

# Facts behind the bitcoin discussion

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World photo/Mike Bonnicksen

*The same low-cost electricity that brought Alcoa to the valley is today luring small energy-intense data centers dedicated to "mining" for crypto currency like bitcoin. The Chelan County PUD is considering a new, higher rate for these businesses. Here, Alcoa's Wenatchee Works smelter, now curtailed, is visible behind the PUD's McKenzie Switchyard.*

WENATCHEE — Chelan County PUD commissioners Tuesday will host the latest in a series of public hearings on a proposed new rate class for "miners" of crypto currencies like bitcoin and others who require extraordinarily high amounts of electricity.

The hearing begins at 1 p.m. in the PUD boardroom, 327 N. Wenatchee Ave., third floor.

After the hearing, commissioners could vote on the proposed higher rate.

Two local businessmen who build data center space for lease to bitcoiners, Jared Richardson of ZoomHash and Malachi Salcido of The Salcido Connection, are calling for PUD commissioners to delay their vote on the proposed new high-density rate until an independent economic analysis is completed to study its impacts.

Much has been said about the proposed rate. Here's a point-by-point fact check on observations made and questions asked so far during the extended public comment period:

## **Why is the Chelan County PUD worried about bitcoin mining?**

In 2014 the PUD received "inquiries" from 34 potential new businesses totaling some 220 megawatts of power — an unprecedented amount. That's more from this handful of inquirers than the approximately 180-200 megawatts the utility currently needs to power the entire county.

If all the inquiries had become actual customers, the county's local demand for electricity would have more than doubled in a single year — far more growth than the typical 1-to-3 percent annually. This would dramatically affect the 5-year and longer-term financial plans and revenue forecasts the utility creates to avoid rate hikes and ensure stability.

Utility staffers expect all or most of these inquiries came from “bitcoin miners” who require very large amounts of electricity to power and cool the high-performance computers they use to compete with their counterparts all over the world for rights to process blocks of transactions in “bitcoin” an experimental digital currency.

The miners have discovered North Central Washington's cheap electricity. Approximately 17 mining operations exist in Chelan County, alone. Owners of vacant buildings are eager to lease to them, if they can get enough power and afford the electrical upgrades needed.

A rapid influx of highly energy intense customers adds to PUD costs to build new transmission lines, substations and other infrastructure. That's to be expected as the county's economy grows, but bitcoin miners have tended to be low-profile and highly itinerant. They lease rather than own the space they occupy here.

They can, and have, pulled the plug and left town with their computers, sticking the PUD with unpaid bills and the expense to maintain high-capacity electrical equipment with no rate income from a customer to recoup costs.

### **What action has the PUD taken so far?**

Early last year commissioners approved a moratorium on new applications for larger amounts of power to give staff time to study this potentially huge increase in local demand.

The moratorium remains in effect for “energy-intense” applicants whose installations would use 250 average megawatts of power annually per square foot of business space. This is approximately 10 to 40 times more power per square foot than the PUD's largest commercial industrial customers.

Staff has proposed creating a new rate of 5.036 cents per kilowatt hour for these energy-intense or “high-density load” businesses. It's based on energy use per square foot rather than overall power needs. That makes it unique, possibly nationwide.

The proposed high-density rate would completely cover the cost to supply these specialized data centers with power, but can be more than double what they're paying now. Bitcoin-related businesses have said the proposed rate would put them out of business.

Other Chelan PUD customers receive power at less than cost, as part of a decades-old benefit of living in a county where hydropower is locally owned and controlled.

PUD staffers have come up with some alternatives, including phasing the higher rate in over time or charging a lower rate per kilowatt hour, but requiring these high-energy customers to pay more up-front equipment costs.

The PUD generates a lot more power than it needs, what's the problem?

True. The PUD generates an average of about 1,100 megawatts from its Rocky Reach, Rock Island and Lake Chelan dams. Only about 200 average megawatts are needed to keep the lights on in Chelan County.

But most of the difference is tied up in long-term contract sales to Puget Sound Energy (250 average megawatts until 2031), Alcoa (260 average megawatts until 2028), and Douglas County PUD (64 average megawatts until 2061). After meeting its contractual obligations, the PUD has about 100 megawatts of power left that it can sell as it chooses. Much of this is "hedged" — tied up in short-term contracts to lock in favorable prices.

Most all these contracts vary in amount of power actually supplied, since they're based on percentages of dam output, not fixed amounts of power.

Longer-term power contracts are considered advantageous, because they provide stable, predictable revenue, PUD officials say. As these contracts reach their expiration dates, they can be allowed to lapse or be negotiated to ensure the utility has enough of its own generation to cover projected local growth.

### **Would the PUD have to raise rates for all customers if bitcoin data centers didn't pay a higher rate?**

Very possibly. Rates that all customers now pay are already below cost. That's a key "public power benefit." It's made possible because the PUD generates more electricity than what is needed locally and sells this power at a higher rate to buyers outside the region. The less power the PUD has to sell outside the region, the less revenue it has to subsidize local rates and keep them low.

In fact, if most of this uncontracted surplus generation went away, due to unexpectedly fast local demand, local residential rates would have to increase from the current approximately 3 cents per kilowatt hour to 5 cents or 6 cents per kilowatt hour, according to rough utility estimates.

Very fast, unplanned growth would strain the PUD's financial strength and force its financial plans to change.

Those plans include paying down debt, maintaining healthy savings and debt coverage and providing other community-requested perks like free-parking passes to state parks, electric car charging stations and park upgrades.

### **Alcoa's Wenatchee Works' plant is now curtailed. Why not use some of that power for bitcoiners?**

By contract, that power won't be available until 2028. The PUD's contract with Alcoa requires the utility to supply 26 percent of the output of Rocky Reach and Rock Island dams. In exchange, Alcoa pays for 26 percent of the capital, maintenance and other costs associated with those dams. The contract requires Alcoa to pay its share of dam costs even if it's not operating.

In case of curtailment, the contract requires the PUD to take Alcoa's unused portion of power, sell it on the regional wholesale market and use the proceeds to cover Alcoa's dam costs. Any surplus from the sale is put in a fund that Alcoa can use if Wenatchee Works restarts. If curtailment lasts 18 months or longer, Alcoa must pay the PUD a fine that declines over time, but is currently about \$72 million.

### **The PUD has been ending recent years with budget surpluses in the double- and triple-digit millions. Why would it need to charge bitcoiners more to avoid rate increases for everyone else?**

The proposed rate is a "best guess," PUD officials say, since they don't have a lot of history to draw from when it comes to customers who use that much electricity.

Big bottom lines now could be needed to save for future years, when the PUD's long-term power contracts with Alcoa and Puget Sound Energy near their end. Before these contracts kicked in in 2011 and 2012 with terms and power allocations more favorable than their decades-old predecessors, the PUD's budgets were strained, especially coming off years of drought and recession.

### **Why are bitcoin miners targeting Chelan County?**

The power in this part of the state is among the nation's cheapest. Electricity is the largest expense for this energy-intense mining data centers. Also, compared to neighboring Douglas and Grant counties, Chelan County already contains vacant space in many old commercial and industrial buildings that are already wired for higher amperage and voltage — this saves on the start-up costs for new data centers.

### **Why do bitcoin-mining data centers use so much electricity?**

Bitcoin miners use hundreds or even thousands of specialized, high-performance computers that compete with others all over the world to be the first to solve a math puzzle linked to a block of bitcoin transactions. The winner is paid in bitcoin and gets to process that block of transactions. Competition worldwide is fierce. Miners with the most computing power — more and/or faster computers — are more likely to get paid.

Minors are forever in need of either more computers or faster computers to stay in the money. This generally translates to more energy use, although technology changes will likely, over time, produce some energy efficiency. The Economist magazine in 2013 described this as an “unsustainable computational arms race” where only mining centers with access to free or cheap power can pay off.

Bitcoin mining computers run at full capacity, non-stop. They emit a lot of heat. The rooms they operate in must have extensive cooling systems, which also use electricity.

According to some estimates, these machines use three to seven times more electricity than the servers in a traditional data center, like Yahoo! Japan in Wenatchee. Its servers can be as energy-intensive during peak processing times, but generally don't operate at that volume around the clock.

**Wouldn't new data centers add to the tax base here, as they have in Quincy, creating more property tax revenue for cities, schools, hospitals and tax-dependent districts?**

The types of data centers that are springing up for bitcoin mining in Chelan County likely would not add to the tax base. At least not much. These centers are, for the most part, being built in leased space in existing buildings or even set up in highly mobile, super-cooled freight containers. Electrical upgrades inside and up to these spaces may cost their developers millions, Chelan County Assessor Deanna Walter says, but generally don't add much value, if any to the taxable value of the space. The upgrades would make the spaces more attractive to similar tenants. That could make it easier for owners/controllers of these spaces to collect more rent.

Contrast these with Quincy, where companies like Microsoft, Dell and Yahoo! bought 50-or-more-acre tracts of what were once bean or alfalfa fields and built sprawling complexes of super-wired, super-connected buildings. This new construction expands the tax base with millions of new construction dollars — a windfall, Deanna says, for taxing districts.

**Wouldn't bitcoin data centers create well-paying jobs?**

Not many so far. Bitcoin networks can be managed and upgraded from anywhere in the world over the Internet. Owners don't need to live here and usually don't. However,

tasks that must be performed at the centers, themselves, can create substantial local benefits through outsourcing to area tech firms, heating-and-cooling technicians and electricians, which pay trade-level wages.

Two of the county's largest providers of leasable bitcoin mining data center space, ZoomHash and Salcido Connection, employ a total of about 18 employees for their data-center operations. Not all are full time. Most receive no benefits other than wages.

Salcido Connection's employees receive full benefits, vacation pay, retirement and more, says business owner Malachi Salcido, who also owns a stable and successful HVAC company whose existing employees do much of the support work. The bitcoin side of his business includes mining operations. It has created six new positions, he says.

The World was unable to immediately find other bitcoin-related businesses that provide employee benefits, although those contacted say they hope to in the future.

### **Could more jobs come later, as bitcoin's "blockchain" public ledger system catches on and becomes more mainstream?**

Possibly. Reputable news sources, including Bloomberg Business, The Economist and Wired.com have reported that big-names, including IBM, Intel and Cisco, as well as the London Stock Exchange Group and big banks including JP Morgan, Wells Fargo and State Street have joined forces to create an alternative to the bitcoin "blockchain."

The blockchain is the public, computerized ledger system that tracks and verifies transactions. This is the verification-and-processing service that the miners provide on the bitcoin system using their private data centers worldwide.

Some analysts predict that a shared blockchain system has the potential to become a more reliable and lower-cost way of tracking and verifying everything from real estate sales to securities trading.

However, the big-name companies seek to create a blockchain that they, themselves, control rather than rely on bitcoin's international network of miners — independent entrepreneurs.

The U.S.' Nasdaq stock exchange, which is heavy with tech stocks, last year began trading bitcoin, with the implication that more regulation will follow. Other types of "crypto currencies" already exist and, together with bitcoin, can create potential, if questionable, buying power to those in countries with less-developed banking systems.

If local power rates remain attractive and data centers exist with trained employees, advocates say a local cottage industry here could one day bloom for developers of

these emerging blockchain technologies. Salcido says his company is already working on prototypes for a mutual funds company.

But aside from Salcido, every other of the approximately 17 data center operations here that would pay the PUD's proposed higher rate is dedicated strictly to bitcoin mining.

**The PUD should not be spooked by the 34 inquiries for new power it received in 2014, prior to the moratorium. Few of these will become actual customers.**

Potentially true. Inquiries — phone calls or emails asking about power prices and availability — are free. Potential customers must fill out applications, pay for engineering studies and fund all the upgrades needed to supply their data center. These high up-front costs will discourage all but the most serious, Salcido says.

What's worrisome, PUD officials say, is that they've continued to receive multiple new inquiries daily or weekly from suspected bitcoin operators throughout the moratorium. Interest in PUD power and data center space continues to remain high.

**Chelan PUD should follow Douglas PUD's example of making bitcoin miners pay all the up-front costs of upgrading power infrastructure and running electricity to their data centers, but keep the per-kilowatt-hour rate the same as it is for other businesses.**

That policy may be working. In 2013, demand for Douglas County PUD power grew 8 percent, as much as 8 times the usual 1-3 percent growth. That utility also encountered some challenges from data center businesses that set up in areas not prepared to handle their sudden demand for power and still support future area growth, officials have said.

They didn't impose a moratorium or propose a rate higher than their single, general rate of just over 2 cents per kilowatt hour. Instead, commissioners in early 2015 lowered from 2.5 megawatts to 1.5 megawatts the threshold for requiring a customer to have a specific power contract. The contract requires the customers to provide more information about their needs and nature of their business. It also requires them to pay all costs up front to PUD lines, transformers, substations and other equipment.

Between Nov. 2014 and Nov. 2015, the growth in local demand was back down to 3 percent. Even so, Douglas PUD officials say they don't attribute the 2013 growth to any particular category of customer, nor do they credit the new contract requirements for any return to "normal."

That doesn't change the fact, however, that in Chelan County more commercial and industrial space is available and already wired for higher energy use, making a start-up

less costly, even with infrastructure upgrades. That, some miners have said, is the reason they chose Chelan County over Douglas in the first place.

**Why would we want to foster development of bitcoin, an unregulated payment system that has drawn the scrutiny of law enforcement worldwide for its use by drug traffickers, money launderers and illicit gamblers?**

Bitcoin has been used for those things, as anyone can see by searching for reports by The Economist, Bloomberg, Forbes and industry blogs about it on the Internet.

Bitcoin's open-ledger "blockchain" system has not been immune to hackers and fraud. In fact, an early but large bitcoin-exchange service called "Mt. Gox" collapsed in August 2013 from cash-flow problems brought on by hackers.

But the mainstream, regulated banking system and Wall Street traders have also been the victims of or complicit with illicit activity or careless management.

Bitcoin mining, which began in 2009, still embodies a "wild-west-type" that can prevail when something is new and unregulated.

Miners can spring up anywhere in the world by buying computers, downloading free software and plugging in to the two necessities: cheap power and fast Internet. Their ever-increasing need for more and more power raises questions of long-term sustainability.

And, even though the bitcoin currency system operates free of any nation or central bank, the county that hosts the most bitcoin-dedicated computing power — right now, that appears to be China, according to web reports — could potentially heavily influence the miners' consensus-based decision making over network improvements or protocol. In fact, any host nation's federal law enforcement could intervene at any time.

Even so, the currency has defied naysayers by making it this far — almost seven years since it was created in 2009. Federal investigators are discovering that bitcoin transactions are quite traceable despite the aura of anonymity that has been the draw for the criminal element.

Local advocates, including Salcido and ZoomHash's Richardson say it shouldn't be demonized just because it's new and different.

**What is bitcoin?**

"Bitcoin" is an on-line payment system that began in 2008 as a paper published under the pseudonym Satoshi Nakamoto. It went live in 2009. Each bitcoin is a sequence of



numbers with mathematical properties that make it hard – but not impossible — to defraud the system. It exists only in digital form – no tangible bills or coins.

All its transactions are tracked and verified mathematically via decentralized computer systems privately owned by “bitcoin miners.” Transactions are entries on a decentralized, digital public ledger, rather than actual transfers of currency.

The software caps the total amount of bitcoin that will ever be issued at 21 million. That’s expected to happen in 2140. Many say sooner. Currently about half that total number is in circulation.

It has no intrinsic value. Rather, its value is based on the trust of its decentralized system of users. Exchanges exist that allow bitcoins to be changed for real money.

The value of a single bitcoin ranged last year from about \$200 to \$400. Its current value is about \$370. It’s not widely accepted anywhere as a direct form of payment. Some websites serve as on-line stores that accept bitcoin as payment for any of hundreds of gift cards that can be redeemed at big-name retailers.

For more information, visit [coindesk.com](http://coindesk.com). If you have a couple of hours, [kahnacademy.org](http://kahnacademy.org) has a very good series of free, on-line video tutorials.

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