HASHRATE INDEX

Hashrate Index Q2 2024 Report: The New Normal

July 2024

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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 to generate alpha. Hashrate Index is a product of Luxor Technology Corporation, a Bitcoin mining software and services company.

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Introduction

Introduction

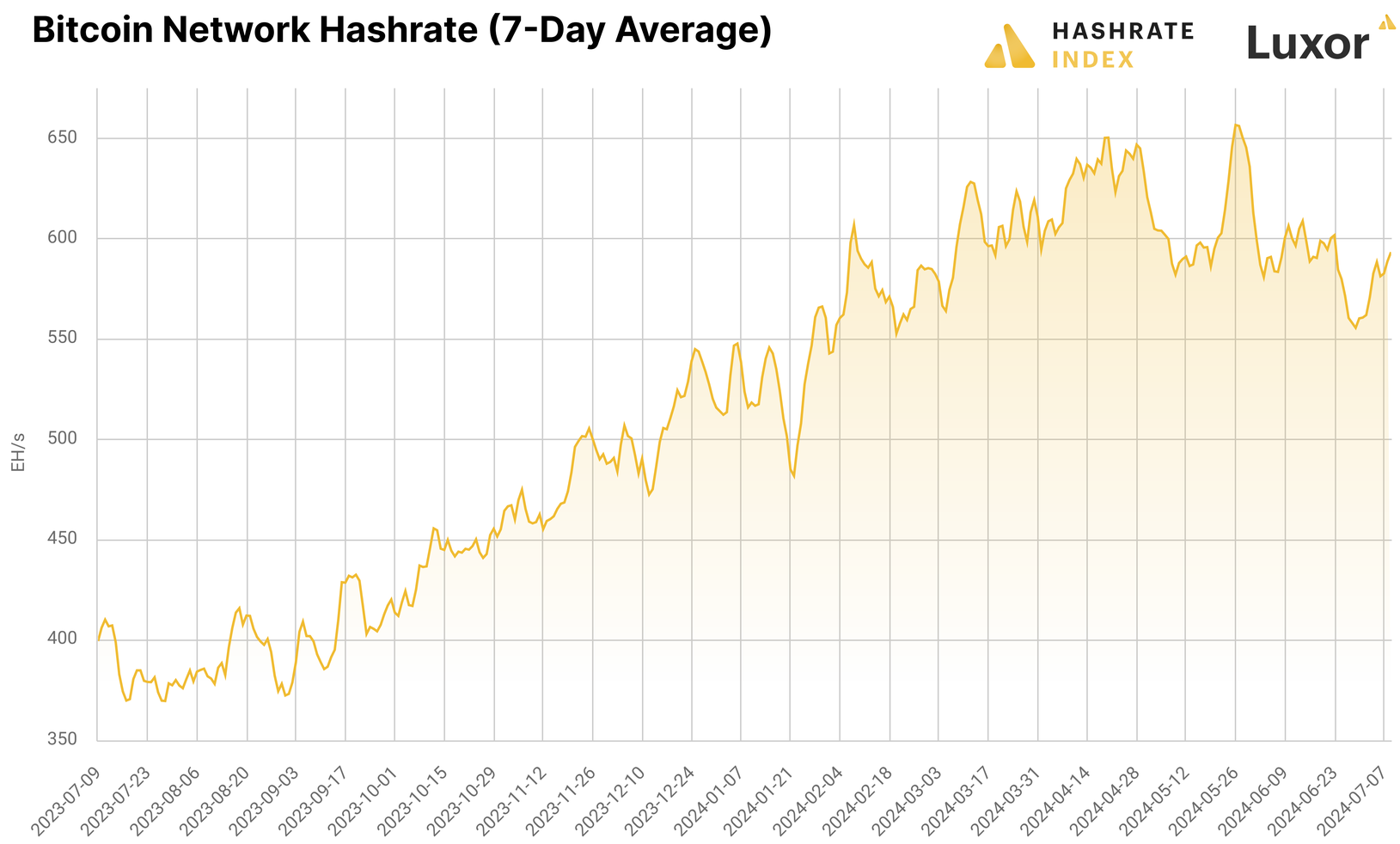
Bitcoin miners rang in Q2-2024 with Bitcoin's Fourth Halving, which occurred on April 19, 2024. With Q2 in the books, we have a (nearly) full quarter of data for the new normal of a 3.125 BTC block subsidy, so we're starting to get a feel for the immediate, near-term effects of this latest Halving epoch.

And it ain't pretty, y'all.

The block subsidy's deleterious impact on hashprice was bad enough, but miners were hit with two other blows that have made it even worse. First – and perhaps most importantly – Bitcoin toppled from all-time highs down to ~$60,000 in the final week of the quarter (and down even further to ~$55,000 in the first week of Q3, although it bounced back to ~$65,000 by July 17). And second, transaction fee volumes have basically evaporated, as the ordinals/inscriptions/runes markets, which have pumped up transaction fees over the past year, are in a cooling period.

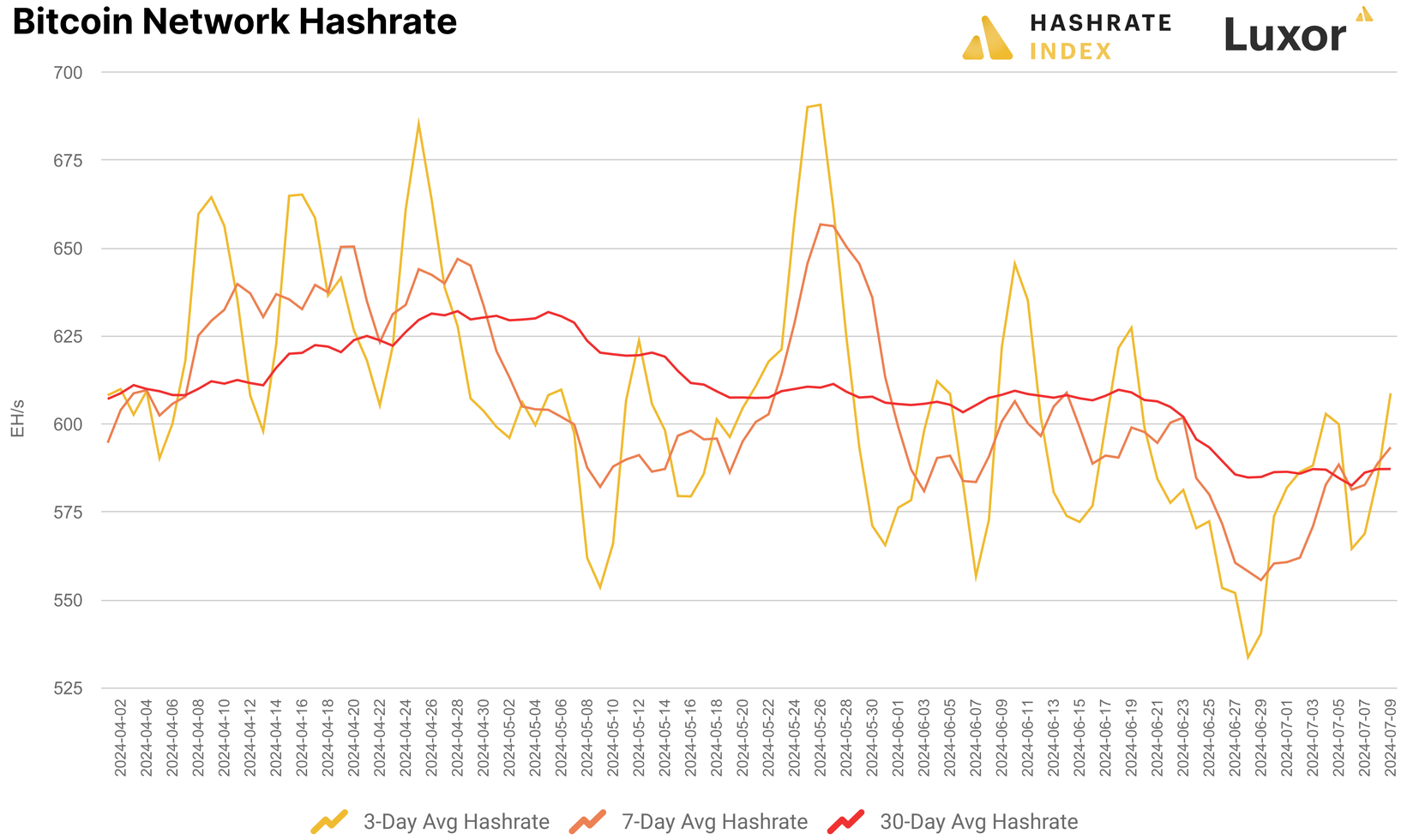
The end result of this three-fold impact is that hashprice is in all-time low territory. It fell below $50/PH/Day for the first time ever in the wake of the Halving, and at the time of writing on July 17, it has been below $55/PH/day for a month.

Naturally, hashrate has been in decline since the Halving given these abysmal mining economics. At the time of writing on July 17, Bitcoin's 7-day average hashrate is 604 EH/s, a 8.2% decline from its all-time high of 658 EH/s on May 26. This late-May surge to an all-time high was an aberrant, last gasp spurt for the quarter's hashrate growth before transaction fee volumes deflated and Bitcoin's price took a turn for the worse; over Q2, Bitcoin hashrate fell -7.3% – a rare occurrence of negative quarter-over-quarter change.



Source: Hashrate Index

As we will discuss in the transaction fee section, a new fungible token protocol, Runes, launched during the Halving, and in the month or so that followed the event, trading for Runes and other digital collectibles in the inscription/ordinals ecosystem buttressed hashprice for the better part of the quarter. Accordingly, many Bitcoin miners remained profitable for longer than they otherwise would have. The result is that Bitcoin' hashrate was particularly volatile in Q2 before hashprice collapsed, taking miners (and network hashrate) with it.



Source: Hashrate Index

With Q3 underway and the hottest months in North America bearing down, it's likely that we see another month of negative hashrate growth – or stagnation, at the very least.

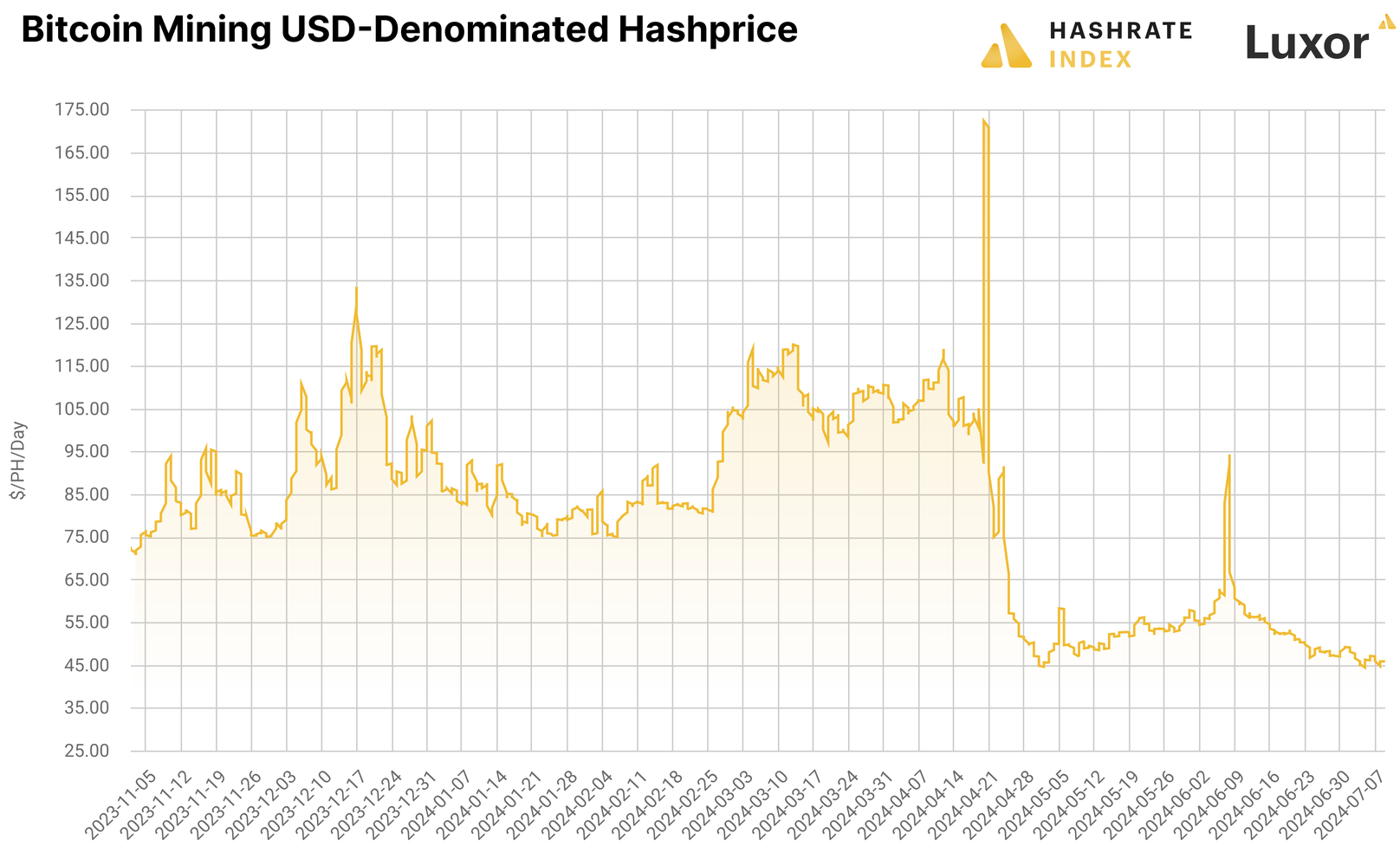
2

Bitcoin Halving Sends Hashprice to All-Time Low

Q2 flipped the script on what had otherwise been a better-than-expected year for Bitcoin's hashprice.

Hashprice had a strong Q1, which cushioned the blow of the Halving's effect on hashprice somewhat. But the pain came all the same, and hashprice hit an all-time low of $44.43/PH/day on May 1. Since then, hashprice has printed yet another all-time low of $44.31/PH/day on July 5. As of June 17, 2024, USD hashprice is $52.18/PH/Day. .

Bitcoin's USD hashprice fell 56% over Q2-2024 to $49.16/PH/Day, which was also a 53% decrease year-to-date at the close of Q2 and a 38% decrease year-over-year. On a BTC-denominated basis, hashprice fell 50% to 0.000776/BTC/PH/Day, a 68% decrease year-to-date and 70% decrease year-over-year.



Source: Hashrate Index

As the chart above shows, hashprice surged on the day of the Halving even despite the block subsidy reduction. The spike was all thanks to Runes-related activity, which created the highest print for hashprice since April 2022. As Runes trading fell off a cliff, hashprice did too, although hashprice experienced another meteoric surge and precipitous plunge in early June thanks to inscriptions/ordinals activity. Barring these two events and a marathon of trading that occurred in the runup to the Halving, digital collectible activity from inscriptions/ordinals/runes was a shadow of its former self in Q2-2024; as we will analyze in depth later, trading volume for these digital collectibles at the end of Q2 was at its lowest level since October 2023.

Given the insane hockey-stick movement of hashprice after the Halving (and its subsequent plummet), it should be no surprise that hashprice volatility hit a multi-year high in April, shattering the prior high it set in December of 2023. (When measuring volatility, the higher the number, the more volatile an asset over the 30-day rolling period and vice versa for a low score). This volatility persisted throughout Q2-2024, but has since plateaued.

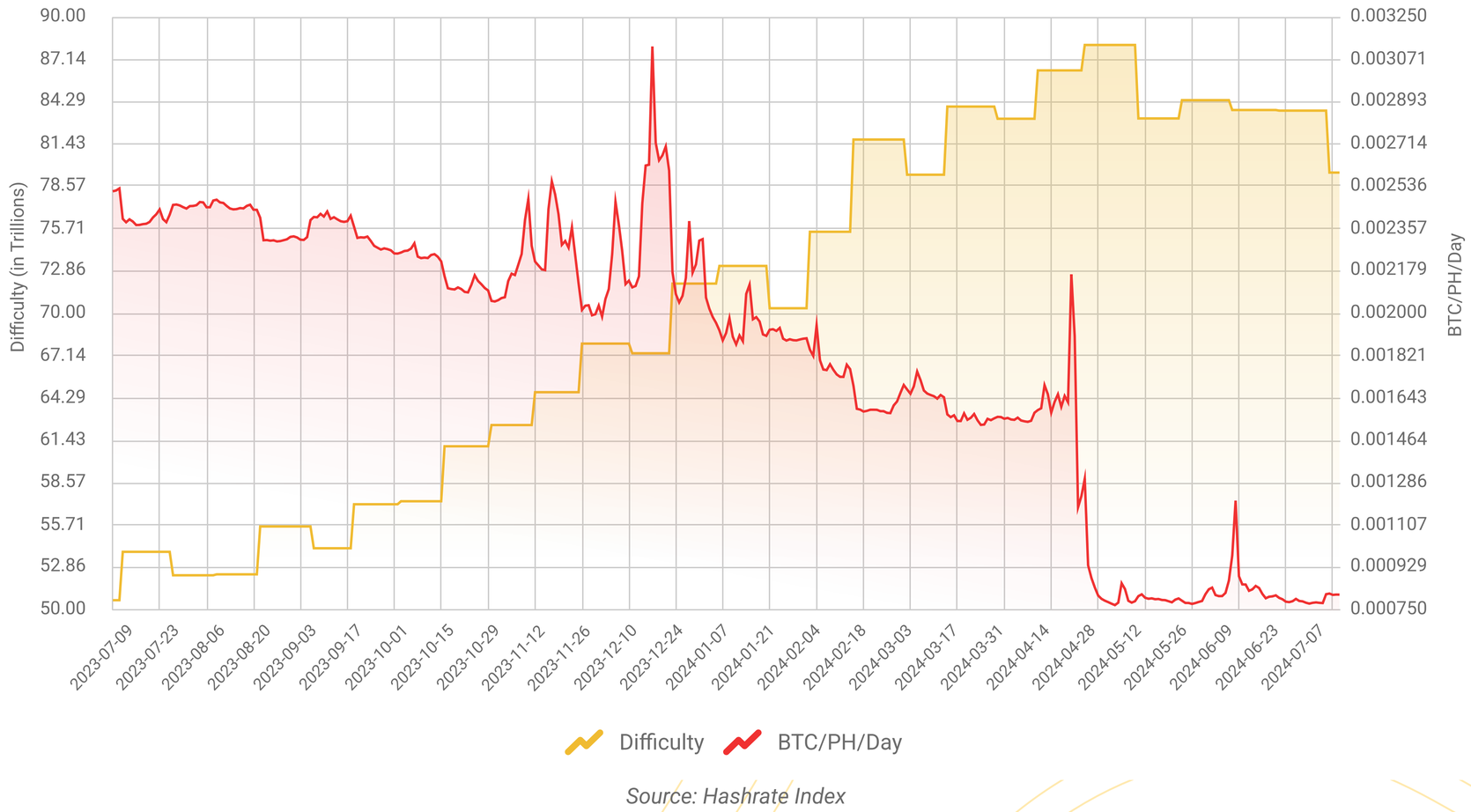
BTC-Denominated Hashprice Volatility

Source: Hashrate Index

Hashrate and Difficulty Decline, Slightly Offset Halving Loses

As Bitcoin's price takes a dive and transaction fees evaporate, Bitcoin's difficulty has fallen too as hashrate comes off the network. This has set the stage for something of an equilibrium where hashprice has found a floor in the $45-50/PH/day range and thus saved miners from an even tighter margin squeeze.

Bitcoin Mining Difficulty vs. BTC-Denominated Hashprice



Source: Hashrate Index

Bitcoin's difficulty rose 0.7% over Q2, and it also set an all-time high of 88.10 trillion during the quarter. But the quarter witnessed an equal number of positive and negative adjustments (3 each). The last time this happened, coincidentally, was Q2-2022, and it's a testament to the rollercoaster ride that hashprice experienced last quarter.

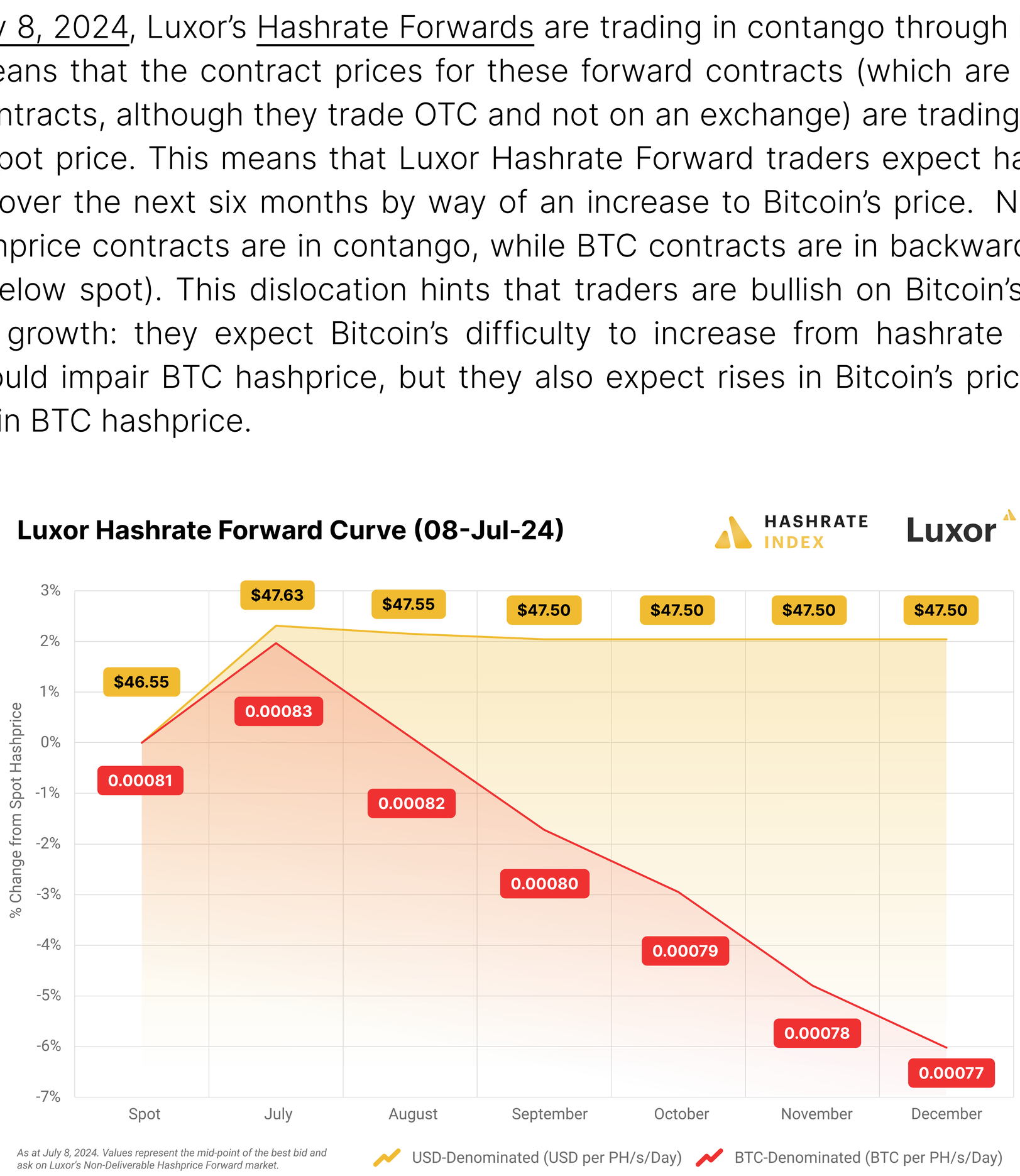
It's also worth noting that, on July 5, Bitcoin's mining difficulty fell 5%, which was also the third straight negative adjustment in a row. The last time the network experienced such a streak, it was the summer of 2021 and the network was reeling from China's Bitcoin mining ban, which cut the network's hashrate temporarily in half.

Hashprice Lows Put Hashrate Forwards in Contango

Hashprice is lower on a USD basis than it has ever been, and as a result, hashrate markets are trading in contango.

As of July 8, 2024, Luxor's Hashrate Forwards are trading in contango through December, which means that the contract prices for these forward contracts (which are essentially future contracts, although they trade OTC and not on an exchange) are trading above the current spot price. This means that Luxor Hashrate Forward traders expect hashprice to increase over the next six months by way of an increase to Bitcoin's price. Notably, the USD hashprice contracts are in contango, while BTC contracts are in backwardation (i.e., trading below spot). This dislocation hints that traders are bullish on Bitcoin's price and hashrate growth: they expect Bitcoin's difficulty to increase from hashrate expansion, which would impair BTC hashprice, but they also expect rises in Bitcoin's price to offset the drop in BTC hashprice.

Luxor Hashrate Forward Curve (08-Jul-24)



As at July 8, 2024. Values represent the mid-point of the best bid and ask on Luxor's Non-Deliverable Hashprice Forward market.

Source: Luxor Derivatives

We can compare this forward curve to the futures curve on Luxor's Hashrate Futures on the Bitnomial exchange, which launched last quarter. The July futures curve for these contracts, which is $48/PH/Day as of July 10, is nearly dead-on with the forward curve.

With the introduction of hashrate derivatives like Luxor's Hashrate Forward Contracts and the Hashrate Futures on Bitnomial, Bitcoin miners finally have a glimpse into market expectations for the future value of hashrate.

Historical Hashprice Forward Curve

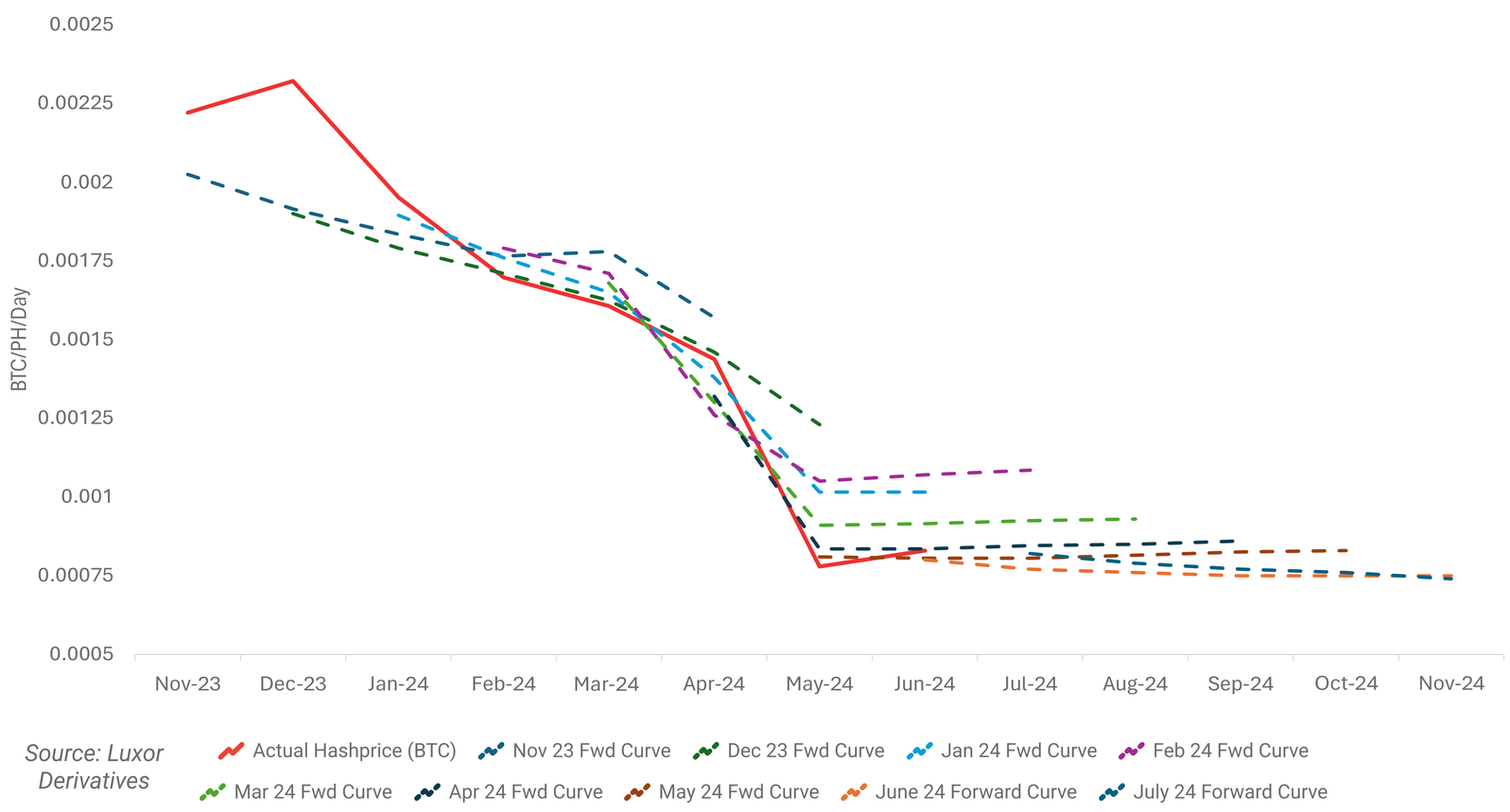
Digging into Luxor's Hashrate Forwards, we can look at historical data for the Forward Curve to discern the market's efficiency at gauging future hashprice and extract alpha based on prior trades.

The chart below shows the BTC-denominated curve for Luxor Hashrate Derivatives contracts from November 2023 to July 2024. We derive this forward curve by taking an average of the lowest ask and highest bid on Luxor's Hashrate Forward order book on the first trading week of each calendar month for each Forward contract month. So for example, for the November data point, we take the ask-bid average for forward contracts in the first week of November for November, December, January, February, March, and April forward contracts. We then compare these forward prices to monthly average spot prices for hashprice.

As the chart demonstrates, Luxor Hashrate Forward market participants have been generally accurate when pricing future hashrate. We may expect this given that BTC-denominated hashprice is more static than USD-denominated, because the only variables traders have to account for are changes to mining difficulty and transaction fees. But the latter is where the alpha lies in these trades.

Monthly Luxor Hashrate Forward Curve vs. Monthly Average Hashprice

HASHRATE INDEX Luxor



Source: Luxor Derivatives

For instance, we see the spot price (the red line) rise sharply above forward pricing in November and December. In USD terms, transaction fees were at their highest levels since 2017 for these months thanks to inscriptions trading, and fees stayed elevated for the longest period since 2020/2021's bull market. As a result, hashprice surged during this period.

As such, forward buyers for these months made a pretty penny. Conversely, though, buyers were overconfident that the transaction fee gold rush would last longer than it did, so traders overbid for hashprice in January, February, and March. As such, miners and hashrate sellers who locked in forward prices for these months earned more than they would have if they had mined spot hashprice. Following the Halving, June contracts that were executed in the month of May were essentially right on the money.

As we mentioned in the prior section and as this chart reiterates, these hashrate forwards are trading in contango over the next six months worth of contracts. Bitcoin's difficulty will be a decisive factor for future hashprice trajectory obviously, but as the above chart suggests, transaction fees could have more of an impact.

Hashcost per ASIC at Different Power Costs

Hashcost is a counterpart to hashprice. The metric measures the daily cost to operate an ASIC, and it's typically denominated in $/PH/Day. Hashcost is the same thing as breakeven hashprice, and as such, we can use it to see the breakeven threshold for different ASIC models at various power costs.

The table below displays the hashcost for common ASIC models for electricity rates that range from $0.01-0.12/kWh. Using July 10, 2024's hashprice of $47/PH/Day, we can see that miners with older models like the S19 and M30 series need power prices at or below $0.05/kWh to be profitable in the current hashprice environment, while miners with the latest models (S21 and M60S) have positive margins up to $0.10-0.11/kWh.

Hashcost ($/PH/day) per Power Cost ($/kWh)	$0.12	$0.11	$0.10	$0.09	$0.08	$0.07	$0.06	$0.05	$0.04	$0.03	$0.02	$0.01
S21 (200 TH/s | 17.5 J/TH)	$50.40	$46.20	$42.00	$37.80	$33.60	$29.40	$25.20	$21.00	$16.80	$12.60	$8.40	$4.20
M60S (186 TH/s | 18.5 J/TH)	$53.28	$48.84	$44.40	$39.96	$35.52	$31.08	$26.64	$22.20	$17.76	$13.32	$8.88	$4.44
M60 (162 TH/s | 19.2 J/TH)	$55.30	$50.69	$46.08	$41.47	$36.86	$32.26	$27.65	$23.04	$18.43	$13.82	$9.22	$4.61
S19 XP (134 TH/s | 21.5 J/TH)	$61.92	$56.76	$51.60	$46.44	$41.28	$36.12	$30.96	$25.80	$20.64	$15.48	$10.32	$5.16
M50S++ (150 TH/s | 22 J/TH)	$63.36	$58.08	$52.80	$47.52	$42.24	$36.96	$31.68	$26.40	$21.12	$15.84	$10.56	$5.28
S19k Pro (120 TH/s | 23 J/TH)	$66.24	$60.72	$55.20	$49.68	$44.16	$38.64	$33.12	$27.60	$22.08	$16.56	$11.04	$5.52
M50S+ (136 TH/s | 24 J/TH)	$69.12	$63.36	$57.60	$51.84	$46.08	$40.32	$34.56	$28.80	$23.04	$17.28	$11.52	$5.76
M50S (126 TH/s | 26 J/TH)	$74.88	$68.64	$62.40	$56.16	$49.92	$43.68	$37.44	$31.20	$24.96	$18.72	$12.48	$6.24
S19j Pro+ (122 TH/s | 27.5 J/TH)	$79.20	$72.60	$66.00	$59.40	$52.80	$46.20	$39.60	$33.00	$26.40	$19.80	$13.20	$6.60
M50 (114 TH/s | 29 J/TH)	$83.52	$76.56	$69.60	$62.64	$55.68	$48.72	$41.76	$34.80	$27.84	$20.88	$13.92	$6.96
S19 Pro (110 TH/s | 29.5 J/TH)	$84.96	$77.88	$70.80	$63.72	$56.64	$49.56	$42.48	$35.40	$28.32	$21.24	$14.16	$7.08
S19j Pro (100 TH/s | 30.5 J/TH)	$87.84	$80.52	$73.20	$65.88	$58.56	$51.24	$43.92	$36.60	$29.28	$21.96	$14.64	$7.32
M30S+ (100 TH/s | 34 J/TH)	$97.92	$89.76	$81.60	$73.44	$65.28	$57.12	$48.96	$40.80	$32.64	$24.48	$16.32	$8.16
S19 (90 TH/s | 34.2 J/TH)	$98.50	$90.29	$82.08	$73.87	$65.66	$57.46	$49.25	$41.04	$32.83	$24.62	$16.42	$8.21
M30 (86 TH/s | 38 J/TH)	$109.44	$100.32	$91.20	$82.08	$72.96	$63.84	$54.72	$45.60	$36.48	$27.36	$18.24	$9.12
S17 Pro (56 TH/s | 45 J/TH)	$161.28	$147.84	$134.40	$120.96	$107.52	$94.08	$80.64	$67.20	$53.76	$40.32	$26.88	$13.44
M20 (68 TH/s | 49.4 J/TH)	$142.27	$130.42	$118.56	$106.70	$94.85	$82.99	$71.14	$59.28	$47.42	$35.57	$23.71	$11.86

Source: Hashrate Index

3

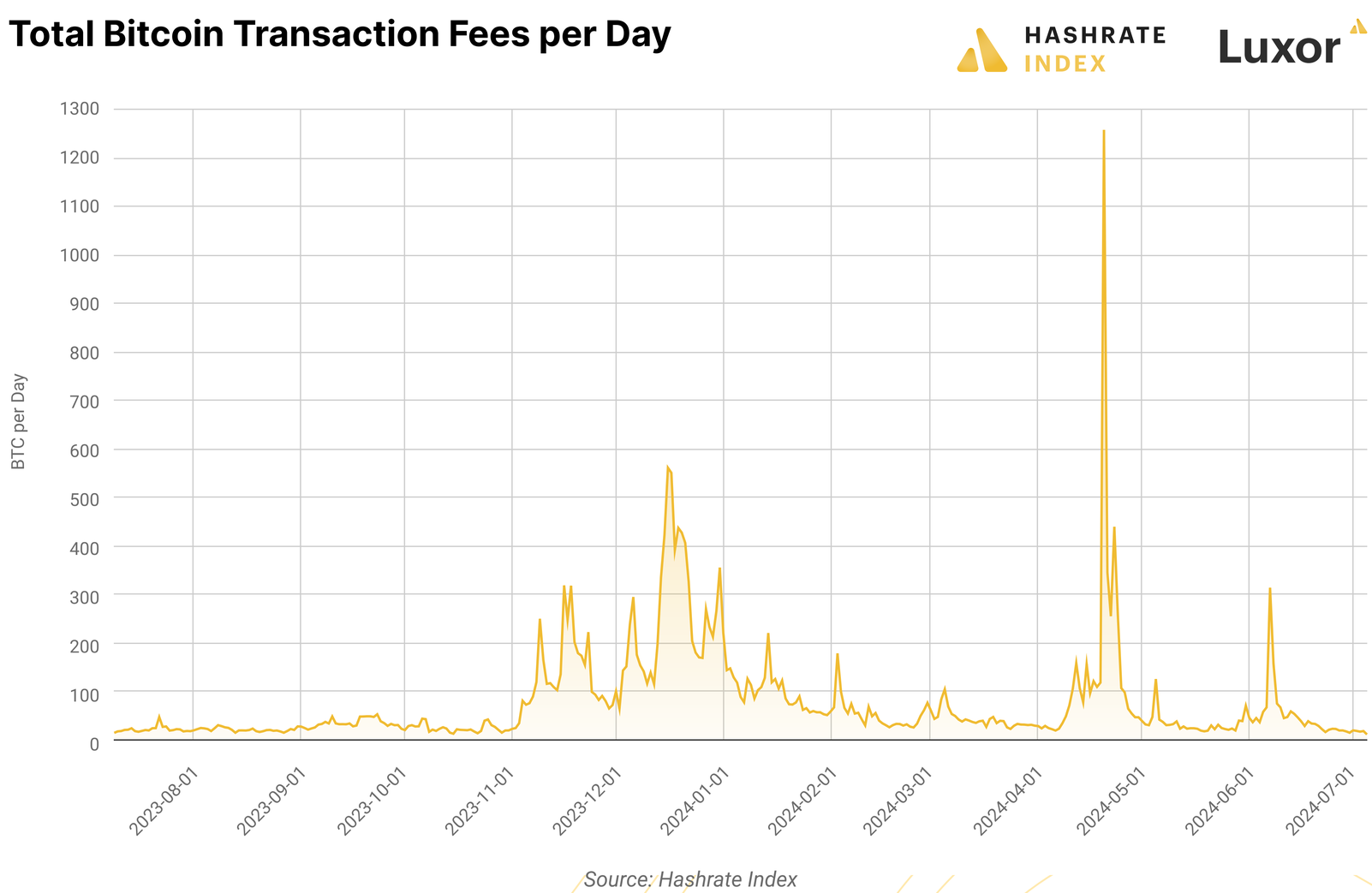
Inscriptions, Ordinals, Runes, and Transaction Fees

Bitcoin transaction fees used to constitute a fair share of total Bitcoin mining rewards. Now that the block subsidy is 3.125 BTC, fees matter now more than ever for the bottom lines of Bitcoin miners. And thanks to inscriptions, ordinals, and Runes, transaction fees have once again entered the fray as a potential major source of mining revenue.

However, the trading of these digital collectibles can be sporadic and the volume from this trading can vary from moderate to extreme. The extremities – or lack thereof – exacerbate hashprice volatility; as we explored in the previous chapter, a significant uptick in digital collectible trading can send hashprice to the moon faster than miners can anticipate such movements, and it can come back down to earth just as fast.

Introduced in December 2022, Ordinals/Inscriptions caught fire last year and sustained transaction fees above the meager portions miners reaped in 2022. Last year, the most impactful and sustained surge in transaction fees from Ordinal/Inscription activity occurred in November and December of 2023.

Trading activity for these collectibles dimmed in Q1-2024, but it picked up again in Q2-2024, leading to the largest spike in transaction fees since the introduction of Inscriptions/Ordinals. This spike occurred on the day of the Halving as traders raced to mint fungible tokens under a new standard called Runes. The come up for transaction fees during the Runes rush was severe, but so was the comedown, and the token standard's introduction ultimately furnished a shorter-lived and less lucrative transaction fee bullrun compared to the mania in Q4-2023. In Q4-2023, miners earned 12,493 BTC in transaction fees; in Q1-2024, they earned 5,860 BTC in fees, and in Q2-2024, they earned 6,790 BTC in transaction fees, the bulk of which (4,312 BTC) came in April.



Source: Hashrate Index

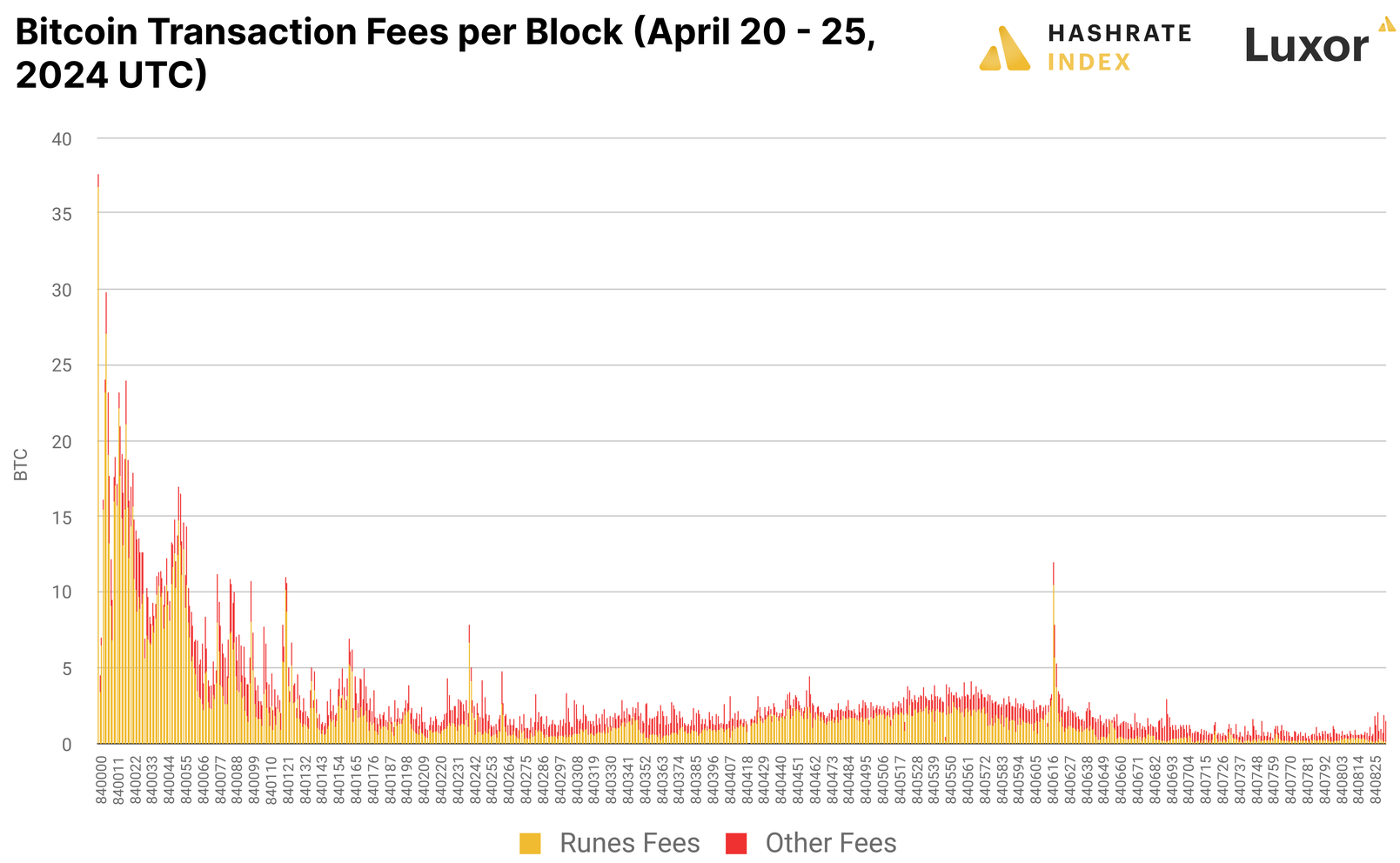
Casey Rodarmor – the inventor of the Ordinal/Inscription standard – designed the Runes protocol to be a more data and fee efficient alternative to BRC-20 tokens, another method to create so-called fungible tokens on Bitcoin.

So while the original trading of Runes precipitated the largest spike in transaction fees of the Ordinals era, Rodarmor largely succeeded in his mandate, because these Runes did not create the same mempool congestion as BRC-20s and thus did not lead to a protracted increase in fees.

Fees From Runes, Inscriptions Have Fallen off Since the Halving

Miners have Runes to thank for the eye-popping transaction fee activity that kept hashprice frothy in the days after the Halving. This new standard for fungible tokens launched on Halving block 840,000, and they were responsible for 36.75 BTC out of 37.63 BTC in transaction fees that were included in this block, making block 840,000's USD value a record-breaking $2.6 million at the time it was mined.

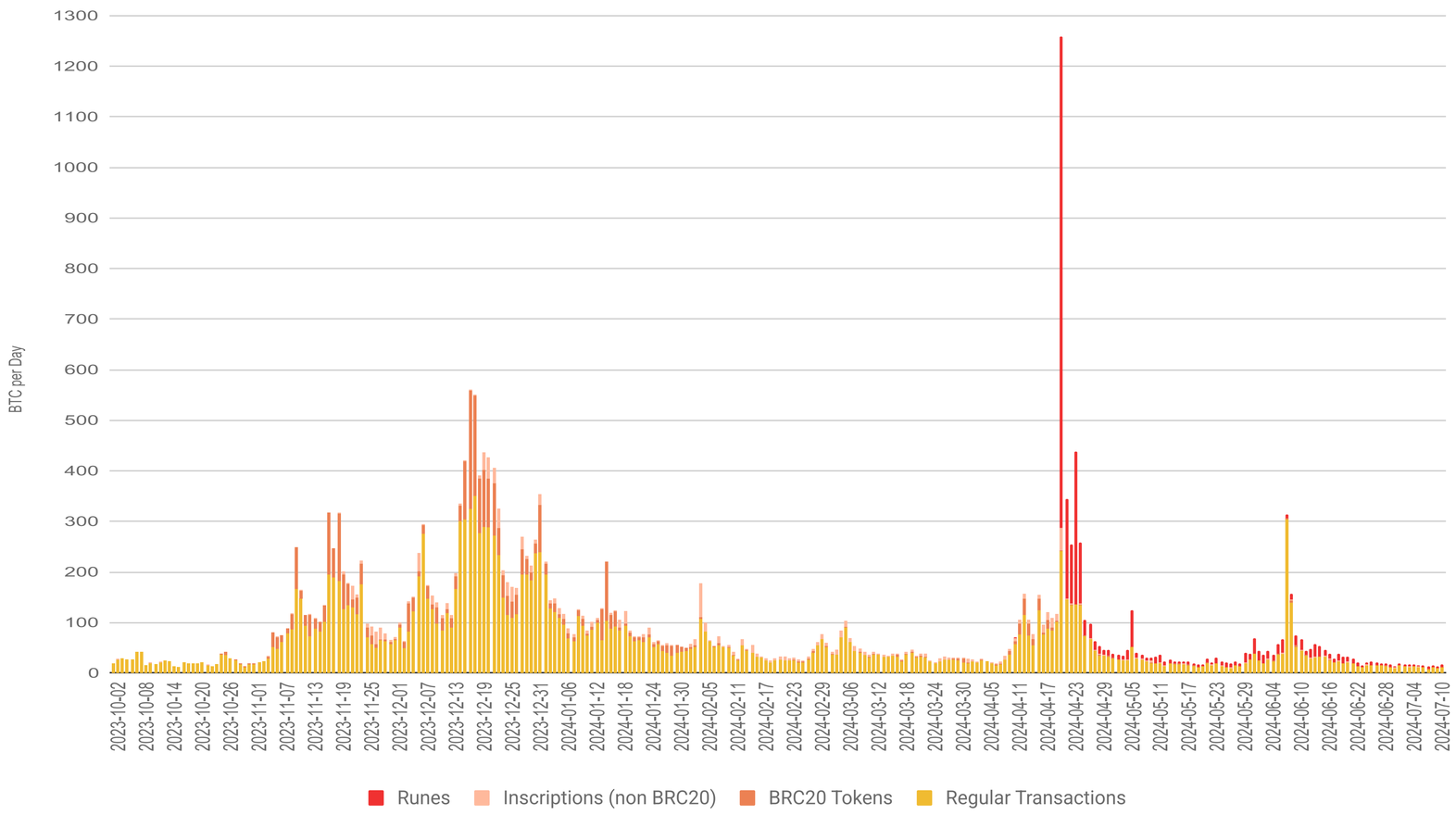
Per data from Matt Kimmell's Dune Dashboard, Runes generated 1,819.8 BTC in transaction fees worth $117 million between the Halving and block 841,539, and they made up 43% of all transaction fees miners earned in this timeframe. For comparison, miners earned 23,445 BTC in fees worth $797.70 million in 2023.



Source: Matt Kimmel's Dune Dashboard, dataalways Dune Dashboard

Runes made a big splash upon their introduction, but enthusiasm for the new standard dried up as quickly as it bubbled up. Runes accounted for 2,521.45 BTC over the course of Q2-2024, the bulk of which (1,822.54 BTC, or 72% of the total) occurred in April after the introduction of Runes on April 19. By comparison, transaction fees from all other sources totaled 4,283.62 BTC in Q2.

Bitcoin Transaction Fees by Source

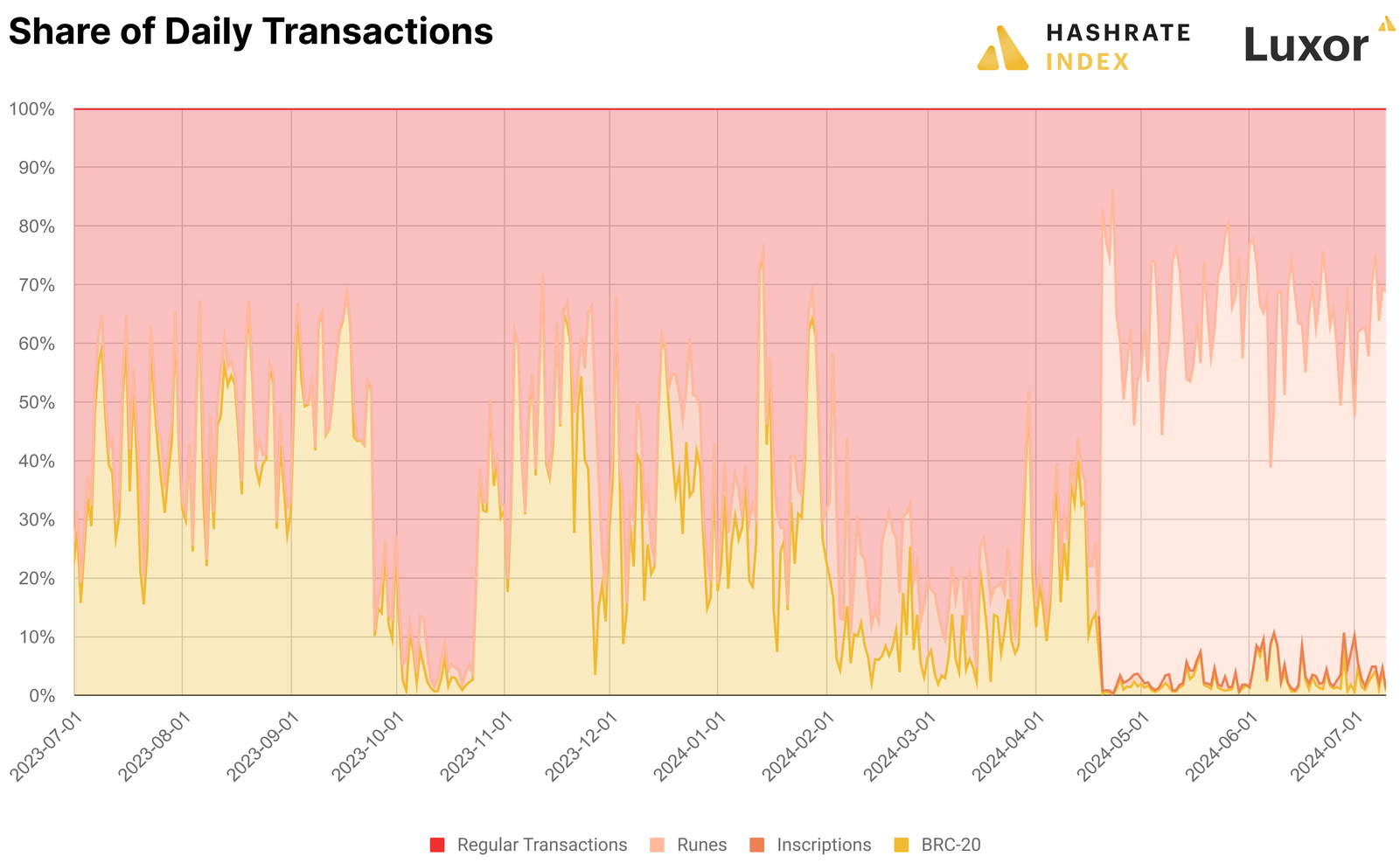


Source: murchandamus's Dune Dashboard | Transaction fee volume for non-BRC-20 inscriptions only includes transactions that create inscriptions, since there is no sure-fire way of tracking the ordinal-tagged satoshis that are associated with these inscriptions

Even Though Fees Are Low, Runes Transaction Volume is High

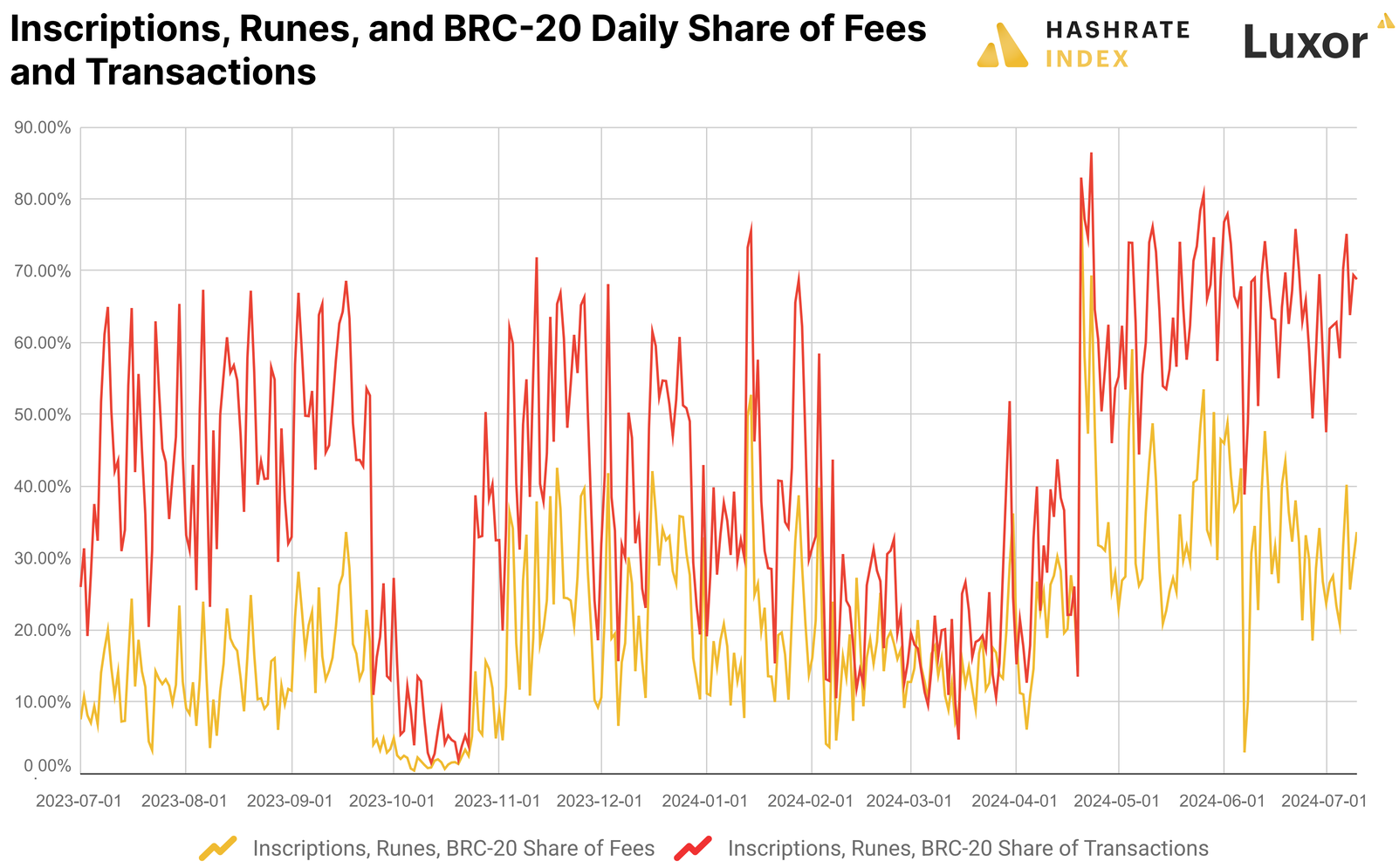
If we zoom in on transaction fee volumes, perhaps it's not fair to say that enthusiasm for Runes has been dying since the Halving. In fact, Runes have consistently constituted the majority of Bitcoin's transaction fee volume since launch, but they are not creating the same pressure on Bitcoin blockspace as BRC-20 tokens and thus are not generating as many fees. BRC-20 tokens are like proto Runes; they are text based and have the same minting gamification as Runes, although they use the Segwit data field to store token information, whereas Runes use OP_RETURN for token info. In fact, Casey Rodarmor designed Runes to be a more data-efficient, elegant alternative to BRC-20, and given that Runes minting and trading have eclipsed BRC-20 tokens without sending fees to the stratosphere, he seems to have achieved his goal.

Indeed, Runes have sucked up trading marketshare from Ordinals/Inscriptions.



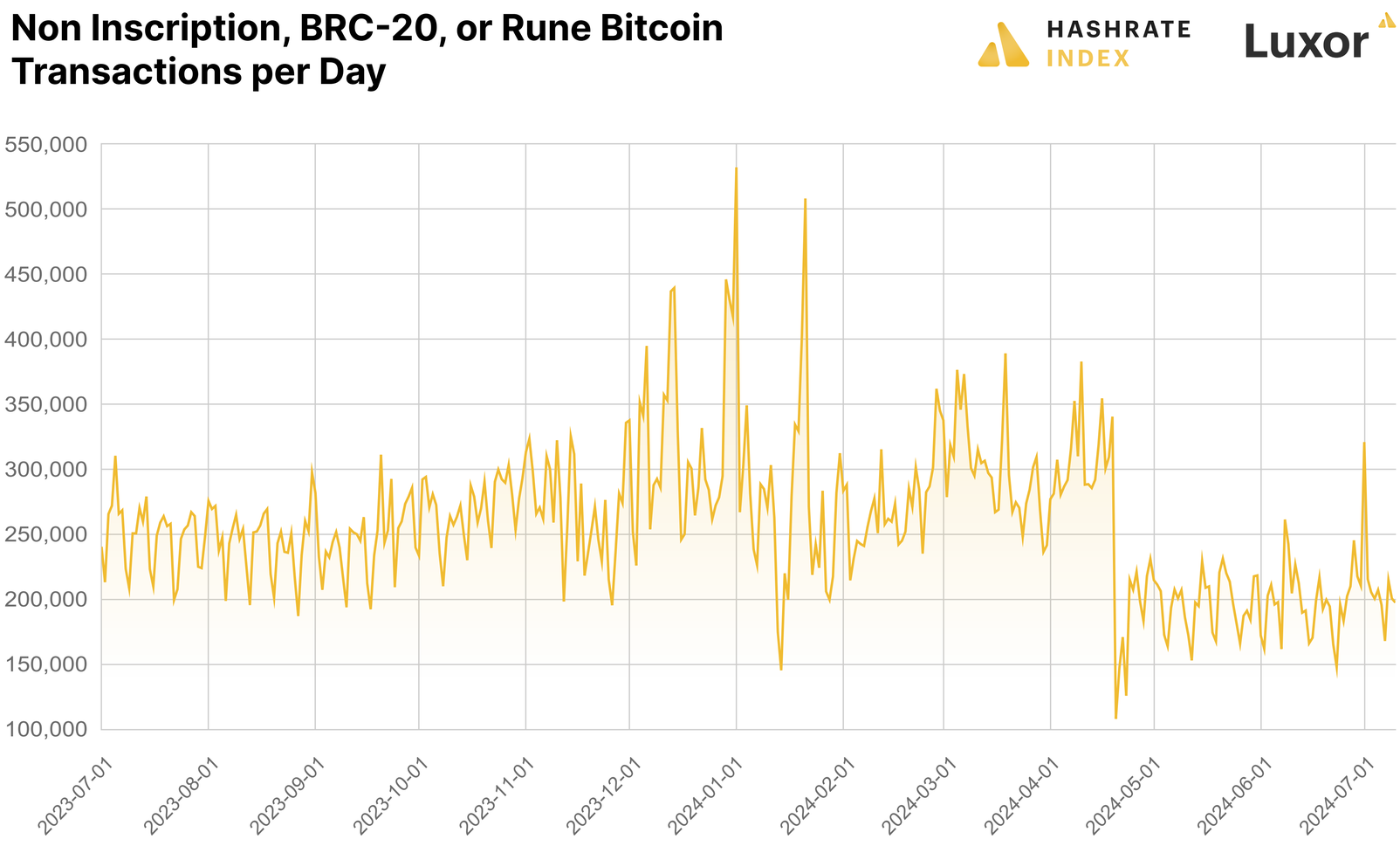
Source: murchandamus's Dune Dashboard | Transaction volume for non-BRC-20 inscriptions only includes transactions that create inscriptions, since there is no sure-fire way of tracking the ordinal-tagged satoshis that are associated with these inscriptions

It’s worth noting that even while transaction fees are at their lowest levels since the beginning of October 2023, digital collectibles a la Inscriptions and Runes still constitute the majority of transaction fee volume.



Source: murchandamus’s Dune Dashboard

Part of the reason why fees aren’t reacting to this activity is in part because Runes are more data efficient than BRC-20, but it also stems from the fact that Runes are generally competing with fewer “normal” transactions than BRC-20 tokens did when they hit peak trading in Q4-2023.



Source: murchandamus’s Dune Dashboard

This point is important to understanding the transaction fee dynamics of these nascent digital collectibles; transaction fees were so high in Q4-2023 because regular transaction volumes clashed with data-heavy BRC-20 tokens for blockspace. The transaction backlog that BRC-20 activity created in November and December last year exerted roundabout pressure on transaction fees. We call this “indirect” fee pressure to differentiate between fees generated from inscription transactions (“direct” fee pressure) and fees generated from other transactions during times of inscription-led mempool congestion; “indirect” fee pressure comes from users who pay higher fees for normal, financial transactions than they would otherwise be paying if inscription activity didn’t create a transaction backlog in the mempool.

As Galaxy Digital points out in a 2023 report on ordinals/inscriptions, mempool congestion precipitated transaction fee “overpayment” from various transactors. The Galaxy Digital Research team defines overpayment as any transaction fee in a block greater than that block’s median transaction fee (in sats/vbyte). For financial transactions (i.e., normal BTC transfers), this overpayment could stem from inaccurate transaction fee estimators in wallet / exchange software or from general user ignorance regarding transaction fee structure and dynamics. Additionally, some financial transactions may have been time sensitive, so users overbid their fees to expedite their transactions during mempool congestion. For inscription transactions, this so-called “voluntary overpayment” was commonplace during times of high activity and popular mints, particularly for BRC-20 tokens whose first-come-first-mint design encourages such behavior.

This insight is important for understanding that inscriptions create bother direct and indirect pressure on transaction fees. We define direct pressure as transaction fees that users pay for inscription transactions, while indirect pressure comes from the impact inscriptions have on block space dynamics by driving other users to overpay for block space. Overall, indirect and direct transaction fee pressures from inscriptions are important for understanding how inscription activity can raise the transaction fee floor.

So far, Runes have not had to compete as heavily with regular transactions as BRC-20 tokens did last year. As such, even though Runes are more data efficient and typically less expensive to transact, we have yet to see how heavy Runes trading/minting activity may affect the fee market given significant transaction fee volume from regular transactions.

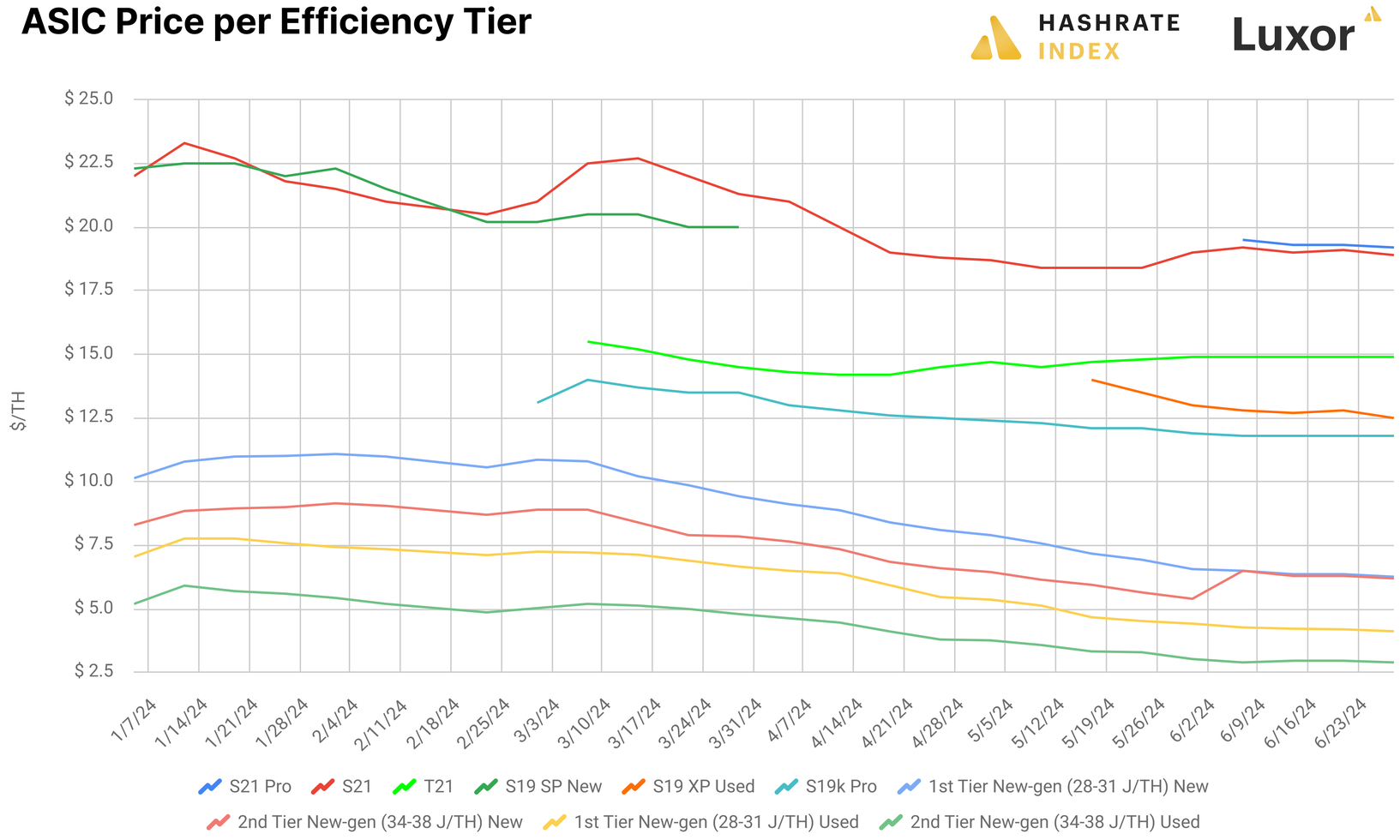
4

ASIC Market Undergoes Significant Repricing

Unsurprisingly, the ASIC market cooled down significantly leading up to the Halving, and after the event, it's also unsurprising that many models experienced significant drawdowns in pricing.

The latest generation of Bitcoin miners like the S21 and T21 fared much better than others in Q2 as Bitcoin miners sought the most efficient rigs to weather the post-halving market environment. The S21 fell in price leading up to the Halving, indicating that it was overpriced despite its industry-leading efficiency at launch, but it rebounded over the remainder of the quarter; it closed Q2 in the red, but only marginally so.

ASIC Price per Efficiency Tier



Source: Luxor ASIC Trading Desk

The T21, another next-generation machine, was the only model to see positive price increases over Q2. Notably, the S19 XP – of which used units started circulating after the halving – is increasingly falling out of favor; similarly, the S19k Pro, which we consider a next-generation machine based on its efficiency, is also falling out of favor. (We classify next-generation rigs as any ASIC with an efficiency between 17.5 and 28 J/TH).

The repricing we witnessed in Q2 is an extension of a realignment that began in Q1, a time when the Halving loomed and miners were uncertain about the total impact of the event. Despite positive changes to hashprice over Q1 and a higher hashprice average over the quarter when compared to Q4-2023, ASIC prices for all tiers fell over the first quarter of the year. Now that the dust from the Halving has settled, these ASICs experienced even more severe drawdowns in Q2.

Change in Listing Prices	Q1-24	Q2-24	YTD (As of Q2-2024 End)
S21 Pro	-	-1.54%	-1.54%
S21	-3.18%	-10.00%	-14.09%
T21	-	4.20%	-3.87%
S19 XP New	-10.31%	-	-
S19 XP Used	-	-	-10.71%
S19k Pro	-	-9.23%	-9.23%
1st Tier New-gen (28-31 J/TH) New	-6.99%	-31.24%	-38.18%
2nd Tier New-gen (34-38 J/TH) New	-5.42%	-18.95%	-25.30%
1st Tier New-gen (28-31 J/TH) Used	-5.44%	-36.54%	-41.49%
2nd Tier New-gen (34-38 J/TH) Used	-7.69%	-37.41%	-44.23%

Source: Luxor ASIC Trading Desk

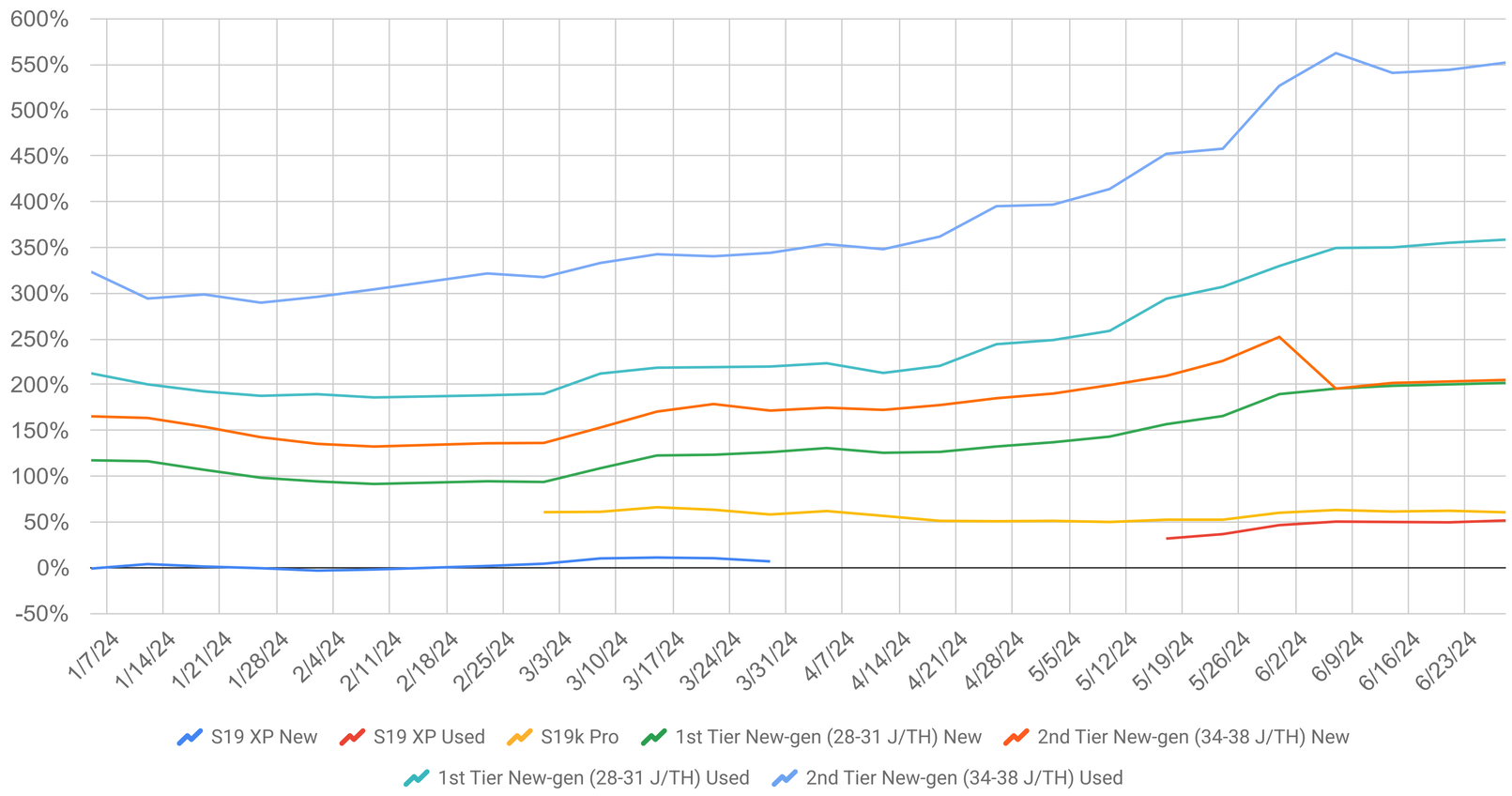
Antminer S21 Premiums

As we touched on above, miners are prioritizing the most efficient hardware available, and as a result, price premiums for the S21 rose significantly over Q2-2024.

These premiums stagnated and even decreased slightly for certain tiers in January and February of this year, which we could attribute to the rise in hashprice in Q1 as bitcoin itself rallied. However, premiums began to rise in March as the Halving crept closer and the S21 began circulating on the spot market after the first batch of deliveries for this model in Q1. Throughout Q2, these premiums rose significantly, particularly for used models in the new-gen bucket (S19 and M30 series ASICs, among others). Premiums for the S19k Pro and used S19 XPs rose slightly over the quarter.

S21 Price Premium vs Other ASICs and Efficiency Tiers

HASHRATE INDEX Luxor



Source: Luxor ASIC Trading Desk

As evidenced by this chart and the one before it, it's becoming clear that S19s, M30s, and other new-gen ASICs are the S9s of this Halving epoch – they are being sold for fire-sale prices as these ASICs are only viable in the lowest cost environments.

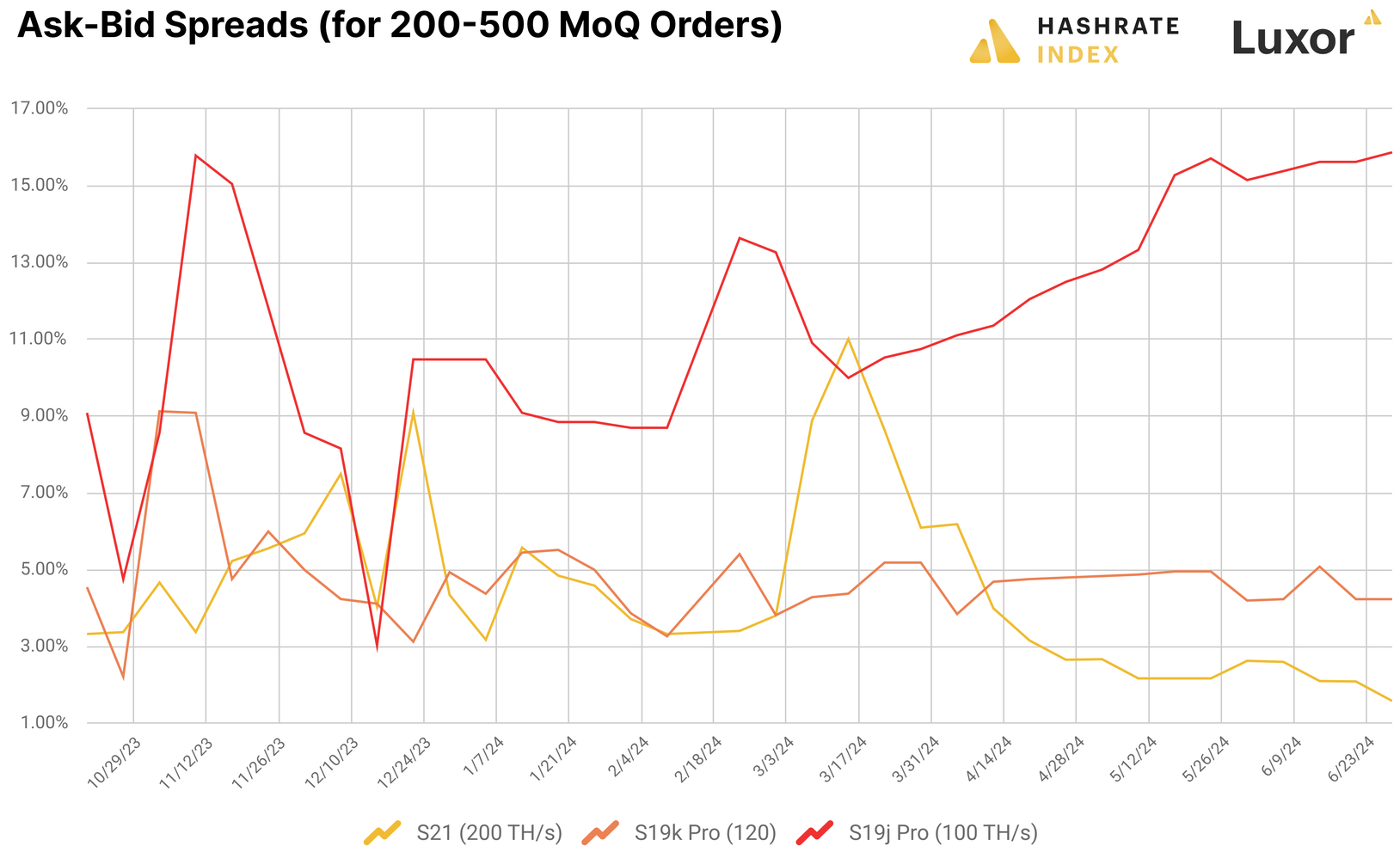
Ask-Bid-Spreads

A continuation of a trend we covered in the last report, ask-bid spreads for popular ASIC models are still diverging depending on the model.

Spreads for the sale price (bid) versus the listed price (ask) of S21s spiked at the end of Q1. Buyers saw increasingly greater discounts from the listed price of this model leading up the to Halving, indicating – as we pointed out earlier – that perhaps the S21 was overpriced upon launch. That said, the ask-bid spread for the S21 fell to its lowest level yet by the end of Q2-2024, which indicates that demand for this ASIC is high and that buyers have little room to negotiate prices with sellers. Given that the S21 is one of the few ASICs available that is still producing comfortable margins, this isn't surprising.

Another trend that is unsurprising (and which speaks to the opposite side of the market for a model that is increasingly obsolete): the S19j Pro's ask-bid spreads hit its highest level since we've been tracking this data. This is a testament to the declining popularity of this model; most miners cannot mine profitably with the S19j Pro at current hashprice levels, and as a result, they have significantly more bargaining power with vendors when purchasing these ASICs.

Ask-Bid Spreads (for 200-500 MoQ Orders)

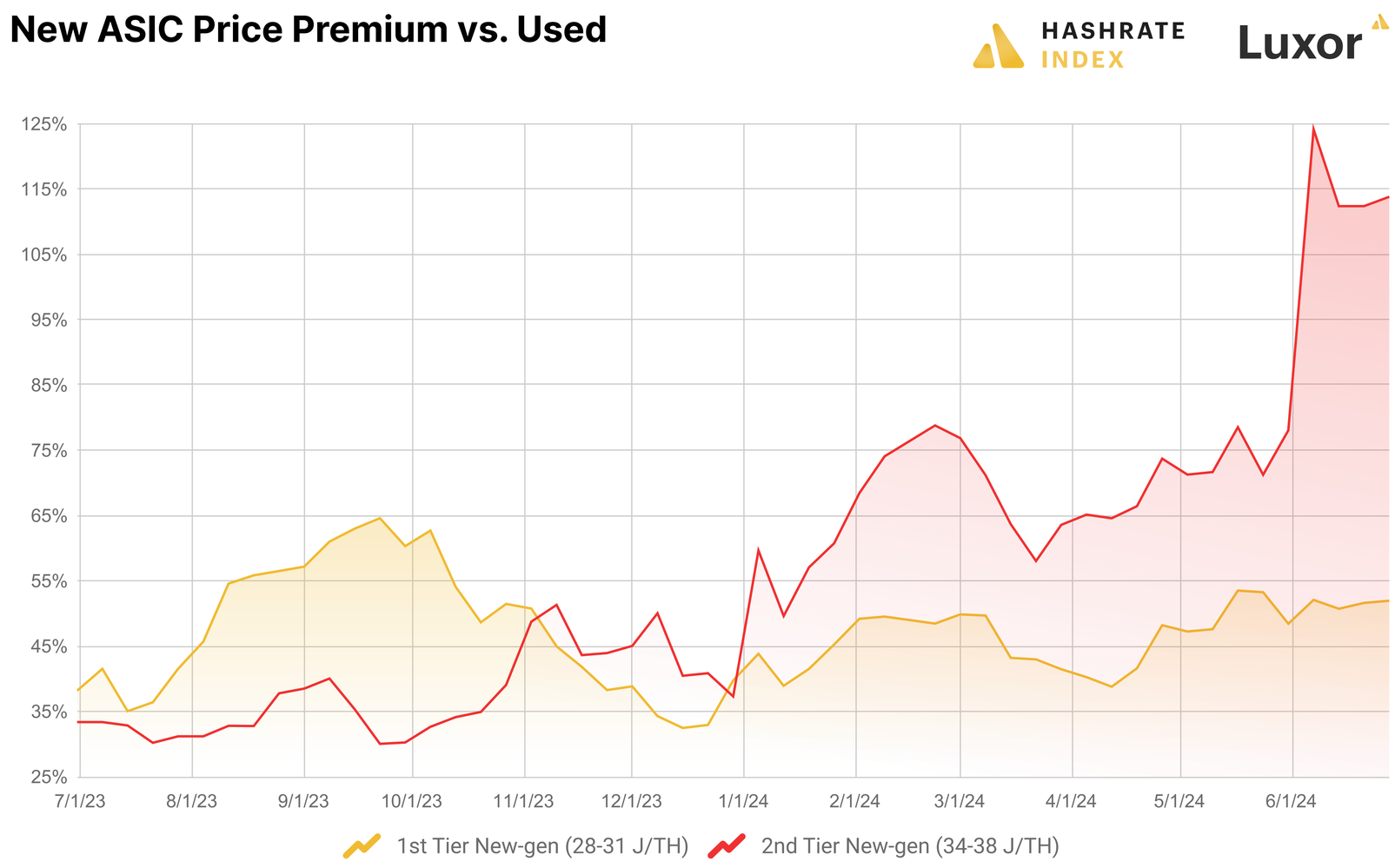


Source: Luxor ASIC Trading Desk

New vs Used ASIC Premiums

Price premiums for new ASICs compared to used ones have been increasing since the beginning of 2023 for our two tiers of new-gen ASICs, and they took off in Q2-2024 for the 2nd tier new-gen ASICs specifically. (We define 1st tier new-gen ASICs as those with an efficiency between 28-31 J/TH and 2nd tier as those with an efficiency between 34-38 J/TH).

In Q4-2023, these premiums fell, likely in response to the quarter's hashprice rally, which largely stemmed from a transaction fee bullrun thanks to inscription activity. These premiums rose over Q1-2024, although 1st tier new-gen ASICs dipped at the end of the quarter. Over Q2-2024, these premiums continued to rise, with 2nd tier ASICs particularly seeing a parabolic rise in the price premium of new ASICs versus used ones.

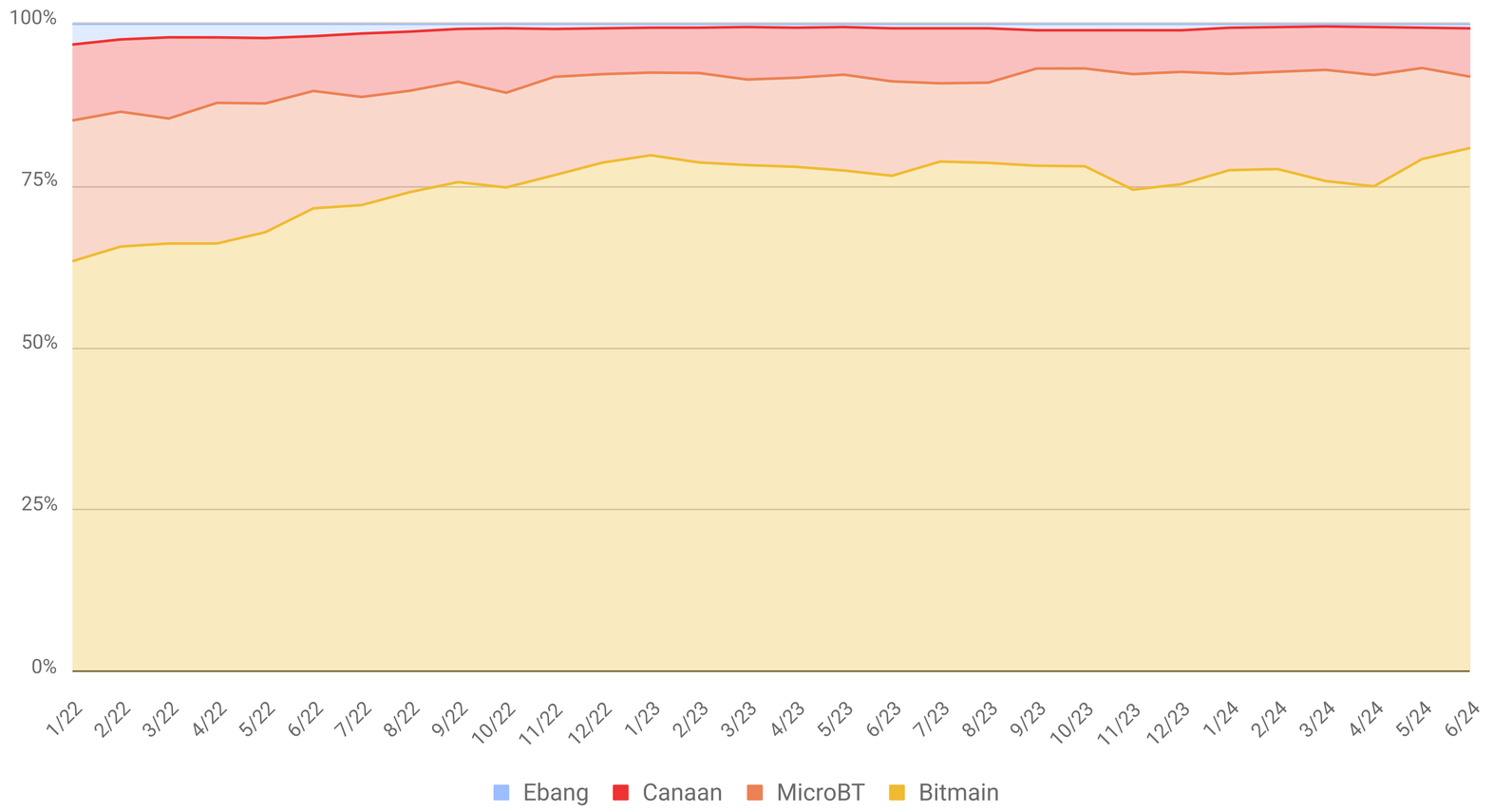


Source: Luxor ASIC Trading Desk

ASIC Market Share per Manufacturer and Model

According to Coin Metric's MINE MATCH data, there were a few notable changes to ASIC manufacturer marketshare over the course of Q2-2024. Bitmain's dominance rose over Q2 to 80.5%. MicroBT's marketshare fell to 11%; Canaan's marketshare rose to 7.5% and Ebang's rose to 1%.

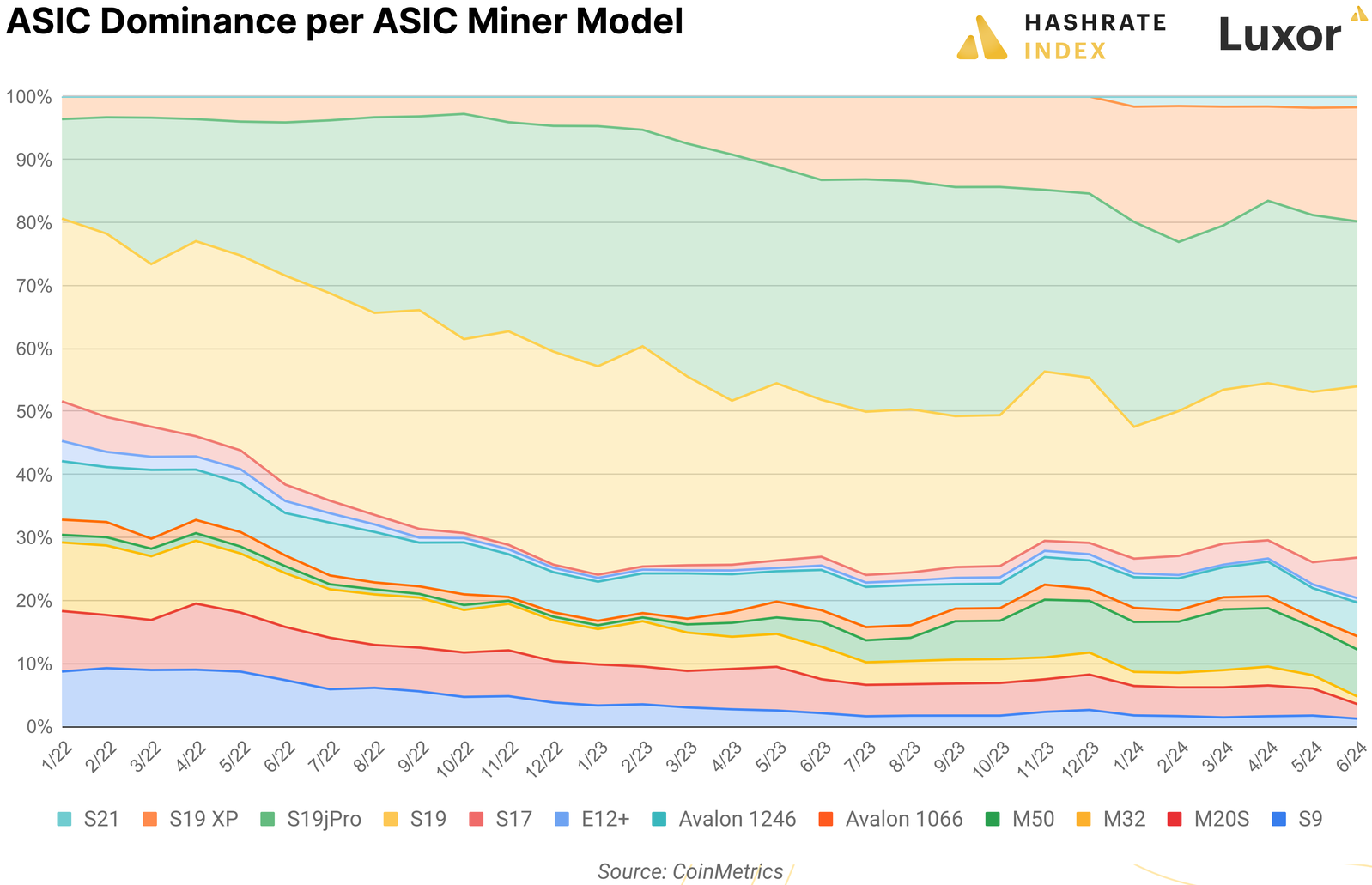
ASIC Marketshare by Manufacturer (via Coin Metrics)



Source: CoinMetrics

The chart below shows an estimated breakdown of Bitcoin's network hashrate per ASIC model. Q1-2024 was the first quarter that miners started deploying S21's en masse, and by the end of the quarter, the model made up 1.6% of the entire Bitcoin network's hashrate; by the end of Q2, the S21's marketshare was 1.7%. For other models, we can observe the market share for older series like the S9, Avalon 1066, and M20S begin to noticeably decline starting in April 2024.

ASIC Dominance per ASIC Miner Model



Source: CoinMetrics

Editor's note: We adjusted Coin Metric's data to only include the S21 from January onward, as the MINE MATCH analysis registers the model earlier than 2024. MINE MATCH is based on nonce analysis, where the program analyzes nonce patterns from ASICs to derive a makeup for the network's hashrate; as such, errors are possible if models display similar nonce patterns, hence why the S21 appears before it was in production. That said, such errors seem like exceptions, and the dataset as a whole appears to provide a generally accurate estimate for the network's ASIC makeup.

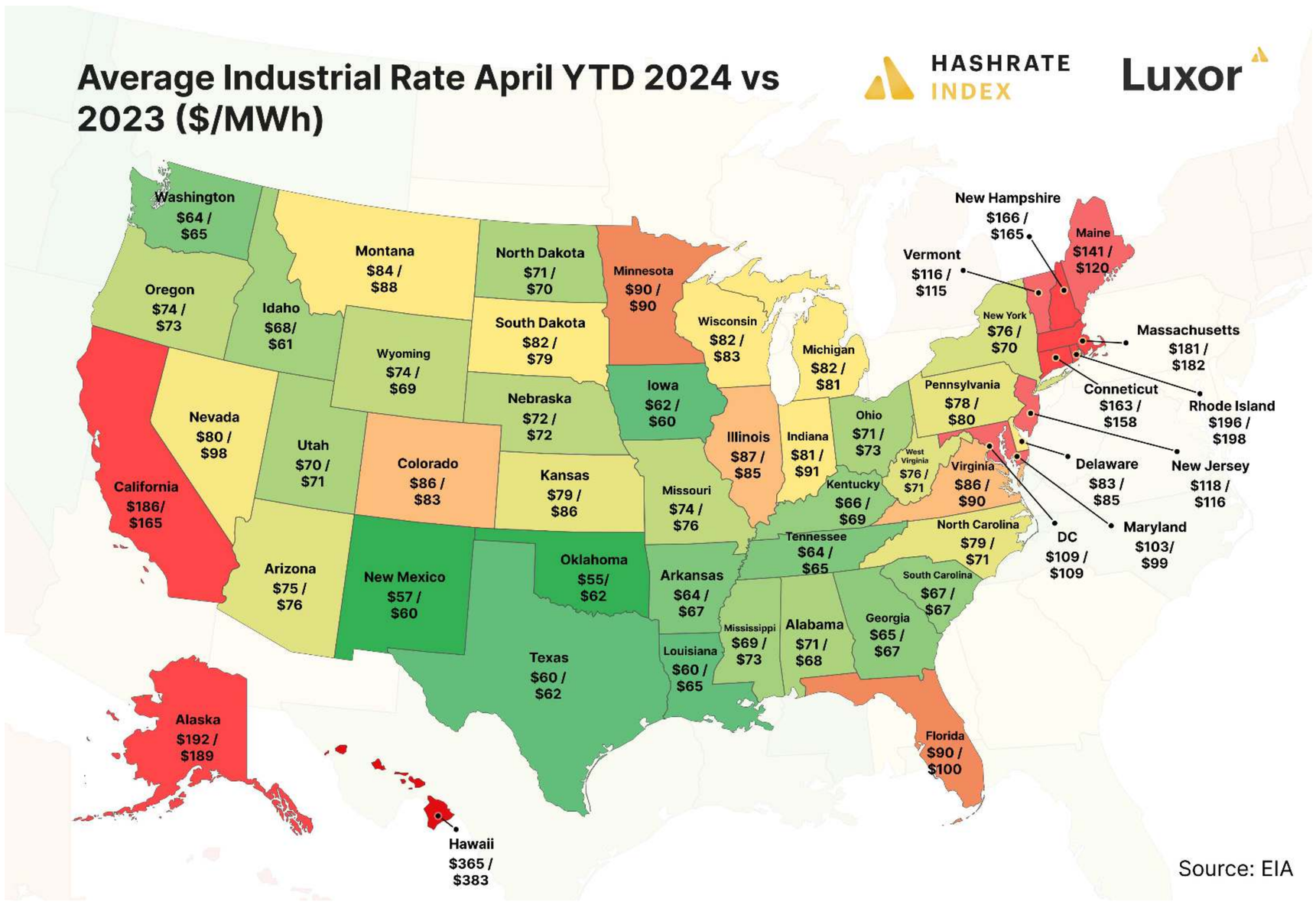
5

Energy Markets

State-by-State Power Prices

Generally speaking, power rates in the US continue to cool down after the white-hot energy price inflation the nation faced in 2022.

Year-to-date as of April 2024 (the most recent data from the EIA), industrial power rates were down year-over-year in the majority of US states. Notably, Bitcoin mining hotspots like Texas, Georgia, Ohio, and New York saw a decrease in industrial power prices.



Source: EIA

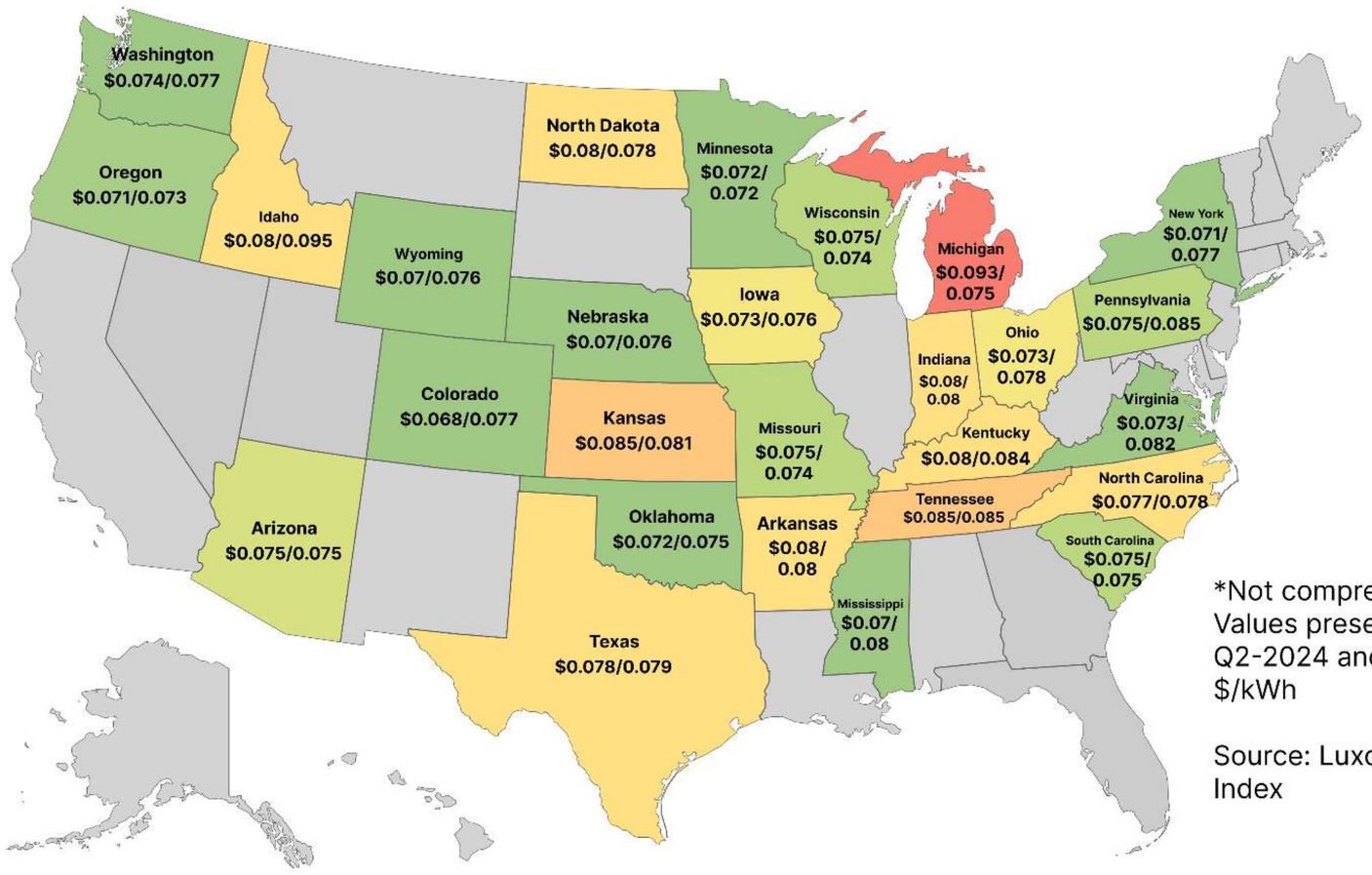
With the Fourth Halving come and gone, it'll be worth keeping a close eye on power prices in the US to discern whether or not the region, which currently houses more hashrate than any country, will remain competitive, particularly for smaller-to-mid-sized miners who may not be able to secure the lower-end rates that industrial-scale miners can attain.

Hosting-as-a-Service Is in Limbo

Now that the Halving has come to pass and hashprice is trading below $50/PH/Day, a big ole question mark is looming over the Bitcoin mining hosting and colocation economy, particularly in the US and Canada.

At current hashprice levels, only those miners with the latest generation ASICs are operating at comfortable profit margins. According to Luxor's Hosting Index, in the United States, the average hosting rate in Q2-2024 was $0.076/kWh, which is down 2.7% from Q4-2023 and 3.6% from Q2-2023. In Canada, the average hosting rate in Q2-2024 was $0.072/kWh, which is up 1% from Q4-2023 and flat from Q2-2023. (Regretfully, we did not collect data for Q1-2024)

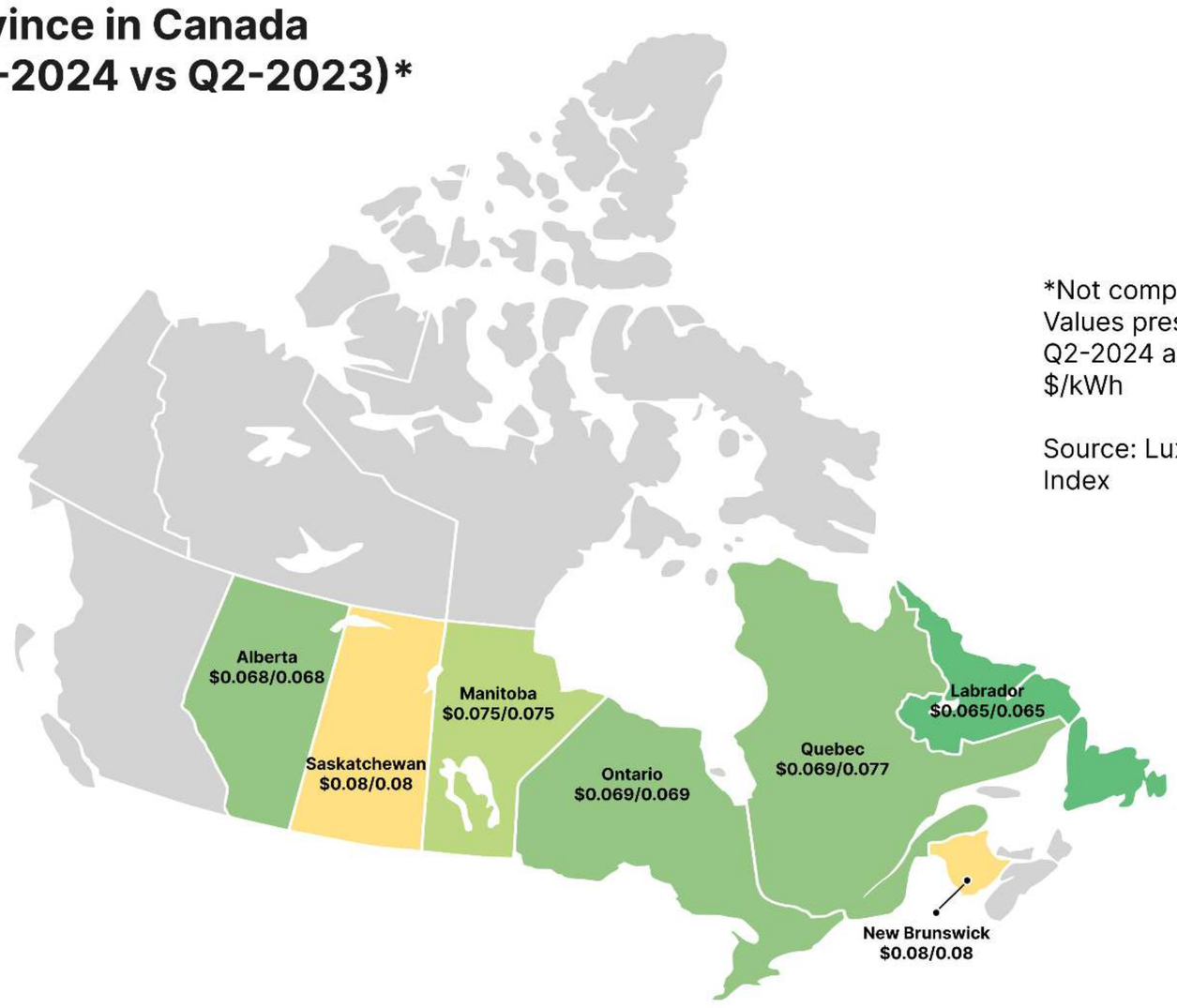
Average Hosting Cost per State in the USA (Q2-2024 vs Q2-2023)*



*Not comprehensive. Values presented as of Q2-2024 and Q2-2023 in $/kWh

Source: Luxor Hosting Index

Average Hosting Cost per Province in Canada (Q2-2024 vs Q2-2023)*



*Not comprehensive. Values presented as of Q2-2024 and Q2-2023 in $/kWh

Source: Luxor Hosting Index

Even though hosting rates fell in the US last quarter year-to-date (and were basically unchanged in Canada), these rates are still too high for miners with mid-gen ASICs like the S19 series and M30 series. If a miner is running an S19j Pro at the average US hosting rate last quarter, for example, their breakeven would be $53.80/PH/Day, and at the average rate in Canada, their breakeven would be $51/PH/Day; in either scenario, this hypothetical miner is currently losing money if they are still hashing. Given this inconvenient truth, we anticipate that hosts will have to change strategies or lower costs to retain clients who have not upgraded their fleets. This could include installing firmware like LuxOS onto hosted machines or lowering rates to accommodate clients with less efficient hardware. Alternatively, depending on the nature of the hosting contract, hosts may requisition ASICs from unprofitable clients / clients that abandon their machines.

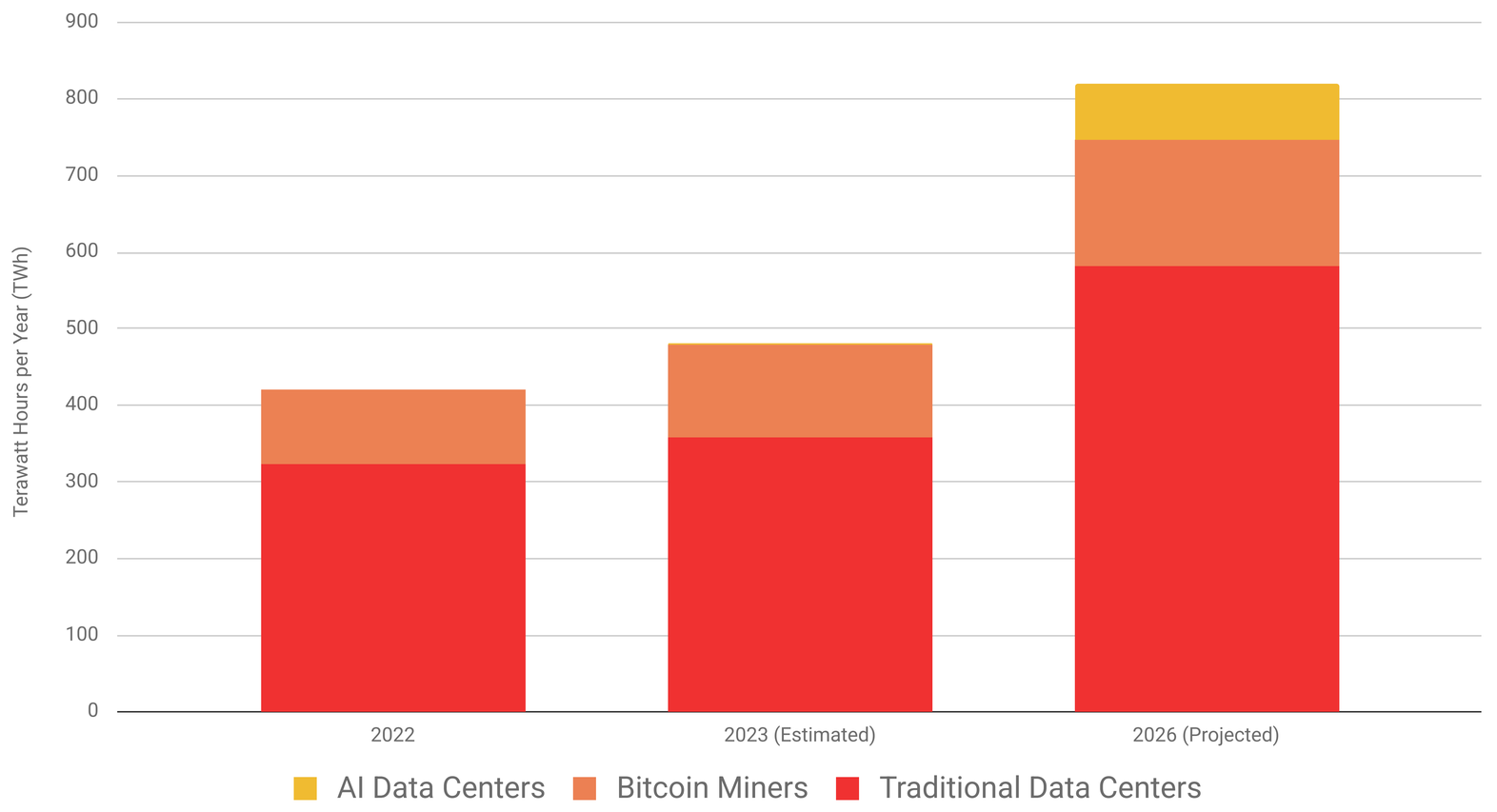
Bitcoin Miners Now Have to Jockey with AI Data Centers for Power

The most impactful and transformative technology to emerge since the internet – if not, the most impactful and transformative ever – will soon compete with Bitcoin for electricity.

AI datacenters consumed relatively small amounts of energy in 2023 compared to other data centers, but that will change over the coming years as AI demand ramps up and new AI data centers come online around the world. Bitcoin miners will compete with these data centers for power resources, something that could inhibit Bitcoin's global hashrate growth.

Taking data from a recent International Energy Agency report, global energy use from AI data centers could grow by a factor of 10 by 2026. In the chart below, we show traditional data center, Bitcoin mining, and AI data center power consumption for 2022, an estimate for 2023 (since there are no clear, public reports on data center numbers for the year yet), and projections for 2026. For Bitcoin mining data, we consult Cambridge's Bitcoin Electricity Consumption Index. For AI data, we use projected figures for 2026 from the IEA report and we estimate 2023 data by cobbling together estimates for Chat-GPT's electricity use per day and extrapolating this out to the rest of the AI compute industry based on Chat-GPT's marketshare. For traditional data centers, we use IEA data for 2022 and projections for 2026, and we estimate 2023's power usage according to annual growth rates for data center power use according to the International Data Corporation.

Traditional Data Centers, Bitcoin Miners and AI Data Centers

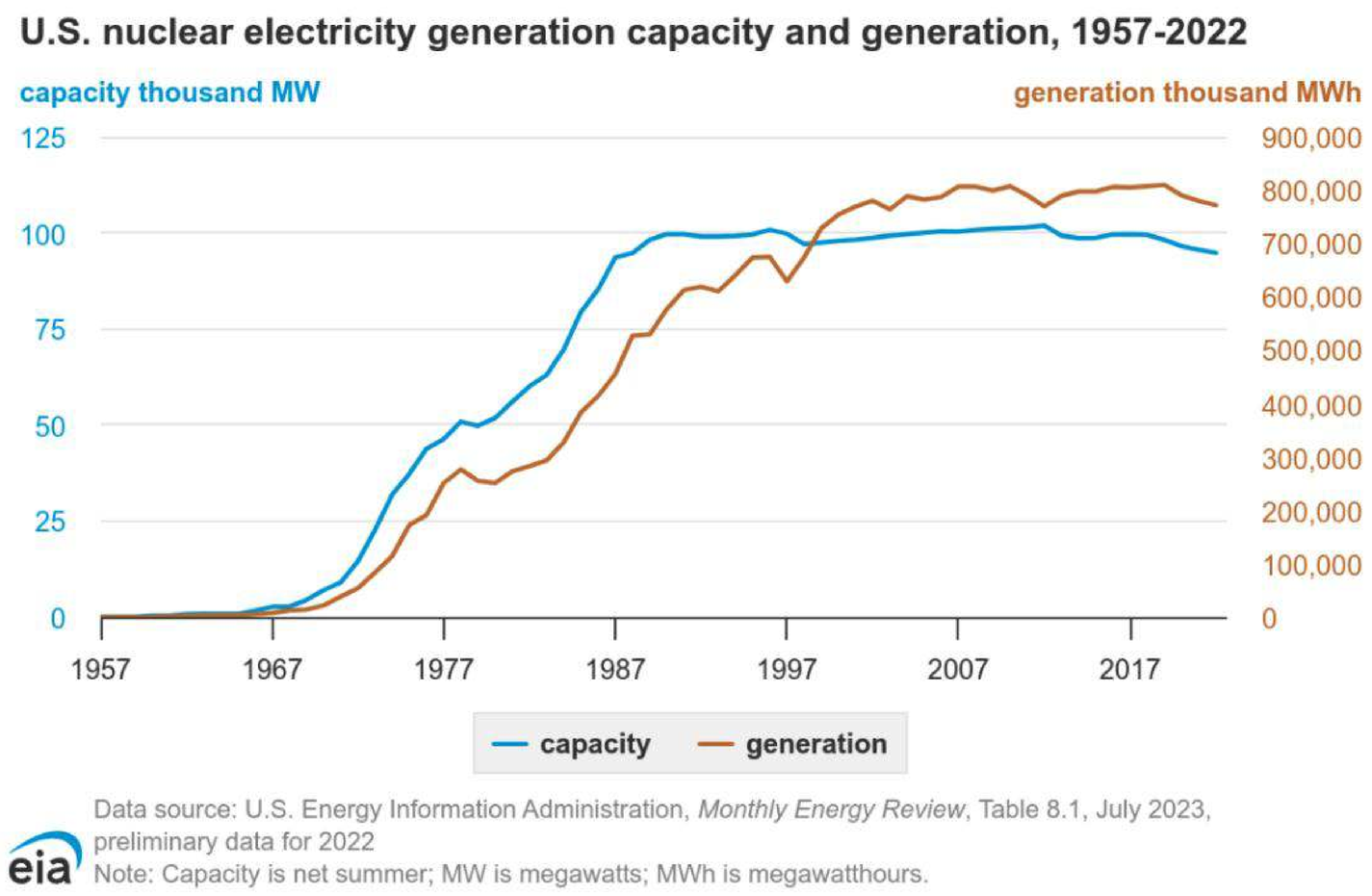


Source: Cambridge, IEA, IDC, Joule

To Quench AI Energy Demand, A Nuclear Renaissance is Brewing

As demand for AI applications increases, so too have calls for an increase in baseload power sources to support the massive, energy-hungry data centers that power applications like ChatGPT. Nuclear power is at the forefront of the solutions to meet this demand.

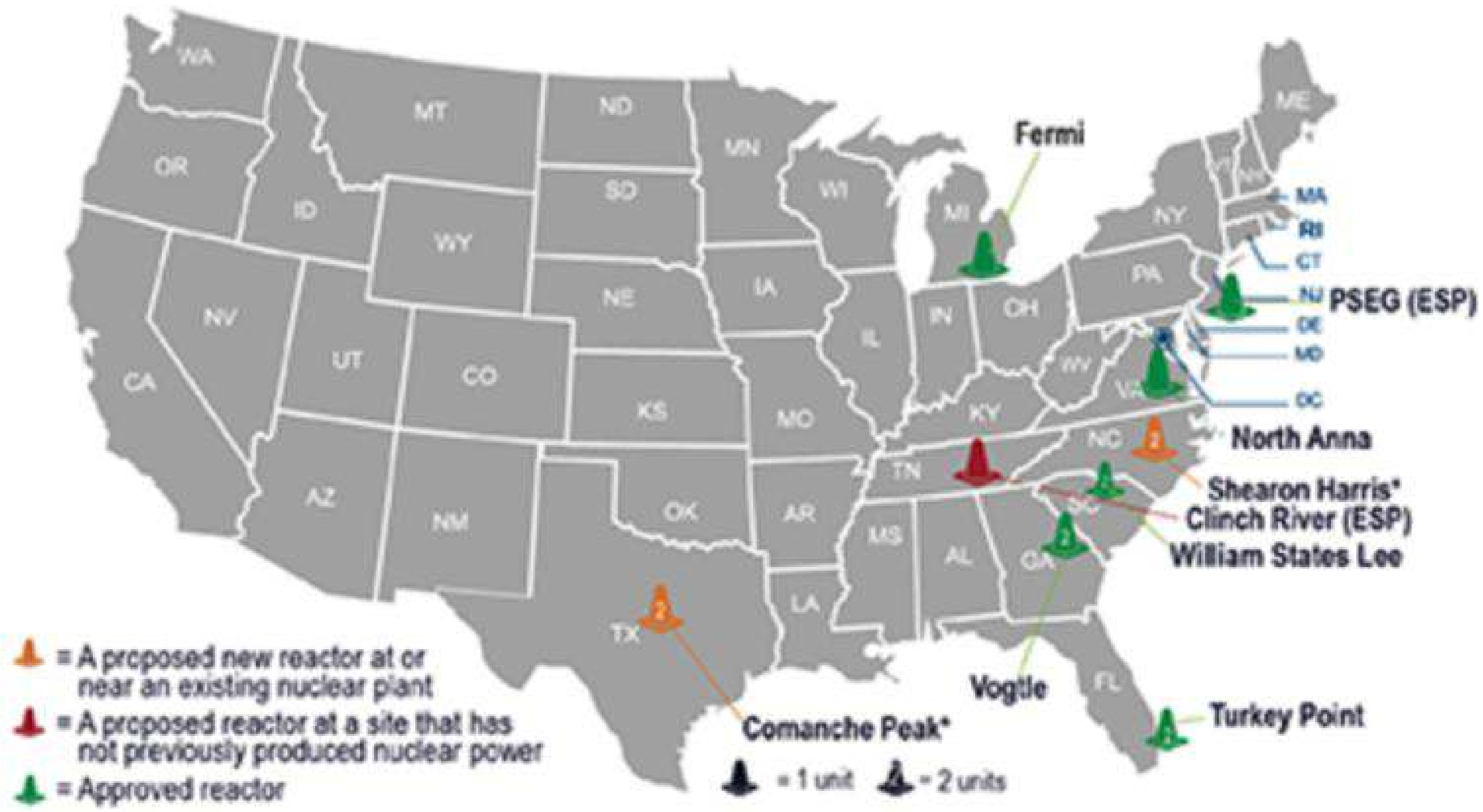
The United States expanded its nuclear power portfolio aggressively in the 1960s, 1970s, and 1980s, but nuclear power generation plateaued in the 1990s, 2000s, and 2010s amid concerns over radioactive leaks from the famous meltdowns of Chernobyl, Three Mile Island, and Fukushima. In addition to negative public perception, the industry was also hampered by oppositional lobbying from the oil and gas and renewable energy industries.



In recent years though, by some combination of educational efforts and necessity, nuclear power has re-entered the conversion as a much-needed solution for base load generation that will both accommodate high-consumption industries and reduce carbon emissions. The Biden administration recently announced measures to support the expansion of nuclear power in the US, which included cutting back on the burdensome red tape that has historically hamstrung new nuclear builds.

The signal from the White House is the first step in a long-overdue process to revamp the US's nuclear power portfolio, and it will be crucial for supporting the gigawatts of datacenters that will be necessary to power the next generation of AI tools. The Vogtle 3 power plant in Georgia was the first nuclear power plant to be built in the US since 2016. The Vogtle 4 power plant, which is also in Georgia, is near completion, but besides it, there are currently no other nuclear power plants under construction in the US. A handful of plants are currently in the planning and permitting stages.

Locations of New Nuclear Power Reactor Active Applications and Approved Licenses



* Review suspended

Note: Alaska and Hawaii are not pictured but have no sites. On July 31, 2017, South Carolina Electric and Gas announced its decision to cease construction on V.C. Summer Units 2 and 3, and the licensee has requested that the COLs be withdrawn. As of October 2017, Duke Energy has announced plans to cancel reactors at Levy County, Florida, and William States Lee, South Carolina. Applications were withdrawn for Calvert Cliffs, Grand Gulf, Nine Mile Point, Victoria County, and Callaway (COL and ESP). In June 2018, Nuclear Innovation North America submitted a letter requesting that the COLs for South Texas Project Units 3 and 4 be withdrawn. NRC-abbreviated reactor names are listed.
Data are current as of September 2022. For the most recent information, go to the NRC website at https://www.nrc.gov.

Source: U.S. Nuclear Regulatory Commission - As of February 2023

6

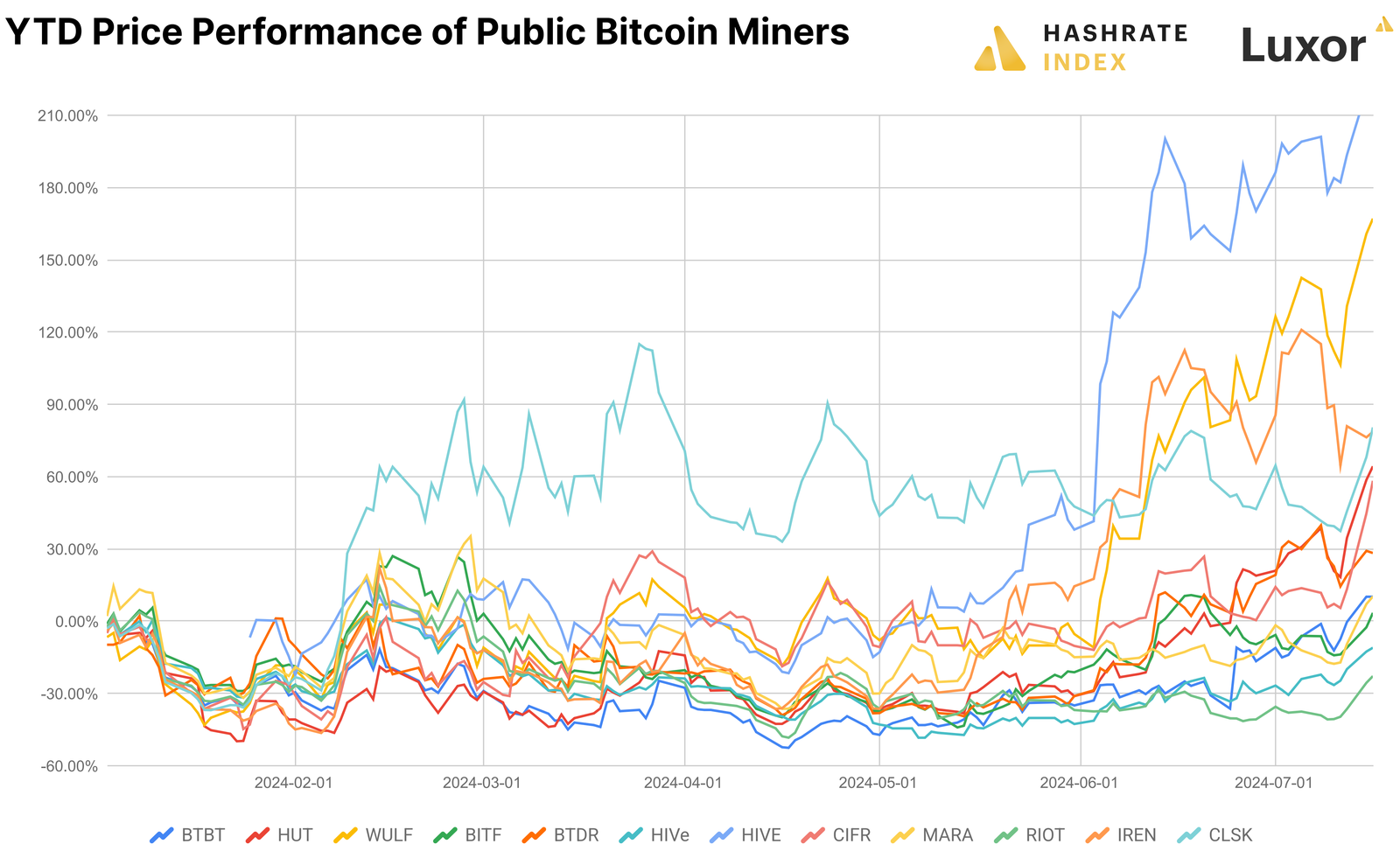
Bitcoin Mining Stocks Rebound in Q2, With AI-Focused Miners Taking Lead

Public Bitcoin miners had a rough Q1, which extended into a rough start to Q2. By the end of Q1 the only one that was in the green since the start of 2024 was Cleanspark. But all of that changed by the end of Q2, and the majority of the leading Bitcoin mining stocks were in the green quarter-over-quarter by the end of Q2, and as of July 15, 2024, most of them were also in the green year-to-date.

% Change	BTBT	HUT	WULF	BITF	BTDR	HIVE	CORZ	CIFR	MARA	RIOT	IREN	CLSK
Q2-2024	15.22%	38.54%	83.13%	13.47%	47.41%	-8.06%	163.46%	-14.96%	-8.23%	-20.31%	74.50%	-14.16%
Year-to-Date*	10.24%	58.73%	160.87%	-2.46%	29.28%	-12.53%	220.06%	44.79%	7.20%	-25.50%	76.40%	68.20%
Year-Over-Year*	3.19%	4.44%	72.91%	50.54%	-19.55%	-32.98%	N/A	25.63%	42.41%	-37.88%	70.63%	167.94%

*As of July 15, 2024

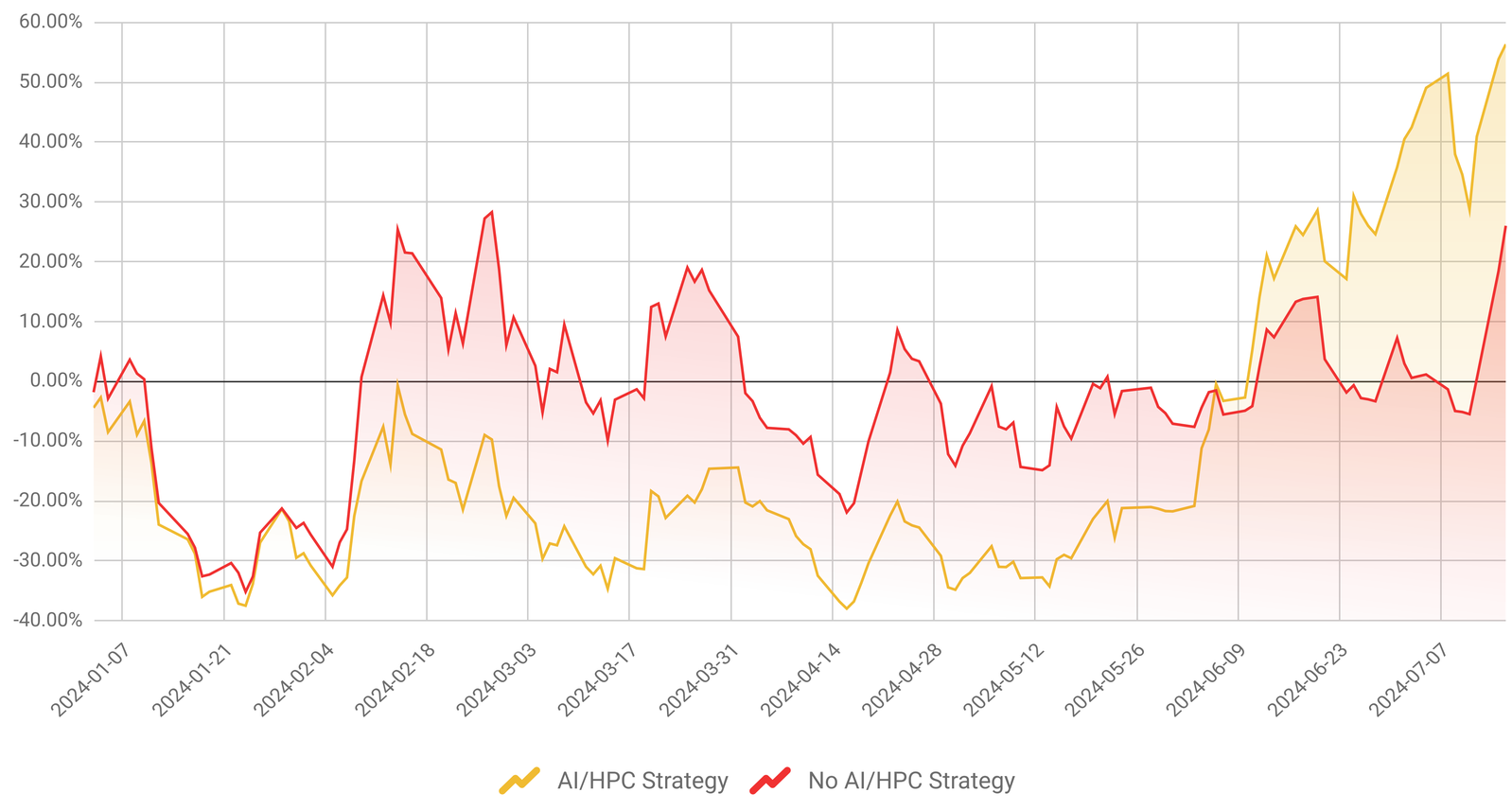
Source: Trading View



Source: Trading View

That said, there has been a clear divergence this year between Bitcoin miners that are executing or have announced an AI / high-performance compute (HPC) strategy. If we break out average returns between AI / HPC-focused and traditional miners, it becomes clear that the market is rewarding miners that are advertising nascent AI / HPC strategies. By Q2 close, AI / HPC miners were up 25% year-to-date, while traditional miners were down 3%. At the time of writing on July 15, the year-to-date returns for AI / HPC miners and traditional miners were 56% and 26%, respectively.

Avg. Price Performance YTD of Miners With AI/HPC Strategy vs. Miners Without AI/HPC Strategy



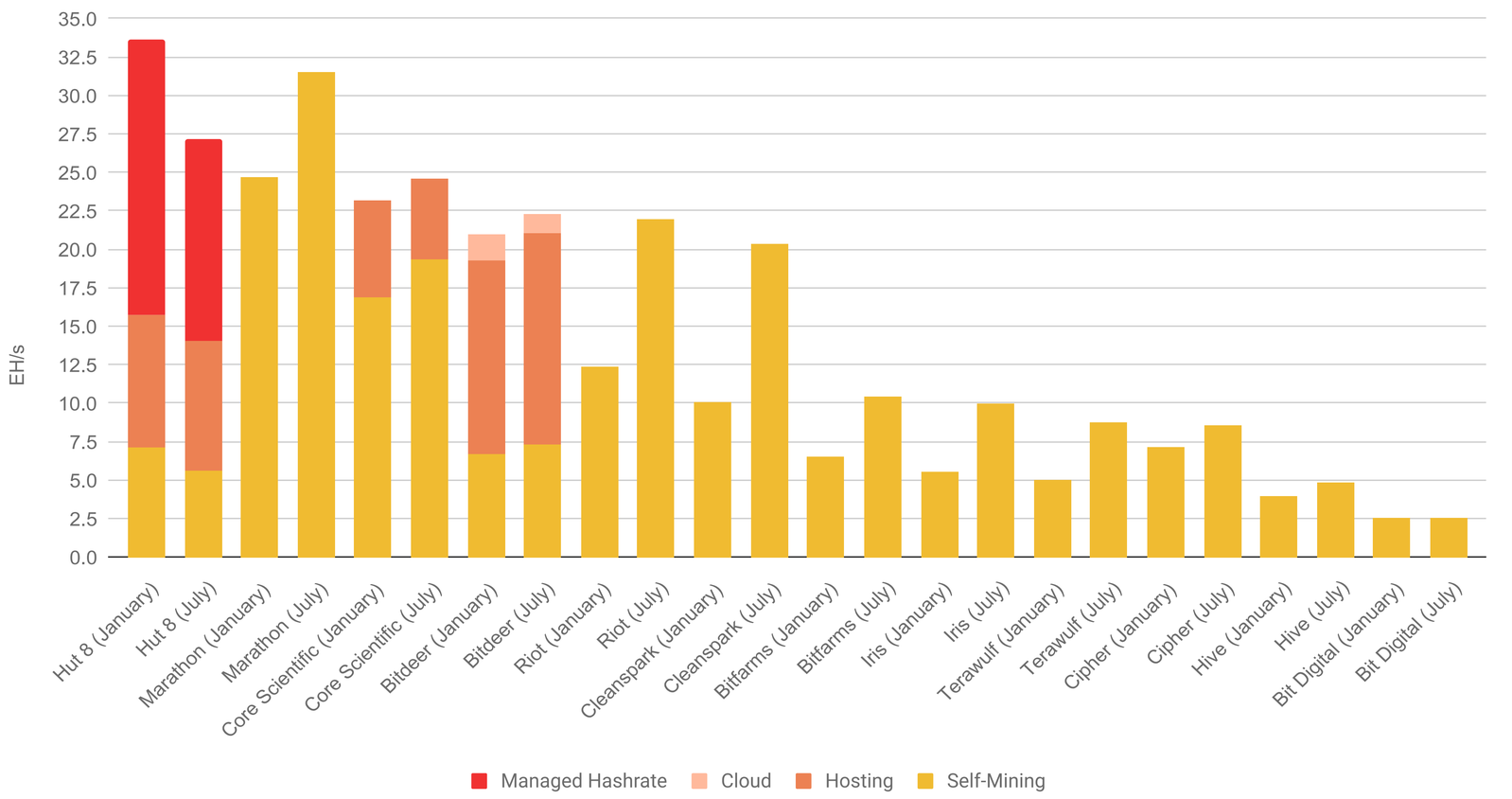
Source: Trading View

Only time will tell if these public miners deserve the valuation increases for their AI / HPC strategies or if they are simply riding the hype wave for AI that has flooded market sentiment. Miners have tried to crack the AI egg in different ways, whether that be leasing tier 3 and 4 datacenters for AI compute or retrofitting existing mining sites to accommodate AI hardware. We'll be eager to see which strategies work in what will no doubt be the hottest and most competitive tech sector over the coming decade.

Public Miners Continue Pursuing Aggressive Hashrate Growth

Over the past year, public Bitcoin miners have focused on increasing their hashrate under management as much as possible in preparation for the Fourth Halving. In Q2, they continued deploying new ASICs in the aftermath of the event, and year-to-date, most every major public Bitcoin miner has more hashrate under management than they had at the beginning of the year.

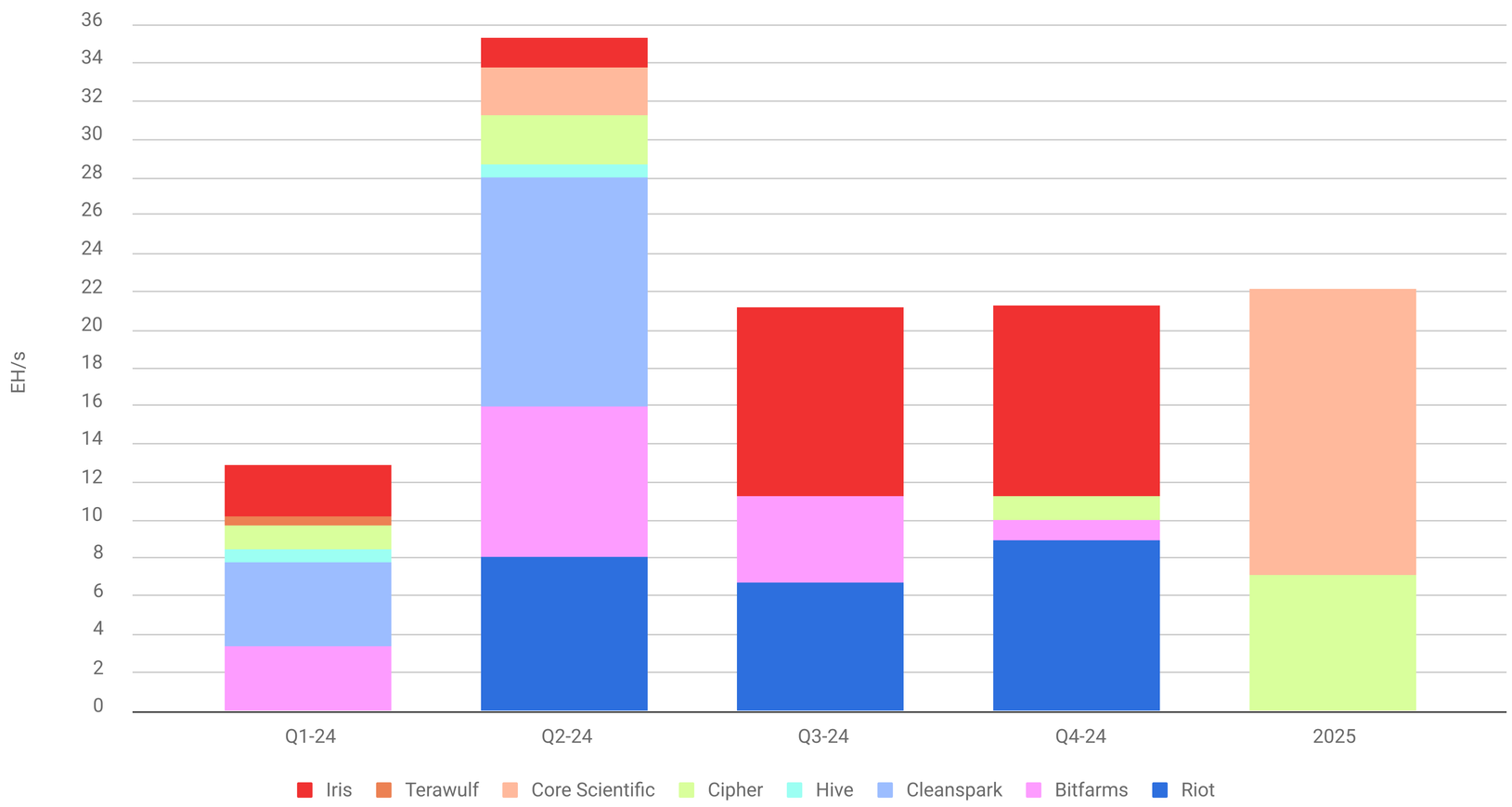
Hashrate Under Management (January 2024 vs. July 2024)



Source: Public Miner Disclosures

Many of these miners were proactive in 2023 and ordered boat-loads of next-generation rigs, namely the S21, T21, M50 series, M60 series, S19k Pro, and S19j XP. Assuming delivery schedules were on time, more than half of the total orders for 2024 should have been delivered in Q1 and Q2. 48.23 EH/s of ASICs were slated for delivery by the end of Q2, and public Bitcoin miners have had a total of 90.70 EH/s on order for the whole of 2024. One thing to note on the chart below: Iris (IREN) did not provide clear delivery schedules for its T21 and S21 Pro orders, so guidance for quarterly EH/s expansion is taken from the company's projections. Similarly, Core Scientific did not announce a delivery timeline for the 15 EH/s of ASIC chips it ordered from Block, so we make an assumption that these will not be delivered until 2025. Lastly, the chart below does not factor in ASIC order options – only confirmed orders.

ASIC Miners on Order (in Exahashes)

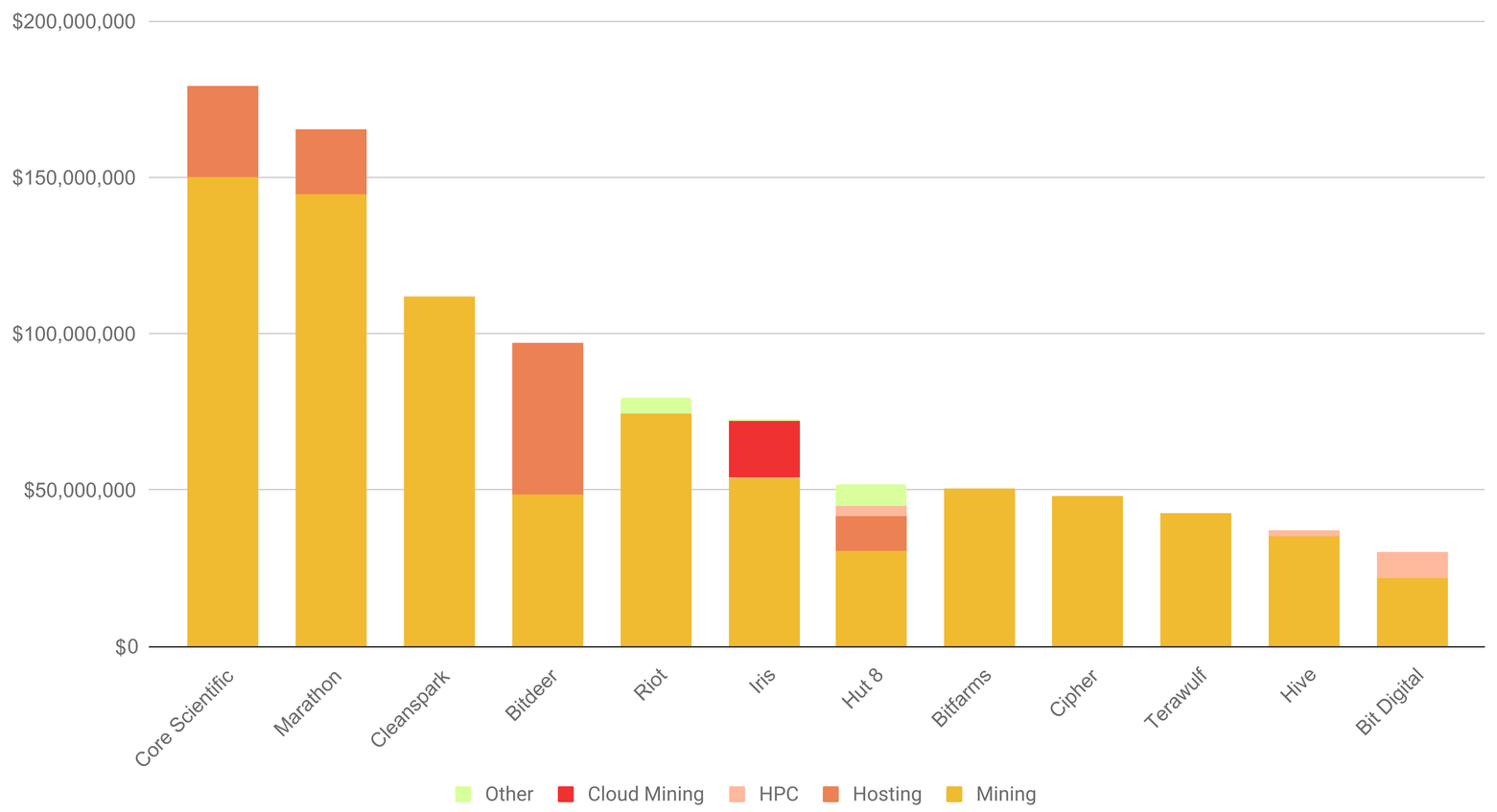


Source: Public Miner Disclosures

Public Miners Seek to Diversify Revenue Streams

Looking at Q1-2024 revenues, we can see that self-mining (unsurprisingly) still comprises the bulk of public miner revenues. And despite all of the chest-beating about AI and HPC strategies, these business lines make up a fraction of a fraction of overall revenues (although this could obviously change in the future, as AI / HPC business lines are still in the early innings).

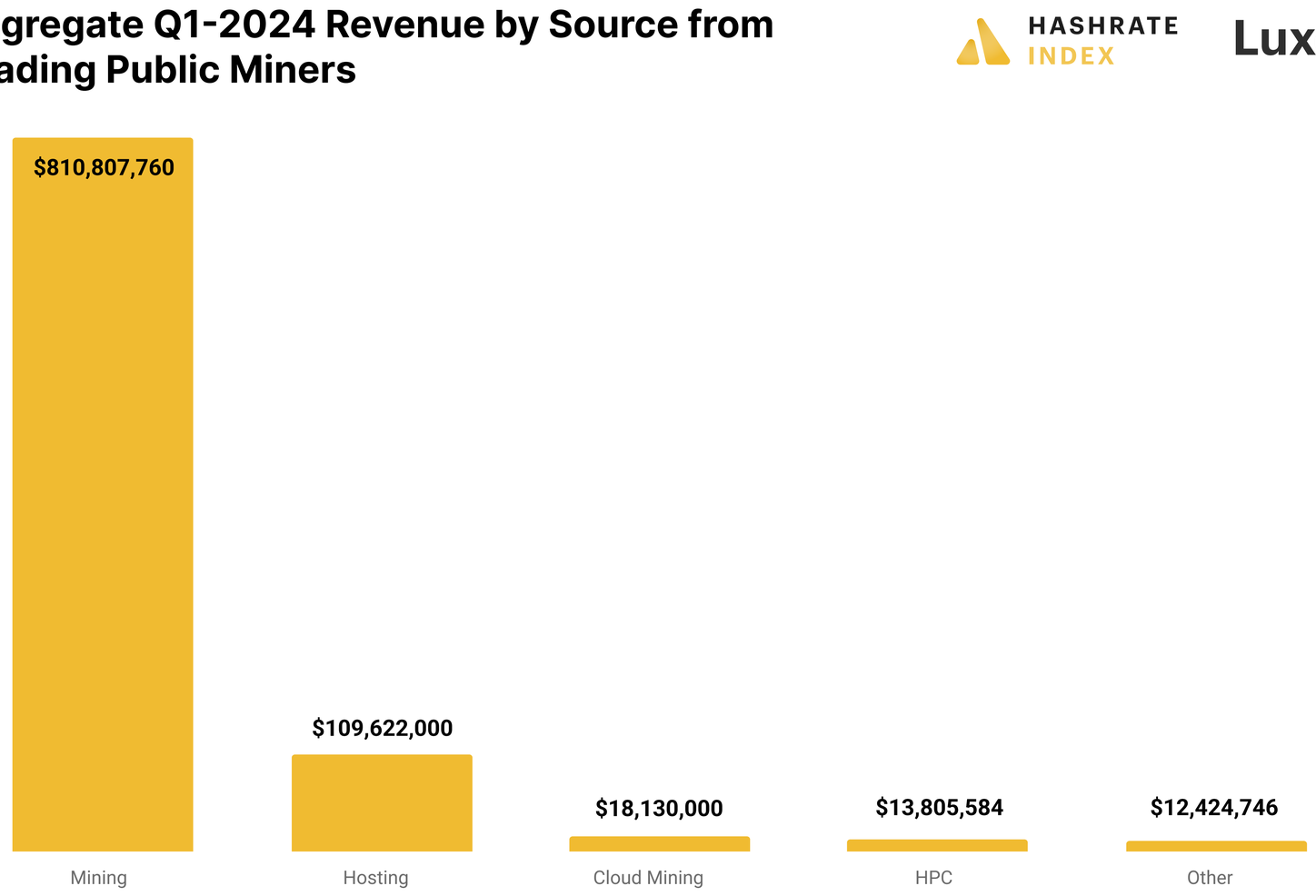
Public Bitcoin Miner Q1-2024 Revenue per Source



Source: Public Miner Disclosures | For Hut 8, hosting includes managed services

Also unsurprising: hosting revenue was the second largest revenue source for public miners in Q1-2024. It will be worth revisiting these numbers when miners report Q2-2024 financials to see the effect of the Halving on hosting revenues.

Aggregate Q1-2024 Revenue by Source from Leading Public Miners



Source: Public Miner Disclosures

Bitcoin miners generally set up their operations in two primary ways: proprietary mining, where they manage both the machines and the facility themselves, or hosted mining, where they own the machines but place them in another miner's facility.

Many public Bitcoin miners adopt a hybrid approach, running their own machines while also offering hosting services to other miners. This dual strategy allows them to negotiate larger power contracts and thus better rates. By selling excess power and facility space to hosting clients at a markup, they avoid the capital expenditure (CAPEX) needed for new Bitcoin mining machines while also expanding their MW footprint.

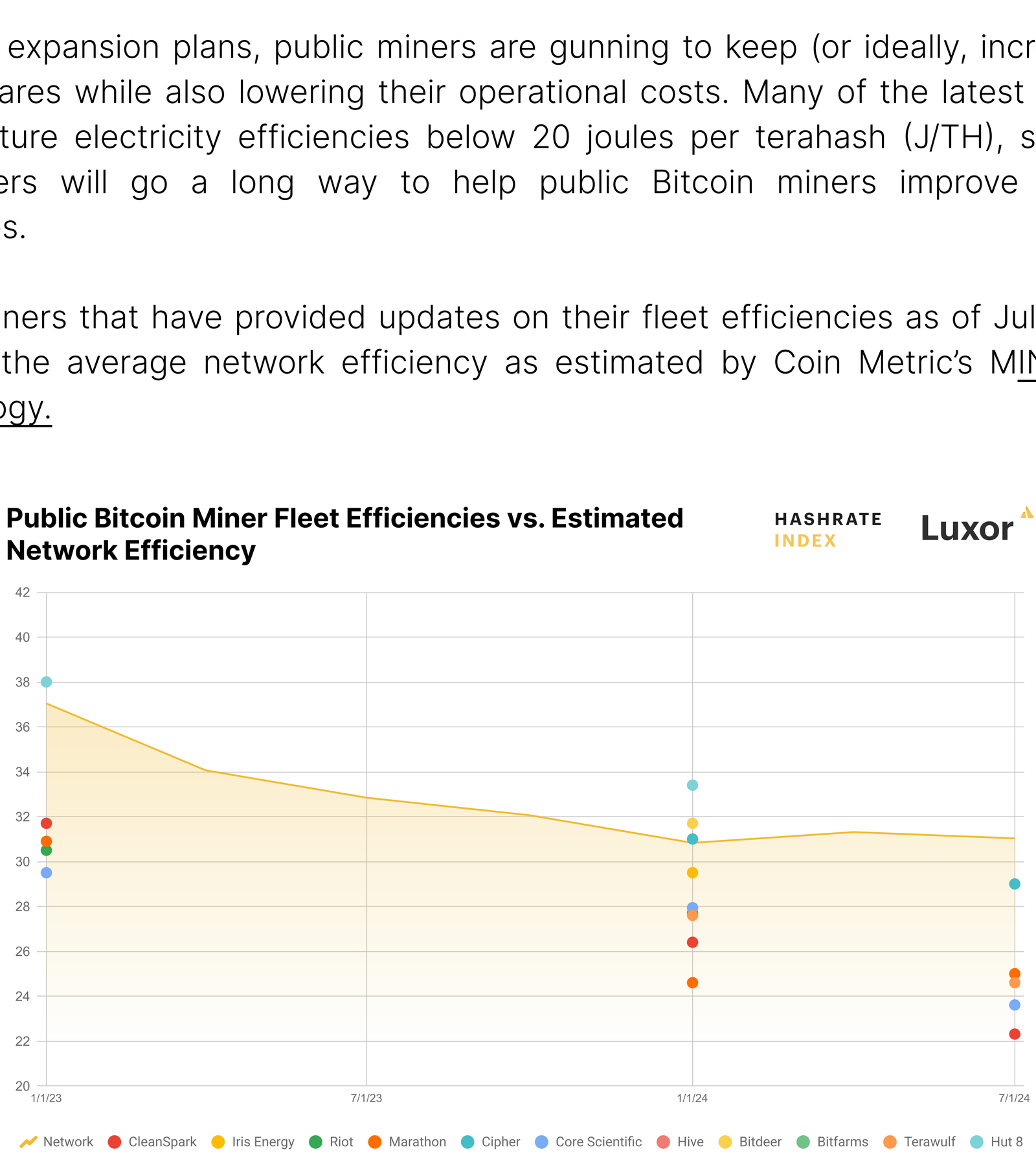
However, hosting revenue doesn't truly diversify income streams, as it remains vulnerable to the same risks and volatility as proprietary Bitcoin mining. In fact, it can be even riskier since hosted miners usually face higher all-in operating costs. Without the latest equipment, hosted miners may find it challenging to achieve comfortable margins, especially after the revenue reduction caused by the halving. Indeed, as we discussed in the section on the hosting market, dynamics for Bitcoin mining hosting are likely to change dramatically over the course of 2024. Hosting services have historically been a profitable method for Bitcoin miners to monetize their expansion efforts, but it remains to be seen how viable this strategy will be in the near future.

Public Miner Fleet Efficiencies

With their expansion plans, public miners are gunning to keep (or ideally, increase) their market shares while also lowering their operational costs. Many of the latest generation ASICs feature electricity efficiencies below 20 joules per terahash (J/TH), so the new ASIC orders will go a long way to help public Bitcoin miners improve their fleet efficiencies.

For the miners that have provided updates on their fleet efficiencies as of July, they are all below the average network efficiency as estimated by Coin Metric's MINE MATCH methodology.

Public Bitcoin Miner Fleet Efficiencies vs. Estimated Network Efficiency



Source: Public Miner Disclosures, Coin Metrics | Certain miners missing for January 2023 and July 2024 as efficiency data was not reported

Notable Public Miner M&A

Q2 was a relatively busy quarter for mergers and acquisitions among public Bitcoin miners. Below, we summarize the highlights.

Cleanspark

- In June, Cleanspark acquired GRIID Infrastructure Inc. in an all-stock deal. With the deal comes all of GRIID's Bitcoin mines in Tennessee, and Cleanspark anticipates these sites will expand to 100 MW by the end of 2024. According to a press release, a breakdown of the deal's terms are as follows:

  Under the terms of the merger agreement, GRIID stockholders will receive shares of CleanSpark common stock based upon an exchange ratio equal to the quotient obtained by dividing the aggregate merger consideration by the total number of shares of GRIID common stock issued and outstanding as of the closing date of the merger. The aggregate merger consideration is equal to the quotient obtained by dividing (x) the sum of (i) $155,000,000 minus (ii) the amount of GRIID's outstanding liabilities as of the closing date of the merger (net of cash on hand) by (y) $16.587 (which is the volume-weighted average price of CleanSpark's common stock for the two consecutive trading days prior to the date of the merger agreement).

  CleanSpark will assume all outstanding debt and other obligations of GRIID pursuant to the merger. CleanSpark also provided GRIID with a $5 million dollar working capital loan and a pay-down bridge loan of approximately $50.9 million that was used to satisfy certain obligations of GRIID at signing. The loan is secured and is senior to all other outstanding debt of GRIID.

- In May, Cleanspark announced that it entered into an agreement to purchase two Bitcoin mining sites in Wyoming worth a combined 75 MW for $18.75 million. The company said it plans to outfit these facilities with S21 and S21 Pros.

Bitdeer

- In line with its aim to launch its new Bitcoin mining ASIC, the Sealminer, Bitdeer acquired Bitcoin ASIC miner design company Desiweminer (a.k.a. FreeChain Inc.) in an all stock deal in June. Per the press release announcement:

  A portion of the Bitdeer Shares to be issued pursuant to the Agreement will vest in equal installments over a period of five or seven years, subject to the terms and conditions therein. Additionally, 50% of the Bitdeer Shares issued to certain sellers under the Agreement cannot be transferred for a period of six months following the closing, and the remaining 50% of the Bitdeer Shares issued to such sellers cannot be transferred for a period of twelve months following the closing.

Northern Data

- In May, Northern Data acquired an in-development Bitcoin mining site in Corpus Christi, Texas. The site is adjacent to one that Northern Data purchased in December of last year, and the newly acquired site is approved for up to 300 MW of capacity. Northern Data expects that the site will be energized in early 2025.