

Bitcoin & Co: Climate Killers or Savers?

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IFIS Lunch at Cercle Munster

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Cambridge
Centre
for Alternative
Finance



Agenda

1. Introduction

2. What's the issue at hand?

3. How concerned should we be?

4. What now?

5. Q&A



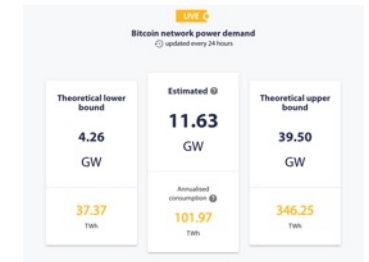
Digital assets researcher and consultant since 2015



 **Michel Rauchs**



Bitcoin Electricity Consumption Index (CBECI)



What's the issue at hand?

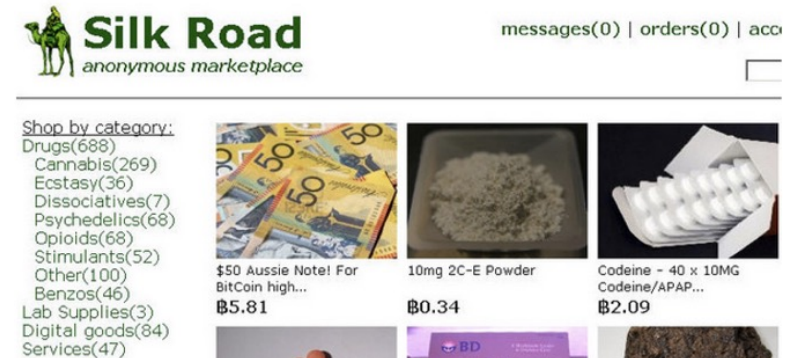
Censorship resistance as the key value proposition of crypto



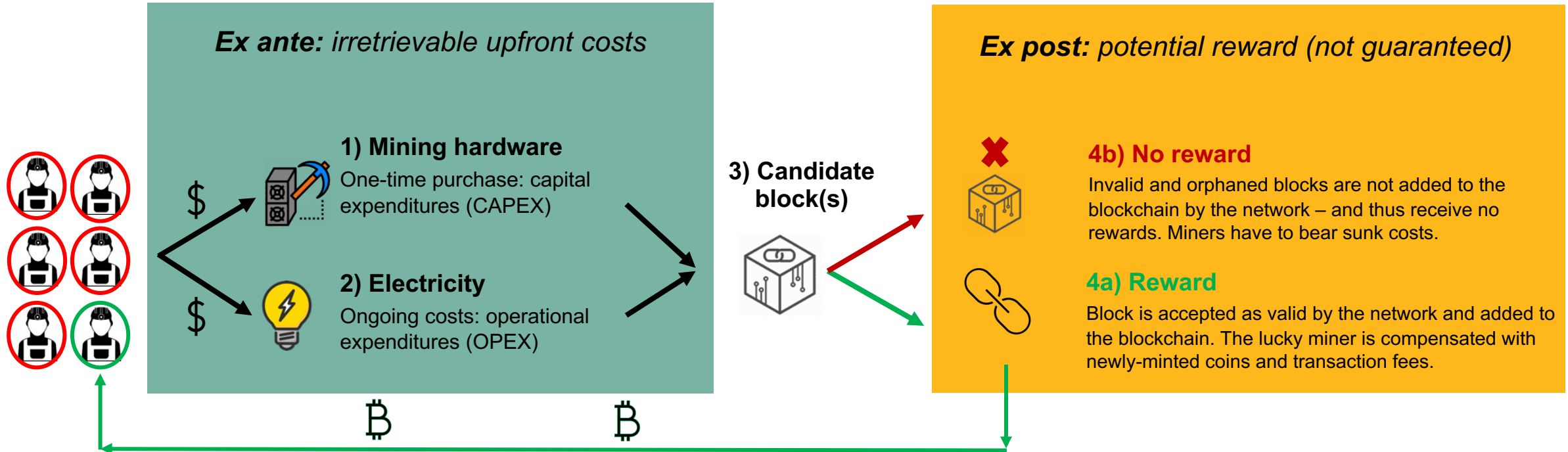
TECHNOLOGY NEWS | OCTOBER 24, 2011 / 3:33 PM / UPDATED 10 YEARS AGO

WikiLeaks says "blockade" threatens its existence

~ Reuters(24/10/2011)



Crypto mining as a decentralised coordination mechanism



Electricity as a **proving resource** that cannot be 'faked' → "proof-of-work"

What's the issue at hand?

What started as a hobby activity has evolved into a global industry



CPU 2009



GPU 2010



FPGA 2011



ASIC 2013



What's the issue at hand?

Concerns have been mounting over time...

TECH & SCIENCE

Bitcoin Mining on Track to Consume All of the World's Energy by 2020 ~ Newsweek (12/11/2017)

Comment | [Published: 29 October 2018](#)

Bitcoin emissions alone could push global warming above 2°C ~ Mora et al (2018)

What's the issue at hand?

... culminating in a heated debate with strongly diverging opinions



Bitcoin requires so much computing activity that it eats up more energy than entire countries. One of the easiest and least disruptive things we can do to fight the [#ClimateCrisis](#) is to crack down on environmentally wasteful cryptocurrencies.

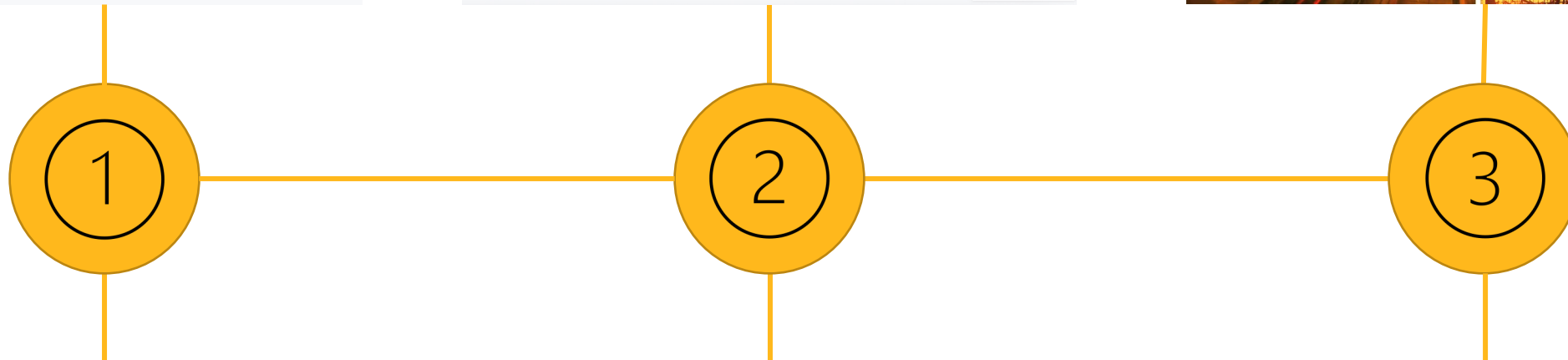
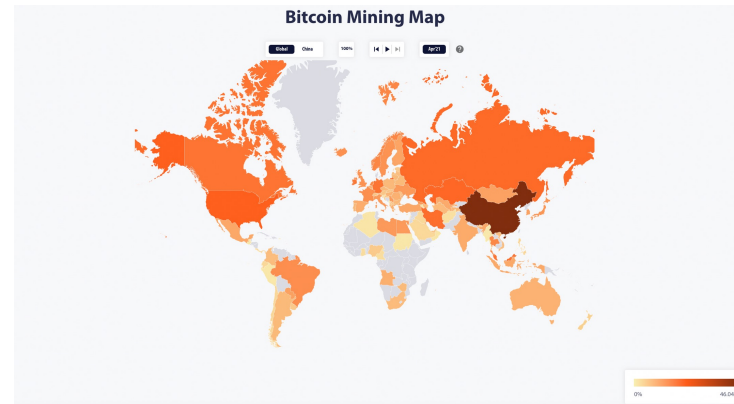
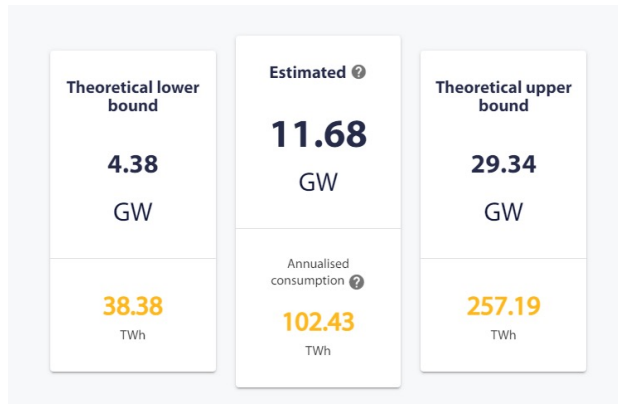
Wood's ARK Says Bitcoin Mining Can Be Good for the Planet ~ Bloomberg (22/04/2021)

We need to ban Bitcoin now. Before it burns the world up ~ GQ Magazine (14/05/2021)

BITCOIN WILL SAVE OUR EARTH ~ Bitcoin Magazine (25/03/2021)

How concerned should we be?

Determining the environmental footprint of Bitcoin mining



Power consumption estimate

Miner location

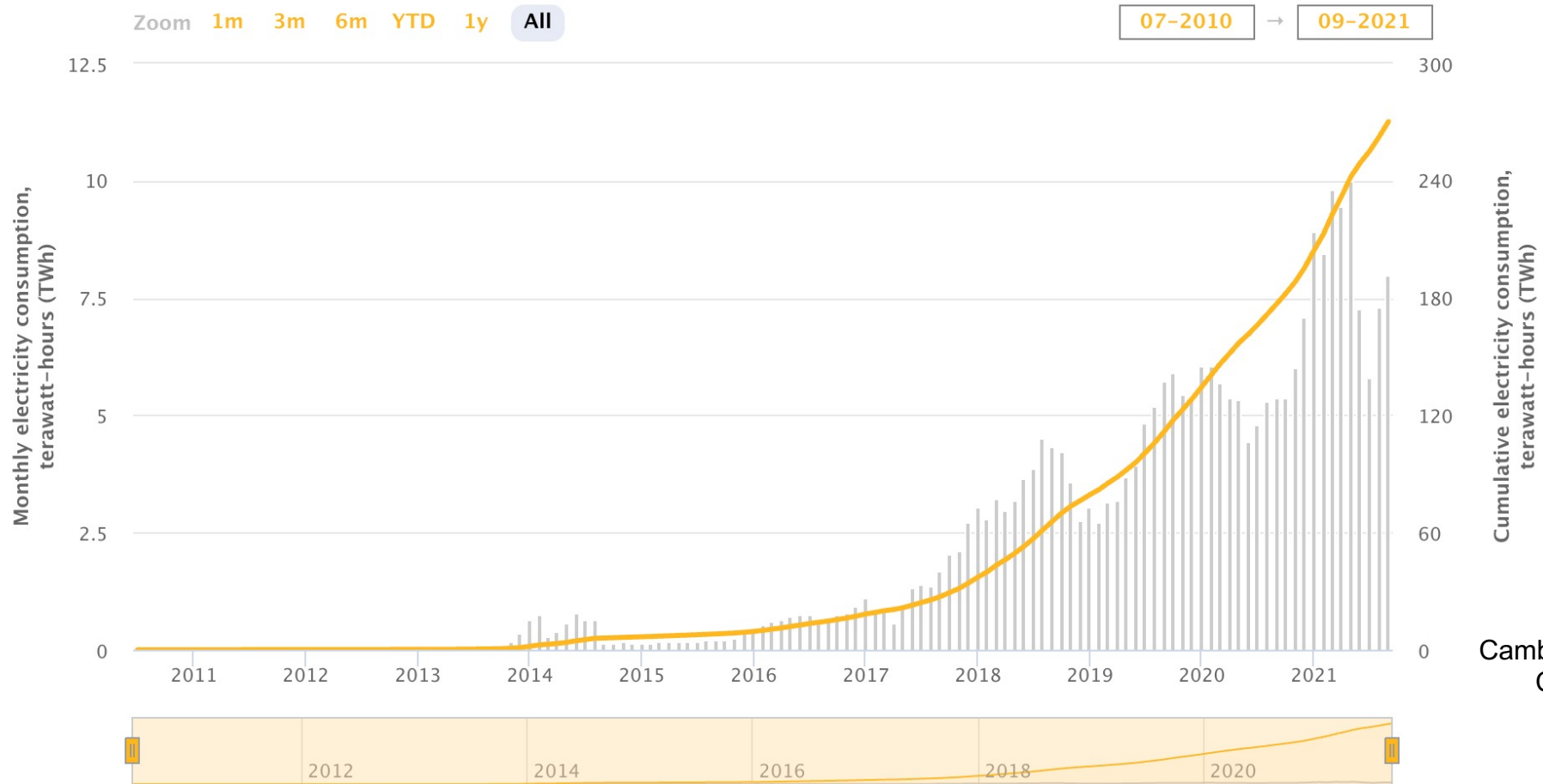
Electricity consumption mix by source

How concerned should we be?

Bitcoin's electricity consumption has been on the rise

Total Bitcoin electricity consumption

Select an area by dragging across the lower chart

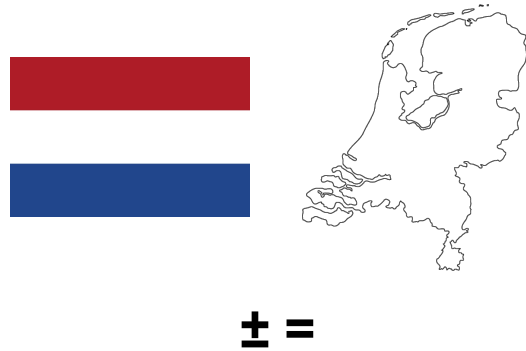


Cambridge Bitcoin Electricity Consumption Index (www.cbeci.org)

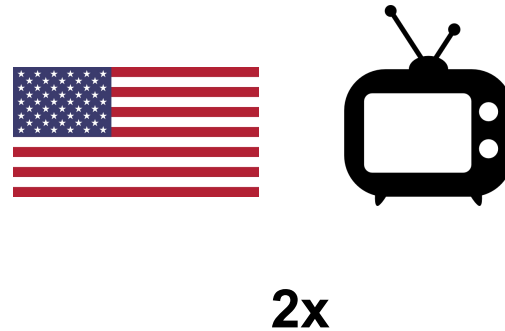
How concerned should we be?

Putting consumption into perspective

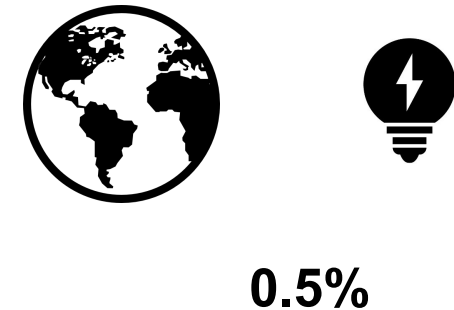
Netherlands electricity consumption



US residential TV usage



World electricity consumption



Based on yearly consumption of 110 terawatt-hours (TWh)

How concerned should we be?

Why location matters: comparing best and worst case scenarios



2.64 million
metric Tonnes



90.20 million
metric tonnes

VS

Assumptions:

- (1) Electricity consumption: 110 TWh
- (2) Emissions: 24 gCO₂eq/kWh*

Assumptions:

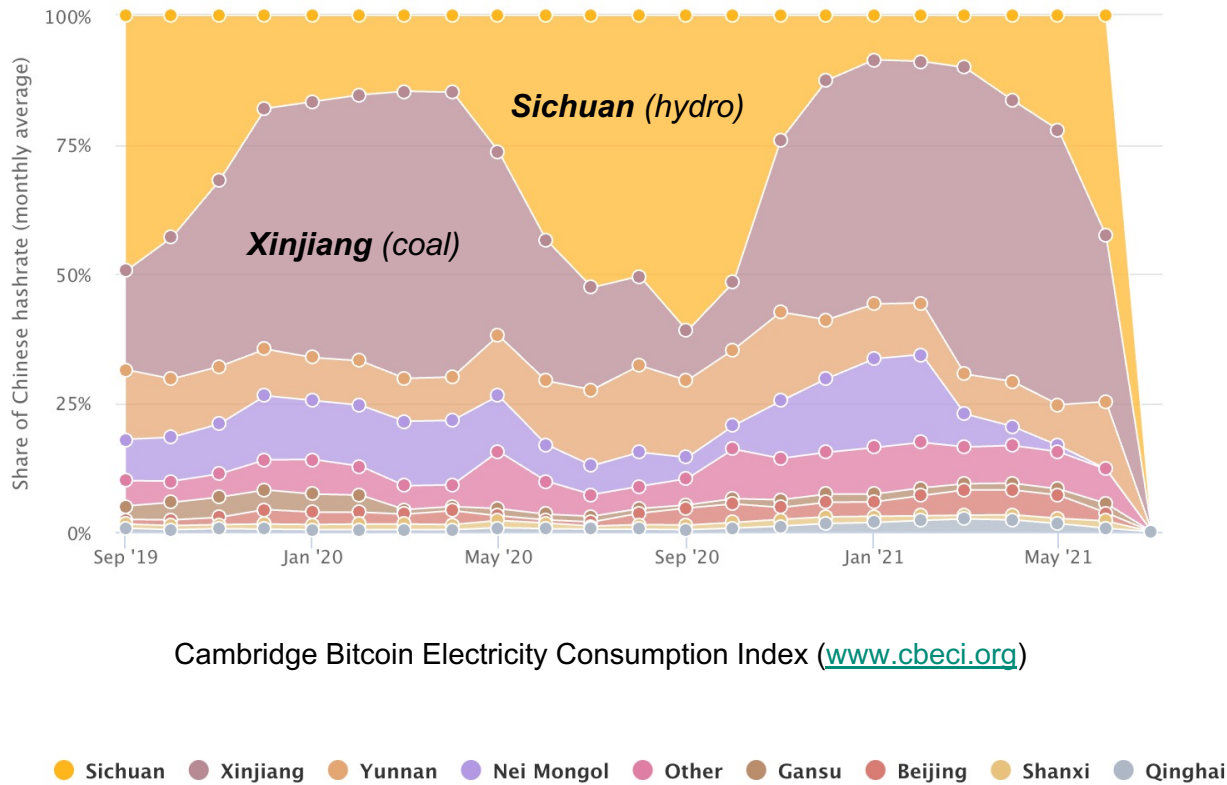
- (1) Electricity consumption: 110 TWh
- (2) Emissions: 820 gCO₂eq/kWh*

*Source: Schlömer S., T. Bruckner, L. Fulton, E. Hertwich, A. McKinnon, D. Perczyk, J. Roy, R. Schaeffer, R. Sims, P. Smith, and R. Wiser. 2014: Annex III: Technology-specific cost and performance parameters. In: Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

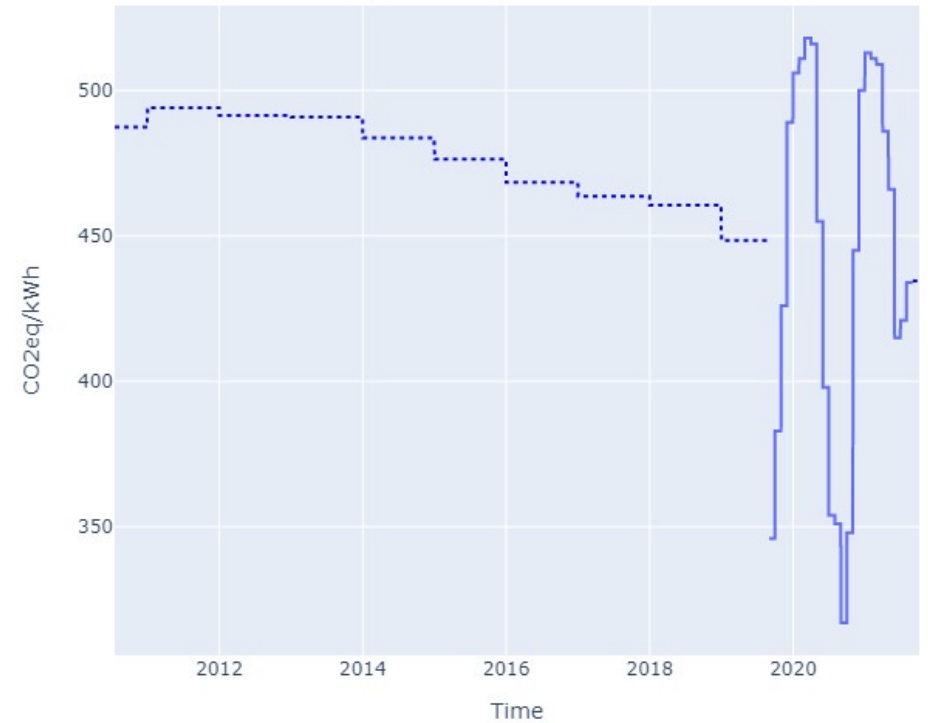
How concerned should we be?

Seasonal migrations within China have global impact

Evolution of Chinese provinces share



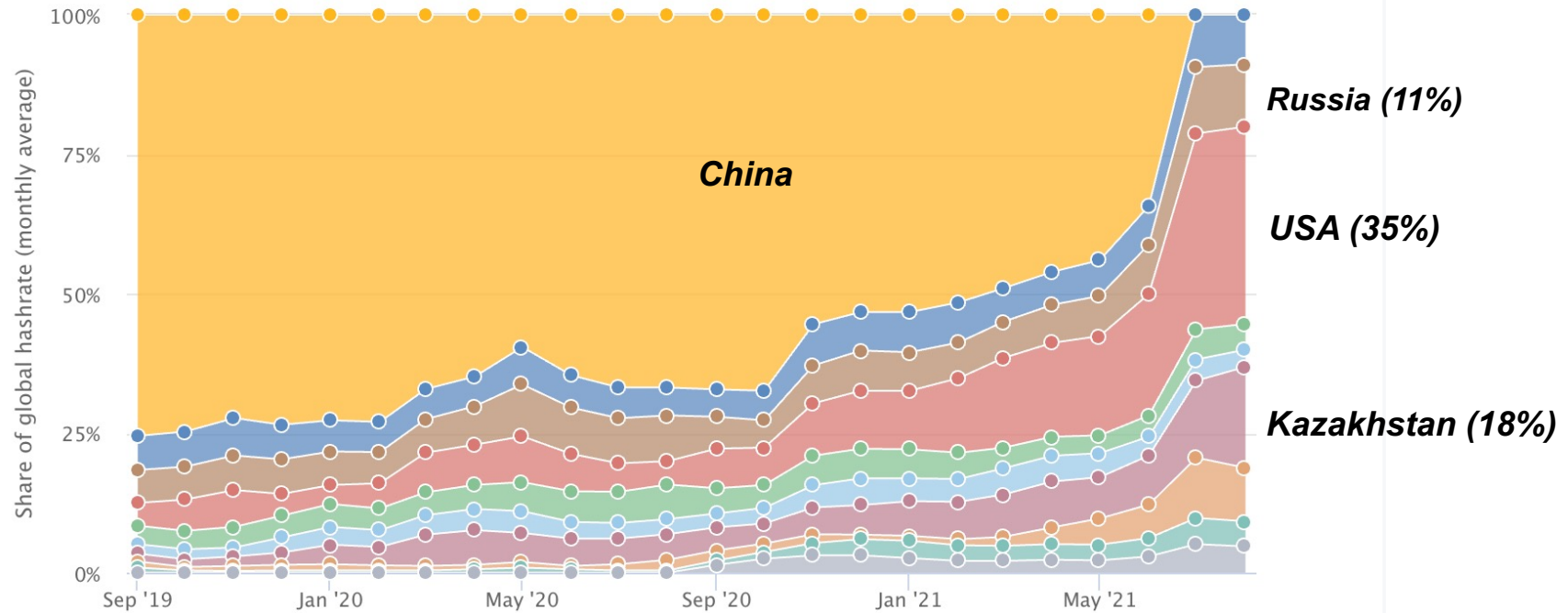
Bitcoin Global Emission Intensity Factor



How concerned should we be?

China exodus: the end of an era

Evolution of country share



Cambridge Bitcoin Electricity Consumption Index (www.cbeci.org)

- Mainland China
- Malaysia
- Germany *
- Other
- Iran, Islamic Rep.
- Ireland *
- Russian Federation
- Kazakhstan
- United States
- Canada

How concerned should we be?

Bitcoin miners tap into stranded renewables and wasted energy...



Hydro power



Natural gas flaring

How concerned should we be?

... but also keeps old carbon-intensive power plants alive



What now?

Where do you draw the line?



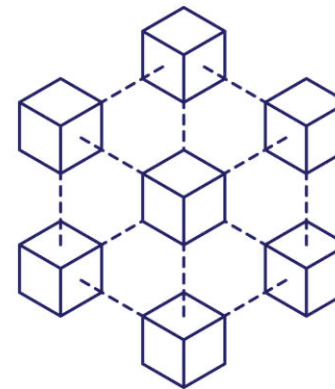
**Mining equipment
e-waste**



**Scope 3 emissions of mining
companies**



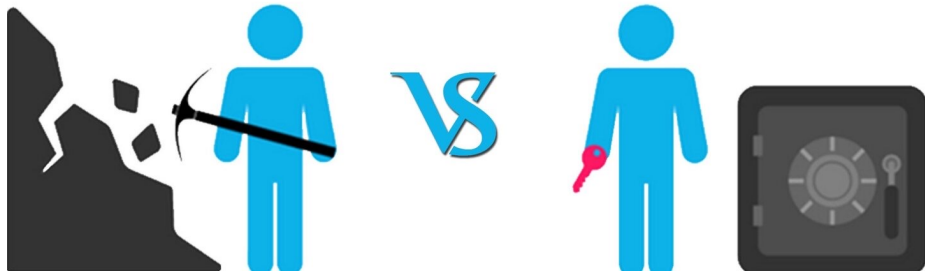
**Hardware supply
chains**



**Broader industry carbon
accounting**

What now?

Ecosystem reactions and industry initiatives



Alternative consensus mechanisms

Gemini Trust Buys \$4 Million In Carbon Credits To Offset Bitcoin Holdings

Carbon offsetting



Decarbonisation pledges

NEWS ANALYSIS

Now, blockchain can turn carbon credits into tokens for trading ~ ComputerWorld (31/05/2021)

Technology powering carbon markets

What now?

Conclusion

- Not black & white: claims are often partially correct
- Bitcoin is not representative for other cryptos and digital assets
- Disproportionate focus on crypto deflects from other industries
- More robust data and insights are needed to inform policy decisions

**Market vs
policy solution?**





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