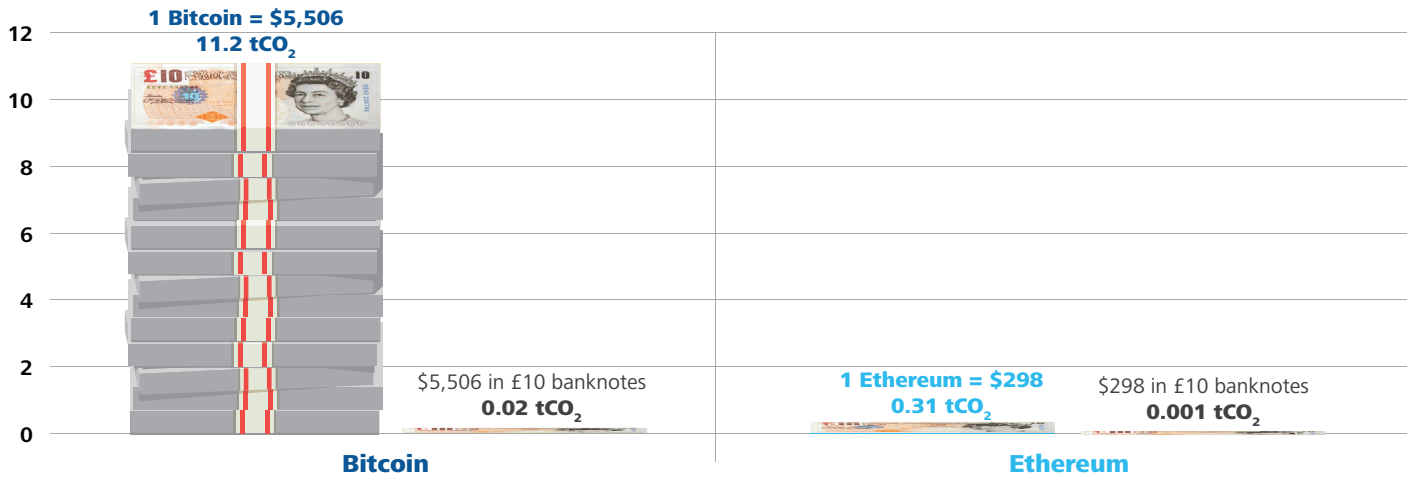
south pole

# THE CLEANCOIN PROJECT

In the CleanCoin project, South Pole examined the climate impacts of cryptocurrencies and developed a live emissions calculator of the Bitcoin and Ethereum blockchain networks. We did this to raise awareness and provide opportunities for wallet holders to take action, and to further define the key attributes of a sustainable digital currency.

## $Co_2$ emissions of one Bitcoin and Ethereum versus an equivalent value in banknotes

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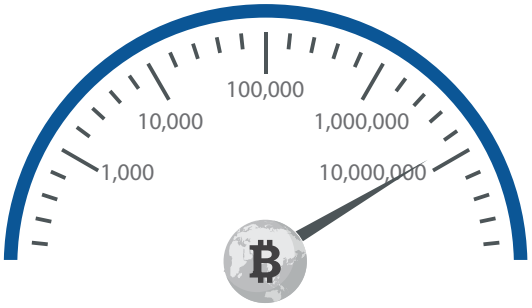
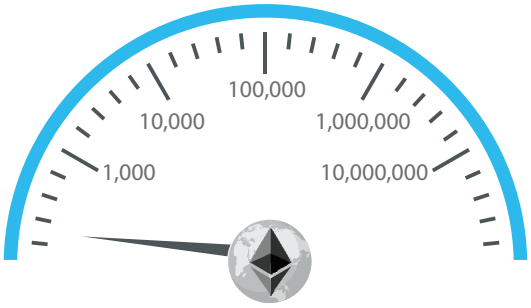
## Bitcoin vs. Ethereum hashrate




**9,935,312 Th/s**




**115 Th/s**

## The challenge

The 'Proof of Work' system that both Bitcoin and Ethereum are currently based on means their energy use and thus greenhouse gas emissions are higher than other forms of currency.

Each time currency is bought or sold it is transferred in a network. This is called a transaction. With more transactions per block, Ethereum has a lower carbon footprint per transaction than the Bitcoin blockchain. However, no cryptocurrency can yet handle as many transactions per second as the Visa network does. Ethereum aspires to this level but needs to become more than 30,000 times more efficient to do so. Bitcoin is further behind - 180,000 times less efficient than Visa.

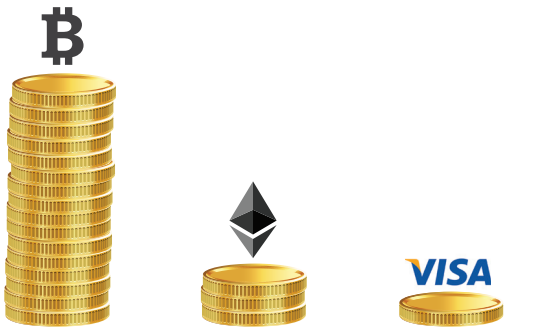
These cryptocurrencies' current carbon footprints are significant. With over 7.7 million tonnes of $CO_2$ Bitcoin's footprint is roughly equivalent to the total carbon emissions of Costa Rica for one year. While Ethereum's is almost 60% lower at around 3.1 million tonnes of $CO_2$, it is still roughly equivalent to the total carbon emissions of Namibia over the same time period.

## The solution

If cryptocurrency and other Blockchain technology developers and users become aware of the problem, changes can be made:

- Proof of Stake could be a much more energy efficient alternative to the Proof of Work system now used to verify and validate a transaction or block.
- Green labels can be developed for cryptocurrency miners and Blockchain technologies that are driven by renewables or use more energy efficient systems.
- Carbon offsetting options for cryptocurrencies can be developed – the cost of offsetting would be much lower than the value of the coins.
- More efficient hardware is available. If Ethereum mining hardware were as energy efficient as the specialised hardware used for Bitcoin mining, its overall emissions per coin and per transaction would be even lower when compared to Bitcoin.

## $CO_2$ emissions per transaction




**0.06 $tCO_2$** **0.01 $tCO_2$** **0.00000033 $tCO_2$**

## Hardware efficiency


**Disclaimer:** The findings in this factsheet are from analysis of data collected on October 24th, 2017. They will not therefore match the current numbers for greenhouse gas emissions for Bitcoin and Ethereum displayed on the live greenhouse gas calculator at: www.cleancoins.io