



February 10, 2022

The Honorable Elizabeth Warren
The Honorable Sheldon Whitehouse
The Honorable Jeffrey A. Merkley
The Honorable Margaret Wood Hassan
The Honorable Edward J. Markey
United States Senate
Washington, DC 20510

The Honorable Katie Porter
The Honorable Rashida Tlaib
The Honorable Jared Huffman
United States House of Representatives
Washington, DC 20515

Dear Senators Warren, Whitehouse, Merkley, Hassan and Markey;
and Representatives Porter, Tlaib and Huffman:

Thank you for the opportunity to respond to your letter dated January 27, 2022,
regarding the energy and environmental impacts of bitcoin mining.

Bitfury does not currently have active mining operations within the United States. (As noted below, our majority-owned Cipher Mining subsidiary will begin bitcoin mining operations at a Texas wind farm in the near future.) We nonetheless appreciate the opportunity to address the energy use of bitcoin mining and why we believe bitcoin mining is an important force for harnessing *more sustainable* energy sources such as wind and solar—including inside the United States.

In assessing environmental concerns about bitcoin mining or any other energy use, not all energy consumption is created equal. An activity that consumes 100 TWh of power derived exclusively from coal or oil adds carbon to the environment and consumes a scarce resource; an activity that consumes the same amount of power derived from a mix of solar, wind, and hydropower does neither. It is important that bitcoin not be judged solely on the basis of how much energy it uses, but rather on the basis of its energy *mix* relative to other energy users in the economy and on the basis of the *incentives* bitcoin generates for creating a more sustainable energy mix.

From a public policy perspective, the most relevant question should be energy *production* rather than energy *consumption*. If Americans' elected representatives in Congress decide that we should eliminate or reduce a particular source of energy such as coal or oil, they may of course do that. But once the energy mix has been established, in a market economy like the United States, markets – meaning the aggregate decisions of American consumers and businesses – should decide the most productive use of the energy that is produced.

The available data suggest that bitcoin mining consumes a small but nontrivial amount of energy relative to the amount of value created, and that *energy is on average drawn more from sustainable sources than the U.S. electric grid as a whole*. There are several different sources one could examine to reach this conclusion, including the Bitcoin Mining Council (BMC) comprising the major global mining companies, the Cambridge Bitcoin Electricity Consumption

Index, and others. Using BMC data for convenience, bitcoin mining last year consumed 188 TWh out of about 155,000 TWh consumed globally for all uses. The energy mix used for bitcoin mining was about *58 percent sustainable* under the definition used by the International Energy Agency, as compared to 31 percent for the U.S. energy grid as a whole. As for Bitfury specifically, our total carbon emission impact (currently outside the U.S.) is significantly less than the carbon emission impact of the U.S. electric grid as a whole [REDACTED]. This figure excludes carbon offsets purchased for one of our international locations; if carbon offsets were included under the International Energy Agency's approach, the improvement would be even better.

We would like to briefly address the energy incentives associated with bitcoin mining. Like any business, a bitcoin mining company seeks the lowest price for its various cost inputs – in this case, the lowest cost of energy. It is a common, but inaccurate, belief that certain fossil fuels such as coal are the lowest-cost sources of electricity production. In fact, the lowest cost of energy comes from consuming excess capacity—from any source. Thus, bitcoin miners can add to total energy efficiency in several ways, including:

- ***Providing baseload consumption for solar and wind power generators that otherwise are unable to sell significant amounts of their production capacity.*** In 2020 in California alone, 1.5 million MWh of solar production (five percent of the total) was curtailed because production exceeded demand. And this figure understates the true extent of the problem—at certain peak production hours, California solar projects have as much as 15 percent excess capacity. This is one reason why solar and wind power as a category have generally been unprofitable and have required government subsidies. As Professors Eric Williams and Eric Hittinger of the Rochester Institute of Technology, among others, have explained in recent analyses, demand response programs that shift demand from periods of low supply and high demand to periods of higher supply are one key to profitable renewable energy production. The International Energy Agency recommends 500 GW of additional demand response by 2030. As a result, solar and especially wind power developers, among others, are partnering with bitcoin miners to provide baseload consumption capacity and turn a money-losing business profitable. In short, if we want *more* solar and wind to be developed, we must harness market incentives for developers. Bitcoin mining partnerships can help do that.

The current project pipeline for our Cipher Mining subsidiary demonstrates the potential for demand-response partnerships between bitcoin miners and renewable energy *projects*. In the near future, Cipher will commence mining operations at a Texas wind farm; this partnership was key to the partner's ability to enhance the profitability of the wind power generation.

- ***Flare gas capture.*** A byproduct of oil drilling is the flaring of natural gas found in oil wells. Currently, that byproduct activity produces carbon emissions with no counterbalancing economic value. Bitcoin miners are partnering with oil exploration companies to turn that dead-weight loss into economic value.

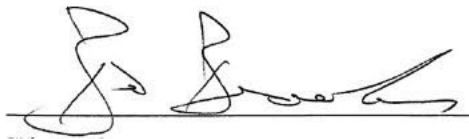
- **Reducing energy loss related to transmission and distribution.** Approximately five percent of all electricity produced in the United States is lost every year due to transmission and distribution issues. The mobility of bitcoin mining allows the industry to construct data centers close to the power generation source, thus reducing these losses and turning the associated power into economic value while also reducing the need for additional investments in transmission and distribution infrastructure.

Bitcoin has positive effects outside of the cryptocurrency ecosystem. Among these are:

- **Stabilization of electric grids.** We all remember the Texas blackout of February 2021. One of the causes of such events in the U.S. and around the world is an imbalance between production and demand on the electric grid. Bitcoin mining data centers can and do adapt their power consumption dynamically to rebalance the grid upon request from the grid operator.
- **Dramatic increases in chip efficiency.** [REDACTED]
[REDACTED] The development of new approaches to low-voltage ASIC design obviously benefits the entire computing industry, not just bitcoin mining. And at Bitfury we have developed the concept of controllable load that responds proactively to supply/demand.
- **Large-scale implementation of immersion cooling systems.** By many estimates, air-cooled mining systems account for more than 20 percent of the total energy use of bitcoin mining. This is why Bitfury developed LiquidStack, one of the world's leading immersion cooling companies. [REDACTED]
[REDACTED] LiquidStack DataTanks eliminate almost all cooling-related energy usage in bitcoin mining data centers, and are now being adopted outside the mining context by operators of cloud-computing data centers and other hyperscalers.

Thank you for the opportunity to respond to the important issues raised in your letter.

Sincerely,



Brian P. Brooks

Chief Executive Officer

[REDACTED]