Decision Time: The Cheshire Cat Method or STEM for a Net Zero Carbon Future?

written by Steve Mackowski | February 6, 2023

This is now Article 5 of the **Net Zero Carbon** series. In Articles 1 through 4 ("Net Zero Carbon and Other "Planning Dilemmas" starting with Rare Earths – Part 1", "Net Zero Carbon and other "planning dilemmas" – Part 2", "An ESG Armageddon, Net Zero Carbon and other "planning dilemmas" – Part 3", and "Is it an ESG Armageddon or are you The Survivor? – Part 4"), we have progressed the first two planning dilemmas facing a 2050 target of Net Zero Carbon, those being: Physical Resources and ESG Concerns. We now have to deal with Technology, Power Requirements, and Human Resources.

And, as I sit here thinking about the last three planning dilemmas to face and the order in which I will discuss them, I find my mind revolving in a circle. My thoughts keep jumping from one to the other to the other as the linkages become more clear. Perhaps that is it, they are linked. The resolution to the Human Resources planning dilemma depends unequivocally upon which Technology is utilized and which Power Requirement wins out. Follow the thinking. I'm starting with Human Resources.

As I discussed in the articles on Physical Resources, there needs to be an across-the-board explosion of new Critical Minerals developments to meet the source materials needed to achieve any Net Zero Carbon timeline targets (irrespective of the technology and the timeline of 2050) through the renewables route. Never mind the creation of Western capacity to refine the metals, configure the alloys, produce the componentry and install them within manufactured products. Where are the Human

Resources going to appear from? In Australia, I look at our Universities churning out non-STEM (Science, Technology, Engineering, Mathematics) graduates and question: Are these the non-STEM people needed to get through the Human Resources dilemma? I think not.

I look at our High Schools and find it impossible to picture these young environmentalists taking up STEM after graduation. I look at our Primary Schools and see what? Kids having days off to attend protest rallies to “Save the Planet”. I see nothing to encourage me that our education systems are geared, gearing up to, or, preparing for the STEM Human Resources challenge that awaits us to achieve the Net Zero goals that everyone seems to desire. Scary huh! Seems to me that THEY will do it! Not me! THEY.

But do not despair. There are examples. The Chinese did it! It took a couple of generations. I’ll come back later to that solution. The West achieved an unimaginable increase in its manufacturing efforts during WWII, so we’ve done it before. JFK also achieved a similar STEM focussed, an unimaginably large project, by putting a man on the moon. BTW would love to read a book on the planning dilemmas involved in developing such a space program. What a valuable reference. Would be a University classic must-read! That is if it was allowed on the syllabus. Can’t offend the Flat Earthers!

So, Physical Resources coupled with ESG Concerns and Human Resources to achieve Net Zero Carbon by 2050? Not to that timeline with renewables only, methinks! Oh, the Chinese solution. Relocate your impoverished poor to government-built accommodation. Educate them to meet the industrial revolution you are creating. Promise lifetime jobs. Could this occur in the US? My answer later.

You are all aware of how China has successfully taken over the industrial world, so I will not re-iterate that history here. But what I will relate to you, is a program I was a minor part of in the mid-’80s. As a large-scale iron ore company, we, like all others, wanted to export more. China was the target, although then, just a minnow!

“Let’s use Western knowledge to help them manufacture stuff out of our iron ore and we can buy that stuff back. Good for us, good for them. So let’s start making cast iron grinding balls in China”.

Result: early failures! Head Office response: *“these guys will never succeed”*. At the same time, an engineering friend of mine was researching the production of military helicopters. The objective was to pour molten aluminum into a cast for the helicopter frame in a single process with no joints (and no cracks on cooling). Why? Secrecy and flying radar blind. All that space race stuff. But never mind. Despite many attempts, they were not succeeding. I mentioned that the Chinese had been casting life-size bronze elephants with a 5 mm thin skin, meeting the same cooling parameters he was attempting to achieve with his helicopters for the last 1,500 years. The point? The point is that the Chinese knew how to cast. But they had yet to develop the industrialization skills needed to do it at scale. Boy, did they catch up in a hurry.

I have mentioned in articles and comments my exposure to the Chinese industrial technology degree process. This was China’s answer to accelerating STEM graduate numbers. All employees in rare earth value-add factories are University students. They are learning the practical side of the technology while studying the science side. Their tutors/lecturers are their supervisors and managers. And here’s the magic part. Each business has a University certified “Professor-ranked” scientist. He mentors,

assesses, and grants qualifications to the employees when they reach the required level of competence. How's that for setting up your resources for the future. Again, however, I cannot quite see this occurring in the Western world.

So where I am going with this, is simple to say but comprises an immensely challenging set of tasks to do. Unless we totally overhaul our entire school system, educational processes, and universities, we will not be able to deliver enough STEM graduates to do all the things that are needed to create, design, install and operate those technologies that can take us through to Net Zero Carbon by 2050. A short-term answer to part of that issue is Cadetship and Mentoring whichever way we go. All of us old engineers are available (never quite retired) and I'll be willing to help young graduates develop the skills and experience as we transition to the new wave of STEM-focused education.

There is obviously a significant gap opening up in our capabilities to achieve Net Zero. We have to become resources efficient in all aspects. So we must now look at the technologies we have focussed on to bring us here and perhaps think again.

Remember this is a journey where we think about a target and how to get there. I am working on thoughts about the balances required to achieve our 2050 goal.

Reference: Lewis Carroll. Alice's Adventures in Wonderland. The scene where Alice meets the Cheshire Cat sitting in the tree at the fork in the road. I'll paraphrase.

Alice: *which way should I go?*

Cheshire Cat: *depends on what you are looking for*

Alice: *I don’t know what I’m looking for*

Cheshire Cat: *well, doesn’t matter which way you go*

Well, it does matter if you go the wrong way and deliberately do not look back and review your decisions. I want to go back in time. Back in time to some fork-in-the-road moments and how those decisions changed mankind. I’ll keep it short and simple. I’ll abbreviate!

Firstly, man discovered fire. Probably in a painful way. But saw its value and started cooking meat. The brain grows and intelligence expands. Burning wood was a good decision. It gave mankind the intellectual boost to discover and utilize coal – steam engines and stuff. Industry. Commerce. The discovery of the concentrated energy of coal and its utilization was another good fork in the road call. STEM was in its heyday. The Industrial Revolution allowed our intellect to discover oil and gas. Note here that each transition of one energy form to the next expands our intellect and allows the expansion of mankind’s capability.

It is now that we get into trouble. The decision to go nuclear was the next key fork in the road moment. Some countries went right and others went left. Let’s see where the left fork has taken us. With no nuclear, baseload power is significantly produced from fossil fuels. Sure hydro works, and of late solar and wind are getting a foothold. But go back to the Resources articles. There is not enough Critical Minerals development for this journey to succeed on a world basis. Tax incentives aren’t the answer. Carbon credits aren’t the answer. We need to go back to that key fork in the road and ask that question again. Should we go nuclear and replace fossil fuels? Knowing what we know now (but some refuse to accept) is that solar and wind cannot supply the majority of our base load needs. We are still in transition

getting out of fossil fuels (where appropriate) and getting into nuclear. Sure renewables have a part to play but only in a niche way where their use is truly beneficial and economic (another article).

So, if we still want to get to Net Zero Carbon by 2050 we have some serious questions to answer. Some ideologies need to be challenged. And since the resources are limited and geographically dispersed across countries, ideologies, and cultures, my next article where I will provide the roadmap should be compelling reading. Left or right time with the Cheshire Cat!!

By the way, I am approaching the key (by market capitalization) Critical Minerals Australian-based people on the Australian Stock Exchange to present to us their ESG credentials. Critical Minerals covered include those mentioned in the 2022 Critical Minerals Strategy, March 2022 developed by the Australian Government.

The Critical Minerals referenced include Lithium, Rare Earths, Vanadium, and Cobalt.

Hopefully, the Australian companies will provide us with their ESG credentials and this can give them an additional means of communicating their ESG efforts. InvestorIntel publication can then supplement their normal communication processes. An example of which is Arafura Rare Earths Limited (ASX: ARU) *Greenhouse Gas Emissions Reduction Pathway* published recently to the Australian Stock Exchange.

In the next article, you, yes you, will have some Cheshire Cat opportunities.