

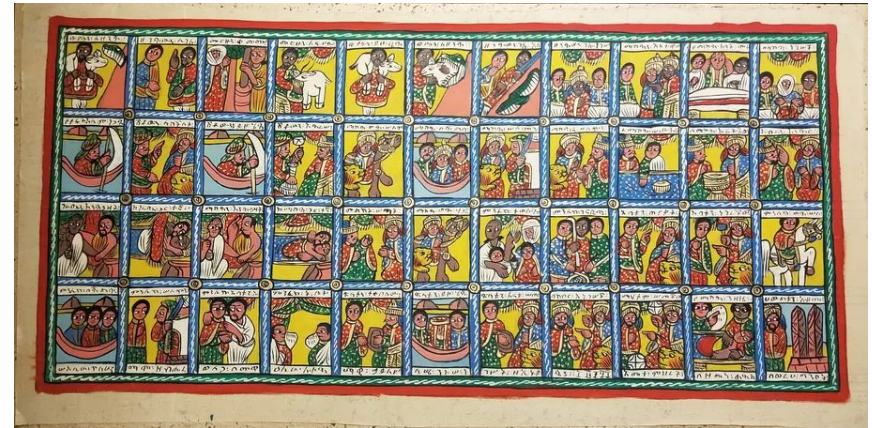
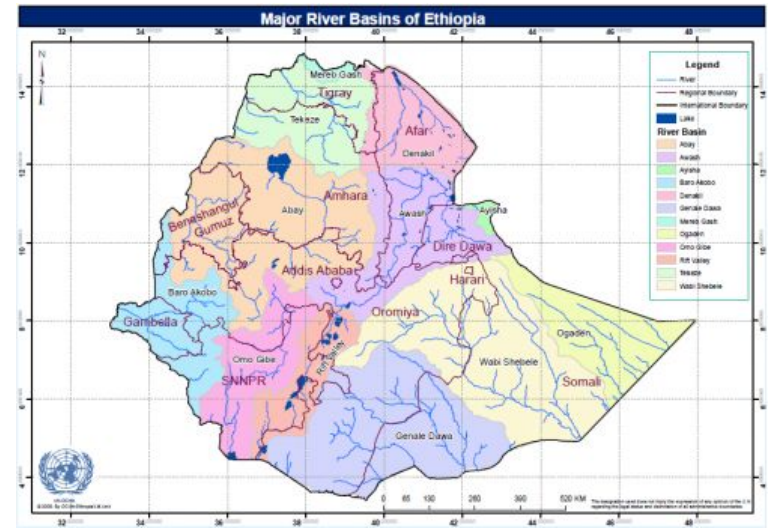
Bitcoin & Ethiopia's journey to electrification

Nemo Semret
QRB Labs



History & Geography

- Ethiopian highlands get a lot of rainfall
- Big rivers flow down to the Mediterranean, Indian Ocean, etc.
- Rivers are not navigable - little commerce
 - 900 BC - Makeda, legendary Queen of Sheba travels down the Nile to meet Solomon but that is an exception
- Little irrigation - so far
- But huge potential hydroelectric energy!

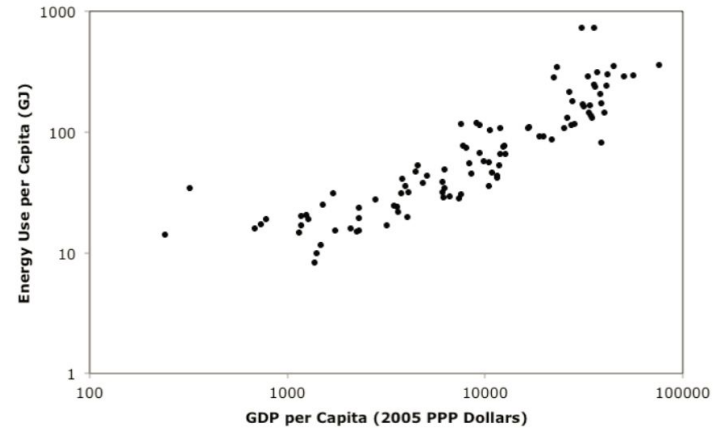


Electrification is a big deal

- 1kWh ~ \$0.40 GDP
- Energy improves human lives
- Only 55% of Ethiopians have electricity
- GDP/capita ~ \$1k/year

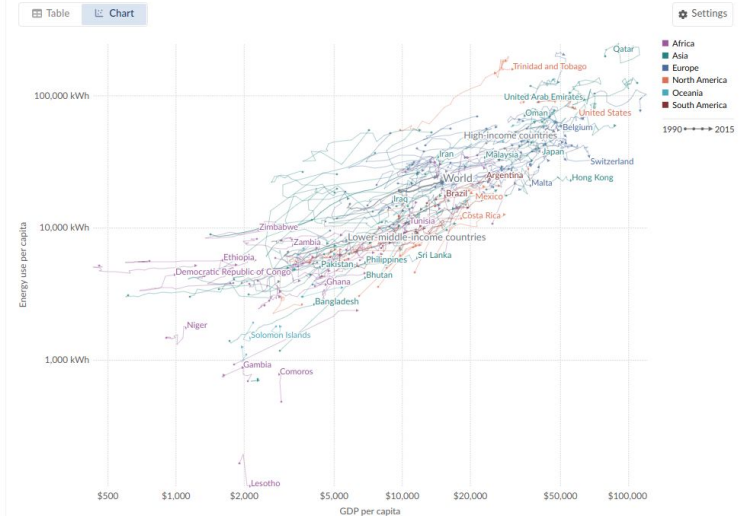
There is no greater investment in humanity than increasing electrification in Africa

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GDP per capita vs. energy use, 1990 to 2015

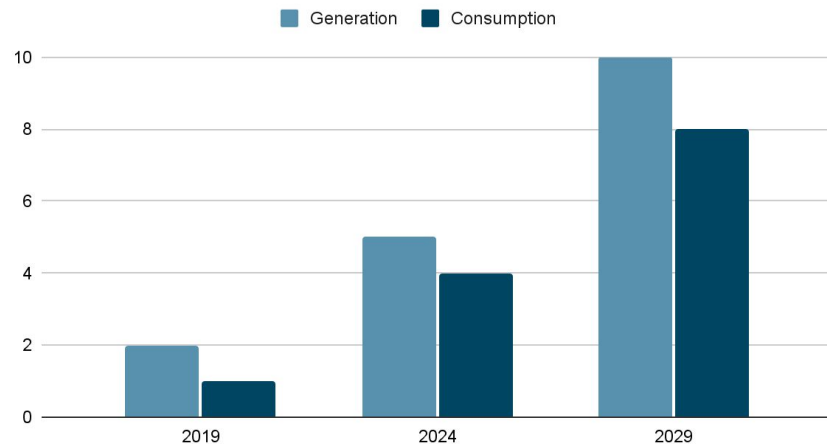
Annual energy use per capita, measured in kilowatt-hours per person vs. gross domestic product (GDP) per capita, which is adjusted for inflation and differences in the cost of living between countries.



Ethiopia's journey

- Rapid growth in electricity generation: almost 3x in 5 years!
 - Grand Ethiopian Renaissance Dam on the Blue Nile is just one project, 6GW, \$5B in 15 years
- Transmission and distribution necessarily lags
 - \$8B-\$10B must be invested to deliver the energy to the people
- Stranded energy
- Financing gap
- Bitcoin mining can fill the gap!

Electricity generation and consumption



QRB Labs

In 2020, we realized: Ethiopia is one of the best places in the world to mine Bitcoin

- Electrification!
 - Great for the country
- Decentralization!
 - Mining in Africa is great for Bitcoin
- Greening!
 - Electricity in Ethiopia is 92% hydro and 98% renewable

Founded QRB Labs in 2021

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Plan:

1. Negotiate power purchase
2. Deploy modular data centers and miners
3.
4. Profit!

But...

Importing the first mining rig (ASIC computer)
took **26** months!



Fundamental theorem of Ethiopian Bureaucracy

Everything is **forbidden** unless explicitly permitted

Most countries work in blacklist mode, but Ethiopia works in whitelist mode. Many positive reforms but anti-economic freedom legacy is still heavy.

Corollary

Challenge is not where you expect.

E.g. for Bitcoin miners:

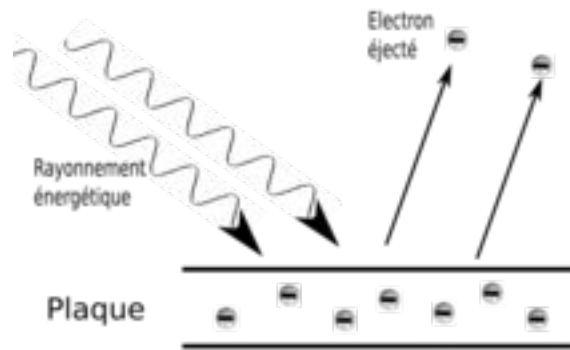
- Energy provider 👍
- Central Bank, Ministry of Finance 👍
- Cybersecurity controls hardware imports 👎

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2024: Annus Mirabilis – 0 to 600 MW

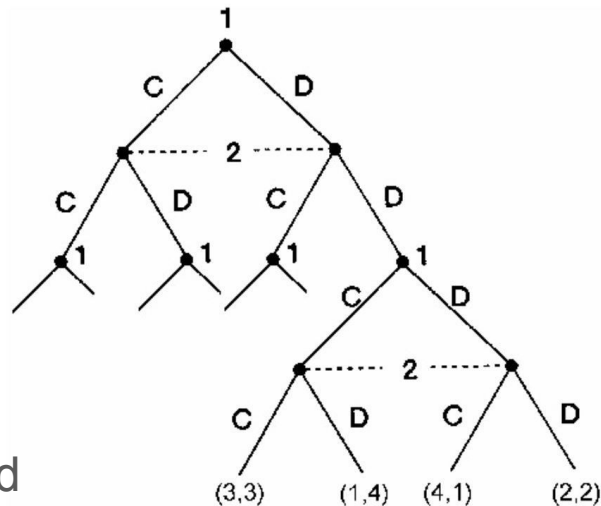
- At the end of 2023, the floodgates opened! 21 companies got permission to import mining rigs
 - 19 Chinese
 - 1 Other
 - 1 Ethiopian – QRB Labs 🙌
- Lots of irony
 - unwritten/unpublished rules which favor foreigners
 - constant need to ask for permission
 - tax uncertainty
 - risk of political interference in pricing
- But at least we got it started!
 - Ethiopia now accounts for 2.5% of the global hashrate
 - 600MW of mining consumption with more coming online



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The danger going forward

- Electricity grid is a very complex beast
 - Too much energy in one place and too little in another
- Bitcoin miners can stabilize or *destabilize* the grid
- **Incentive compatible pricing** of energy is key
 - Aligning miners with the benefit of other users
 - Stranded energy should be cheap
 - Non-stranded energy should be expensive



The ugly

- Potential for corruption
 - Bribery + bureaucracy: a vicious cycle
- Theft of energy is tempting
 - Not paying or paying below the market value for electricity, make profits at the expense of the people
- Opportunity cost of government mining
 - Tempting to get cash from mining, not paying real value for energy. That is cash flow positive, but in reality unprofitable! We don't want African citizens subsidizing the Bitcoin network!
 - Misallocation of capital – diverting money that should be used for infrastructure
- Worst case: the **resource curse!**



Lessons of Mining in Africa

- Don't s*** where you eat
 - Bitcoin is a great force for good in the world, especially in Africa
 - Let's make sure *mining* is a blessing and not a curse!
- Don't p*** on my head and tell me it's raining
 - Foreigners, don't engage in corruption and theft and
 - ... then say "This is Africa"
- Remember to slaughter a sheep

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