

GLOBAL BITCOIN MINING DATA REVIEW

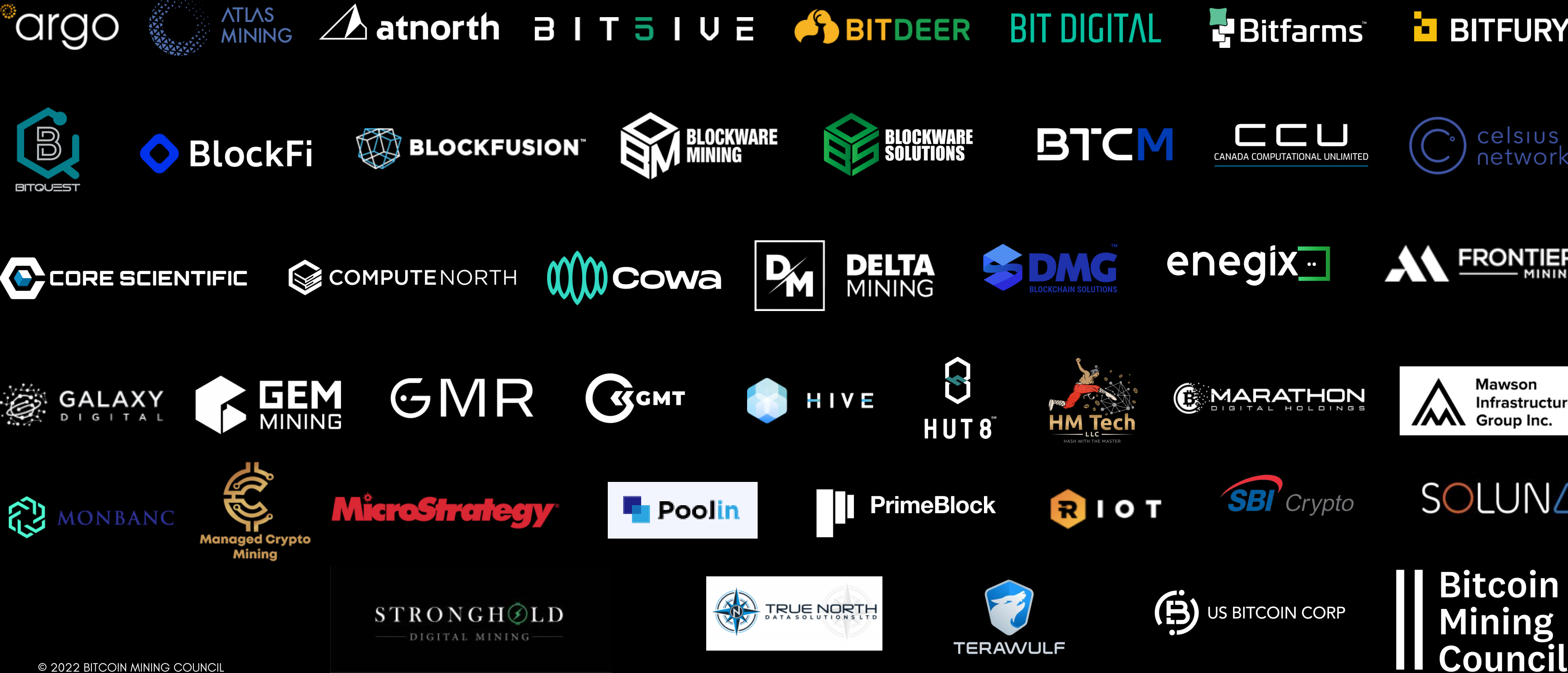
Q1 2022

MARCH 2022

44 MINING COMPANIES REPRESENTING **50%** OF THE GLOBAL NETWORK

BITCOIN MINING COUNCIL

44 MINING COMPANIES FROM 5 CONTINENTS REPRESENTING 50% OF THE GLOBAL NETWORK



EXECUTIVE SUMMARY

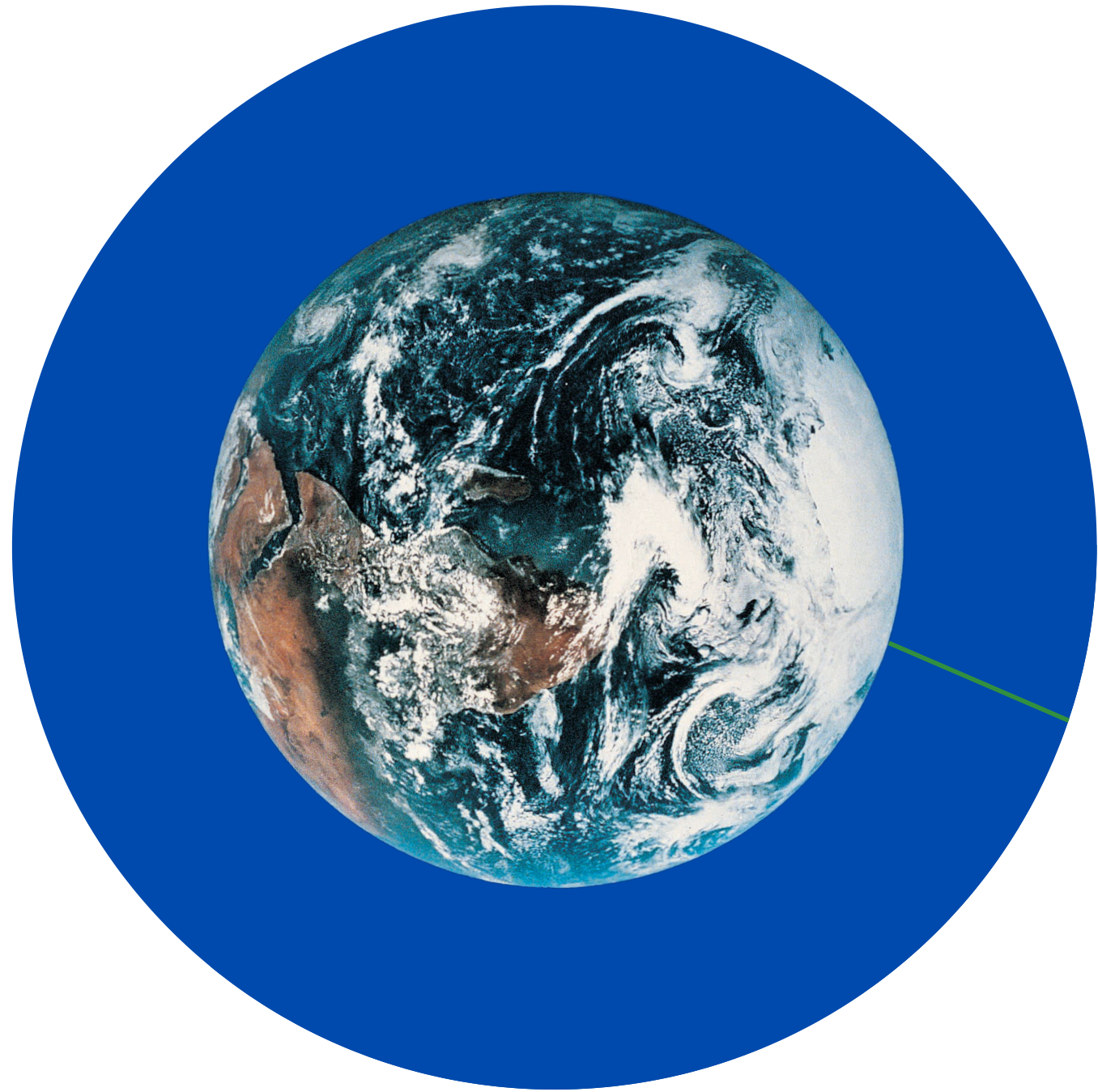
Bitcoin mining, in Q1 2022:

- 1** Uses an inconsequential amount of global energy (**16bps**) and generates negligible carbon emissions (**8bps**).
- 2** Bitcoin mining hashrate is up **23%** YoY, and energy usage is down **25%** YoY, due to an increase in efficiency of **63%**.
- 3** Bitcoin is the industry leader in sustainability with a **58%** sustainable energy mix.

PRESENTATION OVERVIEW

- 1 Bitcoin Mining Energy Use vs Global Energy Use
- 2 Bitcoin Mining Carbon Generation vs Global Carbon Generation
- 3 Global Bitcoin Mining Energy Use Is Negligible
- 4 Global Bitcoin Mining Has The Highest Sustainable Energy Mix
- 5 Global Bitcoin Mining vs Other Industries
- 6 Q1-22, Mining Efficiency Increased **6%** and Sustainable Electricity Was Stable
- 7 YoY, Mining Efficiency Increased **63%** and Sustainable Electricity Mix Increased **59%**
- 8 Bitcoin Mining Is Technology Intensive, **58x+** In Efficiency In 8 Years
- 9 **Conclusion:** Bitcoin Mining Energy Efficiency Is Improving, Rapidly
- 10 Sources And Methodology

BITCOIN MINING ENERGY USE VS TOTAL GLOBAL ENERGY USE



154,750 TWhⁱ
TOTAL ENERGY GENERATED WORLDWIDE

247 TWhⁱⁱ
**ENERGY CONSUMED BY BITCOIN MINING
ON THE WORLD'S ELECTRIC GRID**

**GLOBAL BITCOIN
MINING CONSUMES
0.16%**
OF THE WORLD'S ENERGY PRODUCTION

BITCOIN MINING CARBON EMISSIONS VS TOTAL GLOBAL CARBON EMISSIONS



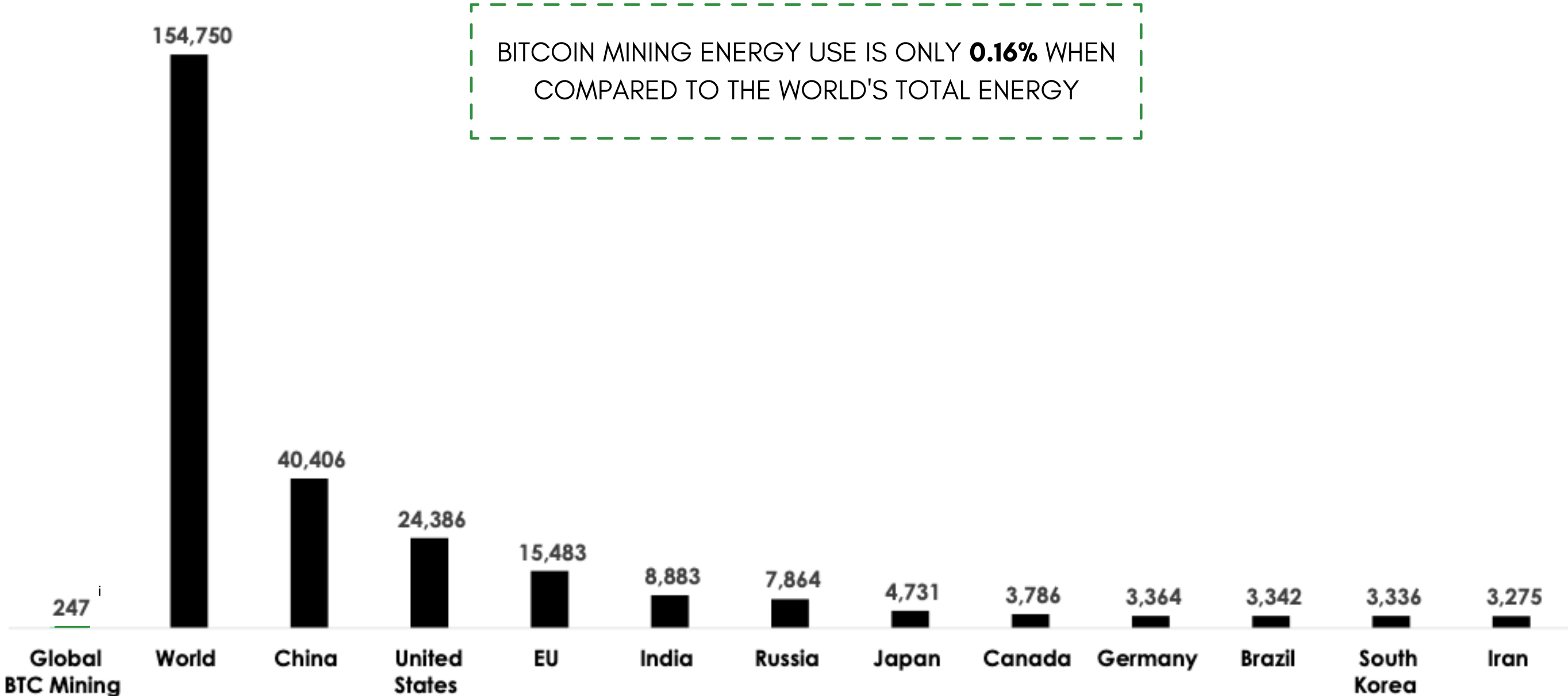
34.8 BMtⁱ
TOTAL ESTIMATED CO² GENERATED
GLOBALLY

0.03 BMtⁱⁱ
ESTIMATED CO² GENERATED BY BITCOIN
MINING ON THE WORLD'S ELECTRIC GRID

**GLOBAL BITCOIN
MINING CONSUMES
0.085%**
OF THE WORLD'S CO² PRODUCTION

GLOBAL BITCOIN MINING ENERGY USE IS NEGLIGIBLE

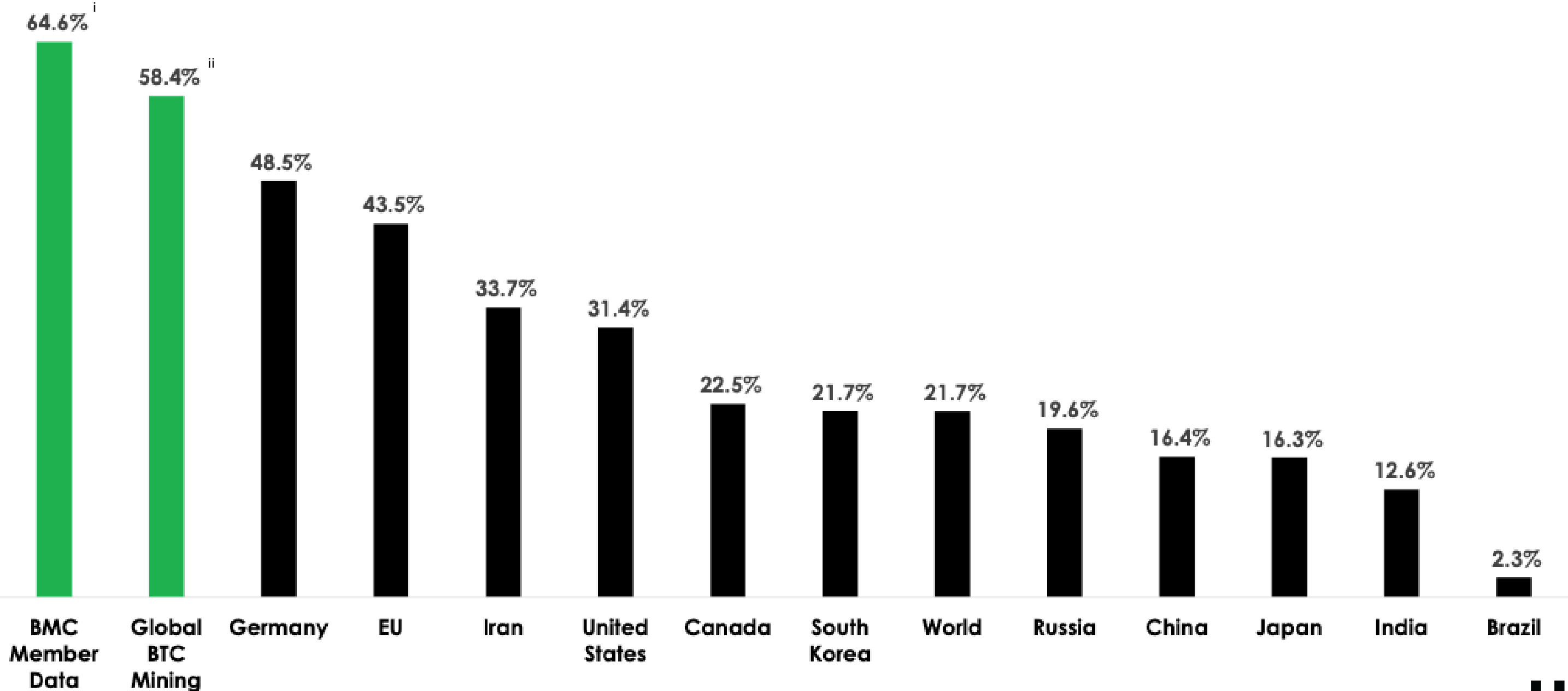
BITCOIN MINING VS COUNTRIES (TWh)ⁱⁱ



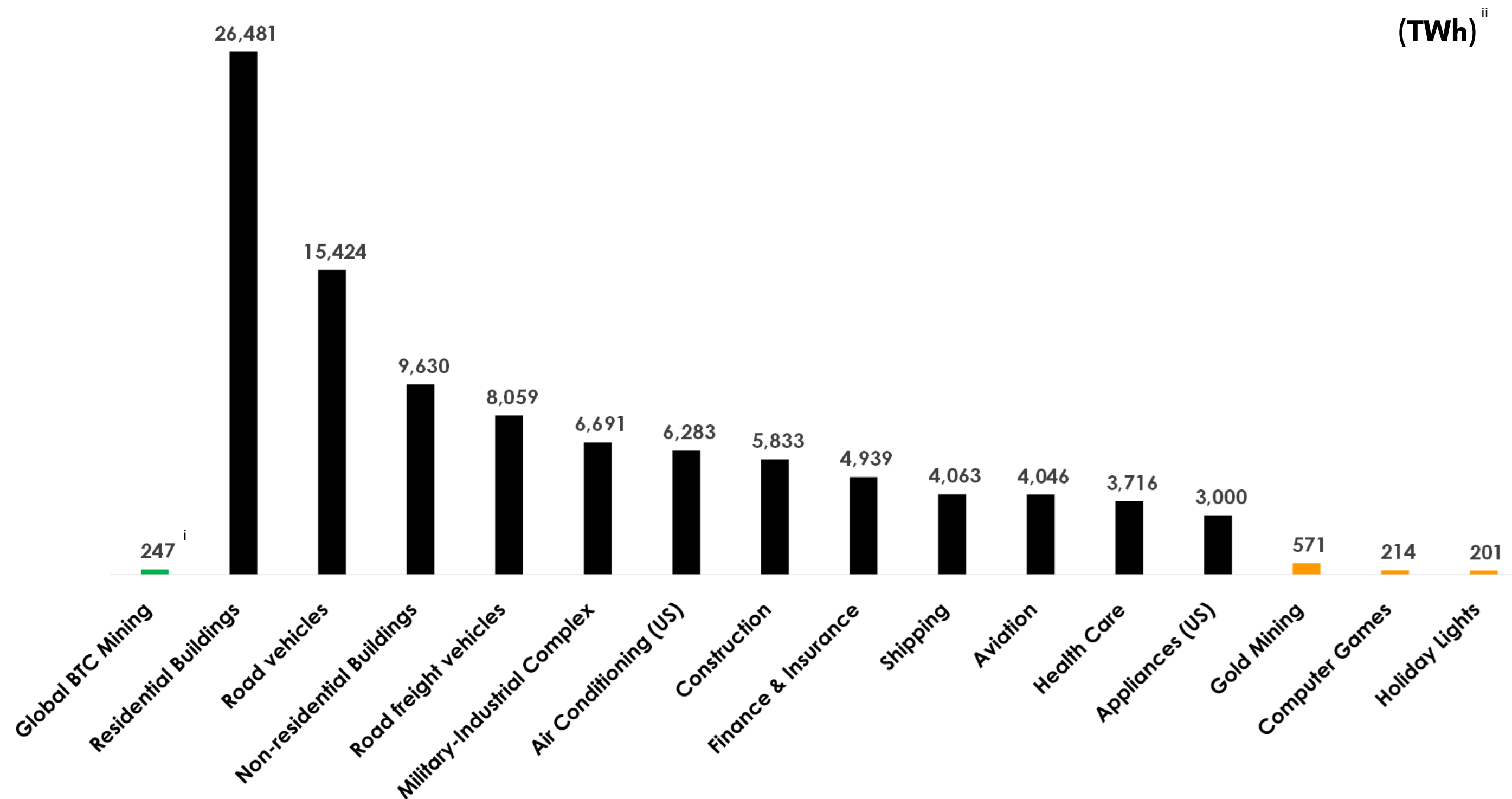
BITCOIN MINING ENERGY USE IS ONLY **0.16%** WHEN COMPARED TO THE WORLD'S TOTAL ENERGY

GLOBAL BITCOIN MINING HAS THE HIGHEST SUSTAINABLE ENERGY MIX

SUSTAINABLE POWER MIX: BITCOIN MINING VS COUNTRIES (% OF TWh)ⁱⁱⁱ

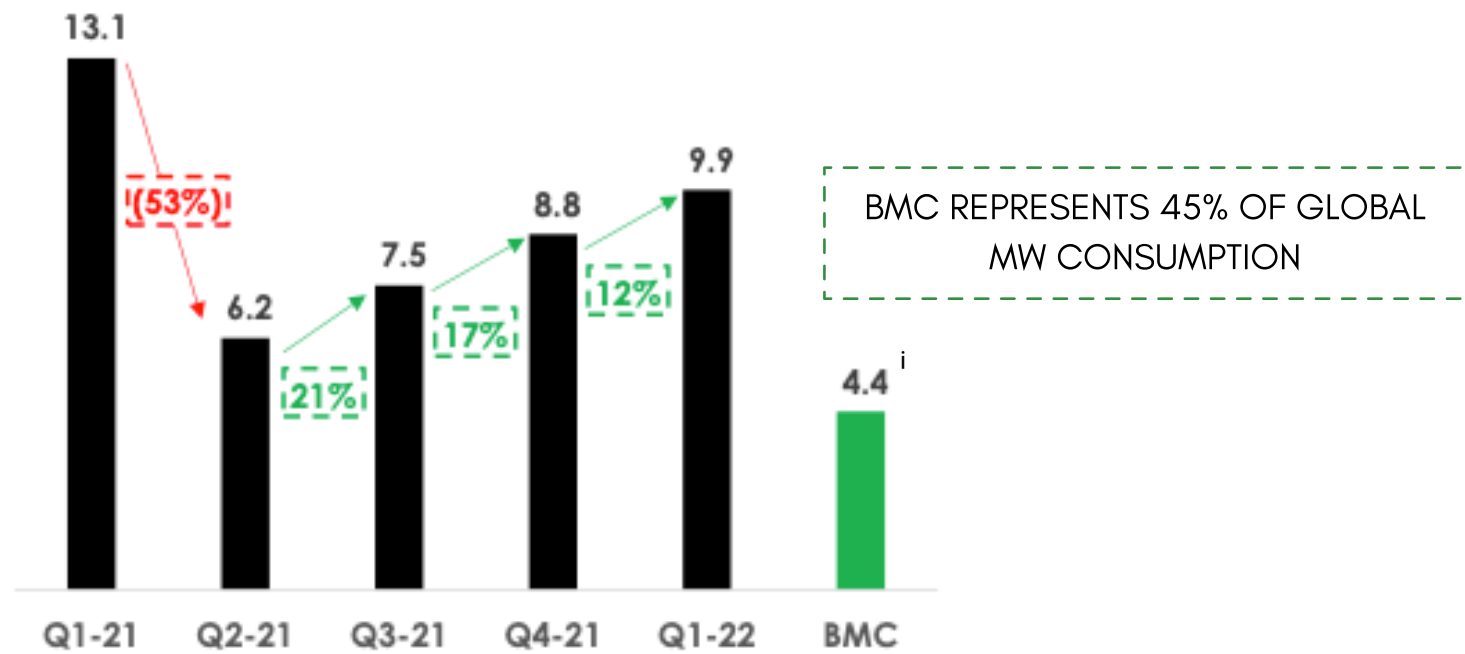


GLOBAL BITCOIN MINING VS OTHER INDUSTRIES

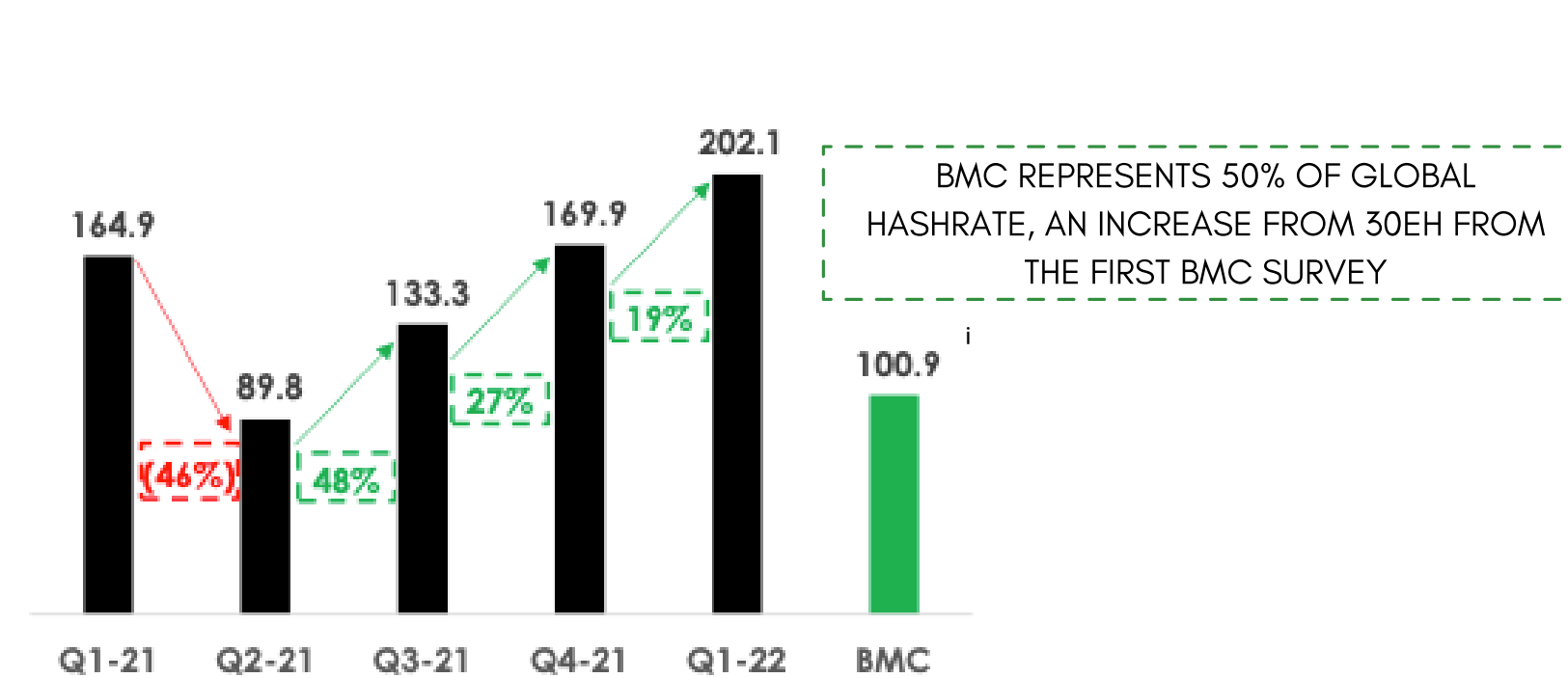


Q1-22, MINING EFFICIENCY INCREASED 6% AND SUSTAINABLE ELECTRICITY MIX REMAINED AT 58%

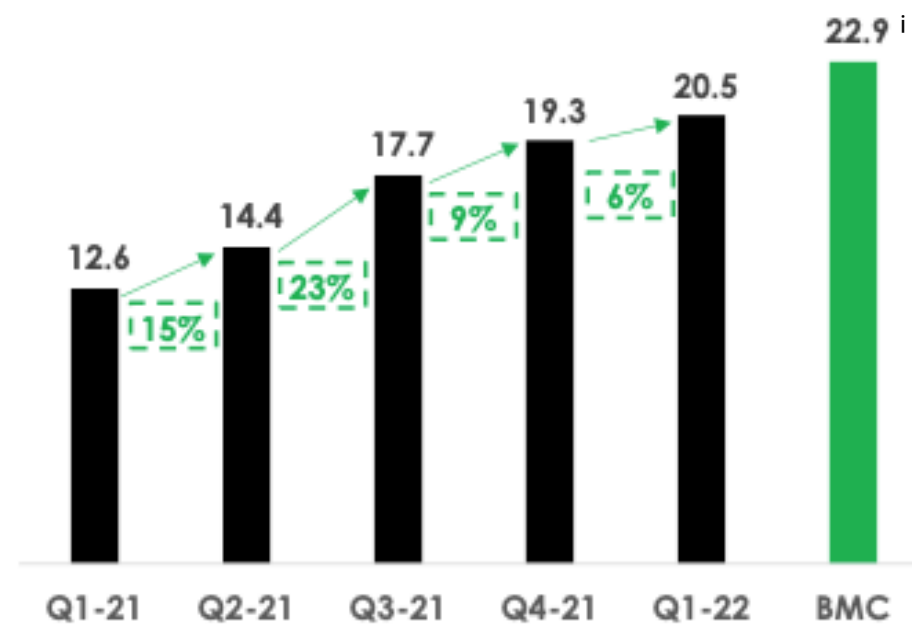
FLEET ELECTRICITY CONSUMPTION (GW)ⁱⁱ



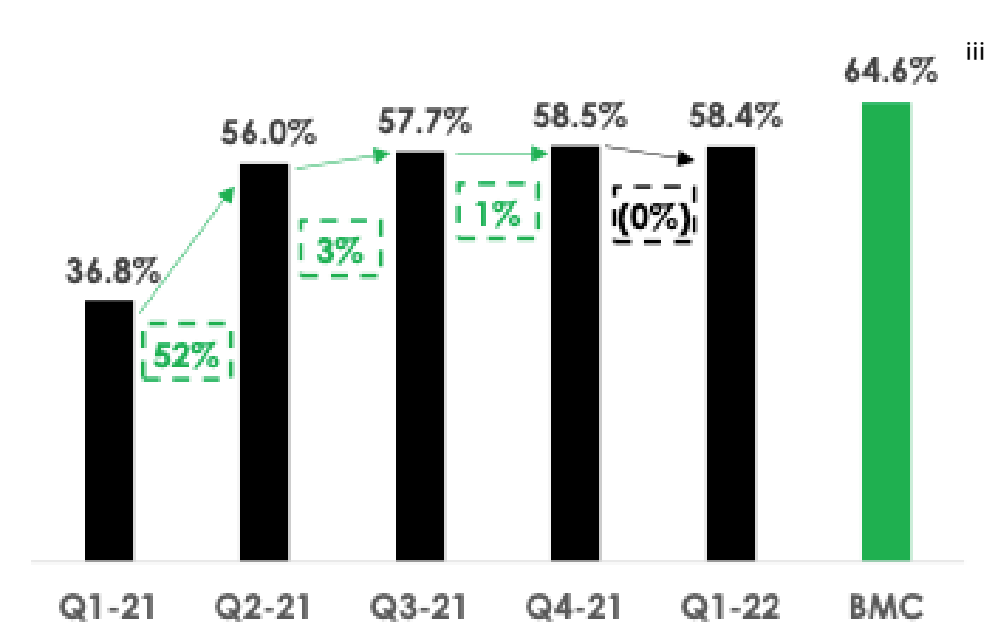
HASHRATE (EH)ⁱⁱ



MINING EFFICIENCY (EH/GW)ⁱⁱ

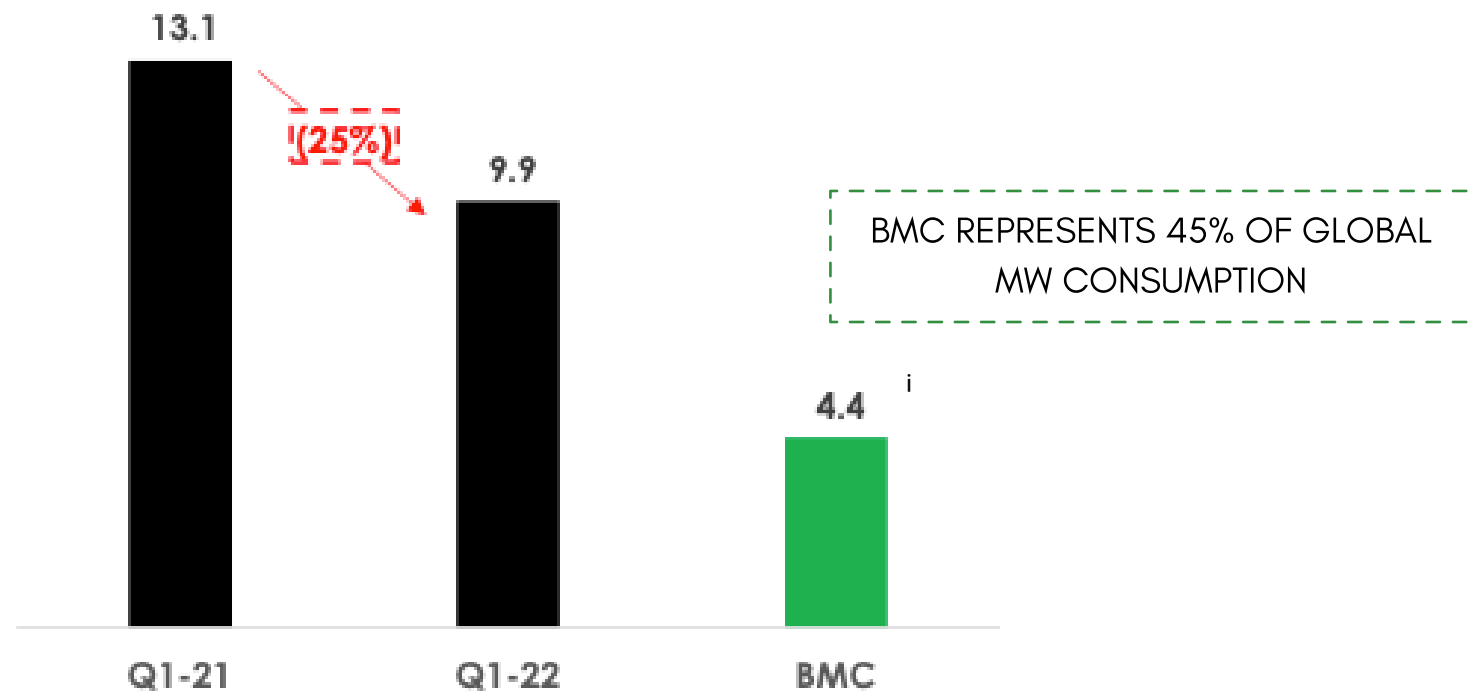


SUSTAINABLE ELECTRICITY (%)ⁱⁱ

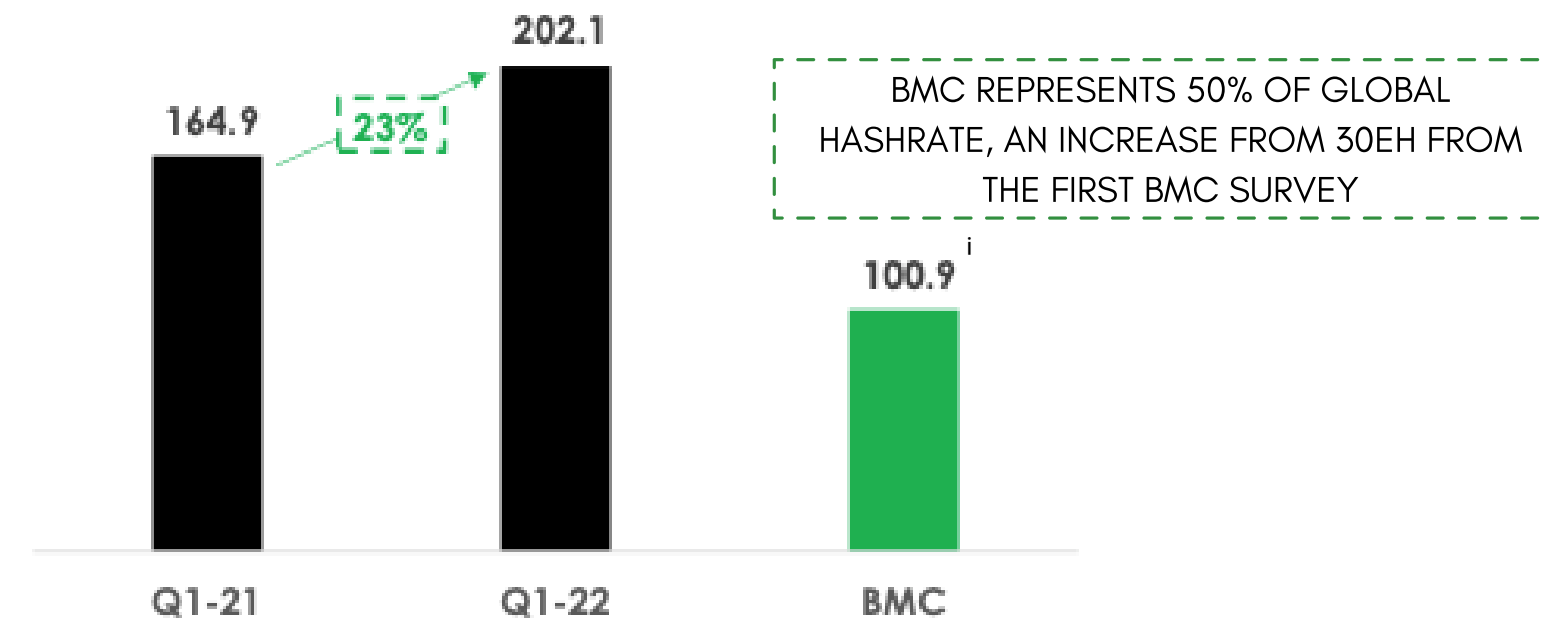


YoY, MINING EFFICIENCY INCREASED 63% AND SUSTAINABLE ELECTRICITY MIX INCREASED 59%

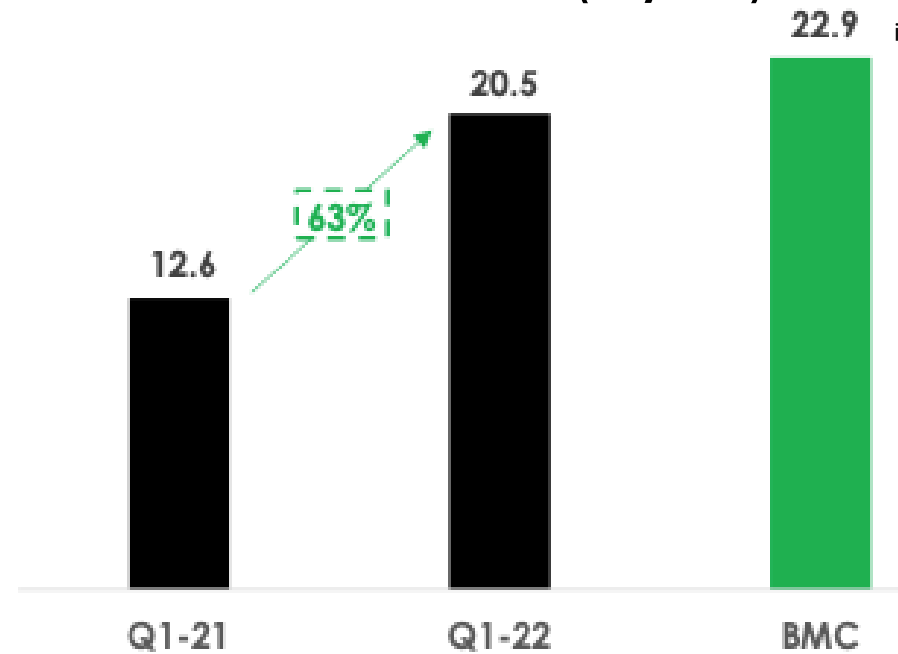
FLEET ELECTRICITY CONSUMPTION (GW)ⁱⁱ



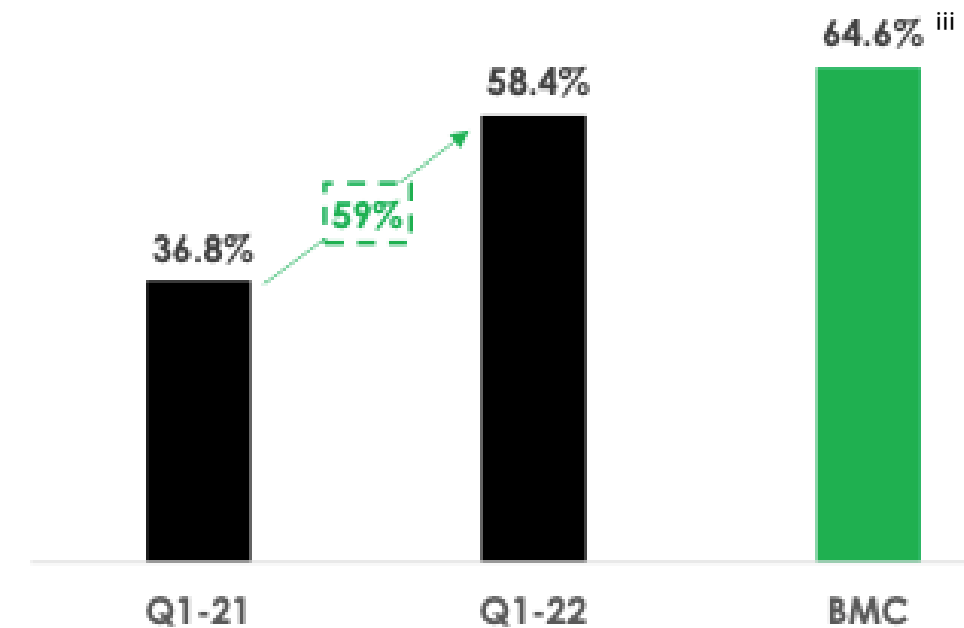
HASHRATE (EH)ⁱⁱ



MINING EFFICIENCY (EH/GW)ⁱⁱ



SUSTAINABLE ELECTRICITY (%)ⁱⁱ

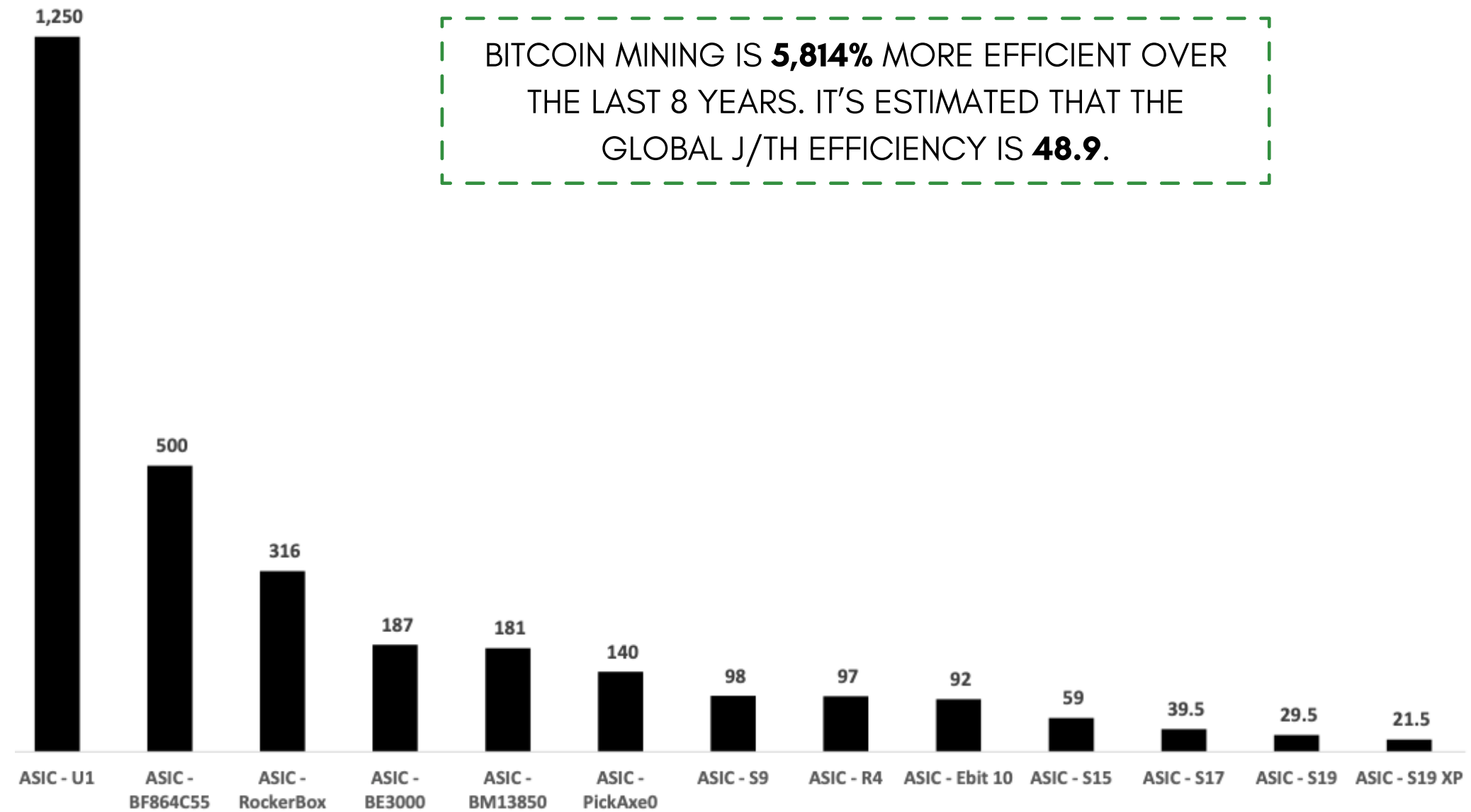


BITCOIN MINING IS TECHNOLOGY INTENSIVE, INCREASING 58X IN EFFICIENCY OVER 8 YEARS

Combined	Hardware name	Date	J/Th
CPU	ARM Cortex A9	3-Jan-09	877,193
GPU	ATI 5870M	23-Sep-09	264,550
FPGA	X6500 FPGA Miner	29-Aug-11	43,000
ASIC - Avalon B1	Canaan AvalonMiner Batch 1	1-Jan-13	9,351
ASIC - Jupiter	KnCMiner Jupiter	5-Oct-13	1,484
ASIC - U1	Antminer U1	1-Dec-13	1,250
ASIC - BF864C55	Bitfury BF864C55	3-Mar-14	500
ASIC - RockerBox	RockerBox	22-Jul-14	316
ASIC - BE3000	ASICMiner BE3000	16-Sep-14	187
ASIC - BM13850	BM1385	19-Aug-15	181
ASIC - PickAxe0	PickAxe	23-Sep-15	140
ASIC - S9	Antminer S9 - 11.5TH	1-Jun-16	98
ASIC - R4	Antminer R4	1-Feb-17	97
ASIC - Ebit 10	Ebang Ebit 10	15-Feb-18	92
ASIC - S15	Antminer S15	9-Apr-18	59
ASIC - S17	Antminer S17	9-Apr-19	39.5
ASIC - S19	Antminer S19 Pro	23-Mar-20	29.5
ASIC - S19 XP	Antminer S19 Pro	12-Nov-21	21.5



J/TH - EFFICIENCY OVER TIME ¹



BITCOIN MINING IS **5,814%** MORE EFFICIENT OVER THE LAST 8 YEARS. IT'S ESTIMATED THAT THE GLOBAL J/TH EFFICIENCY IS **48.9**.

CONCLUSION: BITCOIN MINING ENERGY EFFICIENCY IS IMPROVING, RAPIDLY



The Bitcoin Mining Council is estimating a 3x and 2x improvement in mining efficiency over the next four and following four years, respectively

6x



Satoshi's protocol reduces energy consumption incentives by 2x every 4 years, for the foreseeable future

4x



Bitcoin mining is guaranteed to be **dramatically more energy efficient** in the next 8 years.

SOURCES & METHODOLOGY

BMC SURVEY METHODOLOGY:

THE BMC SURVEYED BITCOIN MINERS AROUND THE WORLD ASKING THREE QUESTIONS;

- 1.) HOW MUCH ELECTRICITY DOES YOUR TOTAL FLEET CONSUME TODAY?;
- 2.) WHAT IS THE TOTAL % OF SUSTAINABLE ELECTRICITY* WITHIN YOUR FLEET'S POWER GENERATION MIX TODAY?;
- 3.) WHAT IS THE TOTAL AGGREGATE HASHRATE OF YOUR FLEET TODAY?

*THE ANNOTATED TERM "SUSTAINABLE ELECTRICITY" WAS DEFINED AS ELECTRICITY GENERATED BY: HYDRO, WIND, SOLAR, NUCLEAR, GEOTHERMAL. THE Q1 2022 BMC SUSTAINABILITY ELECTRICITY VALUE NO LONGER TAKES INTO ACCOUNT RENEWABLE ENERGY CREDITS (REC).

SOURCES:

- ⁱ BP STATISTICAL REVIEW OF WORLD ENERGY (2021), [HTTPS://WWW.BP.COM/EN/GLOBAL/CORPORATE/ENERGY-ECONOMICS/STATISTICAL-REVIEW-OF-WORLD-ENERGY.HTML](https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html).ⁱⁱ BMC ESTIMATED BITCOIN MINING ENERGY USE (MAR 31, 2022).
- ⁱ CO2 EMISSIONS ARE ESTIMATED BY EXTRAPOLATING U.S. CARBON EMISSIONS GENERATED BY ELECTRICAL GENERATION. [HTTPS://WWW.EIA.GOV/TOOLS/FAQS/FAQ.PHP?ID=74&T=11](https://www.eia.gov/tools/faqs/faq.php?id=74&t=11) ⁱⁱ BITCOIN MINING ESTIMATE IS DERIVED FROM THE Q1 2022 BMC ESTIMATED TWH ELECTRICITY CONSUMED GLOBALLY.
- ⁱ BMC ESTIMATED BITCOIN MINING ENERGY USE (MAR 31, 2022). ANNUALIZED VALUES ARE USED FOR BITCOIN MINING ENERGY & ELECTRICITY USE.ⁱⁱ BP'S STATISTICAL REVIEW OF WORLD ENERGY (2021). [HTTPS://WWW.BP.COM/EN/GLOBAL/CORPORATE/ENERGY-ECONOMICS/STATISTICAL-REVIEW-OF-WORLD-ENERGY.HTML](https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html) .
- ⁱ VALUE REPRESENTS DATA COMPILED FROM BMC ADVISORY COUNCIL MINERS. ANNUALIZED PRIMARY ENERGY USE.ⁱⁱ ESTIMATED GLOBAL BITCOIN NETWORK ANNUALIZED POWER BASED ON BMC ANALYSIS, ASSUMPTIONS AND EXTRAPOLATION. (MAR 31, 2022) ⁱⁱⁱ COUNTRY DATA COMPILED FROM BP'S STATISTICAL REVIEW OF WORLD ENERGY (2021). [HTTPS://WWW.BP.COM/EN/GLOBAL/CORPORATE/ENERGY-ECONOMICS/STATISTICAL-REVIEW-OF-WORLD-ENERGY.HTML](https://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy.html) .
- ⁱ BMC ESTIMATED BITCOIN MINING ENERGY USE (MAR 31, 2022). ANNUALIZED VALUES ARE USED FOR BITCOIN MINING ENERGY & ELECTRICITY USE.ⁱⁱ ESTIMATED INDUSTRY ENERGY USE BASED ON SEVERAL SOURCES: [HTTPS://WWW.EIA.GOV/OUTLOOKS/IEO/PDF/TRANSPORTATION.PDF](https://www.eia.gov/outlooks/ieo/pdf/transportation.pdf) / [HTTPS://ACADEMIC.OUP.COM/EURPUB/ARTICLE-ABSTRACT/30/SUPPLEMENT_5/CKAA165.843/5914601](https://academic.oup.com/eurpub/article-abstract/30/supplement_5/ckaa165.843/5914601) / [HTTPS://HASSMCCOOK.MEDIUM.COM/COMPARING-BITCOINS-ENVIRONMENTAL-IMPACT-F56B18014F64](https://hassmccook.medium.com/comparing-bitcoins-environmental-impact-f56b18014f64)[HTTPS://BITCOINMAGAZINE.COM/BUSINESS/INTRODUCING-CBEI-A-NEW-WAY-TO-MEASURE-BITCOIN-NETWORK-ELECTRICAL-CONSUMPTION](https://bitcoinmagazine.com/business/introducing-cbei-a-new-way-to-measure-bitcoin-network-electrical-consumption).
- ⁱ DATA COMPILED FROM BMC ADVISORY COUNCIL MEMBERS. ANNUALIZED VALUES ARE USED FOR BITCOIN MINING ENERGY AND ELECTRICITY USE.ⁱⁱ ESTIMATED GLOBAL BITCOIN NETWORK ANNUALIZED POWER BASED ON BMC ANALYSIS, ASSUMPTIONS AND EXTRAPOLATION.ⁱⁱⁱ AS OF Q4-21, BMC SUSTAINABILITY ELECTRICITY VALUE NO LONGER TAKES INTO ACCOUNT RENEWABLE ENERGY CREDITS (REC).
- ⁱ HARDWARE DATA COMPILED FROM RESPECTIVE HARDWARE MANUFACTURER WEBSITES. OLDER GENERATION MODEL EFFICIENCY DATA FROM "THE COST OF BITCOIN MINING HAS NEVER REALLY INCREASED" (2020) [HTTPS://ARXIV.ORG/PDF/2004.04605.PDF](https://arxiv.org/pdf/2004.04605.pdf).



THANK YOU