**On the day this video is being posted, which is the 9th of July twenty-twenty-three, a regulatory organisation called the International Seabed Authority or ISA, will adopt regulations enabling them to grant licences for engineering companies to start mining the deep ocean floor for minerals that they plan to sell for a handsome profit on the global commodities market.**

**The companies in question claim their mining activities will cause no significant harm to life in the deep oceans and that the minerals they collect will play a crucial role in the so-called ‘green transition’.**

**In April twenty-twenty-three, environmental journalist, Lucy Murray, made an excellent documentary on the subject for the public broadcasting network, Al Jazeera. Following that video Lucy and I had a very interesting conversation via Zoom which brought to my**  **attentiona potential new industry, with global ramifications, which, to my great shame, I had not previously been aware of.**

**Since discovering the potential enormity of the ISA’s ruling, I’ve been on a bit of a research odyssey, and I’ve ended up with a set of difficult questions. I thought you might be interested to find out what those questions are, which is why I made this video. But I’m not sure you’ll be all that keen on some of the answers.**

**Hello and welcome to Just Have a Think,**

**Way down on the floor of our oceans, at depths greater than four thousand metres or thirteen thousand feet, there are ecosystems and marine species that we humans have barely even begun to explore, let alone fully understand. What we do know though, is that there are billions, possibly even trillions of these things, called polymetallic nodules, scattered all over the deep sea bed. They’re the result of a natural process called precipitation, where minerals that were either dissolved in the water, or which made up part of the ocean floor, gradually clumped together over almost unimaginably long geological timescales to form these sort-of golf ball sized lumps, just sitting there, apparently ripe for the picking, like apples from a tree.**

**For a proper detailed analysis of how that precipitation process happened over hundreds of millions of years, I highly recommend watching this superb video over at the Real Engineering channel, which you can jump straight to by clicking up there, or by following the link that I’ve included in the description section below here.**

**The nodules contain extremely valuable elements like manganese, cobalt and nickel, which are of course used in all sorts of industrial applications. I’ll come back to those applications a bit later on, and the details might surprise you.**

**The largest concentration of nodules is in a region called the Clarion-Clipperton Zone, or CCZ, located up here in the Pacific between Hawaii and Mexico. Just that one area alone covers six million square kilometres or two point three million square miles. That’s more than ten times the size of France.**

**Until relatively recently, there’s been no real economic incentive or technological capability to go down to such uncharted depths to collect these things. But now the mining companies tell us that it can be done, using a fleet of remotely operated vehicles or ROVs, that they say will act a bit like industrial scale vacuum cleaners to suck the nodules up to the surface.**

**But marine scientists, ecologists and environmentalists all over the world have pointed out some very sobering caveats to this ostensibly innocuous proposal, not least of which, as I mentioned earlier, is the fact that we humans only have a very sketchy idea of what ecosystems exist down there, how they interact with each other, and what role they play in sustaining marine life in the shallower waters where we catch much of our own food. We’ve only mapped about a quarter of the planet’s deep ocean floor so far and it’s reckoned we’ve only discovered a tiny fraction of the marine life that exists at that depth. By definition then, our scientists argue, it is surely impossible to quantify how much damage any disruptive industrial activity could cause. This guy is Dr Malcolm Clark from the National Institute of Water and Atmospheric Research in New Zealand. He’s one of the world’s most respected marine experts and he had a few observations to share with Lucy Murray as part of the Al Jazeera documentary I mentioned earlier.**

**Dr Clark points out that one of the few important species we do know about down in the depths are these things, called Seabed worms. Essentially, they’re scavengers that live off the carcasses of billions of marine creatures falling to the depths from above when they die. Without these worms the deep seabed would be lethally polluted. They also represent base level prey in an unbroken ocean food chain that goes all the way up to very large apex predators like sharks, and highly intelligent marine mammals like dolphins and whales, not to mention the** **countless species of fish and other marine creatures that make up such an important part of the diet of billions of human beings.**

**Any Seabed worms in the direct path of one of these machines will get sucked up along with the everything else, including the top few centimetres of the sea bed itself.**

**Research also shows that larger deep sea marine creatures depend directly on the nodules for their existence. For example, sea sponges anchor themselves to the nodules, and deep-sea Octopus lay their eggs under them and use them for protection. The dredging activity itself will whip up an underwater sandstorm that’ll clog up the feeding apparatus of seabed creatures and bury them completely as the sand settles back down again - a process that may also restrict the amount of oxygen that would otherwise penetrate to deeper layers below the surface. Long term studies on deep sea beds where mining has been trialled found that, even after more than thirty years, ecosystems show little or no recovery at all from what, to marine life, must feel like a category five hurricane.**

**The ’pragmatic view’ of the marine mining companies is that the world needs these minerals, so there’s no place for what they see as naïve idealism. They tell us they will make every effort to be as mindful of this uncharted marine environment as possible but that we will inevitably have to accept a certain level of collateral damage for the good of humanity. They say they’ll start small and then carefully analyse the real-world impacts before proceeding. That way, if they do find they’re causing unacceptable levels of damage, they will immediately stop what they’re doing and think of a better idea. I wonder what our own human history can tell us about how well that philosophy has been implemented on land-based resource management?**

**One company pressing ahead with explorations in anticipation of licences being granted is Moana Minerals. They’re working in close cooperation with the government of the Cook Islands with a view to initially mining nodules from just one percent of that nation’s ocean territory. That’s a deep-sea area of about twenty thousand square kilometres or about eight thousand square miles with an estimated five hundred million tonnes of nodules containing minerals with a potential market value that could be as much as ten billion dollars.**

**All coastal nations have their own internationally recognised ocean territories called ‘Exclusive Economic Zones’ stretching out a certain distance from their coastlines. Beyond that are international waters, known as ‘the area’, which is where the ISA comes in. The organisation was created by the United Nations in nineteen-ninety- four to police these international waters. It comprises a hundred and sixty-seven member states, plus the EU. It has the exclusive mandate to manage seabed minerals in waters beyond national jurisdiction on behalf of “mankind as a whole” and the responsibility of protecting the marine environment from any harmful consequences. It also has the exclusive right to issue exploration and exploitation contracts for minerals. By all accounts, the ISA is not what you might call a spectacularly transparent organisation. It's based in Kingston Jamaica. Its meetings take place behind closed doors with no minutes made available for public scrutiny. According to the International Justice Foundation, the ISA is highly intertwined with corporations, both through lobbying and by its institutional structure. And there are concerns that, in the longer term, its existence will be funded by revenues from deep sea mining itself, setting up a clear conflict of interest. Not all of the member states get to vote on licensing decisions either. There’s a small sub-group called the Legal and Technical Commission that does that. Each exploration licence costs about five hundred thousand dollars – money which goes towards the ISAs operating budget. To date, the Legal and Technical Commission has not rejected a single exploration application. After today, it will be this group that also approves exploitation licences allowing mining companies to actually go ahead and start dredging, possibly as early as twenty- twenty-four.**

**Over on the Cook Islands, Moana Minerals reckon their five-year exploration project to find the most profitable and exploitable zones within the one percent of Cook Islands ‘Exclusive Economic Zone’ will cost them somewhere in the region of one to two hundred million dollars. They also state quite categorically that if the International Seabed Authority votes against granting licences for Deep Sea Mining, the company will simply write off that capital expenditure and walk away.**

**Let’s take a wild punt the dark though, and make the assumption that the ISA does grant exploitation licences. How long do you think it will be before one percent of one nation’s coastal region grows into every last inch of the rich picking zones across the deep sea beds of all our oceans? 3 years? 5 years? 10 years maybe?**

**Seven hundred international scientists and marine policy experts have now signed a petition calling for a ten-year moratorium on deep sea mining to allow for much more in depth, and genuinely independent, research into its potential impacts. It’s not just scientists who are calling for a pause though. Companies like Volvo, BMW, Renault and VW all back the ten-year moratorium. Big tech corporations like Microsoft, Phillips, Google and Samsung have expressed their opposition to any form of deep-sea mining and have publicly committed not to purchase minerals from the deep seabed. There’s also an increasing number of nations voicing their concerns. The Island State of Palau was the first country to advocate for the moratorium, followed by Fiji, Samoa, Chile and Micronesia. New Zealand has suggested a “Conditional Moratorium”. Germany and Canada have called for a “Precautionary Pause” and France supports a complete ban on all exploitation of deep-sea beds. Even the European Commission itself has called for deep-sea mining to be prohibited.**

**So, are all these ‘naïve idealists’ putting our future green transition at risk?**

**Well, maybe not. Because here’s the thing…we might not need all these additional raw materials anyway. Some analysts have extrapolated today’s energy and raw materials usage as a straight line into the future simply by typing today’s energy and material consumption numbers into an Excel spreadsheet and multiplying those numbers by tomorrows projected global population and demand levels to conclude that the world doesn’t have anything like the quantity of metals and minerals required for the green transition. Other analysts though, have noticed the major technological disruptions already taking place in the global marketplace and have calculated that we’ve got more than ample resources to run the totally transformed world we’re moving towards. I did a deep dive on these contrasting views in last week’s video, so I won’t labour the point too much here, but just as a few examples…the world’s largest battery makers are already mass-producing cells containing no cobalt or nickel at all, and they’re now moving to sodium-ion technology that doesn’t contain any lithium either. And that’s not to mention myriad other energy storage solutions that use cheap, abundant and reusable materials. Couple that** **with huge advances in energy efficiency, a massive over build of renewables like wind and solar to overcome intermittency and rid our grids of fossil fuels once and for all, plus a rapid move towards a more circular economy where products are designed for easy repairs during their operational lifetimes, and folks like you and me are incentivised to properly recycle electronic devices, just like many of us do today with things like glass bottles, then you get to a model of sustainability that is orders of magnitude less resource-hungry, and which starts to looks much more optimistic.**

**And by the way, let’s not forget that one of the biggest consumers of these minerals is the fossil fuel industry. Cobalt-based catalysts are used in the petroleum industry for various processes, including the refining of crude oil. Cobalt alloys find applications in the drilling and exploration of fossil fuel reserves, and cobalt-based superalloys are used to make parts for gas turbine engines. Manganese is an essential alloying element in steel production, and steel is widely used in various aspects of the fossil fuel industry, including pipelines, drilling equipment, and infrastructure. Manganese oxide catalysts are used in the production of fuels and the removal of impurities from hydrocarbon streams. Manganese compounds like manganese dioxide are used in fossil fuel emissions control technologies like in coal-fired power plants, where manganese-based sorbents are used to capture and remove mercury emissions.**

**As for nickel, well it’s biggest use by far is in the production of stainless steel – nothing to do with batteries. But nickel can also be found in alloys and super alloys used in aerospace, power generation, and in the production of hydrogenation catalysts for, guess what, the oil and gas industry, petrochemicals, and other chemical processes. So, a rapid and comprehensive transition away from fossil fuels will bring yet another dramatic reduction in our dependence on the raw materials we currently dig out of the ground.**

**There’s an awful lot more I could say here about the motives, tactics and strategies of deep-sea mining proponents, and the fossil fuel industry in general, but I would probably stray into unhelpful conjecture, so I’m not going to do that. All I would say though, is if you think deep sea mining is a bad idea, then make sure you’re doing whatever you can to accelerate the move away from fossil fuels, and whenever you buy a big electric thing, like say, an electric car in the future, check where the raw materials come from before you choose which manufacturer to give your hard-earned cash to eh?**

**See you next week.**