

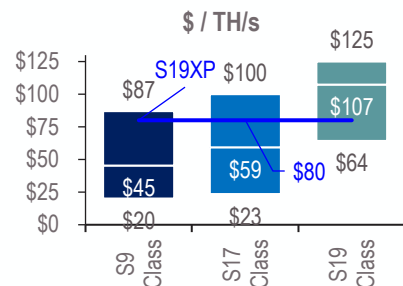


# ASIC Economics: S19XP is Superior, But Months Out; Sensitivity Analysis Shows Deterioration of Miner Profitability Likely as Hash Catches Up

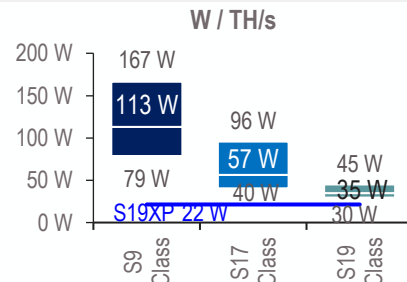
**Network Hashrate has not kept pace with Bitcoin price**, resulting in strong miner economics; however, we see daily revenue per PH/s beginning to mean-revert ([slide 6](#)).

**Rig prices have remained surprisingly high.** Our thesis of not having enough power infrastructure-ready sites to receive rigs outside of China appears to be playing out, based on overall network Hashrate (see our 9/16 Hashrate estimate [here](#)). Meanwhile, although BTC price is 32% off all-time highs, this has not resulted in declining rig prices, leading to weakening payback periods.

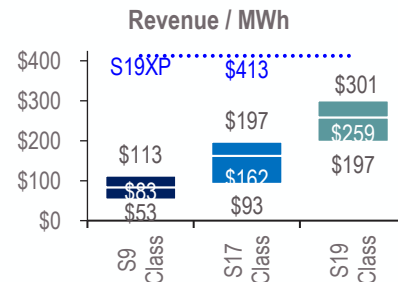
**S19-class rigs range in price from \$64-125 / TH/s** in the spot market, while older S9 and S17-class machines average \$45 and \$59 / TH/s ([slide 2](#)), respectively. The price for the recently announced S19XP with 3Q22 delivery is \$80 / TH/s.



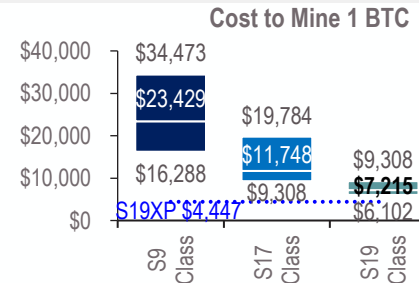
**Older-generation rigs are far less power efficient, with an S9-class average of 113W / TH/s**, compared with 57W for S17-class and 35W for S19-class rigs (see [slide 3](#)). The S19XP clocks in at ~22W per TH/s.



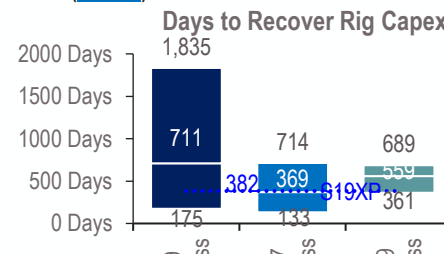
**Revenue per MWh for S19-class rigs is currently \$259**, while even S9-class rigs make over \$80/MWh, on average. With most of the network mining at \$20-50/MWh power cost, even S9-class rigs are significantly profitable right now ([slide 4](#)). S19XP rigs, had they been available to run in the current environment, would make \$413/MWh.



**It costs about \$23,400 to mine 1 Bitcoin using S9-class rigs**, assuming a \$40/MWh power price and \$10/MWh labor cost. For S17-class rigs, the production cost is \$11,750 per Bitcoin, \$6,200 with S19-class rigs and \$4,500 with a hypothetical S19XP running today.



**Payback periods for S9-class rigs are over 700 days, and 369 days for S17-class.** S19-class rigs have a 559-day payback period, on average, and 382-day theoretically for the S19XP ([slide 5](#)).



Our sensitivity analysis shows how daily revenue per PH/s and per MWh varies with price and network Hashrate ([slides 7 to 13](#))

### Takeaways

- Daily revenue per PH/s is beginning to mean revert, while rig prices have not yet dropped in response, leading to extended payback periods
- S17-class rigs are the most attractive option right now, while the S19XP rigs do not present much of an advantage, given our estimated growth in network Hashrate to 334 EH/s by YE '22

## Research

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BTC Price (12/20 at 9am ET) \$45,887

Obs Hashrate 176 EH/s

### Key Takeaways

- Daily revenue per PH/s is beginning to mean revert, while rig prices have not yet dropped in response, leading to extended payback periods
- S17-class rigs are the most attractive option right now, while the S19XP rigs do not present much of an advantage, given our estimated growth in network Hashrate to 334 EH/s by YE '22
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# Latest-Gen ASICs: S19XP at \$80/TH/s for 7-10 Mos. Future Delivery

- S19-class rigs have seen rising prices over the past year owing to the run-up in BTC price and shortage of chips
- Prices stayed resilient even as China banned BTC mining, potentially leaving several GW worth of future orders with no delivery locations
- The enhanced profitability resulting from price increases far outpacing difficulty has made older-generation machines profitable and raised their prices in the secondary market
- The average price of S9-class rigs of \$45 / TH/s exceeds the pricing of S19-class rigs a year ago; S19-class rigs now average \$107 / TH/s
- The S19XP class of machines is expected to commence delivery in 3Q2022, currently at \$80 / TH/s for future delivery

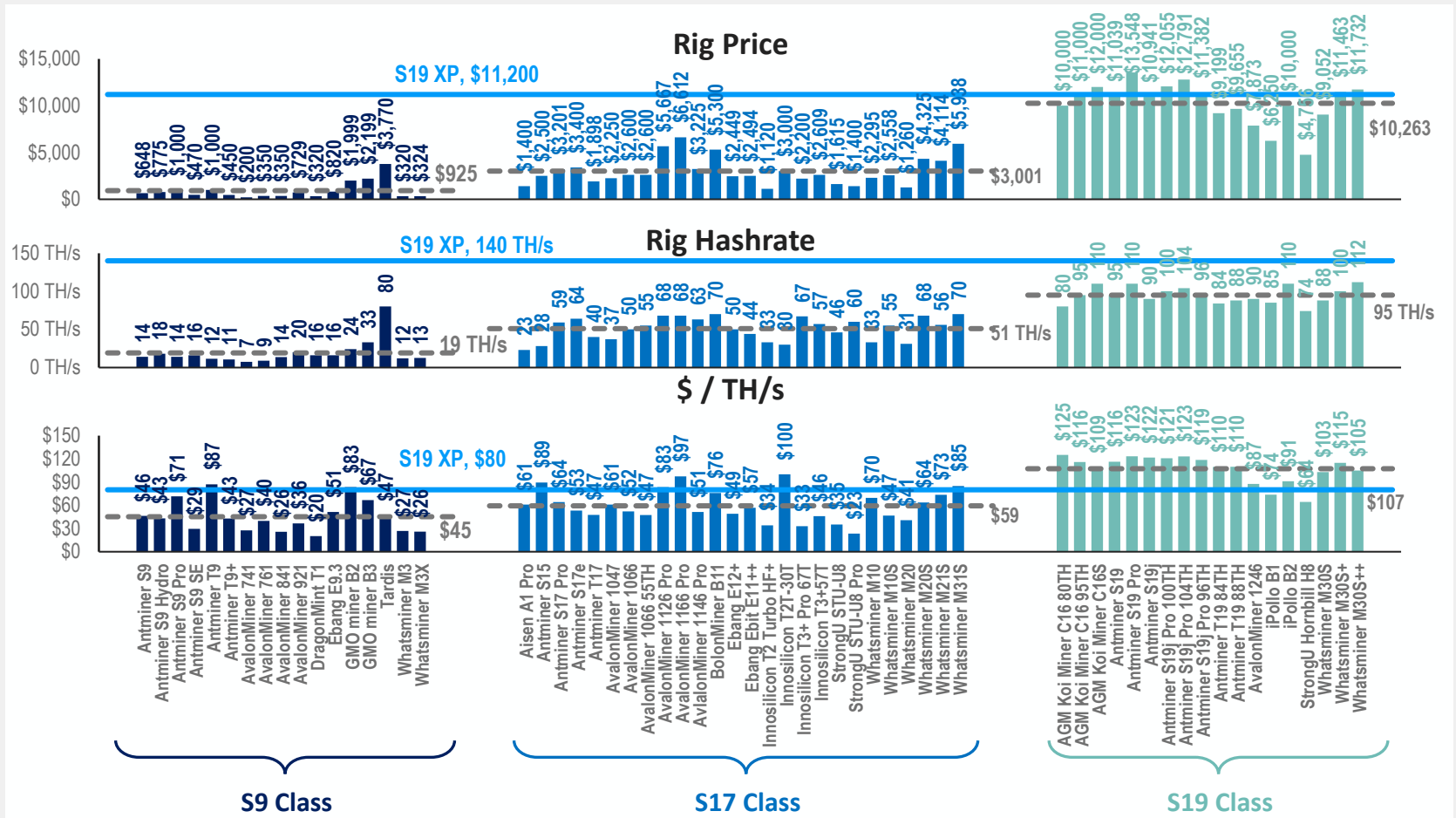


Figure: Device price, Hashrate, and \$ per TH/s, organized by class. Grey lines denote average among corresponding rig class. Light blue line represents the upcoming S19XP

Source: BitOoda estimates, CoinMetrics, Asicminervalue



# S19XP Rigs Have 22W/TH/s Power Consumption

- S9-class rigs have an average power consumption of 113W per TH/s
- The S17-class rigs show an average of 57W per TH/s, although the best device efficiency overlaps slightly with less-efficient S19-class devices
- Note that the latest-generation rigs all consume about the same power per unit, reflecting power supply and power/amperage constraints for components including receptacles, power cords, etc.
- The upcoming S19XP devices have announced power efficiency of around 22W /TH/s

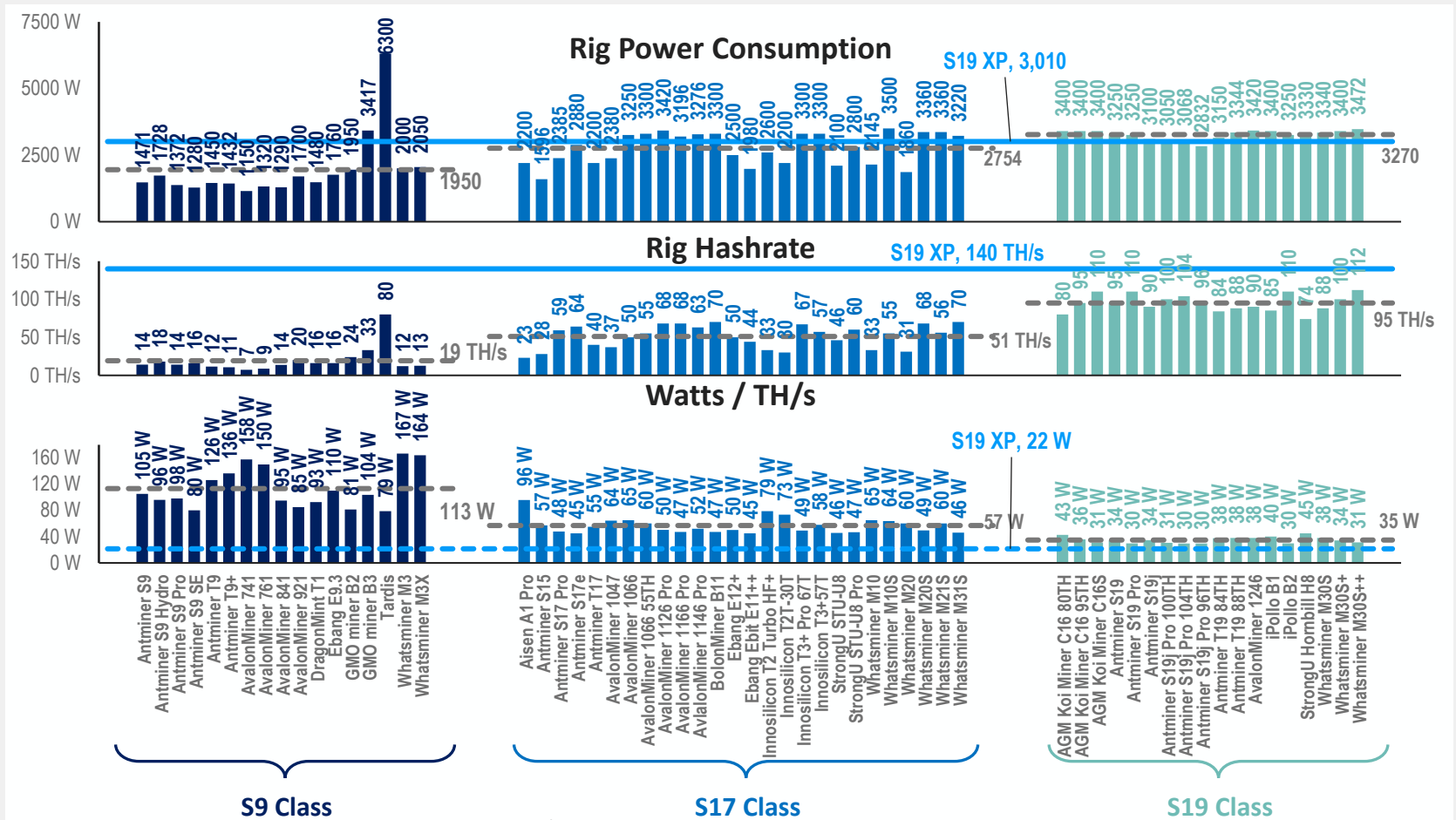


Figure: Device power consumption, Hashrate, and watts per TH/s, organized by class. Grey lines denote average among corresponding rig class. Light blue line represents the upcoming S19XP

Source: BitOoda estimates, CoinMetrics, Asicminervalue



# S19-Class Rigs Generate 3x Revenue / MWh vs. S9-Class

- On average, S9-class rigs deliver 8 PH/s per MW, compared with 16 PH/s for S17 and 26 PH/s for S19-class rigs
- This results in revenue of \$83 / MWh for S9-class rigs, well above wholesale power prices for miners, assuming the median power cost for a Bitcoin miner is about \$40 /MWh
- S17-class and S19-class rigs make \$162 and \$259 per MWh under current price and difficulty conditions
- The S19XP device delivers 42 PH/s per MW, assuming a PUE of 1.12
- Under current conditions, that translates to \$413 revenue per MWh, although clearly conditions would be very different when the S19XP launches in 3Q 22

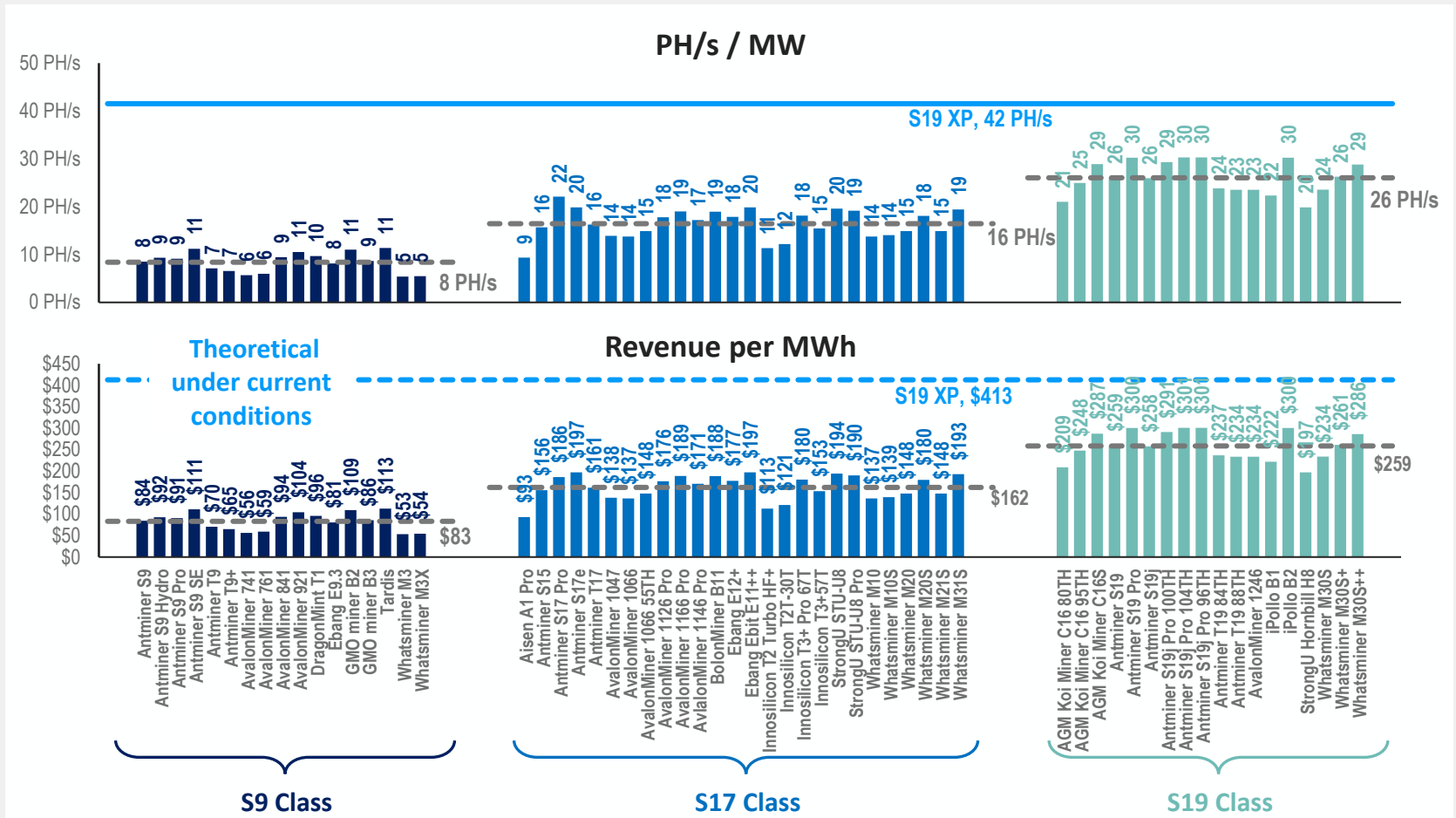


Figure: Device petahash produced per megawatt and revenue per megawatt hour, organized by class. Grey lines denote average among corresponding rig class. Light blue line represents the S19XP; dashed line is theoretical and will be different upon actual launch

Source: BitOoda estimates, CoinMetrics, Asicminervalue



# S17-Class Rigs Exhibit Superior Payback Despite Higher Cost / BTC Mined

- It costs ~\$23,429 to mine 1 BTC using S9-class rigs, assuming a \$40/MWh power price and \$10/MWh labor cost, at current BTC price and difficulty.
- With the same assumptions, it costs \$11,750 to produce a Bitcoin using S17-class equipment and \$7,215 using S19-class equipment
- Based on these assumptions, the average rig cost payback period for older-generation S9-class rigs is now over 700 days, and S17-class rigs are just about one year, while S19-class rigs have a payback period of 559 days. This is based on current economics, and does not account for changes in future price/Hashrate
- Payback periods could extend if difficulty starts catching up with BTC price
- **S19XP rigs, if available today, would have a 382 day payback**

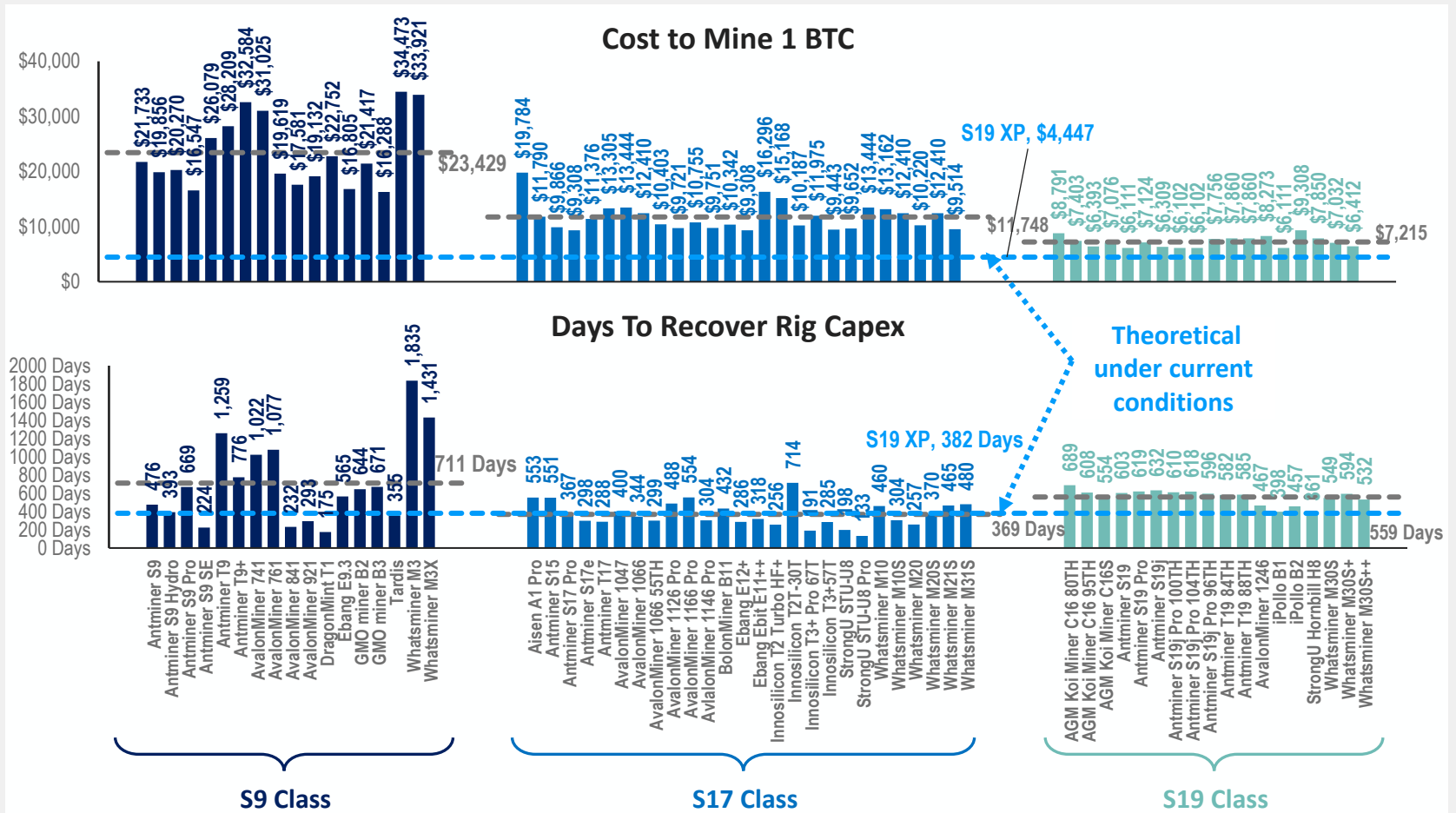


Figure: Device cost to mine 1 bitcoin, and days to recover rig capex dependent on current network conditions, BTC spot, and using a power price of \$40/MWh. Grey lines denote average among corresponding rig class. Light blue line represents the latest 5nm machine.

Source: BitOoda estimates, CoinMetrics, Asicminervalue



# Daily Revenue per PH/s

## \$245 is in the 60<sup>th</sup> Percentile

- Network Hashrate has continued to climb, while Bitcoin price is now ~32% off its all time high
- Earnings per PH/s per day are currently \$245, in the 60th percentile compared to the past 2 years of history
- Over the same period, the mean / median daily earnings have been \$213 and \$180 respectively

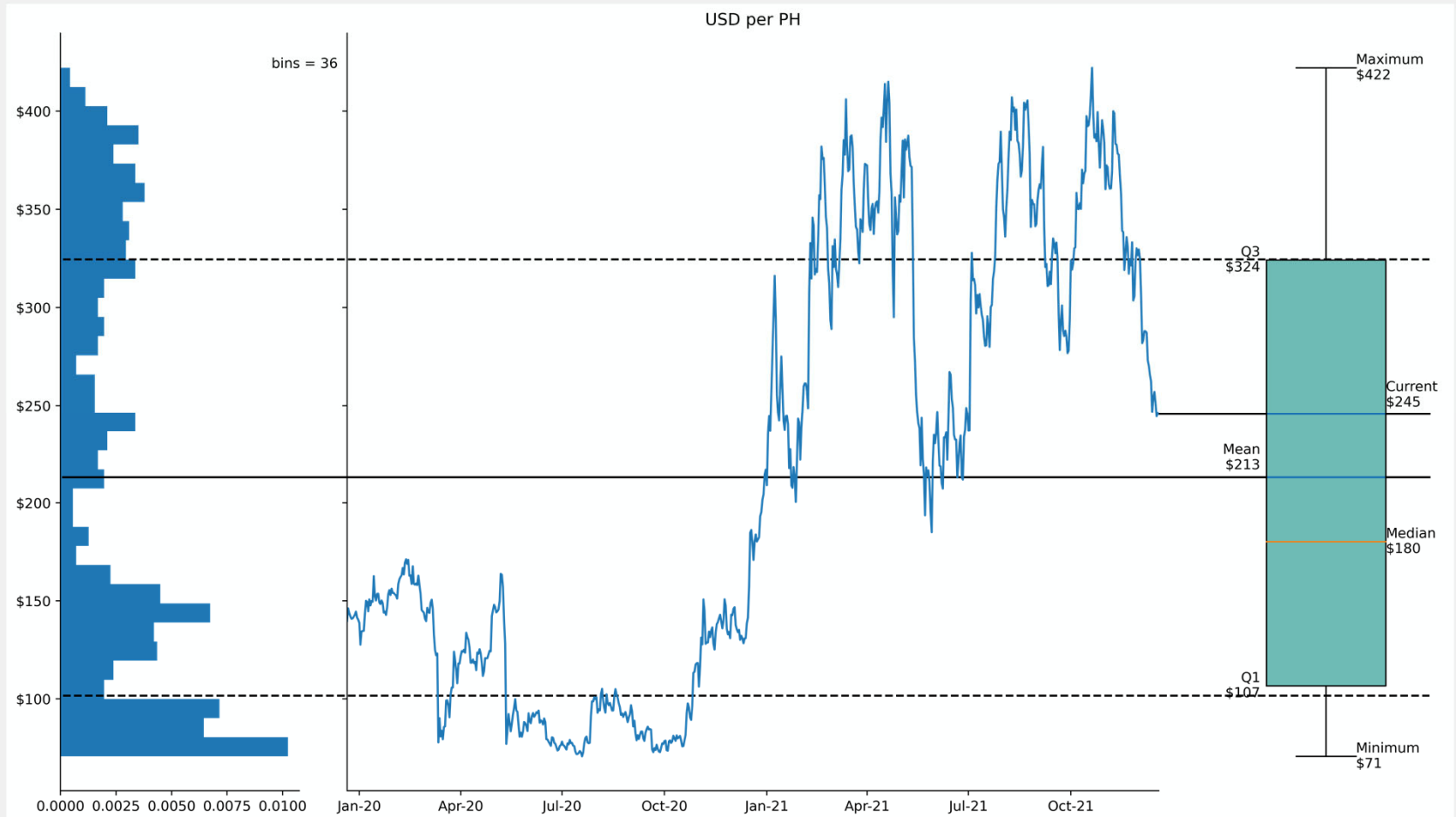


Figure: Bitcoin mining revenue in USD per PH/s over the past two years

Source: BitOoda, CoinMetrics, Bloomberg



# Miner Economics Sensitivity I: Daily Revenue / PH/s as a Function of Price and Hashrate

- At the current price and network Hashrate, daily revenue is \$245 per PH/s, in the 60<sup>th</sup> percentile.
- As shown below, our estimated Hashrate for year end 2022 would result in revenue per PH/s per day dropping to \$130-160

Bitcoin Price	Network Hashrate														
	150 EH/s	175 EH/s	200 EH/s	225 EH/s	250 EH/s	275 EH/s	300 EH/s	325 EH/s	350 EH/s	375 EH/s	400 EH/s	425 EH/s	450 EH/s	475 EH/s	500 EH/s
\$25,000	\$162	\$139	\$121	\$108	\$97	\$88	\$81	\$75	\$69	\$65	\$61	\$57	\$54	\$51	\$49
\$35,000	226	194	170	151	136	124	113	105	97	91	85	80	75	72	68
\$45,000	291	250	218	194	175	159	146	134	125	116	109	103	97	92	87
\$55,000	356	305	267	237	214	194	178	164	153	142	133	126	119	112	107
\$65,000	421	360	315	280	252	229	210	194	180	168	158	148	140	133	126
\$75,000	485	416	364	324	291	265	243	224	208	194	182	171	162	153	146
\$85,000	550	471	412	367	330	300	275	254	236	220	206	194	183	174	165
\$95,000	615	527	461	410	369	335	307	284	263	246	231	217	205	194	184
\$105,000	679	582	510	453	408	371	340	314	291	272	255	240	226	215	204
\$115,000	744	638	558	496	446	406	372	343	319	298	279	263	248	235	223
\$125,000	809	693	607	539	485	441	404	373	347	324	303	285	270	255	243

Current

2022 YE Est

Figure: Daily revenue per PH/s as a function of Bitcoin Price and Network Hashrate

Source: BitOoda estimates, CoinMetrics



# Miner Economics Sensitivity II: Network Hashrate Implied by Daily Rev./ PH/s & BTC Price

- Here, we show what network Hashrate would be, at different BTC price and at different levels of revenue per PH/s per day
- If the market continues to mean revert, one would expect the daily revenue to drop over time.

Bitcoin Price	\$ / PH/s Per Day														
	\$50	\$75	\$100	\$125	\$150	\$175	\$200	\$225	\$250	\$275	\$300	\$325	\$350	\$375	\$400
\$25,000	485 EH/s	324 EH/s	243 EH/s	194 EH/s	162 EH/s	139 EH/s	121 EH/s	108 EH/s	97 EH/s	88 EH/s	81 EH/s	75 EH/s	69 EH/s	65 EH/s	61 EH/s
\$35,000	679	453	340	272	226	194	170	151	136	124	113	105	97	91	85
\$45,000	874	582	437	349	291	250	218	194	175	159	146	134	125	116	109
\$55,000	1068	712	534	427	356	305	267	237	214	194	178	164	153	142	133
\$65,000	1262	841	631	505	421	360	315	280	252	229	210	194	180	168	158
\$75,000	1456	971	728	582	485	416	364	324	291	265	243	224	208	194	182
\$85,000	1650	1100	825	660	550	471	412	367	330	300	275	254	236	220	206
\$95,000	1844	1229	922	738	615	527	461	410	369	335	307	284	263	246	231
\$105,000	2038	1359	1019	815	679	582	510	453	408	371	340	314	291	272	255
\$115,000	2232	1488	1116	893	744	638	558	496	446	406	372	343	319	298	279
\$125,000	2426	1618	1213	971	809	693	607	539	485	441	404	373	347	324	303

Current

Figure: Network Hashrate implied at different daily revenue per PH/s and Bitcoin price combinations

Source: BitOoda estimates, CoinMetrics





# Miner Economics Sensitivity III: BTC Price Implied by Daily Revenue and Network Hashrate

- At current network Hashrate, a \$225-250 daily revenue per PH/s equates to a price of \$40-44,000 for BTC
- However, the same economics at a network Hashrate of 325 EH/s would require BTC price to be \$73-81,000

	Network Hashrate														
	150 EH/s	175 EH/s	200 EH/s	225 EH/s	250 EH/s	275 EH/s	300 EH/s	325 EH/s	350 EH/s	375 EH/s	400 EH/s	425 EH/s	450 EH/s	475 EH/s	500 EH/s
\$50	\$7,500	\$8,750	\$10,000	\$11,250	\$12,500	\$13,750	\$15,000	\$16,250	\$17,500	\$18,750	\$20,000	\$21,250	\$22,500	\$23,750	\$25,000
\$75	11,250	13,125	15,000	16,875	18,750	20,625	22,500	24,375	26,250	28,125	30,000	31,875	33,750	35,625	37,500
\$100	15,000	17,500	20,000	22,500	25,000	27,500	30,000	32,500	35,000	37,500	40,000	42,500	45,000	47,500	50,000
\$125	18,750	21,875	25,000	28,125	31,250	34,375	37,500	40,625	43,750	46,875	50,000	53,125	56,250	59,375	62,500
\$150	22,500	26,250	30,000	33,750	37,500	41,250	45,000	48,750	52,500	56,250	60,000	63,750	67,500	71,250	75,000
\$175	26,250	30,625	35,000	39,375	43,750	48,125	52,500	56,875	61,250	65,625	70,000	74,375	78,750	83,125	87,500
\$200	30,000	35,000	40,000	45,000	50,000	55,000	60,000	65,000	70,000	75,000	80,000	85,000	90,000	95,000	100,000
\$225	33,750	39,375	45,000	50,625	56,250	61,875	67,500	73,125	78,750	84,375	90,000	95,625	101,250	106,875	112,500
\$250	37,500	43,750	50,000	56,250	62,500	68,750	75,000	81,250	87,500	93,750	100,000	106,250	112,500	118,750	125,000
\$275	41,250	48,125	55,000	61,875	68,750	75,625	82,500	89,375	96,250	103,125	110,000	116,875	123,750	130,625	137,500
\$300	45,000	52,500	60,000	67,500	75,000	82,500	90,000	97,500	105,000	112,500	120,000	127,500	135,000	142,500	150,000
\$325	48,750	56,875	65,000	73,125	81,250	89,375	97,500	105,625	113,750	121,875	130,000	138,125	146,250	154,375	162,500
\$350	52,500	61,250	70,000	78,750	87,500	96,250	105,000	113,750	122,500	131,250	140,000	148,750	157,500	166,250	175,000
\$375	56,250	65,625	75,000	84,375	93,750	103,125	112,500	121,875	131,250	140,625	150,000	159,375	168,750	178,125	187,500
\$400	60,000	70,000	80,000	90,000	100,000	110,000	120,000	130,000	140,000	150,000	160,000	170,000	180,000	190,000	200,000

Current

2022 YE Est

Figure: Bitcoin price implied by daily revenue / PH/s and overall network Hashrate

Source: BitOoda estimates, CoinMetrics, Asicminervalue



# S9-Class Revenue / MWh \$50-60 at YE22 at Current BTC Price

- Based on current prices and where we expect the Hashrate to be by year end 2022, S9-class machines still in operation would earn \$50-60 per MWh

		Network Hashrate														
		150 EH/s	175 EH/s	200 EH/s	225 EH/s	250 EH/s	275 EH/s	300 EH/s	325 EH/s	350 EH/s	375 EH/s	400 EH/s	425 EH/s	450 EH/s	475 EH/s	500 EH/s
Bitcoin Price	\$25,000	\$60	\$52	\$45	\$40	\$36	\$33	\$30	\$28	\$26	\$24	\$23	\$21	\$20	\$19	\$18
	\$35,000	84	72	63	56	51	46	42	39	36	34	32	30	28	27	25
	\$45,000	108	93	81	72	65	59	54	50	46	43	41	38	36	34	32
	\$55,000	132	113	99	88	79	72	66	61	57	53	50	47	44	42	40
	\$65,000	156	134	117	104	94	85	78	72	67	63	59	55	52	49	47
	\$75,000	181	155	135	120	108	98	90	83	77	72	68	64	60	57	54
	\$85,000	205	175	153	136	123	112	102	94	88	82	77	72	68	65	61
	\$95,000	229	196	172	152	137	125	114	106	98	91	86	81	76	72	69
	\$105,000	253	217	190	169	152	138	126	117	108	101	95	89	84	80	76
	\$115,000	277	237	208	185	166	151	138	128	119	111	104	98	92	87	83
	\$125,000	301	258	226	201	181	164	150	139	129	120	113	106	100	95	90

Current

2022 YE Est

Figure: Revenue per MWh for S9 class equipment at different Hashrate and BTC Price

Source: BitOoda estimates, CoinMetrics



# S17-Class Revenue / MWh \$120-150 at YE22 at Current BTC Price

- Based on current prices and where we expect the Hashrate to be by year end 2022, S17-class machines would earn \$120-150 per MWh

		Network Hashrate														
		150 EH/s	175 EH/s	200 EH/s	225 EH/s	250 EH/s	275 EH/s	300 EH/s	325 EH/s	350 EH/s	375 EH/s	400 EH/s	425 EH/s	450 EH/s	475 EH/s	500 EH/s
Bitcoin Price	\$25,000	\$149	\$128	\$112	\$99	\$89	\$81	\$74	\$69	\$64	\$60	\$56	\$53	\$50	\$47	\$45
	\$35,000	208	179	156	139	125	114	104	96	89	83	78	74	69	66	63
	\$45,000	268	230	201	179	161	146	134	124	115	107	100	95	89	85	80
	\$55,000	328	281	246	218	197	179	164	151	140	131	123	116	109	103	98
	\$65,000	387	332	290	258	232	211	194	179	166	155	145	137	129	122	116
	\$75,000	447	383	335	298	268	244	223	206	191	179	167	158	149	141	134
	\$85,000	506	434	380	337	304	276	253	234	217	202	190	179	169	160	152
	\$95,000	566	485	424	377	339	309	283	261	242	226	212	200	189	179	170
	\$105,000	625	536	469	417	375	341	313	289	268	250	234	221	208	197	188
	\$115,000	685	587	514	457	411	374	342	316	293	274	257	242	228	216	205
	\$125,000	744	638	558	496	447	406	372	344	319	298	279	263	248	235	223

Current

2022 YE Est

Figure: Revenue per MWh for S17 class equipment at different Hashrate and BTC Price

Source: BitOoda estimates, CoinMetrics



# S19-Class Revenue / MWh \$145-180 at YE22 at Current BTC Price

- Based on current prices and where we expect the Hashrate to be by year end 2022, S19-class machines would earn \$145-180 per MWh

		Network Hashrate														
		150 EH/s	175 EH/s	200 EH/s	225 EH/s	250 EH/s	275 EH/s	300 EH/s	325 EH/s	350 EH/s	375 EH/s	400 EH/s	425 EH/s	450 EH/s	475 EH/s	500 EH/s
Bitcoin Price	\$25,000	\$175	\$150	\$131	\$116	\$105	\$95	\$87	\$81	\$75	\$70	\$66	\$62	\$58	\$55	\$52
	\$35,000	245	210	183	163	147	133	122	113	105	98	92	86	82	77	73
	\$45,000	314	270	236	210	189	172	157	145	135	126	118	111	105	99	94
	\$55,000	384	329	288	256	231	210	192	177	165	154	144	136	128	121	115
	\$65,000	454	389	341	303	273	248	227	210	195	182	170	160	151	143	136
	\$75,000	524	449	393	349	314	286	262	242	225	210	197	185	175	166	157
	\$85,000	594	509	446	396	356	324	297	274	255	238	223	210	198	188	178
	\$95,000	664	569	498	443	398	362	332	306	285	266	249	234	221	210	199
	\$105,000	734	629	550	489	440	400	367	339	314	294	275	259	245	232	220
	\$115,000	804	689	603	536	482	438	402	371	344	321	301	284	268	254	241
	\$125,000	874	749	655	582	524	476	437	403	374	349	328	308	291	276	262

Current

2022 YE Est

Figure: Revenue per MWh for S19 class equipment at different Hashrate and BTC Price

Source: BitOoda estimates, CoinMetrics



# S19XP Revenue / MWh

## \$190-240 at YE22 at Current BTC Price

- Based on current prices and where we expect the Hashrate to be by year end 2022, S19XP machines would earn \$190-240 per MWh

Bitcoin Price	Network Hashrate														
	150 EH/s	175 EH/s	200 EH/s	225 EH/s	250 EH/s	275 EH/s	300 EH/s	325 EH/s	350 EH/s	375 EH/s	400 EH/s	425 EH/s	450 EH/s	475 EH/s	500 EH/s
\$25,000	\$233	\$200	\$175	\$155	\$140	\$127	\$117	\$108	\$100	\$93	\$87	\$82	\$78	\$74	\$70
\$35,000	326	280	245	218	196	178	163	151	140	131	122	115	109	103	98
\$45,000	420	360	315	280	252	229	210	194	180	168	157	148	140	133	126
\$55,000	513	440	385	342	308	280	256	237	220	205	192	181	171	162	154
\$65,000	606	520	455	404	364	331	303	280	260	242	227	214	202	191	182
\$75,000	699	600	525	466	420	382	350	323	300	280	262	247	233	221	210
\$85,000	793	679	595	528	476	432	396	366	340	317	297	280	264	250	238
\$95,000	886	759	664	591	532	483	443	409	380	354	332	313	295	280	266
\$105,000	979	839	734	653	588	534	490	452	420	392	367	346	326	309	294
\$115,000	1,072	919	804	715	643	585	536	495	460	429	402	379	357	339	322
\$125,000	1,166	999	874	777	699	636	583	538	500	466	437	411	389	368	350

Current

2022 YE Est

Figure: Revenue per MWh for S19XP equipment at different Hashrate and BTC Price

Source: BitOoda estimates, CoinMetrics



# Disclosures

## Purpose

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Sam Doctor, the research analyst denoted by an “AC” on the cover of this report, hereby certifies that all of the views expressed in this report accurately reflect his personal views, which have not been influenced by considerations of the firm’s business or client relationships.

## Conflicts of Interest

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