

## Weekly Briefing

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### Cryptocurrency Energy Consumption

- Major cryptocurrencies like Bitcoin and Ethereum are reportedly energy intensive technologies.
- While worrisome on the face of it, the laws of supply and demand will likely prevail to temper the alarmist predictions.

Whether old or new, money provides three essential functions: store of value, medium of exchange, and unit of account. Cryptocurrencies (CC) are electronic money fulfilling some of these functions and by several accounts, require much more energy to produce than monetary units like cash, deposits, and credit card transactions. CC's function as a medium of exchange for goods and services is indeed nascent. The payments system is outside the purview of regulatory authorities such as the Federal Reserve and the Comptroller of the Currency. It may be important to observe that buying and selling CCs without an outlet for broader product market transactions can lead to boom-bust cycles. A good explanation of how units like bitcoin are created is [here](#).

How do CCs lead to energy consumption and how much?

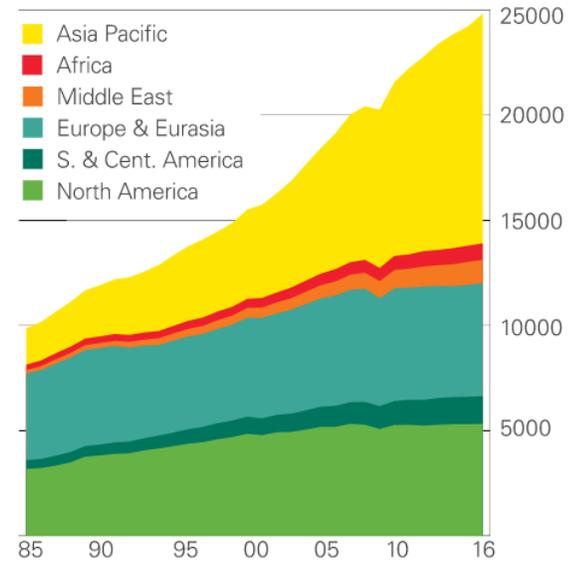
- Miners are individuals or teams who use computing power and specialized software to produce bitcoin. Each new bitcoin requires the creation of a new blockchain which is validated by miners. The miner is paid in bitcoin for this validation.
- This computing power used by miners is reportedly so extensive that it currently uses an estimated 17 million kWh in one day.
- The current rate of electricity consumption by bitcoin miners, however, is estimated to be 0.08% of total global electricity consumption. As of 2016, global electricity generation reached nearly 25,000 terawatt-hours (see top chart).

### The Laws of Supply, Demand, and Policy

The long-term performance of cryptocurrencies is highly uncertain and presently unregulated and opaque. On the supply side, if it were likely that bitcoin pricing rose inexorably, possibly due to speculation, so too would its electricity consumption. In turn, the cost of electricity, an input to the production of bitcoin, would begin to limit the production rate. In other words, the input costs could become too prohibitive and disincentivize miners' output.

On the demand side, the use of bitcoin for transactions would need to become more "money like" over time, i.e., become an acceptable medium of exchange, unit of account, and store of value. Finally, there is much uncertainty about the progress of regulation and policy regarding bitcoin. Last week's announcement by Chinese authorities to restrict bitcoin trading is perhaps a signal of more policy to come. With a substantial amount of bitcoin mining reportedly done in China, along with its coal-fired utilities, such a policy shift may matter for overall electricity consumption and GHG emissions.

Electricity generation (terawatt-hours)



Source: BP Statistical Review of World Energy 2017  
<http://www.bp.com/en/global/corporate/energy-economics/statistical-review-of-world-energy/electricity.html>

### Bitcoin Electricity Consumption Statistics

Current annual electricity consumption	17.16 TWH
Annual global bitcoin mining revenue	\$ 2.880 Bils
Annual global mining costs	\$ 0.858 Bils
Country closest to Bitcoin in terms of annual electricity consumption	Iceland
Electricity consumption per transaction	186 KWH
Number of U.S households powered for one day by electricity consumed for a single transaction	6.27

Source: <https://digiconomist.net/bitcoin-energy-consumption>

### Bitcoin Electricity Consumption Index (BECI)

There are many estimates of bitcoin and other cryptocurrency energy use. The BECI was produced by Digiconomist and can be found [here](#). The table above shows some key statistics for bitcoin electricity consumption from the BECI analysis. This is not an aggregate measure for all cryptocurrencies. Caution: As an economist, I would note that these calculations are very difficult to estimate and subject to substantial volatility.