MAY 2024

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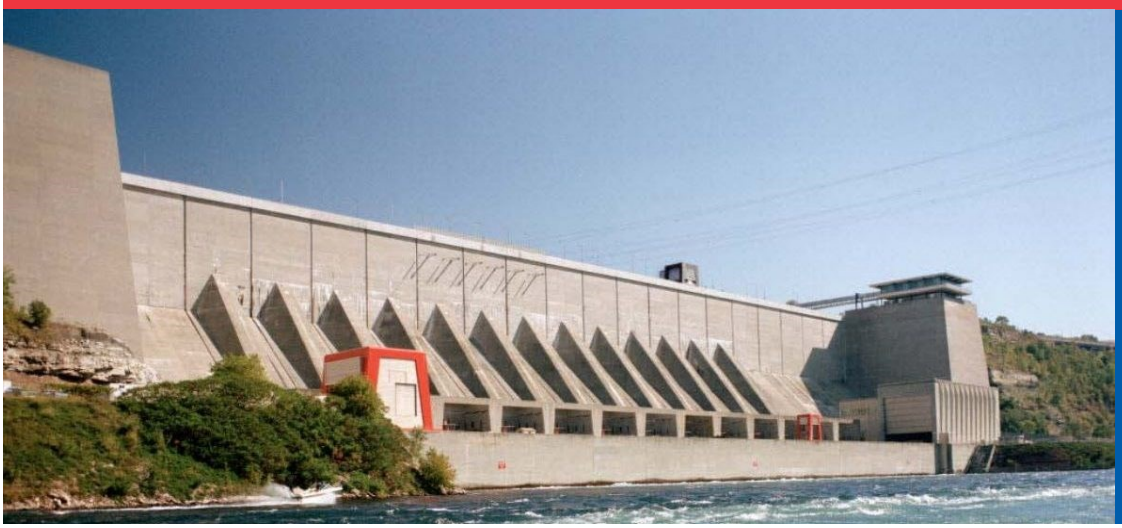

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U.S. Hydropower Generation Expected to Increase by 6% in 2024

This year, the U.S. Energy Information Administration expects hydropower generation to increase 6% and account for 250 billion kWh, based on forecasts in its Short-Term Energy Outlook (STEO). EIA said it expects hydropower to increase in nearly every part of the country, with notable increases in the southeast and northwest and Rockies. This contrasts with last year, when U.S. hydropower generation fell to its lowest since 2001.

More hydropower is generated in the northwest and Rockies than any other region of the U.S. In 2023, 43% of all U.S. hydropower generation occurred in this region. However, last year's hydropower output was the region's lowest since at least 2010. Water supply, particularly in Washington and Oregon, was affected by a May heatwave that quickly melted the snowpack and reduced water supply for the rest of the year. On April 4, the National Oceanic and Atmospheric Administration's Northwest River Forecast Center (NWRFC) released its latest water supply forecast for the Pacific Northwest, which is part of the larger northwest and Rockies region. The NWRFC forecasts normal to more-than-normal water supply in the southern part of the region, around the Snake River Basin, and normal to less-than-normal water supply in the northern part by the Upper Columbia River Basin.

Because water supply and subsequent hydropower generation can vary widely from year to year, EIA uses these NWRFC forecasts as inputs to the STEO model. EIA expects 106 billion kWh of hydropower this year to be produced in the northwest and Rockies, or 3% more than in 2023. EIA expects hydropower to account for 29% of the northwest and Rockies region's electricity generation this year, and the increased output from hydropower resources and non-hydro renewables will reduce generation from natural gas and coal.

The largest regional increase in hydropower this year comes from the southeast region, defined as the SERC Reliability Corporation. EIA expects hydropower generation in the southeast to increase by 4 billion kWh this year compared with last year. This region includes Alabama, Tennessee and North Carolina, which combined account for about 10% of total hydropower generating capacity in the U.S. EIA expects hydropower to account for 5% of electricity generation in the southeast in 2024. Natural gas and nuclear are the two largest sources of electricity generation in the southeast, and EIA expects both to increase in 2024. In particular, nuclear generation will increase after the Vogtle Unit 4 generator in Georgia starts providing power to the grid during the second quarter of 2024. EIA expects these increases in natural gas, nuclear and hydropower to reduce the use of coal for electricity generation in the region. Please click here to read the entire article.

Nickel/Cobalt & Stainless-Steel Flat Rolled Surcharges

--	Feb '24	Mar '24	Apr '24	May '24	Jun '24	Jul '24
15-5	0.8570	0.8493	0.8714	0.8962	*	*
17-4	0.8689	0.8610	0.8836	0.9092	*	*
17-7	0.8720	0.8644	0.9023	0.9191	*	*
201	0.6299	0.6262	0.6347	0.6521	*	*
301 7.0%	0.8536	0.8460	0.8815	0.8978	*	*
302/304/304L	0.9316	0.9234	0.9647	0.9847	*	*
304-8.5%	0.9647	0.9563	1.0044	1.0218	*	*
305	1.2031	1.1927	1.2696	1.2874	*	*
309	1.2437	1.2335	1.3112	1.3324	*	*
310	1.7319	1.7177	1.8533	1.8765	*	*
316/316L	1.4454	1.4281	1.5034	1.5068	*	*
321	0.9860	0.9772	1.0292	1.0456	*	*
347	1.2954	1.2867	1.3388	1.3552	*	*
409/409 Mod	0.3157	0.3118	0.2885	0.2988	*	*
410/410S	0.3248	0.3209	0.2977	0.3088	*	*
430	0.3769	0.3733	0.3513	0.3666	*	*
439	0.3879	0.3843	0.3628	0.3791	*	*
263	7.9101	7.5289	7.4378	7.1872	7.2037	7.5222
276	9.0944	8.2179	8.2185	8.3632	8.4690	8.8325
A286	2.5129	2.3167	2.2714	2.2421	2.2549	2.3887
600	6.0518	5.5351	5.2968	5.1756	5.2453	5.7004
601	5.0475	4.6399	4.4546	4.3571	4.4003	4.7578
617	8.1737	7.6002	7.5183	7.4124	7.4565	7.8179
625	8.9962	8.3243	8.2410	8.2697	8.3298	8.7005
718	7.8114	7.3599	7.2377	7.1970	7.2408	7.5559
X-750	6.4649	5.9800	5.7573	5.6430	5.7073	6.1339
800	2.7867	2.5825	2.4995	2.4442	2.4550	2.6283
825	4.3011	3.9414	3.8727	3.8560	3.8810	4.1142
Alloy X	6.2032	5.6145	5.5787	5.6251	5.6762	5.9659
188	8.8538	9.0730	8.8891	8.2433	8.2733	8.4554
L-605	9.0231	9.4004	9.2428	8.4775	8.4870	8.6063

*Surcharge currently not available

Thin Gauge Stainless Steel and Nickel Alloy Surcharges

--	Feb '24	Mar '24	Apr '24	May '24	June '24	Jul '24
301 7%	1.0243	1.0152	1.0578	1.0773	*	*
302/304/304L	1.1179	1.1081	1.1609	1.1816	*	*
304 8.5%	1.1577	1.1475	1.2053	1.2261	*	*
305	1.4437	1.4313	1.5235	1.5449	*	*
316L	1.7345	1.7137	1.8042	1.8082	*	*
321	1.1832	1.1727	1.2351	1.2547	*	*
347	1.5545	1.5441	1.6066	1.6262	*	*
201	9.0716	8.2428	7.8586	7.6654	7.8060	8.5373
600	7.2622	6.6421	6.3562	6.2108	6.2943	6.8405
625	10.7954	9.9892	9.8893	9.9237	9.9958	10.4406
625LCF	10.7954	9.9892	9.8893	9.9237	9.9958	10.4406
718	9.3736	8.8320	8.6852	8.6365	8.6889	9.0671
Alloy X	7.4439	6.7374	6.6944	6.7502	6.8115	7.1591
X750	7.7578	7.1760	6.9087	6.7716	6.8487	7.3607

*Surcharge currently not available

Nickel/Cobalt & Stainless-Steel Bar Surcharges

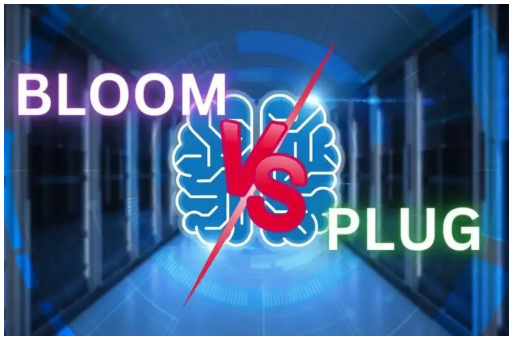
	Dec '23	Jan '24	Feb '24	Mar '24	Apr '24	May '24
316LS/316LVM	2.19	2.25	2.26	2.27	2.36	2.43
Custom 455	1.31	1.33	1.29	1.30	1.34	1.41
Custom 465	1.83	1.85	1.83	1.84	1.91	2.00
Custom 630	0.98	1.01	0.98	0.99	1.01	1.05
CCM	10.76	10.16	12.30	12.30	11.93	11.81
625	8.62	8.69	8.84	8.86	9.31	9.67
718	6.75	6.71	6.70	6.69	7.06	7.37
718CR	6.75	6.71	6.70	6.69	7.06	7.37
A286	3.28	3.27	3.25	3.27	3.44	3.62
A2861	3.28	3.27	3.25	3.27	3.44	3.62
A2862	3.28	3.27	3.25	3.27	3.44	3.62
A2867	3.28	3.27	3.25	3.27	3.44	3.62
A286R1	3.28	3.27	3.25	3.27	3.44	3.62
A286SH	3.28	3.27	3.25	3.27	3.44	3.62
Alloy X	7.00	7.11	7.32	7.37	7.70	7.99
Wasp6	8.33	8.16	8.58	8.64	8.98	9.28
L605	11.59	10.95	12.46	12.54	12.40	12.35
321	1.46	1.47	1.43	1.44	1.50	1.56
347	1.46	1.47	1.43	1.45	1.50	1.56
Greek Ascoloy	1.32	1.34	1.32	1.33	1.34	1.35

*Surcharge currently not available

Titanium Surcharges

Form	Grade	Q1 2024 Surcharge	Q2 2024 Surcharge
TI - SHEET	6AL4V	8.23	7.82
TI - PLATE	6AL4V	8.08	6.52
TI - PLATE	6AL4VE	7.28	4.18
TI - COIL	GR 2	8.70	8.92
TI - COIL	GR 3	8.70	8.92
TI - COIL	GR 4	8.70	8.92
TI - SHEET	GR 2	8.70	8.92
TI - SHEET	GR 3	8.70	8.92
TI - SHEET	GR 4	8.70	8.92
TI - BAR	6AL4V	5.45	6.02
TI - BAR	6AL4VE	5.45	6.02

Bloom Energy vs. Plug Power– The Rising Stars in AI Data Center Power Supply



In the race towards clean energy and technological advancement, two significant players stand as front-runners in the fuel cell arena—Bloom Energy and Plug Power. Amidst the rising interest in AI data centers, both companies present themselves not only as parts of the sustainable energy movement but also as potential key suppliers of the massive electrical demand these data centers will entail.

Bloom Energy has charted its course in the fuel cell market with solid oxide fuel cells, typically powered by natural gas. This technology, which does not require an expensive catalyst and operates at admirably high temperatures, finds its niche in stationary and backup power generation. In 2019, Bloom ventured into the hydrogen fuel space by announcing that its Energy Servers could be adapted to run on hydrogen, positioning the company to produce electrolyzers for renewable hydrogen as well.

On the other side of the spectrum, Plug Power specializes in proton exchange membrane (PEM) fuel cells that function entirely on hydrogen. These cells, requiring a costly catalyst like platinum, operate at lower temperatures and are quick to start or stop. These characteristics make them ideal for transportation applications such as forklifts and vehicles, representing a divergence from Bloom's clime. Bloom Energy's foray into the hydrogen market came with the introduction of systems capable of running on hydrogen. This innovation has led to Bloom providing 250-kilowatt Energy Servers—enough to power a significant retail establishment with sustainable energy—while heralding a compact and space-efficient design.

Green hydrogen has gained prominence as a worldwide decarbonization strategy, but its application in data centers remains nascent. Yet, both Bloom and Plug Power are seizing the opportunities in these emerging markets. Bloom's commitment to low-carbon power generation makes it a compelling option for AI data centers seeking grid-independent solutions. With the projected boom in electricity demand driven by high-powered AI, Bloom Energy is poised as a stealthy contender in supplying the vital power to meet these demands.

Plug Power has signaled a more distant, yet definitive, entry into the AI data center realm. CEO Andrew Marsh announced that by the latter half of 2025, deployments of Plug's green hydrogen fuel cell systems as backup power options for data centers could begin in earnest. The anticipated surge in demand for zero-carbon hydrogen energy resonates with the objectives of major industry leaders like Amazon, Microsoft, Google, and even Tesla, as they shift away from diesel and towards sustainability.

Bloom Energy and Plug Power, through their differing means but similar ends, are expected to become integral parts of the AI data center ecosystem. Their technologies promise a future where clean energy seamlessly integrates with cutting-edge AI advancements. Looking ahead, both companies are worth watching as they work towards realizing the full potential of hydrogen and fuel cells in powering the data-driven world of tomorrow. Read the article here.

Honeywell Wins Contract to Develop Hydrogen Fuel Cell Power System for U.S Army Soldiers

Honeywell has won a contract from General Technical Services for the development of a hydrogen fuel cell system that will power a multitude of electronic devices carried by soldiers. Weighing roughly half as much as commonly used batteries, the system will deliver the same power foot soldiers need.

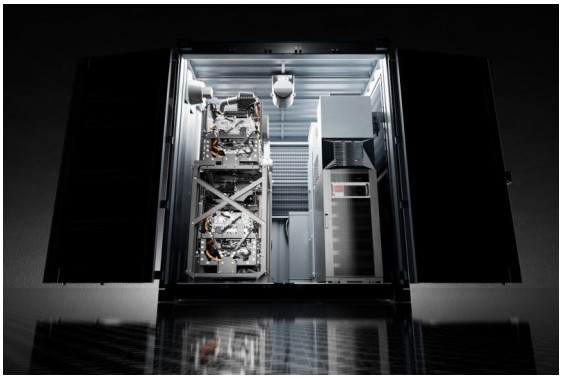
The fuel cell complements a suite of power technologies that the U.S. Army is evaluating and maturing, and it will enable a soldier to perform his or her mission without the need to carry multiple heavy batteries or be resupplied regularly. This announcement supports Honeywell's alignment with the compelling megatrend of energy transition.

"Today, a myriad of electronic devices, such as radios, computers, sensors and other mission-critical equipment, support soldiers on foot. All of this requires power, so the soldiers carry up to 45 pounds of batteries for an extended mission," said Phil Robinson, senior director Engineering, Honeywell Aerospace Technologies. "Honeywell's reliable and proven hydrogen fuel cell power system, when combined with a soldier's power distribution and management system, lowers the weight burden, making soldiers more effective, and that can save lives."

Honeywell's small fuel cell will be used on the move to charge batteries and power equipment, reducing the number of spare batteries needed by the soldier or squad. Additionally, the system is designed to complement standard electronic equipment a U.S. soldier already uses.

The hydrogen fuel cell system prototypes take advantage of Honeywell's proven Proton Exchange Membrane fuel cell technology, which is used in unmanned aerial systems (UAS) in commercial and defense applications. Read the full article here.

Kohler and Toyota Partner on Hydrogen Fuel Cell for U.S. Hospital



Kohler Power Systems, part of Kohler Energy, has collaborated with Toyota Motor North America to develop and install a hydrogen fuel cell power generation system at the Klickitat Valley Health in Goldendale, Washington.

The fuel cell power system, which combines Kohler's power generation control platform and system integration expertise with a fuel cell module from Toyota, can be used as a prime or back-up power source or as part of a distributed network.

Klickitat Valley Health (KVH) is a hospital that serves as the principal medical center for over 10,000 people in their district. The hospital previously announced plans to reinforce their electrical infrastructure including backup and secondary power generation that included a hydrogen fuel cell to ensure uninterrupted operations.

According to Ben Crawford, business development manager, Kohler Energy and Richard Ferguson, new markets manager, business development, Fuel Cell Solutions at Toyota Motor North America, this type of solution was a good fit for KVH.

"For installations such as healthcare facilities, resiliency is critical…The KOHLER Fuel Cell System features a Toyota Solid Polymer Electrolyte Membrane (PEM) fuel cell for high-efficiency energy conversion, and the system has been designed for fast start-up and exceptional transient handling. "Kohler provides one-source responsibility for the generating system and accessories, with the fuel cell unit being prototype-tested and factory-built within Kohler facilities. This approach results in a highly optimized and scalable solution that is built to last."

Toyota has consolidated various components from a second-generation Toyota Mirai passenger vehicle fuel cell system into a single, compact fuel cell module. The newly created module includes the second generation's improved fuel cell stack and the elements responsible for the generation of electricity (air containing oxygen and the gaseous hydrogen fuel), system cooling, and on-board power control. "Toyota has been exploring various applications of our fuel cell technology and this opportunity with Kohler highlights the decarbonization opportunities that hydrogen as a fuel can provide for customers," said Chris Yang, Group vice president, Business Development, Toyota. "Our fuel cell technology can be scaled and used to power a wide variety of products beyond transportation, and it does so without any emissions except water." Read the full article here.

UPM Industry Focus: Alternative Energy with Sam Harkavy

Sourcing energy in new ways has been one of humanity's missions for several decades and there are a number of solutions that have been developed. Solar, wind, and hydroelectric have all been explored as alternative options to traditional energy sources and UPM is dedicated to serving innovative companies who want to make the world a cleaner place. To learn more about how UPM plays a role in the alternative energy industry, we spoke with Sam Harkavy, Business Development Manager for Alternative Energy.

Harkavy was attracted to UPM because of his past experience working in automotive manufacturing and the fact that UPM is a supplier of specialty grade raw materials. "UPM doesn't deal in commodities; it's high grade specialty metals that can be a challenge to source." When asked about his role as the alternative energy manager, Harkavy stated, "I wanted to take on the challenge of helping companies dedicated to helping the environment. This industry is a newer part of UPM and offered me the opportunity to make my mark at UPM and find some altruism in the work I do."

United Performance Metals stocks a wide array of specialty alloys and metals, and Harkavy gave some insight as to which materials are heavily utilized for alternative energy applications. "It's tough to define which materials are used most prominently in the alternative energy space as every company is different, but I would say that stainless steel, nickel (625), and titanium are pretty popular. Since there are so many sub-industries within alternative energy, a number of materials we stock can have a number of applications in the field." Harkavy mentioned that one example of an application of UPM metals to the alternative energy industry is the use of stainless steel or nickel for bipolar plates in hydrogen fuel cells.

Many exciting developments are happening in the alternative energy world, one being hydrogen fuel cells. On this topic, Harkavy said, "The interesting thing about them is that they are 100 year-old technology. They work by converting hydrogen fuel into energy, storing the energy in a cell, and utilizing that energy to power things everywhere. Fuel cells are decentralized so you can power things anywhere and you can have multiple of them." Harkavy is passionate about immersing himself in the alternative energy industry and determining new ways in which UPM can serve companies committed to providing cleaner, more affordable, and more reliable sources of energy. Please visit this web page if you'd like to learn more about UPM and the industries we serve.