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Hello and welcome to another episode of Bitcoin Fiat and Rock and Roll, our podcast that explores the intersection of traditional finance, digital assets and digital currencies and helps you understand how digital money and digital assets will evolve in the future. I am co-host Michael Blaschke and today we explore how Bitcoin mining can become critical energy infrastructure in Europe, a topic that sits at the intersection of

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energy policy, monetary sovereignty and industrial strategy. With Europe curtailing 30 to 40 terawatt hours of renewable energy last year while simultaneously facing an energy competitive crisis, we're examining a controversial solution using Bitcoin mining as flexible load to monetize stranded electricity.

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stabilize grids and accelerate the shift from imported fossil fuels to domestic renewables. And to discuss this very topic, joining me today is Dr. Harald Rauter, Chief Growth Officer at 21Energy, where he drives strategic partnerships, B2P product innovation and investor relations to position Bitcoin mining as critical energy infrastructure across Europe.

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Harald, it's a pleasure to welcome you here at our podcast. I love the topic of Bitcoin mining, particularly from a more institutional lens that you very certainly often take as chief growth officer. So Harald, you recently attended the Bitcoin corporate day in Prague. What's the current state of institutional thinking around Bitcoin mining as energy infrastructure in Europe? And what surprised you most about where

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the corporate conversation is headed. Thank you, Michael, for having me. It's a pleasure to be on. It was maybe to provide a little bit of context for the listeners. Bitcoin Prague is the epicenter of Bitcoin innovation in Europe. It's one of the most traditional, most legacy heavy cities when it comes to Bitcoin and Bitcoin innovation. naturally, a lot of get togethers and meetings are happening there.

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and most notably the Bitcoin Prague conference, is the largest one in Europe. But most recently, the organizers have thought it might be a good idea to scale this down a little, make it more intimate, bring really together high signal people and have a conversation around the state of play of Bitcoin in its different facets, Bitcoin the asset, Bitcoin the infrastructure, uh and have a conversation around what's going on. And so I was privileged enough to

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participate in that conversation. obviously I brought the energy lens to the equation. And what I can say is that Bitcoin is very alive. We don't not only see this in price, but we also see it in the recognition from institutions. And there is a lot of curiosity in how or what the next steps for Bitcoin adoption could actually look like. And what we're seeing

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is that there is a convergence of different disciplines and fields. The asset management people are interested in finding new ways to deploy capital. Obviously, the mining people are looking for capital. We're looking for new ways how Europe can be positioned in this global mining race and can have a role in the global uh hash rate race.

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And the positive news is that the curiosity plus the acceptance from institutions plus, and I think this also should be mentioned from a very European lens, an increasingly favorable regulatory environment both for the asset as well as for the energy infrastructure are actually the perfect cocktail to be

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come more vocal on the role of Bitcoin mining and its role and the role it can play in the transition of our energy systems. Brilliant. Yeah, we love having you here. We already learned that Bitcoin is really your thing. mean, one thing is, of course, you being the chief growth officer at 21Energy, but you also bring a unique blend of climate tech investment expertise and industry strategy to this role you previously served as director of impact at

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or CLIMA now and that global emerging technologies at CLIMAT KIC. You're a board member of the European Bitcoin and Energy Association, if I got it correct. That's correct, yes. Where you advocate for Bitcoin's role as net positive grid supportive infrastructure in Europe's energy transition. And you hold a doctorate from ETH Zurich in analytical modeling.

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Certainly skills you now apply to infrastructure strategy rather than just the deployment of a Bitcoin or blockchain or more generally DLT. Yeah, so what was in particular interesting was you calling yourself a proud investor in 21Energy, which gives you now both operational and financial stake in the company's mission. eh

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And mission is now a good keyword for deep diving into our main conversation, particularly why and why now? So why should we, uh and in particular, institutionals care about Bitcoin mining? So Europe is facing a structural competitiveness crisis, I would say.

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partly driven by energy costs and inefficiencies. Quite some energy is curtailed. I predictions or estimations differ. My assumption is that it's 20 to 40 terawatt hours curtailed in Europe last year only because the grid couldn't absorb or transport renewable energy. So maybe walk us through the economics of this. What does this curtailment actually cost Europe and why should our audience care about this?

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as a monetary phenomenon, not just as an energy phenomenon or not just as an energy problem? Yeah, we touch upon the big question right from the start. I love that. I think what is really important to understand is the nature of energy being a prosperity currency. Henry Ford in 1920s talked about we should have a money that should be tied to energy. The idea of Bitcoin is not new. And what makes it so pristine is that Bitcoin is, in essence,

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realizing Henry Ford's dream of pegging a floating currency or a medium of exchange in a store of value to energy as such. What we also know is that energy prices have a direct impact on the prosperity level of a society. We take it as a commodity, it's always there when we turn on the light, it's always there.

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But we've seen this year in Spain that this is not necessarily always the case. And our life and our prosperity really depends on energy. And what we are advocating for is that for a European future and for European prosperity future is that we are not waiting for this catastrophic event to happen before we actually realize that it is important to provide secure, abundant and cheap energy.

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Now, historically, Europe has optimized for only two of those three dimensions. with cheap Russian gas, natural gas, we have optimized for abundance and for low prices, but we have obviously sacrificed and compromised on the angle of sovereignty. Now, obviously, we

could now turn this around and say let's become immediately very sovereign and use only assets and infrastructure that generates power.

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on-site in our jurisdictions, but obviously our grids and our grid balancing infrastructure is not ready to cope for the complexity of the supply mix that we would face. So it doesn't help us if we nominally would be able to provide the same or generate the same amount of power than in previous supply mixes if the grids are not able to absorb the complexity. And this is where a lot of the

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problems originate from. Now there's a lot of confusion going on because we blame renewable energy on a lot of the challenges that are happening and a lot of the problems that are happening but the problem is more complex than that. The renewable nature is that most of the renewable power is intermittent power so wind only wind power only when wind is available uh solar power only when the sun is shining and

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What we know is that the grid infrastructure needs a higher capacity to balance the frequency and stabilize the grid frequency, the more renewable intermittent power we bring online. know from studies from Japan, from the Tokyo energy provider TEPCO, that if we're not upgrading our grid balancing infrastructure the same way we are

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upgrading our supply mix and add increasing amounts of renewables, the grids will be destabilized and at 50 % renewable intermittent power the grids are most likely to fail. So Japan has clearly identified the need to scale up intermittent power in the supply while at the same time adding more capacity to stabilize the grid at the same time. So

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What was your question again? I'm sorry. I went a bit deep into the physics now. No worries. I'm asking myself why we should care about this containment or the European energy crisis, competitive crisis as a monetary phenomenon, not just as an energy problem. Yeah. Thank you very much for reminding me. Apologies. uh The truth is we cannot bend physics.

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So if the grids are the limiting factor in how much power can be off taken from the assets and transported to possible demand, um then we can have as much supply available as we want. We will not be able to transport it. Now in economic terms, that means that asset owners will invest a lot of CAPEX into new generation capacity.

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but they will not be able to monetize on those assets. Now, to give you a ballpark number, irrespective of what the asset is, where it stands, what the nature of the generation is, we can have a rule of thumb that we can say between 20 and 35 percent of the asset's um uptime and power generation cannot be monetized at fair market prices. That means either the asset

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is curtailing power, cannot even generate it, gets rejected by the grid or has to sell the power at a price where it's actually not economically viable. Now obviously that diminishes the NPVs and the IRRs of the asset itself and that is not only a direct negative economic impact, what it also signals is that the market is very inefficient. And very inefficient markets

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have a tendency that there is no adoption, there is no build out. Why should someone with an investment signal of not being able to monetize one megawatt of generation, as an

example, uh directly build another nine megawatts with a similar economics knowing that it just distresses the economics even further. And I think this is why people should really, really care about uh

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energy and energy market efficiencies. Because inefficiencies are costly in the first place. Now the value chain will be able to somehow roll over this cost to someone else. So the grid operators need to compensate for curtailment of the asset owners, but who pays for these costs? It's either the taxpayers if they get bailed out, or the

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and the costs will be rolled over to the consumer. Now, what do feel when we have sticky high prices of power? We do know that it will compromise the manufacturing base, this is exactly what we see in Germany for instance. We do know that inefficient markets create price volatility. Markets do not like price volatility because it makes it very hard to plan.

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for a precious commodity and planning horizons of 10 years and 20 years plus. So we know from studies, and these are very crude studies and they have some limits, but we know that 25 % price increase in wholesale prices will result in 1.5 % GDP reduction Europe-wide. These are the studies from the IMF. so prices, power prices do directly

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have economic consequences, but they do not even price in yet the long-term consequences of private sector not being able to plan accordingly and have a predictive and robust foundation to be competitive in the global markets. So there is a direct cost and there is a long-term indirect cost. And it's very hard to return because, to reverse, because these cycles are very draggy, they are very long.

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but they are very predictable. All right. So let me try to boil it down to an example or to the, yeah, let's say pragmatic problem of an entrepreneur and of our industry. So let's say you build a solar or a wind farm and can't sell 15 to 20 % of your output during peak production. Then of course your returns collapse. And meanwhile, German industry pays

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about two to three times what American competitors would pay for electricity. And this creates an inflationary spiral in which we subsidize renewables, then pay to curtail them and then compensate for grid stability, all while our industrial base in Europe, or at least in Germany, erodes. And this is where Bitcoin comes into play and where this becomes a monetary phenomenon in that flexible loads

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like Bitcoin mining can flip this equation or at least contribute to flipping this equation. They guarantee demand when renewables overproduce and then make the entire energy transition we undergo more financially viable. So is that intuition correct for why this is also a monetary phenomenon? Yes, exactly. We are talking to asset owners that would fall into that category that you just described.

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holding assets of about 10 to 15 megawatts of PV generation capacity. And to give an illustration how dire the situation is because of the subsidized build out of new power generation. while the grids are equally constrained and congested, these power generators seek curtailment, rejection of being able to put power onto the grid this year in 2025. In April,

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at the same rate as they have seen rejection last year around August. So this is one of the rare phenomenons where new build-out actually has a cannibalizing effect on the existing power generation. So this is a very very dire thing and obviously it makes the economics for power generators that already operates on relatively thin margins extremely dire. Now this will not be

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able to be reverted by politics or anything because the new assets are already going to be built out. They are going to be built out at faster rate than the grids will be able to be built out. So there is an asymmetry there and we will end up with increasing amounts of stranded power, perfectly fine power that cannot be dispatched onto the grid and will have to be curtailed. So we're looking at m

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really at destruction of capital at a large scale. So only the direct of the 35 terawatt hours, I come to the same conclusion if I add up the numbers, corresponds to an equivalent of about 3 billion euros. That does not sound like much. For the listeners, 35 terawatt hours is about 2.5 million households annual energy consumption. That's marginal. But we know from markets that

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prices are constituted at the fringes, where inefficiencies happen of a homogenous good. So these inefficiencies will also be priced into the power that can be dispatched. it's a floor that will continue to rise and will put pressure on any production and manufacturing efforts that Europe will take. Now Bitcoin and to make the bridge is exactly that tool. So we're looking for something that

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a solution perspective we're looking for something that has the properties of being able to offtake power in a geography agnostic and very opportunistic fashion. So you want to have an offtaker that happens or that operates very differently to your fridge at home. The fridge is stationary, it needs permanent power because otherwise it cannot do its job, it cannot provide its utility value.

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A Bitcoin miner has these unique properties and um I'm not sure whether this has ever been the idea of Bitcoin mining in the first place, but how proof of work works is that these operations can be interrupted at any point in time, which is a very rare feature for an off-taker, can be restarted at any given time and provide economic value.

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this period of being online. So it is contrary to most beliefs a very opportunistic off-taker of power. How the uh process works and how the mining economics works is that it's so competitive that it will always be or it can never be in competition with any other off-taker because it is just not as price competitive. It is not price competitive enough to compete with other off-takers.

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And that is its strong suit because that means that Bitcoin mining will always seek to find power that no one else, no other off-ticker can use. While being totally flexible in terms of space and totally flexible in terms of operations and at the capex that is highly competitive to any other solution. So there is a sweet spot there that can be occupied.

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think of it as a pioneering species that can live off very little and still can make a lot out of it. Brilliant. Maybe now is the right time that we investigated the macro perspective. So really the why, why now? What's the connection between energy and money? Or why is the energy crisis or transition in Europe?

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uh also a monetary phenomenon and how Bitcoin can help. So now is the right time to clarify the role of 21 energy in that whole scenario. So I can imagine the audience asking itself, okay, understood. It's also a monetary problem. Bitcoin plays a role, of course, as a proof of work blockchain that is energy intensive.

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But what is now the role of 21Energy in helping here? Yeah. So us as a company, have strategically embraced Bitcoin mining as a core technology, as a key technology to unlock different use cases, both for the B2B sector as well as for the B2C sector. Think of it this way. Our core product for our retail consumers is our Bitcoin Space Heater, which

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essentially is just a computer that uses energy but provides dual value. means on the one hand we provide warmth to our customers homes because physically speaking or thermodynamically speaking a one kilowatt of power will be converted into one kilowatt hour of heat.

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But the same time we provide a computing service, the Bitcoin mining. So we contribute to the hash rate of the network and that all runs in the background which can be monetized. And that is the value that then stays with our customers and together it provides a very superior use case for warming your home while being cross-financed. I avoid the word subsidized.

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because it is not a subsidy, it is a proof of work cross-financing, a second revenue stream that allows the customers to get a cash back on their heating activity. Now for the B2B sector, think of it this way that it's the same dual service, but on a larger scale. uh And this is also where Bitcoin mining offers three angles of utility. The one angle is that for asset

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owners for instance, it can provide a monetization, a price floor that they know and can rely on when they co-localize their or a bitcoin mine, a mining container with their as with the generation asset. It provides them optionality. can still, you know, I mean, obviously power prices are volatile, so they still have the option to

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service the grid whenever it is economically favorable for them, but when it's economically unfavorable for them, they have optionality to use the Bitcoin miner as a second source of income that provides them a price floor, tampering the vol, thus making the economics more predictable, thus giving them more economic stability. So this is for the asset owners.

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But at the same time, we're designing our containers in a way that they can serve a second purpose. And the second purpose is truly one for grid stabilization. And if you don't mind, I just want to go very briefly into grid stabilization because I think it's such a misunderstood topic and it's a very elegant and interesting topic, um but it needs to be understood from a physical point of view. Power on the grid runs

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in a certain frequency. And that means a certain speed. And the speed needs to be coordinated because all the grids in Europe are connected and operate on the 50 Hz frequency. Only then the coordination of the activity on the grid and the brokerage between supply and demand can be ensured. Now, if there is more supply than there is demand, then frequency would increase. If there is more demand than supply, frequency would decrease.

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this is where frequency stabilization infrastructure or reserve capacity comes in. So what this means is that there is a whole line of defense, first, second and third order line of defense that ensures that if there's too little power in the grid that immediately new power comes online so that the grid frequency can be re-established at 50 Hertz. Vice versa if there's too much power in the grid

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there need to be very flexible off-takers that can take this power whenever their surplus is available. And especially for the second case of what is called negative grid balancing, where there's too much power in the grid, Bitcoin mines in their opportunistic nature can also play a very important role. Now this is from an economic standpoint incredibly important and relevant. Why is that? Because to

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provide this reserve capacity and the ability to offtake power whenever there is too much in the grid is economically a very attractive business case. And I would go a little too far now but to go into the nitty gritty details of that. But think of it this way that these Bitcoin mines, once they are pre-qualified to participate in those markets which we're currently working on, they can monetize the

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bidding off this capacity into the market so that the the plan stills the the mine still sits idle it does actually nothing it just bids capacity of taking capacity into a market and is already monetized for it so the readiness to off take power is already monetizable and then on top of that once there is a real bid that is won the mine can off takes the power it mines bitcoin with it

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But is even compensated for that. So suddenly we're unlocking two new revenue streams um of reserve capacity bidding plus off-taking of the power where we can again monetize the power that is actually off-taken uh through Bitcoin mining. what this tells us is that if take the two use cases together

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where we help asset owners to monetize their stranded and distressed power, while at the same time the container can bid into reserve markets and say I'm monetizing the power here, but if you want me, dear market, to take off power, I can do that. And it already gets monetized and compensated while it does that. Why is that good for asset owners and operators of this infrastructure?

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because suddenly they unlocked several revenue streams at the same time. But there is a huge win for the grid because we have enlarged the reserve capacity that allows us to stabilize the grids as more renewable power comes online, as more volatility comes into the flexibility markets. And so what we can do here is we can provide economic values for the operators of

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those infrastructures while providing altruistic um value to the grid and stabilizing the grid, which takes costs for this flexibility management down, which will ultimately also take wholesale power prices down. Now we're talking in the large gigawatt capacity. So we are only at the beginning to tap into this and teaching potential operators

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of the value of Bitcoin mining and how this can be good for them to boost their economics. But once this catches on, we believe that it will be one of the superior methods and

infrastructures because of its costs, because of its flexibility, because of its geo agnosticity that uh will serve as a reserve capacity to stabilize the grids. And that is obviously then a huge opportunity for Europe to

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regain competitiveness in the future. Yeah, you just nicely outlined the two revenue streams that Bitcoin mining affords or offers. Nevertheless, in our exchange before this very recording, you stated clearly that large scale industrial mining won't come to Europe. my perspective now and probably agree that is actually a feature, not a bug. Yes. So it's good.

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as it is. then what is then the European model for Bitcoin mining and why is it fundamentally different from what we've seen develop in North America or the Middle East, where Bitcoin mining certainly looks different than here in Europe? Yeah, that's a very good question. um There are several angles to this. One is one key difference between the US or North America

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and Europe is clearly that if we look at the distribution, a size distribution of generation capacity, then North America has a lot of huge and large scale, very centralized generation capacity. That is just a key difference to the European continent. If we look into Europe, yes, we have a couple of very large generation capacities, mainly the nucleus that are clustered, but

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But then we have a large shoulder that is sort of in the mid-range. And then you have a long tail, is not so much relevant, which is uh more the retail phenomenon then. And I think that is already a core difference. These large generation, large off-taker relationships like we have seen in the US, they are not even technically possible because we just don't have the hyperscale uh power generation that we've seen in the US.

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That is already out of the equation. then secondly, think the US has recognized the value of Bitcoin mining and its role that it can have as a guaranteed off-taker and as an energy infrastructure earlier than Europe. So that means that, especially in Texas, for instance, where we look at these large flexible loads in the gigawatt range.

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Yeah, that's unthinkable in Europe from a concentration perspective. They have just done this. They've recognized this earlier, which meant that it allowed them to also build out the PPAs and the purchasing power purchasing agreements that lasted for years and made these relationships very profitable. Now, uh one word of caution here. I do strongly believe that the big days of

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Large centralized industrial mining are over anyways, because the PPAs in the US, they will soon run out. There is a new kid on the block that demands... Can you elaborate on PPA for the non-power purchasing agreements? But if you take very large generators and very large off takers, they usually do not buy the power on spot or on future contracts, but they buy it on a flat rate.

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these flight rates are agreed over very long periods of time. That means um you and I, agree the kilowatt hour that you provide to me as a base load 24x7 costs me as an off taker three cents. That is good for you because you know your economics over the next 10-15 years. That's good for me because I have a locked in price and I can build my economics on top of that. It's a very

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traditional way of establishing a regime between large generators and large off-takers. And exiting those contracts is very costly. For obvious reasons. But now these contracts are already running for 10 years. So they are getting to the end of the lifetime. And now we have with LLMs and large language models and the AI

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CapEx, Spoom, a new off-ticket that provides much better margins, because it's a much higher margin business. And so these generators are now starting to think, well, I can make a case now if I exit my contract now, let's say three years before maturity or four years, whatever, I pay this amount of fine, but I can refinance that so quickly with a new power purchasing agreement with the AI data center.

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which gives me much better profits, that might be a considerate thing to do. So I expect that the big mining infrastructure and the mining data centers in the US will get increasingly under pressure because they will run out of cheap power that they can use for their mining operations. So I expect these operations to become less and less profitable once these power purchasing agreements run out. Why do I say this?

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because I think that Europe has exactly that opportunity. The future of mining is not to be concentrated in large data centers next to large generators, but be decentralized, modular and put into these pockets of inefficiency within the energy systems that allows you to monetize maybe not only once, but twice or three times.

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So we have not talked about heat reuse yet. So these mining containers, they also produce heat. I can start to reuse the heat, which is another revenue stream that allows me to monetize my mining operations. So what we see is that there's a possibility to stack revenue streams if we identify and describe those pockets of inefficiencies correctly and adequately and provide the right solutions for it. And that will make

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hash rate contribution overall to the network, but it will also contribute a very resilient hash rate. What I mean by that is, know that Bitcoin goes through boom and bust cycles. This is the nature of a monetizing asset. And mining can be under a lot of pressure once the Bitcoin price falls while the hash rate still is resilient and increasing. And that means that pure mining out of a PPA or of cheap power is

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sort of an idea of the past and the future is modular with multiple revenue streams, some of which ideally are even not correlated with Bitcoin mining. Like the example that I was giving you, the bidding of off-taking capacity into these reserve markets, these flexibility stabilisation markets, is a dollar denominated or euro denominated revenue stream. It has nothing to do with Bitcoin. And that constitutes a revenue stack that is

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elegantly decide to build for lot of resilience and profitability boosting of operations. All right, so at least the two of us agree that large scale mining farms won't work here in Europe. Instead, I propose Europe's model, as you just described, is more distributed, more modular, so containers placed at renewable generation sites.

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Bitcoin heaters like the ones you produce to sit in homes or businesses. And a single installation might be, let's say, 50 to 500 kilowatts providing mining revenue, usable heat, and the grid balancing services that, if I understood correctly, in themselves are a revenue stream. Correct. Exactly. Yeah. And the scale then comes from the aggregation.

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So let's take 10,000 Bitcoin heaters equal to 10 megawatts of flexible distributed load that can respond to grid sickness in real time. This integrates into existing infrastructure rather than competing with it. And the value proposition then isn't cheap electricity, but it's multiple revenue streams from the same hardware, right? 100%. And the cool thing about this is, you've mentioned it,

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that we as an operator and as a system integrator, can directly cascade those benefits down to the customer. Now, we are not 100 % there yet. You've mentioned the aggregated nature of the hardware. There is a strong regulatory push in Europe that we must incentivize and must welcome from a regulatory standpoint, all use cases that help to prevent curtailment of power.

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So in Germany it's called Nutzenstab statt abriegeln, what is called uh use it instead of curtail it. But all European nations have similar regulations in place. And that means that if we now can provide a service, for instance, that the aggregated capacity of a lot of heaters in homes serves as a reserve capacity for grid stabilization, which we're working on, and this is going to be part of the next generation of our hardware. The user never sees that

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their heaters are bidding into reserve markets, but they profit from the monetization potential that this service entails or gets compensated for. And that means that we can directly convert physical services into monetary benefits for the customers. And I think this will catch on both from the B2C side of things as well as from the B2B side of things.

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Yeah, so by now we established that large scale mining farms won't work here in Europe, but rather a more modular approach is likely to work. And now I also understand that Europe actually has quite some uh good regulatory preconditions for that. So Mika markets in uh crypto assets regulation provides clarity on Bitcoin as an asset and energy regulations offer a significant room for Bitcoin mining.

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You just described that there is this actually regulatory appetite or desire for making that possible. So this seems counterintuitive now given Europe's reputation for heavy regulation. So what do institutional players need to understand about the actual regulatory landscape when it comes to Bitcoin mining? Yeah, that's a very good question. And I think you framed it the right way. Europe is not known to push a pragmatic, progressive

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clear legislation in the first place, or it doesn't have the reputation, but it might be one of the ironies that regulation gets written a certain way and then people get creative and we start to understand better how existing technologies that might not even have been on the radar of the regulators start to fit into this picture. And we get this question a lot when we talk to institutional actors because there's still

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From their perspective, there's still a career risk and the reputational risk to engage with the technology. And so they are very, very keen on understanding on which soil do I operate here. How robust is the regulatory clarity? In other words, how much can I get into trouble if I engage with these technologies? And there's all kinds of psychologies out there. There are some that say, oh, I'm super fine with it. It's here to stay. I want to be first and I move.

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and others that are very hesitant or even have to overcome standing board decisions that say will not engage with this technology. That stemmed from 2018 or 2019 and a oh lot has changed since then. But specifically to your question, when we look at the EU regulations that really really matter, there are three of them. There is the so-called RED3, the Renewable Energy Directive 3. There is the EED2, the Energy Efficiency Directive 2.

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and there's the EMD, the European market directive. Go out there, find them from, they are translated in all languages and as they have the nature of a directive from a European legislative standpoint, that means that it technically supersedes national law, but it gives the national sovereignty the opportunity to interpret that directive.

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based on the national circumstances. And I think that's a very clever way of doing it because it creates sort of a guardrail on the European level, but it allows individual states to interpret the directive as to their needs. Scandinavia is different to Italy. Sweden has a lot of hydropower. Spain has a lot of solar PV. So the situations are not the same. But what it ultimately says is

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We need to build out renewables, which is qualified as renewables. We have just made the case for it. If we cannot make existing infrastructure economically viable, there is no investment incentive and investment signal to build out new renewables. So Bitcoin mining can help to bid for this power that is sort of not absorbed by the normal market, can provide a price floor, can provide an economic floor, thus

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provide clarity for future investment decisions. The energy efficiency directive very much states two things. We need to sector couple power generation with as many sectors as possible. So the infamous German hydrogen idea also originates in the ED2 that we can store surplus power in hydrogen and then use it for other industrial applications.

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This is a good example why Bitcoin mining is superior there, because the capex and the opex for running hydrogen power plants is so high that it doesn't make sense for the majority of the generation. So if we want to make these markets more efficient, we need something that is less costly, more flexible and still provides the economics to make supply and demand markets in the different capacities more efficient. On the other hand, sector coupling

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Power to heat is a strong incentive within EED2, which means that if we run computer infrastructure, we should and have to reuse the heat. Now, this is not that the industry has pushed for that and said, oh, we love to reuse the heat, because of course it's additional costs that are accrued through these operations. But I think it's a very good thing that we incentivize.

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compute infrastructure to reuse the heat. Bitcoin mining does this already most efficiently either through intelligent modular approaches or through mining equipment that has the heat reuse already built in. And thirdly, just to give you an example, an energy market directive, it essentially says our markets are inefficient, they are not efficient enough, so we need to welcome any actor that provides a

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positive smoothening effect of the inefficiencies. So we are not allowed to discriminate any participant, any off-taker of power in the markets that can help to make markets or the energy markets more smooth and more efficient. And I think this is a key element because

this is the license to operate for institutionals to say well Bitcoin mining is an off-taker of power. I use it

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in line with EED2 and RED3. I can make the case for it. And the directive gives me the clarity that my activity as a Bitcoin mining operator cannot be discriminated in the power markets. So what you're saying, summarizing, is as expected, Europe actually has excellent regulatory foundations.

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MyCar provides clear rules for Bitcoin as an asset class, thinking of custody, trading, taxation. On the energy side, directives like you outlined, the RED or RED3 actively encourage flexible consumption and demand response. So the gap we are having in Europe isn't regulation as expected.

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but it's actually awareness, isn't it? So energy companies don't yet understand Bitcoin mining as infrastructure. Politicians here crypto mining and tend to think of speculation, not grid stabilization. So our work, our conversation here, the podcast involves education, course. So showing grid operators how distributed mining provides

46:13

balancing services, we want to show institution as how it monetizes stranded assets, showing policymakers how it supports energy transition goals. So the regulatory framework is ready. Now stakeholders need to understand and catch up. That's perfectly summarized. I've recently written an intelligence piece for the Swiss Bitcoin Institute where I am proud to be a fellow as well on exactly that topic where I invited

46:42

different stakeholder groups to come together because this is the critical time where we need to talk and legitimize the activities from different angles. see that the industry wants to engage with this technology and we also need to educate legislators that do not really understand their role in how they can support and legitimize this activity.

47:09

for the private sector. So what we're advocating for, this is what we do in Switzerland and in Austria, is to bring together different stakeholders where they sit actually at one table and where they look into each other's eyes and say, well, from my side, it's a go. I was recently at a parliamentary hearing in Switzerland and the canton of Bern on this very topic where executive branch of the canton of Bern has put forward a motion to study Bitcoin mining.

47:36

as uh net positive for grid balancing and grid balancing and power supply chains. And the legislator said, from my side, it's all clear. I don't understand what you want from us. And I responded, yes, but the industry needs to hear it. And I think this is what we try to do with Ibea, with the European Bitcoin Energy Association, where we translate legislation for the industry, but at the same time, showcase how large the

48:04

push from the industry is for legitimacy from the regional and local legislators. if amongst your listeners, there is someone who feels compelled to hold the torch on that and either from the the legislator side or from the practitioner side, please reach out. need every one of us with this critical mass emerging. And I think it will be for the net benefit of all. yeah.

48:32

It's a great opportunity for us to have 21Energy, you as its chief growth officer here. And the opportunity is in the proprietary insights you get and the thought leadership you

produce. Because you operate or work across 37 countries with 21Energy and your board position at the European Bitcoin and Energy Association also gives you

49:01

important or even proprietary insights there. So based on your work across these 37 countries and your position at the European Bitcoin and Energy Association, my question is, what's now the single most important thing that European institutions, be it enterprises, financial institutions, policymakers, still fundamentally misunderstand about Bitcoin mining's role in our European energy systems?

49:30

If I boil it down to one, it's the gap to understand that Bitcoin mining doesn't sit outside or auxiliary to the energy system. Bitcoin mining is the energy system. It's one new demand or off taker of power that has very unique properties. And it does not matter what we produce with those properties.

49:57

If we boil water or if we cool our fridges or if we charge our EVs, we're not questioning really what we use the power for. We just do it. So there is still this idea that is something that is foreign to the energy systems that we need to learn to accept or bring in. It's already right there. People are doing it. The use cases are there.

50:25

And it's really just the acceptance piece to say, yes, I embrace that piece strategically. You mentioned a lot of important stakeholders. The asset owners are so important because they feel the stress of compromised economics on their assets. The grid balancers feel the costs of flex management. The financiers, the infrastructure funds, they are looking for new ways to stabilize

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the returns or even boost the returns of the infrastructure investments. So we're now starting to learn what this new demand, this new off-taker can actually add to the economics of the stakeholders in the energy value chain. And this is something that will still need a little bit of time where we need a lot of conversation and a lot of critical thinking for. But first and foremost, we need

51:24

courageous actors that are willing to talk about their use cases. And this is where we are still lagging, I would say. But my call out to the value chain of the energy sector is truly the burden of proof how Bitcoin mining or what Bitcoin mining is and how it can be useful does not sit with you anymore or with Bitcoin miners.

51:52

it sits with the people who oppose it. It's a mental shift that we need to take there to say, the numbers are there. We know how to operate this. We know how to run it. We know how to install it. We know how to finance it. The burden of proof is not with us anymore. It's not that we have to say why it is good. You need to make a better argument who opposes it, why this is not good. And I think this is where we are still lagging a bit in the 2017 Bitcoin

52:21

uses so much energy in narratives. So let's be courageous about this. We are here to help with developing those narratives and defend them and socialize them. And as always with Bitcoin mining and Bitcoin as a whole, the first movers will see asymmetric benefits from it. So your courage will be rewarded. This has been a masterclass in thinking about Bitcoin mining beyond the hype cycle.

52:47

and the pilot amount announcements and heavy price action happening in the market right now, which I hope doesn't affect you too much. The infrastructure lens we adopted, so viewing mining as critical energy infrastructure that must be integrated into European energy systems, gives us a much clearer and concrete way to understand where we are, where we need to go and who needs to do what.

53:14

and the urgency around grid stability, the opportunity around energy sovereignty and the regulatory clarity that actually exists in Europe paint a very different picture than most of our audience probably expected when it comes to Bitcoin mining. So thank you for bringing such technical depth and practical experience to this conversation.

53:36

Where can people follow your work and 21energies work and stay updated on your progress building this infrastructure across Europe? Well, thank you, Michael, for the kind words. My pleasure to be able to share this and thanks for providing the platform. I'm quite active on LinkedIn. So you find me under my clear name, Harald Rauter and on Twitter, which is also my handle at harald.rauter. can follow us on

54:02

both platforms on the European Bitcoin and Energy Association, EBEA. Please follow as well the Swiss Bitcoin Institute, which sort of also tries to consolidate the different angles of Bitcoin um through Intel briefs that should provide a lot of value for the readers. And last but not least, we're active on all platforms with 21 Energy as a company.

54:28

across all the different domains. I hope you get a better picture of where we stand in terms of the progress that we're doing. There's a lot in the tank which we want to build out next year. So stay tuned for more. you very much, Harald. I really hope that wasn't our last conversation either here at BFRR or at one of your associations or 21 Energies events.

54:55

To our audience, thanks for listening to Bitcoin Fiat Rock and Roll. Thanks Harald for your insights and for helping us understand how Bitcoin mining can become critical energy infrastructure for Europe's energy transition. Connect with us on YouTube, LinkedIn and our expert community on Telegram, both in German and English. For details, check the show notes, please. Harald, you're of course invited to join either of these Telegram channels where we discuss Bitcoin and its mining also heavily.

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Visit our website bfr.info for detailed analysis and complete show notes from this episode, including links to 21 Energies products and resources on Bitcoin mining as energy infrastructure. And do make sure to subscribe to Bitcoin Fiat and Rock'n'Roll wherever you get your podcasts and join us next week when we'll be exploring another critical development in the evolution of digital finance. Until then, this is Bitcoin Fiat and Rock'n'Roll.

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bringing Europe's perspective on digital money to the world. Thanks for listening. Thank you.