resources” in the capacity auction, the RTO said. (See [MISO Plans Additional Capacity Auction Revamps for 2017.](#))

A third change will allow planning resources to request facility-specific reference levels for the auction.

Reference levels are used to determine a resource’s marginal costs, including risk and opportunity costs and technical characteristics for physical offer parameters.

In its filing, MISO said its Tariff is vague as to the types of resources that can obtain a facility-specific reference level rather than using defaults. The change will permit facility-specific levels for planning resources not otherwise exempted from market mitigation.



MISO Changes MTEP Futures Weighting for South

By Amanda Durish Cook

CARMEL, Ind. — The futures assumptions for MISO's 2017 Transmission Expansion Plan are finalized, with the RTO granting its South region a different future weighting in one study.

MISO will use a 40% weighting for an existing trends future, 40% for policy regulations future and 20% for accelerated alternative technologies when conducting its market congestion planning study, which this year is focused solely on MISO South. The other studies in MTEP 17 will continue to use a 31% weighting for existing trends, 43% for policy regulations and 26% for accelerated alternative technologies.

The RTO revisited the weighting in February in response to a request from stakeholders who noted the Trump administration's plan to eliminate the EPA Clean Power Plan. (See [MISO Stakeholders Seek Review of MTEP Futures Under Trump](#).)

"We went through a presidential election that changed a lot of things," MISO Director of Policy Studies J.T. Smith said at a March 15 Planning Advisory Committee meeting. "There were some concerns that, given the political climate, maybe the futures — developed in mid-2016 — didn't quite reflect what the current situation is."

Smith said the revisions are meant to reflect regional differences within MISO; he pointed out that MISO South transmission

"We went through a presidential election that changed a lot of things."

J.T. Smith, MISO

owners and the state regulators of southern states all asked for more emphasis on existing trends.

Both the Louisiana Public Service Commission and Arkansas Public Service Commission asked for existing trends to be given 50% consideration while policy regulations and accelerated alternative technologies receive 30% and 20% weighting, respectively. Entergy went a step further to request a 60% likelihood for existing trends, 25% for policy regulations and 15% accelerated alternative technologies.

All other MISO stakeholders that commented on futures weighting — including MISO's coordinating, environmental and transmission developer sectors, the Iowa Utilities Board, the Indiana Utility Regulatory Commission, the Minnesota Public Utilities Commission, the Minnesota Department of Commerce, Big Rivers Electric, Midwest Power Transmission Arkansas and WPPI Energy — urged MISO to leave weighting as is.

"When we saw that regional separation, we realized that maybe there needs to be a change this year," Smith explained, adding

that the near-term nature of the market congestion planning study can better absorb a change in weighting and not affect other longer-term planning. The study is designed to identify projects to relieve congestion.

Going forward, Smith said he'd like to focus more on the probability that the generating fleet will change regardless of potential federal policy shifts. Development of MTEP 18 futures will begin at the June Planning Advisory Committee meeting, and Smith said it's unlikely that MISO will allow divergent weightings in the next MTEP cycle.

"I still think we're going through fleet change," said Smith, who also admitted that "it's uncomfortable when you change assumptions halfway through."

Smith also said MTEP 17 weights would not change in MISO's footprint diversity study, which is specifically designed to identify alternatives to using SPP's transmission interface for flows between MISO South and MISO Midwest.

Some stakeholders said that conducting one MTEP study using separate future weighting is inconsistent. Others asked how MISO arrived at the altered weights. Smith said the RTO only considered comments from southern stakeholders when creating the new percentages and did not use any mathematical calculations.

Xcel Energy engineer Drew Siebenaler pointed out that most stakeholders that submitted comments on the futures supported leaving them as is. Noting that all MISO stakeholders pay for the MTEP process, he said MISO South should fund its own study if it wants to handpick assumptions.

Smith said Siebenaler's concerns were valid and that MISO would work to improve the futures weighting process in the future.

Meanwhile, Arash Ghodisian, of MISO's economic studies department, said the footprint diversity study and the market congestion planning study continue on track, with project candidates emerging in June. He said stakeholders submitted 58 project ideas for the market congestion planning study.



J.T. Smith, MISO director of policy studies, talks to the Planning Advisory Committee. | © RTO Insider

MISO NEWS



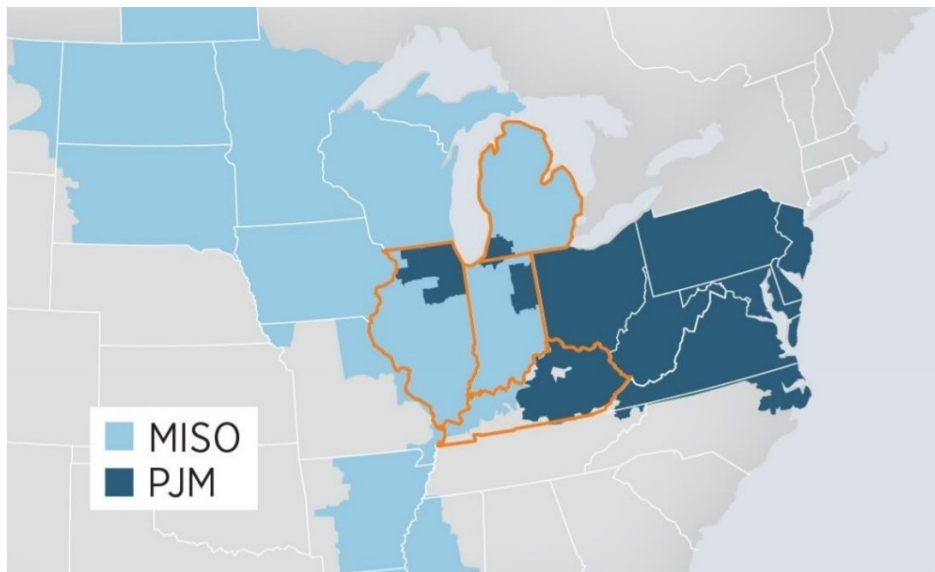
MISO, PJM Find Value in CPP Study, Despite Rule's Likely Demise

By Amanda Durish Cook

CARMEL, Ind. — EPA's Clean Power Plan may be undone by the Trump administration, but MISO and PJM officials say their recently completed study on the rule yielded some valuable insights nonetheless.

"The CPP provides a good stress test to illustrate not only the value of interregional coordination but state coordination, as new policies and/or regulations are considered," the RTOs opined in the [study](#), which was released last week.

The study examined Michigan, Indiana, Illinois and Kentucky — states on the RTOs' seam — and focused on transmission congestion, generation mix, production costs and economic trading.



MISO, PJM

PJM Net Exporter

Coal retirements and new combined cycle gas additions would make PJM a net exporter of power to MISO by 2030 because PJM's gas additions "are located

much closer to shale formations and thus have a lower fuel delivery basis and lower operating cost than the MISO resources," according to the study. Over the last five

years, the net scheduled interchange between the two regions has varied, with each at times being a net seller.

Continued on page 27

MISO-SPP Coordinated Study Yields 1 Possible Project – For Now

By Amanda Durish Cook

CARMEL, Ind. — Preliminary results of MISO and SPP's 2016 coordinated system study are in, and the RTOs say one South Dakota project has potential even though it fails MISO's \$5 million interregional cost threshold.

Davey Lopez, MISO advisor of planning coordination and strategy, said the project — the Split Rock-Lawrence 115-kV circuit into Sioux Falls, S.D. — costs \$4.56 million but is still a strong contender at a 4.79 benefit-cost ratio. The RTOs would split the benefit of the transmission project at 56% for MISO and 44% for SPP.



MISO-SPP 2016 CSP study | MISO, SPP

Need	Constraint	Location
1	Rugby WAUE-Rugby OTP Tie FLO Rugby - Balta 230 kV	Tie Line
2	Hankinson - Wahpeton 230kV FLO Jamestown - Buffalo 345kV	MISO
3	Sub3 - Granite Falls 115kV Ckt1 FLO Lyon Co. 345/115 kV transformer	SPP
4	Sioux Falls - Lawrence 115 kV FLO Sioux Falls - Split Rock 230 kV	Tie Line
5	Northeast - Charlotte 161kV FLO Northeast - Grand Ave West 161 kV	SPP
6	Neosho - Riverton 161kV FLO Neosho - Blackberry 345kV	SPP
7	Brookline 345/161kV Ckt 1 Transformer FLO Brookline 345/161kV Ckt 2 Transformer	SPP

"This project still shows high potential to be an interregional project. ... Both MISO and SPP are open to removing that hurdle," Lopez said of MISO's threshold. MISO won FERC approval to shed its \$5 million cost minimum and 345-kV limit with PJM last year in favor of no cost floor and a 100-kV

threshold. But the commission said the order did not apply to the MISO-SPP process. (See [FERC Signals Bulk of NIPSCO Order Work Complete.](#))

The RTOs looked at seven needs for the

coordinated study: two shared tie lines, one MISO project and four SPP projects. Three of the seven possible projects are unlikely to move forward, MISO stakeholders learned

Continued on page 28



Opposition to Va. Tx Line May Trigger Unintended Consequences

By Rory D. Sweeney

PJM is responding to permitting delays for a 500-kV transmission line across the James River by instituting a multilayered strategy that could cost ratepayers in Virginia's middle peninsula.

The Surry-Skiffes Creek line was proposed to maintain grid reliability on the peninsula after Dominion Energy complies on May 1 with an EPA mandate to shutter its two Yorktown coal-fired units. The project's opponents are concerned the line would ruin the view at Jamestown and other historic sites nearby. A study conducted on behalf of the National Parks Conservation Association concluded Dominion overestimated projected power growth and called

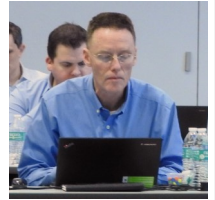
for consideration of other alternatives, including underwater lines and converting the Yorktown units to natural gas.

Approved by the PJM Board of Managers in 2012, the transmission project remains stalled pending permit approval from the U.S. Army Corps of Engineers. Dominion representatives have estimated construction of the line would take at least one year after all permits are approved.

Remedial Action Scheme

Opponents have dismissed as a scare tactic Dominion's warning that failing to build the line could result in blackouts, but the company announced last month it has developed a remedial action scheme for the region that calls for dropping service to

approximately 150,000 customers to prevent a potential voltage collapse from N-1-1 contingencies. (See [Dominion Says Blackouts the Only Solution for Va. Peninsula.](#))



McGlynn

At a series of committee meetings last week, PJM staff detailed several other changes for the area that will have consequences protesters likely haven't imagined.

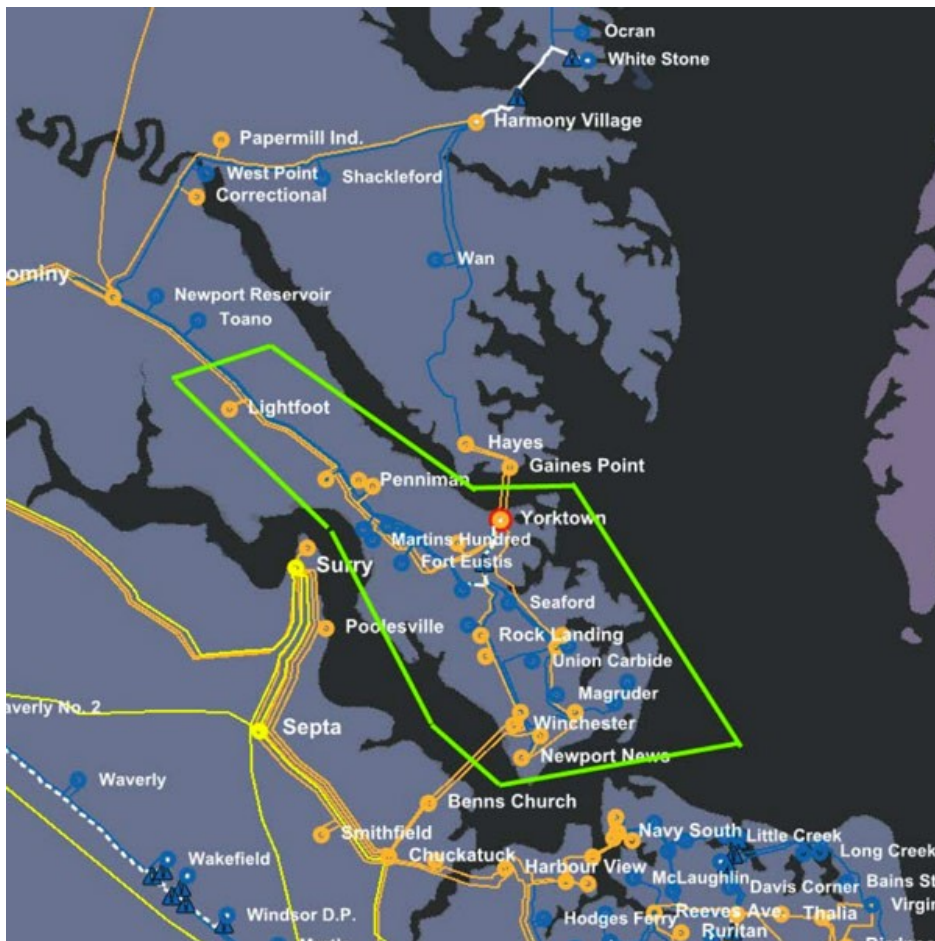
Paul McGlynn, PJM general manager of system planning, announced at the Transmission Expansion Advisory Committee meeting that the RTO has offered Dominion a reliability-must-run contract on the units starting on April 1 and continuing until either the transmission line is constructed or another reliability solution materializes.

PJM calculated that 44% of the costs for retaining the units would be allocated to Dominion's Virginia Electric Power and Power Co., with nearly 10% each to American Electric Power's East zone and Commonwealth Edison.

At the Market Implementation Committee meeting the day before the TEAC meeting, PJM staff presented its new Yorktown pricing interface, which will set real-time LMPs if demand response or other load-management resources are deployed. It would be triggered on a sub-zonal basis when thermal or voltage conditions are encountered that create N-2 or N-1-1 contingencies.

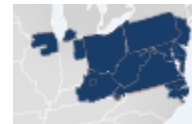
At the meeting, PJM's Independent Market Monitor Joe Bowring took issue with the plan because it allows DR to set regional prices "well above any level that generation can set it" — potentially as high as \$1,800/MWh. Prices in the region are usually around \$40/MWh. The interface would only be modeled in the day-ahead market if conditions are known prior to market close, and it won't be modeled for financial transmission rights auctions.

"It'd be one thing if DR were nodal and were dispatched with the same offer caps," Bowring said. "In a sense, the core issue is that DR can have a price and set price at \$1,800 or more."



Proposed Yorktown pricing interface, which will expose ratepayers to high LMPs should the regional system threaten voltage collapse. | PJM

PJM NEWS



CAPS Hires EnerNOC Alum as Executive Director

By Rory D. Sweeney

The Consumer Advocates of the PJM States (CAPS) has hired former EnerNOC executive Gregory Poulos to replace retiring Executive Director Dan Griffiths. He will transition in as Griffiths, who is expected to depart by the end of the year, leaves.



Poulos

Poulos had been at EnerNOC since 2010, rising from a manager to the director of regulatory affairs. EnerNOC provides demand response and energy management services for industrial clients. His role focused on demand response and energy-market development in PJM and MISO as well as in the states within the grid operators' footprints.

Before EnerNOC, Poulos had stints as an assistant consumer counsel in the Office of the Ohio Consumers' Counsel, and assistant chief of the charitable law section of the Ohio attorney general's office.

Griffiths had worked for another DR provider, Comverge, before joining CAPS. Before Comverge, he spent seven years in the Pennsylvania Office of Consumer Advocate and 18 years at the state's Public Utility Commission.

CAPS is made up of all state utility consumer advocate offices in the PJM region, an area spanning all or parts of 13 states and D.C. In his new role, Poulos' duties will include being a constant presence at PJM stakeholder meetings. (See [CAPS Leader Looking to Pass the Torch](#).)

In a news release distributed Wednesday, CAPS President Robert Mork, of the Indiana Office of Utility Consumer Counselor, cited Poulos' "strong mix of experience and a deep understanding of the people and

processes at PJM" as a major benefit for the organization.

"Dan Griffiths served our organization well as it began formal operations," Mork said. "Hiring Greg represents the next major step as CAPS works with its members to ensure consumer interests are taken into account at PJM. Bills paid by the region's consumers include billions of dollars in PJM charges each year, and effective participation in the PJM stakeholder process has become vital to ensuring reasonable prices and reliable power in each of our states."

Poulos called the opportunity "a great honor" and noted the cooperative nature of the CAPS membership, despite their distance and often disparate interests.

CAPS got its initial funding from a 2012 FERC market manipulation settlement with Constellation Energy. Last year, FERC approved PJM's creation of a funding mechanism to support the organization through a charge to residential electric customers. (See [FERC Approves PJM Funding of Consumer Advocates](#).)

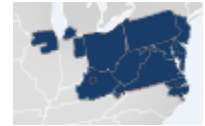
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MRC/MC Preview

Below is a summary of the issues scheduled to be brought to a vote at the Markets and Reliability and Members committees Thursday. Each item is listed by agenda number, description and projected time of discussion, followed by a summary of the issue and links to prior coverage in *RTO Insider*.

RTO Insider will be in Wilmington, Del., covering the discussions and votes. See next Tuesday's newsletter for a full report.

Markets and Reliability Committee

2. PJM Manuals (9:10-9:25)

Members will be asked to endorse the following proposed manual changes:

- A. Manual 13: Emergency Operations. Revisions developed in response to new NERC standards.
- B. Manual 37: Reliability Coordination. Revisions developed in response to new NERC standards.
- C. Manual 1: Control Center and Data Exchange Requirements. Revisions developed in response to new NERC standards.

3. FERC Order 825 – Shortage Pricing (9:25-9:45)

Members will be asked to endorse the proposed shortage pricing and operating reserve demand curve solution and associated manual revisions. (See "Order 825 Implementation Moves Forward," *PJM*

Market Implementation Committee Briefs.)

4. Draft Pseudo-Tie Agreements (9:45-10:05)

Members will be asked to endorse a *pro forma* pseudo-tie agreement and a reimbursement agreement for pseudo-ties into PJM, along with related Tariff and Operating Agreement revisions. (See *PJM to Tighten Pseudo-Tie Rules Despite Stakeholder Pushback*.)

5. Cost Development Manual Revisions (10:05-10:35)

Members will be asked to endorse revisions to Manual 15 and the Operating Agreement regarding hourly offers and fuel-cost policies. (See *PJM Fuel-Cost Policy Changes to Take Effect in May*.)

6. Opportunity Cost Calculation (10:35-10:50)

Members will be asked to endorse a proposed problem statement and issue charge by Bob O'Connell of Panda Power Funds regarding calculation of opportunity costs for units with less than three years of historical LMPs. The initiative would evaluate whether the opportunity cost calculator included in PJM's Markets Gateway produces the same results as that used by the Independent Market Monitor, Monitoring Analytics. It also would consider updating the calculators to reflect the nonperformance penalties under Capacity Performance. (See "Stakeholders Deny Replacement Capacity Initiative; Consider Other Incremental Auction Changes," *PJM Markets and Reliability and Members Committees Briefs*.)

7. Modeling Generation Senior Task Force (MGSTF) (10:50-11:00)

Members will be asked to endorse a draft charter for the MGSTF, an outgrowth of the Combined Cycle Owners User Group, which concluded that a more detailed generator model for combined cycle units might also be applicable to other steam units. The task force will consider expanding the model used by PJM to improve the ability to represent components of all generation types.

8. Incremental Auction Senior Task Force (IASTF) (11:00-11:10)

Members will be asked to endorse a draft charter for the IASTF, which will consider changes to the Incremental Auction process and structure, excess capacity sales, and PJM participation in the auctions.

9. Replacement Capacity (11:10-11:40)

Members will be asked to endorse a revised version of a previously rejected problem statement and issue charge regarding procurement of replacement capacity in Reliability Pricing Model Incremental Auctions. (See "Stakeholders Deny Replacement Capacity Initiative; Consider Other Incremental Auction Changes," *PJM Markets and Reliability and Members Committees Briefs*.)

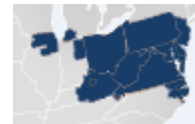
Members Committee

There are no items up for endorsement.

– Rory D. Sweeney

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MISO, PJM Find Value in CPP Study, Despite Rule's Likely Demise

Continued from page 23

The study also found that transmission congestion costs would rise by between \$1.1 billion and \$1.8 billion between 2025 and 2030 if the CPP is enforced. The increase is owed to higher fuel prices and load, new generation constructed without transmission reinforcements, outages and policy decisions that shift the locations of the most economic sources of generation.

It projects LMPs would be between \$54 and \$70/MWh by 2030, with MISO having a slighter higher LMP than PJM under all CPP scenarios.

The report identified three variables — natural gas prices, the geographic scope of emissions trading and how much energy efficiency can count toward compliance — as “key drivers” and used them as sensitivities in the study.

Gas Price Impact

The analysis agreed with previous CPP studies by the RTOs that concluded that the cost of natural gas would be the biggest single determinant in the cost of compliance. “The price of natural gas has by far the

biggest impact,” MISO Senior Policy Studies Engineer Jordan Bakke said at a March 15 Planning Advisory Committee meeting. (See [MISO: Coal Retirements, Gas Prices, Flexibility Key to CPP Compliance Costs](#) and [PJM: Regional Plan Cuts Costs, but Gas Prices are Wild Card for CPP Compliance](#).)

“The political landscape was a lot different a year ago. But we still find value in this entire exercise.”

Jordan Bakke, MISO

The study found that standardizing state energy efficiency measurement and verification rules would allow commoditization of credits across broader markets, helping to offset deployment costs. “Non-similar state policies can drive significant economic distortions along the MISO-PJM seam and exacerbate transmission cost impacts,” the report said. “Conversely, the ability to transact fungible products amongst states results in greater market efficiency.”

Both RTOs used previous analyses for the study, MISO bringing its 2017 Transmission Expansion Plan policy regulations future and PJM supplying its September 2016 CPP study. The earlier studies showed that state

emissions credit trading resulted in “lower costs, fewer generation retirements and more efficient generation investment.”

MISO and PJM began the study six months ago, after the CPP was stayed by the Supreme Court but before Trump's election. “The political landscape was a lot different a year ago,” Bakke acknowledged. “But we still find value in this entire exercise.”

Bakke said the analysis would only be used for informational purposes at this point and would not influence MTEP 18 futures. He also said the study could become a template for future cross-RTO policy analyses.

The study is the first policy-focused study MISO has ever completed with another RTO, according to Bakke. “I think this helped open the lines of communication,” he said.

Both MISO and PJM said the study should not be viewed as a recommendation for complying with the CPP. “However, states, utilities and other entities can consider the observations made from this analysis within the specific context of the CPP or in a broader context as they consider other policy goals that can influence already dynamic economic interactions in electric markets,” they wrote.

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MISO-SPP Coordinated Study Yields 1 Possible Project – For Now

Continued from page 23

at a March 15 Planning Advisory Committee meeting.

Three other projects passed joint operating agreement cost and benefit tests, but the RTOs still have reservations:

- The \$8 million Lyon County 345/115-kV transformer in South Dakota has a 1.14 B/C ratio and could be split 8% to MISO and 92% SPP according to regional benefit. However, MISO and SPP say those preliminary results are “highly dependent” on solar expansion in the area and said more analysis is needed before recommendation.
- The \$8.3 million Crosstown-Blue Valley 161-kV line in Missouri has a 3.34 B/C ratio and could be portioned 32% to MISO and 68% to SPP. SPP staff is currently evaluating whether its own solution could be more cost-effective, and MISO says that to pursue the project, it would have to revise its cost allocation process because the line is below 345 kV.
- The \$25 million New Brookline-James River 345-kV line and new 345/161-kV James River transformer in Missouri has

a 2.06 B/C ratio and could be divided 19% to MISO and 81% to SPP. But SPP is again examining its own regional solution and MISO is testing its own regional criteria because the project is located wholly outside of MISO and because MISO’s adjusted production cost is not in synch with SPP’s.

PAC Chair Cynthia Crane said the RTOs’ mismatched adjusted production cost calculations seem to be driving a lot of MISO’s cost allocation issues.

Lopez said both RTOs will make efforts in the future to align their adjusted production cost calculation. He also said the study’s sub-345-kV projects must be regionally approved on a case-by-case basis because of the 345-kV prerequisite.

The remaining three projects in the coordinated study either failed the 5% minimum regional cost benefit percentage or the \$5 million project floor. In all three cases, either MISO or SPP will continue to evaluate the projects in their own regional processes.

More testing is needed to come up with a final list of projects, Lopez said.

The RTOs will finalize the coordinated study’s findings and publish a report in late

April. At that time, the Interregional Planning Stakeholder Advisory Committee will vote on which recommended projects might proceed. The MISO side of the IPSAC vote will be conducted through the PAC.



Lopez

MISO still maintains that the coordinated study will influence a longer-term joint study between the RTOs in 2017, although it’s unclear when they will work together on future interregional projects. Stakeholders learned earlier this month that a comprehensive MISO-SPP joint study is unlikely to occur in 2017. (See “Long Odds for 2nd MISO-SPP Joint Study,” *SPP Briefs*.)

The coordinated study was originally meant to focus on needs along SPP’s Integrated System in North Dakota, South Dakota and Iowa, and some stakeholders were doubtful that any projects would materialize. (See *MISO-SPP Study Scope Finalized; Stakeholders Doubtful Projects will Result*.) Last year, the IPSAC identified an initial list of high priority seams efforts for the study.



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The RTO Insider Top 30

Q4 Revenues up 7% for Top 30; Net Income Drops

By Rich Heidorn Jr.

Companies in the RTO Insider Top 30 reported revenues of more than \$75 billion in the fourth quarter of 2016, a 7% increase over a year earlier, as all but five companies saw topline growth.

FirstEnergy, Public Service Enterprise Group, NextEra Energy and NRG Energy all reported revenue drops in the fourth quarter while Consolidated Edison was flat.

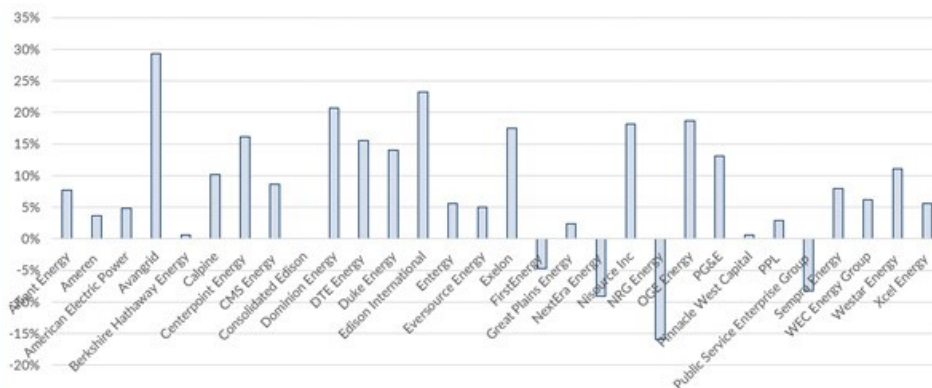
Similarly, all but five companies were profitable in the quarter. The exceptions were FirstEnergy (a \$5.8 billion loss) Entergy (\$1.8 billion), NRG (\$987 million), Duke Energy (\$222 million) and PSEG (\$98 million). But the losses were so large they swamped their peers' earnings, resulting in a cumulative loss of \$2.62 billion for the quarter.

FirstEnergy reported a loss of \$6.2 billion for the entire year, largely because of asset impairment and plant exit costs related to its decision to leave competitive generation by mid-2018. The company is seeking subsidies for its Davis-Besse and Perry nuclear plants in Ohio to make them attractive to buyers. (See [FirstEnergy Seeking ZECs to Aid Sale of Ohio Nukes.](#))

Despite the fourth-quarter loss, Entergy, which also is exiting merchant nuclear generation, earned \$1.27 billion for the year (\$7.11/share), beating Zacks' consensus estimate of \$6.83/share. (See [Entergy Beats Expectations Despite 80% Drop in Earnings.](#))

Avangrid's 29% jump in Q4 revenues and more than doubling of net income reflected the first full year of operations including UIL Holdings, which it acquired in December 2015.

Edison International earned \$377 million in the fourth quarter, versus a \$50 million loss a year earlier. In February, its Southern California Edison unit joined with other investor-owned utilities in proposing spending \$1 billion on transportation electrification. SoCalEd plans to spend \$573 million, including pilot projects for electric transit buses and electrification of cargo handling equipment at the Port of Long Beach.

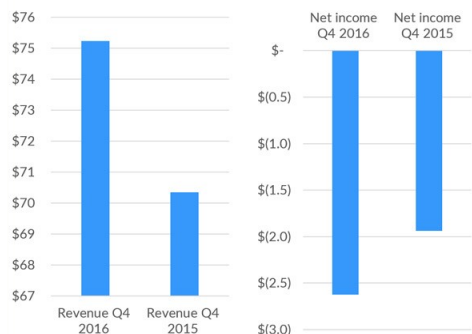


Q4 2016 revenues percent change vs. 2015 | company filings

will continue its role in the [Grid Assurance](#) initiative to pool inventory and develop best practices to support transmission system reliability.

Dominion earned \$457 million for the fourth quarter, a 28% jump, thanks to its acquisition of Questar, which added 56 Bcf of gas storage and 3,400 miles of gas transmission to its assets. Due in part to the acquisition, the company announced last month it was rebranding and replacing "Resources" with "Energy" in its name. The company now does business in 18 states. (See [Dominion Resources Changing Name to Dominion Energy.](#))

The company could see a boost to earnings if Connecticut lawmakers approve legislation providing additional revenues for its Millstone nuclear plant. (See related story, [Connecticut Moves Closer to Equating Nuclear with Renewables, p.1.](#))



company filings

ment at the Port of Long Beach.

Edison CEO Pedro Pizarro said the company has "scaled back business development" at Edison Transmission because of "limited FERC Order 1000 opportunities in our target markets." The company

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The RTO Insider Top 30

Rank	Company	Market Cap (\$ billions)	Revenue Q4 2016 (\$ billions)	% change vs. 2015	Net income Q4 2016 (\$ millions)	% change vs. 2015
1	NextEra Energy	\$55.91	\$3.70	-9%	\$966.00	91%
2	Duke Energy	\$54.33	\$4.82	14%	(\$227.00)	N/A
3	Dominion Energy	\$48.10	\$3.09	21%	\$457.00	28%
4	PG&E	\$33.86	\$4.71	13%	\$696.00	404%
5	Exelon	\$32.79	\$7.87	18%	\$204.00	-34%
6	American Electric Power	\$30.96	\$3.79	5%	\$373.40	-20%
7	Berkshire Hathaway Energy	N/A	\$4.17	1%	\$483.00	1%
8	Sempra Energy	\$25.18	\$2.91	8%	\$379.00	3%
9	Edison International	\$23.46	\$2.88	23%	\$377.00	N/A
10	PPL	\$23.14	\$1.83	3%	\$465.00	17%
11	Public Service Enterprise Group	\$22.15	\$2.09	-8%	(\$98.00)	N/A
12	Consolidated Edison	\$21.63	\$2.71	0%	\$206.00	17%
13	Xcel Energy	\$20.64	\$2.79	6%	\$227.48	9%
14	Eversource Energy	\$18.65	\$1.78	5%	\$231.10	26%
15	WEC Energy Group	\$18.51	\$1.96	6%	\$194.70	8%
16	DTE Energy	\$17.68	\$2.87	16%	\$131.00	64%
17	FirstEnergy	\$13.70	\$3.38	-5%	(\$5,796.00)	N/A
18	Entergy	\$13.11	\$2.65	6%	(\$1,765.54)	N/A
19	Ameren	\$12.73	\$1.36	4%	\$32.00	10%
20	Avangrid	\$11.70	\$1.49	29%	\$207.00	116%
21	CMS Energy	\$11.62	\$1.64	9%	\$77.00	-27%
22	Centerpoint Energy	\$10.61	\$2.08	16%	\$101.00	N/A
23	Pinnacle West Capital	\$8.66	\$0.74	1%	\$53.25	29%
24	Alliant Energy	\$8.63	\$0.80	8%	\$65.20	78%
25	Westar Energy	\$7.99	\$0.61	11%	\$53.94	37%
26	NiSource Inc	\$7.15	\$1.30	18%	\$88.80	49%
27	OGE Energy	\$6.68	\$0.53	19%	\$57.90	97%
28	Great Plains Energy	\$5.89	\$0.58	2%	\$98.00	328%
29	Calpine	\$4.10	\$1.58	10%	\$24.00	N/A
30	NRG Energy	\$3.87	\$2.53	-16%	(\$987.00)	N/A
	TOTAL		\$75.23	7%	(\$2,625)	-35%

NOTE: No % change is listed for net income if either the current quarter or previous year was a loss.

COMPANY BRIEFS

Schukar Promoted to Chair, President of Ameren Transmission

Ameren has announced that Shawn Schukar, a 32-year veteran of the company, has been promoted to chairman and president of Ameren Transmission effective May 1. He will succeed Maureen Borkowski, who will retire on April 30.



Schukar

Schukar is currently Ameren's senior vice president of transmission operations, construction and project management. His other leadership positions at Ameren or its predecessor companies, since joining the company in 1984, include senior vice president of utility operations for Illinois Power, senior vice president of Ameren Energy Resources and vice president of strategic initiatives.

He holds an MBA from the University of Illinois at Urbana-Champaign, where he also earned a bachelor's in engineering.

More: [Ameren](#)

Enterprise Buys Bankrupt Azure's Gas Pipeline Assets for \$189M

Enterprise Products Partners announced it had the winning bid of \$189 million in an auction to buy the natural gas pipeline assets of the bankrupt Azure Midstream.

The win allows Enterprise to expand its presence in East Texas and northern Louisiana with 960 miles of natural gas gathering pipelines, three processing facilities, and two natural gas liquids pipelines that can each ship 10,000 barrels daily.

The deal could be finalized as soon as April.

More: [FuelFix](#)

PG&E Settles San Bruno Shareholder Suit for \$90M

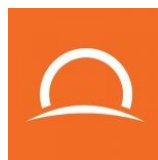
In an apparent conclusion to seven years of legal warfare, Pacific Gas and Electric agreed last week to pay its shareholders \$90 million to settle lawsuits that blamed corporate mismanagement for the 2010 San Bruno pipeline explosion, which killed eight people and destroyed 38 homes.

PG&E's total payout for the incident is more than \$2.2 billion, which includes \$565 million to settle civil claims, a \$3 million federal penalty and a record \$1.6 billion penalty by state regulators.

Shareholder attorney Frank Pitre said the deal was preferable to waging a risky court fight over whether the corporate officers breached their duties to the company.

More: [KNTV](#)

Sunnova Gets \$80M in Tax Equity Funding for Solar Projects



Sunnova announced last week it has received \$80 million in tax equity funding from a subsidiary of U.S. Bank to be used to fund more than \$200 million in residential solar projects.

The tax equity deal with U.S. Bancorp Community Development is Sunnova's first use of tax equity funds. To date, it has received \$1 billion in funding from other entities, according to a statement by the company.

U.S. Bancorp will be able to claim the 30% federal tax credit for companies that install renewable energy systems.

More: [FuelFix](#)

Toshiba Considers Selling Westinghouse

TOSHIBA After missing an earnings deadline for a second time, Toshiba announced Tuesday that it is "actively considering" selling its U.S. nuclear unit Westinghouse as well as other strategic options for the business.

Industry executives see South Korea's Korea Electric Power Corp., which is expanding in nuclear after a successful deal in the United Arab Emirates, as the only potential buyer for Westinghouse. KEPCO said Tuesday it would consider an offer from Toshiba.

Although Toshiba CEO Satoshi Tsunakawa did not address questions about a potential Chapter 11 filing for Westinghouse, sources have said bankruptcy lawyers have been hired as an exploratory step.

More: [Reuters](#)

Spectra to Acquire PSEG's Stake in PennEast Pipeline

Spectra Energy Partners will acquire PSEG Power's 10% stake in the \$1.2 billion PennEast Pipeline, PennEast announced Monday.

The pipeline project is intended to deliver Marcellus Shale natural gas from northeast Pennsylvania into New Jersey. PSEG, which supplies gas to its affiliated company Public Service Electric and Gas, in New Jersey, said it remains committed to paying for 125 Mcfd of the pipeline's 1-Bcfd capacity.

Pending approval by PennEast's board, which could close as soon as the second quarter this year, Spectra's stake in the project will increase to 20%.

More: [The Philadelphia Inquirer](#)

FEDERAL BRIEFS

EPA Faces Deep Cuts in Trump Budget



EPA would see its budget cut by almost one-third to \$5.7 billion — its lowest ever in real terms — under the Trump administration's

budget proposal.

The Department of Energy would be trimmed by 6%, while Interior Department spending would be reduced by 12%, to the lowest level in 21 years.

More: [The New York Times](#); [The Washington Post](#)

Transportation Experts See Future for Zero-Emission, EVs



Leading U.S. transportation experts believe that by 2050, the majority of vehicles used commercially for ride and car

Continued on page 32

Stakeholders Call for Streamlining Federal Review of Projects

By Wayne Barber

Electric infrastructure projects, even those that promote renewable power, are often stymied by federal regulatory reviews that seem to drag on forever, witnesses told the Senate Committee on Energy and Natural Resources on March 14.

Many speakers called for a single agency to play a lead role in infrastructure permits, that the Energy Department should continue to play the lead role in grid security, rather than the Department of Homeland Security. They also called for more firm deadlines for decisions.

No one witness or senator, however, seemed to offer a silver bullet solution on how to speed up license approvals.

When asked about memorandums of understanding (MOUs) between federal agencies, Jeffrey Leahey, deputy executive director of the National Hydropower Association, indicated they can be helpful, but often the real roadblocks can be found in regional offices, not D.C.

Currently most hydroelectric dams don't actively generate electricity, Leahey told Murkowski. While the hydro association supports the FERC MOU to increase the number of power dams, it doesn't go far

enough, he said. (See [FERC, Corps Agree to Streamline Nonfederal Hydro Permits](#).)

Dominion Energy CEO Diane Leopold said some agencies go "pencils down" until another agency finishes work. She said that Dominion has had a slow-go winning approval for the Surry-Skiffes Creek-Wheaton transmission project in Virginia.

"The long-term nature of large energy projects and the millions in private dollars required to execute them demand regulatory predictability to proceed," Leopold said. Surry-Skiffes Creek-Wheaton "is a prime example of the costs of delay to our communities and our national security."

The transmission investment became vital after Dominion determined that retirement was the best course of action for two aging coal units at the Yorktown power station, Leopold said. PJM recently offered the company a reliability-must-run agreement for the units. (See "PJM Offers Four RMR Contracts," [PJM Planning & Transmission Expansion Advisory Committee Briefs](#).)

Pacific Power CEO Stefan Bird stressed the need for the utility's Energy Gateway project, which it has been working on since May 2007. Bird also made the case for a strong federal role in tree trimming for grid reliability.

The Senate session marked the first congressional hearing about infrastructure during this session. The Trump administration has promised to present Congress with a major infrastructure plan.

"I am glad that President Trump has made infrastructure a national priority," Chair Lisa Murkowski (R-Alaska) said. "I look forward to working with him, his administration as well as other members of the Senate to develop a broad infrastructure package," Murkowski said. "And I certainly hope that package will include provisions that streamline the permitting process for all energy infrastructure projects."

She added that it should not take 10 years to merely renew a license for an existing hydroelectric power plant.

"As the first two installments of the Department of Energy's Quadrennial Energy Review have pointed out, we are facing several challenges that threaten to disrupt American's access to reliable and affordable energy," ranking member Sen. Maria Cantwell (D-Wash.) said in her opening statement.

"Our hydroelectric dams, power plants, electric transmission lines and pipelines are aging. And the pace of investments has not always been sufficient to keep these facilities in good working order," she said.

FEDERAL BRIEFS

Continued from page 31

sharing in the nation will be zero-emission vehicles, according to a survey by the Institute of Transportation Studies at University of California, Davis.

Forty policymakers, researchers and representatives from government, non-profit organizations and the technology and auto industries participated in the survey. Some 70% of them agreed on the zero-emission vehicles prediction, which includes battery, plug-in hybrid and fuel-cell electric vehicles.

Almost all survey participants selected California as the state most likely to embrace the zero-emission vehicle trend, as well as other transportation trends.

More: [Phys.org](#)

GOP Lawmakers Acknowledge Climate Change, Call for Action



Seventeen House Republicans on Wednesday introduced a resolution calling for action on climate change, breaking with most of the party's leadership.

The resolution, which notes several existing climate change-related impacts on the U.S. environment, acknowledges humans' impact on climate, and commits to studying and addressing causes and effects of global and regional changes.

A similar resolution introduced by many of the same Republicans in the last Congress did not receive a floor vote in the House.

More: [The Hill](#)

Lawmakers Want Trump to Stop Canadian Nuke Storage Plan

Members of Michigan's congressional delegation introduced resolutions in the House and Senate on Wednesday opposing a Canadian plan to build a nuclear waste repository for low- to mid-level wastes less than a mile from Lake Huron in Ontario.

Ontario Power Generation has sought approval in the last decade for the project, and the lawmakers want President Trump and Secretary of State Rex Tillerson to prevent the Canadian government from moving forward.

Continued on page 33

FEDERAL BRIEFS

Continued from page 32

“Surely in the vast land mass that comprises Canada, there must be a better place to permanently store nuclear waste than on the shores of Lake Huron,” said Rep. Dan Kildee, one of the resolution sponsors.

More: [The Detroit News](#)

Report: Oil, Gas Production on Fed Lands down Under Obama

Under the Obama administration, oil and natural gas production on federal lands declined while private activity increased, according to the Western Energy Alliance in Denver.

The energy advocacy group finalized its report using figures released Wednesday by the Bureau of Land Management for fiscal year 2016.

Fiscal year 2016 showed “the lowest amount of leased acreage for the years statistically available, since 1988,” according to the House Natural Resources Committee. The committee, which is chaired by Rep. Rob Bishop, a Utah Republican, said leased acreage from 2008 to 2016 fell by 20 million.

More: [The Washington Times](#)

Obama Spread, ‘Hid’ Funds to Protect Climate Programs

President Trump may have to search hard if he wants to rein in spending on Obama-era climate change initiatives, as billions of dollars were dispersed in programs across dozens of agencies, in part to make cutting funding difficult.



President Barack Obama sought to integrate climate funding into everything the federal government did, and there is no single list of climate programs or their costs, former members of the administration said.

Programs were not titled with the phrase “climate change” because that would have made them a target in the budget process, said Alice Hill, director for resilience policy on Obama’s National Security Council.

More: [Bloomberg](#)

Remaining Claims in SC’s Plutonium Suit Heading to Mediation

South Carolina and the U.S. government are preparing to mediate what remains of a lawsuit challenging the Department of Energy’s failure to keep its promise to dispose of 1 metric ton of plutonium each year after a federal judge dealt two blows to the state’s case.



Childs

U.S. District Judge Michelle Childs ruled last week that South Carolina can’t claim the government is violating the Constitution by failing to complete a project to process weapons-grade plutonium into nuclear reactor fuel. Last month, she had ruled she couldn’t force the federal government to pay \$100 million in fines for its failure, as the U.S. Court of Federal Claims was the proper forum for that dispute.

The unfinished mixed-oxide fuel facility at the Savannah River Site, a former nuclear weapons plant along the border with Georgia, is billions over budget. Since the U.S. doesn’t have a designated long-term storage site for high-level radioactive waste, tons of unwanted plutonium have accumulated at the site, including at least 7 tons of plutonium intended for the mixed-oxide fuel facility.

More: [The Associated Press](#)

UK Scientists Fear US Cuts to Climate Research

U.K. scientists are warning they won’t be able to continue crucial research if President Trump makes good on his promises to cut climate science funding.

“Everything we do is international, and we particularly rely on American satellite data. Perhaps we could manage if other areas were cut — perhaps the Chinese or the Indians might even step in to fill the gaps — but we would definitely miss the satellite data from the U.S.,” said professor Joanna Haigh, co-director of the Grantham Institute at Imperial College London.

Professor Piers Forster, director of the Priestley International Centre for Climate at Leeds University, also noted academics in the U.S., many of whom he said are immigrants, are pulling out of international

scientific conferences because they are afraid they will not be able to get back into the country.

More: [The Guardian](#)

Trump Poised to Dismantle Obama’s Climate Initiatives

With pressure mounting from a federal lawsuit arguing EPA overstepped its legal authority in imposing carbon emission curbs on plant operators, President Trump is expected within days to issue an executive order aimed at reversing the Obama administration’s climate policies.



The order will instruct Cabinet members to rewrite regulations restricting carbon emissions, lift a moratorium on federal coal leasing and revise how climate change is factored into federal decision-making. It will also reverse an executive order Obama issued instructing agencies to incorporate climate change into National Environmental Policy Act reviews, individuals briefed on the order said.

The directive would instruct Attorney General Jeff Sessions to ask the D.C. Circuit Court of Appeals to hold the lawsuit in abeyance while EPA revisits the rules it wrote under the Obama administration.

More: [The Washington Post](#)

Industry Groups Urge Trump not To Ax Office of Fossil Energy

ENERGY.GOV Office of Fossil Energy
A group of coal mining firms, labor unions and energy industry associations sent a letter to President Trump last week asking that he protect the Department of Energy’s Office of Fossil Energy from funding cuts.

The Trump administration previously identified the office as one of several Energy Department programs that could be eliminated. The office studies fossil fuel technologies, such as carbon capture.

“In light of recent calls for dramatic cuts to the federal budget, we want to stress that every dollar allocated to fossil energy research is an investment in the long-term future of America’s coal and fossil fuel industry,” the letter reads.

More: [The Hill](#)

STATE BRIEFS

ARIZONA

Regulators Vote to End Legal Action Against APS

Utility regulators voted 3-1 last week to end a legal action aimed at making Arizona Public Service and its parent Pinnacle West Capital comply with subpoenas to provide political finance records.

Corporation Commissioner Robert Burns issued subpoenas last year wanting to know if the companies were the source of \$3.2 million that went to independent political campaigns and helped get commissioners Tom Forese and Doug Little elected.

After Burns tried to force disclosure, APS sued him, then subsequently dropped the suit in August. The regulators, who had previously approved funding for Burns' legal defense, also voted to pull the plug on the money. The regulators indicated they had agreed to defend Burns, and that he and his attorney had recently filed suit against APS, which was outside the scope of what they agreed to pay for.

More: [The Arizona Republic](#)

CALIFORNIA

PG&E Delivers Almost 70% Greenhouse-Gas-Free Electricity

Pacific Gas and Electric announced last week that almost 70% of the electricity it delivered to customers in 2016 came from greenhouse-gas-free resources and that 32.8% of its electricity in 2016 came from renewable resources, marking a more than 3% increase in renewables for the utility and its highest percentage to date.

A total of 69.3% of PG&E's electric power mix is from nuclear, large hydro and other renewable sources.

PG&E is on the cusp of meeting the state's renewable portfolio standard, which requires energy providers to achieve 33% renewable energy delivery by the end of 2020.

More: [PG&E](#)

Community Aggregators Taking Growing Share of Load from Utilities

Pacific Gas and Electric expects to lose about 7.3% of its electric load this year to community choice aggregators, with a

potential rise to 21% by 2020, according to Moody's Investors Service. The shift to community aggregators may also eventually account for 40% of the total load at San Diego Gas & Electric and Southern California Edison.

The state currently has five community aggregators, with six more that could begin operations this year, said Lesley Ritter, a New York-based analyst at Moody's. As of early this year, 27 of 58 of the state's counties and more than 300 cities were either members of a community aggregator or evaluating them.

Ritter said it's only the wealthy parts of the state that are opting out of traditional utility service for now, but as community aggregators become more common, "it may become more difficult for the utilities."

More: [Bloomberg](#)

Residential Solar Installations Drop Under Net Metering 2.0

Statistics provided by the state show a slowdown in net metering installations in the service area of San Diego Gas & Electric after it hit a program cap and transitioned to a successor program, dubbed "Net Metering 2.0," enacted by regulators in January 2016.

After the SDG&E service area transitioned to Net Metering 2.0 in late June 2016, it saw a decline of 35% in residential solar installed each month, going from 16.9 MW in the first half of 2016 to 11 MW. Data is not yet available for Pacific Gas and Electric, which hit the cap and switched to the new program in December.

California Solar Energy Industries Association Director Bernadette Del Chiaro blames the slowdown on the combination of rate design changes in 2015, Net Metering 2.0 and "the combined 'solar coaster' brought about by erratic policy behavior" around the federal investment tax credit and net metering.

More: [pv magazine](#)

PUC Head Recruits Federal Climate Change Scientists

The person standing outside two Metro stations this week near EPA offices in D.C., handing out fliers touting the benefits of working for the state Public Utilities Commission, was the commission's president, Michael Picker.

Picker announced plans to stand outside the train stations Wednesday and Thursday in an effort to recruit climate change, renewable energy and environmental scientists as the federal government's environmental priorities shift under the Trump administration.



Picker

"On climate action, there's a dark cloud hanging over Washington right now," Picker said. "If climate scientists and experts want the opportunity to continue doing important work for the good of our planet, my message is simple: Come west, California is hiring."

More: [pv magazine](#)

SoCalEd Awarded \$125M from Mitsubishi for San Onofre Closure



An arbitration decision last week by the International Chamber of Commerce awarded Southern California Edison \$125 million and Riverside Public Utilities \$1.1 million from Mitsubishi Heavy Industries relating to the early shuttering in 2013 of the San Onofre Nuclear Generating Station.

New steam generators Mitsubishi built for the plant failed after a little more than a year of operation, leading to the plant's early closure and more than \$4 billion in premature-shutdown costs.

SoCalEd and its partners had asked the three-member arbitration panel to award \$7.6 billion — way beyond the \$125 million liability limit specified in SoCalEd's contract with Mitsubishi. In rejecting that claim, the panel significantly reduced SoCalEd's share of the recovery to about \$52 million, ordering the utility to pay \$58 million in

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legal costs Mitsubishi incurred in fighting the larger amount.

More: [Los Angeles Times](#); [The Press Enterprise](#)

KANSAS

Wichita Area Welcomes First Utility-Scale Solar Farm

A \$2.5 million, 1-MW solar farm in the Wichita area made its debut last week, ranking in as the first utility-scale solar farm in the area and the largest in the state.

The Prairie Sky Solar Farm, situated on 8 acres of former farmland northeast of Andover, is owned by utility cooperative Kansas Electric Power Cooperative. The electricity will be fed into the grid of member Butler Rural Electrical Cooperative.

More: [The Wichita Eagle](#)

MASSACHUSETTS

7 Communities Awarded \$1.4M for Clean Energy Projects

Seven communities in the western part of the state will receive a total of \$1.4 million in grants to fund clean energy projects.

State energy officials awarded grants to Chicopee, Agawam, Blandford, Granville, Ware, Warren and Westfield. Chicopee will receive the largest grant of \$367,000, followed by Westfield, which will receive \$266,000, and Agawam, which will receive \$208,000.

The funds come from proceeds from the Regional Greenhouse Gas Initiative, which puts a price on carbon and holds auctions where companies buy carbon allowances.

More: [MassLive.com](#)

NEW YORK

Brooklyn Solar Project Allows Virtual Trading Among Neighbors

A solar project in an affluent part of Brooklyn is recruiting residents and businesses to participate in a virtual trading platform that will allow solar energy producers to sell excess electricity credits from their systems

to buyers in the group.

The Brooklyn Microgrid, which presently has about 50 participants, aspires to create a kind of virtual, peer-to-peer energy trading system that would allow participants to bypass utilities. The microgrid is conceived to work with the conventional grid, which is getting a reboot under Gov. Andrew Cuomo's directives to make it more flexible, resilient and economically efficient while reducing greenhouse-gas emissions.

Lawrence Orsini, chief executive of LO3 Energy, which is designing the Brooklyn project in conjunction with Siemens, said the state must determine how to define his company and its network of participants before it can get its market up and running, a move he anticipates by June.

More: [The New York Times](#)

TEXAS

State Sues Former Gov. Perry's DOE on Nuke Waste

The state filed a lawsuit last week accusing U.S. agencies, including the Energy Department under former Gov. Rick Perry, of violating federal law by failing to license Yucca Mountain in Nevada as a nuclear waste repository.

The suit asks the 5th U.S. Circuit Court of Appeals to force the Nuclear Regulatory Commission to cast an up-or-down vote on Yucca Mountain, which for more than 20 years was seen by the federal government as the answer to nuclear waste storage. Tens of millions of dollars were spent preparing Yucca to accept nuclear waste, but the Obama administration abandoned those plans by failing to fund an NRC review.

During Perry's tenure as governor, the state became home to one of the nation's few facilities, located in Andrews County, that accepts low-level nuclear waste. Waste Control Specialists, which runs that site, is seeking a license to store spent reactor fuel, and some observers say the federal government might take interest in the Andrews County site if the lawsuit doesn't prompt the Trump administration to restart the plans for Yucca Mountain.

More: [The Texas Tribune](#)

Google: Houston Ranks No. 1 For Rooftop Solar Potential



Houston has 18,940 GWh of rooftop solar generation potential per year, the most of any U.S. city, according to data from Google's Project Sunroof.

The program, which launched in 2015, uses satellite imagery from Google Maps and Google Earth to calculate how much solar power could be collected if rooftop solar panels were installed on buildings nationwide.

According to Google, if every Houstonian installed rooftop solar panels on every possible home or office building, the city could generate enough electricity to power 1.7 million homes locally for an entire year.

More: [Houston Business Journal](#)

UTAH

Lawmakers Want to Repeal EPA's Regional Haze Rule

A regional haze rule carrying a price tag of \$700 million for new pollution control equipment at two power plants is under attack by the state's congressional delegation, which wants it repealed.

The rule is designed to improve visibility at national parks and is not a public health standard. EPA implemented it after rejecting a regional haze plan submitted by the state Department of Environmental Quality. The state and PacifiCorp sued in response.

Sen. Mike Lee and Rep. Jason Chaffetz, both Republicans, introduced a resolution of disapproval last week, saying the rule would add hundreds of millions of dollars to ratepayers' bills while only creating an imperceptible change in visibility and that the state had already proposed a safe and effective nitrogen oxide regulation regime.

More: [Deseret News](#)



Perry

Continued on page 36

Governor's Support Puts Maryland on Track for Fracking Ban

By Rory D. Sweeney

Maryland Gov. Larry Hogan said Friday he will support a ban on fracking, potentially making the state among the first to enact a statutory ban on the oil and gas extraction method.

In making the announcement, Hogan, a Republican, departed from his previous stance that he would support the practice and that he believed it could be done in an "environmentally sensitive manner." His new stance is the exact opposite, that it's impossible for the process to occur without unacceptable environmental risks.

"I've decided that we must take the next step and move from virtually banning fracking to actually banning fracking," he said. "The choice to me is clear: Either you support a ban on fracking, or you are for fracking."

He made the announcement alongside state Sen. Bobby Zirkin (D-Baltimore), the lead sponsor of SB 740, which would establish the ban. The House of Delegates passed a ban on the practice by a veto-proof margin two weeks ago.

"Larry Hogan just took a big step for Maryland and the nation in moving us toward" solving global climate change, Mike Tidwell, the executive director of the Chesapeake Climate Action Network, said in a news release.

The controversial process of high-volume fracking has never been used in Maryland, but the state's two-year moratorium is due to expire in October. Parts of western Maryland sit atop the Marcellus shale, a rock layer several thousand feet below ground laden with natural gas that runs from Ohio to New York. New York and Vermont already prohibit fracking.

Hogan said his decision was partially based on the state legislature failing to implement rules proposed last year that he said would have been the most stringent in the nation and made it "virtually impossible for anyone to ever engage in fracking in Maryland." Because the legislature didn't enact the regulation, Hogan is now supporting a statutory ban.

Prior to Hogan's announcement, the ban looked unlikely to be approved this session. Legislators feared a veto from Hogan and instead favored extending the moratorium. Sen. Joan Carter Conway (D-Baltimore) had proposed extending the moratorium for two years and requiring each county and Baltimore City to hold referendums next year on whether to ban the practice locally. As the chair of Senate Education, Health and Environmental Affairs Committee, she will decide if the ban bill receives a vote before the moratorium expires.

STATE BRIEFS

Continued from page 35

VERMONT

Peter Rossi Named COO of Vermont Electric Cooperative

Peter Rossi has joined Vermont Electric Cooperative as chief operating officer. He is responsible for overseeing engineering and operations for the co-op, which serves about 32,000 members over 2,000 square miles in the northern part of the state.

Rossi previously was with Powder River Energy, in Wyoming, for 10 years, first as its manager of business support services and then as manager of service operations. Prior to that, he held various roles with IBM for eight years.

More: [Vermont Electric Cooperative](#)



Rossi

VIRGINIA

Bill Aims to Use Abandoned Mines for Pumped Storage

Legislation awaiting signature by Gov. Terry McAuliffe seeks to spur development of pumped storage using water from abandoned coal mines, an idea that is still unproven, according to researchers, coal reclamation experts and even some renewable energy advocates.

The legislation, which declares the projects to be in the public interest and free of many regulations, is focused on seven counties in the eastern part of the state where dozens of coal mines have closed over the past decade. Pairs of reservoirs in Wise and Dickenson counties appear, at least initially, to be suitable, said a legislative aide to Sen. Ben Chafin, who helped spearhead the effort.

Don Fosnacht, an associate professor at the University of Minnesota's Natural Resources Institute, estimated a 100-MW pumped storage facility would cost about \$120 million, based upon two studies he has led.

More: [Southeast Energy News](#)

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