HASHRATE INDEX

Hashrate Index Q2-2022 Report: Exit, Pursued By a Bear

Luxor

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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 from Luxor Technology, a mining software and services company.

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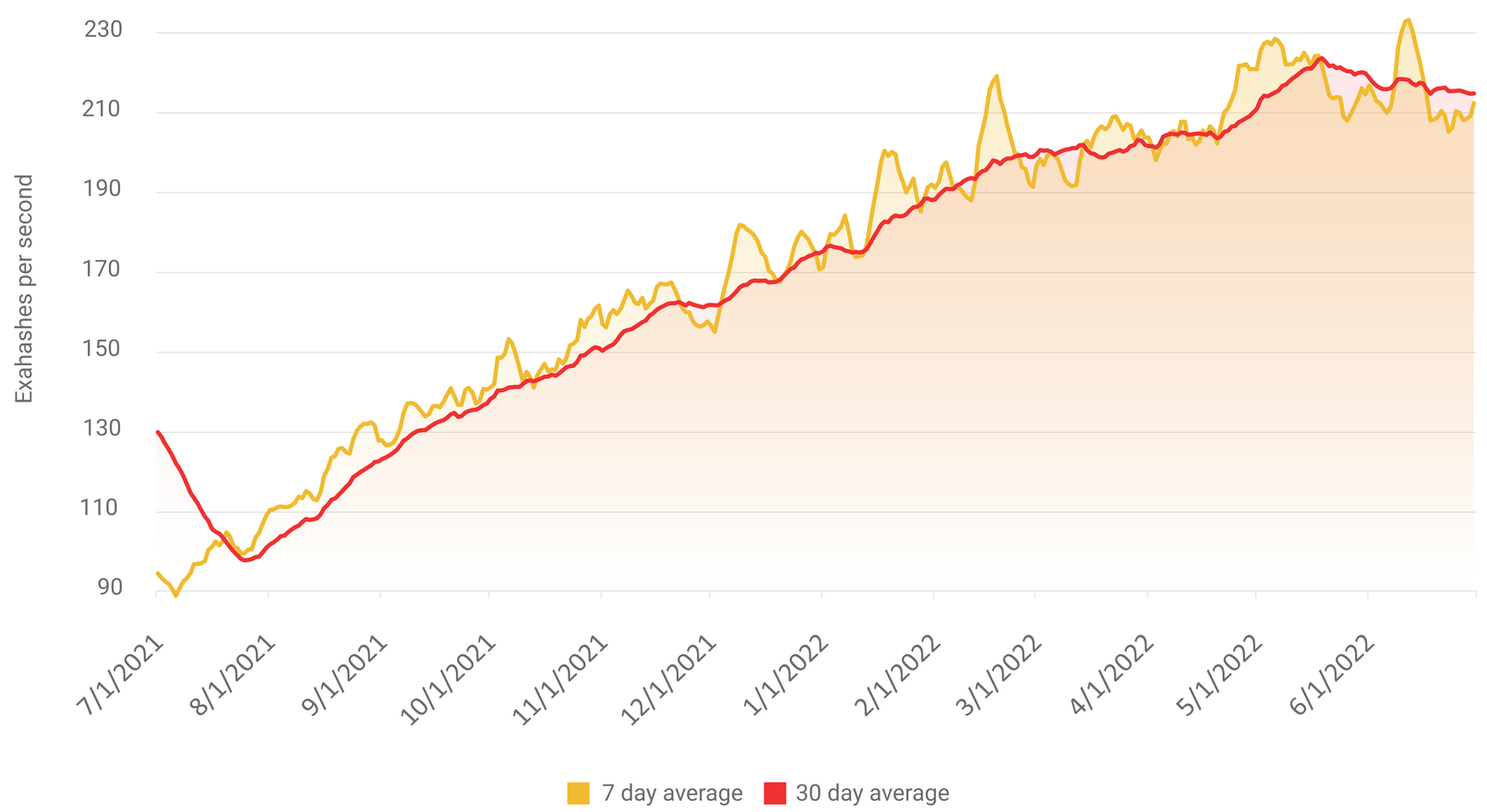
We are a year removed from China's Bitcoin mining ban and the ensuing Great Hashrate Migration. Since this historic event, the Bitcoin mining landscape has changed indelibly, both as a result of the migration and 2021's bull market.

Bitcoin mining profitability soared to multi-year highs in 2021. Now, it's approaching all-time lows. COVID-constricted markets created deflationary pressure on energy in 2021. Now, energy prices are rising quickly alongside general inflation. New gen bitcoin miners sold for over $10k in 2021. Now, these same models are going for ~$3k.

Time is a flat circle. Just like prior bull-turned-bear markets, newcomers drunk on the influence of "up only" (or established miners overscaled existing operations) jumped into Bitcoin mining when the getting was good. But now the getting is bad, and plenty of folks who modeled out their operations under 2021 profitability assumptions are now wrestling with poor mining economics and are feeling the heat–especially those who are over leveraged.

As such, plenty of miners are starting to shut off as their costs outweigh the profits they can squeeze in this hostile hashprice environment.

We can see this in how slowly hashrate grew in Q2-2022. Bitcoin's 7-day moving average hashrate grew only 7% in Q2-2022. Compare that to 15% growth in Q1-2022 and 27% in Q4-2021.



We expect sluggish hashrate growth for the rest of the year unless Bitcoin's price reverses course. Indeed, rising energy costs, credit crunches, and waning BTC price gives us the perfect recipe for constrained hashrate growth and capitulation from overleveraged, high-cost miners.

1

The Shoring 20s: Inflation, Recession Pressures Put a Damper on Bitcoin and Hashrate Growth

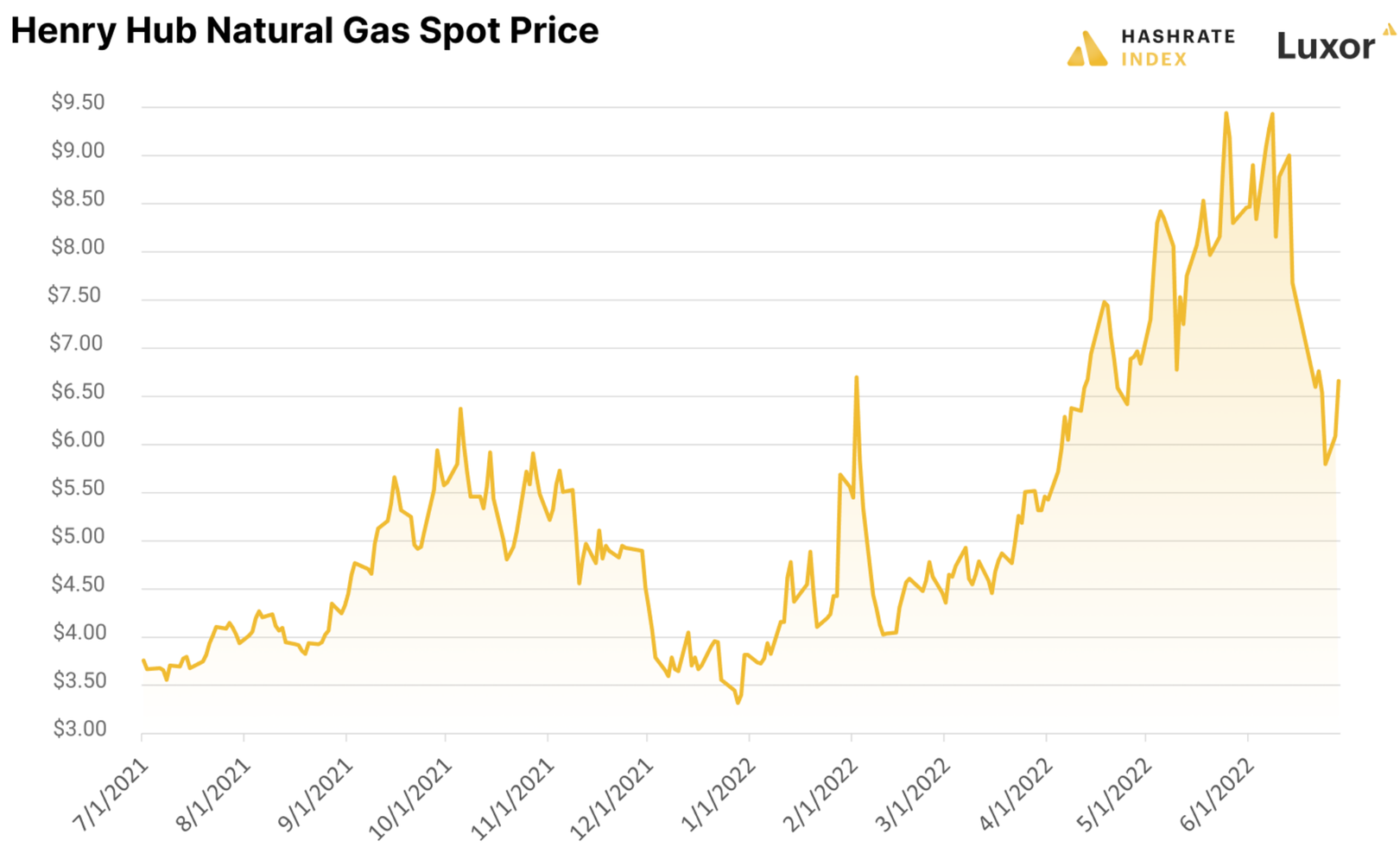
In the United States, 2022 has been the year that the Fed began shoring up its monetary policy to curb inflation, and an incipient recession has meant the shoring up of individual finances.

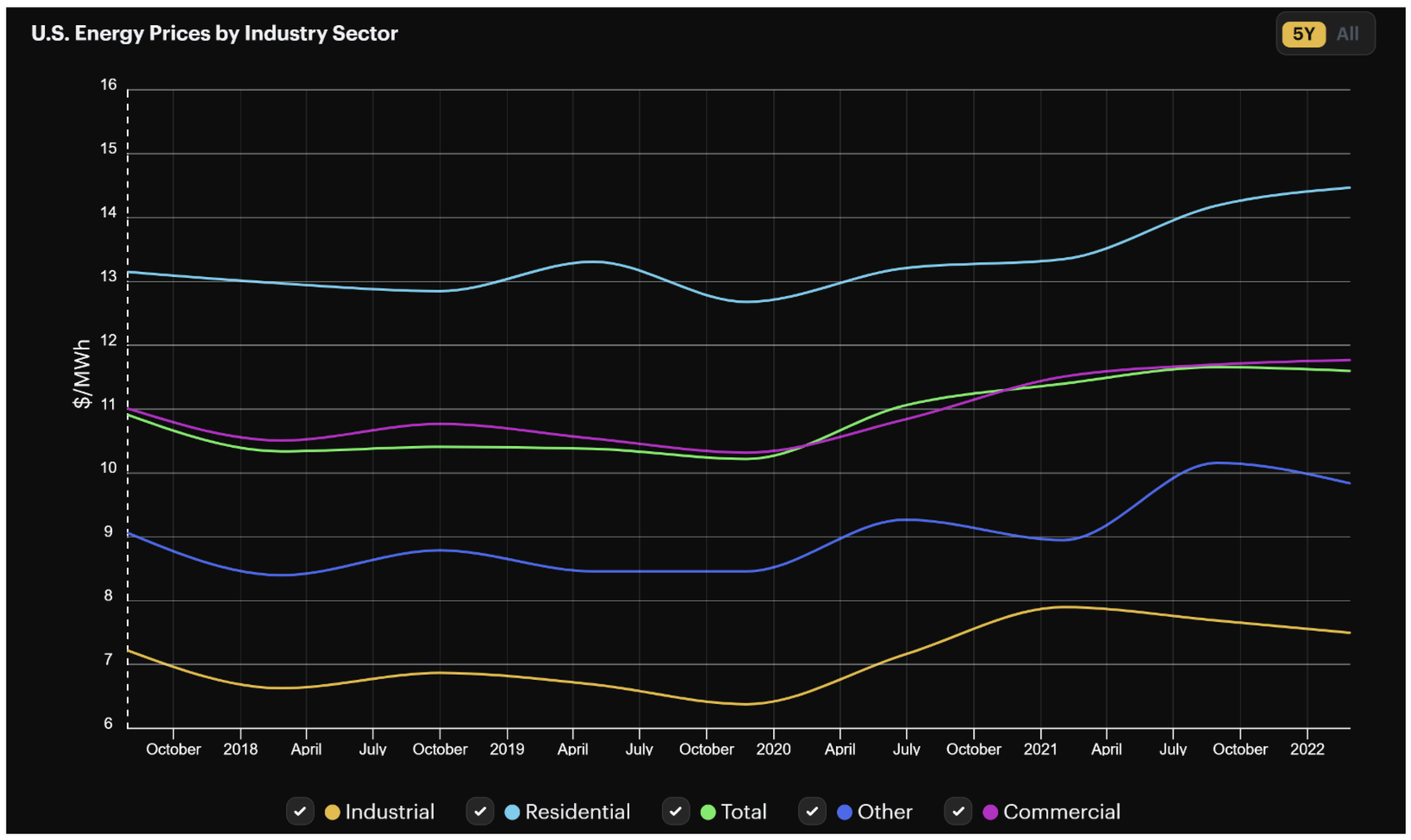
Beginning late last year, the U.S. Federal Reserve reversed course on its pandemic policy. Easy money in 2020 and 2021 from unprecedented monetary and fiscal policy flushed markets with cash and inflated everything from financial assets like Bitcoin to consumables like used cars. In a bid to rein this inflation in, a hawkish Fed has started raising rates in a move that is reminiscent of the Volker rate hikes in the 80s.

Target interest rate and Effective Federal Funds Rate | Source: New York Fed

The dollar is strengthening after a period of relative weakness. We've gone from easy money to hard(ish) money, and a financial system and economy that has become addicted to cheap credit is feeling the withdrawals. Despite any quibblings from "The experts" and finance thinkbois about recession indicators, we've undoubtedly entered a recession–just ask the average American who is struggling with rising prices.

One of the places where they are feeling this the most is in the cost of energy. On the next page is a chart for the Henry Hub Natrual Gas Spot price, which has increased nearly 100% year-to-date, and below that is a chart looking at the average cost of power in the US per sector.

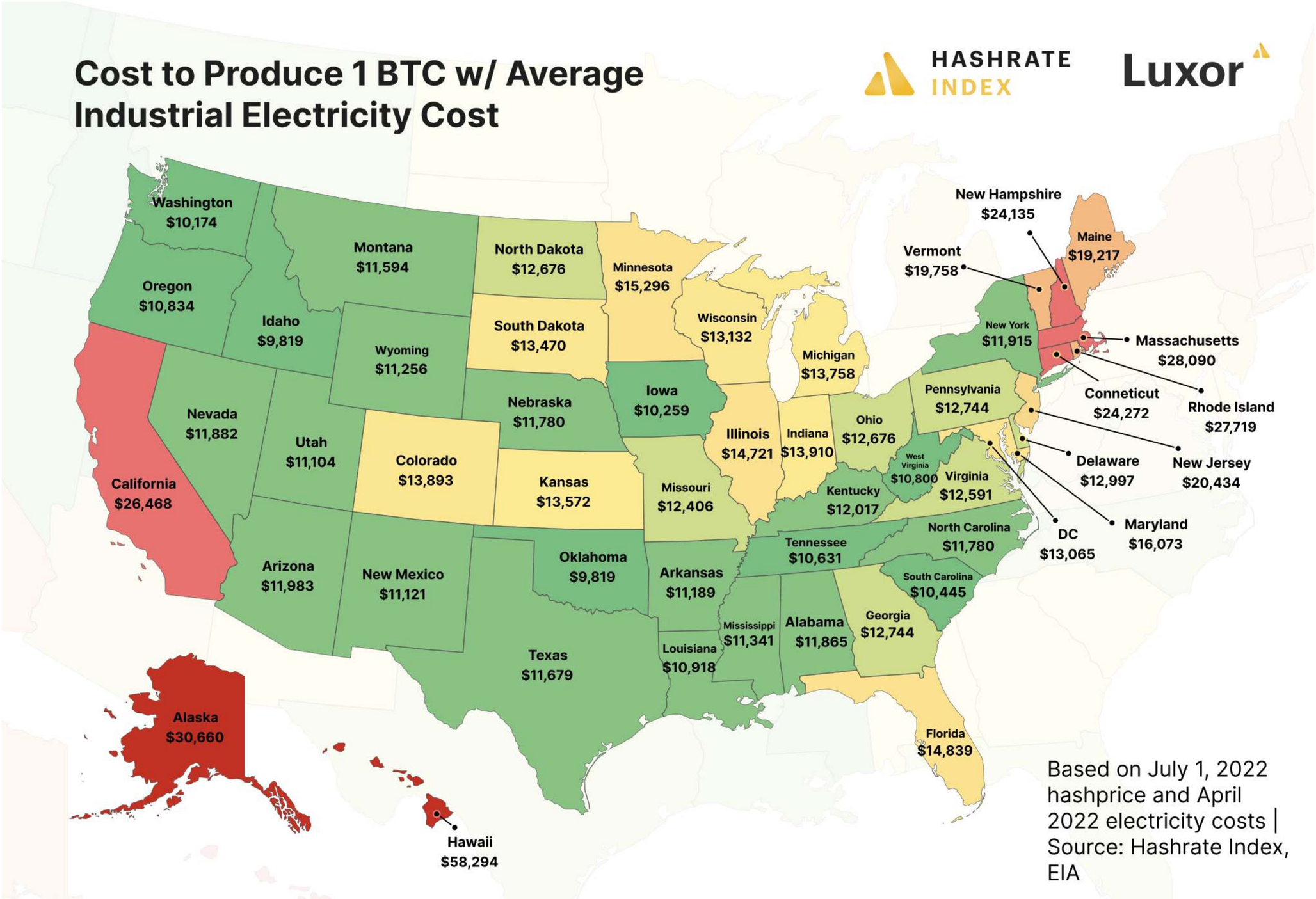




With power prices changing by a non-negligible degree by the month, negotiations for long term power purchasing agreements (PPA) are becoming strained.

Going further, while plenty of miners secured long term power contracts through PPAs in the past year, there were quite a few in the United States that did not. During 2021, the forward pricing curve on grids looked positive for miners, with forescasts anticipating cheaper energy. Enter the Ukraine war and inflation and now the opposite is panning out, with many miners not securing longterm PPAs. Miners who were expecting 2.5-3.5 cent power are now paying over 4.5 cents a kWh, significantly affecting their operations and their forecasts.

These miners are stuck with an unfortunate delimma: lock in a long-term PPA at this elevated rate or roll the dice again to see where power prices end up next year.

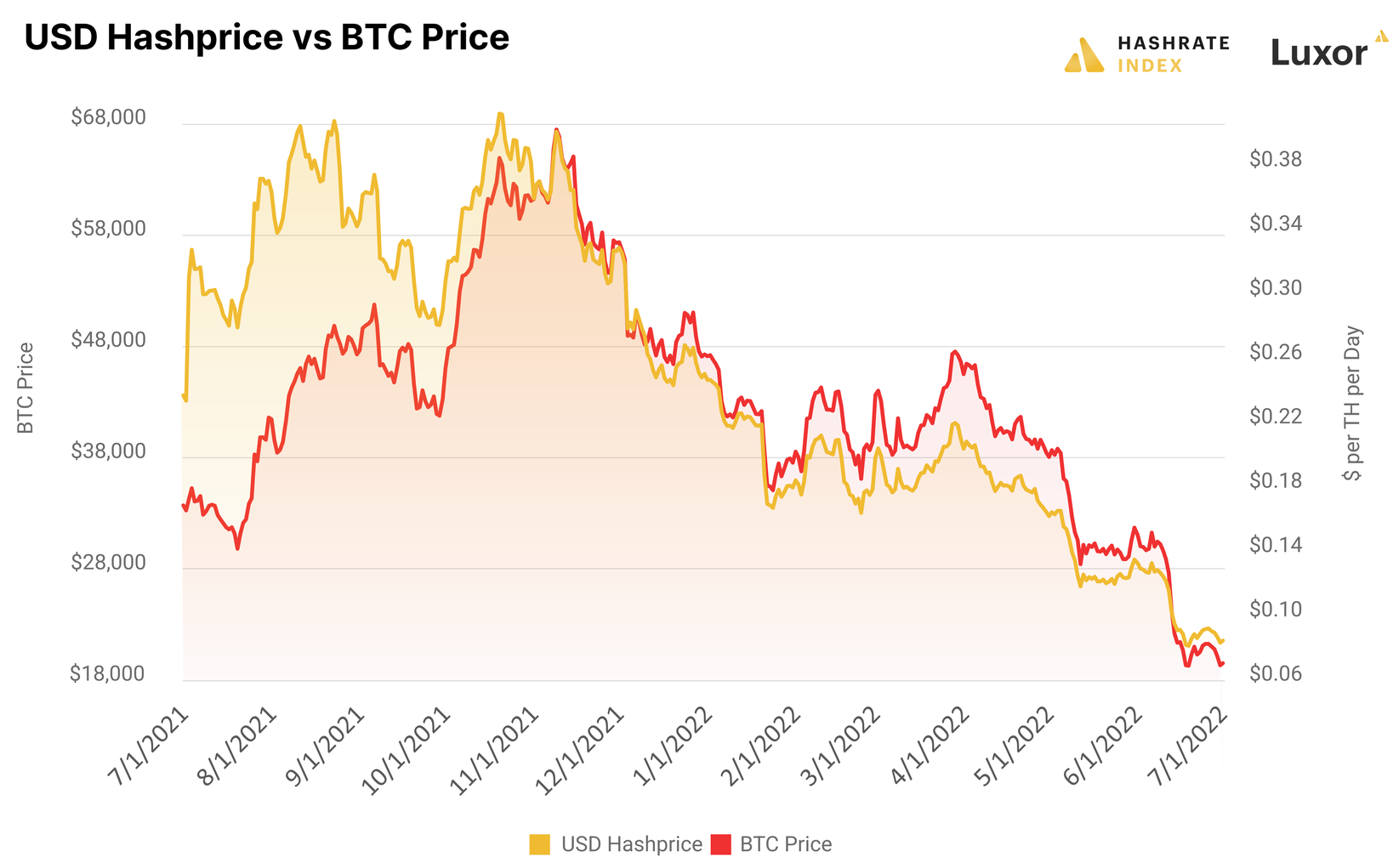


2

Hashprice Hits Multi-Year Lows

At the same time as power rates rise, Bitcoin's price is in the shitter, which means that hashprice is in an even shittier position.

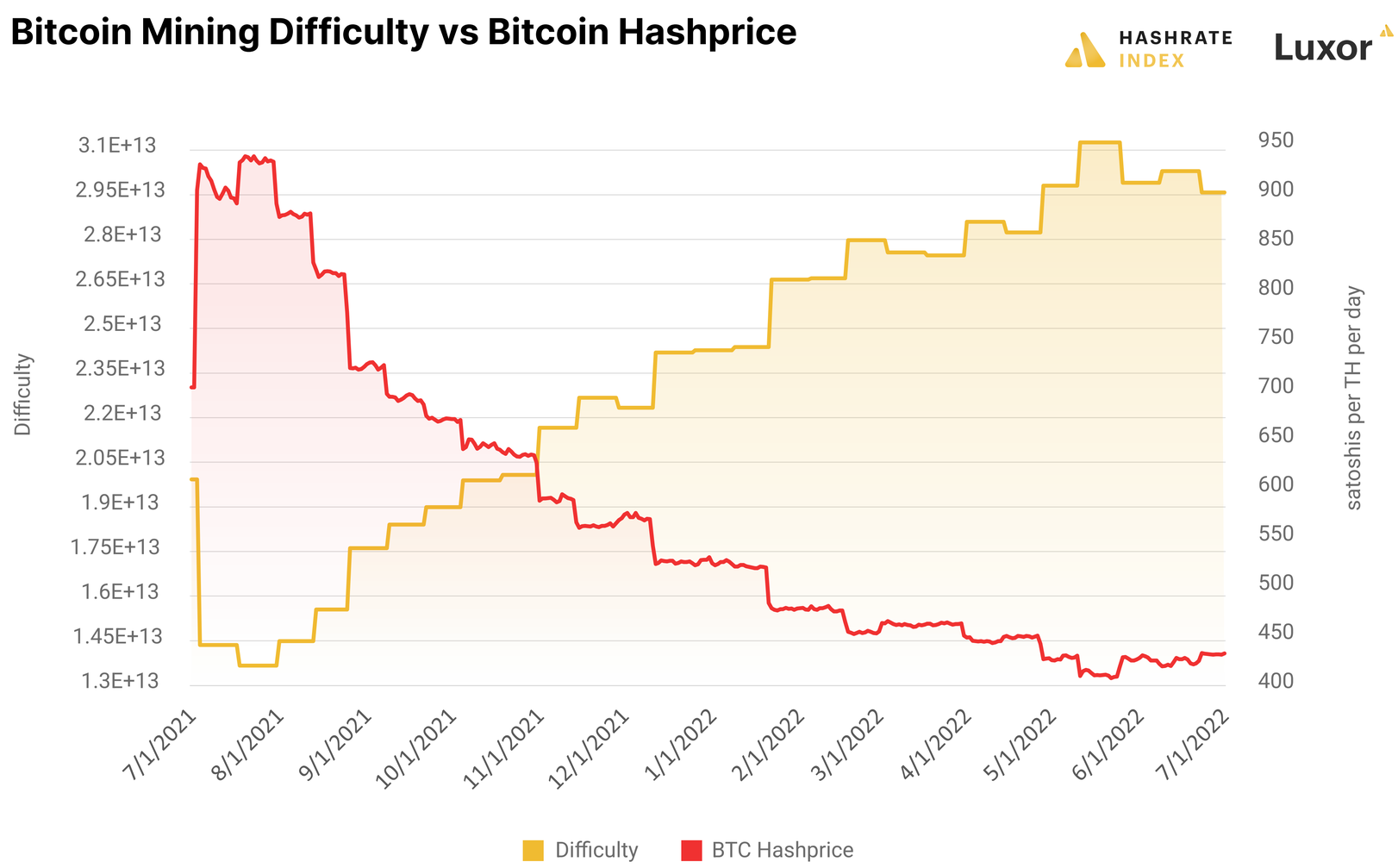
In USD terms, hashprice is at lows we haven't seen since Q4-2020, right before the bull run set off. From the beginning of Q2 to the end of the quarter, Bitcoin's USD hahprice fell 58% from $0.20/TH/day to $0.08/TH/day.



In Q3-2021, the spread between Bitcoin's price and USD hashprice widens significantly. China's mining ban cut the network's hashrate in half and resulted in a much lower mining difficulty. This reduction of competition supercharged Bitcoin mining economics, widening the gap between Bitcoin price and hashprice during this period.

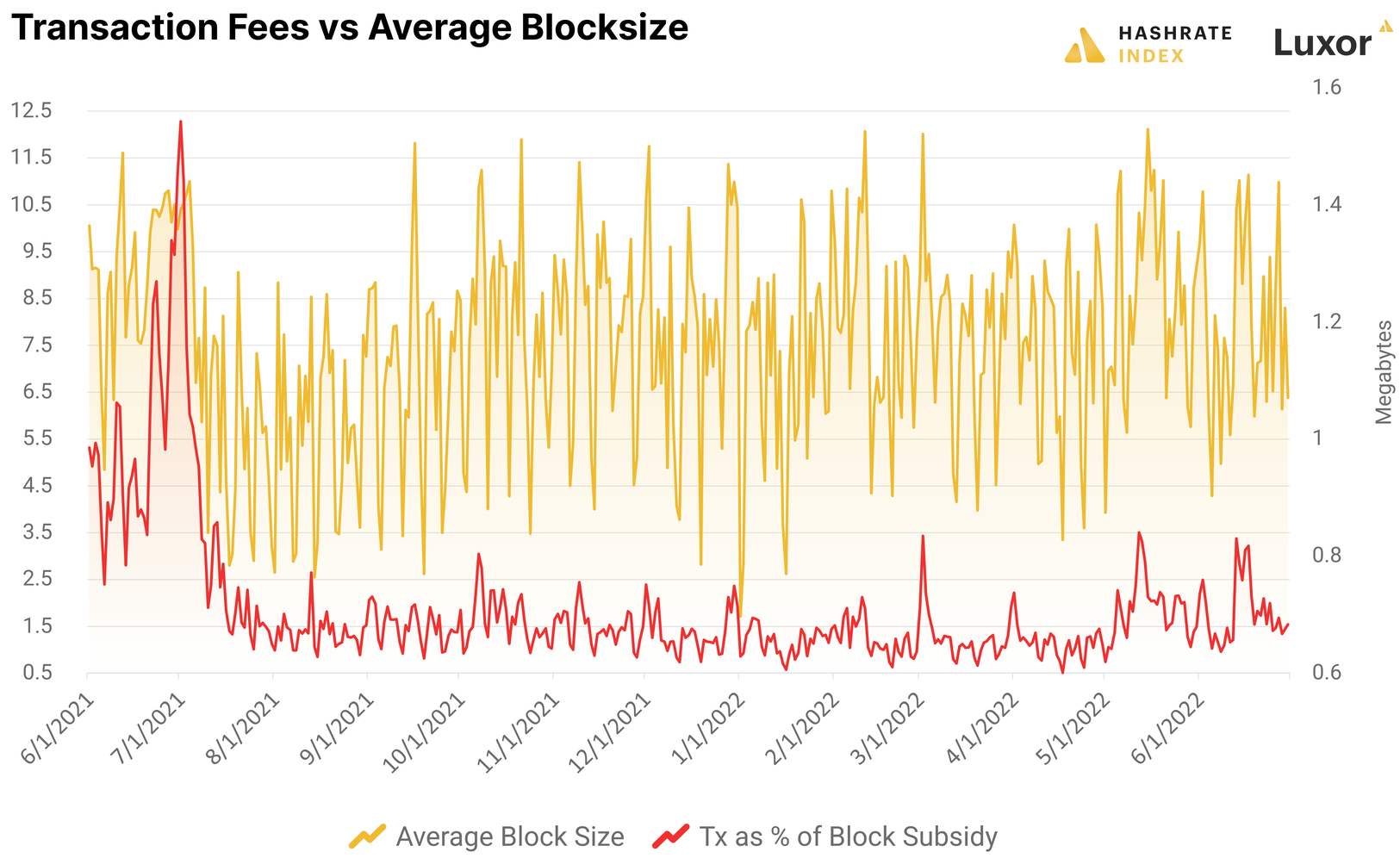
Conversely, at the end of Q1-2022 and the beginning of Q2-2022, we see this spread widening in the opposite direction. Bitcoin's price was in a downtrend, but at the same time, difficulty was increasing quickly. This put a damper on USD hashprice. Throughout Q2, high-cost miners began shutting off as mining economics worsened, so the spread has tightened.

As a result of these poor mining economics, Bitcoin's difficulty only grew by 3.4% over Q2 from 28.59T to 29.57T, much slower growth than we observed in Q1-2022 (18%) and Q4-2021 (28%). And in turn, this means that BTC denominated hashprice isn't falling as much as it did in Q1. In fact, over Q2 it only fell 3.5% from 439 sats/TH/day to 433 sats/TH/day.



Transaction Fees Are Still Low

Transaction fee revenue increased quarter-over-quarter, but transaction fees are still in the gutter. Transaction fee volume as a percentage of block rewards increased by 31% from Q1 to Q2, rising from 1.23% to 1.61%.

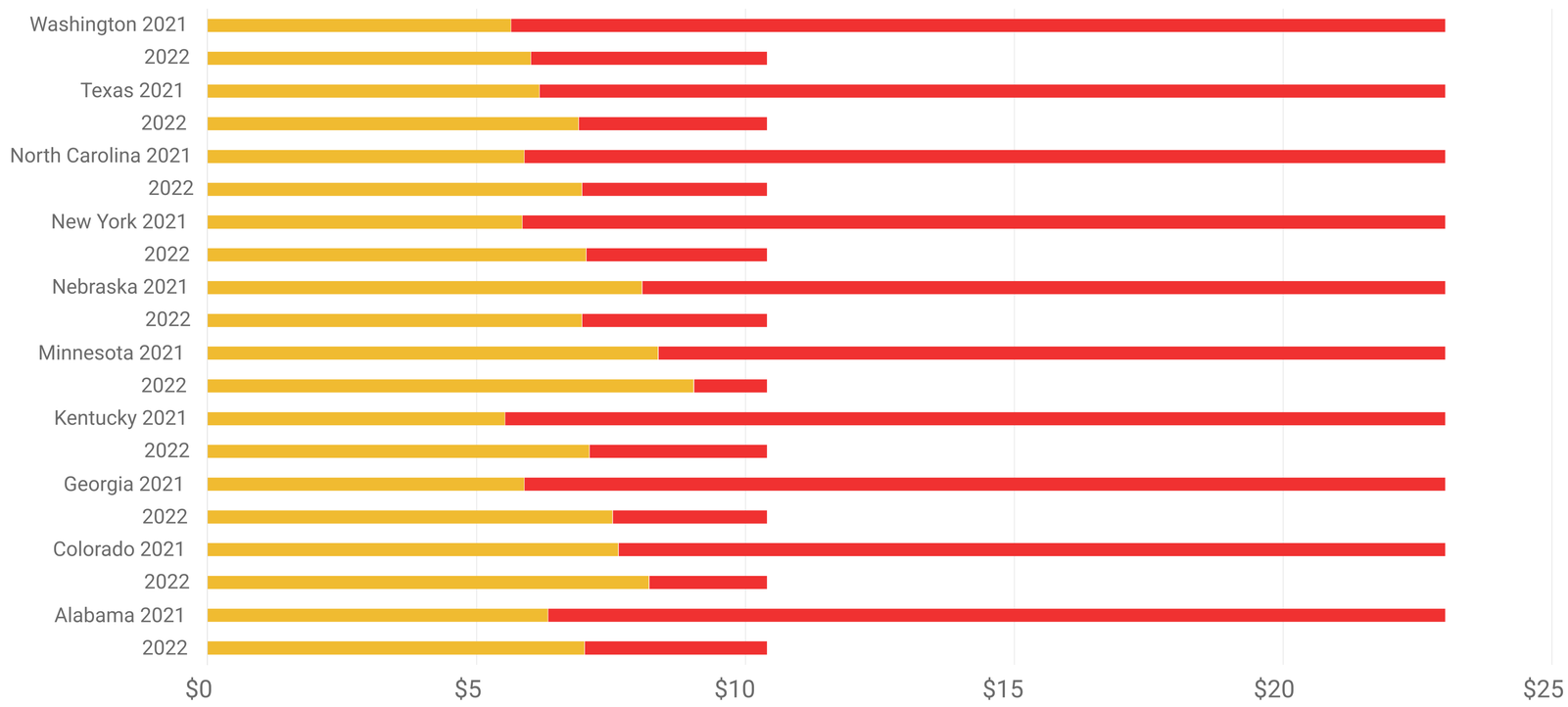


Scaling solutions like Segwit and the Lightning Network partly explain the dropoff in fee volume. But blocksizes are not far off from the levels we saw back before China's mining ban, so there's likely more to this explanation than scaling solutions.

Hashprice Break Even Analysis

Miners with higher electricity costs are already approaching shut-off points, even those who are running new generation hardware. For the popular mining states we sampled below, the average industrial electricity price rose 11% from $6.55/MWh to $7.30/MWh from April 2021 to April 2022.

S19 (100 TH) Daily Cost vs. Daily Profit (June 2021 / June 2022)



	WA 2021	WA 2022	TX 2021	TX 2022	NC 2021	NC 2022	NY 2021	NY 2022	NE 2021	NE 2022	MN 2021	MN 2022	KY 2021	KY 2022	GA 2021	GA 2022	CO 2021	CO 2022	AL 2021	AL 2022
Cost	5.65	6.02	6.18	6.91	5.9	6.97	5.86	7.05	8.09	6.97	8.39	9.05	5.54	7.11	5.9	7.54	7.65	8.22	6.34	7.02
Profit	17.35	4.38	16.82	3.49	17.1	3.43	17.14	3.35	14.91	3.43	14.61	1.35	17.46	3.29	17.1	2.86	15.35	2.18	16.66	3.38

Cost Profit

Power costs based on April 2021 and April 2022 data | Source: EIA, Hashrate Index

The analysis to the righ shows breakeven costs for various machines at various hashprice levels.

(The benchmark hashprice for the analysis is $0.09/TH/day).

Unsurprisingly, old-generation mining rigs are now completely unprofitable except for those miners hashing with basically free electricity. Mid-gen machines are still eking out a living for folks with all-in power costs under $0.07/KWh. Even miners with the newest generation equipment are starting to sweat, particularly those in hosting agreements with all-in power over $0.08/KWh.

Electricity Price	Hashprice breakeven S9	Hashprice breakeven S17	Hashprice breakeven S19j Pro	Hashprice breakeven S19 XP
$0.01	$0.024	$0.011	$0.007	$0.004
$0.02	$0.048	$0.021	$0.015	$0.007
$0.03	$0.072	$0.032	$0.022	$0.011
$0.04	$0.096	$0.043	$0.029	$0.015
$0.05	$0.120	$0.054	$0.037	$0.018
$0.06	$0.144	$0.064	$0.044	$0.022
$0.07	$0.168	$0.075	$0.051	$0.026
$0.08	$0.192	$0.086	$0.059	$0.029
$0.09	$0.216	$0.096	$0.066	$0.033
$0.10	$0.240	$0.107	$0.073	$0.037

3

Bitcoin Mining ASICs Approach All-Time Lows

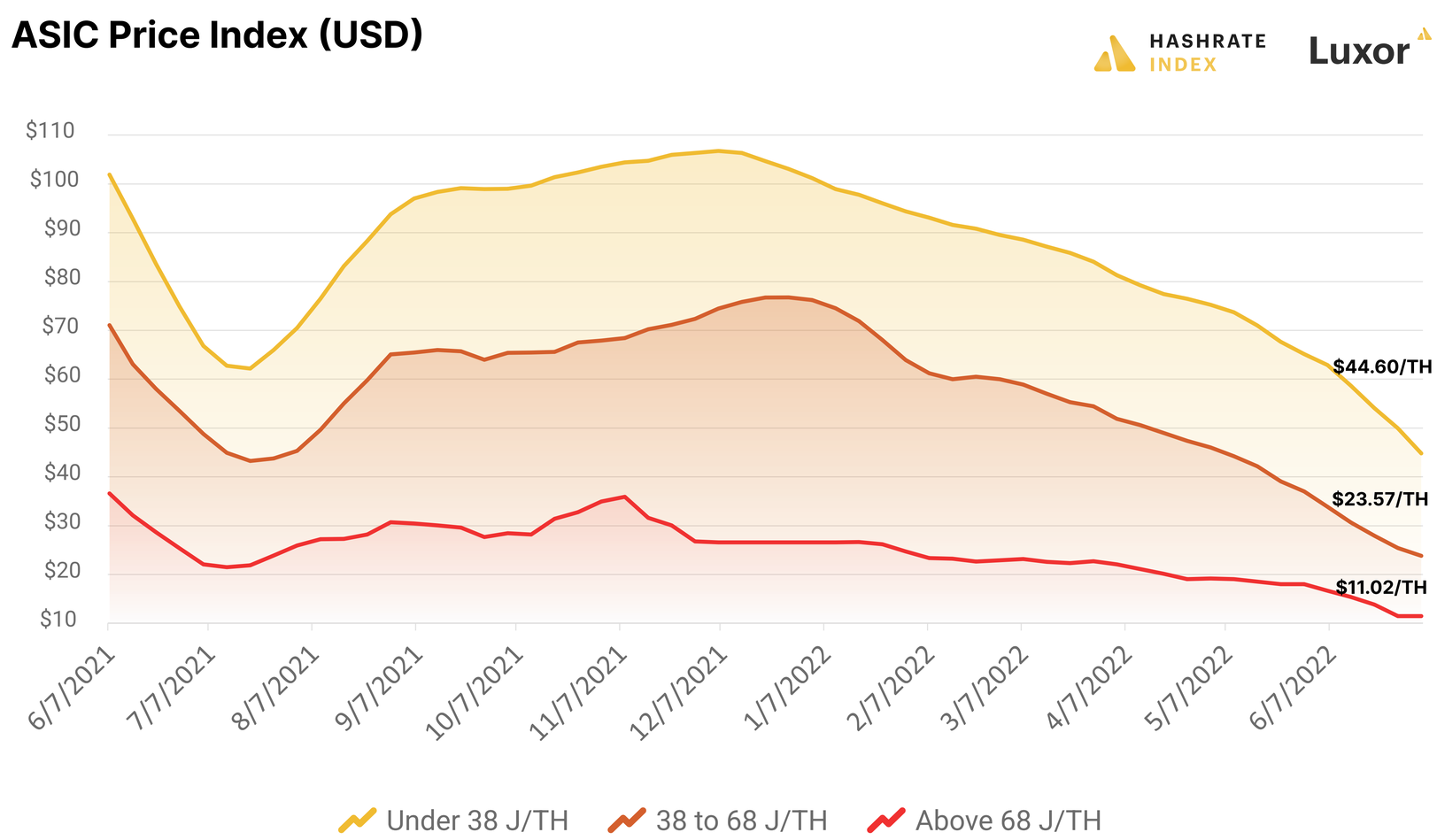
2022 has been one of the most punishing years yet on Bitcoin mining rig prices.

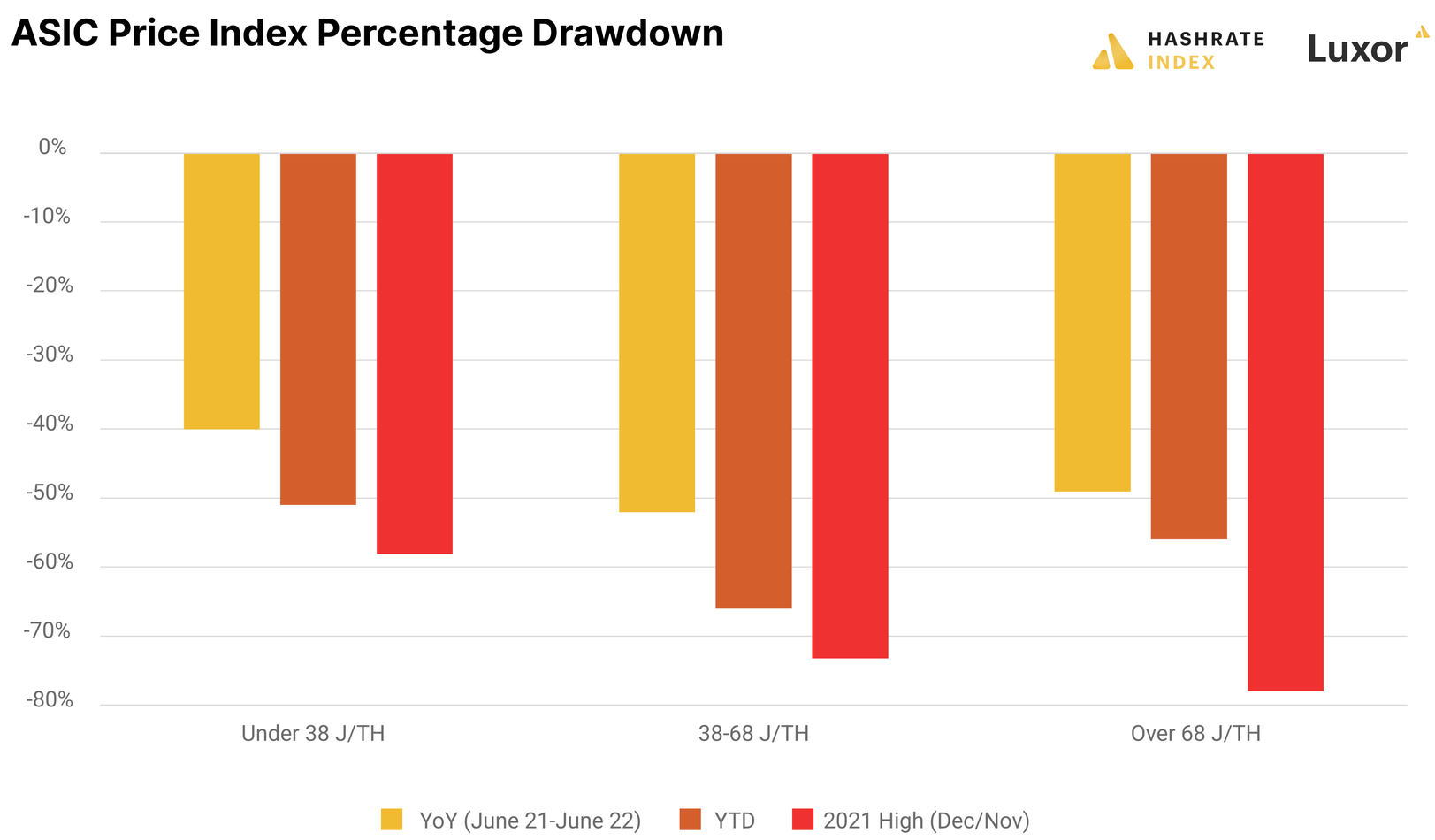
Long way up, long way down...from the beginning of the year to the close of Q2, the tiers in our ASIC Price Index fell:

Under 38 J/TH (-51%)	38-68 J/TH (-66%)	Over 68 J/TH (-56%)

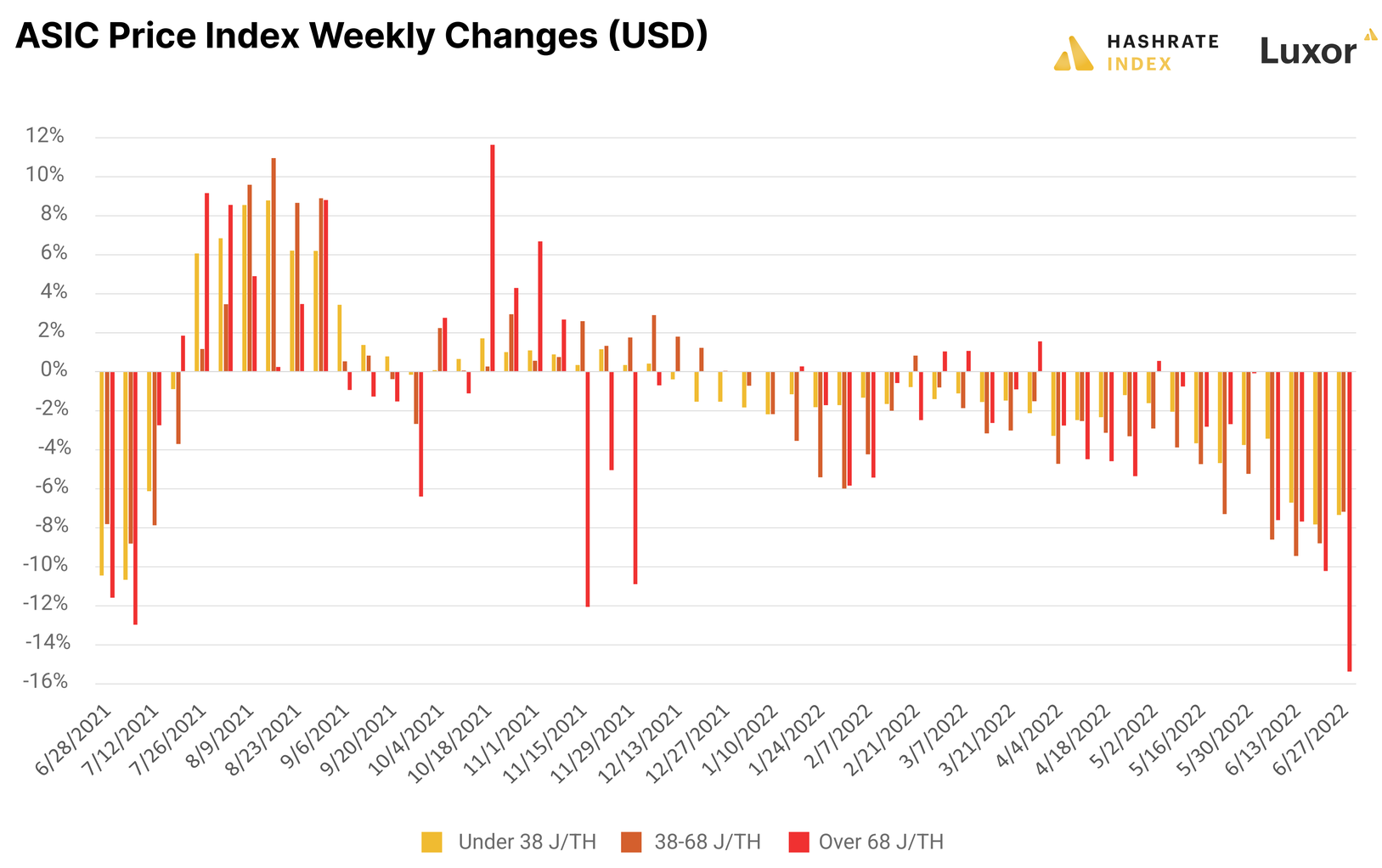
Year-over-year, ASIC prices have changed:

Under 38 J/TH (-40%)	38-68 J/TH (-52%)	Over 68 J/TH (-49%)



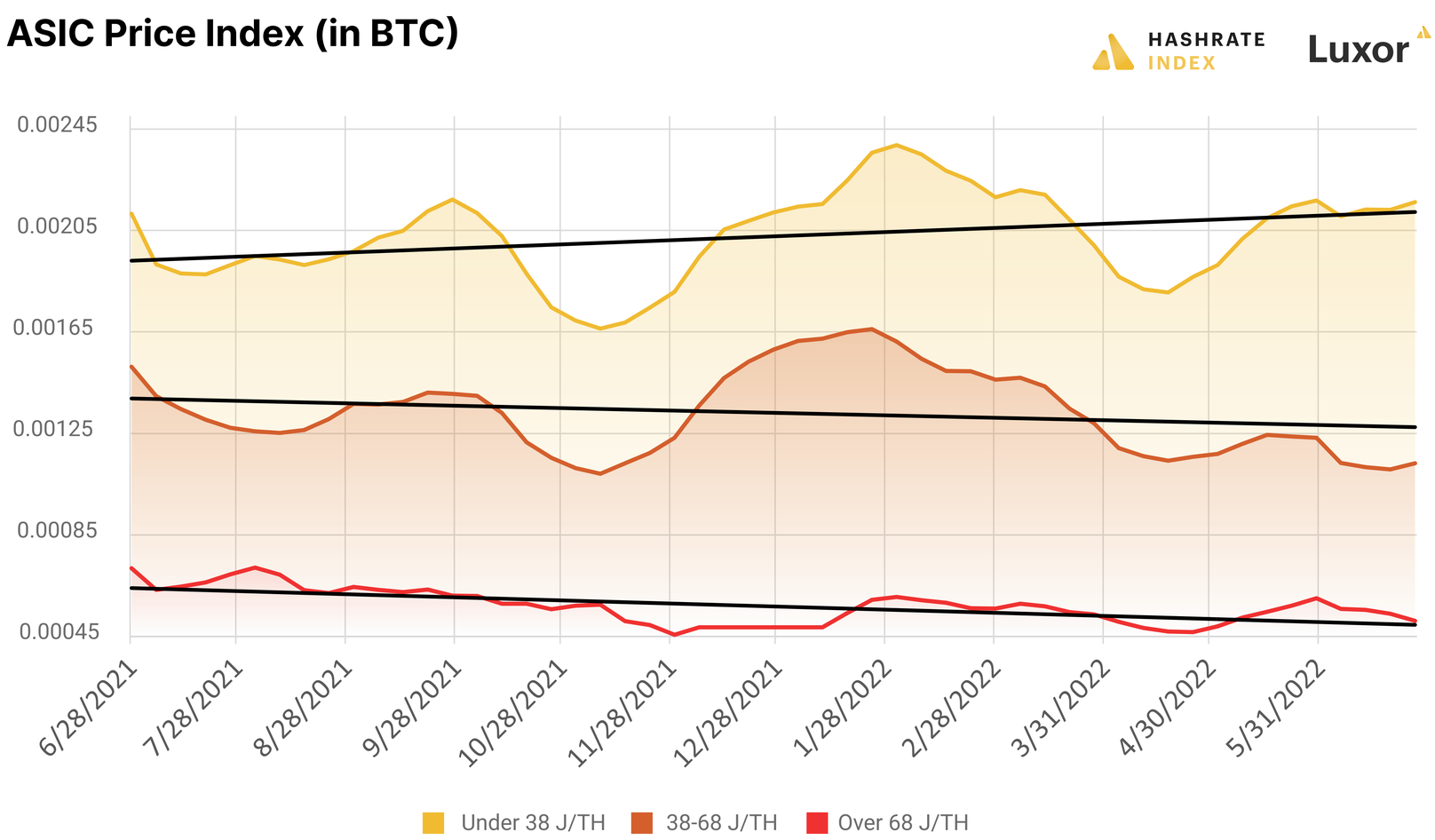


When looking year-over-year, ASIC price declines weren't as drastic because China's mining ban depressed ASIC prices last summer. But when we look at the ASIC price declines from last year's peak in prices–which marked an all-time high for new and mid gen machines in December, but only a multi-year high for older machines in November–the drawdown is more brutal.



Rig Prices in BTC Are Less Volatile Longterm

Rig prices in USD tell one tale, but rig prices in BTC tell another story entirely. As Bitcoin's price plummets, the BTC cost for new generation machines has actually increased. **Year-to-date, new-gen machines have risen 2% in BTC terms. Mid-gen rigs, by contrast, have fallen 28%, while old-gen machines have risen 5%.**
Year-over-year, new-gen ASICs have risen 2%, mid-gen ASICs have fallen 25%, and old-gen machines have fallen 29%.



The Billion Dollar ASIC Lending Market

With mining economics at multi-year lows, some miners are having to sell machines for fractions of the price they paid for them.

If we take a long look at the state of ASIC financing, the source of this selling comes into focus (i.e., miners who took out loans are more likely to sell than those who paid in cash). We estimate that there are anywhere from $3-4 bln in outstanding ASIC loans.

To assess the current health of the ASIC-backed debt market, it's helpful to remember that 2021 was the most profitable year for Bitcoin mining since the last bull market, with hashprice averaging ~$0.30 per TH over the year. Given favorable mining economics and lofty valuations, miners were looking to purchase and deploy as many machines as possible. Strong demand from miners along with lingering supply chain issues led to soaring ASIC prices. New generation rigs reached as high as 119 $/TH. To feed this frenzy, miners turned to capital markets to fund their aggressive expansion plans.

During this frantic hash-grab, miners purchased far-dated futures orders (machines that would be produced and shipped at a later date than the purchase date). Typically, miners put some form of downpayment on these machines (usually 25-50%), with the rest of the payment due in the months leading up to the delivery of the machines. Many miners spent all their capital on down payments, with the expectation of raising debt/equity or generating enough cash flow to pay off the remainder of the balance in the future.

Capital Tap Shuts Off

Debt financing deals became ever more popular as more lenders entered the market; increased competition (and a low Fed funds rate) drove down interest rates for borrowers in 2021. Deal flow continued into Q1-2022 but slowed in recent months as lenders took a step back given the downturn in hashprice and broader financial markets. This coincided with public and private equity markets drying up. Miners are now facing a difficult environment to raise both debt and equity.

Despite the recent slowdown, Luxor estimates that miners have $3-4 billion in outstanding ASIC-backed debt on their balance sheets.

These loans were provided by a mix of crypto-native lenders, machine lenders, and hedge funds. Miners from North America and overseas (both public and private) took advantage of these loans.

With hashprice fully in bear market territory, miners should be cautious about leverage, and actively reduce debt on their balance sheets. The miners that bought and deployed large fleets at elevated ASIC prices are in the toughest spot. Pair that with a high LTV loan, a short loan duration, and high interest rate, and these miners are likely significantly cash-flow negative on those machines. Miners will need to dig into their treasuries to service the debt (they are already starting to do so, as we cover in more detail later in the public miners section).

Notably, while it was an unpopular trade last year when Bitcoin's price was on a tear, miners who took out bitcoin-denominated debt are in a stronger position to cover their interest payments and principal payments.

ASIC Loan Analysis

Monthly DSCRs were calculated using the below formulas:

DSCR=Miner Margin ÷Debt Service

*Miner Margin=$ Hashprice × Machine TH/s-Machine kW*24 Hours× Electricity Rate×30 Days*

Debt Service= $ per TH Machine Price × Loan to Value %÷Tenor+Interest Rate÷12 ×Loan Balance

For miner margin, we used machine specifications for the S19 Pro (100 TH, 3.25 kW) and an electricity rate of $0.05 per kWh. We use machine pricing from the Hashrate Index ASIC Price Index and a 75% loan-to-value to calculate debt amounts. Debt matured over 18-months with equal monthly amortization payments. Finally, we calculate interest expenses by applying a 15% interest rate to the average loan balance between the beginning and end of the month. We show the results using these assumptions in the table below.

(1)	(2)	Jan-21	Feb-21	Mar-21	Apr-21	May-21	Jun-21	Jul-21	Aug-21	Sep-21	Oct-21	Nov-21	Dec-21	Jan-22	Feb-22	Mar-22	Apr-22	May-22	Jun-22
Jan-21	61	2.00x	2.73x	3.13x	3.27x	2.54x	2.02x	2.84x	3.54x	3.01x	3.59x	3.40x	2.55x	1.93x	1.73x	1.80x	1.72x	1.15x	0.75x
Feb-21	75		2.19x	2.51x	2.62x	2.04x	1.61x	2.28x	2.84x	2.41x	2.87x	2.72x	2.04x	1.54x	1.39x	1.44x	1.38x	0.92x	0.60x
Mar-21	101			1.84x	1.92x	1.49x	1.18x	1.67x	2.08x	1.77x	2.11x	1.99x	1.49x	1.13x	1.02x	1.05x	1.01x	0.67x	0.44x
Apr-21	117				1.65x	1.28x	1.02x	1.43x	1.78x	1.52x	1.81x	1.71x	1.28x	0.97x	0.87x	0.90x	0.87x	0.58x	0.37x
May-21	116					1.28x	1.01x	1.42x	1.77x	1.51x	1.80x	1.70x	1.27x	0.96x	0.87x	0.90x	0.86x	0.57x	0.37x
Jun-21	88						1.32x	1.86x	2.31x	1.97x	2.34x	2.21x	1.66x	1.25x	1.13x	1.17x	1.12x	0.74x	0.48x
Jul-21	64							2.52x	3.13x	2.67x	3.17x	3.00x	2.25x	1.70x	1.53x	1.58x	1.52x	1.01x	0.66x
Aug-21	82								2.42x	2.06x	2.45x	2.32x	1.74x	1.31x	1.18x	1.22x	1.17x	0.78x	0.51x
Sep-21	98									1.71x	2.04x	1.92x	1.44x	1.09x	0.98x	1.01x	0.97x	0.65x	0.42x
Oct-21	100										1.97x	1.86x	1.39x	1.05x	0.95x	0.98x	0.94x	0.62x	0.41x
Nov-21	105											1.77x	1.32x	1.00x	0.90x	0.93x	0.89x	0.59x	0.38x
Dec-21	105												1.31x	0.99x	0.89x	0.92x	0.88x	0.58x	0.38x
Jan-22	98													1.05x	0.95x	0.98x	0.94x	0.62x	0.40x
Feb-22	91														1.00x	1.04x	0.99x	0.66x	0.43x
Mar-22	86															1.08x	1.04x	0.69x	0.45x
Apr-22	78																1.13x	0.75x	0.49x
May-22	70																	0.83x	0.54x
Jun-22	56																		0.66x

(1) Date refers to the month in which the loan was issued; (2) Indicates the average $/TH price for machines during the month of loan issuance

DSCRs remained healthy across all months in 2021. In early 2022, DSCRs for loans issued in months where machine prices were above 100 $/TH began to dip below 1.00x, indicating miners were unable to service the larger loans they received to buy machines during peak pricing periods. **As hashprice nosedived in May and June 2022, all loans fell below the 1.00x DSCR mark.**

The results of the analysis corroborate recent headlines of miners liquidating bitcoin from their balance sheets to cover costs. Clearly, miners, especially those with leverage, are struggling in this low hashprice environment. If hashprice continues to linger in the single digits for an extended period of time and capital markets don't improve, it's likely we'll see some miners default on their debt as their liquidity runs completely dry.

As defaults occur, operators on more sound financial footing will be well-positioned to scoop up machines at bargain prices as lenders liquidate collateral to recover what funds they can. With this in mind, it's reasonable to expect distressed asset sales in the year to come. Based on our ASIC Trading desk data, distressed assets usually sell for a 10-25% discount to fair-market-value if the seller needs to liquidate a large volume into the market with an immediate sale.

Managing Loan Books

On the flipside of this trade are the lenders. While market conditions are tough and many loans are under-collateralized, certain lenders are in better positions than others. Lenders who raised from LPs and charge a management fee (i.e. 2% of deployed capital + 20% over a certain return threshold) are at less risk then the lenders who took in deposits from investors and lent that out. The duration mismatch makes the latter arrangement more dangerous. Lenders who prioritized well-capitalized and good operators, lower loan-to-value (LTV), and lower levels of credits during periods of high ASIC prices are in better shape.

Intel Has Entered the Chat

One of the US's oldest computer companies is the newest competitor on the Bitcoin ASIC manufacturing playing field.

Intel broke into the scene this year in perhaps the year's most exciting development in the Bitcoin mining hardware market. The semiconductor manufacturer has shipped its flagship bitcoin mining ASIC chips (dubbed "Blockscale") to its North American customers. The miners who have purchased chips include Argo, GRIID, Block (formerly Square), and Hive.

Intel is just selling the chips, so it's up to these miners to put together everything else that makes a bitcoin miner tick (PSUs, chassis, heat sinks, fans, etc). The North American ASIC manufacturer, ePIC Blockchain, is designing both air-cooled and immersion rigs for Argo, the ePIC team told Hashrate Index (this information is also available in public disclosures). In Argo's Helios facilities, all of these Intel chips will go towards immersion mining.

We do not know the exact hashrate and efficiency rating of Intel's Blockscale, but using Intel's website, we can drum up the following estimate (assuming a miner uses all 256 threads): 140 TH/s; 26 W/TH efficiency; ~3600 watts.

ASIC Miner Comparison	Hashrate	Efficiency	Wattage
Intel Blockscale	140 TH/s	26.0 W/TH	3640 W
S19 XP	140 TH/s	21.5 W/TH	3010 W
M50	114 TH/s	29.0 W/TH	3306 W
S19 Pro	110 TH/s	29.55 W/TH	3250 W
M30S++	112 TH/s	31.0 W/TH	3472 W

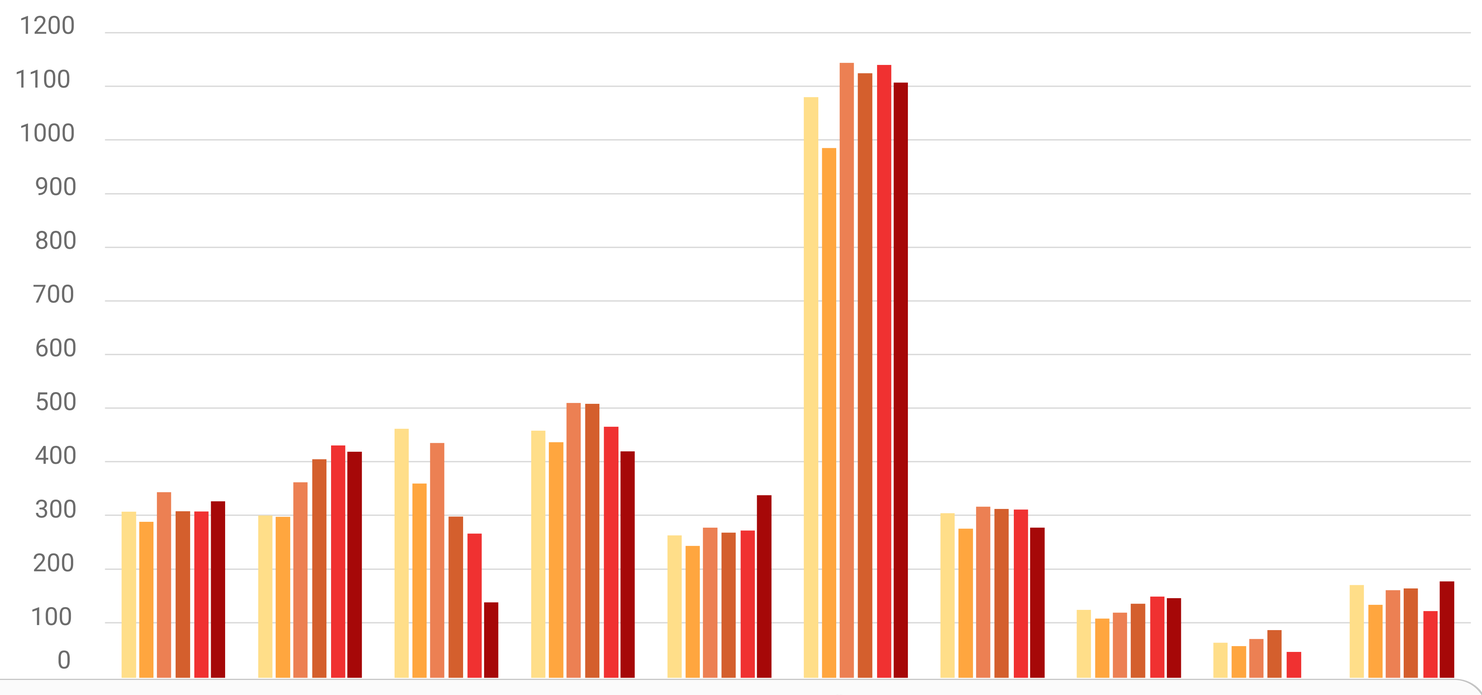
Source: Hashrate Index, Intel

4

Public Miners Come Down from Their High

2021 was a watershed year for the industry's publicly traded companies. The Chinese Mining Ban was a boon for business (particularly in the immediate aftermath last summer). These miners mined more on a USD basis than ever before, and their stock prices hit all time highs.

Monthly BTC Production



	Hut 8	Bitfarms	Marathon***	Riot	Cleanspark	Core Scientific	Hive	Iris	DMG	Argo
January	308	301	462	458	264	1077	305	126	65	172
February	289	298	360	436	244	981	276	110	59	135
March	345	363	436	511	279	1143	318	121	72	163
April	309	405	299	508	269	1,121	313	137	88.1	166
May	309	431	268	466	273	1,138	312	312	48.3	124
June	328	420	140	421	339	1,106	279	148		179

January February March April May June

Now that the bear has come around, though, these miners are facing shrinking profitability. Some have shed their Bitcoin treasuries to shore up finances and pay off debts for real estate and equipment (as the above section details, there's plenty of outstanding debt in the ASIC financing market).

The bear market has firmly clamped down on miner valuations. Year-to-date, most miners in our analysis are down at least 70%. At the time of writing, Cleanspark is leading the pack as it is only down 57.46%, while Core Scientific is lagging behind the pack at 85.47%.

Bitcoin Miner Metrics and Ratios

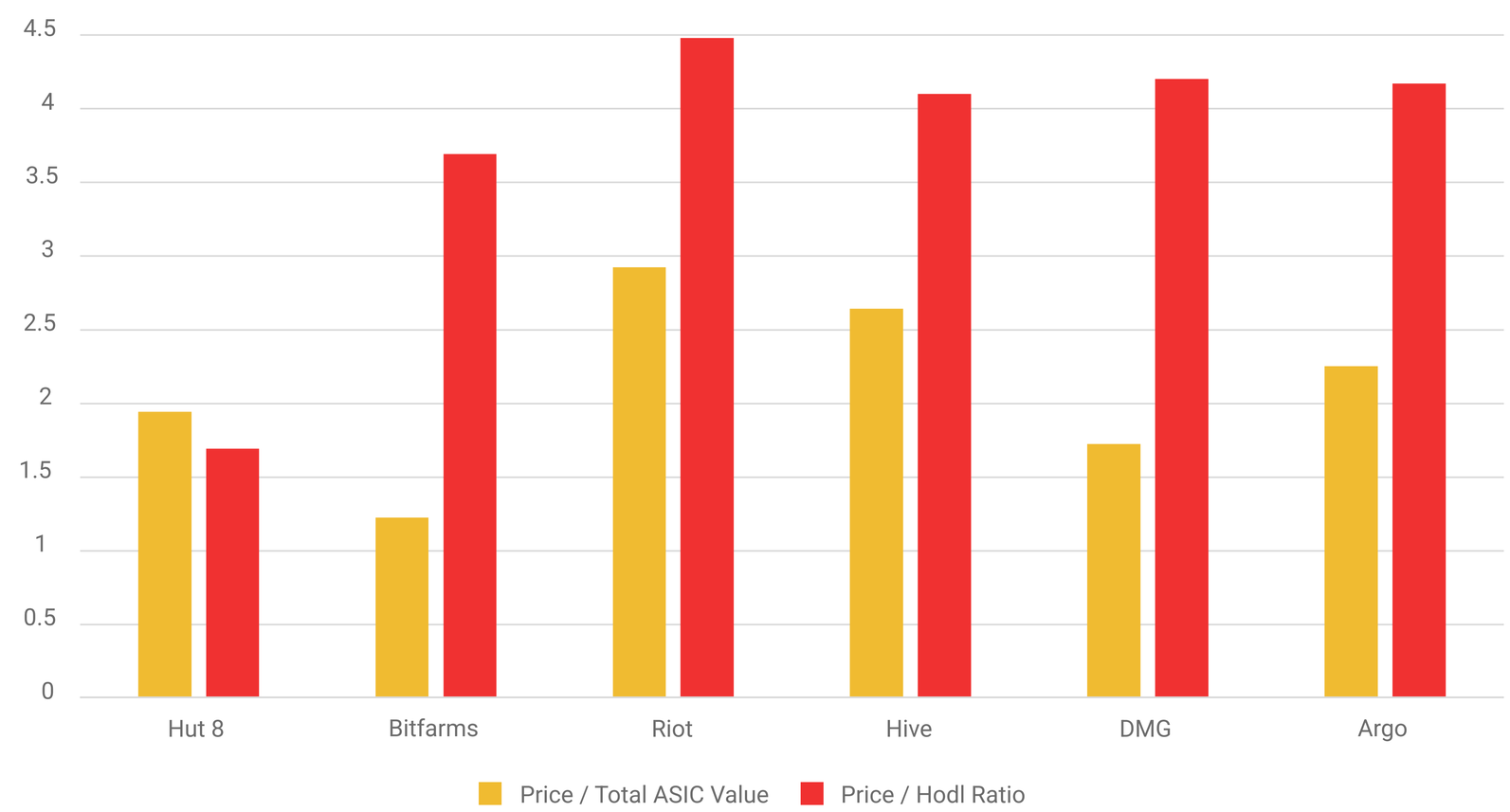
Looking beyond stock prices, we can use a variety of ratios and metrics to measure public miner health. These include: Price/ Total ASIC Value ratio, the Price / Hodl ratio, the EV / Total ASIC Value, and the EV + Hodl /Total ASIC Value.

To start, the Price / Total ASIC value ration shows investors how much they are paying for exposure to a Bitcoin miner's ASIC portfolio.

Similarly, the Price / Hodl ratio shows how much investors pay for exposure to a miner's BTC treasury. In traditional equities analysis, price-to-earnings indicates a company's ability to generate profit; for miners, the Price / Hodl ratio gives us a bespoke metric to gauge a miner's ability to accumulate BTC. For both ratios, a lower value is preferable to a higher value.

Accumulating BTC in a bull market and holding onto that BTC is easy when miners can raise money with equity offerings or via debt vehicles. But as we'll see in the analysis below, when the bear market comes around and miners need to raise funds, hodl ratios may become less favorable as miners sell off BTC to cover costs.

Price / Total ASIC Value vs Price / Hodl



Price to Hold Table

Metrics	Hut 8	Bitfarms	Marathon	Riot	Cleanspark	Core Scientific	Hive	Iris	DMG	Argo
Bitcoin Treasury Value (USD)	$142,708,954.22	$60,602,168.65	$193,753,515.35	$128,218,387.98	$10,810,116.57	$37,748,695.83	$62,413,489.43	$38,538.74	$7,168,205.64	$45,841,831.23
Held Bitcoin	7406	3145	10055	6654	561	1959	3239	2	372	2379
Market Cap	$240,865,200	$223,432,000	$588,957,400	$573,884,000	$163,095,500	$523,894,000	$255,766,400	$198,036,000	$30,106,800	$191,128,000
Price / Hodl Ratio	1.69	3.69	3.04	4.48	15.09	13.88	4.1	5138.62	4.2	4.17
Market Cap / Hashrate	$86,642	$54,496	$981,596	$130,428	$58,248	$50,863	$117,865	$169,988	$48,171	$100,594
Shares Outstanding	174,540,000	203,120,000	106,310,000	135,350,000	412,900,00	325,400,000	82,240,000	55,010,000	167,260,000	477,820,000
Share Price	1.38	1.1	5.54	4.24	3.95	1.61	3.11	3.6	0.18	0.4
Bitcoin Value July 1, 2022	$19,269.37									

EV / Total ASIC Value Ratio

The enterprise value vs ASIC value ratio (EV-ASIC value ratio) measures the value of a public bitcoin miner's active rig fleet compared to that company's enterprise value. The benefit of using a public miner's enterprise value (instead of just the miner's marketcap) is that it adjusts cash and total debt from the total market capitalization value of the company. (To understand more about ratios for public miners' marketcaps and ASIC values, read How to Estimate Public Bitcoin Miner Value using Price to Total ASIC ratio)

If a company is less leveraged with debt, the enterprise value will be less than their market capitalization. If the company is highly leveraged, the enterprise value will be higher, as the debt will be larger than the cash on hand.

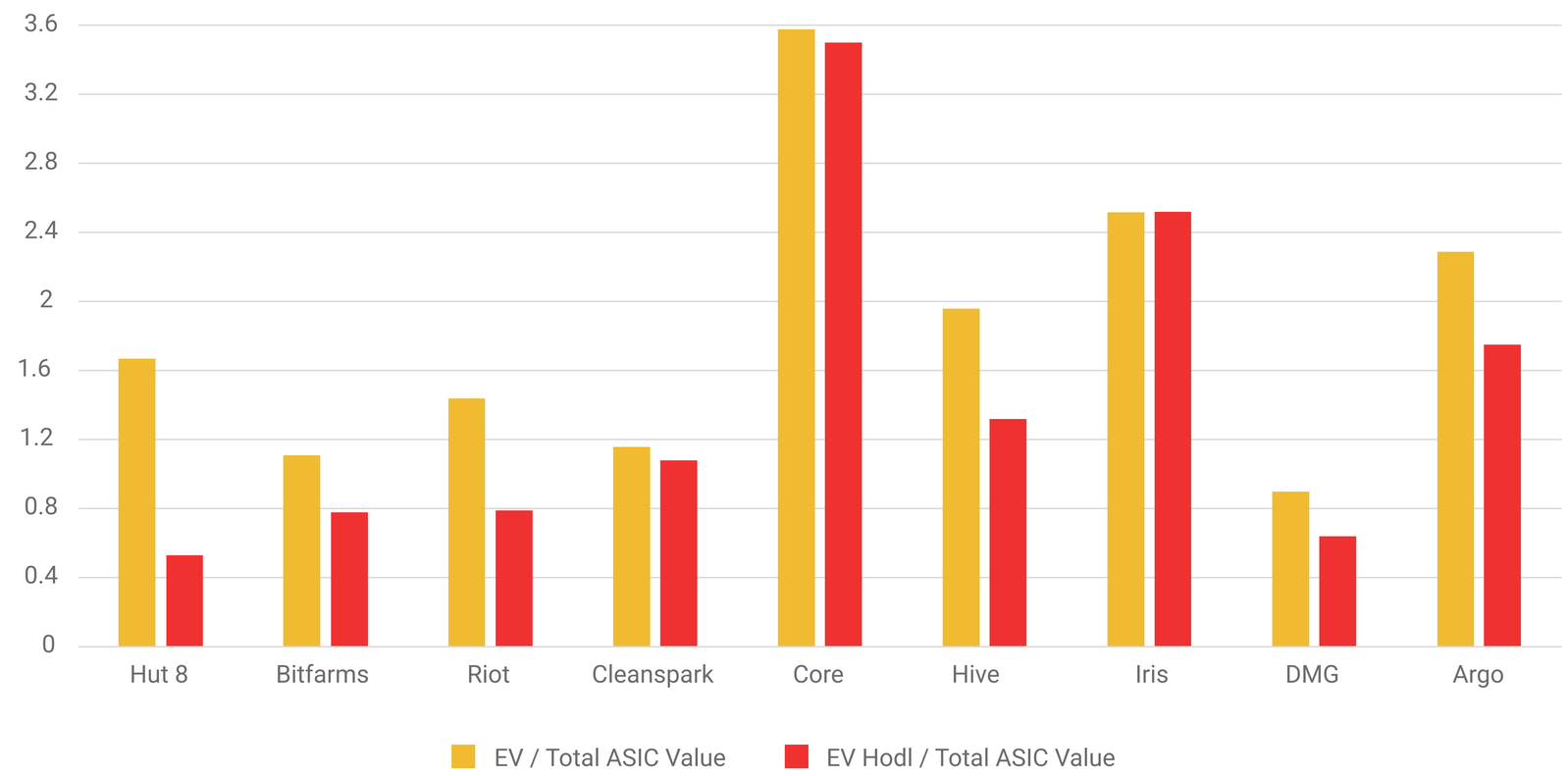
Highly leveraged Bitcoin miners are less desirable than their lower leveraged peers. Mining economics have destabilized and profitability is dropping, so investors should generally favor miners with lower leverage. A low EV-ASIC value ratio is more desirable than a high ratio.

EV + HODL / Total ASIC Value Ratio

The EV + HODL is an enhancement to the existing EV / Total ASIC value. EV + HODL includes enterprise value in addition to the total market value of Bitcoin held in treasuries. Traditionally, enterprise value excludes any marketable securities. Within the Bitcoin mining space, it makes sense to add back Bitcoin holdings as investors understand Bitcoin is more equivalent to cash holdings that miners use to run their businesses.

With the recent market carnage in Bitcoin treasuries, comparing EV / Total ASIC multiples reveals some interesting findings. Hut 8 held on to all their BTC, which allowed them to move within the same range as DMG Blockchain for the lowest EV + HODL ratio. Another key observation, Bitfarms still retains a very low EV / Total ASIC multiple amongst its peers even after selling nearly 50% of their Bitcoin treasury in June.

EV / Total ASIC Value vs EV + Hodl / Total ASIC Value



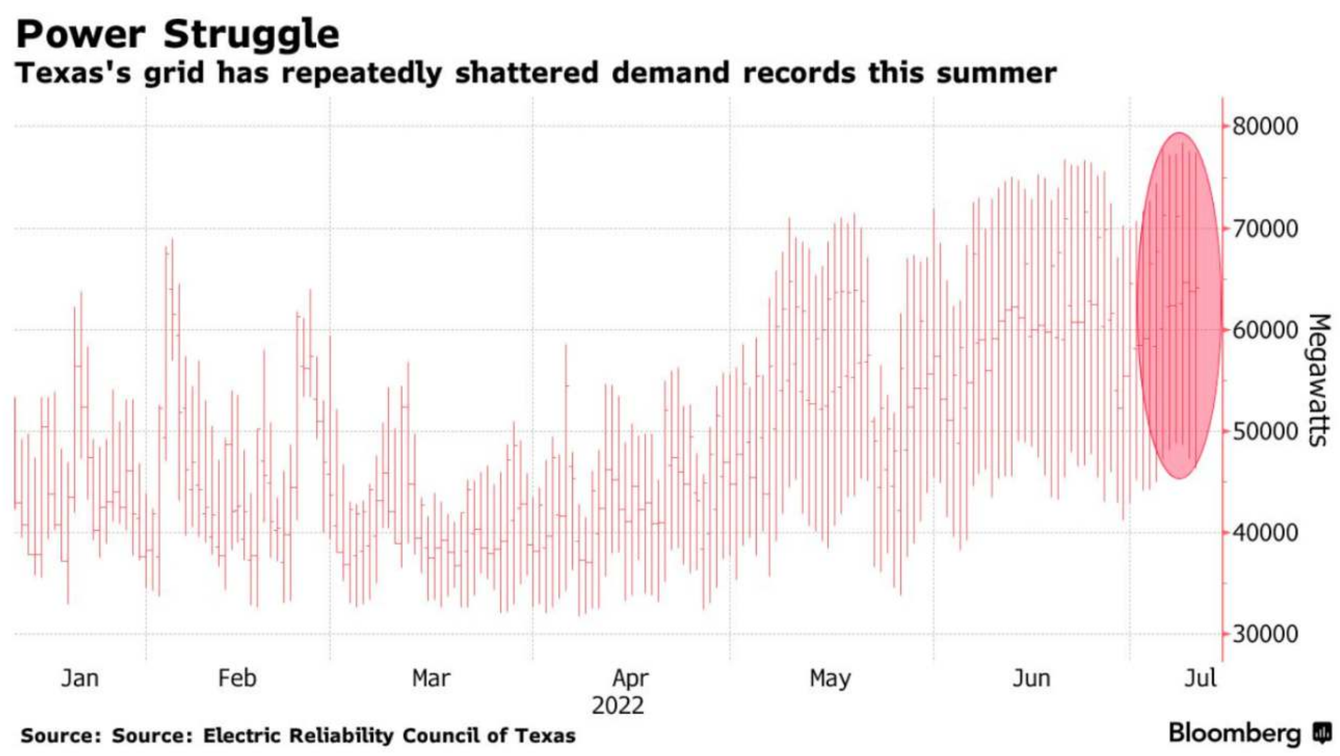
Price to Total ASIC Value

Metrics	Hut 8 ***	Bitfarms	Marathon **	Riot	Cleanspark	Core Scientific	Hive ***	Iris	DMG	Argo
Current Hashrate	2780	4100	600	4400	2800	10300	2170	1165	625	1900
Power Capacity	119	137	117	144	84	309	-	31	18.5	52
J/TH Efficiency	41	38	30	30	30	30	-	30	29.5	36.54
Spot ASIC Tier $/TH	44.73	44.73	44.73	44.73	44.73	44.73	44.73	44.73	44.73	44.73
**Total ASIC Value (USD) ** **	$124,349,400	$183,393,000	$26,838,000	$196,812,000	$125,244,000	$460,719,000	$97,064,100	$52,110,450	$27,956,250	$84,987,000
Market Cap USD	$240,865,200	$223,432,000	$588,957,400	$573,884,000	$163,095,500	$523,894,000	$255,766,400	$198,036,000	$48,000,000	$191,128,000
Enterprise Value	$208,000,000	$203,420,000	$847,790,000	$283,320,000	$145,530,000	$1,650,000,000	$190,720,000	$131,150,000	$25,170,000	$194,980,000
Price to Total ASIC Value	1.94	1.22	21.94	2.92	1.3	1.14	2.64	3.8	1.72	2.25
EV / Total ASIC Value	1.67	1.11	31.59	1.44	1.16	3.58	1.96	2.52	0.9	2.29
EV Hodl / Total ASIC Value	0.53	0.78	24.37	0.79	1.08	3.5	1.32	2.52	0.64	1.75

1 Market Capitalization = Share Price multiplied by shares outstanding
2 Price of Bitcoin as of July 1, 2022 ($19,269.37)
*** Excludes customer owned hashrate and non-bitcoin related mining**
**** Total ASIC Value represents total deployed hashrate, excludes inventory or on-order mining rigs**
***** Excludes ETH mining hashrate**

Bitcoin Miners in Texas: A Case Study on Load Shedding

As sweltering heat waves grip the US this summer, some of these miners–namely, Argo, Core Scientific, and Riot–are giving credence to the load balancing/curtailment thesis. Earlier this summer and in the second week of July, these miners powered down their Texas facilities to free up power for ERCOT. This load shedding (which can come in many forms depending on the miner's contract with ERCOT) is essential for stabilizing the grid at times of stress, and Bitcoin miners are almost always the first industrial power consumers to turn off to pipe power back to the grid.

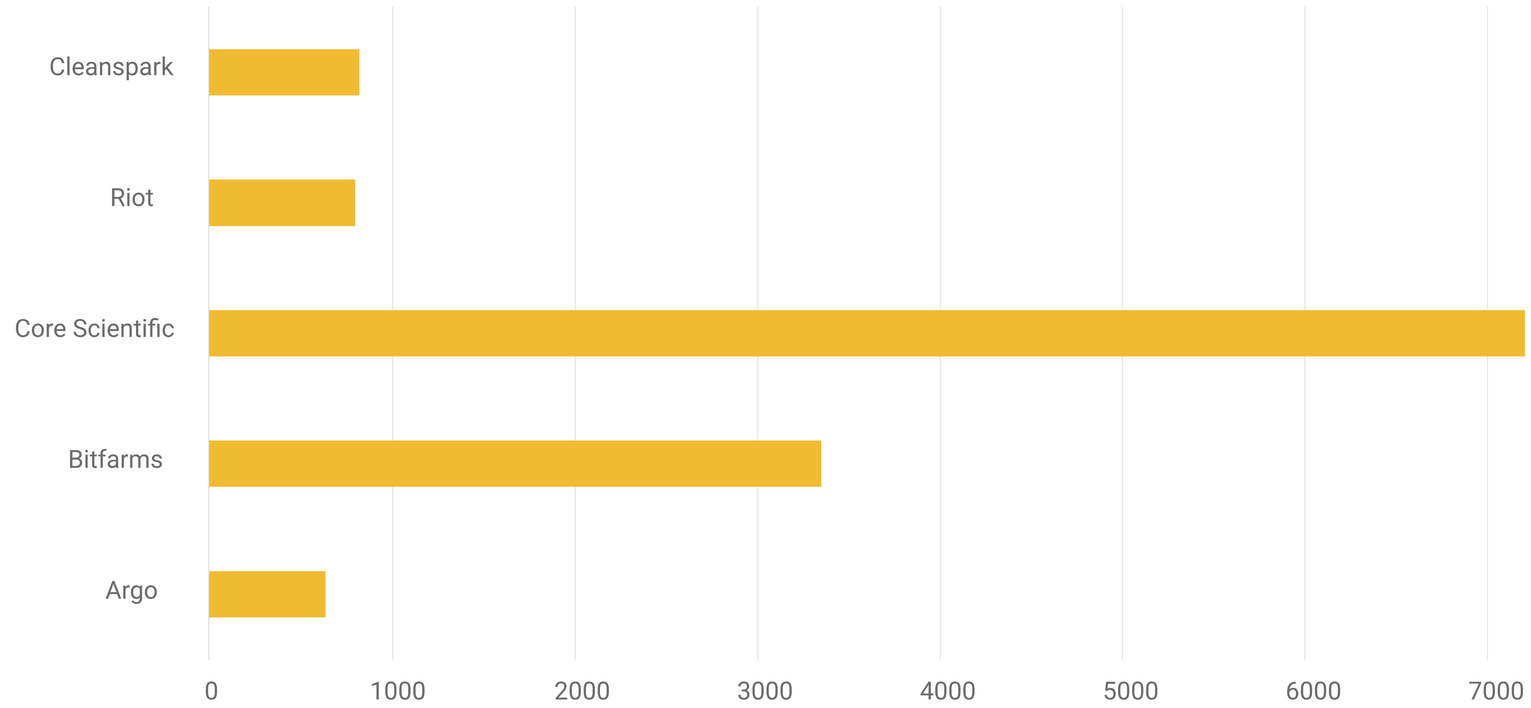


Mine High, Sell Low: Public Miners Hawk BTC for Cash

In a bid to cover costs, public Bitcoin miners are selling their BTC inventories.

Most miners explained that the selling will cover various operational costs and expansion plans without being specific. Core Scientific sold over 7,000 BTC, over 75% of its stack, to cover the covenants on the loans for its facilities.

BTC Sold in Q2



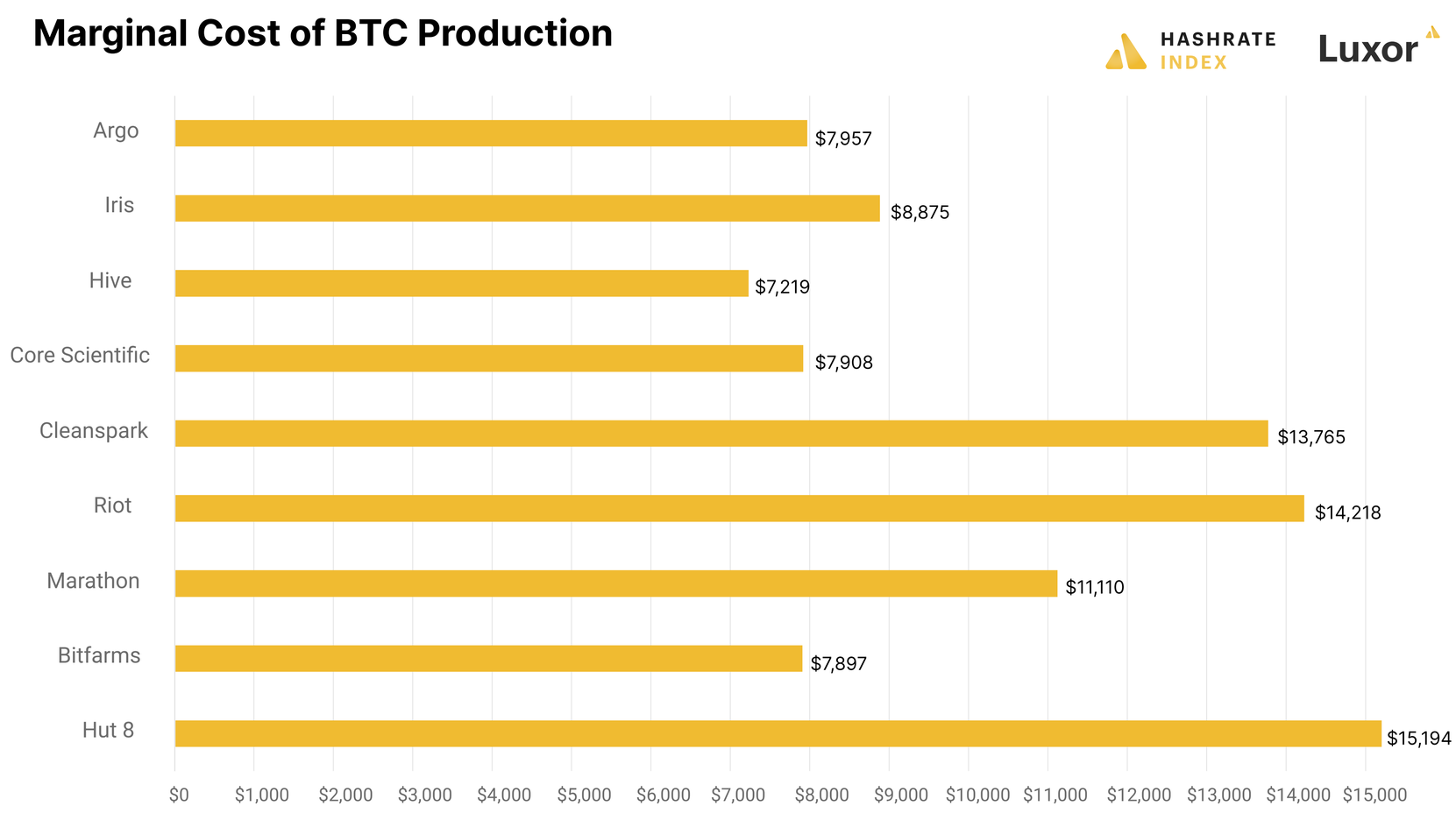
	Argo	Bitfarms	Core Scientific	Riot	Cleanspark
BTC Sold in Q2-2022	637	3,352	7,202	800	823

Hut 8, Marathon, and Hive Blockchain avoided selling BTC over the course of the quarter (DMG's June update was not available before publication, and Iris Energy has always sold its mined BTC). However, Marathon wrote in its June update that it "may sell a portion of its monthly bitcoin production as needed to fund monthly operating costs." And Hive Blockchain sold roughly 17,400 ETH over the course of Q2 to fund operations.

Most of these miners sold their BTC for a profit of course, but (and we hate to state the obvious here) they would have made more if they sold down their treasuries last year when price was still elevated.

Marginal Cost of Production

We use the marginal cost of production to estimate a miner's cost of electricity to produce one bitcoin. Keep in mind some miners, who have higher marginal average costs to produce a bitcoin may have other business line input costs within their operations (Hut 8, for example, has other high computation operations unrelated to Bitcoin or Ethereum mining which add to its bottom line). Pure play miners like Bitfarms, Core Scientific, Marathon Digital, Hive, and Argo are more representative of pure play mining operational costs.



To arrive at the marginal cost of production, we take the cost of revenues excluding depreciation expenses by the number of bitcoins mined during the period. We collected our dataset based on the latest quarterly financials from each company. Based on current mining economics, most publicly traded miners would still produce some mining profit at $10,000 Bitcoin. That said, we never want to see miners inch close to the marginal cost of production.

Still, this gap is closing, and bitcoin price may graze these miner's marginal cost of production before the bear market is over. Many miners hit marginal cost of production in the 2018-2019 crypto winter.

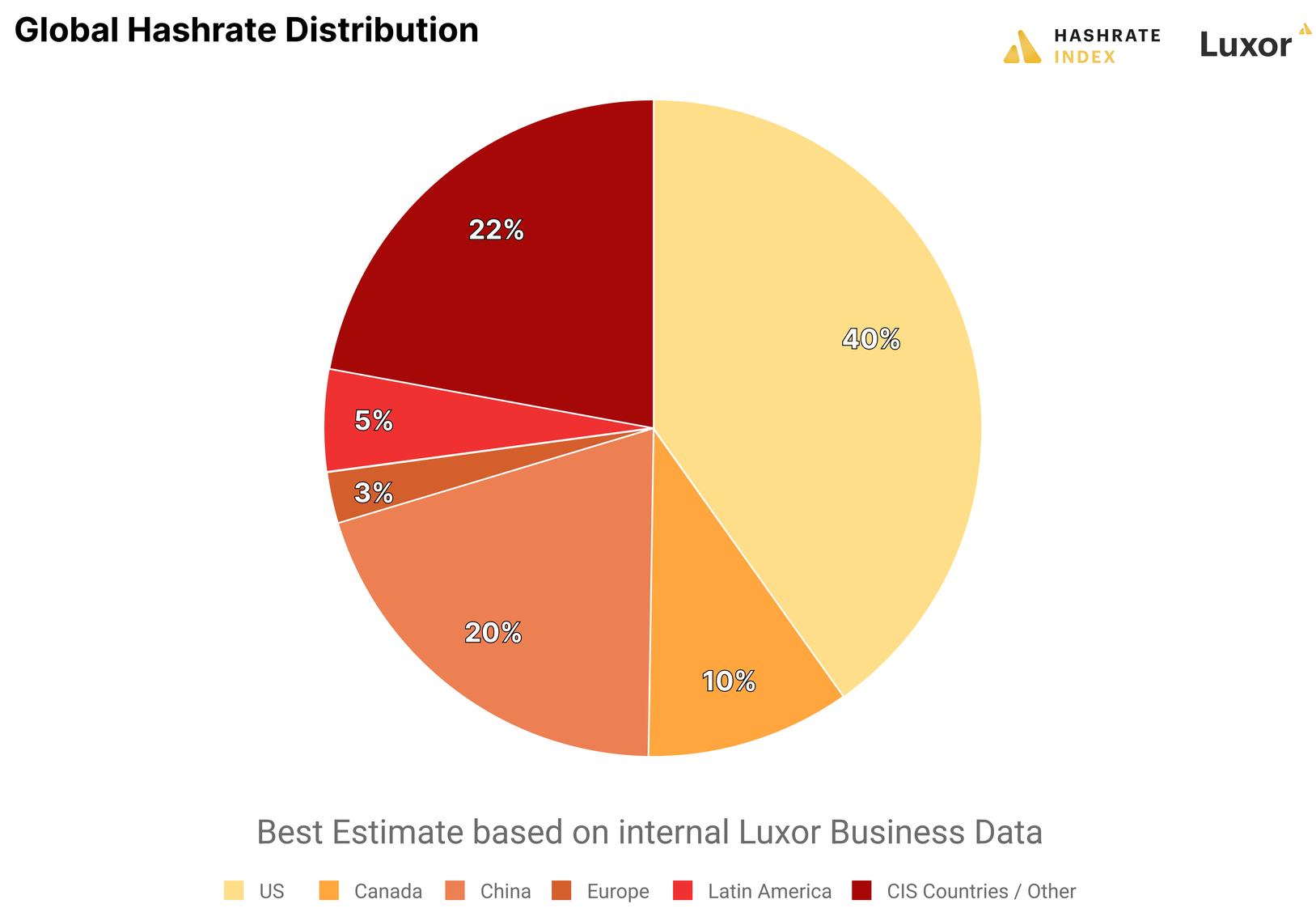
If you're an investor and you're looking for a silver lining, here's one: there is still some meat on the bone for paying interest on loans and for payroll expenses. Equipment purchases have already slowed down, as miners are trying to preserve capital. Capital expenditures going forward will likely be funded with excess cash flow, as miners squeeze every sat they can to fund existing delivery contracts.

5

Hashing Into a Recession

Things have changed drastically in the year that followed China's mining exodus. One of the biggest change (that's kinda no change at all): miners are coming back online in China, so much so that we estimate that roughly 20% of the network's hashrate is still operating in the country.

As for the rest of the world, the US dominates with more hashrate than any other country.



Bitcoin miners are entering what will likely be the lowest USD hashprice environment they have ever faced. For Bitcoin itself, the asset is entering a global recession for the first time, at a time when interest has never been higher and investment in the industry have never been larger.

So where do we go from here? It's hard to say, obviously. Many analysts (including us) thought that Bitcoin's hashrate would far exceed 300 EH/s by the end of the year, but at the time of writing, it's still puttering around 207 EH/s on the 7 day. As we keep hammering home in this report, depressed mining economics will depress network growth for the foreseeable future. Plenty of highly leverage, higher cost miners who entered the game last year will be out before the year is up, and while that's bad news for them, it's good news for those who are scrappy and run lean operations.

Now, to cap off the report, a few predictions:

- **Bitcoin's hashrate will not exceed 300 EH/s by the end of the year. It will likely settle closer to 250-260 EH/s**

- **Hashprice in USD terms will hit new all-time lows, which means it will drop below $0.07/TH/day.**

- **ASIC prices will hit new all-time lows (per Hashrate Index's ASIC Price Index), and new gen equipment will fall well below $20/TH/day.**

- **At least 1 (probably more) public miners will file for bankruptcy. There will be many more bankruptcies for private miners.**