



**NY Power
Authority**

Cryptocurrency

Implications on Renewable Resources

June 5, 2018

What is Cryptocurrency / Bitcoin Mining

- It is a digital asset
- Works as a medium of exchange
- Uses cryptography to secure transactions and control the creation of additional units of the currency
- It is a digital form of payment for goods and services
- It metabolizes energy into money, or ultimately an exchange of electricity for coins, mediated by a whole lot of computing power



Cryptocurrency

Energy Requirements
Comparisons
Economic Development

How Much Energy is Required

Annual estimated electricity consumption is estimated at 68.61 TWhs (*Digiconomist*)

- nearly half of what New York State consumed in 2016 (160 TWh),
- three times what Ireland consumed in 2014 (24 TWhs)

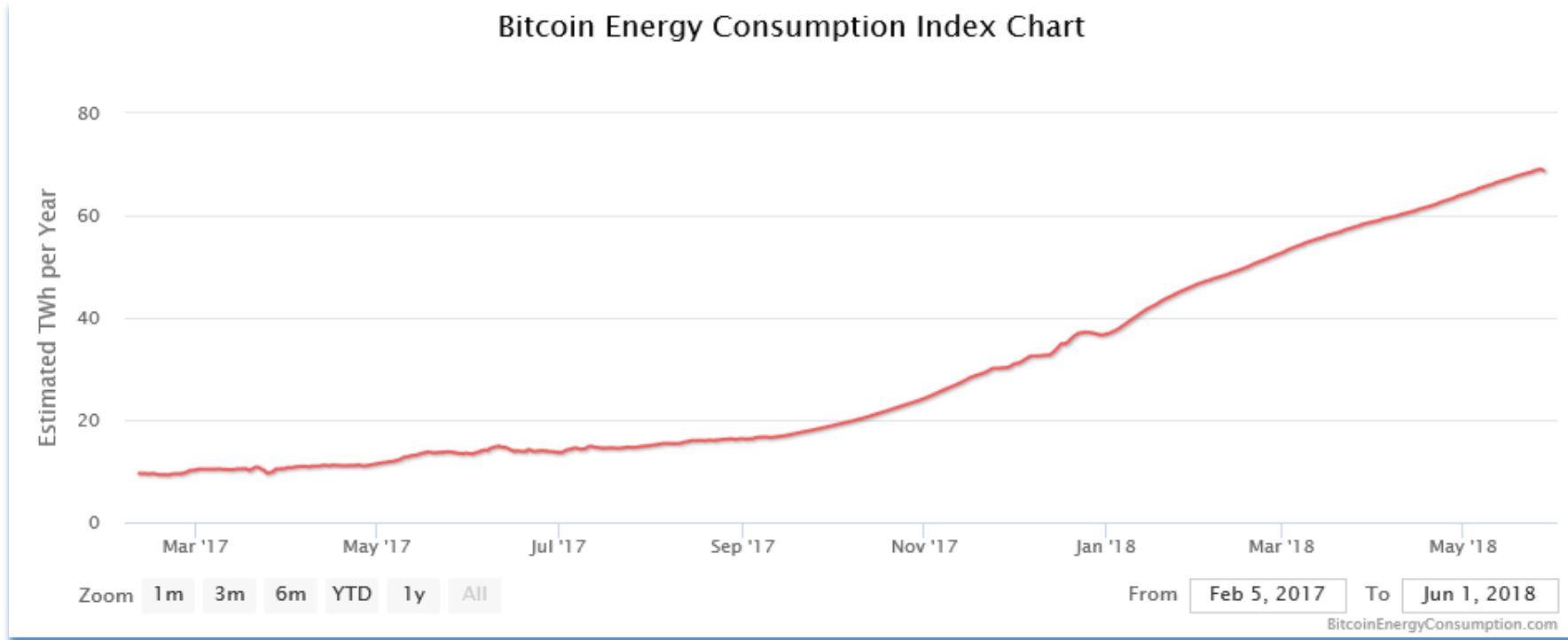
Electricity consumed per transaction 26 KWh, approximately 200-300 thousand transactions/day (*blockchain.info*)

- average power needed to power a US household for one day ~29 KWh

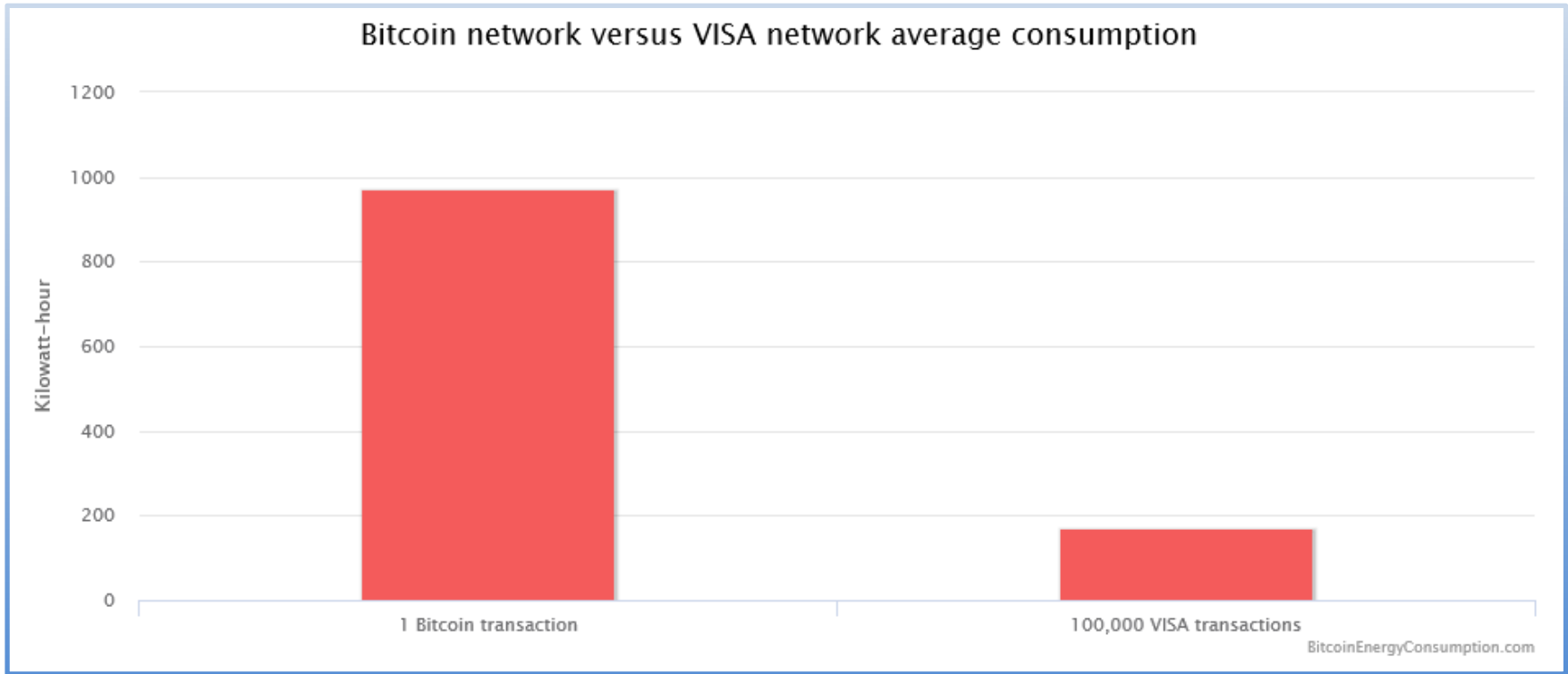


Worldwide Energy Consumption

Bitcoin Energy Consumption Index Chart



Compared to other Payment Systems



Cryptocurrency & Datacenter Operations

Cryptocurrency & Datacenters – are they the same?

Datacenter

- facility that centralizes an organization's IT operations and equipment, stores, manages, and disseminates its data
- houses a network's most critical systems vital to the continuity of daily operations

Cryptocurrency mining

- process in which transactions for various forms of **cryptocurrency** are verified and added to the blockchain digital ledger



Cryptocurrency & Economic Development

What are the average jobs, capital investments commitments and power requests of Datacenters compared to Cryptocurrency Operations?



Datacenters

- Jobs 55/MW
- Capital \$34M/MW
- Power is slightly below 3 MWs



Cryptocurrency Operations

- Jobs <1/MW
- Capital \$1.4M/MW
- Power is slightly above 172 MWs



Renewable Resources

Risks
Impacts

What are the Risks

Huge costs for infrastructure necessary to accommodate these massive loads:

- new substations, transmission wires, transformers and other related equipment

Energy bill impacts:

- residential rate subsidization for additional power needed to accommodate the massive loads

Safety issues:

- non-permitted applications and zoning violations

Long-term assurances:

- transient nature of operations

Economic Development Impacts

For the purposes of Economic Development, we must ask some simple questions as to what we get in exchange for low-cost, reliable hydro-power

Is the business:

- making a meaningful economic development contribution to New York State
- creating enough jobs
- creating jobs that are not low-quality / low-paying
- making a meaningful capital investment commitment
- utilizing the hydro-power in a sale for resale scenario, since it diminishes the value and competitiveness of the hydro-power (exporting the power)
- impacting the energy costs of other customers
- supporting the goals and objectives of the region

What are Others Doing

Locally
US-wide

Outreach

We have conducted outreach to the various agencies who provided summary feedback:

- NYS Department of Financial Services
- NYS Department of Public Service
- Economic Development Agencies
- Grant County Public Utility District
- Chelan Public Utilities District
- Municipal Electric Utilities Association of NYS
- New York Association of Public Power

Locally

Economic Development Agencies:

- high energy / low job creating projects such as businesses conducting bitcoin mining operations, do not make significant contributions to economic development

Municipal & Rural Electric Cooperatives:

- experienced equipment damage and customer cost increases in their service territory
- implemented a temporary moratorium
- expressed concerns regarding load size, infrastructure upgrade requirements and the ability to recover those investments if these businesses (bitcoin operators) leave abruptly
- requested and received tariff relief from DPS that mirrors Chelan PUD HDL classification for HDL

Locally (cont'd)

Department of Public Service:

- issued a draft order permitting increased charges for cryptocurrency firms classifying them as “High Density Load” customers (250 kWh/ft²/year with a minimum demand of 300Kw) and thereby addressed the negative effects on other consumers permitted tariff changes allowing for:
 - 100% of system upgrade costs up front
 - two month cash deposit for energy bills and rate recovery through the purchase power adjustment charge (PPAC)
 - approval of a new Rider to the current M&REC tariff

US-Wide

Grant County PUD (Washington State):

- City Council passed a one year moratorium on cryptocurrency and they stopped taking applications for power in October 2017
- developed a new rate class for cryptocurrency mining operators
- recovering costs up front for infrastructure upgrades
- working on zoning requirements (classifying cryptocurrency as heavy industrial) with the cities
- publicly affirmed their position that core customer groups – residential, irrigation and commercial customers are first in-line for low-cost hydro-power

US-Wide (cont'd)

Chelan PUD (Washington State):

- implemented a 2 year moratorium for these businesses
- restricted operations in residential areas
- conducted a rate study and cost-of-service which resulted in the creation of a “high density load” classification allowing for;
 - up front infrastructure cost recovery
 - 5MW cap on load
 - retroactive billing of unanticipated costs such as utility equipment failure from unauthorized operations
- working with cities, towns, villages and the IOU’s to educate them

QUESTIONS?