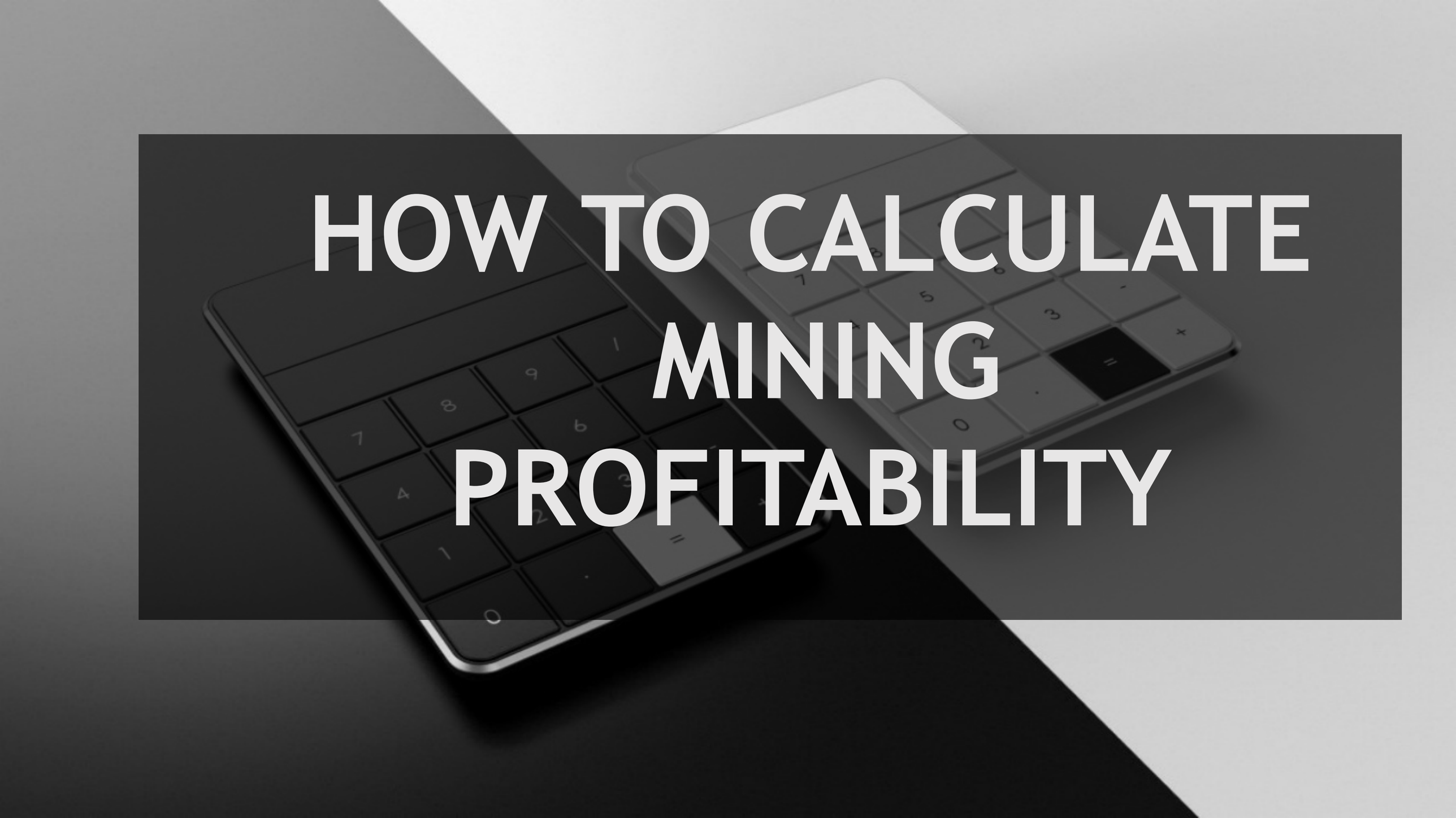

HOW TO CALCULATE MINING PROFITABILITY

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Are you serious about mining cryptocurrencies? If so, you need to know how to make the best use of your money and equipment. In this guide, we'll show you how to mine your digital treasure in the most profitable way.

Obviously, the big money is going into costly bitcoin ASICs. If you are already in that position, you probably know how the process works and are intending to mine bitcoin. However, those of you on a more moderate budget are probably looking at building a GPU miner for scrypt currencies, or a buying a small ASIC machine for bitcoin or other SHA-256 currencies. In that case, you have come to the right place.

HOW DO I START?

CHOOSE YOUR CURRENCY

Digital Puzzle

The process of mining digital currencies involves solving complex cryptographic puzzles. By doing this, miners are providing 'proof of work' that is rewarded with digital currency. Broadly speaking, there are two proof-of-work hashing algorithms in use today: SHA-256 and scrypt. Note that there are some lesser-used alternatives, which we will not be looking at in this guide (for example, Primecoin).

SHA-256

The SHA-256 algorithm favors raw processing power. In bitcoin's very early days, one could mine effectively with the CPUs and GPUs (graphics processing units) that you find in a normal home PC. That time has passed, however, and the difficulty level of bitcoin is so high that specialized processors known as 'Application Specific Integrated Chips' (ASICs) are needed to mine it. The use of such powerful processors, along with bitcoin's exponential increase in difficulty level, have created a technological arms race, which means that even quite recently designed chips can quickly become obsolete.

Scrypt

The scrypt algorithm favors greater amounts of RAM and parallel processing ability, which is why GPU-based rigs are still the way to go. Furthermore, ASICs for scrypt have yet to take off, so the difficulty level of those currencies has not been pushed up as dramatically as has been the case with bitcoin.

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THE RIGHT RIG

Depending on your budget and the type of currency you intend to mine, there are two ways to go when setting up your mining system:

DIY Mining Rig

These can be built from your own PC, with as many graphics cards (ie: GPUs) as you can fit or afford. While some people may use a standard PC case, many use unusual casings, such as beer crates, which allow for increased air flow around the components. A bonus of DIY systems is that you can carry out both CPU and GPU mining at the same time.

ASICs

ASICs are self-contained units (power adapters not withstanding), which come with a USB and/or Ethernet port, and are usually ready made by manufacturers. ASIC miners are usually more expensive than DIY rigs and are mostly produced in the USA, which means those of us in other parts of the world will have to spend a little extra to get them imported.

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POWER UP

MINING RIG

Mining requires electricity – lots of electricity. If you are building a DIY rig, you'll be getting an ATX power supply unit (PSU) anyway, so it's worth investing in the most efficient supply you can get.

Consider the following two cases, for example: A PSU that is guaranteed to supply 860W and is 93% efficient would actually draw 925W (860W/0.93). By contrast, a 750W power supply that is only 80% efficient would actually draw 937.5 W (750/0.8) – thus using more power, but supplying less.

When building a mining rig, you will need to take account of the power requirements of all the components you are using – especially all those graphics cards. Plus it's a good idea to provide some excess capacity to deal with unexpected events and provide the potential to overclock your system.

ASICs, on the other hand, can do far more calculations with far less power because they are highly specialised devices. And since they ship with an appropriate power adapter, you won't have to worry about doing all the maths to find one that is up to the task.

The mining efficiency of different systems can be compared by taking the ratio of the number of hashes it can perform in a second, divided by the power it consumes:

Hashing speed / power consumption = mining efficiency

CHECK YOUR BILLS

After the initial expense of your rig, the essential thing you need to know to calculate your ongoing profitability is the cost of your electricity. Check with your provider, or take a look at your last bill. If the power charges add up to more then you earn, it obviously isn't a good business model.

POOL YOUR EFFORTS

Rather than go it alone, it usually makes more sense to join a pool, where you combine resources with other miners. By joining a pool, you earn a share of the coins mined by all members of the pool and stand a greater chance of solving a block.

Miners earn a share of the rewards if the difficulty level of the blocks they solve is greater than the level set by the pool operator. That level is always somewhere between 1 and the difficulty level of the currency.

PROBLEMS TO BE AWARE OF

SPEND TO EARN

Inevitably, the difficulty level of all currencies increase with time – a fact that will reduce the chances of your equipment earning coins or mining shares. As a result, it is important to start with the best equipment you can afford, in order to mine profitably over the longest period of time.

The volatility of the currency being mined also affects your long-term profitability. If the price suddenly drops, you will be faced with the choice of either selling at a low price or hanging onto your coins until their value increases. In the former case, you would have to keep mining for longer to recoup your expenditure on equipment and electricity.

KEEPING COOL

Mining rig whichever way you mine, it’s a computationally intensive operation that creates lots of excess heat. Mining efficiency decreases as temperature increases, so make sure your rig has adequate ventilation and cooling. As mentioned above, this is why some mining rig builders use beer crates rather than PC cases – to maximise airflow around their components. Even a standalone desktop fan can help to keep your kit cool.

POWER PROBLEMS

When building a DIY mining rig, it doesn't make sense to save money by buying a cheap PSU. Any instability in the power supply could hit performance, or even cause a system crash that will lead to downtime, so do invest in a high-quality unit.

AVOIDING DOWNTIME

If your hardware isn’t mining, you are losing money. Here are some ways to minimise downtime:

Get the best power supply you can afford.

Consider using an uninterruptible power supply (UPS), so that, if your electricity supply cuts out for a moment, it won’t affect your miner.
Configure your mining computer to automatically start mining on start-up, so that if the system crashes and reboots, it will automatically start mining again. (This applies to DIY rigs and computers hosting an ASIC.)

HIDDEN COSTS

Losing money, there are costs involved with mining, of course, like the rig and the ongoing electricity costs for starters. However, some extras are less obvious:

Delivery and customs

We imported a Jalapeno ASIC miner from Butterfly Labs to the UK. The delivery cost £53 ($88), and UK customs charged £46.09 in duty (around $76). These costs are significant, and if you’re importing an item, try to work out beforehand what costs it might incur.

Accessories

Will you need cables, adapters, etc, for what you are planning to use and/or build?

COOLING COSTS

It’s not just the cost of your miner’s power use. What about the electricity of running any extra cooling system, such as fans or air conditioning?

DOING THE SUMS

PROFITABILITY CALCULATORS

For assistance with some of the calculations miners need to make, there are several websites that provide profitability calculators. You can input parameters such as equipment cost, hash rate, power consumption, and the current bitcoin price, to see how long it will take to pay back your investment. As a test, we entered the specifications of two mining systems into the calculators below. For our Scrypt GPU mining rig, we used the system described, and for our SHAS-256 ASIC miner we used the specifications of a Butterfly Labs miner.

With a UK electricity price set at £0.20 per KWh (which equated to $0.33), these are the recommendations and profits that the following sites presented:

DUSTCOIN:
SHA-256: Freicoin at $1.43 per day
Scrypt: Dogecoin at $31.05 per day

COINWARZ:
SHA-256: Bitcoin at $1.14 per day
Scrypt: Dogecoin at $39.13 per day

Bitcoin Specific Calculators:

Tradeblock:
Bitcoin at $1.20 per day

Bitcoinx:
Bitcoin at $1.42 per day