HASHRATE INDEX

Hashrate Index **Q3-2022 Report:** Gradually, Then Suddenly

Luxor

Authored by: Colin Harper
With assistance from: Balmy Investor, Ben Harper, Jaran Mellerud, Ethan Vera
Designed by: Mikołaj Gałęziowski

About Hashrate Index

Hashrate Index is a Bitcoin mining data, analytics and research platform. Our platform offers novel data sets that enable miners, traders, content creators, and investors to gain key insights into the mining industry and generate alpha. Hashrate Index is a product of Luxor Technologies, a mining software and services company.

“How did you go bankrupt,” Bill asked?

“Two ways,” Mike said. “Gradually and then suddenly.”

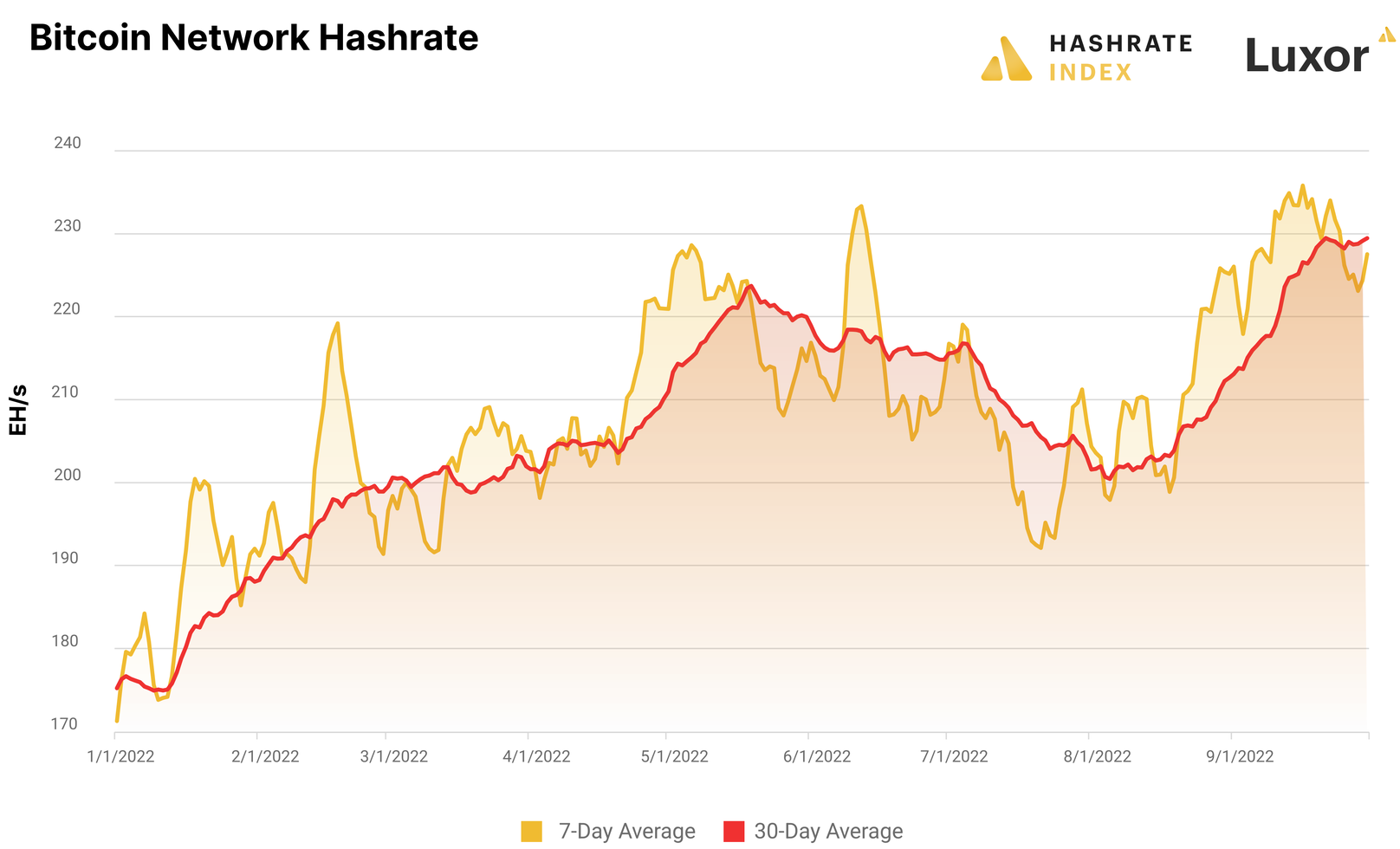
-Ernest Hemingway, *The Sun Also Rises*

Table of Contents

The Bitcoin mining sector's third quarter in 2022 could rightly be summed up in one word: limbo.

Bitcoin's precipitous drop to $17.5k at the end of Q2 presaged hardship for Q3. This hardship came in many forms, such as rising energy prices and adverse weather that impeded mining operations, particularly for industrial miners. But these difficulties also created stagnancy. As summer heatwaves choked power access in mining hubs like Texas, hashrate melted down in July and August. This led to lowered mining difficulty, and – with an assist from Bitcoin's price recovering from June's lows – it also gave a boost to hashprice.

Q3's sluggish hashrate growth highlights how hamstrung miners were over the quarter. The 7-day average only increased by 6.6% from 212.4 EH/s at the close of Q2 to 227.6 EH/s at the close of Q3. Notably, though, the average 7-day hashrate for the entirety of Q3 was only 0.5% less than the average for Q2 (214.2 EH/s vs 214.5 EH/s, respectively). Looking at year-over-year numbers, Bitcoin's hashrate increased 61% from the end of Q3-2021 to the end of Q3-2022.



Source: Hashrate Index

Hashprice rose briefly in the footsteps of July's hashrate dip, but some miners could not capitalize on this increase because their curtailed/limited operations contributed to the very hashrate reduction that gave way to a higher hashprice. Industrial sized public miners were hit particularly hard here. Throughout the quarter, nearly all of them sold significant stocks of BTC to compensate for thinning margins, cover costs, and pay down pressing debts. Going further, miners both big and small continue to liquidate Bitcoin mining rigs; with rack space sparse and energy prices riding high, miners who were overzealous in the bull market with ASIC purchases are having to cut their losses and hock inventory, especially those with high-interest debt from ASIC financing.

All of that said, as we write this report, Q3's limbo has graduated into a more hellish scenario. Hashprice recently hit an an all-time low, pushing many miners up against breakeven costs (particularly those with average or above average energy rates and mid-gen equipment). With machines becoming less profitable, new/mid-gen ASICs are approaching their own all-time low values.

For as difficult as Q3 was for Bitcoin miners, Q4 is turning out to be more difficult still, and the beginning of it smells eerily similar to Q4-2020 – the last time hashprice hit an all-time low. We're nearing a tipping point in market conditions where many miners will be washed out, and the efficient operators will separate themselves from the inefficient.

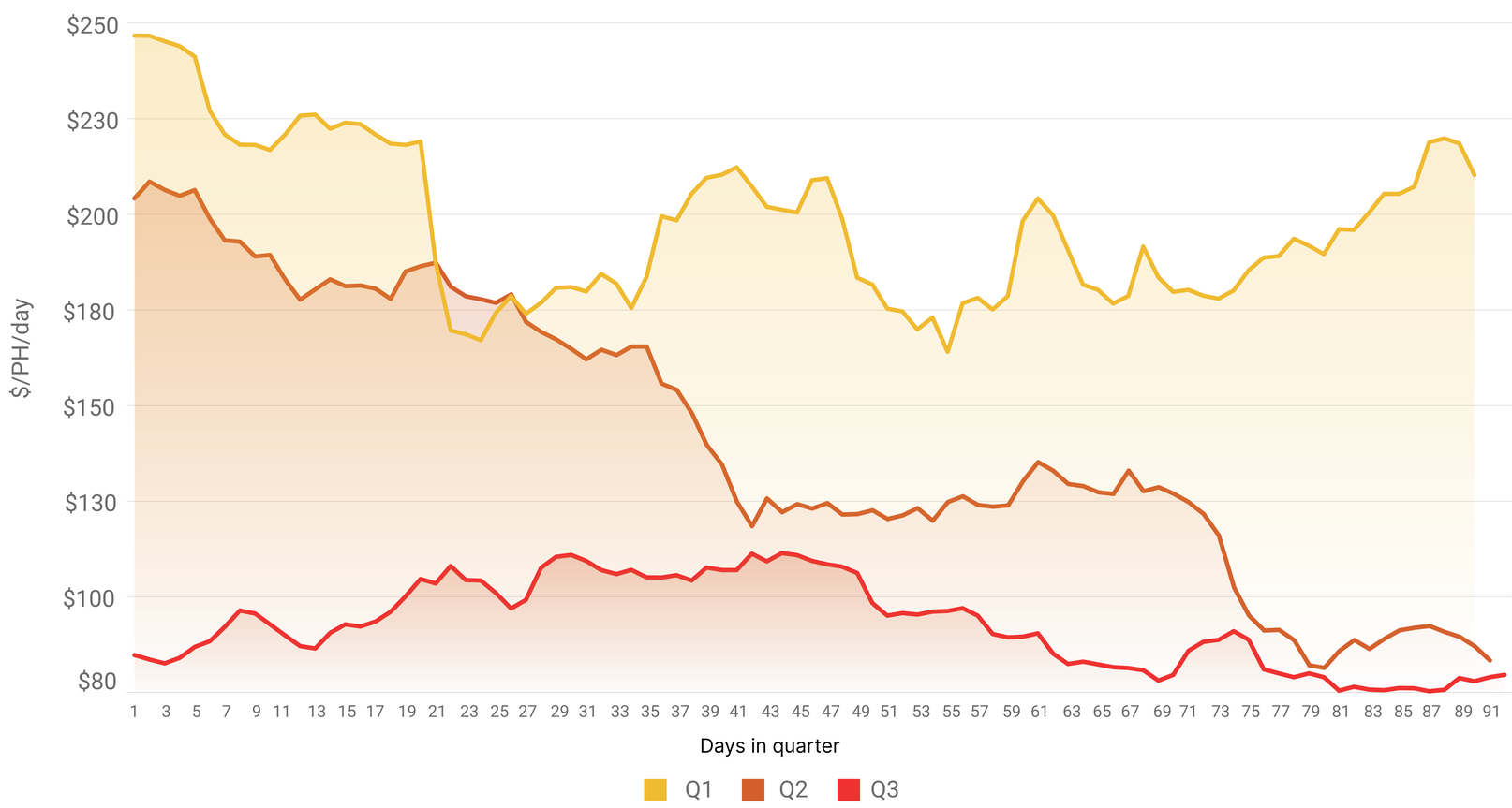
1

Hashprice Teeters on the Edge

Bitcoin's hashprice saw some reprieve in the middle of Q3 as hashrate came offline in the heat of the summer and Bitcoin's price recovered from its June sell-off. This reprieve was short lived, though, and as Bitcoin's price slipped back below $20k and difficulty ramped up, hashprice slipped closer and closer to all-time low territory.

- **Throughout Q3, USD hashprice fell from $83.30/PH/day to $79.60/PH/day (-5%)**
- **Q3's average USD hashprice was $92.70/PH/day vs. Q2's average of $141.20/PH/day (-34%)**
- **Year-over-year (the end of Q3-2021 to the end of Q3-2022), USD hashprice declined from $290.40/PH/day to $79.60/TH/day (-73%)**

USD Hashprice Q1, Q2, Q3 (2022)



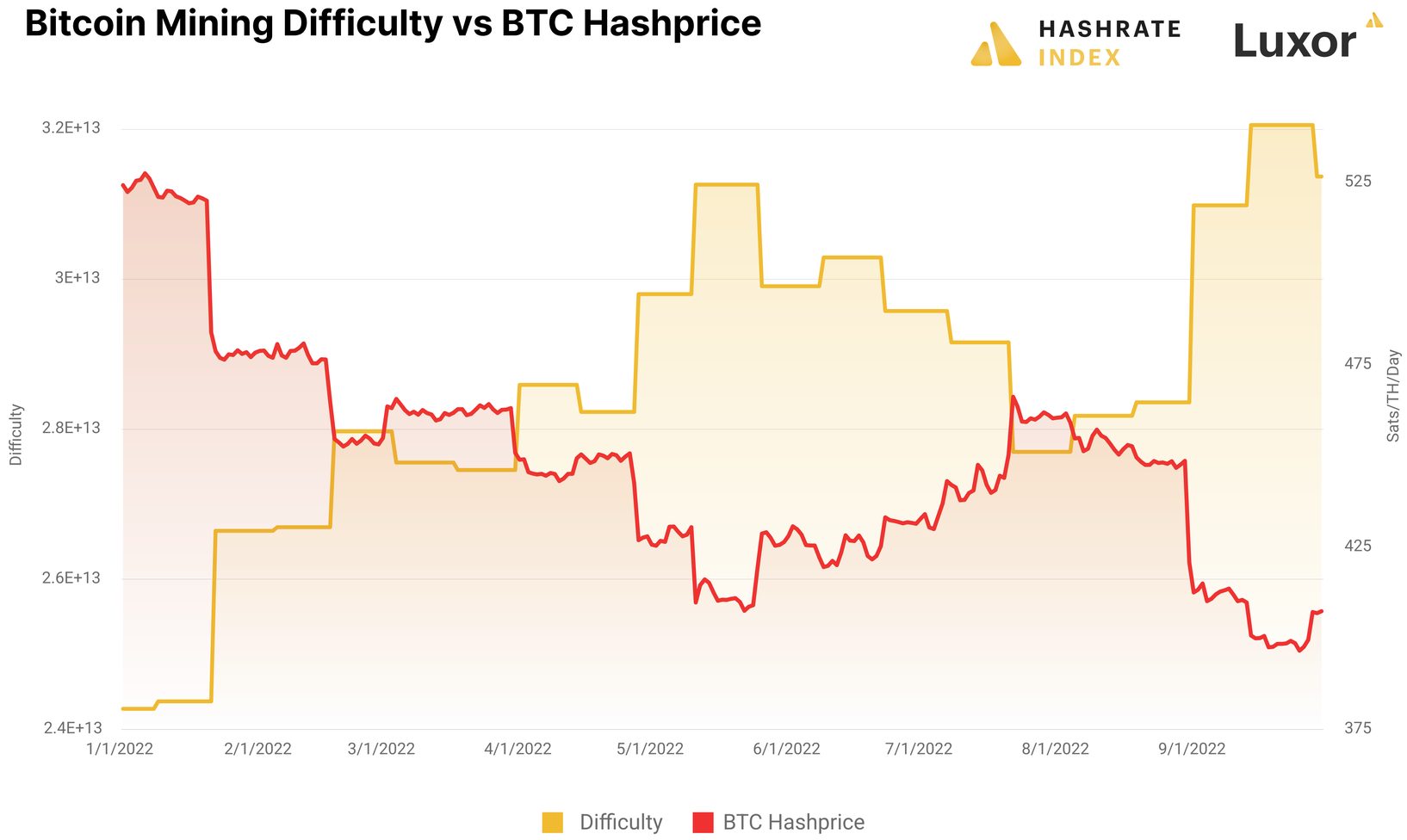
Source: Hashrate Index

While USD hashprice only flirted with all-time low territory in Q3, BTC denominated hashprice hit a new all-time low of 397 sats/TH/day just before the quarter's close.

- **BTC hashprice fell from 437 sats/TH/day to 407/sats/TH/day over Q3 (-5.6%)**
- **Year-over-year (the end of Q3-2021 to the end of Q3-2022), BTC hashprice declined from 671 sats/TH/day to 397 sats/TH/day (-40%)**
- **Q3's average hashprice was actually larger than Q2's average, an increase from 430 sats/TH/day to 434 sats/TH/day (+1%)**

(For those not in the know, sats is short for "satoshi," a unit of measurement that is equal to 0.00000001 BTC, so 100 sats equals 0.00000100 BTC).

Of course, with hashrate surging in the second half of the quarter, Q3's hashprice decline was spurred primarily by a series of upward difficulty adjustments. Bitcoin's difficulty hit an all-time high of 32.05 trillion on September 13, and has continued to set new highs in October.



Source: Hashrate Index

Hashprice Derivatives Hit the Market

With hashprice getting crushed, miners now have a new way to hedge this downward pressure on revenue streams.

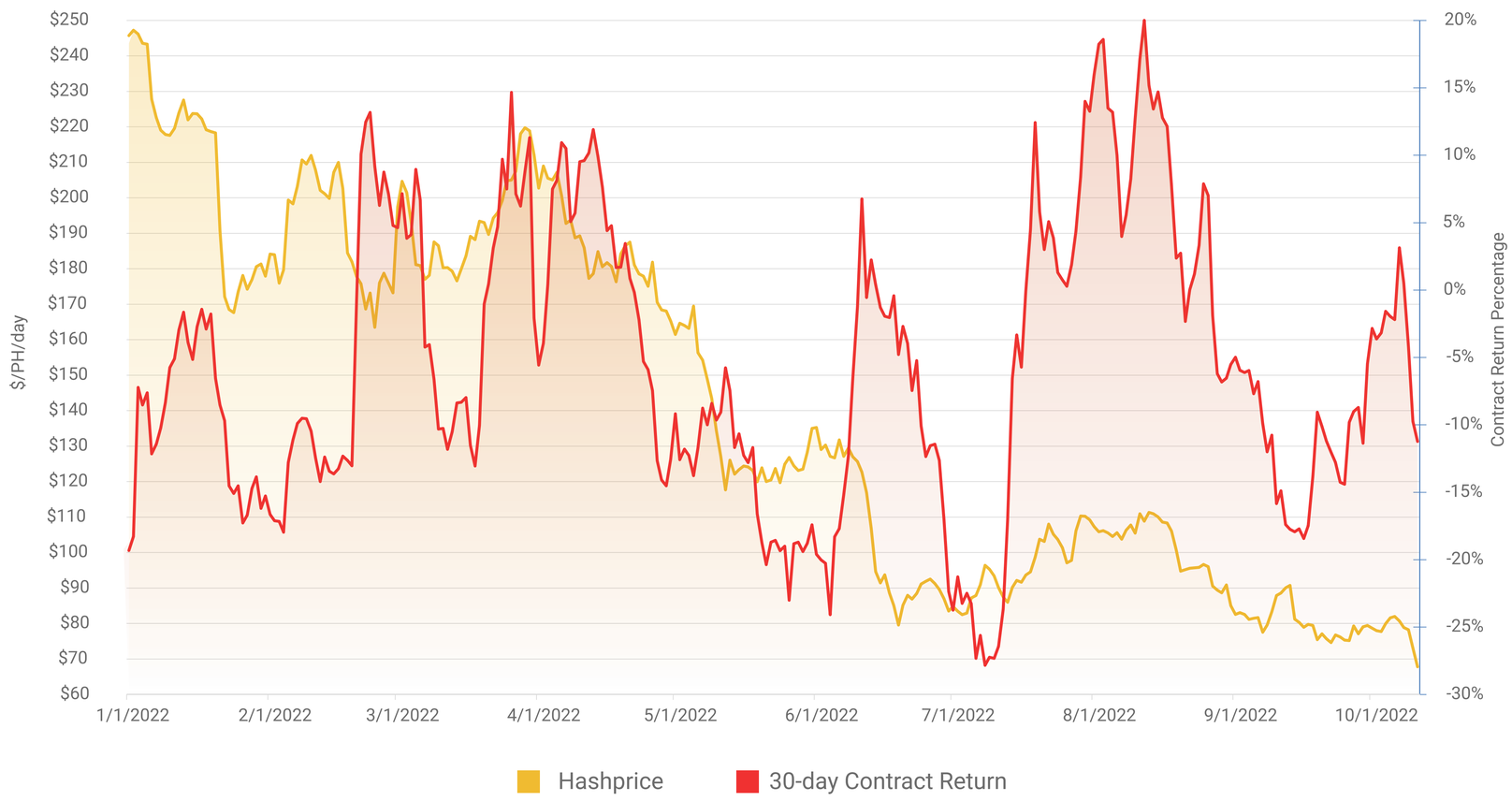
After years of ideation and tinkering, Luxor has launched its first Bitcoin mining derivative: the Luxor Hashprice Non-Deliverable Forward (NDF).

Luxor has always viewed hashrate as a digital commodity in its own right, and the Luxor Hashprice NDF gives miners an unprecedented financial instrument to trade this commodity.

The derivative is available OTC through Luxor, and it allows miners to lock-in a hashprice threshold for the duration of the contract period. For example, a miner could offer a contract for 100 PH/s of hashrate for $70/PH/day ($7,000 in daily revenue) for 30 days. If the average hashprice during this 30 day period is below $70/PH/day when the contract expires, then the miner profits from the agreement; if it rises above $70/PH/day, then the miner loses out on that upside.

The below chart illustrates the spot value of hashprice (in $/PH/day) vs the 30-day contract return for a hypotehtical hashprice NDF contract. In other words, if an NDF trade settles today, it shows how much the trade moved in the past 30 days from hashprice the day before the trade was executed.

Hashprice and 30 Day Contract Return



Source: Hashrate Index, Luxor business data

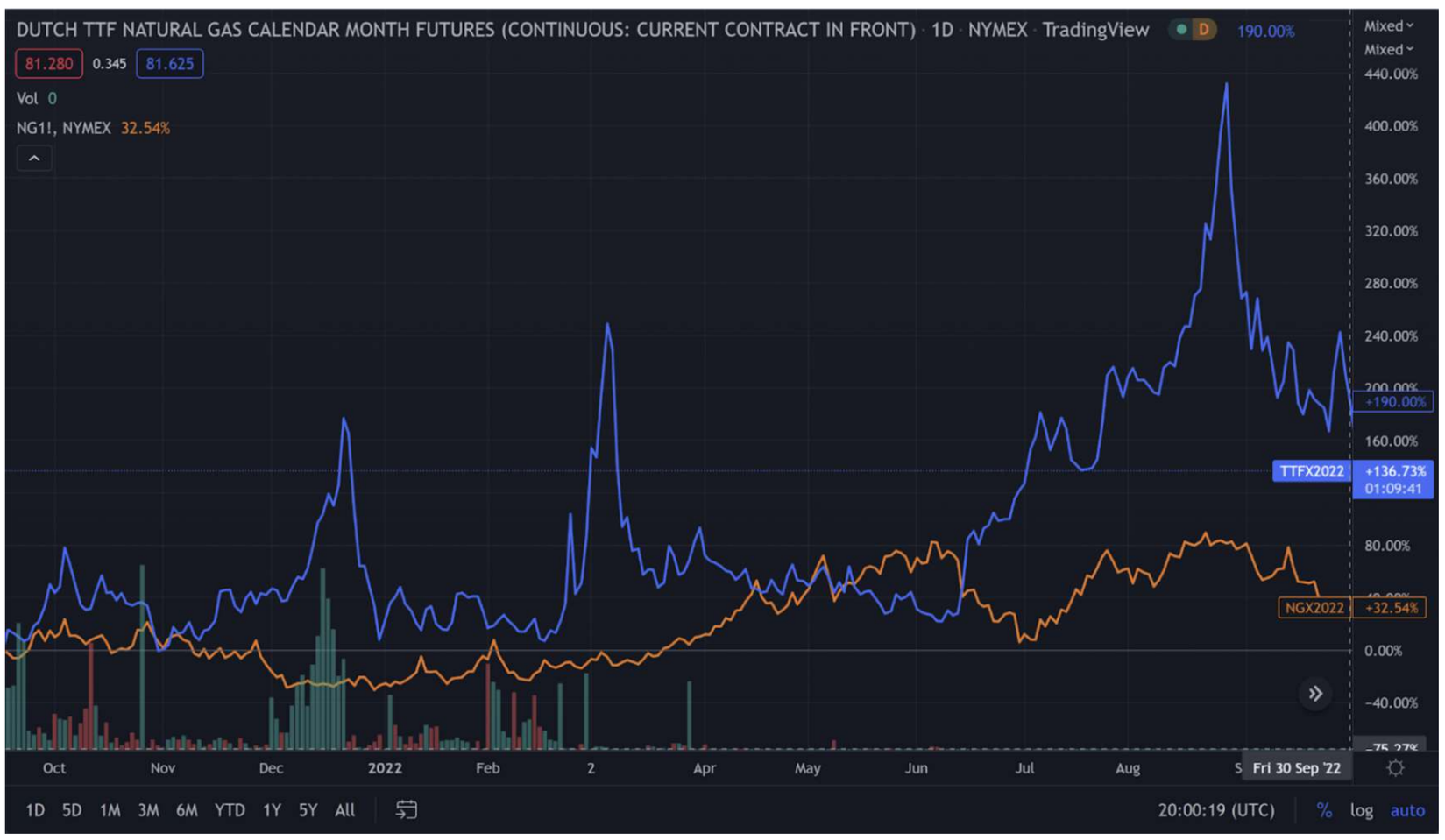
2

Bitcoin May Be in a Bear Market, But Energy Isn’t

While hashprice is plummeting, energy costs are going up across the board, a deadly combo for mining profit margins.

This situation has been particularly dire in Europe. A combination of mis-managed renewable energy policies, underinvestment in oil and gas, nuclear plant decomissionings, and Russia's war with Ukraine have sent energy prices on a jaw-dropping tear.

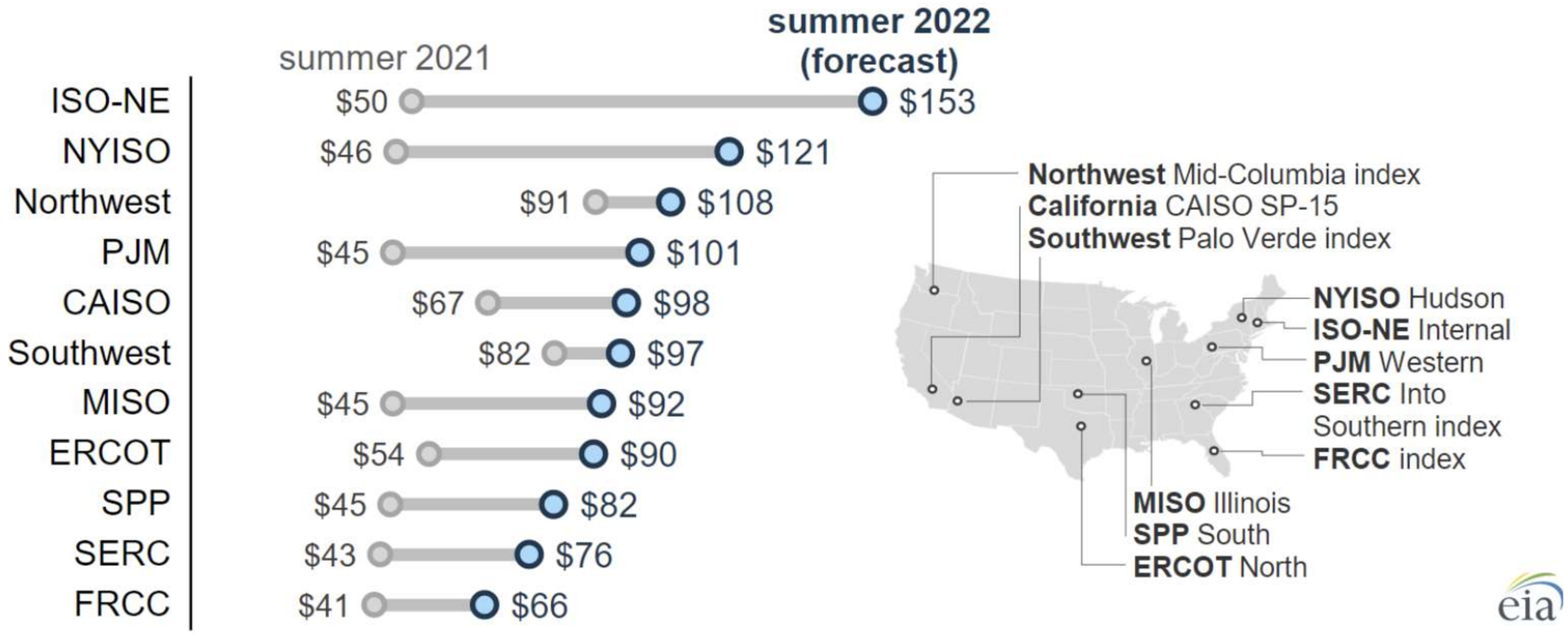
To provide one example, the Dutch Transfer Facility Gas Futures (a common index for European natural gas prices) rose an eye-watering 136.73% year-over-year by the end of Q3-2022. Henry Hub Futures (an index for US natural gas prices traded on the New York Mercantile Exchange) rose a more modest – but still substantial – 32.54%.



Dutch Transfer Gas Facility in blue and Henry Hub in orange | Source: TradingView

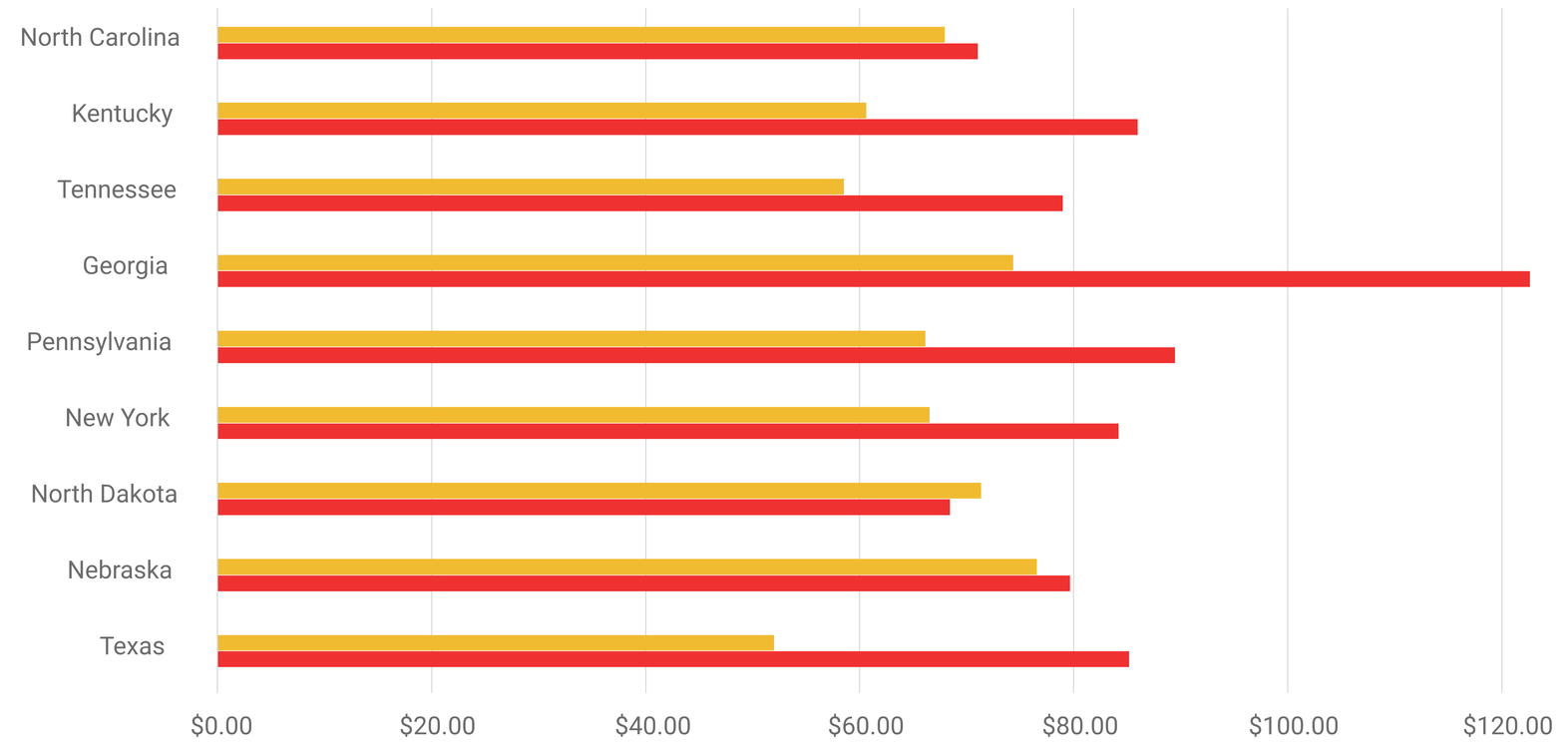
If Bitcoin mining wasn't popular in Europe before, it's nearly impossible now on the continent. Still, there are a few outliers like Norway, thanks to its abundance of cheap hydro energy in the northern reaches of the country, an area that is not interconnected with mainland Europe for energy supply.

Turning an eye to power rates in the United States, the average cost of industrial electricity increased 25% from $75.20 a megawatt hour to $94.30 per megawatt hour from July 2021 to July 2022.



When looking at popular mining states in the US, some states saw even sharper increases. Very few states saw stagnant / minor growth in electricity rates or decreases in electricity rates.

Average Industrial Power Price July 2021 vs July 2022 ($/mWh)



	Texas	Nebraska	North Dakota	New York	Pennsylvania	Georgia	Tennessee	Kentucky	North Carolina
Jul-21	$52	$76.50	$71.30	$66.50	$66.10	$74.30	$58.50	$60.60	$67.90
Jul-22	$85.10	$79.60	$68.40	$84.10	$89.40	$122.50	$78.90	$85.90	$71.00
Change	64%	4%	-4%	26%	35%	65%	35%	42%	5%

Jul-21 Jul-22

Source: eia.gov

Texas, for instance, saw a tremendous 64% increase in the price of electricity from July 2021 to July 2022. It's worth noting that this increase was an outlier event given a persistent heatwave that strangled the grid in July; as air conditioning units were pushed to the max across Texas, the grid experienced significant stress, something that was exacerbated by the fact that wind turbines underperformed substantially in the sweltering climate.

For industrial miners, the rise in prices and grid strain necessitated load shedding. Riot, for example, earned $9.5 million worth of power credits in July and $3 million in August for its power curtailment at times of grid stress. This practice can be lucrative, as evidenced by the fact that Riot's July curtailing revenue was worth more than the BTC the company earned individually in July, August, and September.

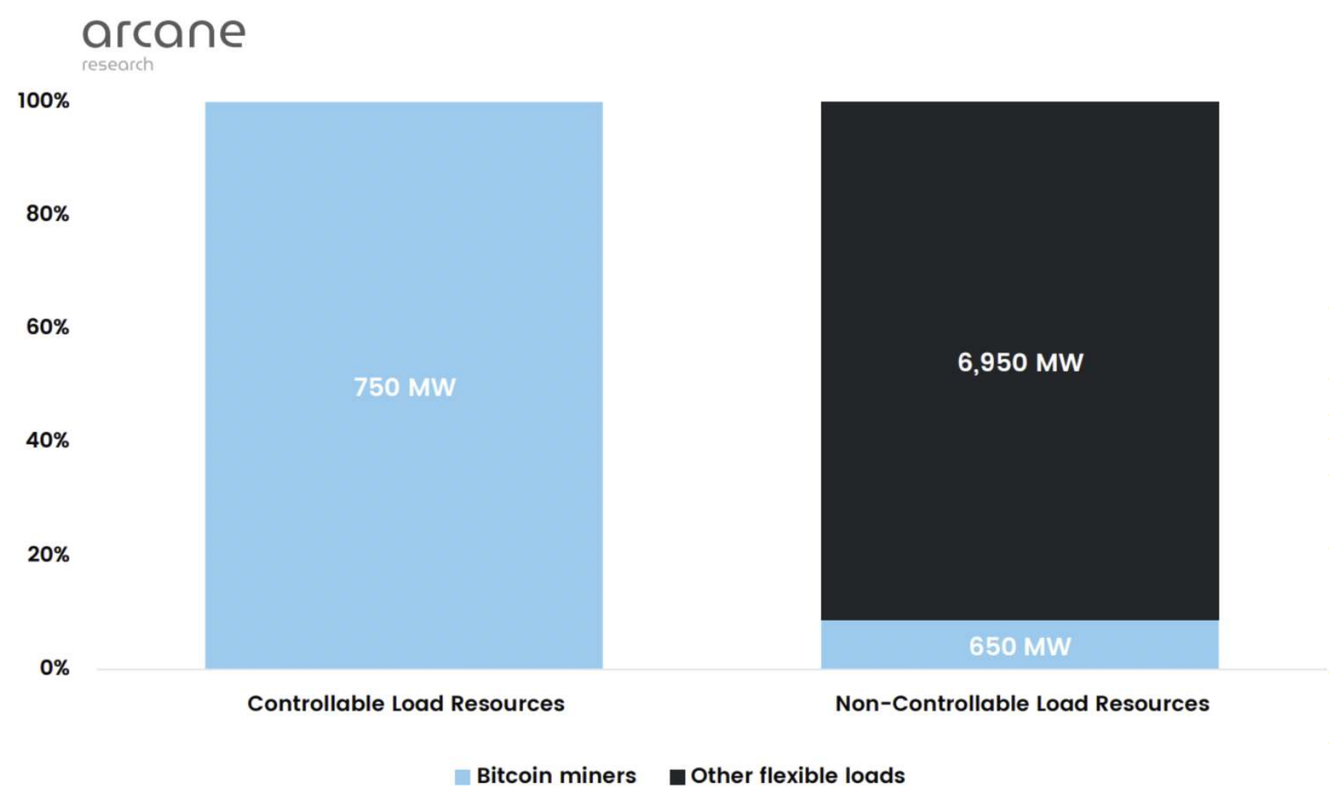
Riot July 2022 Operations	BTC/BTC Equivalent	$ Value
BTC Mining	318	$6,900,000
Power Curtialing	439	$9,500,000
Total	**759**	**$16,400,000**

Riot August 2022 Operations	BTC/BTC Equivalent	$ Value
BTC Mining	374	$8,300,000
Power Curtailing	136	$3,000,000
Total	**510**	**$11,300,000**

Source: Riot press releases

Other miners in Texas may have similar contracts in place with The Electric Reliability Council of Texas (ERCOT), but it's worth noting that these load shedding scenarios can come in various forms and don't always guarantee remuneration for curtailment. Additionally, smaller operations may not have the opportunity to take advantage of such opportunities.

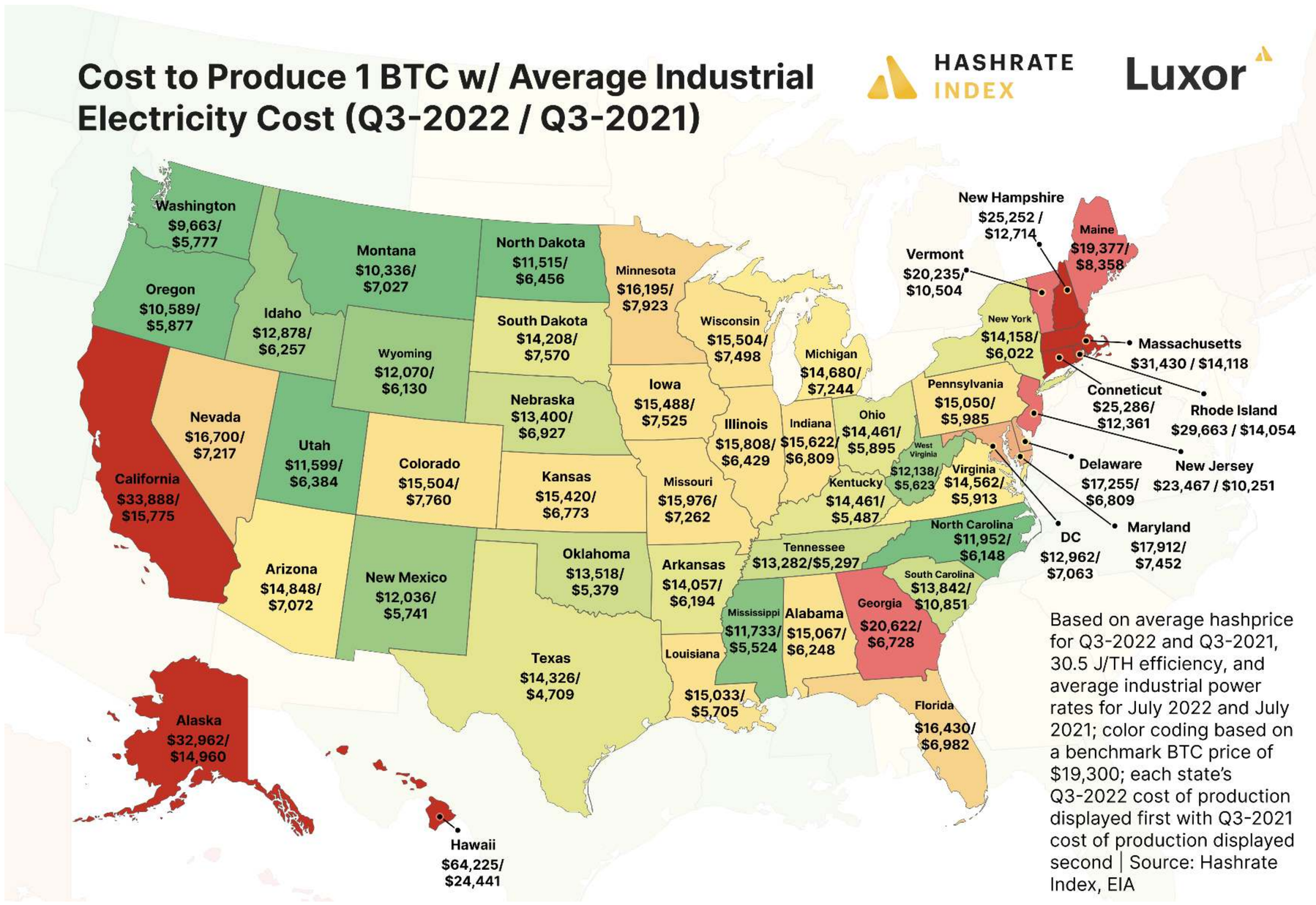
As Arcane covered in their How Bitcoin Mining Can Transform the Energy Industry Report, there are currently eight Bitcoin miners representing 750 MW of load that ERCOT designates as controllable load resources. These miners represent some 10.8% of flexible load resources in Texas, though this number could be even smaller. Per Arcane's report, Texas miner Rich Godwin, who tracks these curtailing practices, suggests that only ~130 MW of Bitcoin mining load participates in controllable load programs. Arcane points out that this could mean that not all miners participate in load shedding at the same time, or more likely, it could mean that they are shedding load but are not compensated for this service.



Source: ERCOT

Touted as the new mecca of Bitcoin mining since China's mining ban, Texas has become the largest hashrate holding state in the United States. Still, Texas only has so much capacity, and ERCOT has slowed issuing permits to miners in Texas, so much so that the Texas Blockchain council now estimates that Texas will host 3.5 GW of Bitcoin mining capacity by Q1-2024 instead of the previously projected 5 GW.

With power costs swelling and hashprice crumbling, the cost to produce 1 BTC has risen drastically since last year. The below chart does not factor in machine cost and downtime; still, it's a useful and novel way to illustrate just how much current mining economics have impacted the cost of BTC production.



Hosting: 0.08/kWh is the new $0.06/kWh

As energy prices rise and hashprice plummets, hosting rates are rising in step.

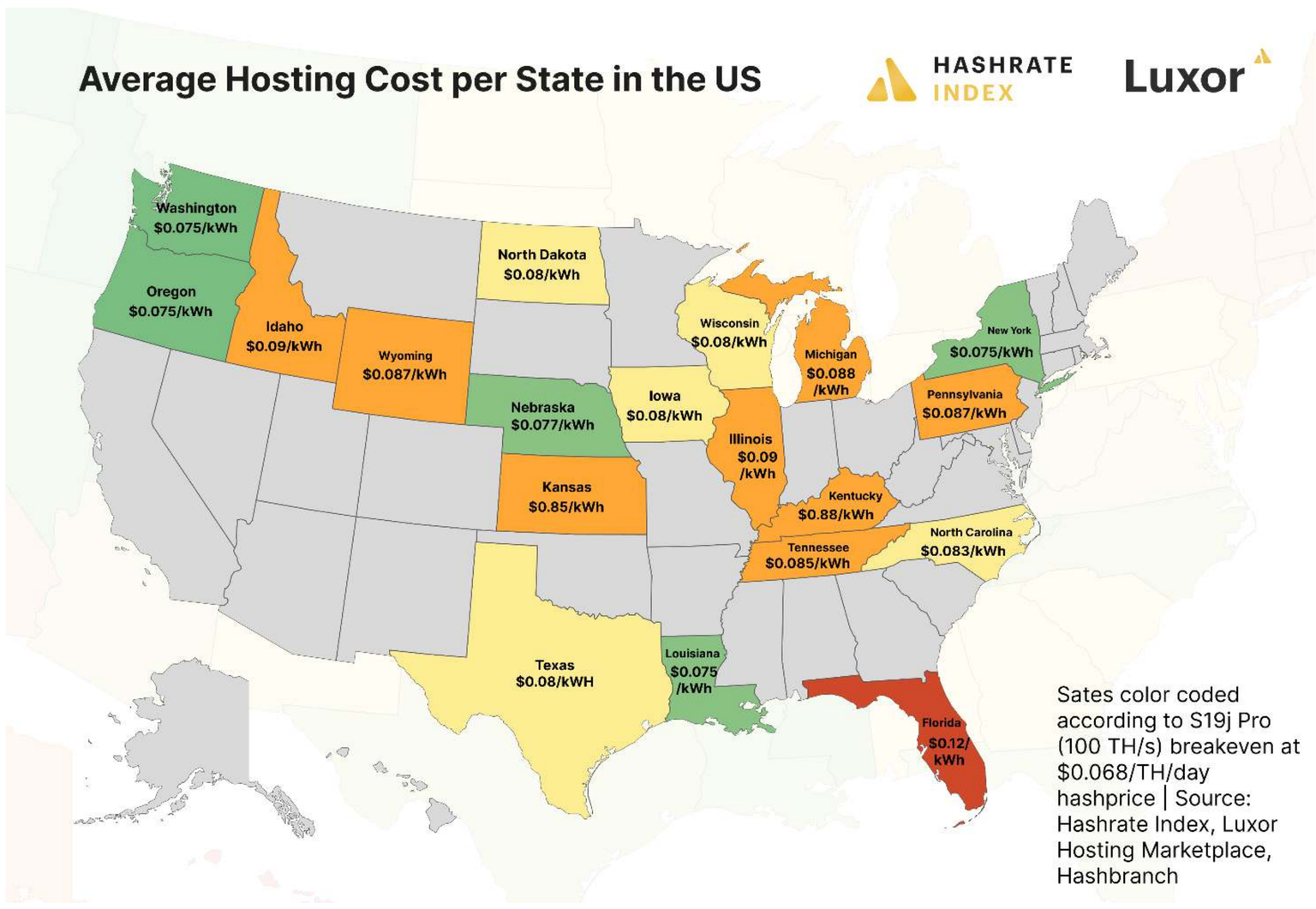
Over the past year, many miners have failed to lock in fixed power purchasing agreements (PPAs), or they neglected to understand the variable rates within their contracts. Both are critical oversights which have contributed to depressed margins as rising power rates and anemic hashprice squeeze profits.

This phenomenon is especially difficult for miners who rely on third party hosting providers. These hosting companies often make spreads on the power they purchase directly from the grid by marking up power costs in their hosting contracts with miners. As power rates have risen, these hosting providers have jacked up prices accordingly.

Before 2022's energy price inflation, a reasonable hosting contract might offer power prices at $0.05-$0.06/kWh. Now, it's not uncommon to see $0.08-0.09/kWh, and many hosting contracts are switching from the standard 'all-in' hosting terms to profit/revenue sharing models. Anything below $0.075/kWh is considered "a steal" given market conditions.

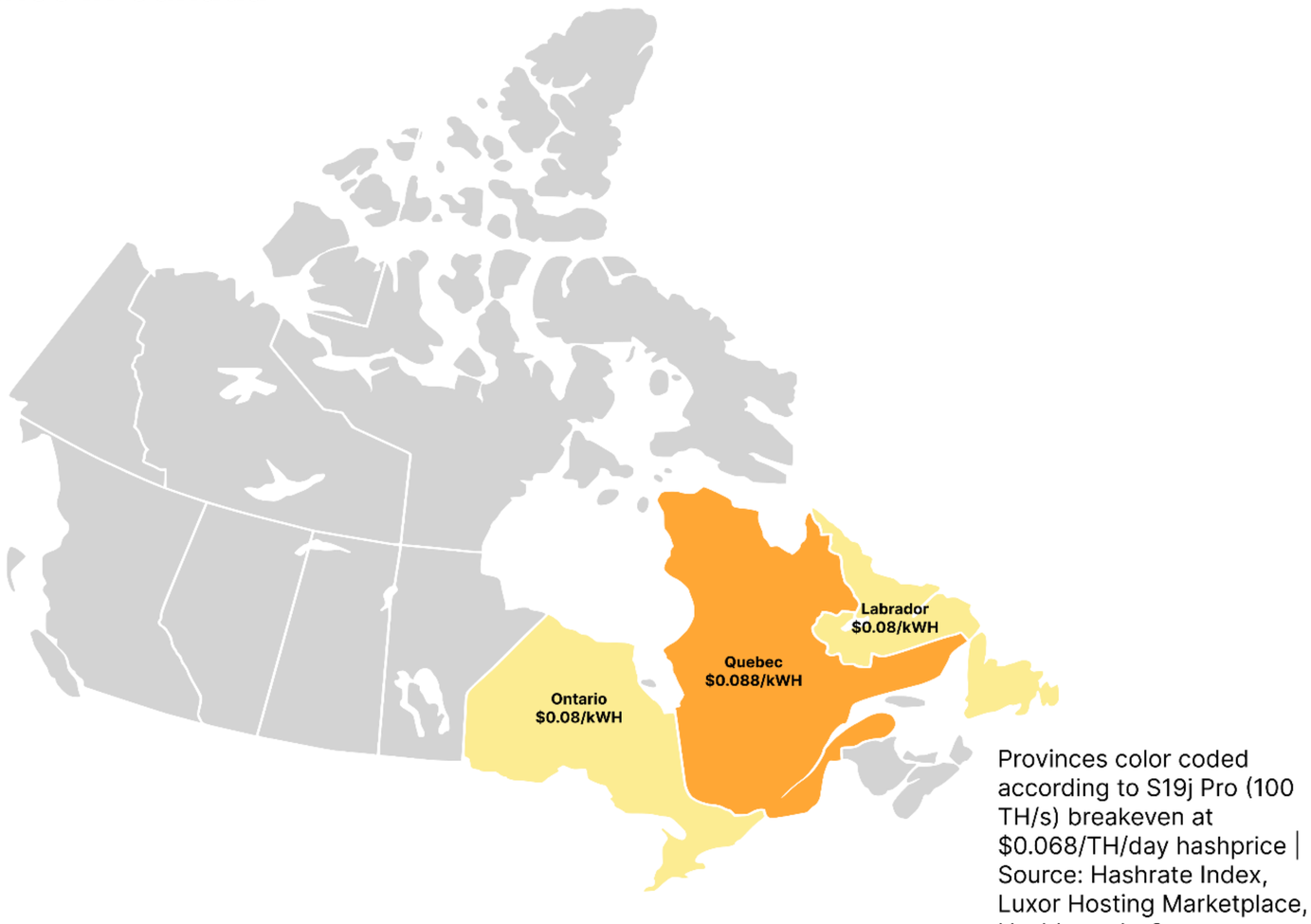
As hosting rates rise, teams that are traditionally not active in site development are being forced to consider owning infrastructure further down the stack in order to achieve reasonable margins.

Based on analysis that we conducted of public hosting rates from Hashbranch and Luxor's ASIC Trading Desk, the majority of hosting providers in the United States are butting up against breakeven thresholds for even new-gen machines like the S19j Pro (100 TH/s). Admittedly, this dataset is not comprehensive and the rates are more geared toward small-to-mid-sized operations, but the prices are in line with private rates that Luxor's business team has observed.



Hosting rates in popular Canadian provinces aren't faring any better. As with our chart for the US, the following dataset is not comprehensive but is in line with private rates that Luxor's business team has observed.

Average Hosting Cost per Province in Canada



Provinces color coded according to S19j Pro (100 TH/s) breakeven at $0.068/TH/day hashprice | Source: Hashrate Index, Luxor Hosting Marketplace, Hashbranch, Compass Mining

To add color to the above data, it's important to note that miners who are dealing in substantial quantities may receive a $0.005-0.015 discount per kWh compared to the above rates. Additionally, some miners are willing to pay a ~$0.01/kWh premium for a host that utilizes a preferred energy mix (a miner seeking renewable energy, for example), and other miners will pay premiums on hosting rates for providers with proven track records or those who can deliver high machine uptime. We are also seeing a significant premium ($0.01/kWH) for hosting rates in the near term (Q4-2022) vs in Q1-2023.

The Rise of the Profit Share Standard

As power prices go up for hosts, so too have profit and revenue sharing agreements. Some hosts may opt to offer lower power costs to Bitcoin miners while baking into the contract a profit/revenue sharing agreement.

These are particularly common for Bitcoin mining operations that are powered via stranded natural gas (i.e., gas that would not be brought to market and is vented or flared as a result). With natural gas prices rising, we have seen some profit sharing agreements go as high as 40% of mining profit, whereas in 2021 and early 2022, a typical agreement ranged from 15-30%.

The safest move for hosting providers that have not locked in a fixed PPA is to offer a pass-through power cost and to charge clients a fee on top of this cost. This does raise some questions regarding misaligned incentives between host and client, though, because the hosting provider isn't incentivized to lower costs for their clients if the power rates they negotiate through power programs go down.

Breakeven Thresholds Loom

With hashprice crushed, many miners with run-of-the mill hosting agreements or power costs are near (or have hit) breakeven costs, especially those with mid-range equipment.

Rather than use Q3's closing hashprice, which would be outdated at the time of this report's publication, the following breakeven analysis is based on the October 13, 2022 USD hashprice of $0.068/TH/day.

Given this hashprice level, mid-gen equipment like the S17 (56 TH/s) is unprofitable from $0.07/kWh and up, and these rigs are basically breakeven at $0.06/kWh. New-gen rigs like the S19j Pro (100 TH/s) are unprofitable at $0.10/kWh, basically at breakeven at $0.09/kWh, and nearing breakeven at $0.08/kWh.

Electricity Price ($/kWh)	Hashprice ($/PH/day) breakeven S9	Hashprice breakeven S17	Hashprice breakeven S19j Pro	Hashprice breakeven S19 XP
$0.01	$24	$11	$7	$4
$0.02	$48	$21	$15	$7
$0.03	$72	$32	$22	$11
$0.04	$96	$43	$29	$15
$0.05	$120	$54	$37	$18
$0.06	$144	$64	$44	$22
$0.07	$168	$75	$51	$26
$0.08	$192	$86	$59	$29
$0.09	$216	$96	$66	$33
$0.10	$240	$107	$73	$37

Source: Hashrate Index

When machines become unprofitable, it is common for the hosted client to abandon them, especially retail miners. If hashprice falls below $60/PH/Day we could see many miners abandon their machines with their hosting providers. The hosting providers will gain plenty of equipment, but they might not have the cost buffer to run them either (if hashprice drops to $45/PH/day, for example, many of these hosts won't be able to hash these abandoned machines for profit).

3

Mining Rig Prices Approach All-Time Lows

Bitcoin mining ASICs have been in a downtrend all year. They declined in price less drastically in Q3 than in Q2, but they still lost substantial value.

Quarter-over-quarter, Bitcoin mining rigs fell slightly less in Q3 than they did in Q2:

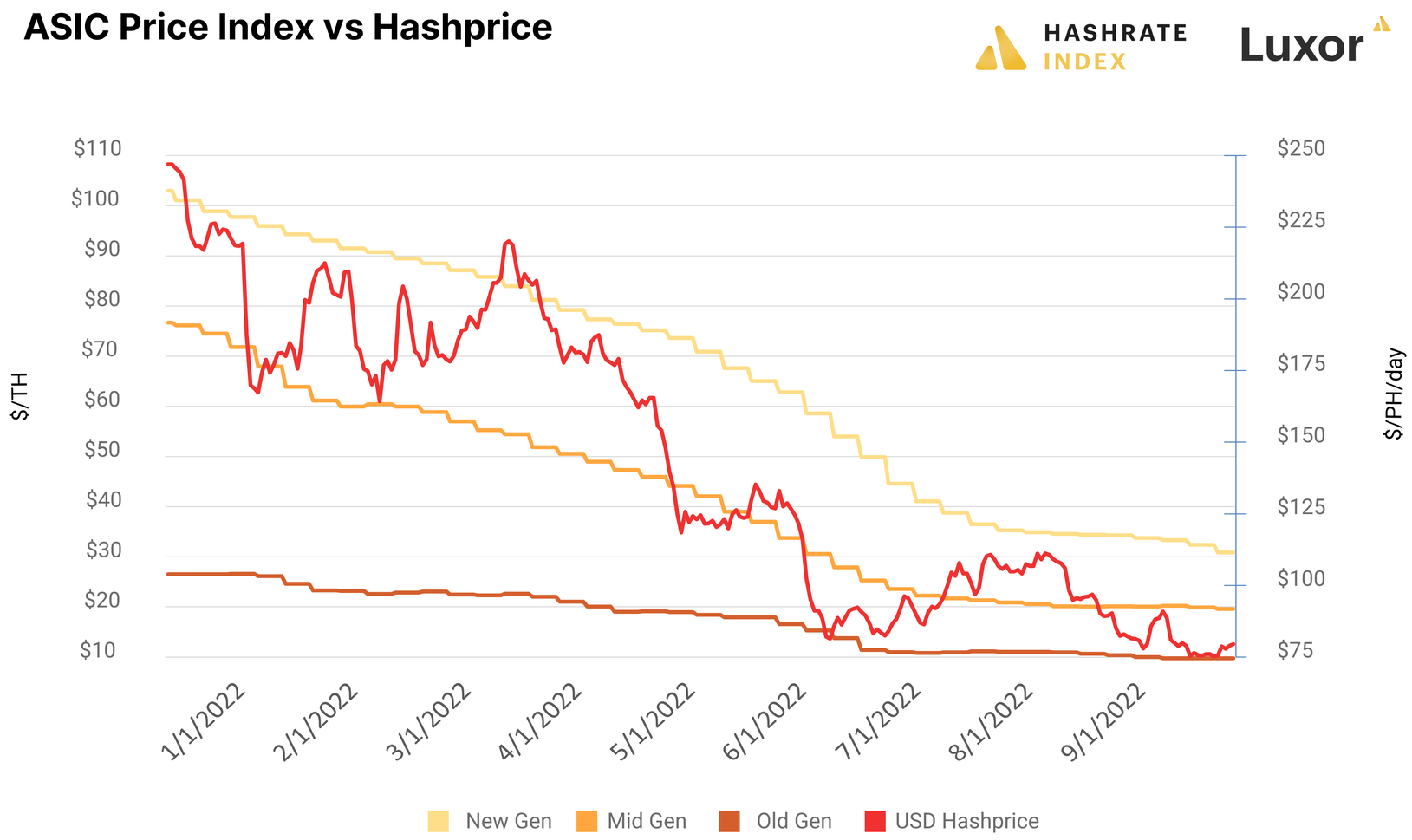
Under 38 J/TH (-38%)	**38-68 J/TH (-21%)**	**Over 68 J/TH (-17%)**

Year-over-year, ASIC prices of all calibers have lost nearly 3/4th of their value.

Under 38 J/TH (-69%)	**38-68 J/TH (-70%)**	**Over 68 J/TH (-66%)**

No surprises here: as Bitcoin mining becomes less profitable, the value of Bitcoin mining hardware corrects accordingly. In addition to thinning margins, deliveries of new hardware like the Antminer S19 XP and the Whatsminer M50 have exacerbated selling pressure on older models and even newer generation machines like the S19 and M30 series.

ASIC Price Index vs Hashprice

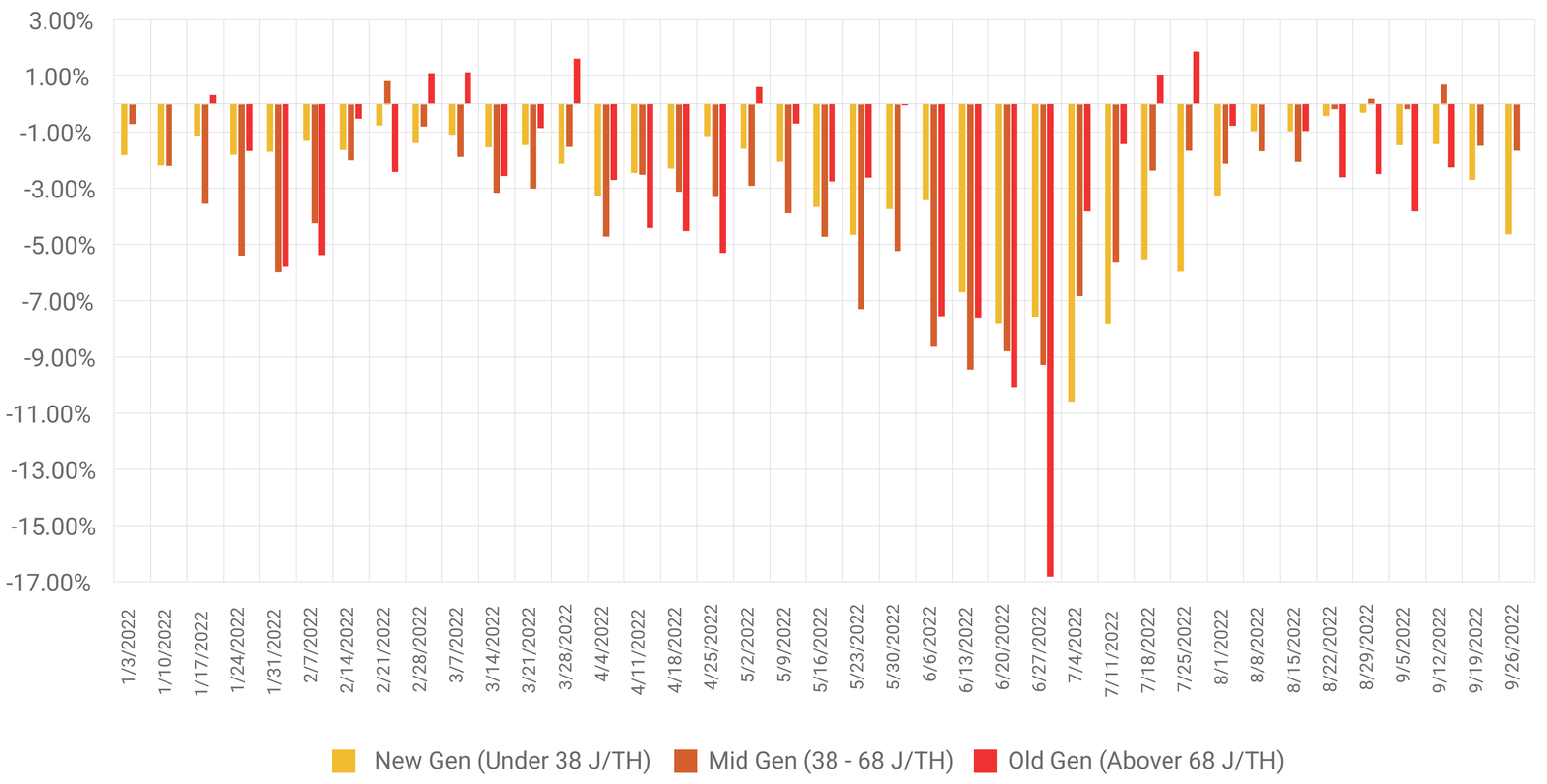


Source: Hashrate Index

Rig prices experienced their biggest sell-offs in May and June, a time when hashprice fell from $165/PH/day to $83/PH/day. As hashprice briefly recovered over the quarter, volatility eased somewhat, and while prices still fell successively throughout August and September, this trend flattened toward the end of the quarter. Still, new and mid gen rigs are quickly approaching all-time low values.

Old-gen machines like the S9 experienced a precipitous drawdown at the end of June amid Bitcoin's freefall to $17.5k. With mining economics in the dumpster, the S9 and similar rigs have become unviable except in the cheapest energy markets.

Weekly Changes to ASIC Price Index ($/TH)

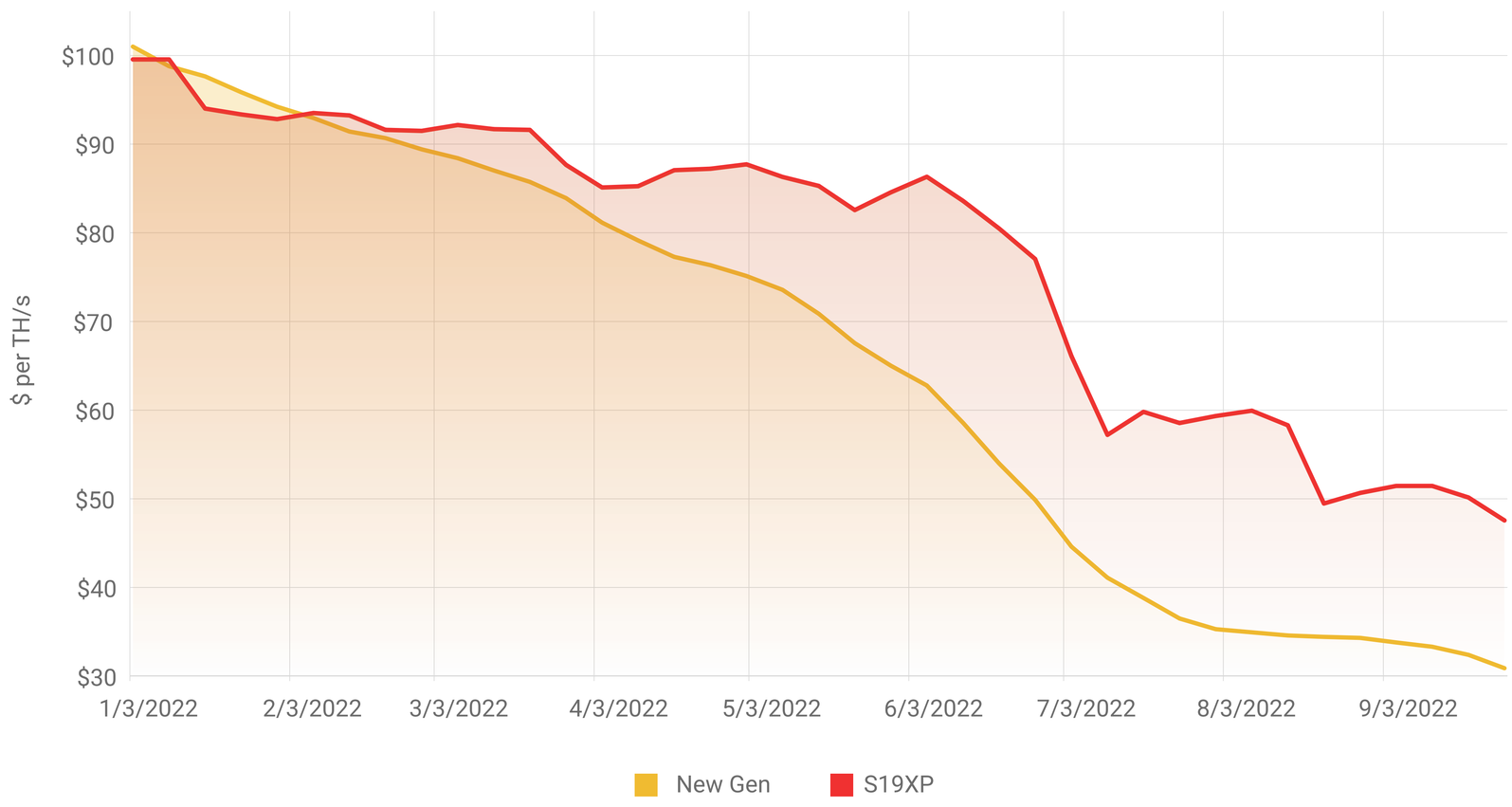


S19 XP Commands a Premium Over Other New Gen Rigs

Q3 saw the first deliveries of Bitmain's Antminer S19 XP to the market. In Q1, the average price per terahash for the S19 XP was either cheaper than or on par with the price per terahash of new gen machines (those in the under 38 J/TH bucket on our ASIC Price Index). As hashprice dropped and margins evaporated, though, this trend flipped and the S19 XP started commanding a premium.

The following analysis compares futures prices for the Antminer S19 XP versus spot prices for other new-gen hardware per our ASIC Price Index. We did not have enough datapoints in our datasets to compare the S19 XP with futures prices for another new-gen rig (like the S19j Pro), though we are confident that the S19 XP premium per terahash would still exist based on the few weeks of S19J Pro futures data we could compare while conducting this analysis.

New Gen Rigs (Under 38 J/TH) Spot Prices vs S19 XP Futures Prices



Source: Hashrate Index's ASIC Price Index

Compared to spot orders, futures orders usually carry a discount that can be more-or-less sizable depending on the lead time for delivery (a futures order with a 3 month delivery timeframe, for example, will command a larger discount to spot than an order with a 2 month timeframe). In Q4-2021 and Q1-2022, the S19 XP mostly adhered to this trend, but this changed in Q2 as hashprice increasingly weakened.

The gulf begins widening particularly in May and mid-June at a time when hashprice was cut in half from ~$160/PH/day to $80/PH/day. In Q3, this trend continued and the gulf grew larger, an indicator that miners are more-and-more willing to pay a premium for the S19 XP given its top-of-the-line efficiency as hashprice continues to wane.

The S19 XP's average premium to new-gen rigs in our ASIC Price Index per quarter were as follows:

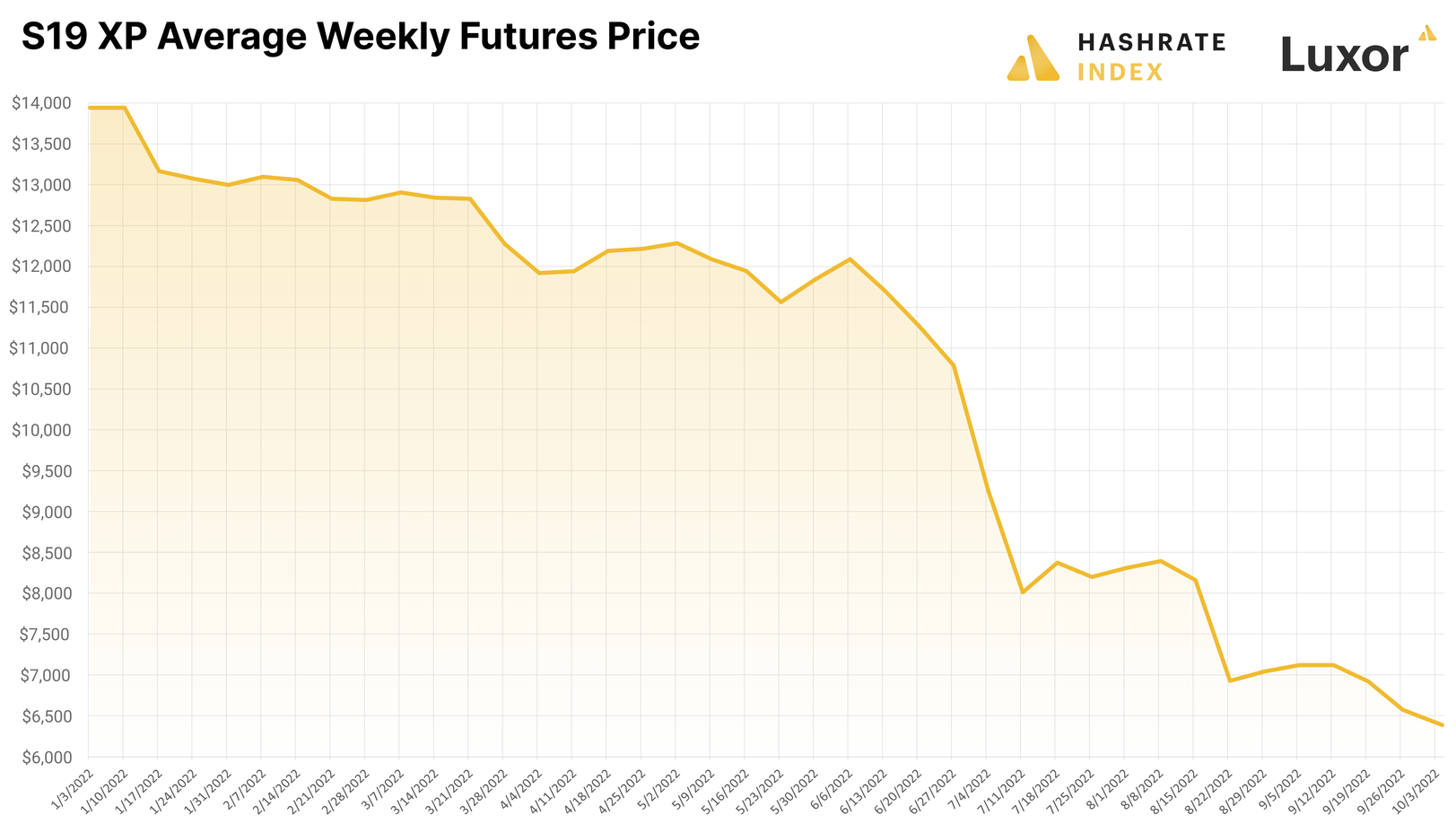
Q1: 1%

Q2: 21%

Q3: 43%

Year to date, the average price of an S19 XP futures order has fallen 54%. Quarter-over-quarter, the average price of an S19 XP futures order has fallen 39%.

S19 XP Average Weekly Futures Price



Source: Hashrate Index's ASIC Price Index

The S19 XP and other brand new hardware like the Whatsminer M50, in addition to deliveries of other new-gen hardware, will contribute to the price pressure on mid-gen and old-gen rigs. As we creep further into the bear market, it wouldn't surprise us to see miners give away S9s and other old-gen rigs as prices collapse (like they did last bear market), and if things get bad enough, they may do the same for mid-gen machinery.

4

Bear Market Bears Down on Public Bitcoin Miners

Public miners were not spared from Q3's difficulties, and in some cases, their scale actually worked against them.

Energy supply constraints, delays in data center build outs, and poor mining economics constricted hashrate growth. In the US, the summer's brutal series of heatwaves also stressed grids and mining operations, leading many of these public miners to curtail power draw, which cut into their bottom lines.

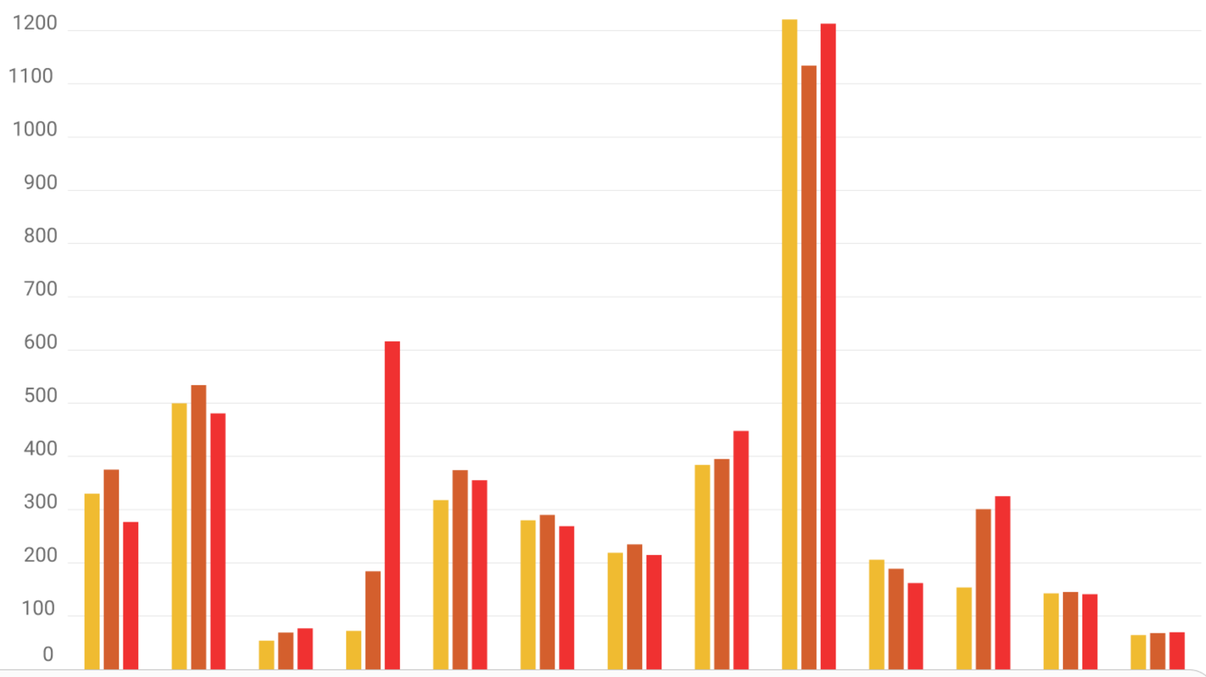
Year-to-date performance of public Bitcoin miners | Source: TradingView

Many public Bitcoin miners struggled to add substantial hashrate over the quarter. This could be for a variety of factors, including delays in expanding power capacity, difficulties with hosting providers, and rising energy costs, among others. Some miners even trimmed their hashrate over the course of the quarter, either from selling equipment and assets, migrating to new sites, or shuttering operations on high-cost farms.

Still, a handful of miners were better at executing their expansion plans and added active hashrate to their fleets each month.

BTC Mined in Q3 by Month

HASHRATE INDEX Luxor



	Hut 8*	Bitfarms	DMG	Marathon	Riot	Hive*	Argo*	Cleanspark	Core Scientific	Northern Data	Iris	Bit Digital	Digihost
July	330	500	54	72	318	280	219	384	1,221	206	154	142.5	64.17
August	375	534	69	184	374	290	235	395	1,134	189	301	145.3	67.97
September	277	481	77	616	355	268.9	215	448	1213	162	325	141.3	69.84

Source: Public Bitcoin miner disclosures

With some of these miners behind on their hashrate expansions, they had a hard time keeping up with the network's difficulty increases, resulting in stagnant or declining monthly BTC production throughout the quarter. Additionally, scorching summer heat and the strain it caused the electrical grid hampered uptime for some of these miners, particularly in the month of July.

BTC Mined in Q3 by Month

	Hut 8*	Bitfarms	DMG	Marathon	Riot	Hive*	Argo*	Cleanspark	Core Scientific	Northern Data	Iris	Bit Digital	Digihost
July	330	500	54	72	318	280	219	384	1,221	206	154	142.5	64.17
August	375	534	69	184	374	290	235	395	1,134	189	301	145.3	67.97
September	277	481	77	616	355	268.9	215	448	1213	162	325	141.3	69.84

*BTC and BTC equivalents

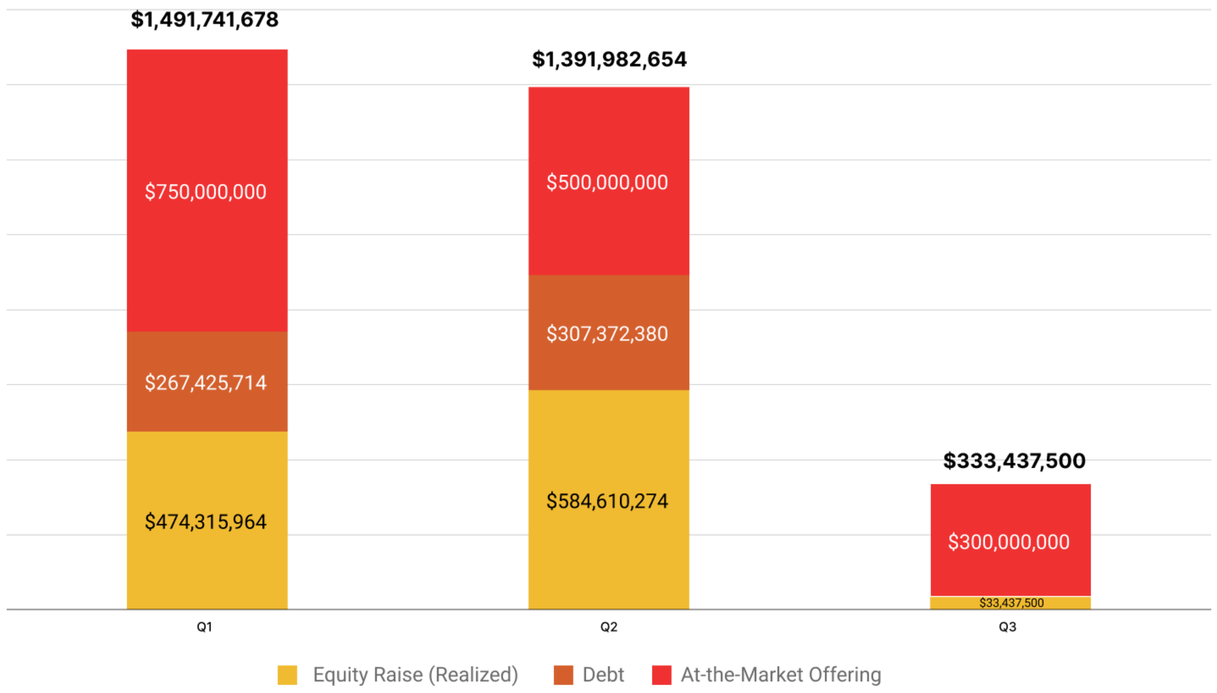
Source: Public Bitcoin miner disclosures

Public Bitcoin Miners Increasingly Turn Toward Equity for Liquidity

As interest rates rise, credit is becoming more expensive and harder to come by. Miners are increasingly turning to equity fundraising as a result, a move that dilutes shareholders at a time when stock prices are significantly lower than they were last year.

We can't know for sure how much debt and equity each miner raised in Q3 until they file their 10-Qs for the quarter, but in the chart below, we provide a limited look at fundraising and financing so far into Q3 based on press releases and other public filings. We distinguish between at-the-market equity offerings and other equity fundraising.

Q1, Q2, and Q3 2022 Equity and Debt Raises by Public Miners



Companies included in the above analysis: Bitfarms, Hut 8, Marathon Digital, Core Scientific, Riot Blockchain, Hive Blockchain, Argo, Cleanspark, Mawson, Tera Wulf, Bitnile, Cipher Mining, Iris Energy, DMG Blockchain, Greenidge, and Cathedra Bitcoin | Source: Public miner disclosures, public filings

At the beginning of 2022, Bitcoin miners were flush with substantial debt and equity funding. At-the-market offerings were very common during the beginning of 2022. With interest rates rising and investment bankers shying away from the industry, at-the-market raises persisted as the primary fundraising vehicle in Q3. Additionally, as rig prices have plummeted in value the past 9 months, ASIC-collateralized debt is getting wrecked. In Q3, we started to see more miners sell facilities, rigs, and other assets to pay back loans.

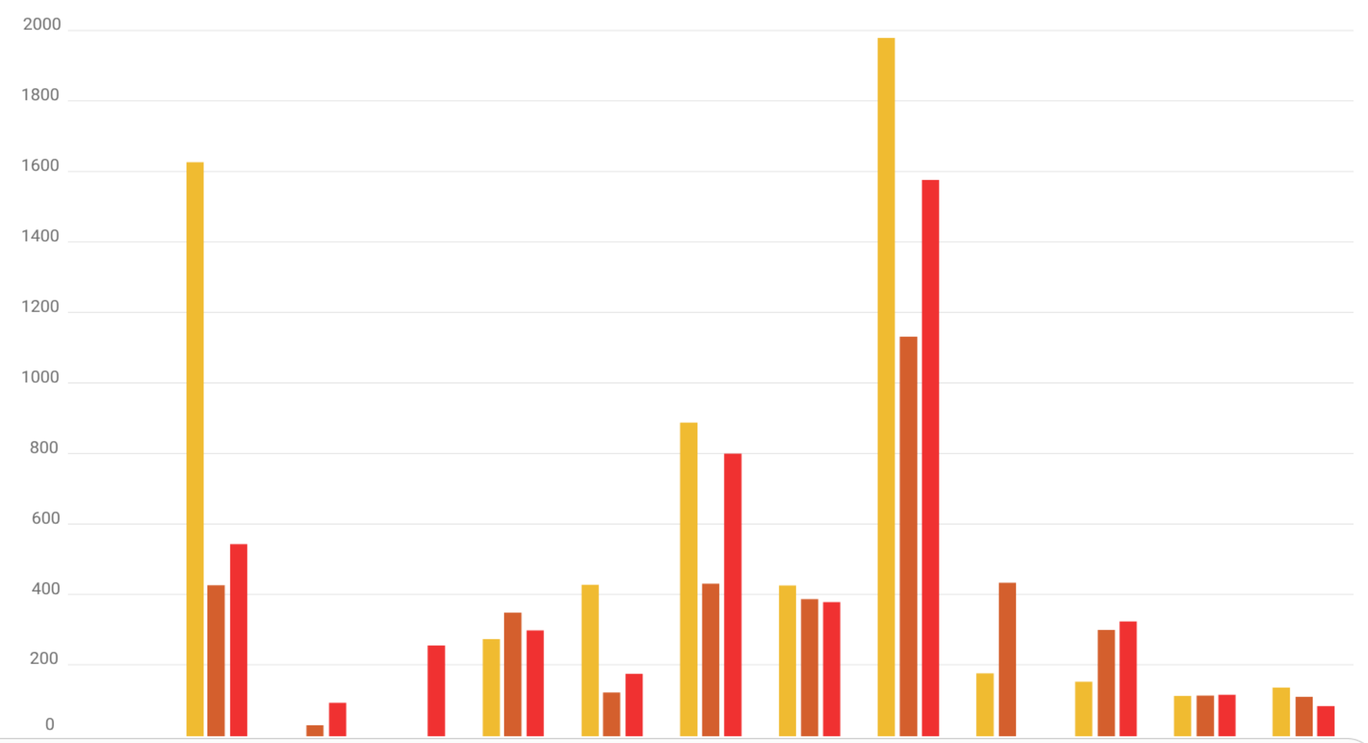
It's worth noting that, when a company makes an at-the-market stock offering, they do not sell the proposed amount all at once. The company sells the shares gradually, and they may not sell the entire amount originally proposed.

The downside to these at-the-market offerings is that investors see share dilution at the worst time, right in the middle of a bear market. At-the-market offerings allow for fast, revolving capital raises (like a line of credit) to fund expansion and keep the lights on. Miners have substantial ATM offerings outstanding that can still be tapped for liquidity. Investors should expect to see plenty of ATM money hitting the balance sheets of Bitcoin miners in Q3 2022. With the bear market in full swing, these equity offerings will be key to surviving the current downturn.

Mine High, Sell Low: BTC Liquidations Continue

With debt becoming more expensive and harder to come by, cash-strapped miners continued liquidating BTC treasuries in Q3.

BTC Sold in Q3 by Month



	Hut 8	Bitfarms	DMG	Marathon	Riot	Hive	Argo*	Cleanspark	Core Scientific	Northern Data	Iris	Bit Digital	Digihost
July	0	1623	?	0	275	427.9	887	426	1975	178	154	114.1	137.38
August	0	427	31	0	350	123.4	432	388	1130	434	301	115.2	111.45
September	0	544	95	257	300	176.9	801	380	1576	?	325	117.2	85.59

*BTC and BTC equivalents

A "?" indicates unkwown number of BTC sold due to lack of disclosure/ data

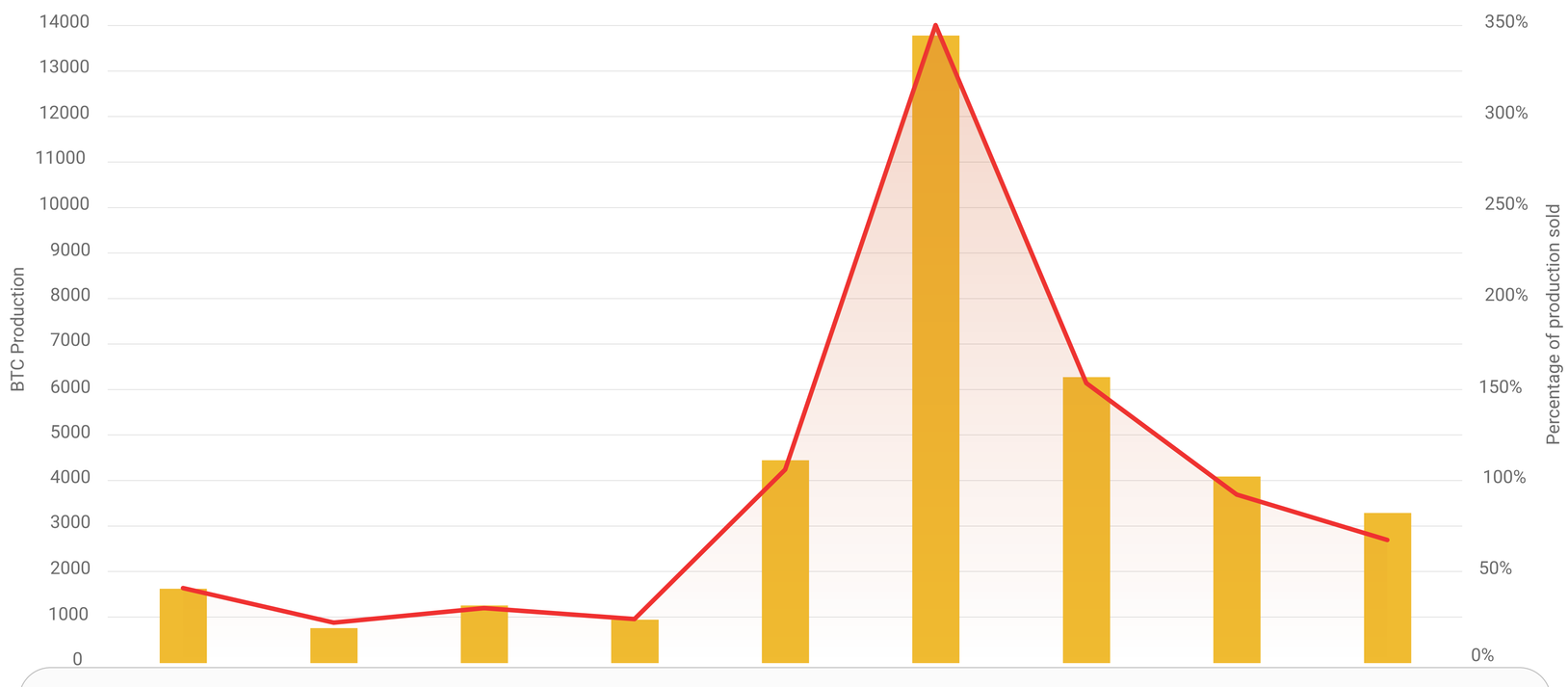
Source: Public Bitcoin miner disclosures

So far this year, public bitcoin miner selling reached a zenith in June 2022, a month that saw public miners sell 13,794 BTC, which accounted for 350% of their production for the month.

Miners are still selling substantial portions of their BTC production each month, but this selling slowed progressively throughout Q3. In both August and September, public miners sold fewer BTC than their monthly production for the first time since May,

(This data includes only known BTC production and selling as disclosed by public bitcoin miners; some public miners have not disclosed this data, while others disclosed it for certain months but not others, so the actual numbers are likely higher).

Public Bitcoin Miner Monthly Production vs Share of Production Sold



	January	February	March	April	May	June	July	August	September
BTC sold	1636	767	1266	955	4456	13794	6287.38	4101	3183.69
Share of production sold	41%	22%	30%	24%	106%	350%	154%	92%	68%

BTC Sold Share of production sold

Source: Public Bitcoin miner disclosures

Acquisitions, Distressed Assets, and Firesales

As Q2's difficult market conditions bled into Q3, acquisitions and distressed asset sales became an emergent trend, one that we expect to continue throughout the rest of the year.

From the public sector, Cleanspark's acquisitions of Bitcoin mining farms from Waha Technologies and publicly traded Mawson are perhaps the most notable of this emerging trend. Cleanspark purchased Waha Technologies' Washington, Georgia facility in August for $16.2 million, while also acquiring the 3,400 S19 J Pros (worth 340 PH/s) on site for an additional $8.9 million (sum total: $25.1 million); Cleanspark did not disclose how much of this purchase (if any) it made with equity. In September, Cleanspark entered into an agreement to purchase Mawson's Sandersville, Georgia facility for $34.3 million, which was partly paid with 1,590,175 shares in Cleanspark stock and could include an additional $2 million in a seller-financed earn-out. The Mawson deal included 6,468 new gen mining rigs worth 560 PH/s.

Rather than sell the entire farm, other miners have been selling off the cattle, so to speak. Argo, for example, sold 3,400 S19 J Pros in September for $7,000,000. Stronghold defaulted on an ASIC loan with NYDIG, returning 26,000 ASICs to the financial firm to cover $67.4 million in financing. In Q2, Cathedra Bitcoin sold 600 Antminer S19 XPs for some $4,116,000.

These mining rigs are one of the most liquid assets in these miners' portfolios (behind only Bitcoin and company stock). We expect this trend to continue in Q4 as more miners, who were overzealous in the bull market with their ASIC financing, must sell rigs to cover debt and operational costs.

Compute North Files for Chapter 11 Bankruptcy

Perhaps the biggest Bitcoin mining news to come out of Q3 was the Chapter 11 bankruptcy of Compute North, the second largest Bitcoin mining host in the US.

Compute North filed for bankruptcy on September 22. Adverse bitcoin mining economics, coupled with rising energy costs (Compute North failed to lock in fixed PPAs with its power providers) decimated the host's profit margins. Probably responding to this unprofitability, Compute North's primary lender, Generate Capital, closed its $300 million credit line to the hosting provider. With trouble brewing in July – a month marred by spikes in electricity costs during a series of nationwide heatwaves in the US – Generate Capital asserted that Compute North was in technical default and took control of its Kearney, Nebraska and Granbury, Texas facilities, while also seizing a bank account worth $23.6 million.

Per bankruptcy filings, Compute North's long-term debt obligations include a $99,809,696 secured promissory note to power company NextEra for its joint venture, the wind-powered King Mountain site in McCamey, Texas; a $21,013,027 senior unsecured promissory note to Marathon Digital in relation to its two joint ventures with this public miner; and $7,466,005 in secured debt to Foundry for equipment financing. Additionally, through a subsidiary dubbed CN Borrower, Compute North has $101,282,118 in outstanding debt with Generate Capital, which is guaranteed by its Wolf Hollow and Kearney facilities.

Compute North also has approximately $18,374,138 in other unsecured debt, putting its total outstanding obligations at $146,662,866 (notwithstanding the $101,282,118 owed to Generate Capital, which is guaranteed by the facilities that the loan funded). The hosting provider has roughly $8,721,311.77 in unencumbered cash.

To dig itself out of this hole, Compute North will be auctioning off assets in a 363 asset sale beginning November 1 and finalized via a sales hearing on November 8 (the company will also sell up to $1,000,000 worth of assets in a de minimis sale prior to the auction). This auction will likely include Bitcoin mining rigs, mining containers, power assets, and Compute North's data centers themselves.

Facility	Capacity	Operationality
Kearney, Nebraska	100 MW	Fully operational
Big Springs, Texas	13 MW	Fully operational
North Sioux City, North Dakota	7 MW	Fully operational
Granbury, Texas (Wolf Hollow)	Up to 300 MW	Partially operational
McCamey, Texas (King Mountain)	Up to 280 MW	Partially operational
Corpus Christi, Texas (Bootstrap)	Up to 300 MW	In development
Minden, Nebraska	Up to 35 MW	In development

Compute North's operational, partially operational, and in-development facilities | Source: Compute North Chapter 11 bankruptcy filing

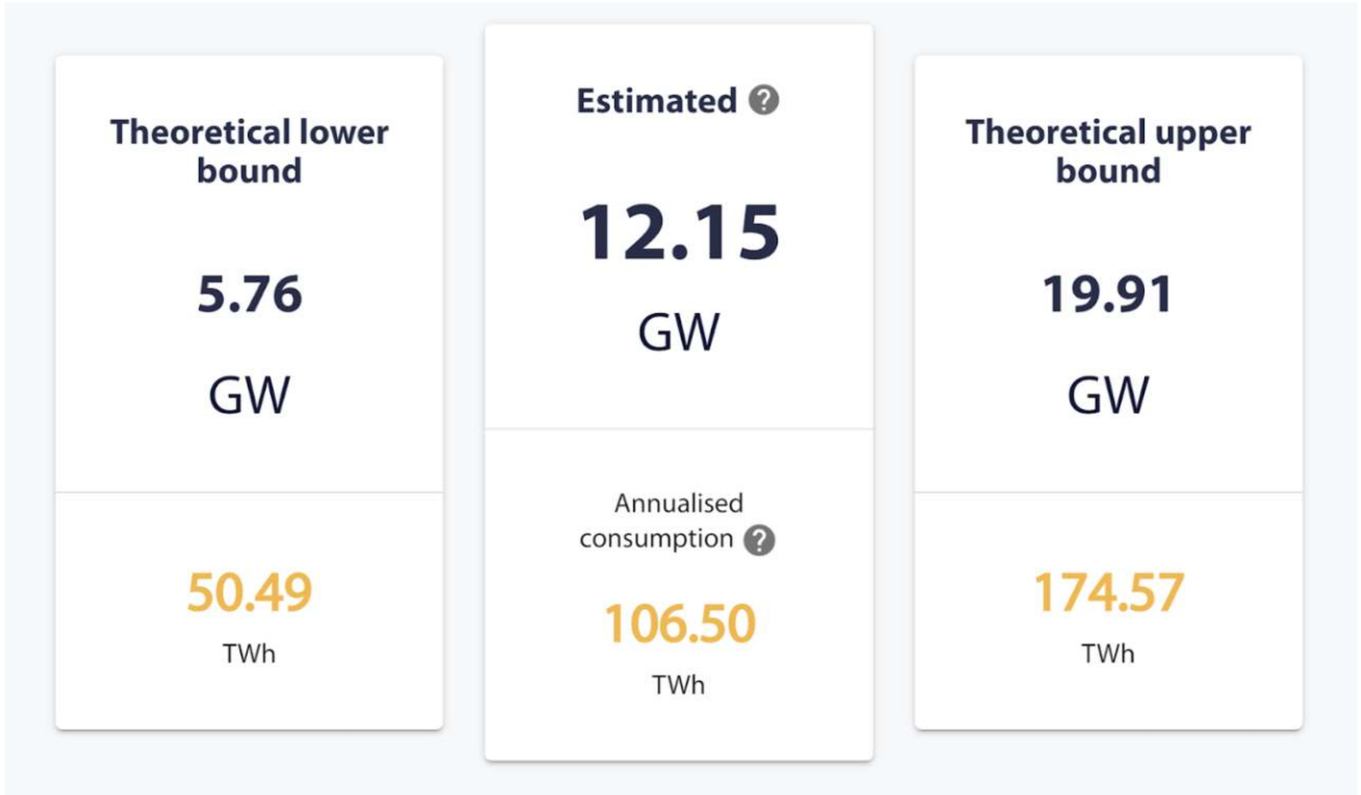
If hashprice stays below $70/PH/Day for an extended period of time, and equity capital markets don't improve, then many leveraged-miners will be facing similar fates. If one of the public miners files for Chapter 11, that could create a cascading effect and trigger sell-offs in the public mining market, making the Bitcoin mining equity landscape even more dire than it is today.

5

US Lawmakers, Regulators Take Notice

As Bitcoin mining becomes increasingly entrenched in North America, lawmakers and regulators are coming to grips with the sector – for better or worse.

Following up on President Biden's March 9, 2022 Executive Order 14067, the White House released a report in September that heavily scrutinized Bitcoin mining and its energy use. Relying on data from Digiconomist author Alex de Vries – whose data on Bitcoin's energy use is highly contested and is inflated when compared to other third party estimates like Cambridge University's Center for Alternative Finance – the report did not mince words regarding its disapproval for Bitcoin mining and the energy it consumes.



Cambridge Centre for Alternative Finance's Bitcoin Electricity Consumption Index's best estimate for Bitcoin mining's electricity consumption is 12.15 GW, with an annualized consumption of 106.5 TWh | Source: Cambridge University

Our own best estimate of Bitcoin mining's electricity consumption is 8.6 GW, with an annualized consumption of 75.3 TWh | Source: Hashrate Index Energy Markets page

The White House's report calls for a number of measures, including the EPA and DOE developing Bitcoin mining standards "for very low energy intensities, low water usage, low noise generation, clean energy usage by operators, and standards that strengthen over time for additional carbon-free generation to match or exceed the additional electricity load of these facilities."

If those measures fail, the report says that **“the Administration should explore executive actions, and Congress might consider legislation, to limit or eliminate the use of high energy intensity consensus mechanisms for crypto-asset mining."**

Additionally, the report recommends that the DOE and EPA collect Bitcoin mining data for future regulations; encourage self-reporting by miners regarding mining locations, energy mixes/carbon intensity, and e-waste; and work with Congress and other agencies to develop standards and practices for the mining industry with regards to energy use and environmental considerations.

6

A Look Through the Looking Glass

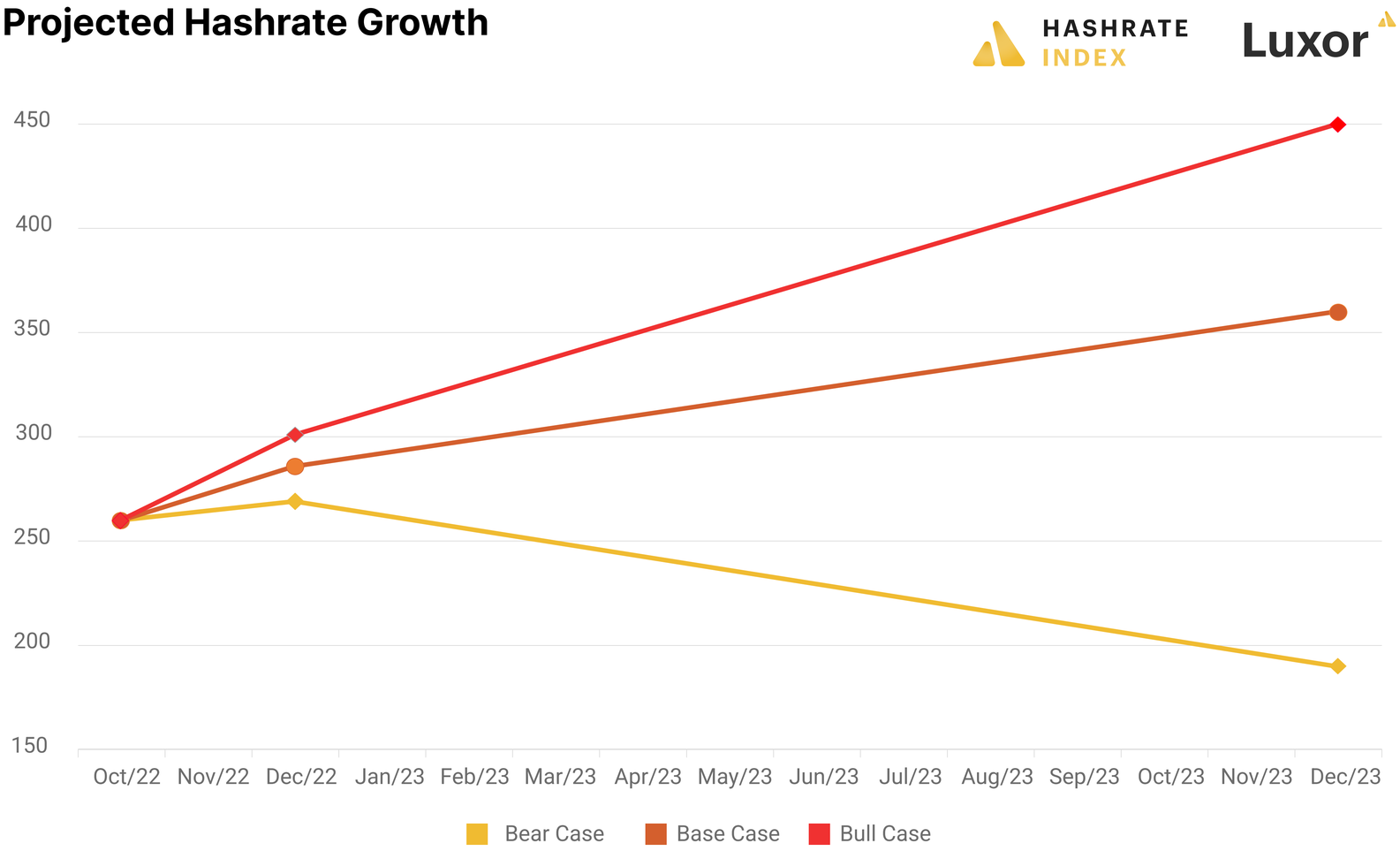
We're heading into the toughest environment for Bitcoin mining since Q4 of 2020.

As we write this, hashprice is in all-time low territory, hovering just below $70/PH/day. As the bear market clamps down on mining margins, this hostile environment will kick miners off the network who are higher up the cost ladder and/or who are running less efficient hardware.

As such, we don't anticipate that Bitcoin's hashrate will exceed 300 EH/s before the end of the year unless market conditions change considerably. In our 2021 year end report, we projected a base case scenario for Bitcoin mining hashrate to grow to 290 EH/s by the end of 2022. We believe that this won't be too far from the mark based on updated projections.

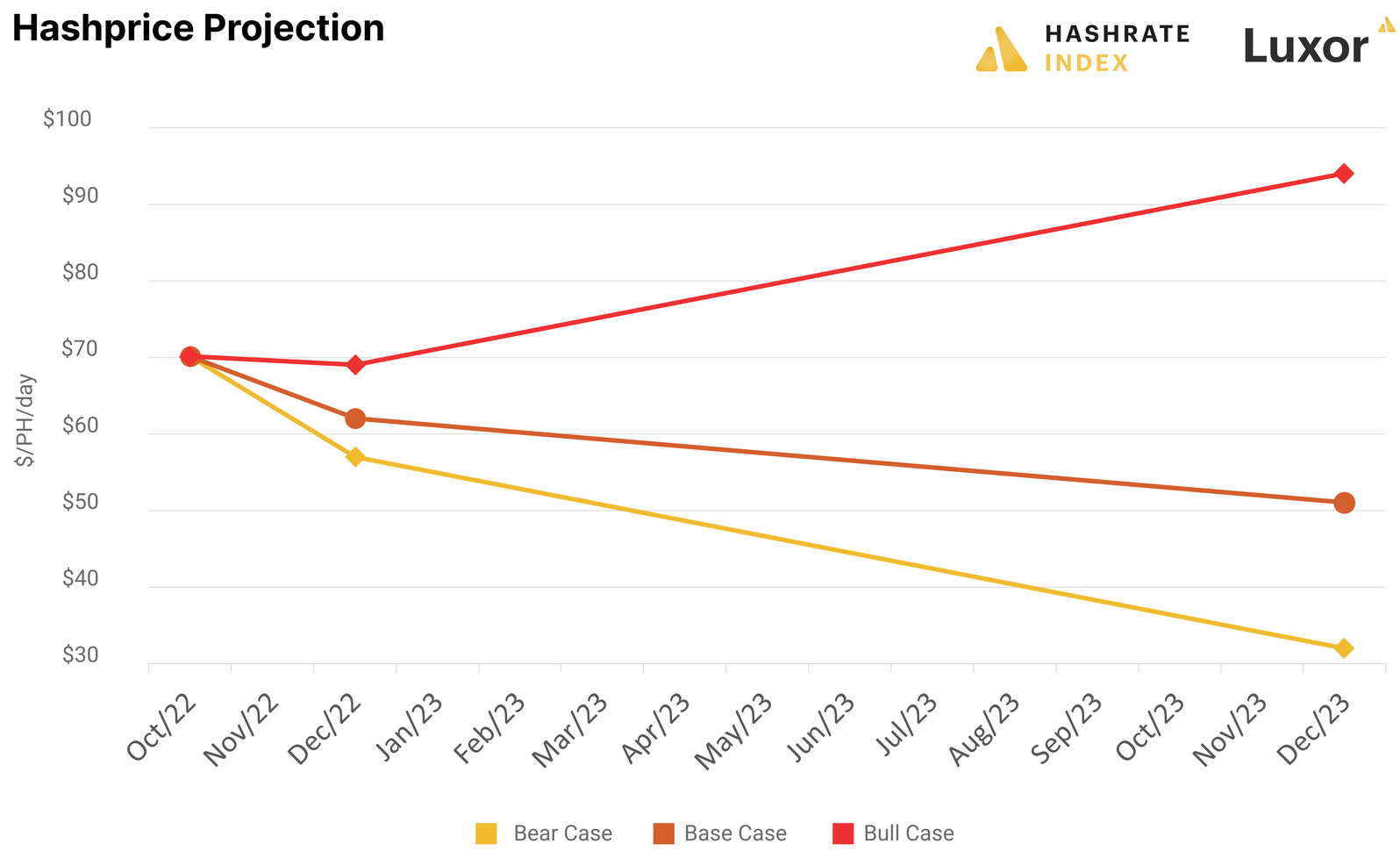
Based on public filings, news releases, and other available research to determine ASIC manufacturers' historical and future production volumes, we estimate a maximum possible hashrate of approximately 300 EH/s at the end of 2022 and 450 EH/s at the end of 2023, with a based case of 286 EH/s and 360 EH/s, respectively. We reached these figures by segmenting ASICs by efficiency tiers (i.e., J/TH), estimating the total number of active machines in each tier, and applying future estimates for production and scrap rate (i.e., machines that can no longer be used due to wear and tear).

Projected Hashrate Growth



Using the CME Bitcoin futures price for December 2022 and based on the above trajectory of hashrate growth, we project that Bitcoin's hashprice will finish the year roughly at $62/PH/day. Of course, drastic changes to Bitcoin's price and/or abnormal growth or degrowth for Bitcoin's hashrate could affect this projection, and so we've included a bear and a bull case for hashprice as well.

As always, these projections should be taken with a grain of salt. We're not clairvoyant, so we can only give a best guess for what's coming in the future.



We do know, though, that if Bitcoin's price stays in this range or goes lower, Bitcoin miners are in for even greater pain. Q3 could have very well been only a prologue for what's to come in Q4, as we expect more distressed asset sales, bankruptcies, and capitulation from miners as we round out the year.