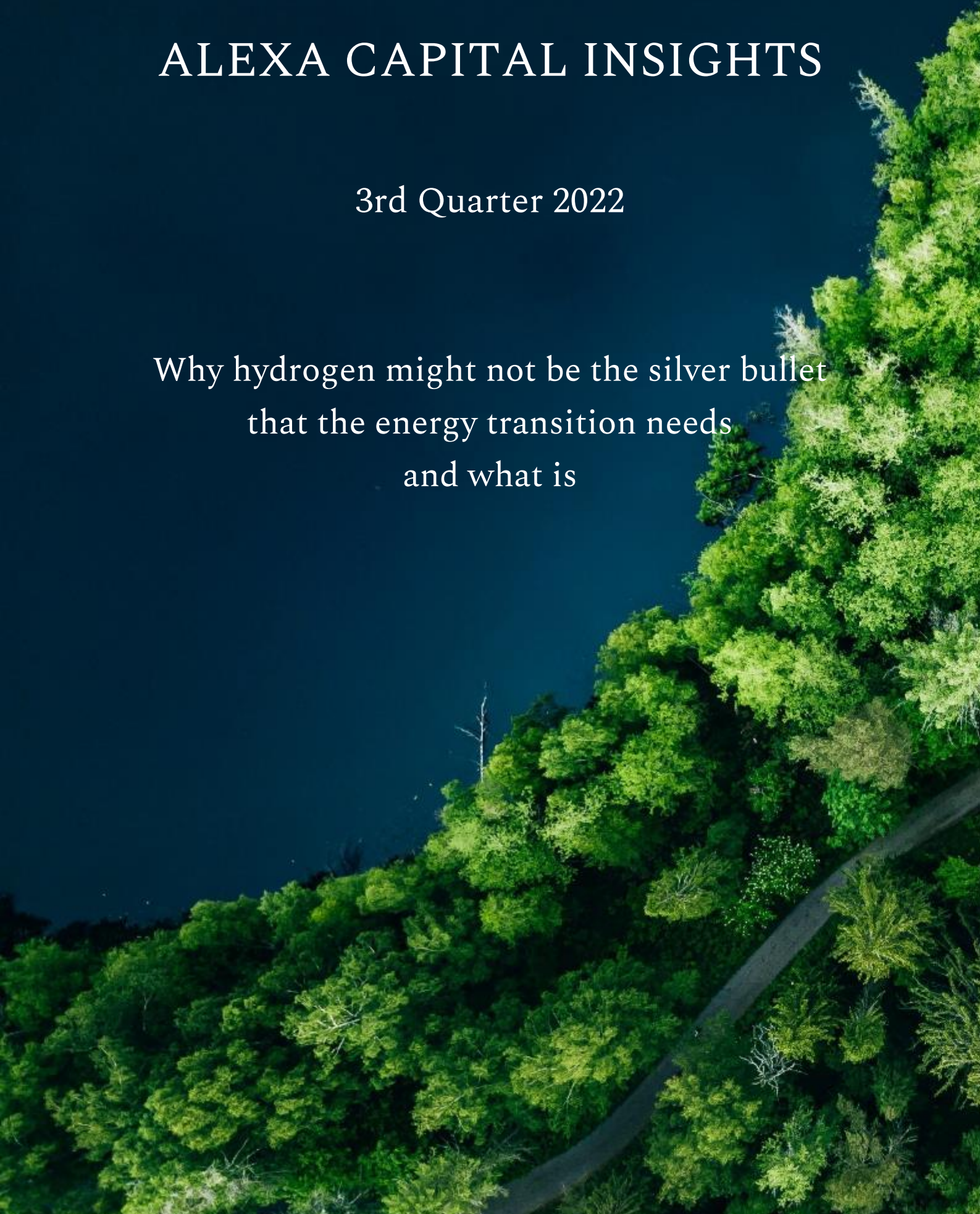


ALEXA CAPITAL INSIGHTS

3rd Quarter 2022

Why hydrogen might not be the silver bullet
that the energy transition needs
and what is



ALEXA CAPITAL INSIGHTS

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Why hydrogen might not be the silver bullet that the energy transition needs—and what is

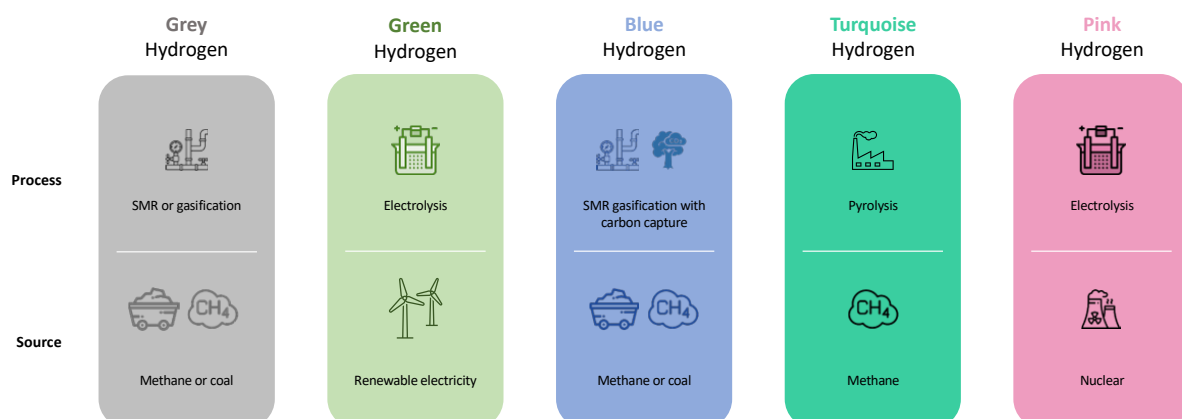
Never have so many people got so excited about something so unremarkable. Hydrogen, which makes up around three-quarters of all visible matter in the universe, is being feted by politicians, industrialists and energy experts alike as a wonder molecule that will help deliver humankind from fossil fuels. At least there is some basis for this furore.

Hydrogen 101

When created via electrolysis, using renewable or nuclear energy, or—more contentiously—via a process called steam methane reforming (SMR) combined with carbon capture and storage (CCS), hydrogen can indeed be used as a low-carbon fuel to replace oil and gas in a range of applications. In theory, this range is rather wide. Hydrogen, currently produced using SMR without CCS, is already a major industrial chemical, used mainly to produce the ammonia that goes into fertiliser and other products.

However, this so-called grey hydrogen is also a major contributor to greenhouse gas emissions, since SMR emits significant amounts of carbon. Getting rid of the carbon, for example, through production via electrolysis or SMR with CCS, would allow ammonia to be made without emissions. Low-carbon hydrogen (called ‘green’ if made via electrolysis with renewables, ‘pink’ if made from nuclear energy and ‘blue’ if created using SMR with CCS) could also be used in methanol to replace bunker fuels in shipping. And it could be used as a fuel and reacting agent to replace coal in metallurgy. And it could power turbines, instead of gas.

Different types of hydrogen



The list of potential applications for hydrogen includes prosaic uses such as powering cars—a concept that Toyota has tried to popularise with its sleek yet poorly selling Mirai sedan—and heating homes, which Northern Gas Networks in the UK is hoping to do with a project called HyDeploy. This vast array of possibilities has got policymakers and energy nerds all worked up. Low-carbon hydrogen has almost all the usefulness of fossil fuels, with little or none of the emissions. In the decarbonised society of the future, hydrogen, rather than oil and gas, will be key to geopolitical heft.

There is much to celebrate about this picture, starting with the fact that green hydrogen will, in theory, be readily available to any nation that has access to cheap renewable energy—and the list of such nations is growing rapidly. Furthermore, in emissions reduction terms, low-carbon hydrogen is a lifesaver for several industries that have few other options for eliminating greenhouse gases. Ammonia or steel cannot be produced at scale without fossil fuels unless hydrogen is used, for example.

Hydrogen Economics

But this importance for certain sectors, contrasted with its wide range of possible applications, could prove a problem for hydrogen. Despite all the hype around hydrogen's decarbonising potential, almost all the hydrogen today is of the highly polluting grey variety. And it will take a long time before green and blue hydrogen dominate the picture. Both types are currently more expensive to make than grey hydrogen, although the high price of natural gas is starting to give green supplies an edge in certain locations. In February, for example, steelmaker ArcelorMittal declared green hydrogen made using low-cost solar power in Spain would be [able to compete](#) with coal, oil and natural gas.

Even once economic barriers have been overcome, it will take some time before the infrastructure currently used for storing and transporting natural gas can be adapted for hydrogen. In many cases, the infrastructure for hydrogen may need to be created from scratch. On top of that, the production facilities for low-carbon hydrogen will need to scale massively from where they are today.

The European Union (EU) already uses about [9.7 million tonnes](#) of hydrogen a year for industrial purposes. That would all have to be switched from grey to low-carbon production before any excess could be used for critical decarbonisation tasks such as reducing steelmaking emissions. And it is a vast undertaking: just replacing those 9.7 million tonnes would require 200 GW of new renewable energy capacity or as much nuclear power as there is in the whole of France.

The ability to increase production will likely depend on advances in green hydrogen, which has traditionally been the most expensive version of the gas but is expected to be the cheapest and most scalable option in the long term. Blue hydrogen, in contrast, will always be more expensive than fossil fuels because it relies on natural gas as a feedstock for SMR. And it will always be more expensive than grey hydrogen because it requires CCS to be added to the SMR process.

Nuclear power, meanwhile, could, in theory, provide round-the-clock energy for electrolyzers, but the recent track record of the two newest reactors in Europe does not bode well for pink hydrogen costs

and timescales. One of the reactors at Flamanville in France is more than five times over budget and a decade over schedule. The other, in Olkiluoto Island in Finland, went more than three times over budget and is 13 years over schedule.

The cost and availability of green hydrogen, meanwhile, is essentially a function of the cost and availability of electrolyzers and renewable energy. In Europe, electrolyzer manufacturers are currently able to build enough electrolyzers to produce an estimated 1.75 GW of hydrogen per year. The EU is planning to [invest €27 billion](#) in electrolyzers through its REPowerEU programme, but with a timeline that extends to 2027.

And in practice, scaling up low-carbon hydrogen could take up to twice as long because of limitations on the renewable energy needed to power these electrolyzers. Today's electrolyzer technology has a conversion efficiency of [only around 65%](#), which means it takes roughly 51 kWh of electricity to produce a single kilogram of green hydrogen. If used to fuel [a Mirai](#), this could take you roughly 200 km. But based on an average range of [6.4 km](#) per kWh, an electric vehicle could go for more than 320 km on the same amount of electricity.

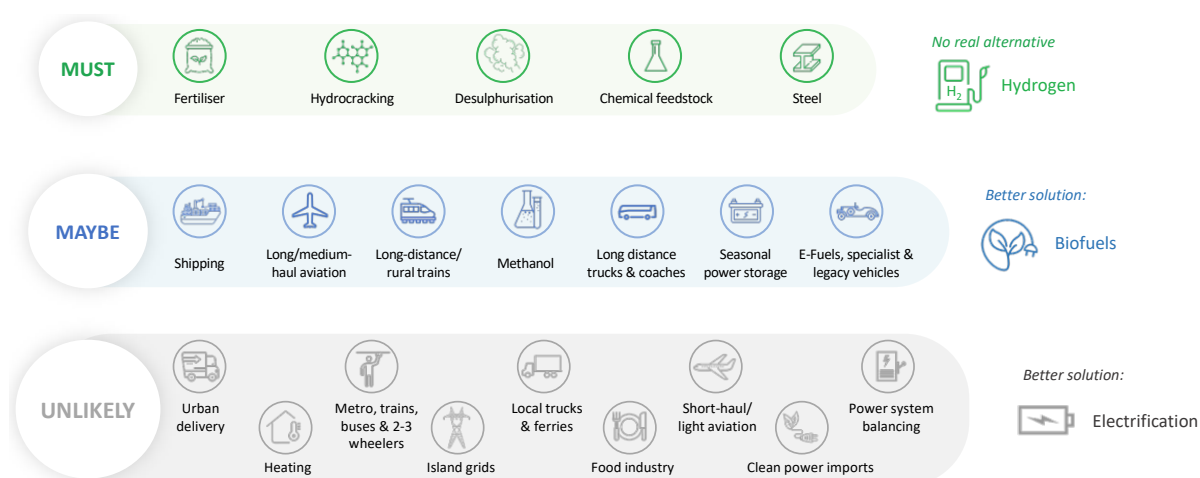
Electrolyzer efficiency levels could rise to around 76% by 2050, according to the International Renewable Energy Agency. But that still means around a quarter of the electricity used for electrolysis will simply be wasted. And this is electricity that is already needed to decarbonise energy grids and road traffic. Whether renewables can scale rapidly enough to replace existing fossil fuel generation, fuel industries such as transport and at the same time meet the needs of a burgeoning green hydrogen sector is still unclear.

The European wind energy industry body WindEurope, for one, has called on policymakers to speed up the rate of renewables deployment in pursuit of hydrogen goals, [saying](#) in June that this must become the EU's top priority for reaching climate neutrality and breaking away from Russian fuel. We will need significant periods of excess renewable energy to drive power prices to fractional or negative levels for extended periods to make hydrogen economics attractive for many applications. This will take several years, likely well into the next decade.

Low-carbon hydrogen's scalability and efficiency challenges have sobering implications for how it might best be used in the energy transition. Given that climate scientists are warning we need to drastically reduce carbon emissions now, it hardly makes sense to wait a decade or so to find out if there will be enough low-carbon hydrogen for tasks such as residential heating, which can be carried out using electricity today.

Indeed, an emerging school of thought advocates a strict hierarchy of use cases for low-carbon hydrogen. Thus, applications such as fertiliser or methanol production, which cannot really be carried out at scale by any other means, should have priority in switching from fossil fuels to hydrogen.

Hydrogen - Merit order by demand side sector



At the other extreme, meanwhile, is a host of applications that really should not be powered by hydrogen because they can easily be carried out using electricity. These applications include power system balancing and most types of short-to-medium distance road transport, including passenger cars, urban delivery vans, two- and three-wheelers and metro trains and buses.

In some cases, such as heating, there are fears using hydrogen could be bad for climate and health. The fact that many of hydrogen's potential use cases might not be competitive in the long term should not be a concern for investors, however. Hydrogen's place in the energy systems of the future is pretty much assured and a hydrogen economy will deliver major returns even if the gas-only ends up being used in a fraction of the applications it is currently being touted for.

Digital Energy and the Focus on Electrification

Meanwhile, investors should focus on the bottom of the hydrogen hierarchy for another reason: this is where the next big opportunities for electrification lie. Heating, passenger mobility and road transportation can all be decarbonised using electricity now instead of waiting a decade or so for hydrogen to do the job. What is more, electrifying these sectors is a much bigger deal than it sounds. We are already seeing the value of the digital transformation taking hold of energy production as fossil fuels are gradually replaced by renewables in the generation system. Digital-first concepts such as aggregators and virtual power plants are delivering new sources of value for investors. But an even bigger opportunity is on the horizon with the digitalisation of demand-side assets needed to enable the electrification of sectors such as transport and heating.

At Alexa Capital, we outlined some of the likely winners in this evolution a decade ago, in a 2012 paper on the dawning of the digital energy revolution. The paper outlined eight energy-related concepts that would stand to gain from digitalisation, and the list is still as pertinent today as it was then. We highlighted:

- **New energy services**, such as selling efficiency (net zero) consultancy and demand management. These can help regulated companies overcome a key challenge facing the move to a low-carbon society: how do you get energy providers to reduce end-user consumption when their profits depend on selling more? Carbon pricing and efficient markets are now beginning to help shape this journey.
- **E-infrastructure/alpha infrastructure**, or investments in distributed generation assets that can maximise profits by combining negotiated power agreements with flexible merchant sales and new energy services. This investment opportunity has already gone mainstream and is set for further growth. A new category of core++ infrastructure/private equity investors is now emerging, capable of taking merchant market risks and engaging in today's increasing volatile power markets.
- **Next-generation intensive power users** such as data centres, water companies, electric vehicle fleet operators and food and beverage industrials and distributors, to name a few energy-intensive industrial groups, have a need for low-cost energy supplies for competitive advantage and are keen to embrace efficiency and demand response technologies to cut costs and reduce emissions.
- **Power electronics** for low-voltage and high-voltage use cases. The former creates new opportunities in fields such as home/prosumer automation, while the latter supports more intelligent charging infrastructure, more efficient grids and demand response aggregation systems.
- **Efficiency and environmental technologies** from LEDs and cavity insulation to building automation and smart heating, ventilation and air conditioning systems. Driven by building regulations, this is a massive and growing opportunity for private equity and credit investors as well as corporate capital flows.
- **Grid intelligence and capacity/constraint management**, required for a move from traditional hub-and-spoke electricity networks to grids with distributed generation and smart demand response controls. Grid intelligence is critical for the energy transition, encompassing fields such as sensor technologies, data analytics, inertia control, capacity management and interconnectivity for the critical expansion of distributed renewable generation, storage and electric vehicle charging infrastructure. [Learn more on our Quarterly](#)

Insight focused on Flexibility

- **Large-scale energy storage and flexible power peaking**, incorporating assets as varied as pumped hydro, gas peakers, flywheels, capacitors and fuel cells. In practice, the most efficient and cost-effective storage option is to interconnect grids for widespread power flows and manage demand and supply with digital technology.
- **Hybrid systems**, whether in cars (for example, in the form of regenerative braking mechanisms or stop-start motors), homes (mixing electricity with heat pumps and solar thermal heating) or large-scale power generation (combining wind with batteries and electrolyzers, for instance).

Many of these areas are already attracting major flows of capital and others are beginning to pick up speed. On the demand side in particular, progress has been slow because of a lack of pricing signals that assets can respond to, but that is changing. In the UK, for example, the proposed Future System Operator will feature five-minute pricing intervals instead of the 15-minute periods used today.

It could also use nodal or locational energy pricing, which has already been adopted in other parts of the world, as an incentive to build new generating assets in areas where they can deliver the most value. As other electricity system operators go down this route, the potential for value generation is huge. The heat pump market alone, for example, is expected to be worth \$83.5 billion worldwide by 2026, rising with a compound annual growth rate of 9.5% from 2021. This is a here-and-now market, not one that will take years to mature.

All that is needed to stimulate this market are the regulatory structures to support digitalisation of energy on the demand side. That, we believe, should be just as much a priority in the short term as getting the clean hydrogen economy off the ground is in the long run.

An aerial photograph of a lush, green forest. A dark, winding river flows through the landscape, creating a meandering path. The forest is dense and vibrant green, with some areas appearing slightly darker due to shadows. The river is a deep blue-grey color, contrasting with the surrounding greenery. The overall scene is a natural, undisturbed landscape.

SECTOR TRADING ANALYSIS

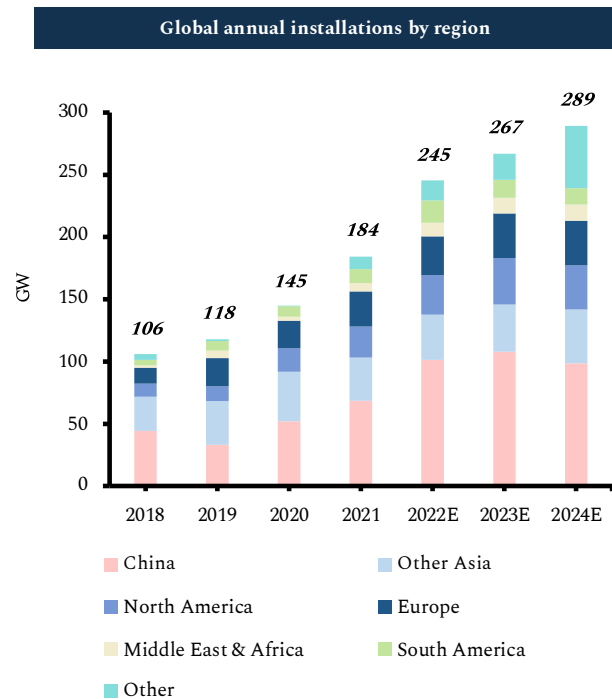
SOLAR

Company	Price Current	Weekly % Change	YTD Price % Change	Market Cap	Enterprise Value	Revenue 2021E	EBITDA 2021E	EV/Revenue			EV/EBITDA			P/E		
								2020A	2021E	2022E	2020A	2021E	2022E	2020A	2021E	2022E
Solar Downstream																
Sunrun	\$25.03	0%	-29%	5,260	13,522	1,581	-136	14.9x	8.6x	6.6x	N/A	N/A	N/A	N/A	N/A	N/A
Sunnova Energy	\$19.88	0%	-31%	2,279	6,126	242	83	36.9x	25.3x	17.4x	N/A	74.0x	50.1x	N/A	N/A	N/A
Scatec	100.90 kr	-1%	-35%	1,595	2,573	439	327	7.6x	5.9x	7.4x	9.8x	7.9x	10.6x	67.5x	39.2x	N/A
Sunpower	\$16.80	3%	-22%	2,921	3,041	1,317	69	2.3x	2.3x	1.9x	97.3x	44.2x	31.3x	36.5x	N/A	76.4x
Solaria Energia	€20.75	-8%	20%	2,635	3,259	118	103	43.5x	27.5x	17.0x	55.2x	31.7x	20.1x	78.8x	53.0x	32.1x
Azure Power	\$11.81	6%	-33%	717	1,988	211	151	11.5x	9.4x	8.4x	15.8x	13.2x	10.3x	N/A	N/A	N/A
Altus Power	€6.70	0%	-36%	1,038	1,294	72	40	N/A	18.1x	12.4x	N/A	32.6x	22.6x	N/A	N/A	15.1x
Soltec	\$3.90	-9%	-40%	362	450	480	-13	0.9x	0.9x	0.9x	N/A	N/A	28.1x	N/A	N/A	N/A
Solar Philippines	P1.56	-6%	23%	225	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Holaluz-Clidom	€9.76	-2%	-22%	212	200	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Median Average								11.5x 16.8x	9.0x 12.2x	7.9x 9.0x	35.5x 44.5x	32.1x 33.9x	22.6x 24.7x	67.5x 60.9x	46.1x 46.1x	32.1x 41.2x
Solar Upstream																
Longi Green Energy	¥62.10	3%	2%	69,820	69,110	13,410	2,243	8.3x	5.2x	4.0x	39.6x	30.8x	24.7x	54.2x	43.5x	33.5x
Trina Solar	¥75.29	13%	4%	24,201	27,188	8,320	596	5.9x	3.3x	2.2x	49.0x	45.6x	30.9x	N/A	81.1x	45.7x
Jinko Solar Co	¥14.00	-2%	180%	20,761	23,507	6,351	542	4.4x	3.7x	2.4x	N/A	43.4x	25.5x	N/A	N/A	49.4x
GCL-Poly Energy	HK\$3.79	1%	29%	13,086	14,444	2,897	1,647	6.1x	5.0x	3.1x	16.7x	8.8x	5.9x	N/A	14.9x	6.4x
Hanwha Solutions	₩32,350.00	-5%	-9%	4,698	9,277	8,962	1,255	1.1x	1.0x	1.0x	8.1x	7.4x	8.7x	10.3x	6.5x	11.0x
First Solar	\$67.82	-2%	-23%	7,229	6,081	2,934	730	2.1x	2.1x	2.5x	10.3x	8.3x	27.8x	17.2x	16.5x	N/A
AU Optronics	NT\$14.65	-1%	-35%	4,714	3,805	13,238	3,645	0.4x	0.3x	0.4x	3.0x	1.0x	2.9x	N/A	2.1x	15.4x
Wacker Chemie	€135.30	-1%	1%	7,171	6,476	6,793	1,666	1.1x	1.0x	0.8x	8.1x	3.9x	3.6x	36.4x	8.6x	6.7x
Shanghai Aiko Solar	¥31.80	48%	9,603	10,613	2,898	193	6.8x	3.7x	2.2x	54.0x	54.9x	25.1x	87.7x	N/A	46.0x	
Jinkosolar Holding	\$65.40	-7%	41%	3,197	9,690	5,898	397	1.9x	1.6x	1.0x	22.0x	24.4x	15.4x	27.6x	26.8x	19.9x
Sino-American Silicon	NT\$144.50	2%	-38%	2,832	3,121	2,450	870	1.4x	1.3x	1.1x	4.0x	3.6x	3.0x	12.8x	10.7x	8.8x
Canadian Solar	\$30.69	4%	-2%	1,969	5,087	5,341	390	1.5x	1.0x	0.7x	15.4x	13.0x	10.6x	20.0x	21.9x	12.9x
Daqo New Energy	\$69.27	1%	65%	5,161	4,657	1,894	1,274	6.8x	2.5x	1.2x	17.9x	3.7x	1.7x	36.1x	5.8x	2.8x
United Renewable Energy	NT\$20.40	-6%	-6%	1,110	1,293	505	N/A	2.9x	2.6x	2.0x	N/A	N/A	16.4x	N/A	N/A	23.8x
Meyer Burger	CHF 0.48	8%	16%	1,315	1,260	80	-54	11.3x	15.7x	5.4x	N/A	N/A	N/A	N/A	N/A	N/A
FTC Solar	\$3.84	5%	-50%	387	285	241	-71	N/A	1.2x	1.3x	N/A	N/A	N/A	N/A	N/A	N/A
Motech Industries	NT\$27.75	-7%	-23%	329	358	N/A	N/A	2.7x	N/A	N/A	N/A	N/A	N/A	50.7x	N/A	N/A
Tainergy Tech	NT\$28.85	-7%	-26%	217	215	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Median Average								2.8x 4.1x	2.3x 3.2x	1.7x 2.0x	16.0x 20.7x	8.8x 19.1x	13.0x 14.4x	31.9x 35.3x	14.9x 21.7x	15.4x 21.7x

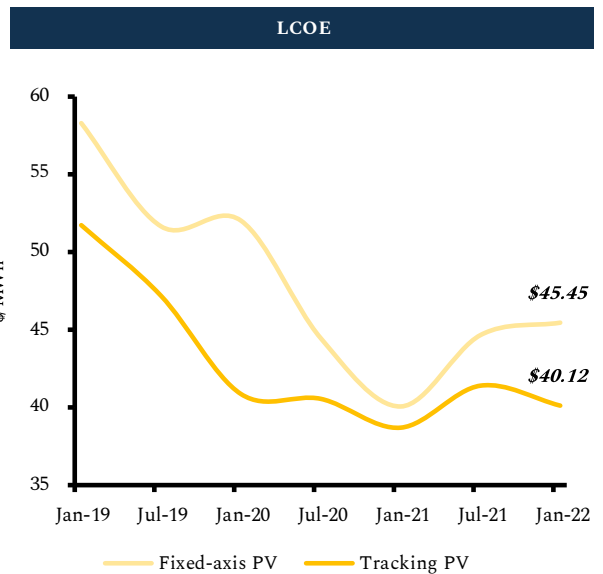
Figures in dollars millions except for share price; actuals are converted using FX rate as of the relevant fiscal year-end, estimates using the latest FX rate as of 18th July 2022.

N/A: Not Applicable

Source: Bloomberg as of 18th July 2022



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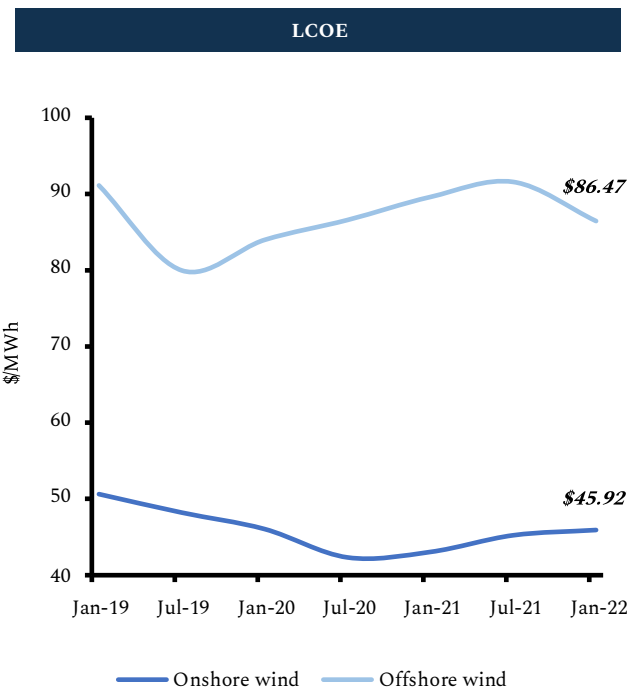
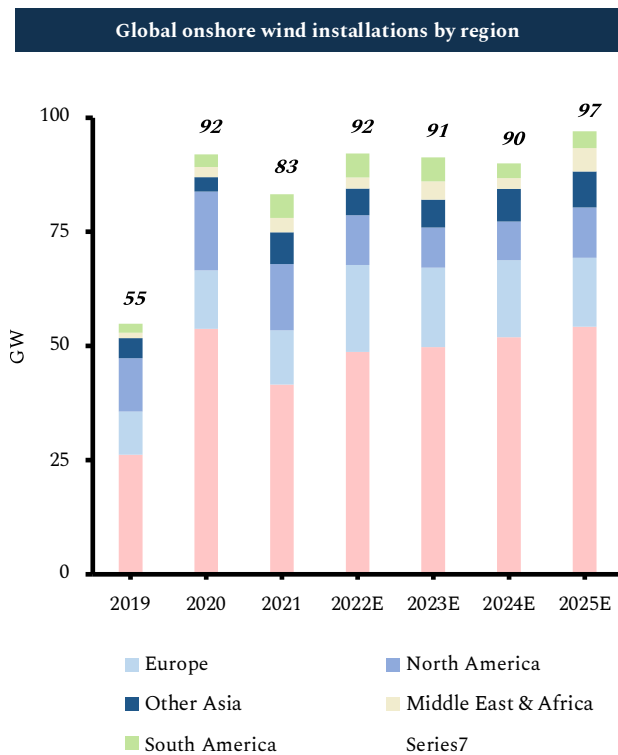
WIND

Company	Price	Weekly	YTD Price	Market	Enterprise	Revenue	EBITDA	EV/Revenue			EV/EBITDA			P/E		
	Current	% Change	% Change	Cap	Value	2021E	2021E	2020A	2021E	2022E	2020A	2021E	2022E	2020A	2021E	2022E
Wind Downstream																
Energiekontor	€89.90	6%	26%	1,278	1,492	184	82	8.4x	8.1x	6.8x	18.9x	18.1x	15.0x	52.1x	42.3x	29.6x
PNE	€14.42	5%	65%	1,123	1,522	153	34	11.3x	10.0x	13.3x	51.8x	45.1x	44.0x	N/A	N/A	N/A
ABO Wind	€57.80	-1%	3%	542	624	202	39	3.2x	3.1x	3.0x	16.0x	15.8x	17.1x	34.5x	33.9x	32.4x
Edda Wind	27.50 kr	0%	-23%	176	109	27	10	N/A	4.0x	3.5x	N/A	11.2x	9.3x	N/A	N/A	N/A
Cloudberry Clean Energy	16.30 kr	3%	1%	389	297	4	-4	N/A	72.1x	11.6x	N/A	N/A	21.0x	N/A	N/A	N/A
Median								8.4x	8.1x	6.8x	18.9x	17.0x	17.1x	43.3x	38.1x	31.0x
Average								7.6x	19.5x	7.6x	28.9x	22.5x	21.3x	43.3x	38.1x	31.0x
Wind Upstream																
Vestas Wind Systems	166.62 kr.	-3%	-16%	22,969	22,922	18,125	1,556	1.3x	1.3x	1.5x	12.9x	14.7x	38.5x	35.2x	75.2x	N/A
Siemens Energy	€14.48	0%	-38%	10,696	8,961	33,126	950	0.3x	0.3x	0.3x	13.9x	9.4x	6.3x	N/A	N/A	N/A
Siemens Gamesa	€17.95	0%	-14%	12,428	14,294	11,843	534	1.3x	1.2x	1.5x	38.5x	26.7x	N/A	N/A	N/A	N/A
Xinjiang Goldwind	¥15.17	4%	-7%	9,195	12,825	8,051	1,076	1.5x	1.6x	1.6x	15.2x	11.9x	13.2x	16.9x	14.6x	18.3x
Nordex	€8.34	-2%	-38%	1,510	1,279	5,693	60	0.2x	0.2x	0.2x	12.3x	21.4x	N/A	N/A	N/A	N/A
Suzlon Energy	₹ 6.35	-5%	-41%	777	1,558	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
TPI Composites	\$11.17	-9%	-26%	416	773	1,727	33	0.5x	0.4x	0.4x	8.3x	23.7x	17.9x	N/A	N/A	N/A
Inox Wind	₹ 79.95	-2%	-31%	277	480	#N/A	#N/A	3.5x	N/A	N/A	34.0x	N/A	N/A	N/A	N/A	N/A
Median								1.3x	0.8x	1.0x	13.9x	18.1x	15.6x	26.0x	44.9x	18.3x
Average								1.2x	0.8x	0.9x	19.3x	18.0x	19.0x	26.0x	44.9x	18.3x

Figures in dollars millions except for share price; actuals are converted using FX rate as of the relevant fiscal year-end, estimates using the latest FX rate as of 18th of July 2022.

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ENERGY STORAGE

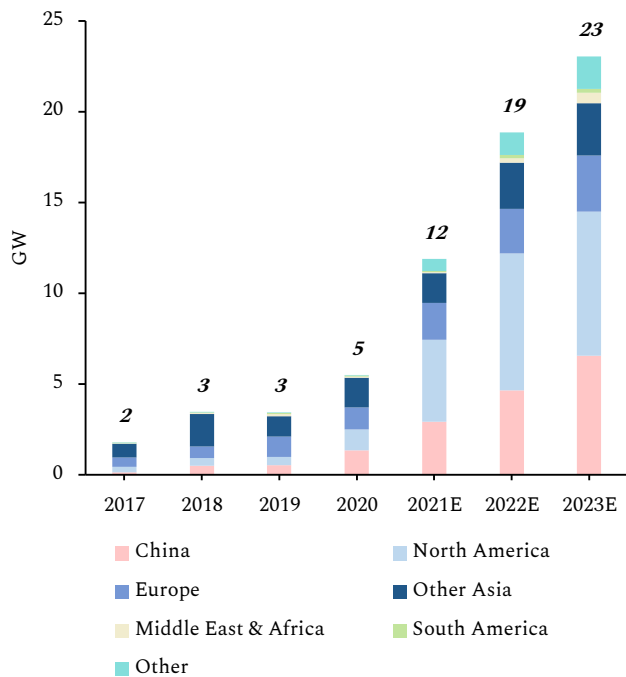
Company	Price	Weekly	YTD Price	Market	Enterprise	Revenue	EBITDA	EV/Revenue			EV/EBITDA			P/E		
	Current	% Change	% Change	Cap	Value	2021E	2021E	2020A	2021E	2022E	2020A	2021E	2022E	2020A	2021E	2022E
Storage																
Tesla	\$748.19	6%	-38%	775,417	765,750	52,663	11,544	24.5x	14.5x	9.1x	N/A	66.3x	39.1x	N/A	N/A	63.3x
CATL	¥551.66	6%	-3%	199,663	208,904	19,094	3,649	27.3x	10.9x	5.2x	N/A	57.2x	38.2x	N/A	93.1x	61.1x
LG Energy Solutions	₩393,000.00	-1%	31%	69,826	75,255	14,430	1,872	N/A	5.2x	4.7x	N/A	40.2x	32.3x	N/A	N/A	N/A
LG Chem	₩515,000.00	-1%	-17%	27,604	32,296	35,679	6,694	1.2x	0.9x	0.8x	N/A	7.6x	4.8x	5.7x	21.9x	8.4x
Panasonic	¥1,114.00	-2%	-16%	19,732	26,918	61,234	4,895	0.4x	0.4x	0.5x	N/A	4.6x	5.5x	5.2x	10.7x	13.5x
Gotion High-Tech	¥44.55	0%	-8%	10,998	12,534	1,485	187	13.2x	8.4x	3.9x	N/A	78.1x	67.0x	40.6x	N/A	N/A
Panasonic	¥32.20	8%	-21%	8,207	9,562	5,799	383	2.1x	1.6x	1.3x	N/A	36.4x	25.0x	22.9x	71.2x	52.1x
Sunvoda Electronic	¥10.85	17%	-53%	4,668	3,382	#N/A	-163	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Quantumscape	\$10.33	0%	-70%	1,780	1,744	680	-65	N/A	2.6x	1.6x	N/A	N/A	N/A	N/A	N/A	N/A
Fluence	\$72.32	-7%	-39%	2,971	3,265	995	302	3.2x	3.3x	3.4x	N/A	13.0x	10.8x	12.8x	21.7x	22.4x
Varta	€28.50	4%	-14%	4,525	4,745	561	-87	23.0x	8.5x	3.1x	N/A	N/A	N/A	N/A	N/A	N/A
Farasis Energy	¥59.72	3%	-26%	2,428	3,401	2,966	364	1.1x	1.1x	1.0x	N/A	9.1x	9.4x	9.6x	12.9x	14.9x
Energys	\$401.01	-4%	117%	9,208	9,099	337	55	50.9x	27.0x	12.2x	N/A	N/A	75.0x	N/A	N/A	N/A
Pylon Technologies	¥10.83	-2%	-28%	1,884	2,057	2,000	278	1.4x	1.0x	0.9x	N/A	11.2x	7.4x	8.2x	17.9x	11.8x
Camel Group	¥8.14	3%	-58%	1,255	1,448	148	-25	43.9x	9.8x	3.7x	N/A	N/A	N/A	N/A	N/A	N/A
Stem	\$149.30	-2%	-12%	1,586	1,540	2,120	210	N/A	0.7x	N/A	N/A	7.3x	N/A	N/A	N/A	N/A
Exide Industries	₹ 6.85	-12%	-31%	916	628	#N/A	#N/A	N/A	N/A	4.1x	N/A	N/A	N/A	N/A	N/A	N/A
Energy Vault	\$3.33	13%	-71%	529	294	1	-41	N/A	N/A	78.8x	N/A	N/A	N/A	N/A	N/A	N/A
Ess Tech	\$6.66	11%	-34%	1,162	695	#N/A	#N/A	N/A	N/A	18.3x	N/A	N/A	N/A	N/A	N/A	N/A
Li-Cycle	\$2.33	2%	-61%	702	463	148	-90	N/A	3.1x	2.2x	N/A	N/A	N/A	N/A	N/A	N/A
Microvast	\$0.69	#N/A	-82%	59	402	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Dynavolt Renewable Energy	¥8.29	8%	-30%	969	446	#N/A	-78	N/A	N/A	59.2x	N/A	N/A	N/A	N/A	N/A	N/A
Freyr	\$22.08	9%	18%	502	497	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Chongqing Wanli	¥25.60	2%	-18%	237	365	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Amita Technologies	NT\$137.50	1%	-1%	377	326	203	#N/A	N/A	1.6x	1.3x	N/A	N/A	N/A	N/A	17.4x	11.1x
Kung Long Batteries	NT\$0.62	0%	-2%	212	275	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Leclanche	CHF 7.02	3%	-23%	343	346	37	-18	N/A	9.3x	4.1x	N/A	N/A	N/A	N/A	N/A	N/A
ADS Tech	\$7.02	3%	-23%	343	346	37	-18	N/A	9.3x	4.1x	N/A	N/A	N/A	N/A	N/A	N/A
Median								8.2x	3.3x	3.8x	11.2x	10.8x	22.9x	19.8x	16.2x	15.1x
Average								16.0x	6.3x	10.2x	22.9x	27.4x	26.3x	26.1x	29.2x	28.9x

Figures in dollars millions except for share price; actuals are converted using FX rate as of the relevant fiscal year-end, estimates using the latest FX rate as of 18th of July 2022.

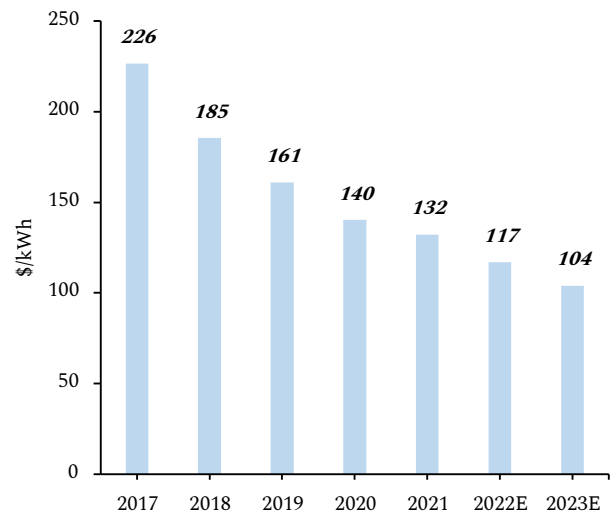
N/A: Not Applicable.

Source: Bloomberg as of the 18th of July 2022.

Global annual energy storage installations



Battery pack prices



Source: Bloomberg.

HYDROGEN & FUEL CELLS

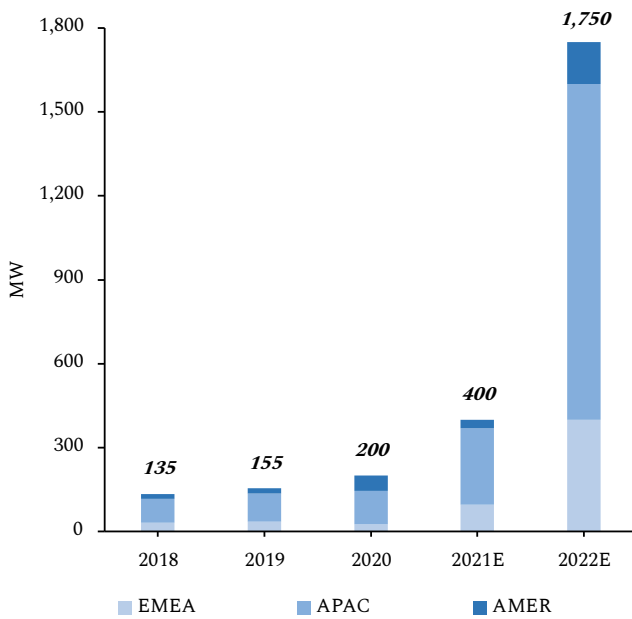
Company	Price Current	Weekly % Change	YTD Price % Change	Market Cap	Enterprise Value	Revenue 2021E	EBITDA 2021E	EV/Revenue 2021E	EV/EBITDA 2021E	P/E 2021E
Power Generation - Fuel Cells										
Plug Power	\$24.92	-3%	-13%	14,404	11,239	496	-193	36.9x	22.6x	12.2x
Bloom Energy	\$21.49	-4%	-3%	3,817	4,322	941	13	5.6x	4.6x	3.8x
Thyssenkrupp	€7.44	8%	-25%	5,032	2,601	37,891	1,919	0.1x	0.1x	0.1x
ITM Power	£354.40	0%	-10%	2,837	2,621	7	-25	N/A	N/A	N/A
Beijing Sinohytec	¥118.40	-10%	-55%	1,310	1,244	120	2	14.3x	10.4x	5.9x
Ballard Power Systems	C\$12.10	-6%	-24%	2,884	#N/A	98	-79	N/A	N/A	N/A
Nel	15.68 kr	2%	-4%	2,774	2,414	92	-44	33.7x	26.4x	17.8x
Ceres Power	£738.40	-2%	-23%	1,839	1,512	41	-19	40.7x	36.7x	32.4x
Fuelcell Energy	\$4.67	-11%	-19%	1,714	1,509	77	-27	21.2x	19.6x	11.2x
Powercell	SEK 196.80	-4%	4%	1,087	1,058	15	-8	N/A	68.6x	44.3x
Enapter	€18.80	4%	-20%	499	486	9	-8	N/A	51.8x	10.2x
Hexagon Purus	37.08 kr	-3%	56%	1,087	1,039	44	-32	41.0x	23.5x	10.2x
Proton Motor Power Systems	£15.25	-2%	-31%	308	416	#N/A	#N/A	N/A	N/A	N/A
McPhy Energy	€19.48	7%	-9%	592	395	16	-19	21.5x	25.2x	19.6x
Forsee Power	£3.24	-7%	-46%	187	287	79	-19	N/A	3.7x	2.5x
SFC Energy	€25.80	-1%	-10%	406	#N/A	72	7	N/A	N/A	N/A
Everfuel	82.90 kr	2%	83%	734	728	1	-6	N/A	N/A	N/A
Green Hydrogen Systems	20.30 kr	-4%	-47%	243	203	1	-23	N/A	N/A	15.0x
Gencell	¥ 775.00	11%	-27%	260	251	#N/A	#N/A	N/A	N/A	N/A
Median								21.5x	25.2x	11.2x
Average								28.9x	24.4x	14.8x

Figures in dollars millions except for share price; actuals are converted using FX rate as of the relevant fiscal year-end, estimates using the latest FX rate as of 18th of July 2022.

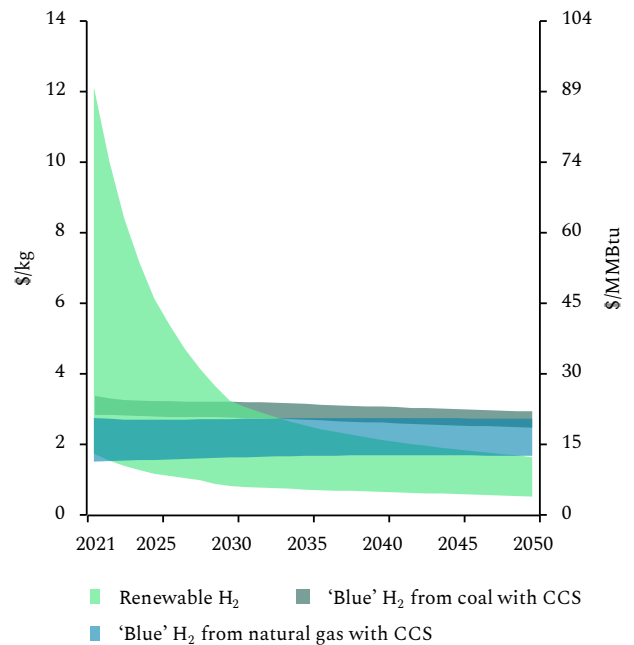
N/A: Not Applicable.

Source: Bloomberg as of the 18th of July 2022.

Annual electrolyser shipments



Source: Bloomberg.

Global range of 'green' and 'blue' LCOH₂

MOBILITY

Company	Price Current	Weekly % Change	YTD Price % Change	Market Cap	Enterprise Value	Revenue 2021E	EBITDA 2021E	EV/Revenue 2020A	2021E	2022E	EV/EBITDA 2020A	2021E	2022E	P/E 2020A	2021E	2022E
EV Manufacturers																
Tesla	\$748.19	6%	-38%	775,417	765,750	52,663	11,544	24.5x	14.5x	9.1x	N/A	66.3x	39.1x	N/A	N/A	63.3x
BYD	Y337.10	4%	24%	131,734	131,543	34,854	3,220	5.8x	3.8x	2.5x	42.1x	40.9x	31.3x	N/A	N/A	N/A
Rivian	\$33.11	11%	-68%	29,816	14,961	63	-2,745	N/A	N/A	8.2x	N/A	N/A	N/A	N/A	N/A	N/A
Lucid Motors	\$20.65	11%	-50%	34,433	31,241	58	-1,312	N/A	N/A	22.9x	N/A	N/A	N/A	N/A	N/A	N/A
NIO	\$21.44	4%	-36%	35,827	32,070	5,622	-396	12.7x	5.7x	3.6x	N/A	N/A	N/A	N/A	N/A	N/A
XPeng	\$28.73	-2%	-43%	24,728	23,349	3,224	-901	26.8x	7.2x	3.8x	N/A	N/A	N/A	N/A	N/A	N/A
Li Auto	\$40.00	7%	24%	41,331	35,124	4,187	-141	24.4x	8.4x	4.6x	N/A	N/A	N/A	N/A	N/A	N/A
Arrival	\$1.51	1%	-81%	961	524	0	-164	N/A	N/A	15.0x	N/A	N/A	N/A	N/A	N/A	N/A
Fisker	\$9.76	10%	-42%	2,901	2,536	0	-331	N/A	N/A	38.6x	N/A	N/A	N/A	N/A	N/A	N/A
Nikola	\$5.74	12%	-44%	2,415	2,059	5	-411	N/A	N/A	17.9x	N/A	N/A	N/A	N/A	N/A	N/A
Embark Technology	\$0.40	-19%	-95%	185	-53	0	-55	N/A	N/A	N/A	N/A	1.0x	0.4x	N/A	N/A	N/A
REE Automotive	\$1.27	15%	-77%	409	133	0	-96	N/A	N/A	23.3x	N/A	N/A	N/A	N/A	N/A	N/A
Lion Electric	\$4.47	3%	-55%	850	684	48	-28	N/A	14.3x	3.8x	N/A	N/A	N/A	N/A	N/A	N/A
Faraday Future	\$7.61	39%	25%	2,299	2,144	#N/A	-280	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Proterra	\$4.72	5%	-50%	1,051	526	243	-89	N/A	2.2x	1.8x	N/A	N/A	N/A	N/A	N/A	N/A
Polestar*	\$11.23	#N/A	-6%	1,123	1,125	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Canoo	\$4.13	74%	-49%	1,109	1,033	#N/A	-322	N/A	N/A	9.4x	N/A	N/A	N/A	N/A	N/A	N/A
Workhorse	\$3.04	11%	-33%	496	355	1	-83	N/A	N/A	14.5x	N/A	N/A	N/A	N/A	N/A	N/A
Electric Last Mile Solutions	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Hyliion	\$3.66	6%	-42%	636	283	1	-113	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sono Motors	\$2.87	1%	-73%	234	86	0	-52	N/A	N/A	22.2x	N/A	N/A	N/A	N/A	N/A	N/A
Median								24.4x	7.2x	9.2x	42.1x	40.9x	31.3x	N/A	N/A	63.3x
Average								18.8x	8.0x	12.6x	42.1x	36.0x	23.6x	N/A	N/A	63.3x
EV Charging Infrastructure																
Chargepoint Holdings	\$12.60	6%	-37%	4,344	4,124	#N/A	#N/A	N/A	N/A	17.3x	N/A	N/A	N/A	N/A	N/A	N/A
EVGO	\$7.70	25%	-27%	2,039	3,500	21	-55	N/A	N/A	69.9x	N/A	N/A	N/A	N/A	N/A	N/A
Wallbox	\$8.77	2%	-47%	1,212	1,125	78	-50	N/A	14.5x	5.8x	N/A	N/A	N/A	N/A	N/A	N/A
Alfen Beheer	€100.65	-1%	18%	2,225	2,192	279	40	9.3x	7.9x	5.5x	76.3x	54.8x	33.6x	N/A	N/A	57.2x
Volta	\$1.68	9%	-77%	283	131	32	-123	N/A	4.1x	1.8x	N/A	N/A	N/A	N/A	N/A	N/A
Blink Charging	\$17.93	6%	-33%	900	740	19	-35	N/A	38.6x	16.0x	N/A	N/A	N/A	N/A	N/A	N/A
Allego*	#N/A	#N/A	-35%	#N/A	#N/A	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Pod Point	£99.00	-9%	-61%	183	#N/A	78	-1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Tritium	\$5.98	3%	-40%	916	915	71	-45	N/A	13.0x	5.9x	N/A	N/A	N/A	N/A	N/A	N/A
Median								9.3x	13.0x	5.9x	76.3x	54.8x	33.6x	N/A	N/A	57.2x
Average								9.3x	15.6x	17.5x	76.3x	54.8x	33.6x	N/A	N/A	57.2x
Mobility services																
Uber	\$22.91	8%	-48%	44,995	52,876	17,066	-811	4.7x	3.1x	1.8x	N/A	N/A	39.6x	N/A	N/A	N/A
Didi	#N/A	#N/A	#N/A	#N/A	#N/A	27,202	-3,146	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Grab	\$2.79	17%	-61%	10,693	4,950	728	-777	N/A	6.8x	4.0x	N/A	N/A	N/A	N/A	N/A	N/A
Lyft	\$13.91	13%	-69%	4,842	3,657	3,180	92	1.6x	1.2x	0.9x	N/A	39.6x	15.4x	N/A	N/A	N/A
Bird	\$0.48	4%	-92%	159	192	202	-77	N/A	1.0x	0.6x	N/A	N/A	N/A	N/A	N/A	N/A
Swvl*	#N/A	#N/A	0%	#N/A	#N/A	55	-49	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Median								3.1x	2.1x	1.3x	N/A	39.6x	27.5x	N/A	N/A	N/A
Average								3.1x	3.0x	1.8x	N/A	39.6x	27.5x	N/A	N/A	N/A
Automotive Manufacturers																
Tesla	\$748.19	6%	-38%	775,417	765,750	52,663	11,544	24.5x	14.5x	9.1x	N/A	66.3x	39.1x	N/A	N/A	63.3x
Tovota	¥2,163.00	1%	-3%	254,705	227,415	246,553	27,622	0.8x	0.9x	1.0x	7.2x	8.2x	7.5x	12.7x	13.7x	11.9x
Volkswagen	€185.95	2%	-30%	84,330	68,023	272,061	50,187	0.3x	0.3x	0.2x	1.8x	1.4x	1.5x	10.3x	5.6x	5.0x
BYD	HK\$293.80	-4%	11%	131,734	131,543	34,854	3,220	5.8x	3.8x	2.5x	42.1x	40.9x	31.3x	N/A	N/A	N/A
Hyundai	₩185,500.00	4%	-12%	30,095	101,734	98,365	9,609	1.1x	1.0x	1.0x	16.0x	10.6x	10.1x	18.2x	6.1x	5.8x
General Motors	\$33.28	8%	-46%	48,523	52,731	128,183	15,570	0.4x	0.4x	0.3x	4.1x	3.4x	3.1x	9.1x	4.9x	5.0x
Honda	¥3,373.00	2%	1%	44,099	85,608	119,172	8,375	0.6x	0.7x	0.8x	7.8x	10.2x	9.5x	8.7x	9.5x	8.3x
Ford	\$12.17	8%	-44%	48,910	40,481	126,423	12,640	0.3x	0.3x	0.3x	11.3x	3.2x	2.9x	N/A	4.9x	11.8x
BMW	€75.89	3%	-17%	50,491	142,243	123,383	21,498	1.2x	1.2x	1.1x	11.2x	6.6x	7.0x	11.5x	4.2x	3.2x
Mercedes Benz Group	€53.75	0%	-22%	58,435	30,549	180,978	31,870	0.2x	0.2x	0.2x	1.7x	1.0x	1.2x	16.4x	3.9x	4.9x
Stellantis	\$12.41	2%	-36%	38,876	21,937	169,132	23,605	0.1x	0.1x	0.1x	1.3x	0.9x	0.9x	21.1x	3.0x	2.9x
Ferrari	€194.60	2%	-15%	36,338	37,696	4,811	1,717	9.0x	7.8x	7.8x	27.4x	22.0x	22.1x	56.6x	39.8x	40.2x
SAIC	¥16.77	-4%	-19%	29,056	38,114	120,231	5,508	0.3x	0.3x	0.3x	8.4x	6.9x	6.5x	8.6x	7.5x	7.6x
NIO	\$21.44	4%	-36%	35,820	32,070	5,622	-396	12.7x	5.7x	3.6x	N/A	N/A	N/A	N/A	N/A	N/A
Tata Motors	\$28.22	4%	-16%	20,200	32,994	34,019	3,839	0.9x	1.0x	0.9x	10.5x	8.6x	9.4x	N/A	N/A	N/A
Volvo	SEK 77.50	3%	-7%	22,321	18,635	29,848	3,885	N/A	0.6x	0.6x	N/A	4.8x	5.0x	N/A	15.6x	14.7x
Geely	HK\$16.84	0%	-21%	21,497	18,307	16,046	1,823	1.3x	1.1x	1.0x	10.8x	10.0x	9.8x	19.4x	21.7x	21.4x
Kia	₩80,100.00	3%	-3%	24,654	18,106	59,263	6,359	0.3x	0.3x	0.3x	4.8x	2.8x	2.7x	19.0x	6.4x	5.9x
Nissan	¥508.10	-2%	-14%	15,478	27,900	70,982	781	0.3x	0.4x	0.4x	7.4x	35.7x	6.8x	N/A	N/A	9.2x
Guangzhou Automobile	HK\$7.79	1%	-1%	20,463	20,204	11,677	182	2.3x	1.7x	1.5x	N/A	N/A	82.5x	20.0x	18.1x	14.0x
Suzuki	¥4,329.00	1%	-4%	15,345	15,297	28,721	3,202	0.5x	0.5x	0.6x	4.4x	4.8x	5.6x	11.6x	11.9x	11.9x
Renault	€24.72	6%	-21%	7,427	15,584	51,080	6,010	0.3x	0.3x	0.3x	3.6x	2.6x	3.3x	N/A	9.7x	N/A
Dongfeng	HK\$5.78	0%	-13%	6,344	7,034	17,693	1,748	0.4x	0.4x	0.4x	7.6x	4.0x	4.6x	4.4x	3.4x	3.6x
Subaru	¥2,307.00	0%	8%	12,808	7,331	26,554	2,271	0.2x	0.3x	0.4x	2.5x	3.2x	3.4x	8.7x	15.6x	20.3x
Mazda	¥1,050.00	1%	12%	4,788	4,422	26,593	875	0.1x	0.2x	0.2x	3.7x	5.1x	3.3x	21.2x	N/A	11.9x
Mitsubishi	¥437.00	0%	29%	4,700	4,702	13,286	-238	0.2x	0.4x	0.3x	5.6x	N/A	4.4x	N/A	N/A	10.5x
Median								0.4x	0.5x	0.5x	7.3x	5.1x	5.6x	12.7x	7.5x	9.8x
Average								2.6x	1.7x	1.4x	9.1x	11.4x	11.3x	16.3x	10.8x	13.3x

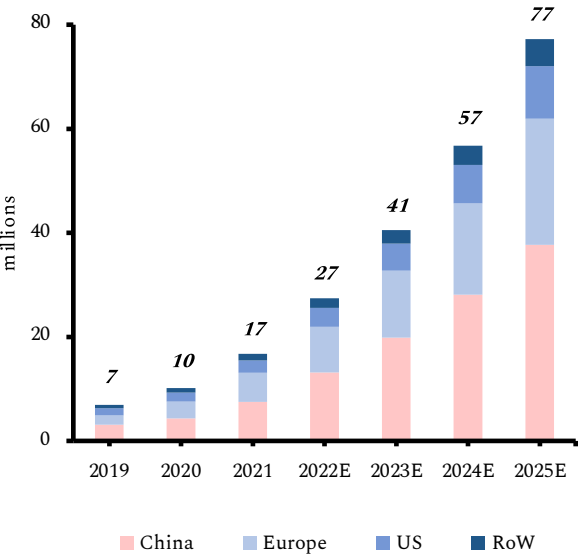
Figures in dollars millions except for share price; actuals are converted using FX rate as of the relevant fiscal year-end, estimates using the latest FX rate as of 18th of July 2022.

N/A: Not Applicable.

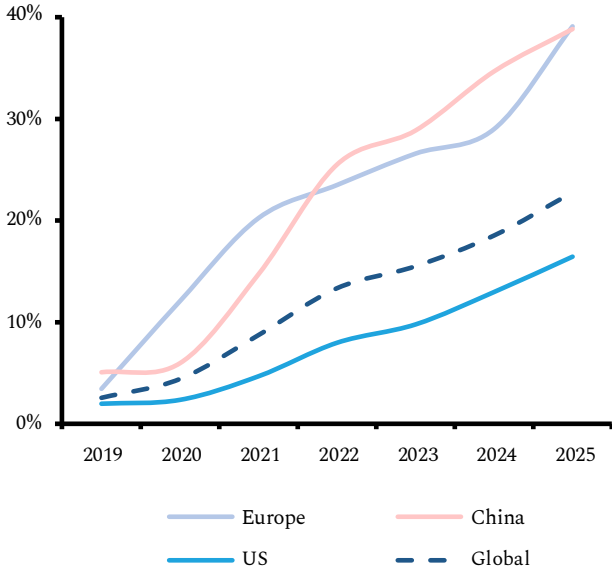
Source: Bloomberg as of the 18th of July 2022

MOBILITY (cont'd)

Global EV fleet by region



EVs as a % of total vehicle sales



Source: Bloomberg

EUROPEAN UTILITIES

Company	Price Current	Weekly % Change	YTD Price % Change	Market Cap	Enterprise Value	Revenue 2021E	EBITDA 2021E	EV/Revenue			EV/EBITDA			P/E		
								2020A	2021E	2022E	2020A	2021E	2022E	2020A	2021E	2022E
European Utilities																
Enel	€4.88	-7%	-32%	50,417	144,162	82,164	20,671	1.6x	1.8x	1.6x	6.7x	7.0x	7.5x	8.7	8.5	9.1
Iberdrola	€9.75	-4%	-7%	63,566	123,077	42,211	12,717	2.8x	2.9x	2.8x	9.7x	9.7x	10.0x	14.1x	15.0x	15.4x
EDF	€10.23	6%	1%	40,196	97,808	86,557	20,470	1.1x	1.1x	1.1x	5.0x	4.8x	24.5x	32.4	8.8	N/A
Eni	€11.03	-2%	-11%	40,024	55,580	83,816	18,710	0.9x	0.7x	0.5x	4.9x	3.0x	2.0x	N/A	7.8x	3.8x
Engie	€11.18	4%	-15%	27,663	61,421	69,436	12,419	0.9x	0.9x	1.0x	5.6x	4.9x	5.1x	9.4	7.0	6.5
Orsted	830.90 kr.	0%	-3%	47,681	55,662	9,048	3,648	6.0x	6.2x	4.7x	19.2x	15.3x	13.9x	18.4x	27.3x	20.4x
Naturgy Energy	€28.22	0%	-1%	27,806	45,345	20,643	4,148	1.9x	2.2x	1.9x	9.9x	10.9x	10.8x	28.9	21.2	20.4
EDP	€4.62	-3%	-5%	18,626	42,095	14,975	4,216	2.5x	2.8x	2.5x	9.5x	10.0x	10.5x	20.8x	20.0x	22.1x
Verbund	€104.30	-2%	8%	36,822	41,345	3,918	1,743	8.9x	10.6x	5.6x	27.1x	23.7x	13.2x	51.4	42.1	18.4
Fortum	€11.71	-6%	-56%	10,570	20,038	90,262	4,035	0.3x	0.2x	0.2x	7.0x	5.0x	6.9x	4.5x	3.1x	16.9x
RWE	€37.07	2%	3%	25,474	31,682	16,612	3,854	1.8x	1.9x	1.3x	8.2x	8.2x	7.7x	21.5	14.4	12.1
EnBW	€83.20	1%	9%	23,386	32,092	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Endesa	€17.75	-3%	-12%	19,097	29,683	22,454	4,502	1.2x	1.3x	1.3x	6.2x	6.6x	7.2x	9.0	9.6	11.0
CEZ	1,100.00 Kc	8%	36%	24,529	-1,412	9,133	2,631	N/A	N/A	N/A	N/A	N/A	N/A	55.5x	50.4x	11.6x
A2A	€1.20	-4%	-31%	3,804	9,159	9,395	1,529	1.1x	1.0x	0.5x	6.5x	6.0x	6.5x	10.3	6.4	9.6
Hera	€2.69	-4%	-28%	4,066	8,323	9,377	1,328	1.0x	0.9x	0.7x	6.3x	6.3x	6.6x	11.2x	10.0x	12.0x
Iren	€1.82	-8%	-32%	2,411	6,279	4,624	1,089	1.4x	1.4x	1.1x	5.8x	5.8x	5.8x	9.5	7.3	8.7
BKW	CHF 105.80	1%	-11%	5,720	7,189	3,505	685	2.1x	2.1x	1.9x	9.7x	10.5x	9.8x	17.2x	16.0x	18.3x
Public Power	€5.09	5%	-45%	1,976	4,245	5,862	900	0.8x	0.7x	0.7x	3.8x	4.7x	4.4x	47.2	N/A	10.6
Centrica	£88.32	7%	20%	6,256	5,736	22,175	2,119	0.2x	0.3x	0.2x	2.4x	2.7x	2.7x	N/A	14.7x	7.9x
EVN	€21.95	0%	-17%	4,012	5,414	2,629	817	2.1x	2.1x	2.3x	7.7x	6.6x	8.1x	16.6	13.7	16.6
Drax Group	£749.00	7%	22%	3,599	5,211	5,875	518	0.8x	0.9x	0.8x	9.3x	10.1x	6.9x	N/A	27.7x	10.8x
PGE	10.26 zł	5%	25%	4,895	6,264	10,323	2,212	0.6x	0.6x	0.4x	3.9x	2.8x	3.2x	N/A	6.4	4.7
Redes Energeticas Nacionais	€2.76	-2%	8%	1,871	4,170	856	508	4.6x	4.9x	4.9x	7.5x	8.2x	8.9x	15.1x	16.9x	18.2x
Tauron Polska	3.26 zł	5%	22%	1,217	4,771	5,267	1,022	0.9x	0.9x	0.6x	4.5x	4.7x	5.2x	45.0	6.9	N/A
Inter RAO UES	3.29 P	-3%	-25%	5,970	3,080	15,188	2,163	0.2x	0.2x	0.2x	1.9x	1.4x	1.2x	5.9x	4.4x	3.5x
Alerion Cleanpower	€36.55	5%	25%	2,014	2,569	168	135	N/A	15.3x	N/A	N/A	19.1x	N/A	N/A	N/A	N/A
AB Ignitis Grupe	€18.08	0%	-15%	1,365	2,458	1,903	368	1.7x	1.3x	1.0x	7.1x	6.7x	6.7x	8.1x	8.9x	8.0x
Romande Energie	CHF 1,150.00	3%	-17%	1,342	1,358	640	161	2.0x	2.1x	2.0x	8.8x	8.4x	9.1x	17.8	13.2	N/A
Median								1.3x	1.3x	1.1x	6.9x	6.6x	7.0x	16.6x	11.6x	11.3x
Average								1.9x	2.5x	1.6x	7.9x	7.9x	7.9x	20.8x	14.9x	12.4x
Grid Companies																
National Grid	£1,102.50	2%	2%	48,245	103,612	20,681	7,007	5.3x	5.0x	5.3x	15.6x	14.8x	14.5x	18.8	19.2	16.4
E.On	€8.06	-1%	-35%	21,623	59,900	69,112	8,494	0.8x	0.9x	0.7x	7.3x	7.1x	7.8x	16.1x	9.2x	10.1x
SSE	£1,791.00	3%	8%	22,927	34,893	9,653	3,091	3.8x	3.6x	3.7x	13.9x	11.3x	12.7x	26.1	9.7	16.1
Snam	€4.88	-3%	-9%	16,680	30,708	3,243	2,449	9.5x	9.5x	9.9x	11.9x	12.5x	14.2x	12.7x	12.8x	14.8x
Terna-Rete Elettrica Naziona	€7.19	-4%	0%	14,686	24,233	2,821	2,025	8.3x	8.6x	9.0x	11.4x	12.0x	12.8x	16.1	17.1	18.3
Red Electrica Corporacion	€18.02	-2%	-6%	9,777	17,238	2,222	1,722	7.2x	7.8x	8.6x	9.1x	10.0x	11.4x	12.0x	12.5x	14.8x
Elia Group	€146.80	1%	26%	10,960	17,675	2,995	1,132	6.3x	5.9x	6.1x	15.6x	15.6x	15.6x	35.6	36.7	36.4
Enagas	€18.76	-3%	-8%	4,995	9,942	1,134	1,021	7.4x	8.8x	10.4x	8.6x	9.7x	12.1x	9.4x	11.1x	10.9x
Acea	€13.69	-4%	-27%	2,963	7,719	4,111	1,361	2.0x	1.9x	1.8x	5.7x	5.7x	5.5x	8.8	8.6	8.6
Albioma	€49.86	0%	43%	1,640	2,781	625	239	4.4x	4.4x	4.4x	11.3x	11.6x	12.2x	27.3x	26.2x	26.6x
MVV Energie	€28.60	-13%	-21%	1,915	3,561	4,568	577	0.8x	0.8x	0.8x	7.2x	6.2x	6.7x	16.5	10.6	11.5
Ascopiave	€2.68	-7%	-23%	640	1,108	160	88	6.0x	6.9x	7.2x	14.9x	12.5x	13.7x	12.8x	13.0x	14.2x
Transelectrica	18.40 lei	0%	-19%	278	201	#N/A	#N/A	0.3x	N/A	0.2x	N/A	N/A	2.8x	N/A	N/A	N/A
Median								5.3x	5.5x	5.3x	11.4x	11.5x	12.2x	16.1x	12.7x	14.8x
Average								4.8x	5.3x	5.2x	11.1x	10.8x	10.9x	17.7x	15.6x	16.6x

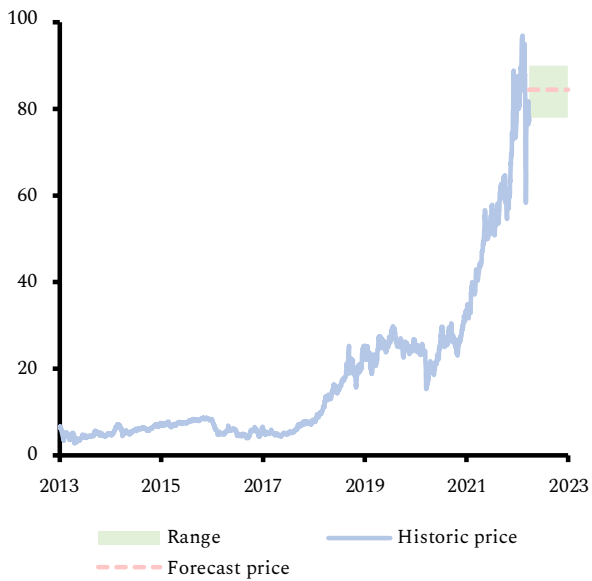
Figures in dollars millions except for share price; actuals are converted using FX rate as of the relevant fiscal year-end, estimates using the latest FX rate as of 18th of July 2022.

N/A: Not Applicable.

Source: Bloomberg as of the 18th of July 2022

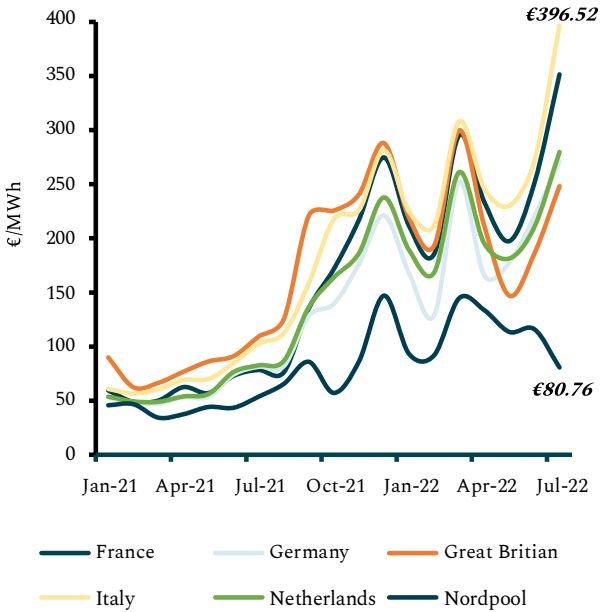
EUROPEAN UTILITIES (cont'd)

EU ETS carbon price outlook



Source: Bloomberg

Monthly electricity prices in Europe



NORTH AMERICAN UTILITIES

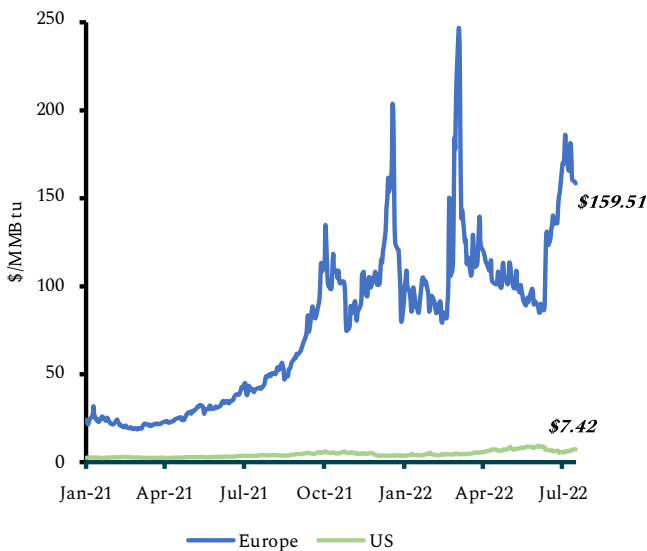
Company	Price Current	Weekly % Change	YTD Price % Change	Market Cap	Enterprise Value	Revenue 2021E	EBITDA 2021E	EV/Revenue 2020A	2021E	2022E	EV/EBITDA 2020A	2021E	2022E	2020A	P/E 2021E	2022E
North American Utilities																
Nextera Energy	\$78.10	-3%	-15%	153,427	220,008	18,882	9,965	11.3x	11.7x	10.4x	20.7x	22.1x	19.3x	34.1x	30.8x	27.2x
Exelon	\$44.19	-1%	9%	43,312	79,858	28,219	8,264	2.5x	2.8x	4.3x	8.8x	9.7x	11.3x	16.0x	17.9x	19.9x
Xcel Energy	\$68.90	-1%	1%	37,527	62,115	12,612	4,426	5.3x	4.9x	4.5x	14.8x	14.0x	13.0x	25.4x	23.5x	21.7x
Edison International	\$61.07	-2%	-10%	23,280	56,909	14,503	4,792	4.2x	3.9x	3.6x	12.7x	11.9x	10.2x	21.1x	21.8x	16.9x
Public Service Enterprise	\$60.45	-3%	-9%	30,180	48,105	9,766	4,178	4.8x	4.9x	5.4x	12.0x	11.5x	14.1x	17.3x	16.4x	17.3x
Entergy	\$110.12	-1%	-1%	22,396	50,539	10,922	3,905	4.9x	4.6x	4.3x	13.9x	12.9x	12.1x	19.6x	18.9x	17.2x
Transalta Renewables	C\$17.16	3%	-8%	3,543	4,009	366	358	11.6x	11.0x	9.8x	11.1x	11.2x	10.3x	29.9x	27.5x	25.8x
Fortis	C\$60.97	2%	1%	22,505	45,844	7,306	3,304	6.4x	6.3x	5.8x	14.3x	13.9x	13.5x	23.9x	22.8x	21.6x
Algonquin Power & Utilities	C\$17.44	0%	-4%	9,115	18,209	2,236	1,065	10.7x	8.1x	6.5x	21.0x	17.1x	13.7x	22.4x	31.7x	19.2x
Emera	C\$60.95	1%	-3%	12,501	26,296	4,526	1,909	5.7x	5.8x	5.2x	14.0x	13.8x	13.0x	21.2x	27.6x	19.4x
Canadian Utilities	C\$40.22	3%	10%	8,389	16,677	2,768	1,356	6.2x	6.0x	5.8x	12.3x	12.3x	11.6x	22.3x	22.8x	16.9x
FirstEnergy	\$37.65	1%	-9%	21,493	44,342	11,345	3,933	3.9x	3.9x	3.8x	11.4x	11.3x	11.5x	17.9x	15.4x	15.6x
Wec Energy	\$99.10	-1%	3%	31,260	46,555	7,732	2,884	6.2x	6.0x	5.5x	16.9x	16.1x	15.1x	26.2x	24.2x	22.6x
DTE Energy	\$124.04	-2%	4%	24,032	42,482	13,183	3,113	3.3x	3.2x	2.9x	12.0x	13.6x	12.8x	17.7x	22.0x	20.5x
Nisource	\$28.60	-1%	4%	11,606	23,109	4,881	1,845	4.4x	4.7x	4.4x	12.9x	12.5x	11.4x	23.0x	20.6x	18.2x
Median Average								5.3x	4.9x	5.2x	12.9x	12.9x	12.8x	22.3x	22.8x	19.4x
								6.1x	5.9x	5.5x	13.9x	13.6x	12.8x	22.5x	22.9x	20.0x
Integrated Utilities																
Duke Energy	\$106.18	-2%	3%	81,756	155,081	25,149	11,348	6.2x	6.2x	5.9x	15.0x	13.7x	13.0x	26.9x	20.8x	19.9x
The Southern Company	\$71.75	0%	5%	76,247	135,130	21,872	8,946	6.3x	6.2x	5.6x	15.1x	15.1x	14.3x	22.9x	23.0x	19.8x
Dominion Energy	\$78.44	-2%	0%	63,636	108,342	14,949	6,963	7.1x	7.2x	6.8x	16.8x	15.6x	14.2x	36.7x	20.3x	19.0x
American Electric Power	\$94.22	-1%	6%	48,386	85,602	16,507	6,311	5.4x	5.2x	4.9x	14.5x	13.6x	12.4x	22.5x	20.4x	19.0x
PG&E Corporation	\$10.42	3%	-15%	20,710	67,421	19,855	7,007	3.6x	3.4x	3.0x	9.7x	9.6x	8.3x	N/A	N/A	9.7x
Edison International	\$61.07	-2%	-10%	23,280	56,909	14,503	4,792	4.2x	3.9x	3.6x	12.7x	11.9x	10.2x	21.1x	21.8x	16.9x
Hydro One	C\$34.90	1%	6%	16,165	27,747	5,736	1,954	5.0x	4.8x	4.7x	14.8x	14.2x	13.6x	22.4x	21.5x	21.1x
Edison International	\$82.63	-1%	-7%	28,487	49,005	9,384	3,393	5.6x	5.2x	4.7x	15.5x	14.4x	13.1x	23.1x	22.3x	20.0x
Eversource Energy	\$124.04	-2%	4%	24,032	42,482	13,183	3,113	3.3x	3.2x	2.9x	12.0x	13.6x	12.8x	17.7x	22.0x	20.5x
DTE Energy	\$87.09	-1%	-2%	22,477	36,768	6,175	2,630	6.1x	6.0x	5.5x	15.0x	14.0x	13.0x	26.0x	22.8x	21.1x
Ameren Corporation	\$29.79	1%	8%	18,751	33,372	7,876	2,772	4.1x	4.2x	4.1x	12.7x	12.0x	11.3x	N/A	20.9x	20.1x
Centerpoint Energy	\$65.00	-2%	0%	18,858	31,632	6,965	2,498	4.6x	4.5x	4.2x	12.9x	12.7x	12.6x	24.7x	24.3x	22.6x
CMS Energy	\$27.41	0%	-9%	20,171	28,049	6,241	3,126	3.5x	4.5x	4.1x	6.4x	9.0x	9.3x	11.3x	16.1x	20.2x
PPL Corporation	\$70.41	-1%	1%	7,956	16,388	3,725	1,517	4.6x	4.4x	4.3x	11.3x	10.8x	11.7x	13.9x	13.4x	17.5x
Pinnacle West Capital	\$72.25	0%	3%	4,684	9,232	1,853	762	4.9x	5.0x	4.6x	13.7x	12.1x	11.4x	20.6x	19.3x	17.7x
Black Hills	\$72.25	0%	2%	4,684	9,232	1,853	762	4.9x	5.0x	4.6x	13.7x	12.1x	11.4x	20.6x	19.3x	17.7x
Median Average								4.9x	4.9x	4.6x	13.7x	13.1x	12.5x	22.4x	20.9x	19.9x
								5.0x	4.9x	4.6x	13.2x	12.8x	12.1x	22.2x	20.5x	18.9x

Figures in dollars millions except for share price; actuals are converted using FX rate as of the relevant fiscal year-end, estimates using the latest FX rate as of 18th of July 2022.

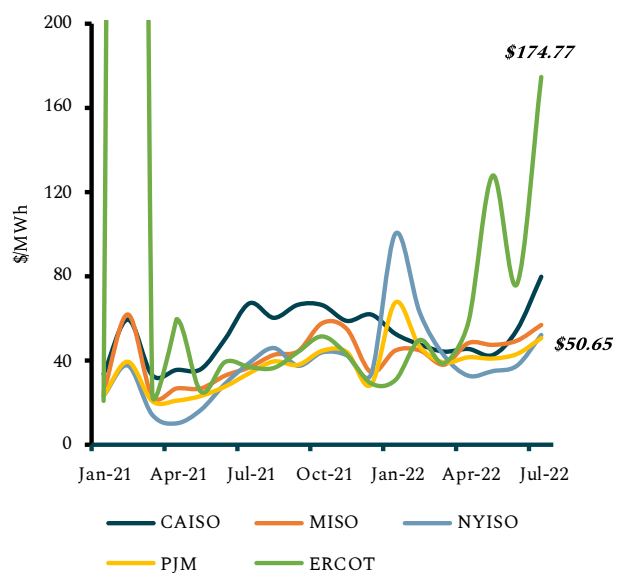
N/A: Not Applicable.

Source: Bloomberg as of the 18th of July 2022.

Monthly gas prices in the US and Europe



Monthly electricity prices in the US



Source: Bloomberg

OIL & NATURAL GAS

Company	Price	Weekly	YTD Price	Market	Enterprise	Revenue	EBITDA	EV/Revenue			EV/EBITDA			P/E		
	Current	% Change	% Change	Cap	Value	2021E	2021E	2020A	2021E	2022E	2020A	2021E	2022E	2020A	2021E	2022E
Oil & Gas Majors																
Saudi Aramco	43.00 ر.س.	0%	21%	2,292,966	2,379,781	391,549	229,773	10.4x	6.1x	4.1x	19.9x	10.4x	7.5x	47.9x	21.6x	16.7x
Exxon Mobil	\$89.73	2%	41%	379,170	432,414	283,736	53,705	2.4x	1.5x	1.1x	21.8x	8.1x	5.2x	N/A	17.0x	9.7x
Chevron	\$171.85	0%	44%	337,603	367,741	159,460	42,225	3.8x	2.3x	1.7x	21.2x	8.7x	6.0x	N/A	20.6x	11.6x
Royal Dutch Shell	#N/A	#N/A	16%	218,485	273,961	275,915	52,419	1.3x	1.0x	0.7x	8.3x	5.2x	3.6x	N/A	13.6x	7.1x
TotalEnergies	€47.27	1%	5%	134,109	166,806	185,136	38,338	1.4x	0.9x	0.6x	9.1x	4.4x	3.0x	N/A	8.3x	5.5x
Gazprom	212.25 P	-4%	-40%	63,055	#N/A	110,386	38,714	N/A	N/A	N/A	N/A	N/A	N/A	99.7x	2.5x	1.8x
BP	£405.20	1%	15%	103,446	156,917	153,737	36,017	0.8x	1.0x	0.7x	12.0x	4.4x	3.4x	N/A	10.1x	8.0x
Petrobras	R\$ 35.12	1%	11%	95,158	143,225	87,011	45,842	2.8x	1.6x	1.3x	6.7x	3.1x	2.5x	N/A	5.2x	3.6x
ConocoPhillips	\$103.39	2%	40%	134,005	149,152	45,331	20,529	8.1x	3.3x	2.1x	27.2x	7.3x	4.5x	N/A	16.0x	8.1x
Equinor	335.00 kr	-1%	42%	123,872	123,229	89,413	42,366	2.7x	1.4x	1.0x	7.0x	2.9x	1.9x	N/A	14.0x	8.1x
Novatek	1,026.80 P	1%	-42%	39,124	40,426	14,590	4,568	N/A	2.8x	3.1x	N/A	8.9x	8.5x	N/A	7.1x	8.6x
Eni	€14.03	-1%	13%	55,000	76,120	83,816	18,684	1.2x	0.9x	0.6x	6.7x	4.1x	2.9x	N/A	10.8x	6.8x
Marathon Petroleum	\$92.97	7%	42%	51,931	75,371	113,117	7,611	1.0x	0.7x	0.6x	22.8x	9.9x	6.9x	N/A	7.9x	13.1x
Canadian Natural Resources	C\$87.89	6%	61%	81,902	93,939	23,137	12,166	7.2x	4.1x	3.2x	20.8x	7.7x	5.2x	N/A	13.7x	8.6x
Lukoil	4,020.00 P	-18%	-40%	34,909	35,970	121,259	18,573	N/A	0.3x	0.3x	N/A	1.9x	1.6x	N/A	4.7x	3.8x
Phillips 66	\$90.19	9%	19%	43,384	58,229	110,674	4,784	0.9x	0.5x	0.4x	31.1x	12.2x	7.9x	N/A	42.2x	11.2x
Valero Energy	\$110.00	5%	43%	45,038	57,428	106,764	4,120	0.9x	0.5x	0.4x	56.6x	13.9x	7.3x	N/A	65.3x	11.8x
Omv	€47.27	5%	-7%	16,818	33,034	35,360	9,308	1.6x	0.9x	0.7x	7.3x	3.5x	2.9x	15.7x	5.6x	5.4x
Repsol	€13.76	0%	29%	22,848	34,506	57,067	7,743	0.9x	0.6x	0.5x	7.2x	4.5x	3.5x	N/A	7.9x	6.4x
Galp Energia	€11.69	-2%	34%	10,534	15,606	18,791	2,686	1.1x	0.8x	0.7x	8.1x	5.8x	4.2x	N/A	18.5x	10.9x
Petronas Gas	RM16.90	0%	-2%	7,784	7,761	1,337	874	5.6x	5.8x	5.7x	8.4x	8.9x	8.7x	15.5x	16.2x	16.9x
Petronet LNG	₹ 210.70	3%	-4%	4,149	3,859	3,745	592	0.9x	1.0x	0.7x	7.0x	6.5x	6.1x	10.8x	N/A	9.9x
China Oil & Gas	HK\$0.40	7%	-13%	290	1,452	#N/A	#N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Median								1.4x	1.0x	0.7x	9.1x	6.1x	4.1x	15.7x	13.4x	8.8x
Average								2.9x	1.8x	1.4x	16.2x	6.8x	4.9x	27.9x	13.7x	8.8x

Figures in dollars millions except for share price; actuals are converted using FX rate as of the relevant fiscal year-end, estimates using the latest FX rate as of 18th of July 2022.

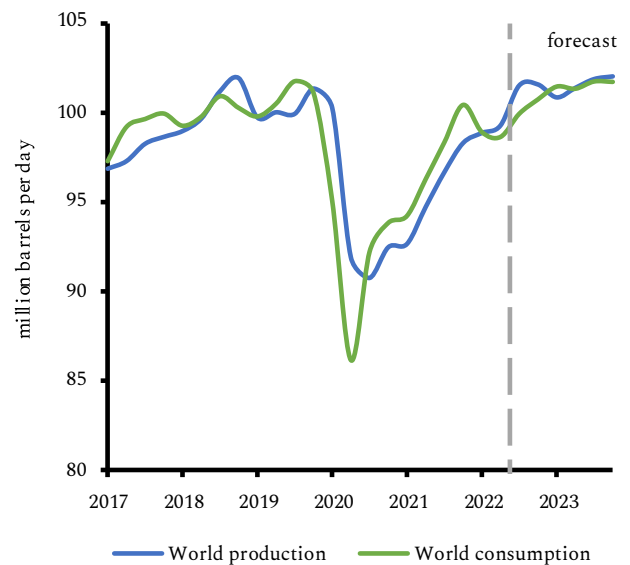
N/A: Not Applicable.

Source: Bloomberg as of the 18th of July 2022

West Texas Intermediate Crude Oil Price



Daily global crude oil demand



Source: Bloomberg

An aerial photograph of a lush green forest with a river winding through it. The river is a dark blue line that curves from the bottom left towards the top right. The forest is a dense canopy of green trees, with some areas appearing lighter green and others darker. The overall scene is a natural, serene landscape.

SELECTED M&A

SELECTED M&A TRANSACTIONS

Date	Target	Country	Valuation (\$m)	Solution	Acquirers
Mobility					
04 Jul	Valeo Siemens eAutomotive	Germany	238	EV Power Electronics	Valeo
01 Jul	WebEye Telematics	Hungary	48	Fleet Management	Eurowag
20 Jun	SemaConnect	US	161	EV Charging	Blink Charging
11 May	Reby	Spain	62	Micromobility	House of Lithium
22 Apr	EB Charging	UK	18	EV Charging	Blink Charging
Renewables					
28 Jun	Emerald Solar Energy	Canada	13	EPC	Polaris Infrastructure
15 Jun	Seachange Group	US	216	Biofuels	Ingenia Communities Group
13 Jun	Renewable Energy Group	US	2522	Biofuels	Chevron
31 May	SunPower	US	200	Solar Manufacturer	TotalEnergies
23 May	Geotek	UK	80	Energy Tech	Judges Scientific
05 May	Fiberline Composites	Denmark	65	Energy Tech	Gurit Holding
03 May	8point8	UK	10	EPC	Mitie Group
21 Apr	Univergy Autoconsumo	Spain	10	Developer	Greenvolt
19 Apr	Photosol France	France	322	IPP	Rubis
15 Apr	New Energy Equity	US	126	Developer EPC	Allete
11 Apr	Nispera	Switzerland	23	Energy Tech	Fluence
Energy Storage & Fuel Cells					
07 Apr	Huayu Power Source	China	37	Energy Storage	Yadea Group Holdings
25 May	Johnson Matthey	UK	50	Battery Tech	EV Metals

Source: Bloomberg