

## “Coalchain” – A Love Supreme?

Two of the most rapidly growing themes in today's global economy are related to electrification of the transportation sector and the application of blockchain technologies. While both have tremendous benefits on which much has been written, it has become very interesting to consider how these two trends might intersect in a world that is combating climate change.

Obviously, the transportation sector is energy intensive – the U.S. Energy Information Administration (EIA) estimates that 29% of total U.S. energy consumption involves transporting people and goods from one place to another<sup>1</sup>. As society attempts to reduce emissions, much of this energy is likely to be transferred from liquid carbon based fuels to chemical (battery) storage of electrons from the power grid. Bloomberg New Energy Finance estimates that by 2040, 54% of new car sales and 33% of the global car fleet will be electric, displacing up to 8 million barrels of transportation fuel per day. However those electric vehicles will also require 1800 terawatts in 2040, up from 6 terawatts currently<sup>2</sup>.

At the same time, we now have some preliminary indications for the power use of the most popular cryptocurrency, Bitcoin, and they are rather disconcerting. The tremendous growth of Bitcoin has created exponential demand for computing power, as Bitcoin mining becomes more difficult and energy intensive. Today, it is estimated that each Bitcoin transaction requires the same amount of energy used to power eight U.S. households for a day<sup>3</sup>. To put in perspective, it should be noted that value is being exchanged electronically, displacing value that was stored physically (paper or gold), so Bitcoin's energy usage should not be viewed as a complete net addition in energy use. Instead, similar to the move in the transportation sector to electric vehicles, the current system based on oil and gas will be displaced by a transfer to some combination of grid power. Currently, Bitcoin's estimated annual electricity consumption is 33 terawatts<sup>4</sup> and increasing at an exponential rate.

If we add the two together, it seems worth asking the question as to how both transformations can occur without eroding progress being made towards CO2 reduction. Clearly the increasing grid demand will negate most efforts towards building energy efficiency and will require new generation capacity. Without cheap battery storage (still several years away) base load power will likely be supplied from a combination of gas and coal and perhaps some nuclear and hydro, with intermittent supply added from renewable energy sources such as solar and wind power. It's notable that the world's largest bitcoin mines are in China, not the U.S., straining the local energy infrastructure and providing demand for cheap electricity sources such as coal.

As is often the case, the intersection of these societal trends are perhaps more interesting than any in isolation, and monitoring the increasing energy burden of Bitcoin will be important as the world wrestles with reducing global carbon emissions.

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<sup>1</sup> U.S. EIA, Monthly Energy Review, April 2017

<sup>2</sup> BNEF Electric Vehicle Outlook 2017, July 2017

<sup>3</sup> Digiconomist, as of December 2017

<sup>4</sup> Digiconomist, as of December 2017

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