

# MEGAWATT DAILY

Friday, July 10, 2020

## NEWS HEADLINES

### Gas-fired power burn to test prior record by mid-July on low prices, summer heat

- Month-to-date burns up 2.6 Bcf/d vs. year-ago
- Henry Hub cash averages \$1.56 over past month
- Weather Service predicts hotter July temperatures

### MISO Power Tracker: Natural gas weakness pushes power prices down on year

- Peakloads up sharply on month and year
- Aug forwards dip with gas contracts

### Wind generation spikes to 76% of Xcel's New Mexico-Texas supply mix

- Adds 728 MW of wind capacity in service territory since 2019
- Further 522 MW of wind capacity to be added by end of 2020

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## REGIONAL DAY-AHEAD PRICE CHANGES

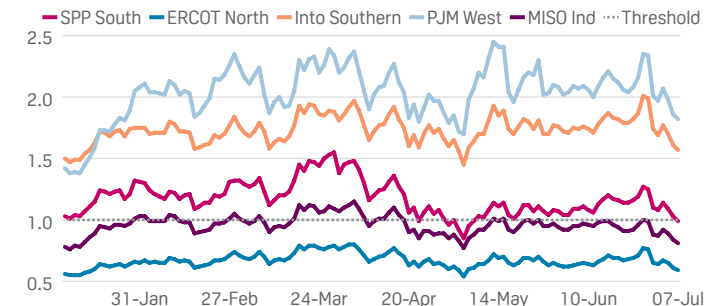
ISO Price Locations	Day-ahead peak prices			Regional weather trends		
	10-Jul	Daily chg	Prior 7-day avg	10-Jul	Daily chg	7-day forecast
CAISO NP 15	32.91	4.00 ▲	22.41	71.7	1.4 ▲	72.4
ERCOT North Hub	35.00	9.55 ▲	26.96	88.4	0.7 ▲	90.2
ISONE Internal Hub	22.63	-8.48 ▼	22.68	74.0	-4.5 ▼	77.9
MISO Indiana Hub	31.94	-12.21 ▼	35.80	78.0	-3.1 ▼	76.8
NYISO Zone G	26.11	-3.63 ▼	25.11	78.0	-3.3 ▼	81.1
PJM West Hub	32.03	-7.54 ▼	32.25	78.9	-2.1 ▼	80.0
SPP South Hub	33.23	6.62 ▲	26.16	81.9	0.3 ▲	82.7
<b>Bilateral indexes</b>						
Into Southern	27.89	4.89 ▲	20.79	83.3	1.2 ▲	84.6
Palo Verde	53.16	13.88 ▲	31.92	76.2	1.5 ▲	77.1
COB	25.00	5.50 ▲	18.42	65.9	1.5 ▲	68.7
Mid-C	16.50	2.29 ▲	10.51	65.9	1.5 ▲	68.7

Source: Platts

## HOURLY INDEX VALUES

08-Jul	Mid-C hourly (\$/MWh)	Cal ISO curtailment (MW)
On-peak	14.84	440.20
Off-peak	3.50	0.00

## COAL-vs-GAS \$/MWh FUEL COST RATIOS



The Platts coal-vs-gas fuel cost ratios indicate the regional competitiveness of gas versus coal for power generation. The ratio is calculated by dividing the \$/MWh fuel cost for coal by that of gas. Gas generation is cheaper than coal generation when the ratio is greater than one. All price data reflects prompt month fuel contracts.

Source: S&P Global Platts daily OTC coal prices and M2MS gas prices

## PLATTS PEAK DAILY DEMAND (GW)

ISO	Daily change								Season		Season average					
	01-Jul	02-Jul	03-Jul	04-Jul	05-Jul	06-Jul	07-Jul	08-Jul	Chg	% Chg	Min	Max	2020	2019	Chg	% Chg
BPA-Puget	6.46	6.38	6.64	5.99	6.78	6.56	6.44	6.61	0.17	2.64	5.58	7.61	6.56	6.69	-0.13	-1.89
IESO	20.28	22.46	22.52	20.70	21.16	23.19	24.28	24.05	-0.23	-0.95	13.36	24.28	18.78	17.44	1.34	7.67
CAISO	32.29	31.91	32.99	33.54	35.77	37.16	36.27	36.44	0.17	0.47	24.91	39.81	32.37	31.05	1.31	4.23
ERCOT	67.59	68.19	68.08	66.57	64.75	63.74	64.65	69.45	4.80	7.42	41.93	69.45	61.69	60.46	1.23	2.04
SPP	46.13	45.57	43.29	41.13	42.29	44.87	46.07	48.01	1.94	4.21	33.57	48.01	41.48	38.78	2.70	6.96
MISO	107.59	111.65	105.27	101.59	103.24	112.07	112.64	114.03	1.39	1.23	79.85	114.03	97.08	93.84	3.24	3.45
PJM	125.29	132.35	133.87	124.89	130.61	141.45	135.68	102.56	-33.12	-24.41	36.00	141.45	111.93	106.07	5.86	5.53
NYISO	23.41	26.46	25.23	22.77	24.95	27.45	25.53	26.85	1.32	5.17	15.97	27.45	22.04	21.99	0.05	0.22
NEISO	16.74	20.41	15.68	15.92	17.98	18.35	16.73	19.78	3.05	18.23	12.65	21.09	16.62	16.12	0.50	3.09
AESO	9.18	9.48	9.70	9.26	9.21	9.85	9.64	9.43	-0.21	-2.18	8.76	9.92	9.36	9.97	-0.61	-6.14

Season definitions: Summer (June – August), Fall (September – November), Winter (December – February), and Spring (March – May).

Source: S&P Global Platts

## NEWS

## Gas-fired power burn to test prior record by mid-July on low prices, summer heat

- Month-to-date burns up 2.6 Bcf/d vs. year-ago
- Henry Hub cash averages \$1.56 over past month
- Weather Service predicts hotter July temperatures

Gas demand from US power generators continues to outperform this month as historically low prices for the fuel combine with scorching temperatures to push burns toward prior record highs set last summer.

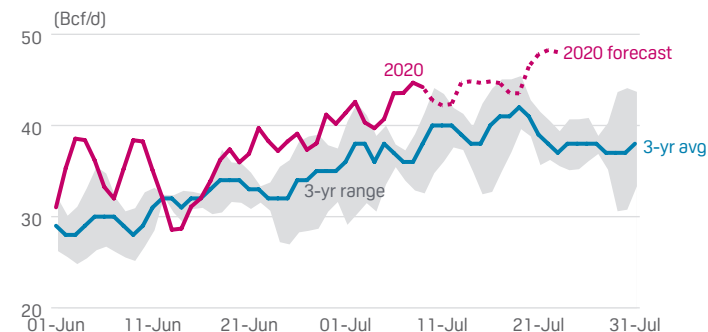
In July, US gas-fired power burn is averaging 44.3 Bcf/d – up about 2.6 Bcf/d, or nearly 7%, from its record month-to-date average in July 2019, S&P Global Platts Analytics data shows.

Stronger burns this summer, which have already approached last summer's single-day record high at over 45 Bcf/d, come as historically low prices keep gas at the top of the US generation stack.

Since at least the start of May, gas-fired generation has remained cheaper than coal in SPP South, Into Southern and PJM West, according to data compiled by S&P Global Platts.

Over the same period, US gas prices have tested record lows. In the Henry Hub cash market, prices settled to a 20-year low on June 16 at just \$1.38/MMBtu. On the NYMEX, the benchmark index fell to a quarter-century low on June 25, settling at \$1.48/MMBtu. On July 9,

## US GAS-FIRED POWER BURN



Source: S&P Global Platts Analytics

Henry Hub cash and futures prices settled at \$1.82 and \$1.78/MMBtu, respectively, S&P Global Platts data shows.

Adding fuel to generator demand, population-weighted temperatures this month across the Midwest, Texas and the Northeast – which together account for over half of US power burn this year – are up 3.5 degrees, 0.7 degrees and 0.3 degrees Fahrenheit, respectively, compared to the same period last July.

According to a recent month-ahead forecast from the US National Weather Service, the same regions have a 50% chance for hotter-than-average weather this month, with 30% to 40% probabilities for upward temperature deviations across the entire Southeast, the Plains and much of the West.

## S&P Global Platts

### MEGAWATT DAILY

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#### Megawatt Daily Questions? Email:

Electricity\_Platts@spglobal.com

#### Managers North America Gas and Power Content

Rocco Canonica, +1-720-264-6626

Joe Fisher, +1-713-658-3290

Amy Gasca, +1-346-348-6896

Chris Newkumet, +1-202-383-2141

Anne Swedberg, +1-720-264-6728

#### Editors

Jared Anderson, +1-212-904-2002

Sheky Espejo, +55-5081-5274

Brandon Evans, +1-720-264-6671

Jasmin Melvin, +1-202-383-2135

Kassia Micek, +1-713-655-2227

J. Robinson, +1-720-264-6657

Jeffrey Ryser, +1-713-658-3225

Mark Watson, +1-713-658-3214

Harry Weber, +1-713-658-3257

Maya Weber, +1-202-383-2244

#### Spot Market Editors

Kelli Ainsworth, +1-713-658-3267

Humza Jamal, +1-346-348-6890

Isabel Milton, +1-713-658-3213

#### Analysts

Eric Brooks

Emmanuel Corral

Richard Frey

John Hillfiker

Luke Jackson

Tyler Jubert

Jack Winters

Ross Wyeno

#### Director, Americas Generating Fuels and Electric

Power Pricing

Mark Callahan

#### Director, Americas Energy News

James O'Connell

#### Global Director of Generating Fuels

Simon Thorne

#### Platts President

Martin Fraenkel

#### Advertising

Tel: +1-720-264-6618

#### Manager, Advertisement Sales

Bob Botelhoe

To reach Platts: E-mail: support@platts.com; North America: Tel: 800-PLATTS-8; Latin America: Tel: +54-11-4121-4810; Europe & Middle East: Tel: +44-20-7176-6111; Asia Pacific: Tel: +65-6530-6430

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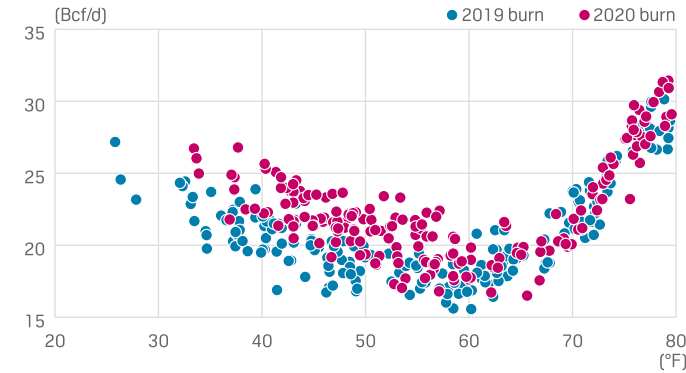
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**Forecast**

Over the next two weeks, modeled power burn data from Platts Analytics shows demand from US generators topping its previous record high at 45.4 Bcf/d, and potentially rising to over 47 Bcf/d as population-weighted temperatures across nearly every US region top 80 degrees with Texas pushing into the low-90s.

**YEAR-TO-DATE SAMPLE US GAS-FIRED POWER BURN vs POPULATION-WEIGHTED TEMPERATURE: 2020 vs 2019**



Source: S&P Global Platts Analytics

Stronger power burns this year, which are up on a per-degree basis compared to 2019, have defied a downturn in electricity demand that started with milder winter temperatures and was followed by pandemic-related demand destruction in office buildings, commercial spaces and industry settings.

Through June, US electricity demand has averaged nearly 4% lower compared to last year while gas-fired generation has climbed almost 7% over that period, according to Platts Analytics.

This summer, strong power burns have help to keep total US demand afloat, partly compensating for losses in the LNG export and industrial sectors which continue to struggle.

Over the past week, though, rising benchmark cash and forwards prices have begun to threaten gas' competitive edge compared to coal. On July 8, balance-summer forwards prices for July, August and September settled at an average \$1.82/MMBtu, up from an annual low at just \$1.55/MMBtu in late June.

— *J. Robinson*

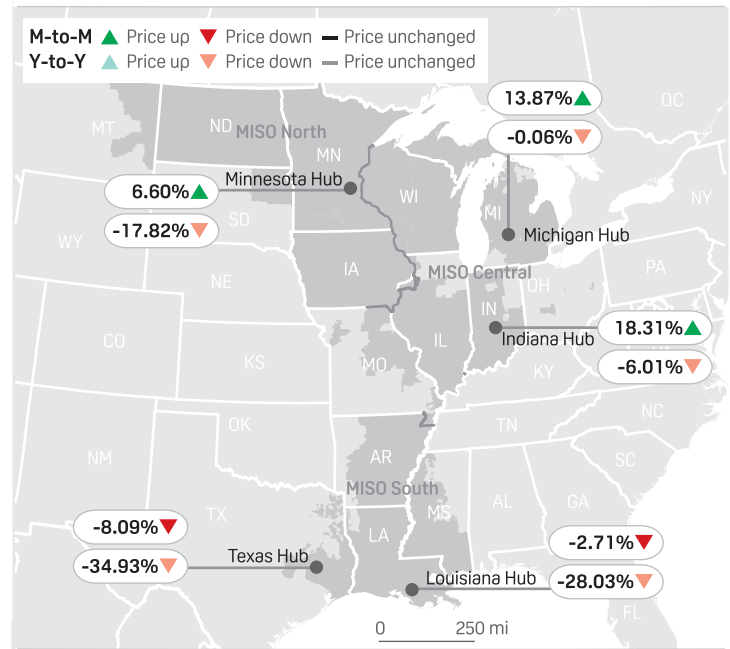
**MISO Power Tracker: Natural gas weakness pushes power prices down on year**

- Peakloads up sharply on month and year
- Aug forwards dip with gas contracts

Weaker natural gas prices overpowered heavier loads in the Midcontinent Independent System Operator to push wholesale power prices lower across the large footprint this June, compared with June 2019, but the month-to-month changes were mixed at various MISO hubs.

Also, August on-peak forwards trended downward in June with gas contracts for the same period, both in comparison with the August forward prices this May and in comparison with August 2019 forwards

**MIDCONTINENT ISO DAY-AHEAD POWER PRICE CHANGES**



**DAY-AHEAD ON-PEAK AVERAGE PRICE COMPARISON (\$/MWh)**

Location	Jun-20	May-20	Jun-19	MtoM	YtoY
MISO Indiana Hub	26.00	21.97	27.66	4.02	-1.66
MISO Louisiana Hub	21.46	22.06	29.82	-0.60	-8.36
MISO Michigan Hub	26.75	23.49	26.76	3.26	-0.02
MISO Minnesota Hub	17.99	16.87	21.88	1.11	-3.90
MISO Texas Hub	21.78	23.70	33.47	-1.92	-11.69

Source: S&P Global Platts

in June 2019, according to S&P Global Platts price data.

Of the five MISO hubs included in Platts' monthly Power Trackers, three had higher average day-ahead on-peak locational margin prices in June than in May, while two had lower.

In comparisons with June 2019 day-ahead on-peak LMPs, this June's prices at the five hubs were all down, but the Michigan Hub's price was down just one cent to \$26.75/MWh, which was higher than the other four.

Chicago city-gate spot gas averaged \$1.548/MMBtu in June, down 7.3% from this May's \$1.67/MMBtu and down 26.5% from June 2019's \$2.106/MMBtu.

Henry Hub spot gas averaged \$1.567/MMBtu this June, down 7.7% from this May's \$1.698/MMBtu and down almost 33% from June 2019's \$2.337/MMBtu.

Daily peakloads averaged 94.4 GW this June, up sharply from this May's average of 70.4 GW and June 2016's 90.8 GW.

June's weather was a mixed bag for MISO, where population-weighted average combined heating- and cooling-degree days were down 20.2% in comparison with this May's total but up 43.7% in comparison with June 2019.

**Forward markets**

Looking ahead, Indiana Hub August on-peak forwards, which averaged about \$28.45/MWh this June, were down 1.5% in comparisons with their May average and down almost 14% in comparison with

August 2019 forwards in June 2019.

Similarly, MISO's Louisiana Hub August on-peak, averaging about \$27.35/MWh, was about 4.1% lower than its average in May and down almost 23.5% in comparison with August 2019 forwards in June 2019.

**AUGUST FORWARDS FOR SELECTED MISO HUBS, NATURAL GAS PRICING POINTS**

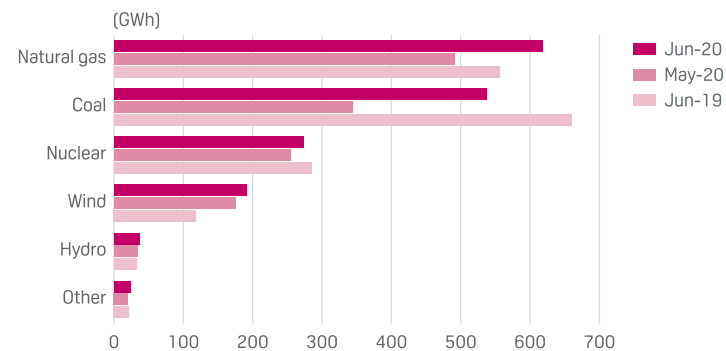


Source: S&P Global Platts

Chicago city-gate August gas averaged \$1.688/MMBtu this June, down 12.9% from its May average of \$1.939/MMBtu and down 20.8% from the \$2.132/MMBtu that August 2019 gas averaged in June 2019.

Henry Hub August gas averaged \$1.778/MMBtu this June, down 14.4% from this May's \$2.076/MMBtu and down 23.4% from the \$2.322/MMBtu that August 2019 gas averaged in June 2019.

**MISO AVERAGE DAILY GENERATION MIX**



Source: Midcontinent Independent System Operator

**Generation mix**

With such inexpensive fuel, gas-fired generation had no problem retaining its leading share in the MISO generation mix, averaging 36.8% this June, down from May's 37.2% but up from June 2019's 33.3%.

Coal-fired generation retained its No. 2 slot with 32% of the mix this June, up from this May's 26.1% but down from June 2019's 39.4%.

Nuclear power's share was down on both the month and year, with 16.3% of the mix this June, compared with 19.3% of the mix in May and 17% of the mix in June 2019.

Wind's share, 11.4%, was down from this May's 13.2% but up from June 2019's 7.1%.

— Mark Watson

**Wind generation spikes to 76% of Xcel's New Mexico-Texas supply mix**

- Adds 728 MW of wind capacity in service territory since 2019
- Further 522 MW of wind capacity to be added by end of 2020

Wind generation spiked as high as 76% of the electricity supply mix in Xcel Energy's Texas-New Mexico service area this spring, as the whole company strives toward 100% carbon-free electricity by 2050.

The service territory set a new hourly wind peak of 76% on the morning of May 8, following a daily wind peak record of 64% on April 12, the company said. Wind accounted for nearly 40% of all the service territory's electricity supply throughout April.

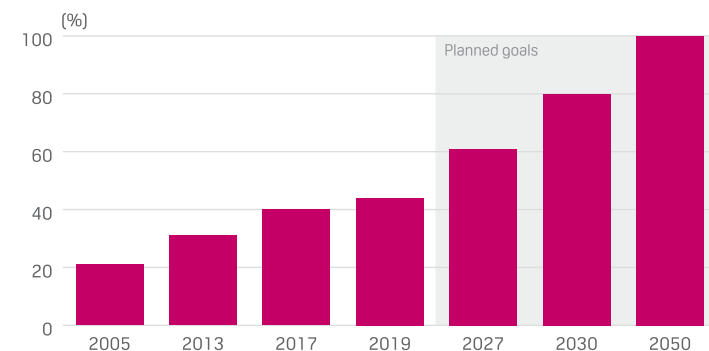
In comparison, wind energy accounted for only 26% of Xcel's Texas-New Mexico electricity in 2019, behind natural gas-fired generation at 47% and coal-fired generation at 25%, according to the company. About 2% of the footprint's electricity came from solar-power sources.

**Wind additions**

Xcel has added 728 MW of wind generation capacity to its Texas-New Mexico system in the last year, spokesman Wes Reeves said July 9. The additions involved the 478-MW Hale Wind Project in Texas, which came online in June 2019, as well as 250 MW from contracts from two wind farms in Texas.

By the end of 2020, Xcel plans to add a further 522 MW at the

**XCEL ENERGY CARBON-FREE ELECTRICITY GOALS**



Source: Xcel Energy

Sagamore Wind Project in Roosevelt County, New Mexico, Reeves said. Construction began in the fourth quarter of 2019 and the wind farm is expected to be online in December.

### Renewable goals

Wind will be a key factor in Xcel's goal to reduce its carbon emissions by 80% by 2030, the company said. It has already reduced the carbon emissions from its Texas-New Mexico system by 47% since 2005.

Xcel is striving for 100% carbon-free electricity by 2050. In 2019, it had its largest one-year decline and has reduced its carbon emissions by 44% since 2005.

In 2005, Xcel was 21% carbon free with 56% of its electricity coming from coal, 23% from gas, 12% nuclear, 5% hydro, 3% wind and 1% biomass, according to the company. The carbon-free level grew to 40% by 2017 with 37% of its electricity coming from coal, 23% gas, 21% wind, 13% nuclear, 3% hydro, 2% solar and 1% biomass.

The goal is to reach 61% carbon-free electricity by 2027 with a fuel mix of 38% wind, 21% gas, 19% coal, 12% nuclear, 8% solar and 1% hydro and biomass, it said.

— *Kassia Micek*

## Democrat's climate plan excludes fracking ban, targets net-zero emissions

- Report eyes net-zero US emissions by 2050
- Targets 500 million solar panels, 60,000 wind turbines

Noticeably lacking from a plan in the works to unify the Democratic party agenda is a call to ban hydraulic fracturing. The task force created by presumptive Democratic presidential nominee Joe Biden and former candidate Senator Bernie Sanders published their policy recommendations July 8.

And while the group did not call for an end to fracking, it did recommend eliminating carbon pollution from power plants by 2035 and a dramatic expansion of renewable generation, including the installation of 500 million solar panels and 60,000 wind turbines.

The recommendations of the panel, led by former Secretary of State John Kerry and Representative Alexandria Ocasio-Cortez, Democrat-New York, took up 19 pages of a 110-page report that also covered the suggestions of other panels charged with tackling such issues as healthcare, education and criminal justice reforms.

Biden has historically outlined policies to reduce fossil fuel production and market share, including to halt fossil fuel leases on federal land. But unlike some of the more progressive Democratic contenders such as Sanders who have since pulled out of the race, Biden has not called for a ban on hydraulic fracturing. Also not mentioned in the report by name was the Green New Deal.

But the report did call for ending financing for coal projects overseas, repealing fossil fuel subsidies, reducing methane pollution through federal standards, and providing "targeted support" for replacing or repairing aging fossil fuel distribution systems. And the report suggested that Biden require that any federal approval or financial support for domestic and international infrastructure projects include a climate-change test that includes a full life cycle assessment.

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The report specifically mentioned seeking ways to avoid, minimize and mitigate climate impacts from fossil fuel projects and export terminals, which has been a point of contention for some natural gas infrastructure projects approved by the Federal Energy Regulatory Commission.

### Net-zero emissions target

More broadly, the report embraced the concept of achieving net-zero emissions by 2050 in the US and globally. Some of the steps toward achieving that goal would include achieving net-zero greenhouse gas emissions for all new buildings by 2030, transitioning all American school buses to "zero-emission alternatives" within five years, installing half a million electric vehicle charging stations, and transitioning the 3 million vehicles in the federal, state, and local fleets to zero-emission vehicles.

As for the power industry, the report said technology-neutral clean energy and energy efficiency standards should be used to eliminate carbon pollution from power plants by 2035. Of the 500 million new solar panels called for by the report, 8 million would be placed on roofs and community solar projects. And the 60,000 new wind turbines would be built both onshore and offshore. Biden should also create a battery storage and clean energy transmission line moonshot program, the report said.

FERC would also play a role under the report's recommendations, being called upon to "increase transparency and fairness in power markets for clean energy." In addition, the report cited a need to create a long-term transmission plan for effectively moving generation from renewables to markets but did not explain how that would be achieved.

The climate panel also stressed the importance of environmental justice in its recommendations. "For too long African American communities, tribal nations, immigrants and low-income families have been excluded from a clean and safe environment, basic infrastructure, and economic prosperity," the report said. "We must not repeat the mistakes of the past."

Some of the related recommendations included building a more inclusive workforce by expanding training to recruit historically marginalized and underrepresented groups. In addition, the task force urged Biden to target investments in job-creating clean energy and infrastructure projects in communities in transition. The plan would also require the use of US made iron, steel and aluminum for water and clean energy infrastructure as a way to help promote American jobs.

The report said Biden should also create a task force focused

on helping communities impacted by fossil fuel retirements such as coal-fired plants to attract private sector investments and receive federal resources.

— *Esther Whieldon, S&P Global Market Intelligence*

## Clean grid buildout to continue amid pandemic uncertainties, execs tell FERC

- Clean energy transition plans remain on target
- Load forecasting difficulties persist

Accurately forecasting electricity demand will likely remain a challenge as the coronavirus pandemic continues to sweep across the U.S., but the power grid buildout is largely expected to progress as planned, industry representatives told federal regulators July 8.

The COVID-19 outbreak also is not anticipated to significantly alter utilities' plans to transition to cleaner generating fleets, the Federal Energy Regulatory Commission heard on the first day of a two-day technical conference focused on the impacts of the virus.

A recent S&P Global Market Intelligence analysis found that demand for electricity was down about 10% in May in the two largest organized power markets in North America. Electricity consumption crept back up to normal levels toward the end of the month as some jurisdictions eased lockdowns, but now some states are reinstating restrictions as new case counts spike.

As an example of load forecasting challenges, Minnkota Power Cooperative Inc. President and CEO Robert McLennan noted that the co-op's members serving the Great Lakes region experienced unanticipated residential demand over the Fourth of July holiday weekend.

"Historically, we'd see people spreading out for vacation over the 4th, but they were so concentrated at the lakes that demand and usage created a few spots of concern over whether the system would remain intact," McLennan said. "Is the pandemic going to change behavioral patterns in a way that the system wasn't originally designed around? Just anecdotally over the last few days, a doubling of individuals going to the lakes, or whatever the number was, certainly put pressure on it."

Vistra Energy Corp. President and CEO Curtis Morgan suggested load forecasting difficulties will persist as states such as Texas, Florida and Arizona reinstate restrictions and lockdowns due to spikes in new coronavirus cases after moving to reopen their economies after Memorial Day weekend. "It's going to be an uneven economy in fits and starts until we have an effective vaccine," he said.

Despite the economic uncertainty, grid operators like the Midcontinent ISO will continue to add new transmission lines to accommodate a huge wave of renewable energy projects, said Clair Moeller, MISO's president and COO.

"The dominant members in the MISO market have not indicated that there are any changes to their goals with fleet transitions," Moeller said when asked whether COVID-19 could change previous forecasts about the nation's changing resource mix.

In the near-term, one of the biggest challenges state regulators will face is the threat that the virus poses to workers, said Sam Randazzo,

chairman of the Public Utilities Commission of Ohio.

"From a planning perspective, the pandemic scenario is really a people problem," Randazzo said. "That's the context that I think we've all been struggling with, and the priority that we've been thinking about as we try to think through our more typical regulatory responsibilities."

LS Power Associates LP President and CEO Paul Segal expressed hope that the coronavirus pandemic may propel the country in the coming years toward a heightened focus on clean energy infrastructure and climate issues.

"We may well see that this event leads people to focus even more than they have been around solving the big, potentially disruptive changes that are coming at us in the future," Segal said. "It shows that we are capable of having a collective impact."

FERC Chairman Neil Chatterjee said at the end of the panel discussion that more dialogues centered on the long-term energy impacts of COVID-19 are likely to follow. "I hope today's conversation is just the beginning of our efforts to examine and tackle the potential long-term effects of the coronavirus pandemic on the energy industry," he said.

— *Zack Hale, S&P Global Market Intelligence*

## Public power utilities say they have 'weathered' COVID-19 storm; S&P adds, 'so far'

- LPPC points to challenges in the fall
- S&P warns of a hot summer

Public power utilities in the US have, like everyone else, faced high unemployment and the economic slowdown brought on by the coronavirus pandemic, but they have felt a "relatively small impact," according to the chairman of the Large Public Power Council.

Dan Sullivan, the chairman of the LPPC and president and CEO of Grand River Dam Authority in Oklahoma, said the main message put out during Thursday webcast hosted by the council was that the public power industry has been "resilient and has weathered the storm."

There have been delays in some capital and O&M projects because public power utilities were reluctant to send large crews out into the pandemic, he said, "but some of this activity has been picking up."

There could, however, be "challenges" in the autumn shoulder months when outages are typically scheduled.

Sullivan said much depends on the "dynamics of where you are and who you serve." He said that retail and commercial customers have generally been hardest hit, while heavy industry has generally been deemed "essential."

During the early months of the pandemic the decline in demand for power ran into the double-digits, Sullivan said. Now, he said, there is "minimal degradation of demand—certainly in the single digits."

He said much depends on the "dynamics of where you are and who you serve," and what your mix is of retail and commercial customers.

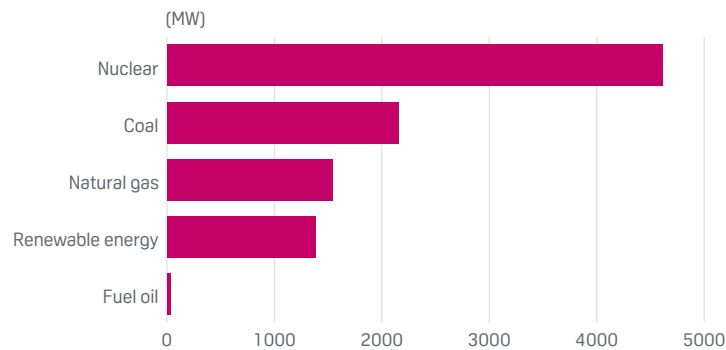
The Southwest Power Pool has a 3% to 5% range of demand decline, he said. "Our utility—based in Pryor, Oklahoma is much less."

### S&P Global Ratings investor note

David Bodek, senior director of S&P Global Ratings said during the webcast that as the public power industry is heading into what is

## OUTAGES

### US MEGAWATTS OFFLINE BY FUEL TYPE



Source: IIR Energy  
For more information please contact IIR Energy at [iirteam@iirenergy.com](mailto:iirteam@iirenergy.com) or at their website. [www.iirenerav.com](http://www.iirenerav.com)

### NORTH AMERICAN DAILY GENERATION OUTAGES BY REGION, JUL 09

ISO Region	MW OFF	NERC Region	MW OFF
AESO	0	ERCOT	258
CAISO	385	FRCC	860
ERCOT	258	MRO	632
ISONE	0	NPCC	1,333
MISO	2,847	RFC ECAR	2,499
NYISO	0	RFC MAAC	0
Ontario IESO	1,065	RFC MAIN	88
PJM	310	SERC	392
SPP	42	SPP	42
		WECC	1,730
		US TOTAL	7,835

Source: IIR Energy

For more information please contact IIR Energy at [iirteam@iirenergy.com](mailto:iirteam@iirenergy.com) or at their website. [www.iirenergy.com](http://www.iirenergy.com)

already proving to be a hot summer, it may be hard to predict what will happen to demand.

He said that his recent report on the impact on COVID-19 and the recession will have on municipal utilities may not be great. With so many companies still shuddered, there may be many people who won't be able to pay their bills.

The title of his July 8 report was, "COVID-19 And The Resulting Recession Are Having A Limited Impact On US Municipal Utility Credit Quality, So Far."

The investor note said that although there is evidence of residential customers and businesses having difficulty meeting financial obligations, the credit ratings agency has yet to see challenges "flow through to electric, water, wastewater and storm water utility cash flows."

It said that while weather-adjusted energy sales are down across all control areas, the decline has been generally modest, at less than 5% in California ISO, ERCOT and ISO New England, but a more pronounced 7% to 11% in the MISO, PJM and New York ISO control areas.

Bodek said the credit ratings agency has not "broadly applied" a

### GENERATION UNIT OUTAGE REPORT, JUL 9

Plant/Operator	Cap	Fuel	State	Status	Return	Shut
<b>Northeast</b>						
BruceB-G6/Bruce	872	n	Ont.	MO	Unk	01/21/20
Indian Pt. 2/Entergy	1031	n	NY	MO	Unk	05/01/20
Lennox-4/OPG	525	n	Ont.	MO	Unk	07/08/20
Pickering 8/OPG	500	n	Ont.	MO	Unk	07/09/20
Thunderbay/OPG	153	bio	Ont.	MO	Unk	05/02/20
<b>West</b>						
Alamitos-4/SCE	337	g	Calif.	PMO	Unk	05/21/20
Caribou-4-5/PG&E	120	h	Calif.	MO	Unk	07/07/20
Colgate Powerhouse-1/PG&E	177	g	Calif.	PMO	Unk	07/08/20
ESJ Wind/SDGE	155	w	Calif.	PMO	Unk	07/08/20
Gateway Storage	250	g	Calif.	MO	Unk	07/09/20
Inland-1/SCE	376	g	Calif.	PMO	Unk	05/01/20
Southpoint/SCE	200	g	Calif.	MO	Unk	06/18/20
Sutter Power/Calpine	275	g	Calif.	MO	Unk	07/08/20
Tule Wind/SDGE	131	w	Calif.	PMO	Unk	07/07/20
<b>Southeast &amp; Central</b>						
Fermi 2/ DTE	1100	n	Mich.	MO	Unk	03/23/20
Turkey Pt. 4/FP&L	823	n	Fla.	MO	Unk	07/06/20
<b>PJM &amp; MISO</b>						
Gina/Constellation	568	n	NY	MO	Unk	04/06/20

Daily generation outage references: MO=unplanned maintenance outage; RF=refueling outage; PMO=planned maintenance outage; Unk=unknown; OA=offline/available. Fuels: Nuclear=n; Coal=c; Natural gas=g; Hydro=h; Wind=w; Solar=s

Sources: Generation owners, public information and other market sources.

negative outlook on the sector, and in the report mentioned five reasons why it has not.

First, the note said, utilities are still measuring the impact of the recession.

Secondly, utilities are essential services which provide "a high-level floor for demand, relative to other sectors."

Third, S&P Ratings said that utilities have financial flexibility.

"The combination of historically low natural gas prices and relatively low power prices has allowed some electric utilities to increase current funding for capital expenditures, reduce debt, bolster [debt] coverage and liquidity, and/or reduce rates."

Fourth, the report says that utilities have structured rates that "insulate debt coverage metrics" from sales volatility, weather conditions, energy efficiency and even the pandemic/recession, by "shifting recovery of fixed costs from the variable commodity portion of bills to the fixed demand component."

"Of course, this does not help if cash flows are being pressured by delinquencies or non-payment."

Finally, and "most importantly," utilities have "several levers they can employ in response to lower demand."

Among these are the ability to reduce variable fuel and power purchases and to maintain liquidity and fixed cost coverage levels that "exceed what is necessary to support their credit ratings."

Some utilities can also defer nonessential capital spending in the short-term or shift debt financing at what are historically low interest rates.

— Jeffrey Ryser

## US power market dynamics pressuring utilities: Brattle

- Power prices have fallen steadily since February
- Continued economic stress could challenge utilities

Daily power prices have fallen in every ISO in almost each month from February through June 2020, compared to their past two-year averages, which is not necessarily due to the pandemic, but could strain economic viability for some coal and nuclear plants, Brattle Group said July 9.

The consultant has treated February 1, 2020 as the beginning of the significant influence of the coronavirus pandemic on the US economy in a report called "Impacts and Implications of COVID-19 for the Energy Industry."

Energy data has not been weather-normalized, so Brattle used – where relevant – the average of "a few years' prior history for comparison," the report said.

The day-ahead average monthly locational marginal power price in June was down 31% in the PJM Interconnection, 18% in ISO New England and down 14% in the New York Independent System Operator markets, compared to the prior two-year historical average, Brattle said.

At US ISO hubs, average on-peak forward prices "fell dramatically and universally" by April for front months, but as of June 15 forwards had increased to within nearly 50 cents of February estimates, according to the report.

For 2021 and beyond, June 15 forwards increased above February levels, Brattle said, adding that long-dated forwards for PJM West and Midcontinent Independent System Operator are "slightly (\$2 to \$3/MWh) above pre-COVID-19 levels."

Overall, forward power prices for 2020 generally remain depressed, but for 2021 and beyond prices are "mostly a bit above pre-COVID-19 levels," Brattle said.

Natural gas- and coal-fired power generation in June 2020 are up by over 60% compared to May 2020 due to seasonal warming plus partial economic recovery, but compared to June 2019, gas is up around 20% and coal is down roughly 10%, according to the report.

These pricing and other market dynamics could pressure utility profitability, the analysts said.

"Utility revenue reductions should initially be smaller in percentage terms than load losses, due to residential increases under volumetric rates offsetting the much larger commercial and industrial load losses that are partly softened in revenues by demand charges," Brattle said in an emailed statement.

Over the next few months, however, losses from utility service shut-off moratoriums for non-payment may "grow to levels difficult to recover and some businesses may not be viable at reduced commercial levels likely over the next few months, possibly leading to bankruptcies – so very significant cost recovery shortfalls could arise despite notional deferral and decoupling mechanisms," Brattle said.

US utilities will release their second quarter 2020 earnings results in the next few weeks.

— [Jared Anderson](#)

## SPP proposes uniform zonal planning criteria for local power-grid upgrades

- Proposal seen increasing transparency, coordination
- SPP seeks Sept. 7 effective date for changes

Looking to eliminate confusion and inequity that exists in its current transmission planning process, Southwest Power Pool has asked the Federal Energy Regulatory Commission to sign off on a plan to establish uniform local planning criteria for all transmission owners within a pricing zone.

FERC Order 890 mandates that SPP conduct a coordinated, open and transparent planning process at both the local and regional level. As such, the grid operator's tariff specifies how transmission owners' local plans are to be included in the SPP regional planning process.

Currently, the SPP tariff allows zones with multiple transmission owners to have multiple, varied sets of applicable local planning criteria that SPP uses to evaluate the need for zonal reliability transmission upgrades. Those upgrades have their costs allocated to all load in the zone based on a load ratio share, regardless of which transmission owner's criteria resulted in construction of the upgrade.

"This scenario creates the potential for a transmission owner to establish criteria that would produce upgrades solely, or disproportionately, benefitting a portion of the load in the zone at the expense of all load in the zone," SPP said in a July 7 filing.

To remedy this inequity and fulfill a stakeholder-backed recommendation made in July 2019 following a comprehensive review of SPP's policies, the grid operator has proposed a change to the way local planning criteria is submitted to SPP for consideration of zonal reliability upgrades (ER20-2334).

### Facilitating transmission owner

Rather than allow an array of local planning criteria to exist within a zone, new tariff language would direct the designation of a facilitating transmission owner within a zone, and that entity would hold open meetings during which zonal planning criteria would be crafted with input from and meaningful participation by all transmission owners and customers with long-term transmission service within the zone.

The facilitating transmission owner would also serve as the single point of contact between the zone and SPP regarding criteria development. After the zonal planning criteria was submitted to SPP, the grid operator would use it to select and issue zonal reliability upgrades for each zone.

SPP's proposal tasks the network customer that bears the largest cost within each zone based on its load ratio share with selecting which transmission owner in the zone will be the facilitating transmission owner. The grid operator reasoned that this was appropriate as it is the network customers who foot the bill for the upgrade projects.

"These open meetings held for the purpose of forming zonal planning criteria will encourage increased collaboration among multiple entities within the zone. This increased collaboration is beneficial in that it creates better understanding of common reliability needs within each zone and promotes enhanced coordination needed to solve those issues," SPP said.

### 'Increased system reliability'

The grid operator added that “the proposed process to create zonal planning criteria for identification of zonal reliability upgrades is expected to provide increased transparency and coordination among transmission owners that will likely promote increased system reliability in a fair and equitable fashion for all customers in each zone.”

SPP specified that while the proposal is intended to “address confusion and inequity resulting from the current allowance of multiple sets of local planning criteria in SPP zones,” it does not eliminate a transmission owner’s ability “to develop and use their own local planning criteria in their applicable local planning processes to meet the individual needs of their respective customers.”

Any such projects would “simply ... [be] ineligible for allocation of costs to other customers in the same zone since the zonal planning criteria did not recognize the need for those local upgrades,” SPP said.

The grid operator has asked FERC to approve the proposed tariff changes with a Sept. 7 effective date. FERC has set a July 28 deadline for comments on the proposal.

— [Jasmin Melvin](#)

## HYDROGEN

### Huge green ammonia production facility planned for new Saudi city of Neom

- Air Products, ACWA Power, Neom in hydrogen JV
- 4 GW of renewables to feed ThyssenKrupp electrolyzers
- 650 mt/day facility to be online in 2025

Air Products, ACWA Power and the new city of Neom are to co-develop a \$5 billion green hydrogen-based ammonia production facility in Saudi Arabia, the partners said July 9.

The project, equally owned by the three partners, is to be sited in

Neom, the mega-city being built in Tabuk province on the Red Sea in northwest Saudi Arabia, on the borders of Egypt, Israel and Jordan.

“The world’s largest green hydrogen project will supply 650 tons per day of carbon-free hydrogen, saving the world three million tons per year of CO<sub>2</sub>,” the partners said.

The project involves integration of over 4 GW of solar, wind and storage capacity, with Neom partnering international developers in order to provide the green power needed for electrolysis.

Thyssenkrupp is to provide electrolysis technology, while Air Products technology is to produce nitrogen from air separation. Production of 1.2 million mt/year of green ammonia would use Haldor Topsoe technology.

The project is scheduled to be onstream in 2025.

On July 5 Air Products and Thyssenkrupp Uhde Chlorine Engineers agreed to collaborate on green hydrogen projects, using Thyssenkrupp’s alkaline water electrolysis technology.

Under the agreement, Thyssenkrupp is to supply equipment and services for water electrolysis plants to be built, owned and operated by Air Products in specific regions.

On May 15, meanwhile, Air Products and Haldor Topsoe signed a global agreement to collaborate on construction of large-scale ammonia, methanol and/or dimethyl ether plants.

This agreement provides Air Products access to Topsoe’s licenses and services, allowing integration of Topsoe’s technology into Air Products’ technologies including gasification of various feedstocks and synthesis gas processes.

Construction of the vast city of Neom is being backed by more than \$500 billion from the Public Investment Fund of Saudi Arabia, as well as local and international investors. The city’s contribution to Saudi Arabia’s GDP is projected to reach at least \$100 billion by 2030.

The region has excellent renewable energy resource, with “perennial” solar irradiance of 20 MJ/square meter and average wind speeds of 10.3 meters per second, according to city data.

— [Henry Edwardes-Evans](#)

**REC MARKETS****RECs trend mixed across the board**

- Class I RECs trended mixed across the board in the S&P Global Platts weekly REC assessments.
- Both Massachusetts V20 and Connecticut V20 both gained 25 cents at \$45/REC and \$44.25/REC, respectively.

**Solar RECs Maryland and New Jersey jump down on the week**

- The Maryland V20 and New Jersey V20 SRECs were assessed \$3 higher at \$78/SREC and \$231/SREC, respectively.
- Ohio V20 and Pennsylvania V20 were assessed flat on the week, in light of limited trading activity observed.

**Other packages trended flat on the week**

- Lacking new trading information, Any Technology RECs remained flat, assessed below \$1.
- Wind V20 RECs were assessed at \$1.10/REC, similarly unchanged on the week.

**EMISSIONS MARKETS****RGGI V20 and CCA make gains on the week**

- The Regional Greenhouse Gas Initiative V20 December strip was assessed up 3 cents on the week at \$6.10/mt in the S&P Global Platts weekly carbon assessments.
- Trading on the Intercontinental Exchange picked up at the start of the current week after stalling ahead of the Independence day holiday over the weekend.
- CCA Vintage 20 for December 2020 delivery was assessed 23 cents higher on the week at \$17/mt, on par with many ICE deals done at this level. Over the past seven days trades ranged from \$16.80/mt to \$17.02/mt.
- Bucking the trend, the California CC3 offset fell by 19 cents, to be assessed at \$13.25/mt.

**EMISSIONS MARKETS JUL 09 (\$/ton)**

	Low	High	Close
RGGI	6.10	6.10	6.10
California Carbon Allowance	17.00	17.00	17.00
California Offset	13.25	13.25	13.25

**RGGI CARBON ALLOWANCE FUTURES, JUL 08 (\$/allowance)**

ICE	Settlement	Volume
Dec20 V20	6.110	0
Dec21 V20	6.250	0
Dec22 V20	6.390	0
Dec20 V21	6.110	0
Dec21 V21	6.250	0
Dec22 V21	6.390	0
Dec20 V22	6.110	0
Dec21 V22	6.250	0
Dec22 V22	6.390	0
Dec20 V23	6.110	0
Dec21 V23	6.250	0
Dec22 V23	6.390	0

The Regional Greenhouse Gas Initiative is a carbon cap-and-trade program for power generators in nine Northeast and Mid-Atlantic US states. One RGGI allowance is equivalent to one short ton of CO<sub>2</sub>. The volume listed is the number of futures contracts traded. Each futures contract represents 1,000 RGGI allowances.

**RENEWABLE ENERGY CERTIFICATE MARKETS JUL 09 (\$/MWh)**

	Low	High	Mid
<b>Class I/Tier I RECs*</b>			
Connecticut	44.25	44.25	44.250
Maryland	9.50	9.50	9.500
Massachusetts	45.00	45.00	45.000
New Jersey	9.50	9.50	9.500
Ohio	8.75	8.75	8.750
Pennsylvania	9.25	9.25	9.250
Texas	1.10	1.10	1.100
<b>Solar RECs*</b>			
Maryland	78.00	78.00	78.000
Massachusetts	350.00	350.00	350.000
New Jersey	231.00	231.00	231.000
Ohio	7.00	7.00	7.000
Pennsylvania	24.00	24.00	24.000
<b>California RPS*</b>			
California Bundled REC (Bucket 1)	15.25	15.25	15.250
California Bundled REC (Bucket 2)	8.50	8.50	8.500
California Tradable REC (Bucket 3)	2.65	2.65	2.650
<b>Voluntary RECs*</b>			
National voluntary, any technology	0.94	0.94	0.940
National voluntary, wind	1.10	1.10	1.100

\*Prices are for the value of the environment attribute of the renewable energy certificate only and do not include energy. Bundled transactions are normalized by subtracting the market price of electricity.

## HYDROGEN

## NORTH AMERICA HYDROGEN ASSESSMENTS, JULY 8\*

Production Pathway	Excluding Capex		Including Capex	
	\$/kg	Change	\$/kg	Change
<b>Alberta (C\$/kg)</b>				
SMR w/o CCS	0.36	0.00	1.68	+0.01
Alkaline Electrolysis	1.60	+0.05	3.09	+0.05
PEM Electrolysis	1.79	+0.06	3.93	+0.07
<b>Appalachia</b>				
SMR w/o CCS	0.27	+0.01	1.26	+0.01
Alkaline Electrolysis	1.60	+0.20	2.61	+0.20
PEM Electrolysis	1.79	+0.22	3.24	+0.22
<b>Gulf Coast</b>				
SMR w/o CCS	0.30	0.00	1.14	0.00
Alkaline Electrolysis	1.00	0.00	1.96	0.00
PEM Electrolysis	1.13	0.00	2.50	0.00
<b>Midcontinent</b>				
SMR w/o CCS	0.28	0.00	1.17	0.00
Alkaline Electrolysis	1.09	-0.02	2.07	-0.02
PEM Electrolysis	1.22	-0.02	2.62	-0.02
<b>Northeast</b>				
SMR w/o CCS	0.29	-0.01	1.35	-0.01
Alkaline Electrolysis	1.14	+0.08	2.17	+0.08
PEM Electrolysis	1.28	+0.09	2.77	+0.09
<b>Northern California</b>				
SMR w/o CCS	0.61	0.00	1.83	0.00
Alkaline Electrolysis	1.24	+0.10	2.37	+0.10
PEM Electrolysis	1.38	+0.10	3.00	+0.10
<b>Northwest</b>				
SMR w/o CCS	0.27	0.00	1.45	0.00
Alkaline Electrolysis	0.53	+0.10	1.56	+0.10
PEM Electrolysis	0.59	+0.10	2.06	+0.10
<b>Rockies</b>				
SMR w/o CCS	0.28	0.00	1.21	0.00
Alkaline Electrolysis	1.36	+0.16	2.35	+0.16
PEM Electrolysis	1.53	+0.18	2.96	+0.18
<b>Southeast</b>				
SMR w/o CCS	0.32	+0.01	1.19	+0.01
Alkaline Electrolysis	1.00	+0.15	1.98	+0.15
PEM Electrolysis	1.12	+0.17	2.52	+0.17
<b>Southern California</b>				
SMR w/o CCS	0.51	+0.02	1.68	+0.02
Alkaline Electrolysis	1.26	+0.04	2.36	+0.04
PEM Electrolysis	1.41	+0.04	3.00	+0.04
<b>Upper Midwest</b>				
SMR w/o CCS	0.32	0.00	1.27	0.00
Alkaline Electrolysis	1.80	+0.19	2.84	+0.19
PEM Electrolysis	2.02	+0.22	3.52	+0.22

\*Assessed previous day

## NETHERLANDS HYDROGEN ASSESSMENTS, JULY 8

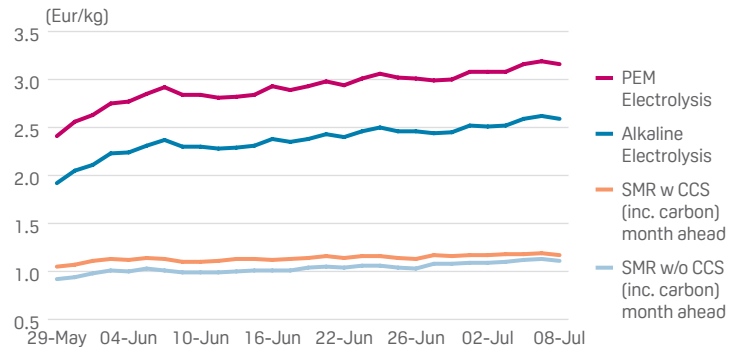
Production Pathway	Eur/kg	Change	Eur/KWh	Change
SMR w/o CCS	0.3452	-0.0160	0.0104	-0.0004
SMR w/o CCS (inc. Capex)	0.8113	-0.0170	0.0243	-0.0006
SMR w/o CCS (inc. Carbon)	0.6425	-0.0167	0.0193	-0.0005
SMR w/o CCS (inc. Capex & Carbon)	1.1086	-0.0177	0.0333	-0.0005
SMR w CCS	0.3761	-0.0177	0.0113	-0.0005
SMR w CCS (inc. Capex)	1.1356	-0.0194	0.0341	-0.0006
SMR w CCS (inc. Carbon)	0.4090	-0.0178	0.0123	-0.0005
SMR w CCS (inc. Capex & Carbon)	1.1684	-0.0195	0.0351	-0.0005
Alkaline Electrolysis	1.7735	-0.0231	0.0532	-0.0007
Alkaline Electrolysis (inc. Capex)	2.5947	-0.0250	0.0778	-0.0008
PEM Electrolysis	1.9840	-0.0260	0.0595	-0.0008
PEM Electrolysis (inc. Capex)	3.1640	-0.0286	0.0949	-0.0009

## JAPAN HYDROGEN ASSESSMENTS, JULY 8\*

Production Pathway	Excluding Capex		Including Capex	
	Yen/kg	Change	Yen/kg	Change
SMR w/o CCS	53.48	-0.07	220.34	-0.07
Alkaline Electrolysis	269.76	-1.54	457.91	-1.54
PEM Electrolysis	302.32	-1.73	572.67	-1.73

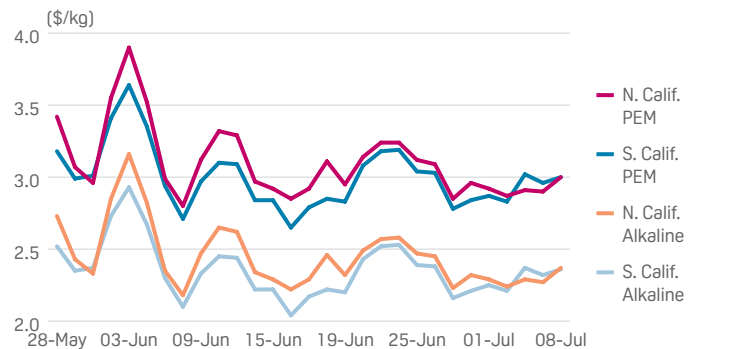
\*Assessed previous day

## NETHERLANDS HYDROGEN (INCLUDING CAPEX)



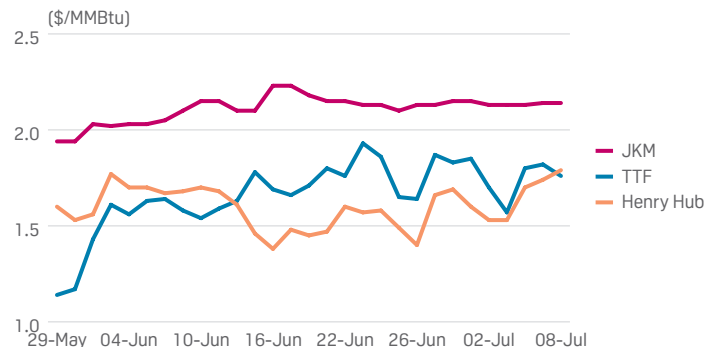
Source: S&amp;P Global Platts

## CALIFORNIA ELECTROLYSIS (INCLUDING CAPEX)



Source: S&amp;P Global Platts

## NATURAL GAS/LNG



Source: S&amp;P Global Platts

## ASSESSMENT RATIONALE

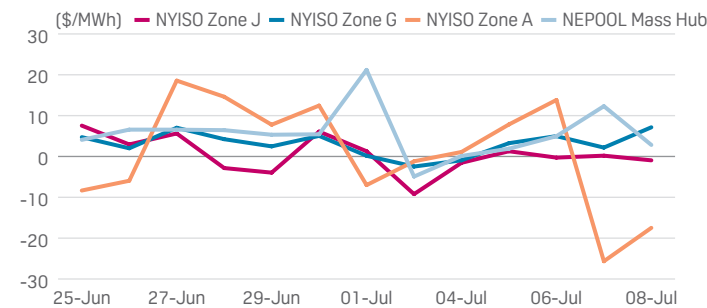
The daily and month ahead hydrogen assessments are valuations that incorporate fixed capital and operating costs and variable natural gas, electricity, and carbon prices. Details on hydrogen methodology can be found at <https://www.spglobal.com/platts/en/our-methodology/methodology-specifications/electric-power/hydrogen-methodology>

**NORTHEAST POWER MARKETS**

**NORTHEAST DAY AHEAD POWER PRICES (\$/MWh)**

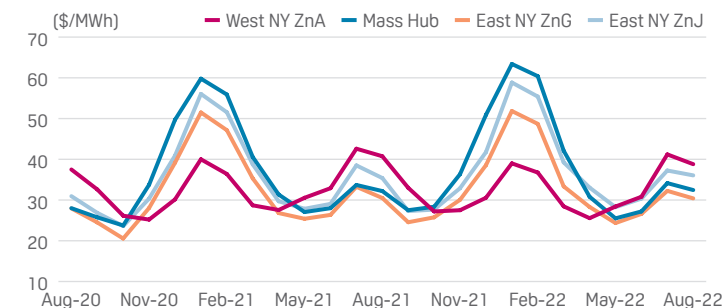
Hub/Index	Symbol	10-Jul	Marginal heat rate	Spark spread		Price change		Prior 7-day Average	Month Min	Month Max	Yearly change			
				@7K	@12K	Chg	% Chg				Jul-20	Jul-19	Chg	% Chg
<b>On-Peak</b>														
ISONE Internal Hub	IINIM00	22.63	13589	10.97	2.65	-8.48	-27.3	22.68	17.88	31.11	22.65	33.95	-11.30	-33.3
ISONE NE Mass-Boston	IINN000	22.58	13563	10.93	2.60	-8.36	-27.0	22.64	17.94	30.94	22.65	35.58	-12.93	-36.3
ISONE Connecticut	IINC000	22.37	11805	9.11	-0.37	-8.31	-27.1	22.44	17.78	30.68	22.37	33.44	-11.07	-33.1
NYISO Zone G	INYHM00	26.11	13780	12.85	3.37	-3.63	-12.2	25.11	19.79	29.74	25.02	31.32	-6.30	-20.1
NYISO Zone J	INYNM00	29.04	16640	16.82	8.10	-3.39	-10.5	26.78	20.11	32.43	26.81	35.97	-9.16	-25.5
NYISO Zone A	INYWM00	52.25	37865	42.59	35.69	3.43	7.0	32.75	21.10	52.25	34.39	40.79	-6.40	-15.7
NYISO Zone F	INYCM00	25.24	14466	13.03	4.30	-4.28	-14.5	24.41	19.19	29.52	24.34	30.50	-6.16	-20.2
<b>Off-Peak</b>														
ISONE Internal Hub	IINIP00	16.53	9925	4.87	-3.46	0.16	1.0	15.02	14.26	16.53	15.22	21.43	-6.21	-29.0
ISONE NE Mass-Boston	IINN000	16.52	9923	4.87	-3.46	0.14	0.9	15.08	14.29	16.52	15.29	22.08	-6.79	-30.8
ISONE Connecticut	IINC000	16.21	8553	2.94	-6.53	0.17	1.1	14.74	14.02	16.21	14.92	21.01	-6.09	-29.0
NYISO Zone G	INYHP00	17.77	9379	4.51	-4.97	0.46	2.7	15.59	14.32	17.77	15.69	20.42	-4.73	-23.2
NYISO NYC Zone	INYNP00	18.44	10569	6.23	-2.50	0.45	2.5	15.97	14.62	18.44	16.09	21.75	-5.66	-26.0
NYISO West Zone	INYWP00	17.80	12901	8.14	1.24	1.19	7.2	14.57	13.31	17.80	14.73	17.85	-3.12	-17.5
NYISO Capital Zone	INYCP00	17.51	10032	5.29	-3.43	0.43	2.5	15.26	14.02	17.51	15.38	21.19	-5.81	-27.4

**NORTHEAST AVG. DAY-AHEAD/REAL-TIME PEAK PRICE SPREAD**



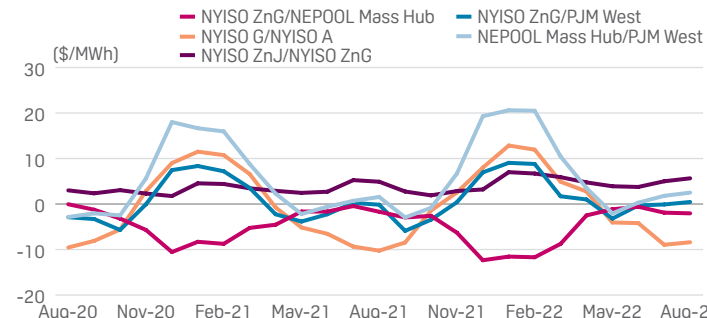
Source: S&P Global Platts

**NORTHEAST PLATTS M2MS FORWARD CURVE: ON-PEAK**



Source: S&P Global Platts

**NORTHEAST PLATTS M2MS LOCATIONAL SPREADS: ON-PEAK**



Source: S&P Global Platts

**New York on-peak power dailies sink**

- NYISO Zone G on-peak locational marginal price tumbled near \$3.75 to the mid-\$20s/MWh July 9, while Zone J fell \$3.50 to price near \$29/MWh
- The corresponding off-peak packages gained just under 50 cents to price near \$18/MWh.
- Bucking the trend, Zone A on-peak gained \$3.50 to reach over \$50/MWh.
- Mass Hub next-day on-peak fell near \$3.25 in the mid-\$20s/MWh for July 10 delivery on the Intercontinental Exchange.

**Regional temperatures forecast to dip**

- Boston temperatures were expected to fall to below average levels in the high 70s Fahrenheit after several days of above-average levels, according to CustomWeather.
- Similarly, in New York City, high temperatures were forecast to fall 9 degrees to the high 70s F.

**Power forwards trade higher despite the NYMEX gas contract dip**

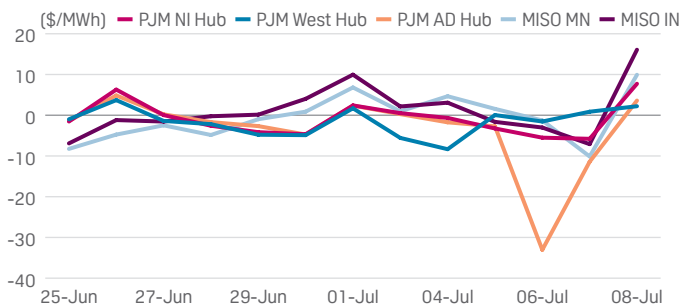
- The NYMEX natural gas August contract dipped more than 5 cents to settle at \$1.779/MMBtu.
- The Mass Hub on-peak August package was valued about 50 cents higher on the day to trade in the high \$20s/MWh.

**PJM/MISO POWER MARKETS**

**PJM/MISO DAY AHEAD POWER PRICES (\$/MWh)**

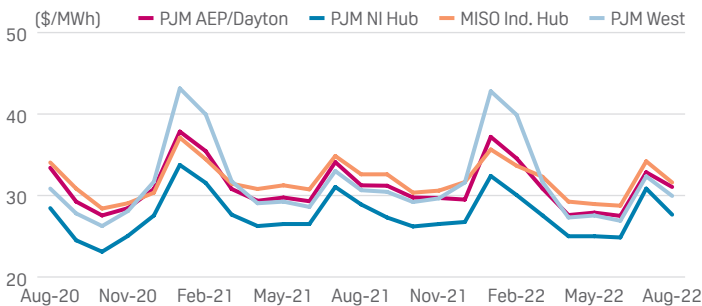
Hub/Index	Symbol	10-Jul	Marginal heat rate	Spark spread		Price change		Prior 7-day Average	Month Min	Month Max	Yearly Change			
				@7K	@12K	Chg	% Chg				Jul-20	Jul-19	Chg	% Chg
<b>On-Peak</b>														
PJM AEP Dayton Hub	IPADM00	36.64	20819	24.32	15.52	-7.79	-17.5	33.01	22.61	48.48	32.53	33.01	-0.48	-1.5
PJM Dominion Hub	IPDMM00	28.73	14885	15.22	5.57	-0.69	-2.3	27.64	22.63	32.79	27.79	32.71	-4.92	-15.0
PJM Eastern Hub	IPEHM00	23.23	13387	11.08	2.41	-8.80	-27.5	29.84	19.18	36.05	27.47	40.99	-13.52	-33.0
PJM Northern Illinois Hub	IPNIM00	25.61	14307	13.08	4.13	-7.14	-21.8	28.91	21.94	37.08	28.39	31.12	-2.73	-8.8
PJM Western Hub	IPWHM00	32.03	18461	19.88	11.21	-7.54	-19.1	32.25	22.71	39.57	31.14	32.13	-0.99	-3.1
MISO Indiana Hub	IMIDM00	31.94	17841	19.41	10.46	-12.21	-27.7	35.80	28.03	44.15	35.11	32.79	2.32	7.1
MISO Minnesota Hub	IMINM00	27.36	15371	14.90	6.00	-7.58	-21.7	30.63	24.11	36.15	30.31	26.99	3.32	12.3
<b>Off-Peak</b>														
PJM AEP Dayton Hub	IPADP00	18.76	10658	6.44	-2.36	-0.21	-1.1	15.50	13.21	18.97	15.76	18.77	-3.01	-16.0
PJM Dominion Hub	IPDMP00	16.48	8540	2.97	-6.68	0.04	0.2	14.56	13.00	16.51	14.81	18.70	-3.89	-20.8
PJM Eastern Hub	IPEHP00	16.37	9435	4.22	-4.45	0.25	1.6	14.41	12.83	16.37	14.54	18.56	-4.02	-21.7
PJM Northern Illinois Hub	IPNIP00	15.56	8691	3.03	-5.92	0.84	5.7	14.37	12.47	16.84	14.60	17.97	-3.37	-18.8
PJM Western Hub	IPWHP00	16.58	9559	4.44	-4.23	0.03	0.2	14.67	13.11	16.66	14.88	18.64	-3.76	-20.2
MISO Indiana Hub	IMIDP00	17.29	9657	4.76	-4.19	-1.64	-8.7	16.74	15.00	18.93	16.81	19.75	-2.94	-14.9
MISO Minnesota Hub	IMINP00	14.07	7906	1.61	-7.29	-0.35	-2.4	14.02	12.43	14.74	13.90	17.06	-3.16	-18.5

**PJM/MISO AVG. DAY-AHEAD/REAL-TIME PEAK PRICE SPREAD**



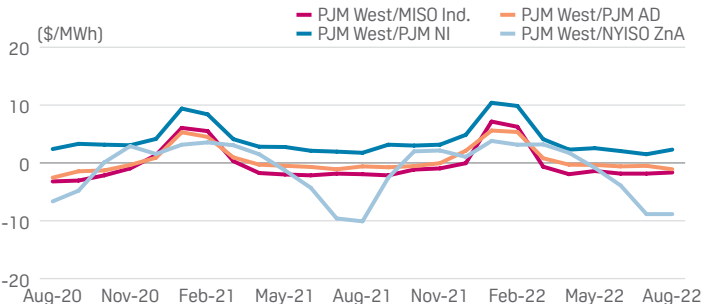
Source: S&P Global Platts

**PJM/MISO PLATTS M2MS FORWARD CURVE: ON-PEAK**



Source: S&P Global Platts

**PJM/MISO PLATTS M2MS LOCATIONAL SPREADS: ON-PEAK**



Source: S&P Global Platts

**PJM spot power prices plummet as demand drops**

- PJM West Hub day-ahead on-peak package traded July 9 in the low \$30s/MWh, over \$7 under the July 8 Intercontinental Exchange settled price.
- AD Hub day-ahead on-peak fell even further, down almost \$12 on the day to trade in the mid \$30s/MWh.

**Demand falling**

- PJM peakload demand is dropping down to 128.2 GW July 10, falling from a year-high of 143.2 GW on July 9.
- PJM MidAtlantic is seeing the largest drop in this time frame, falling over 15%.
- The downtrend is expected to continue through the end of the week.

**Temperatures trending lower**

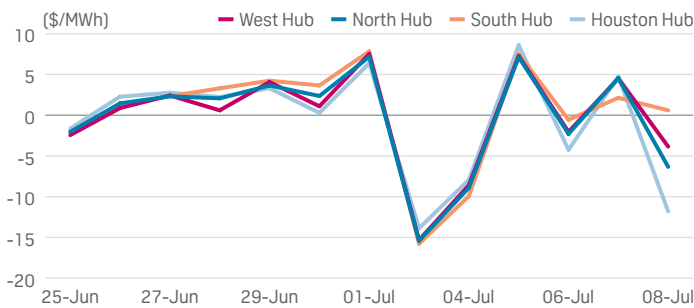
- According to CustomWeather, Pittsburgh high temperatures are forecast to fall to 88 F July 10 from 90 F on July 9.
- This still remains far above the five-day norm of 83 F typically seen for Pittsburgh at this time of the year.

**SOUTHEAST POWER MARKETS**

**SOUTHEAST & CENTRAL DAY-AHEAD POWER PRICES (\$/MWh)**

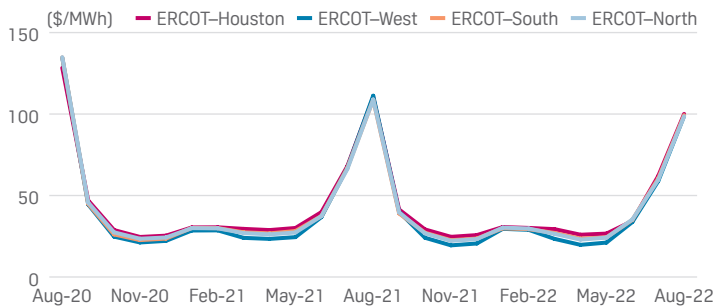
Hub/Index	Symbol	10-Jul	Marginal heat rate	Spark spread		Price change		Prior 7-day Average	Month Min	Month Max	Yearly change			
				@7K	@12K	Chg	% Chg				Jul-20	Jul-19	Chg	% Chg
<b>On-Peak</b>														
MISO Texas Hub	IMTXM00	25.26	14432	13.01	4.26	-2.97	-10.5	21.44	17.64	28.23	22.57	31.31	-8.74	-27.9
MISO Louisiana	IMLAM00	26.15	14570	13.59	4.61	3.95	17.8	19.37	16.54	26.33	21.11	28.95	-7.84	-27.1
SPP North Hub	ISNOM00	30.40	17079	17.94	9.04	4.29	16.4	26.54	22.95	35.91	27.89	28.08	-0.19	-0.7
SPP South Hub	ISSOM00	33.23	19841	21.51	13.13	6.62	24.9	26.16	23.00	39.42	28.68	32.88	-4.20	-12.8
ERCOT Houston Hub	IERHM00	38.65	20782	25.63	16.33	10.05	35.1	28.07	24.52	38.65	30.08	36.85	-6.77	-18.4
ERCOT North Hub	IERNM00	35.00	20001	22.75	14.00	9.55	37.5	26.96	24.19	35.00	28.60	36.70	-8.10	-22.1
ERCOT South Hub	IERSM00	28.06	15501	15.39	6.34	7.82	38.6	23.97	20.24	28.06	24.95	36.41	-11.46	-31.5
ERCOT West Hub	IERWM00	33.82	20623	22.34	14.14	9.98	41.9	26.64	23.84	33.82	28.15	36.27	-8.12	-22.4
<b>Off-Peak</b>														
MISO Texas Hub	IMTXP00	15.12	8641	2.87	-5.88	1.21	8.7	12.72	11.56	15.12	13.32	19.24	-5.92	-30.8
MISO Louisiana	IMLAP00	15.17	8448	2.60	-6.38	0.99	7.0	12.78	11.54	15.17	13.38	18.96	-5.58	-29.4
SPP North Hub	ISNOP00	14.06	7896	1.60	-7.31	0.67	5.0	14.23	10.76	15.81	14.43	12.75	1.68	13.2
SPP South Hub	ISSOP00	13.45	8030	1.73	-6.65	2.62	24.2	13.92	10.83	15.52	14.03	14.39	-0.36	-2.5
ERCOT Houston Hub	IERHP00	12.53	6737	-0.49	-9.79	0.65	5.5	12.77	11.88	13.53	12.82	16.04	-3.22	-20.1
ERCOT North Hub	IERNP00	11.69	6680	-0.56	-9.31	-0.17	-1.4	12.76	11.69	13.69	12.76	15.95	-3.19	-20.0
ERCOT South Hub	IERSP00	13.04	7206	0.37	-8.68	1.37	11.7	12.63	11.67	13.29	12.70	16.08	-3.38	-21.0
ERCOT West Hub	IERWP00	10.47	6381	-1.02	-9.22	-0.48	-4.4	12.72	10.47	14.03	12.63	15.82	-3.19	-20.2

**ERCOT AVG. DAY-AHEAD/REAL-TIME PEAK PRICE SPREAD**



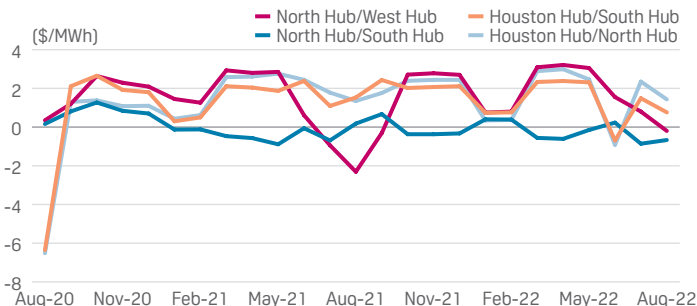
Source: S&P Global Platts

**ERCOT PLATTS M2MS FORWARD CURVE: ON-PEAK**



Source: S&P Global Platts

**ERCOT PLATTS M2MS LOCATIONAL SPREADS: ON-PEAK**



Source: S&P Global Platts

**ERCOT spot power trends higher on bullish fundamentals**

- ERCOT North Hub day-ahead on-peak traded July 9 in the mid-\$30s/MWh, trending about \$5 higher than the July 8 Intercontinental Exchange settled price of \$31/MWh.
- ERCOT North Hub real-time August package fell on the day, dropping down almost \$10 to price in the mid-\$110s/MWh.
- In the Southeast, Into GTC day-ahead on peak package was trading up almost \$3 on the day, right around \$27.00/MWh.

**Demand moving up**

- ERCOT peakload demand is forecast to rise to 72.5 GW on July 10 from 71.7 GW on July 9, according to ERCOT data.
- This is from hotter weather moving in, with Dallas high temperatures hitting 98 F on July 9, according to CustomWeather.

**Supply fundamentals pushing up**

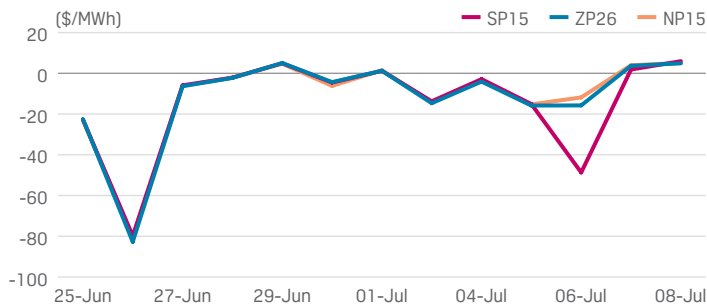
- Natural gas is pricing higher, with Houston Ship Channel hub trading up 9 cents on the day, right around \$1.860/MMBtu.
- Average wind generation is forecast to move down to 12.8 GW on July 10, down from 15.9 GW on July 9, according to ERCOT data.

**WEST POWER MARKETS**

**WESTERN DAY-AHEAD POWER PRICES (\$/MWh)**

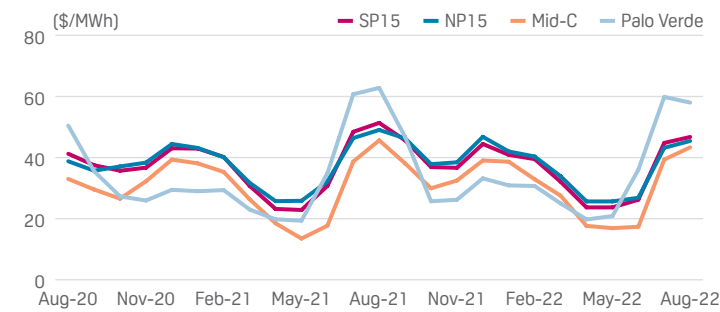
Hub/Index	Symbol	10-Jul	Marginal heat rate	Spark spread		Price change		Prior 7-day Average	Month Min	Month Max	Yearly change			
				@7K	@12K	Chg	% Chg				Jul-20	Jul-19	Chg	% Chg
<b>On-Peak</b>														
NP15	ICNGM00	32.91	12257	14.12	0.69	4.00	13.8	22.41	17.55	32.91	23.47	32.01	-8.54	-26.7
SP15	ICSGM00	43.68	23613	30.73	21.48	12.77	41.3	23.52	17.24	43.68	25.27	33.67	-8.40	-24.9
ZP26	ICZGM00	30.63	16558	17.68	8.43	2.78	10.0	21.77	16.99	30.63	22.66	31.98	-9.32	-29.1
<b>Off-Peak</b>														
NP15	ICNGP00	23.90	8901	5.10	-8.32	1.57	7.0	20.87	19.66	23.90	21.34	26.82	-5.48	-20.4
SP15	ICSGP00	23.95	12945	11.00	1.75	1.53	6.8	21.06	19.71	23.95	21.45	27.23	-5.78	-21.2
ZP26	ICZGP00	23.66	12792	10.71	1.46	1.68	7.6	20.66	19.44	23.66	21.10	27.19	-6.09	-22.4

**CAISO AVG. DAY-AHEAD/REAL-TIME PEAK PRICE SPREAD**



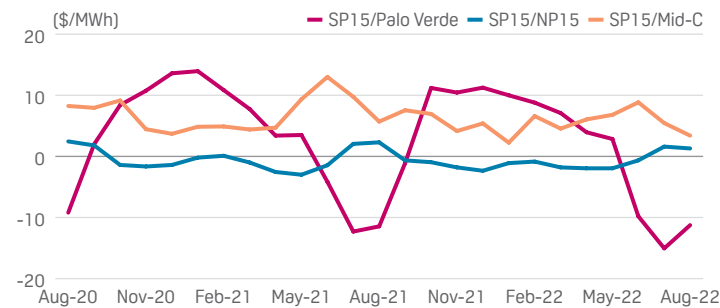
Source: S&P Global Platts

**WESTERN PLATTS M2MS FORWARD CURVE: ON-PEAK**



Source: S&P Global Platts

**WESTERN PLATTS M2MS LOCATIONAL SPREADS: ON-PEAK**



Source: S&P Global Platts

**Southwest spot power prices jump on above-average temperatures**

- US Southwestern power day-ahead jumped double digits across the board on July 9, rising to highest levels since last summer.
- Mona and Four Corners on-peak packages nearly doubled on the Intercontinental Exchange to price in low 70s/MWh, while Mead 230 traded in mid-60s/MWh.
- Palo Verde on-peak rose over \$14 to price near \$54/MWh, and off-peak was up \$5 at \$25/MWh.
- High temperatures in both Las Vegas and Phoenix were forecast to average 110 degrees Fahrenheit over the next few days, pacing well above average, according to CustomWeather.

**California power and gas prices trend up**

- SP15 day-ahead on-peak locational marginal price was valued nearly \$12 higher, to trade just below \$40/MWh.
- SoCal city-gate natural gas hub continued its upward momentum on ICE, gaining 25 cents to price at \$2.250/MMBtu.
- Excessive heat warnings remained in effect for desert parts of Southwest and Southern California, according to the National Weather Service.

## BILATERALS

## SOUTHEAST &amp; CENTRAL DAY-AHEAD BILATERAL INDEXES (\$/MWh)

Hub/Index	Symbol	10-Jul	Marginal heat rate	Spark spread		Price change		Prior 7-day Average	Month Min	Month Max	Yearly change					
				@7K	@12K	Chg	% Chg				Jul-20	Jul-19	Chg	% Chg		
<b>On-Peak</b>																
Florida	AAMAV20	33.75	17532	20.27	10.65	5.25	18.4	28.54	23.75	33.75	28.96	38.94	-9.98	-25.6		
GTC, Into	WAMCJ20	29.75	15995	16.73	7.43	5.44	22.4	23.76	18.48	29.75	24.33	32.00	-7.67	-24.0		
Southern, Into	AAMBJ20	27.89	14995	14.87	5.57	4.89	21.3	22.61	19.00	27.89	23.16	30.38	-7.22	-23.8		
TVA, Into	WEBAB20	30.25	16947	17.76	8.83	2.25	8.0	25.89	22.75	30.25	26.57	31.07	-4.50	-14.5		
VACAR	AAMCI20	29.00	15026	15.49	5.84	2.25	8.4	24.39	21.00	29.00	25.07	31.07	-6.00	-19.3		
<b>Off-Peak</b>																
Florida	AAMAO20	13.50	7013	0.03	-9.60	1.50	12.5	11.93	11.75	13.50	12.25	17.50	-5.25	-30.0		
GTC, Into	WAMCC20	15.00	8065	1.98	-7.32	1.19	8.6	13.58	13.50	15.00	13.86	19.73	-5.87	-29.8		
Southern, Into	AAMBC20	13.50	7258	0.48	-8.82	1.69	14.3	11.87	11.50	13.50	12.21	18.19	-5.98	-32.9		
TVA, Into	AAJER20	14.50	8123	2.00	-6.92	1.75	13.7	12.86	12.50	14.50	13.20	17.52	-4.32	-24.7		
VACAR	AAMCB20	13.75	7124	0.24	-9.41	1.75	14.6	12.11	11.75	13.75	12.45	18.00	-5.55	-30.8		

## WESTERN DAY-AHEAD BILATERAL INDEXES (\$/MWh)

Hub/Index	Symbol	10-Jul	Marginal heat rate	Spark spread		Price change		Prior 7-day Average	Month Min	Month Max	Yearly change					
				@7K	@12K	Chg	% Chg				Jul-20	Jul-19	Chg	% Chg		
<b>On-Peak</b>																
Mid-C	WEABF20	16.50	10092	5.06	-3.12	2.29	16.1	10.51	2.99	16.50	11.84	30.15	-18.31	-60.7		
John Day	WEAHF20	18.50	11315	7.06	-1.12	2.25	13.8	12.50	5.00	18.50	13.83	33.42	-19.59	-58.6		
COB	WEABE20	25.00	15244	13.52	5.32	5.50	28.2	18.42	16.69	25.00	19.88	33.99	-14.11	-41.5		
NOB	WEAIF20	27.00	16514	15.56	7.38	4.63	20.7	19.81	16.64	27.00	21.41	35.71	-14.30	-40.0		
Palo Verde	WEACC20	53.16	23679	37.44	26.22	13.88	35.3	31.92	24.00	53.16	36.64	41.83	-5.19	-12.4		
Mona	AARLQ20	65.00	39275	53.42	45.14	30.00	85.7	28.65	23.60	65.00	36.73	40.27	-3.54	-8.8		
Four Corners	WEABI20	70.00	41543	58.20	49.78	31.50	81.8	33.82	25.75	70.00	41.86	40.99	0.87	2.1		
Pinnacle Peak	WEAKF20	57.00	25390	41.29	30.06	14.00	32.6	33.57	25.25	57.00	38.78	42.95	-4.17	-9.7		
Westwing	WEAJF20	52.75	23497	37.04	25.81	14.00	36.1	31.39	23.50	52.75	36.14	40.07	-3.93	-9.8		
MEAD	AAMBW20	64.15	28575	48.44	37.21	22.60	54.4	35.38	30.17	64.15	41.77	42.39	-0.62	-1.5		
<b>Off-Peak</b>																
Mid-C	WEACL20	6.36	3890	-5.08	-13.26	4.53	247.5	2.32	-3.79	6.36	1.94	22.98	-21.04	-91.6		
John Day	WEAHL20	8.00	4893	-3.44	-11.62	4.50	128.6	4.11	-2.00	8.00	3.70	26.17	-22.47	-85.9		
COB	WEACJ20	8.00	4878	-3.48	-11.68	2.50	45.5	5.67	4.00	8.00	5.83	23.58	-17.75	-75.3		
NOB	WEAIL20	16.86	10312	5.42	-2.76	3.05	22.1	14.47	7.50	17.00	13.64	24.59	-10.95	-44.5		
Palo Verde	WEACT20	25.00	11136	9.29	-1.94	5.00	25.0	21.29	18.25	25.00	21.41	22.38	-0.97	-4.3		
Mona	AARLO20	16.00	9668	4.42	-3.86	1.00	6.7	13.71	12.00	22.00	15.64	23.58	-7.94	-33.7		
Four Corners	WEACR20	23.75	14095	11.96	3.53	5.00	26.7	18.25	15.75	23.75	19.20	21.51	-2.31	-10.7		
Pinnacle Peak	WEAKL20	23.00	10245	7.29	-3.94	5.00	27.8	19.29	16.25	23.00	19.41	23.31	-3.90	-16.7		
Westwing	WEAJL20	25.25	11247	9.53	-1.69	5.00	24.7	21.36	18.25	25.25	21.50	21.56	-0.06	-0.3		
MEAD	AAMBQ20	25.50	11359	9.79	-1.44	4.83	23.4	22.49	19.25	26.00	22.45	23.76	-1.31	-5.5		

Note: Western bilateral indexes reflect Friday-Saturday delivery

## PLATTS M2MS BALANCE-OF-THE-MONTH, JUL 9, (\$/MWh)

	Symbol	On-peak	Symbol	Off-peak		Symbol	On-peak	Symbol	Off-peak
<b>Northeast</b>					<b>Southeast &amp; Central</b>				
Mass Hub	EMHTB00	31.90	EMHUB00	20.75	Southern Into	ESTTB00	38.19	ESTUB00	21.50
N.Y. Zone G	ENGTB00	29.45	ENGUB00	20.35	ERCOT North	ETNTB00	67.00	ETNUB00	25.14
N.Y. Zone J	ENJTB00	32.70	ENJUB00	21.40	ERCOT Houston	ETSTB00	68.49	ETSUB00	25.29
N.Y. Zone A	ENATB00	45.85	ENaub00	20.75	ERCOT West	ETWTB00	66.45	ETWUB00	24.39
Ontario*	EONTB00	45.00	EONUB00	17.00	ERCOT South	ETHTB00	67.98	ETHUB00	24.95
<b>PJM &amp; MISO</b>					<b>Western</b>				
PJM West	EPJTB00	39.60	EPJUB00	19.75	Mid-C	EMCTB00	24.15	EMCUB00	12.00
AD Hub	EECTB00	41.85	EECUB00	20.15	Palo Verde	EPVTB00	48.40	EPVUB00	25.55
NI Hub	ECETB00	39.90	ECEUB00	19.00	Mead	EMDTB00	51.04	EMDUB00	26.75
Indiana Hub	ECITB00	41.60	ECIUB00	21.45	NP15	ENPTB00	33.90	ENPUB00	25.55
					SP15	ESPTB00	36.90	ES PUB00	26.05

\*Ontario prices are in Canadian dollars

**HOURLY INDICES**

**SYSTEM-WIDE CALIFORNIA ISO RENEWABLE GENERATION CURTAILMENTS (MW), JULY 08**

Solar			
		Current	Previous
Peak	CAICA00	357.89	607.69
Off-Peak	CAICB00	0.00	0.00
24-Hour	CAICC00	357.89	607.69
Wind			
		Current	Previous
Peak	CAICD00	0.42	14.23
Off-Peak	CAICE00	0.00	0.00
24-Hour	CAICF00	0.42	14.23
Combined Solar and Wind			
		Current	Previous
Peak	CAICG00	440.20	825.81
Off-Peak	CAICH00	0.00	0.00
24-Hour	CAICIO0	440.20	825.81

**Curtailement by Hour**

Hour	Solar	Wind	Combined
1	0.00	0.00	0.00
2	0.00	0.00	0.00
3	0.00	0.00	0.00
4	0.00	0.00	0.00
5	0.00	0.00	0.00
6	0.00	0.00	0.00
7	2.38	0.00	7.59
8	22.36	0.00	31.77
9	56.60	0.42	71.68
10	33.60	0.00	39.21
11	30.40	0.00	34.78
12	47.52	0.00	53.80
13	35.22	0.00	40.08
14	33.38	0.00	38.66
15	31.91	0.00	37.89
16	26.43	0.00	32.51
17	21.44	0.00	27.60
18	11.04	0.00	15.10
19	5.61	0.00	9.23
20	0.00	0.00	0.00
21	0.00	0.00	0.30
22	0.00	0.00	0.00
23	0.00	0.00	0.00
24	0.00	0.00	0.00

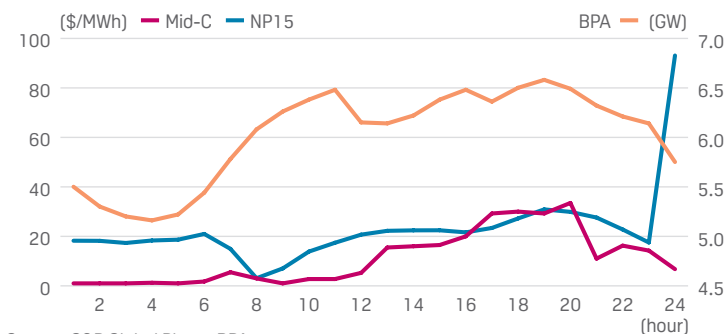
**JULY 2020 HOURLY WEIGHTINGS (%)**

Hour	Solar	Wind	Combined
1	0.00	0.13	0.13
2	0.00	0.13	0.13
3	0.00	0.14	0.14
4	0.00	0.13	0.13
5	0.00	0.13	0.13
6	0.00	0.11	0.11
7	0.04	0.10	0.14
8	0.19	0.08	0.28
9	0.31	0.07	0.38
10	0.35	0.06	0.40
11	0.36	0.05	0.41
12	0.37	0.05	0.41
13	0.36	0.05	0.40
14	0.34	0.05	0.39
15	0.32	0.06	0.38
16	0.29	0.07	0.36
17	0.26	0.08	0.34
18	0.22	0.08	0.30
19	0.13	0.08	0.21
20	0.03	0.09	0.12
21	0.00	0.10	0.10
22	0.00	0.10	0.10
23	0.00	0.11	0.11
24	0.00	0.12	0.12

**MID-C HOURLY BILATERAL INDEXES (\$/MWh)**

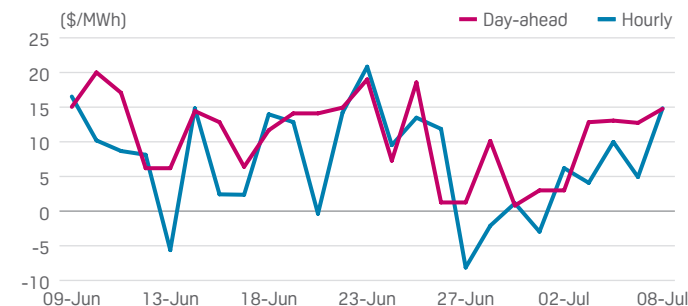
On-peak	Symbol	08-Jul	Range	Deals	Volume (MW)	
On-peak	MCRTPO0	14.84	1.00-33.50	79	3834	
Off-peak	MCRT000	3.50	1.00-14.25	16	666	
Hour	Symbol	08-Jul	Range	Deals	Volume (MW)	Jul-20
<b>ending</b>						
1	MCRTH01	1.00	1.00-1.00	1	25	-0.50
2	MCRTH02	1.00	1.00-1.00	3	175	-1.06
3	MCRTH03	1.00	1.00-1.00	2	150	-1.56
4	MCRTH04	1.25	1.00-2.00	2	123	-1.03
5	MCRTH05	1.00	1.00-2.00	2	170	-1.72
6	MCRTH06	1.75	-2.00-2.00	4	194	-1.47
7	MCRTH07	5.50	-2.00-10.00	3	64	1.44
8	MCRTH08	3.00	-2.00-10.00	4	138	1.31
9	MCRTH09	1.00	-2.00-2.00	6	306	3.13
10	MCRTH10	2.75	0.00-7.00	8	324	4.25
11	MCRTH11	2.75	1.00-5.00	6	223	5.06
12	MCRTH12	5.25	5.00-10.00	3	107	6.84
13	MCRTH13	15.50	10.00-17.00	3	217	9.69
14	MCRTH14	16.00	15.00-19.00	3	235	11.44
15	MCRTH15	16.50	15.00-20.00	4	265	11.75
16	MCRTH16	20.00	15.00-38.00	5	270	12.06
17	MCRTH17	29.25	15.00-40.00	6	395	13.88
18	MCRTH18	30.00	15.00-38.00	8	495	14.03
19	MCRTH19	29.25	15.00-38.00	7	423	13.41
20	MCRTH20	33.50	15.00-38.00	3	124	13.50
21	MCRTH21	11.00	10.00-12.00	3	55	8.56
22	MCRTH22	16.25	10.00-25.00	7	193	8.78
23	MCRTH23	14.25	10.00-18.00	5	139	8.31
24	MCRTH24	6.75	6.00-10.00	2	15	6.41

**MID-C AND NP15 HOURLY PRICES vs BPA HOURLY DEMAND**



Source: S&P Global Platts, BPA

**MID-C DAY-AHEAD/HOURLY ON-PEAK PRICE COMPARISON**



Source: S&P Global Platts

**PLATTS M2MS FORWARD CURVE, JUL 9 (\$/MWh)**

Prompt month: Aug 20

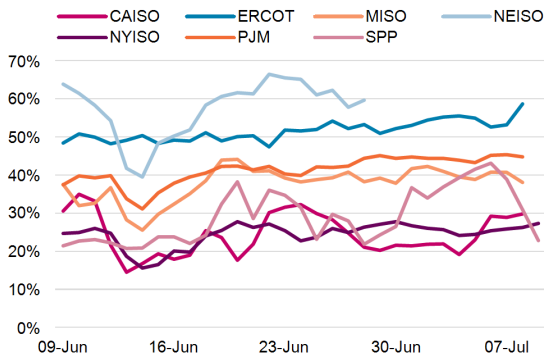
	On-peak	Off-peak		On-peak	Off-peak
<b>Northeast</b>					
Mass Hub	28.00	20.20			
N.Y. Zone G	27.95	19.25			
N.Y. Zone J	30.95	20.00			
N.Y. Zone A	37.50	20.20			
Ontario*	25.38	11.67			
*Ontario prices are in Canadian dollars					
<b>PJM &amp; MISO</b>					
PJM West	30.85	18.95			
AD Hub	33.40	19.60			
NI Hub	28.45	17.50			
Indiana Hub	34.05	20.40			
<b>Southeast &amp; Central</b>					
Southern Into			32.02	20.50	
ERCOT North			134.90	35.80	
ERCOT Houston			128.38	36.30	
ERCOT West			134.55	36.00	
ERCOT South			134.74	35.48	
<b>Western</b>					
Mid-C			33.00	22.65	
Palo Verde			50.45	24.75	
Mead			53.25	25.90	
NP15			38.80	26.30	
SP15			41.25	27.75	

**ISO DAY-AHEAD LMP BREAKDOWN FOR JUL 10 (\$/MWh)**

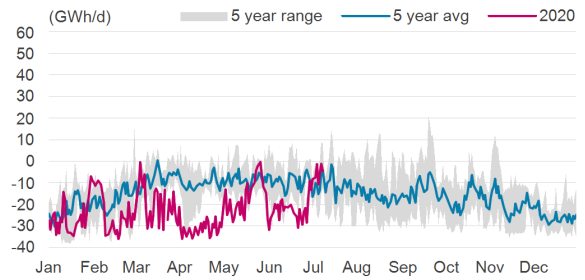
Hub/Zone	Average	Cong	Loss	Change	Avg \$/Mo	Marginal heat rate		Average	Cong	Loss	Change	Avg \$/Mo	Marginal heat rate
<b>Northeast</b>													
<b>On-peak</b>							<b>Off-Peak</b>						
ISONE Internal Hub	22.63	0.00	0.03	-8.48	22.65	13589	ISONE Internal Hub	16.53	0.00	0.04	0.16	15.22	9925
ISONE Connecticut	22.37	0.00	-0.23	-8.31	22.37	11805	ISONE Connecticut	16.21	0.00	-0.28	0.17	14.92	8553
ISONE NE Mass-Boston	22.58	0.00	-0.01	-8.36	22.65	13563	ISONE NE Mass-Boston	16.52	0.00	0.04	0.14	15.29	9923
NYISO Capital Zone	25.24	0.00	1.11	-4.28	24.34	14466	NYISO Capital Zone	17.51	0.00	1.15	0.43	15.38	10032
NYISO Hudson Valley Zone	26.11	0.00	1.98	-3.63	25.02	13780	NYISO Hudson Valley Zone	17.77	0.00	1.42	0.46	15.69	9379
NYISO N.Y.C. Zone	29.04	-2.20	2.71	-3.39	26.81	16640	NYISO N.Y.C. Zone	18.44	-0.25	1.84	0.45	16.09	10569
NYISO West Zone	52.25	-26.13	1.99	3.43	34.39	37865	NYISO West Zone	17.80	-0.39	1.06	1.19	14.73	12901
<b>PJM &amp; MISO</b>													
<b>On-peak</b>							<b>Off-Peak</b>						
PJM AEP-Dayton Hub	36.64	6.86	0.31	-7.79	32.53	20819	PJM AEP-Dayton Hub	18.76	1.53	0.49	-0.21	15.76	10658
PJM Dominion Hub	28.73	0.41	-1.15	-0.69	27.79	14885	PJM Dominion Hub	16.48	0.03	-0.28	0.04	14.81	8540
PJM Eastern Hub	23.23	-6.72	0.48	-8.80	27.47	13387	PJM Eastern Hub	16.37	-0.05	-0.32	0.25	14.54	9435
PJM Northern Illinois Hub	25.61	-3.65	-0.20	-7.14	28.39	14307	PJM Northern Illinois Hub	15.56	-1.55	0.36	0.84	14.60	8691
PJM Western Hub	32.03	2.64	-0.07	-7.54	31.14	18461	PJM Western Hub	16.58	0.15	-0.30	0.03	14.88	9559
MISO Indiana Hub	31.94	-0.46	0.48	-12.21	35.11	17841	MISO Indiana Hub	17.29	0.08	0.45	-1.64	16.81	9657
MISO Minnesota Hub	27.36	-2.79	-1.77	-7.58	30.31	15371	MISO Minnesota Hub	14.07	-1.61	-1.08	-0.35	13.90	7906
MISO Louisiana Hub	26.15	-4.48	-1.28	3.95	21.11	14570	MISO Louisiana Hub	15.17	-1.09	-0.51	0.99	13.38	8448
MISO Texas Hub	25.26	-6.03	-0.63	-2.97	22.57	14432	MISO Texas Hub	15.12	-1.18	-0.46	1.21	13.32	8641
<b>Southeast &amp; Central</b>													
<b>On-peak</b>							<b>Off-Peak</b>						
SPP North Hub	30.40	-1.83	0.65	4.29	27.89	17079	SPP North Hub	14.06	-0.08	0.34	0.67	14.43	7896
SPP South Hub	33.23	1.85	-0.19	6.62	28.68	19841	SPP South Hub	13.45	0.05	-0.39	2.62	14.03	8030
ERCOT Houston Hub	38.65	-	-	10.05	30.08	20782	ERCOT Houston Hub	12.53	-	-	0.65	12.82	6737
ERCOT North Hub	35.00	-	-	9.55	28.60	20001	ERCOT North Hub	11.69	-	-	-0.17	12.76	6680
ERCOT South Hub	28.06	-	-	7.82	24.95	15501	ERCOT South Hub	13.04	-	-	1.37	12.70	7206
ERCOT West Hub	33.82	-	-	9.98	28.15	20623	ERCOT West Hub	10.47	-	-	-0.48	12.63	6381
<b>Western</b>													
<b>On-peak</b>							<b>Off-Peak</b>						
CAISO NP15 Gen Hub	32.91	-6.45	-1.45	4.00	23.47	12257	CAISO NP15 Gen Hub	23.90	0.00	-0.75	1.57	21.34	8901
CAISO SP15 Gen Hub	43.68	4.41	-1.54	12.77	25.27	23613	CAISO SP15 Gen Hub	23.95	0.00	-0.71	1.53	21.45	12945
CAISO ZP26 Gen Hub	30.63	-7.86	-2.32	2.78	22.66	16558	CAISO ZP26 Gen Hub	23.66	0.00	-0.99	1.68	21.10	12792

**US POWER FUNDAMENTALS**

**GAS GEN MARKET SHARE BY ISO**

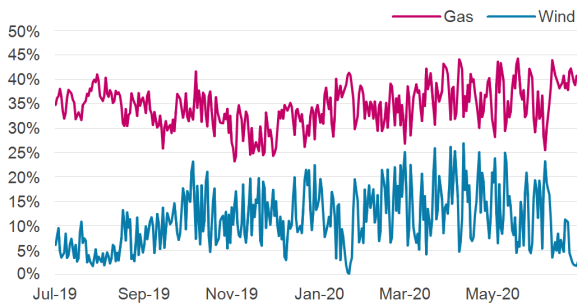


**ISONE-NYISO INTERTIE TRANSMISSION E-W**



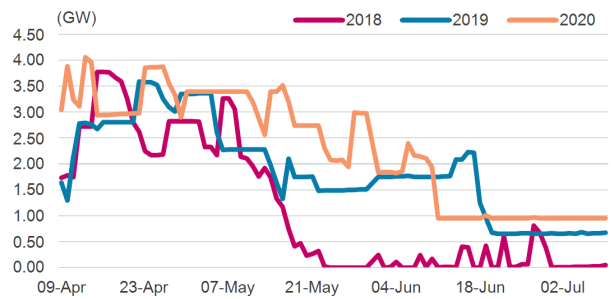
Source: ISONE

**MISO GENERATION MARKET SHARE - GAS VS. WIND**



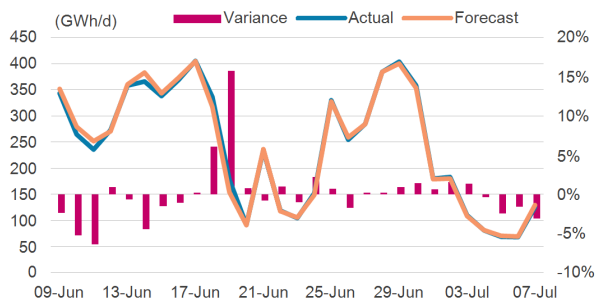
Source: S&P Global Platts Analytics

**ISONE & NYISO NUCLEAR GENERATION OUTAGES**



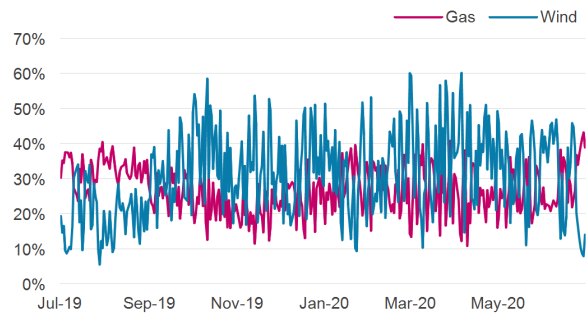
Source: NRC

**SPP ACTUAL WIND GENERATION VS. FORECAST**



Source: SPP

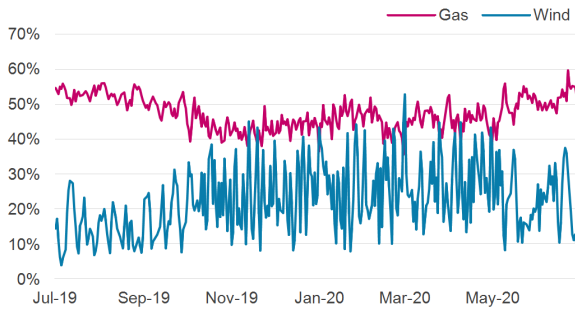
**SPP GENERATION MARKET SHARE - GAS VS. WIND**



Source: S&P Global Platts Analytics

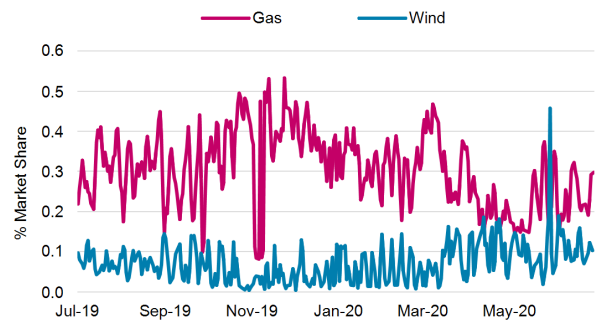
US POWER FUNDAMENTALS

ERCOT GENERATION MARKET SHARE - GAS VS. WIND

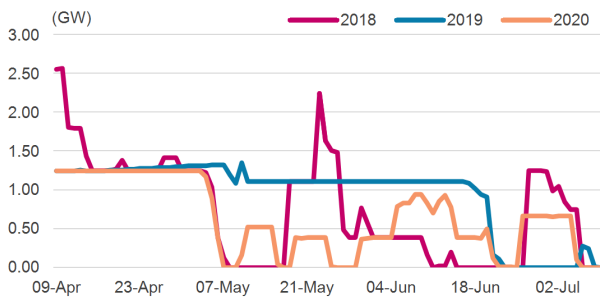


Source: S&P Global Platts Analytics

CAISO GENERATION MARKET SHARE

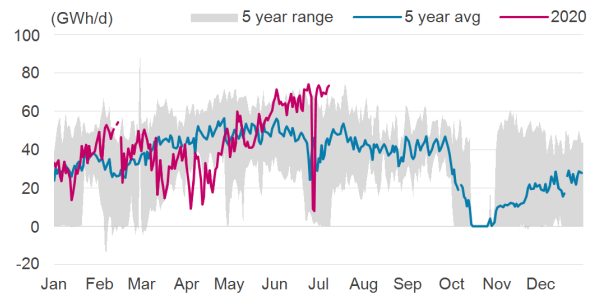


WESTERN NUCLEAR GENERATION OUTAGES



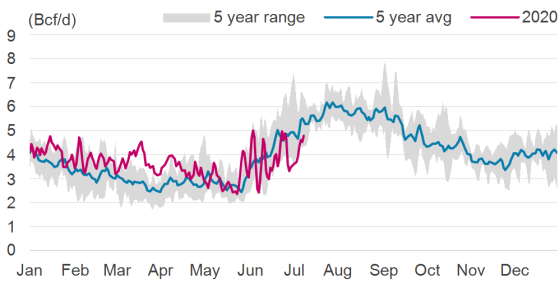
Source: NRC

BPA DC LINE TRANSMISSION FLOWS N-S



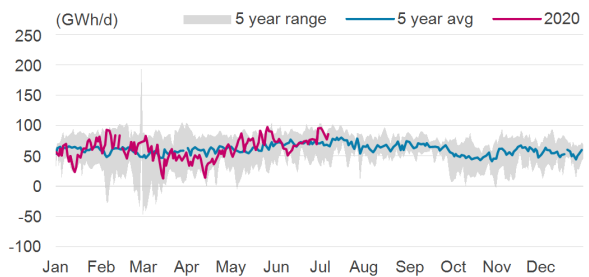
Source: BPA

WEST REGION GAS DEMAND FROM POWER GEN



Source: S&P Global Platts Analytics

BPA AC LINE TRANSMISSION FLOWS N-S



Source: BPA