

How Much is a Trillion?

When the numbers get big enough, it can be hard to wrap your head around just how big they are. I have a pretty good handle on \$20 or \$100, amounts I can actually hold in my hand. One thousand dollars is a little more abstract, but still reasonable – maybe half of my rent or mortgage payment, so still pretty concrete. Elon Musk was recently – and briefly – said to be a “trillionaire” with a net worth (the total value of everything he owns) of one trillion dollars. That’s a little harder to get a good feel for. So I decided to play a little game – a “thought experiment” if you will – to get a better idea of just how much money that is.

In this game, every person in the United States has to send me some money, and there are currently about 342 million people in the US. If I wanted to be a millionaire, everyone would have to send me about 3/10 of a cent (if everyone sent me a penny, I’d have over \$3-million dollars!) If I wanted to be a billionaire, everyone would have to send me about \$2.93. If I wanted to be a trillionaire, everyone would have to send me just under \$3000. (That ramped up pretty quickly!)

Of course, Elon could just give me *his* trillion dollars, since he is the only person on earth who could do that, and even then only on a good day. Should that happen, and I am not holding my breath, I promise to only use that wealth for good, a promise he never made and probably never will.

What Does This Have to Do With Data Centers?

The current boom in data center construction, of course, stems from the rise of artificial intelligence and the belief that businesses (and maybe the rest of us, too) will see huge financial gains from its widespread use. Mega-corporations like Meta, Google, Amazon, Tesla/SpaceX and others are buying up huge amounts of land to build the gigantic data centers to support their AI. Clearly, the expectation is that AI adoption will continue to grow, and with it the need for more data centers. Since a simple AI query uses 10 times the computing power of, for example, a Google search, AI will “need” at least 10 times the computing capacity we now have, and most of that will live in dedicated data centers.

Not to pick on poor Elon, but his current near-trillion-dollar net worth stems in large part from his promises of what AI will deliver: the long-delayed self-driving cars and humanoid robots that will supposedly transform our lives “for the better”. And all of those dreams of his (and the hopes of his investors) hang on the existence of the data centers needed to support all of that AI.

Where Are Those Data Centers Going?

Not in Vermont, at least not so far, but pretty much everywhere else where land can be bought. Some of them take up space that used to be productive agricultural land. Some of them are being wedged into urban and suburban areas, much to the dismay of the residents of those areas, who will have to put up with the noise and visual blight of those new data centers. Apparently, “Not-In-My-Back-Yard” (NIMBY) has not been enough to stop them as many get government approval with little or no advance notice. Always the “visionary”, Musk has even proposed launching thousands of data centers into space, with potentially huge environmental consequences.

What the residents who live near ground-based data centers also get is higher electric rates, as the data centers consume huge amounts of power from the grid. That increase in demand has already raised electric rates for everyone. Even if data centers come with their own power generation they are far from neutral in terms of cost, and especially when you factor in environmental impact.

And don’t get too complacent about there being no new data centers in Vermont. This is a proposal to use the former Vermont Yankee nuclear site to build a data center. That project may be several years out, so there is still time. Expect that other Vermont projects will surely follow.

The Environmental Cost of Data Centers

For reasons known only to them, our tech moguls mostly opt for gas-turbine-powered generators for their data centers’ electrical needs. That means more fossil fuel use, more carbon into the atmosphere, and more localized heat islands around the data center and its attached power generation. At least one article I found describes the level of pollution they will generate as “unfathomable.”

There is also a movement to use smaller, dedicated modular nuclear reactors to power data centers, but that technology is still being developed. It would also potentially place nuclear reactors close to population centers which is, to say the least, less than ideal.

One answer, of course, is to power data centers using renewable energy – solar, wind and geothermal, along with dedicated power storage. Since the cost of renewable, green energy with storage is already below the cost of new fossil fuel generation, I am puzzled that green energy is not the default. Musk has recently purchased a company that builds gas turbine generators, which shows his dedication to fossil fuels, despite his history with solar and storage technologies. If he and others building data centers are using AI to make these decisions, I really have to question how good their AI actually is.

But It's Not Just Electricity and Fossil Fuels

Wait, there's more: data centers require large amounts of water to help keep their huge number of CPUs from melting down into a giant puddle of silicon and toxic metals. That water will come from the same sources as our drinking water and existing water use for agriculture and business. The need for water for cooling is so critical that China has been experimenting with sinking data centers into the ocean. (To their credit, that prototype undersea data center used wind generation for power.) That scheme appears slightly less far-fetched than launching them into space, but comes with its own potential threats to local ecosystems should, for example, someone get the idea that it's not that big a leap from data centers sunk in the ocean to data centers sunk in a lake somewhere in Vermont.

Let's Take This Back to Vermont

In their most recent session the Vermont legislature passed a bill addressing some of the concerns about data centers. One of the most important provisions in the bill would have been the requirement that any new data centers use renewable energy. Governor Scott vetoed the bill, purported because it wasn't "business friendly", fearing it would discourage businesses from investing in Vermont.

It is worth noting that lobbying from industry groups, including at least one supported by Koch Industries, was instrumental in ensuring Scott's veto. Note also that the Republicans who initially voted for the data center bill ultimately

voted to uphold Scott's veto. Presumably, the Governor and his supporters in the legislature are in favor of mega-sized data centers in Vermont, along with their associated fossil-fuel power plants.

What Can We Do About It?

The most important thing you can do is vote in November. Find out where your candidates stand on this important issue, and vote for the ones you agree with. Make your feelings known once the election is over. In the next legislative session we need to address this issue again. With any luck, we'll have a veto-proof majority supporting a bill that keeps our electric costs down while protecting our environment.

Full Disclosure

I have spent much of my career working with computer and network technology, and I have spent much of that time working with (and in!) data centers. Compared to the giant data centers now being built for AI, these were on a more human scale: hundreds of CPUs rather than hundreds of thousands, a few thousand square feet rather than acres, and using grid power at a level that was barely noticeable.

I still have a couple of virtual servers "in the cloud" (which means "in a data center somewhere") that I use for web hosting and data storage – including for my campaign web site and others. I am not a Luddite: I embraced technology early and still use it extensively. I even use AI now and again.

Even so, I have mixed feelings about the current boom in AI. I suspect that, to a certain extent, it is being oversold. You can see this in stories about companies that have tried to replace much of their staff with AI agents, only to realize that they need people supported by AI rather than AI replacing people. Moving to AI seems cost effective; moving from an AI-based model back to a people-based business is more costly, but will probably prove necessary for at least some businesses now making the transition.

I'm also old enough to remember the "dot-com bubble" and the current boom in AI bears a lot of resemblance to that. Everyone jumps on the bandwagon without fully understanding the impact, and create businesses using AI that may not be based on valid assumptions. Right now, the future for AI looks all rosy from a

business perspective. Whether the future we envision actually happens remains to be seen. We owe it to ourselves to move forward with caution, and to make sure that unintended consequences are dealt with before they get out of hand.

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