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BitOoda

BitOoda Bitcoin Hashpower Estimate:

Lowering Estimate to 145 EH/s by Year End on China Ban, Power Infrastructure Bottlenecks

A key factor determining investment returns from Bitcoin mining is an estimate of future Hashrate and difficulty. Whether directly investing in Bitcoin mining assets or in mining stocks, this estimate is critical. The mining investment's share of future Hashrate determines future Bitcoin earnings. Our "Bitcoin Reserve" metrics estimate the BTC expected to be mined by 1PH/s (7.2BTC) and 1MW (315BTC), operating through 2030.

We assess Hashrate could recover to 145EH/s by year end 2021, versus our prior 241 EH/s estimate. This is a significant downward revision, as China's mining ban has taken roughly 50% of capacity offline.

The ongoing Chinese government crackdown on mining has resulted in observed Hashrate falling as low as 64 EH/s, although it has since recovered to 100 EH/s. We had estimated Chinese capacity at about 50% of worldwide capacity in July last year, somewhat lower than other estimates we have seen. With mining in China now shut down, we expect Hashrate growth to lag previous estimates until power infrastructure outside of China catches up.

In our view, a lack of power infrastructure currently constrains the industry – a shift from the previous semiconductor shortage. This is the result of the migration of miners out of China, who are looking to relocate to North America and elsewhere in the world. Current high-tension infrastructure cannot support incoming shipments, and thus many rigs now have nowhere to go. We assess that this power constraint will ease by 2024, after which the industry will once again be limited by the semiconductor market (mining economics aside).

We expect an inventory glut in the market, as wafer start commitments with foundries outstrip rig deployments in the market by ~93,000 wafers. Power infrastructure coming online by late 2022 / 2023 could flush the inventory, albeit at lower prices. Commissioning of infrastructure will lead to broad rig deployments and 2023 Hashrate acceleration.

Several variables could cause delivered Hashrate to vary from our estimates. The boundary conditions that combine to define the limits achieved by Hashrate include:

1. **Total Bitcoin mined daily, including Transaction Fees**.
2. **The price of Bitcoin and associated mining profitability** – Hashrate cannot sustain an increase beyond the marginal cost of production.
3. **The available power supply –** Hashrate is constrained by stranded power availability, grid stabilization / controllable load functionality, and the political climate across local and national jurisdictions. Replacing any lost Chinese power elsewhere will face delays owing to transformer / substation lead times, assuming rigs are permitted to relocate.
4. **Advances in semi technology,** which can influence power consumption per unit of hash, as well as amount of hash per unit of physical size of the underlying semiconductor.
5. **Availability of semiconductor capacity is a key constraint**. The main rig makers have migrated to the latest process nodes, competing for scarce wafer capacity with the large players like Apple and Qualcomm, in a foundry industry seeing major shortages.

While the price of rigs is a constraint, we view it as a dependent variable on the overall price and profitability of mining Bitcoin.

Risks to our Hashrate estimates: upside risk would be driven by easing infrastructure constraints, coupled with a surging price.

Downside risks appear to have substantially played out, driven by China's crackdown and recent declines in Bitcoin price.

Takeaways

- *We expect 145H/s Hashrate by year end, with risks skewed slightly to the upside*
- *Bottom-up analysis suggests 100-150k wafer starts per year to achieve our long term Hashrate estimates, with a near-term 90k wafer inventory glut*
- *Our "Bitcoin Reserve" stands at 7.2BTC / PH/s and 315BTC/MW through 2030*
- *Paid subscribers can access our full report with detailed build up to our estimates*

Please see **slide 5** for important disclosures.

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Key Takeaways

- *We expect Hashrate to reach 145EH/s by YE2021, with upside risk bias*
- *Power infrastructure is the constraint as mining migrates to the US / Canada*
- *Estimated Hashrate suggests 100-150k wafer starts per year through 2030 to achieve our long term Hashrate estimates*
- *This could drive a ~90k wafer inventory glut*
- *Our "Bitcoin Reserve" stands at 7.2BTC / PH/s and 315BTC/MW through 2030*
- *Paid subscribers can access our full report with detailed build up to our estimates*
- *Contact our sales team at info@bitooda.io with questions or to subscribe*

BitOoda 2021 Hash Ests
~145 EH/s by Year End

- Our projections call for target Hashrate of ~145EH/s by year end (YE) 2021
- On May 22nd, we had expected Hashrate to be over 240EH/s
- The actual network Hashrate has lagged our prior projections, with the gap expanding significantly since the end of 2020
- The next reset should see a target Hashrate of roughly 95-100EH/s, with China's ban resulting in over half of the network being removed
- We previously attributed much of this shortfall to the ongoing semiconductor shortage, though now we expect power infrastructure to be the gating factor in mining expansion

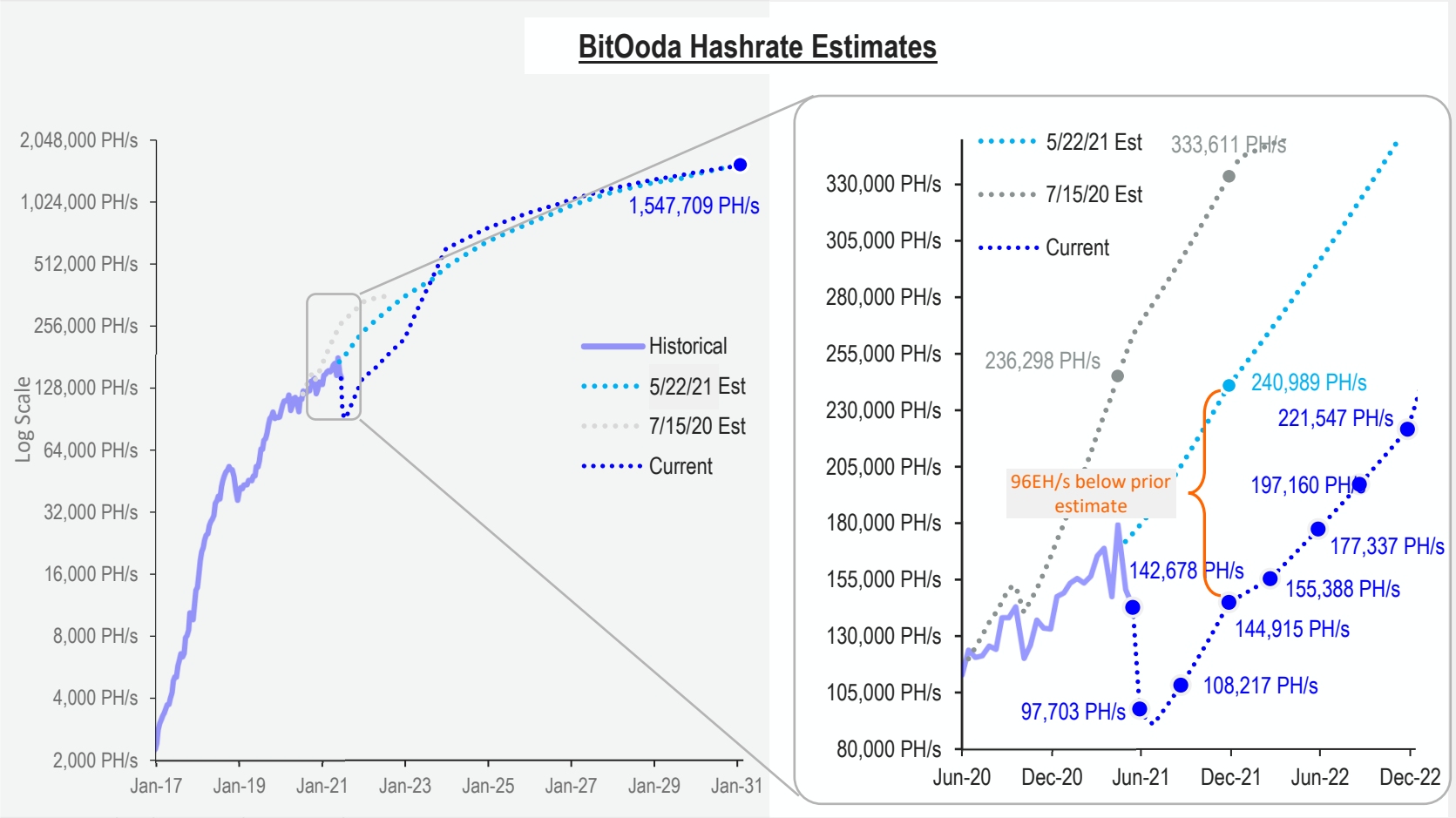

Figure: Actual and Estimated Target Hashrate 2017-2030
Actual as of 6/30/21; Estimates as of current, 7/15/20 and 5/22/21

Source: BitOoda estimates, CoinMetrics

Factoring China Ban:
Our Methodology

- Total current Hashrate can currently be broken down into the Hashrate of China and Hashrate of the rest of the world (RoW)
- Due to China's mining ban, Chinese Hashrate will likely approach zero, with its future expansion being hosted outside of China
- As such, new Hashrate will be the sum of the current Hashrate of the RoW, future Hashrate expansion for the RoW, and future Chinese expansion rerouted outside of China

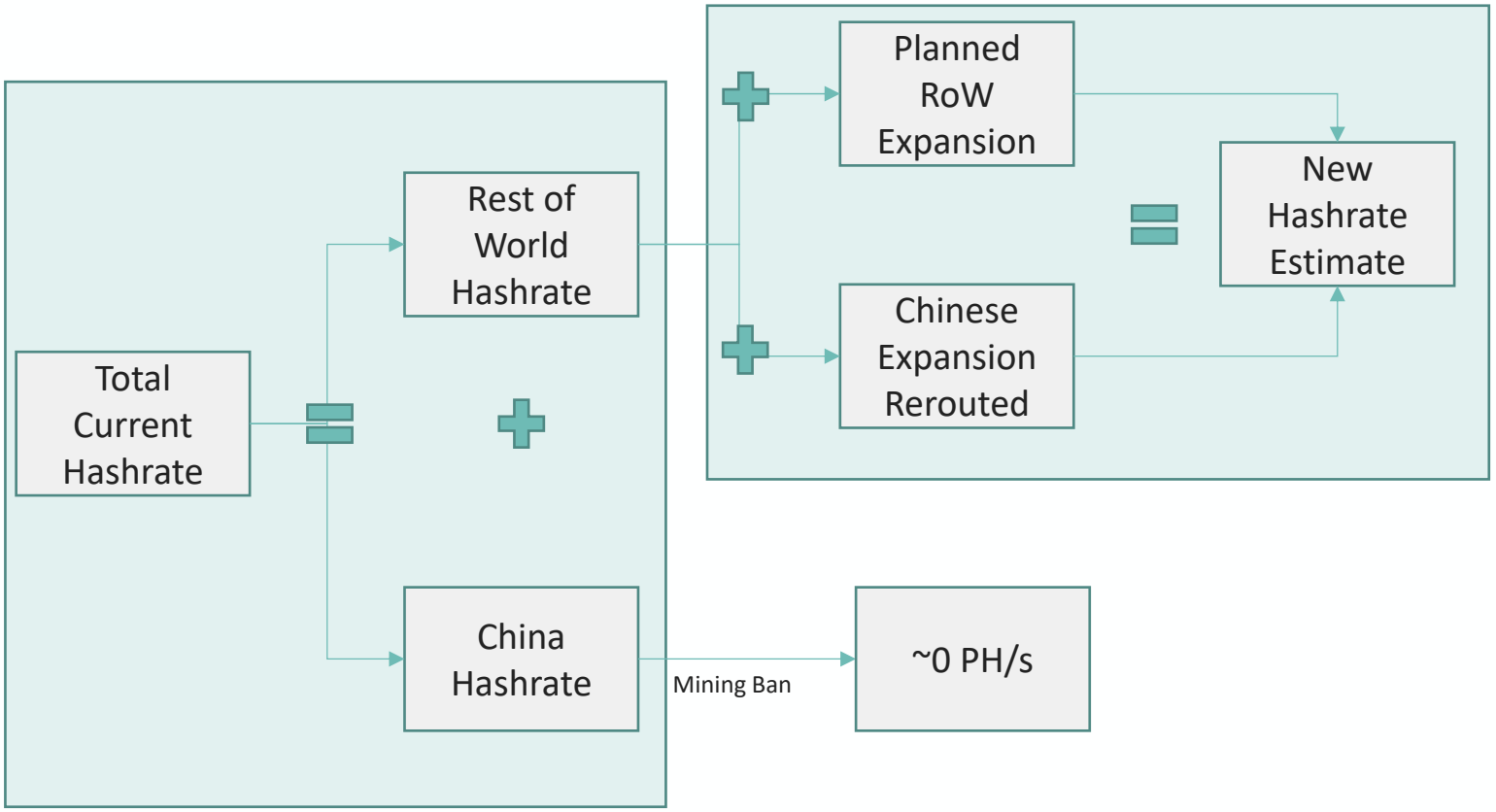

Figure: BitOoda Hashrate Estimation Process

Source: BitOoda

Risks

- Hashrate estimates are notoriously challenging
- Constraints include semiconductor capacity, power availability, and miner profitability, which is essentially a spread between Hashrate growth and price growth
- With the crypto mining ban in China, power availability becomes the operating constraint
- Specifically, the constraint is on power infrastructure including substations, transformers and breakers
- Due to long lead times on these items, any mining capacity either relocating out of China or future deliveries to China getting relocated elsewhere, may have a hard time finding sites that are ready to turn the machines on
- Hence, a loss of network Hashpower due to the ban could take 24-36 months to recover to our prior projected path
- However, we believe our long-range forecasts are intact, subject to the mining profitability constraint
- While semiconductor access is constrained, overall volumes appear modest to us, and could allow Hashrate to surprise meaningfully to the upside over time if mining profitability warrants it – i.e., if BTC price appreciation largely keeps pace with Hashrate growth
- We will continue to monitor the situation and update our Hashrate model as more information becomes available
- **With the latest downward revisions to Hashrate, we think Hashrate risks are currently skewed modestly to the upside**

Disclosures

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