

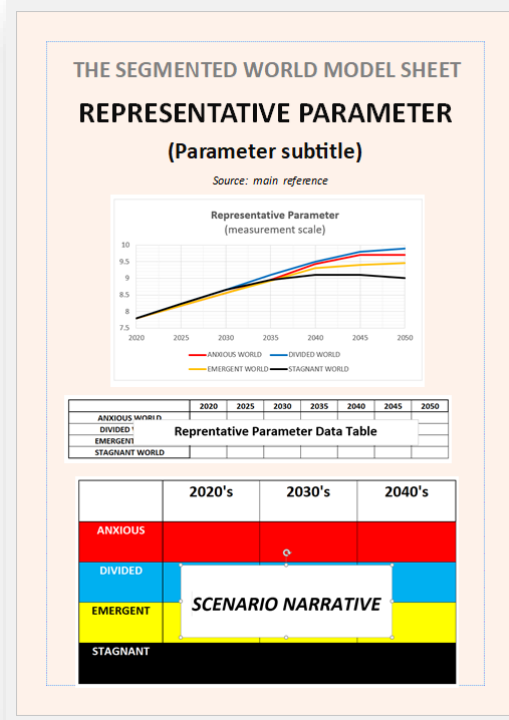
*There is an evening coming in / Across the fields, one never seen before /  
That lights no lamps. From Going by Phillip Larkin 1947*

## **DIALOGUE 4: The Global Drivers over the next thirty years**

**Interviewer:** Having discussed the background to the parameters that influence the scenario charts in 1<sup>st</sup> Version of the ‘real’ Model, we now move on to the Model’s main purpose, *prediction* - starting with the Global Drivers.

**FN:** Before we do that, let me say something about how the Model output is presented on the website. ([www.thesegmentedworld.com](http://www.thesegmentedworld.com))

For each parameter, there is, what I call, a **Model Sheet** that provides, for each world view over the next thirty years, a **summary scenario chart**, a **data table** and a **graph**. Here is a general example.



**Figure 1: Generic ‘real’ Segmented World Model Sheet**

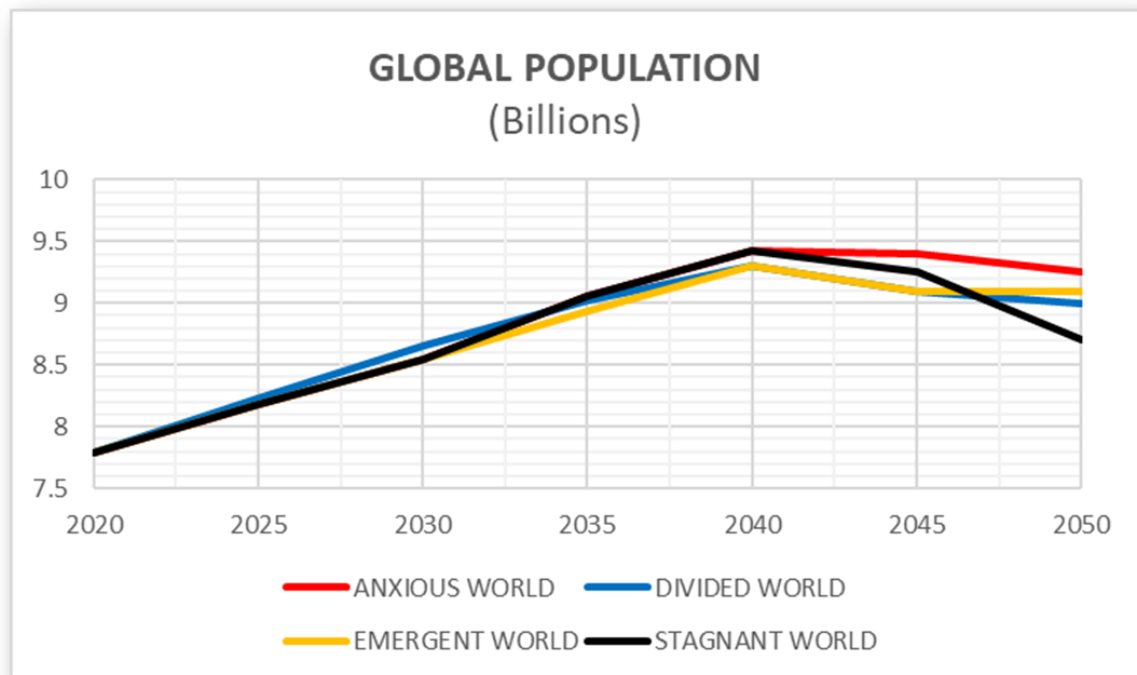
‘Live’, full sheet versions of the Model Graphs and the Scenario Charts, are also provided along with the **averaged graphs for each parameter** - as we discussed in Dialogue 1.

**Interviewer:** What do you mean by ‘live’?

**FN:** This is a dynamic model. As new parameters are added and existing scenarios deepened and widened, any changes to the predictions will be noted in the different component boxes (Graph, Scenario Chart) for all those that sign up to the website.

**Interviewer:** So, we start with the Global Driver Population and the parameter **Population Number**.

**FN:** This an example where then the Model narrative uses an existing external, comprehensively modelled prediction (See Dialogue 2, *Figure 3*). In this case, the four UN predictions (variants) are used to help define the different curves for the four world views. The result is shown on the graph below.



*Figure 2: Population Numbers: 2020-2050*

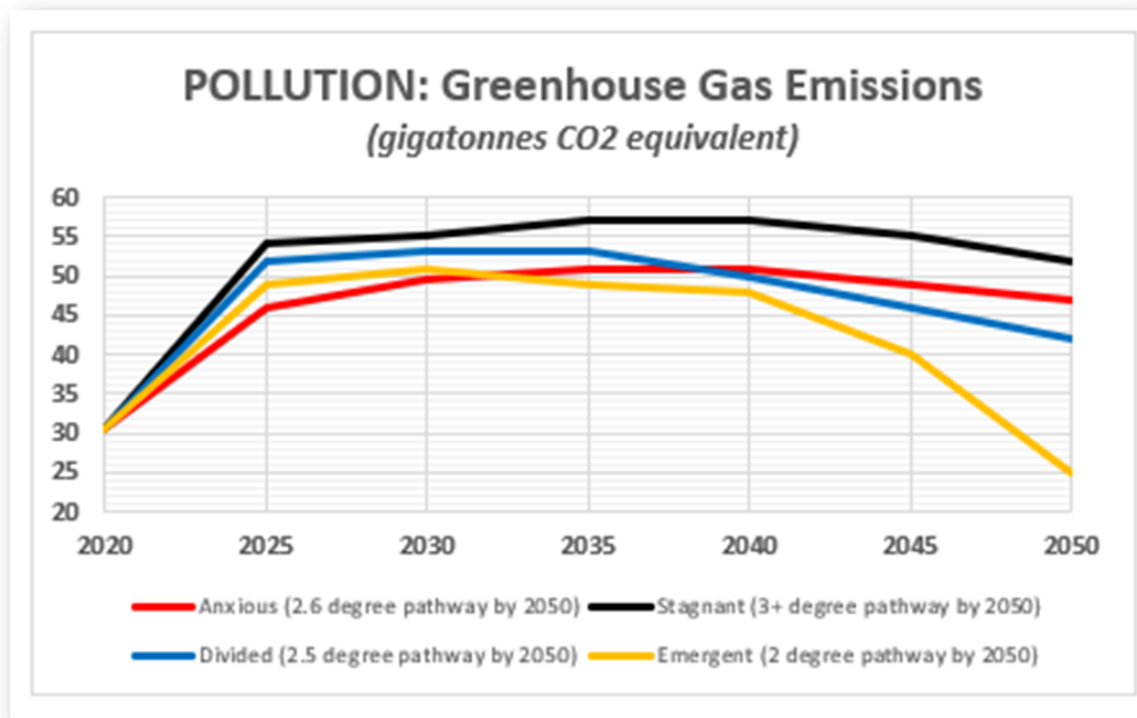
**Interviewer:** There isn't very much variation - all scenarios show an increase and hover around the UN mid-Variant with between 9-10 bn?

**FN:** Population is a slow mover . . . but by 2040, important differences begin to emerge. I think of it in terms of 4'C's.

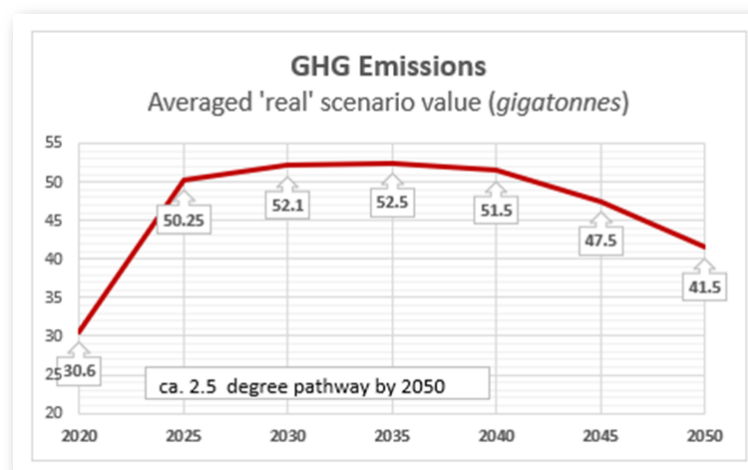
For the Stagnant and Divided Worlds there is a decline in population in the 2040's due to a combination of **collapse** (mainly Stagnant) and **conflict** (mainly Divided). Despite support for greater global agency, in the Anxious World, indecision and **confusion** induces anxiety that results, among other things, of birth rates continuing to climb in impoverished areas. In contrast, the Emergent World – once it has established the Global Council (Dialogue 1) – develops a planned, **controlled** approach gradually lowering population growth rate through investment and incentives in impoverished areas.

**Interviewer:** Do the 4 C's also dictate how the different worlds cope with the next parameter **GHG Emissions**?

**FN:** Yes. . . particularly in the way they resolve the issue underlying this problem – the energy crisis. Here is the main graph and a figure showing the *averaged* plot for GHG emissions.



**Figure 3: Greenhouse Gas Emissions: 2020-2050**



**Figure 4: Averaged Segmented World Curves: Greenhouse Gas Emissions**

At present, the debate on GHG emissions is around how we can reduce our use of fossil fuels and find non-polluting alternatives. But as we already discussed in Dialogue 2, rapidly switching off fossil fuels, despite the harm they are causing the environment, is not a viable

option. The transition to a low carbon world is, at least, a thirty-year project – and even the averaged trend from the ‘real’ Model comes close to a 2.5-degree world by 2050.

The reason for this high global warming prediction is due to the actions in three of the four worlds. Banning the use of fossil fuels and setting ambitious targets for renewables, is the path that the Anxious World takes in the 2020’s - only for it to discover, in the 2030’s, that underinvestment in fossil fuel sources has created an energy shortage, that cripples industry and causes living standards, for all but the wealthiest, to rapidly fall. Ironically, the Anxious World with only slow progress in finding new alternative energy sources, is forced to substitute oil and gas with burning coal and biomass to provide a source of energy, resulting – by 2050 – in the second highest emission’s pathway.

**Interviewer:** But from the main graph I can see that the worse outcome is in the Stagnant World.

**FN:** This is a world where short-term needs always trump long-term benefits. There are plenty of initiatives but little action on the scale required. GHG emissions soar as fossil fuel use rises, only to fall back as first, cost increases and then, as oil and gas accumulations simply become too expensive to extract, what I call *innate depletion* spreads,

**Interviewer:** And I suppose the Divided World, is less affected because of the high level of Focused Innovation in the Powerblocks?

**FN:** Yes . . . renewables are developed *but* only in some, not all, of the Powerblocks and also a few of the high Utility StaticLands. It is only in the Emergent World where, from the start, policies guided by technical-based strategies drive a balanced approach with, for example, a tax on carbon being used to develop the alternatives that eventually drive fossil fuels out of business.

**Interviewer:** It is a world of **control**, though!

**FN:** It is a world that develops the skill to operate globally; a world where the current UN Climate Change Conference (COP), by the late 2030’s, is an executive body with the global authority to enforce agreements. Just as with the Covid pandemic with the world gradually moving from ‘requested’ to ‘enforced’ vaccination, so to on a global scale, the Emergent introduces global enforcement for policies, processes and systems that are deemed to be beneficial for controlling the Global Drivers and creating a sustainable solution to a Full-Up planet.

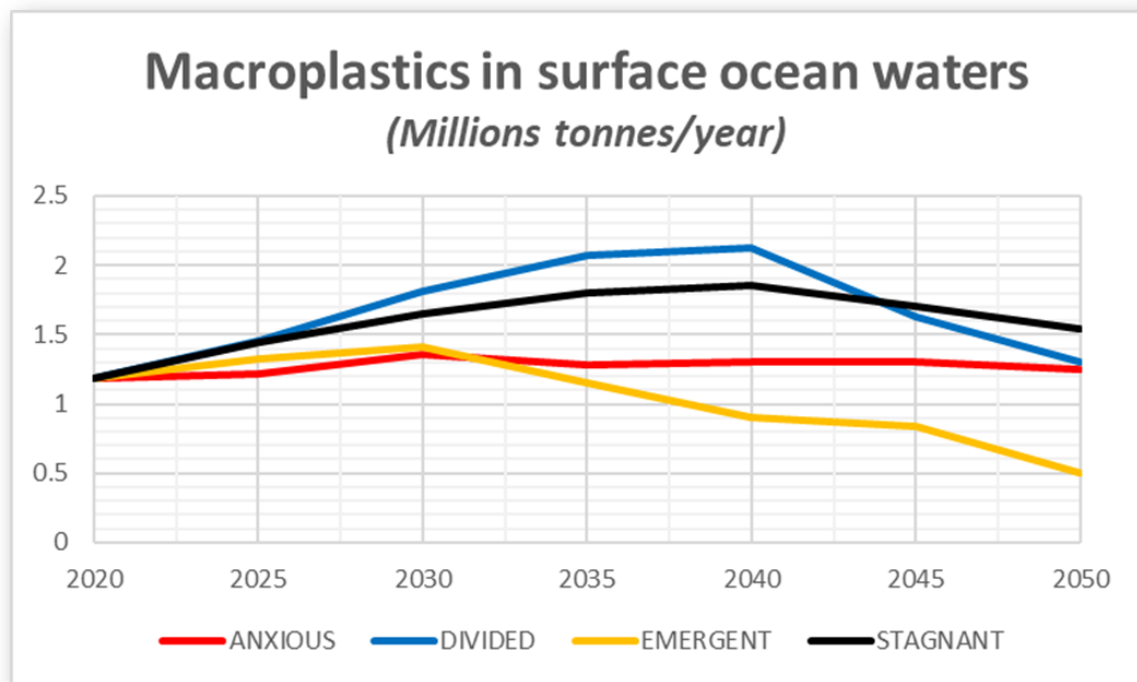
As a result, even though global temperatures have reached 2 degrees about pre-industrial levels in the Emergent World by 2050, the increase has slowed down and a huge, new energy infrastructure has begun to take shape driven by a combination of old and newly developed, clean technologies.

**Interviewer:** But still a 2-degree world!

**FN:** But one where focused innovation is also being used to adapt to the higher temperature, giving all sentient life the prospect of thriving in the future.

**Interviewer:** GHG emissions is the obviously the main parameter representing **POLLUTION** in the Model, but you have also included the littering of our oceans by **Plastics**.

**FN:** This is a good example of an indirect measure of Global Cooperation and to some extent Focused Innovation. As with the CFC ban to protect the Ozone layer, a global agreement to reduce plastic waste pollution could be achieved without impinging too much on people's living standards. But this will depend on the level of Focused Innovation to create new inert forms of plastic and other suitable materials, as well a high level of Global Cooperation to distribute the product. The next figure shows how the different worlds respond to the problem. Again, it is a parameter whose forecasts are guided by published projections (*Lebreton et al, Scientific reports, 9(1), 1-10, 2019*)



*Figure 5: Macroplastics: 2020-2050*

**Interviewer:** The next set of parameter predictions relate to those concerned with the threat posed by dwindling resources – starting with what you have termed **INANIMATE RESOURCES** – solid, liquid and gaseous - naturally-occurring raw materials.

**FN:** Yes, we must start with what I have argued in Dialogue 2, is the most serious resource problem we face – the lack of **safe drinking water**.

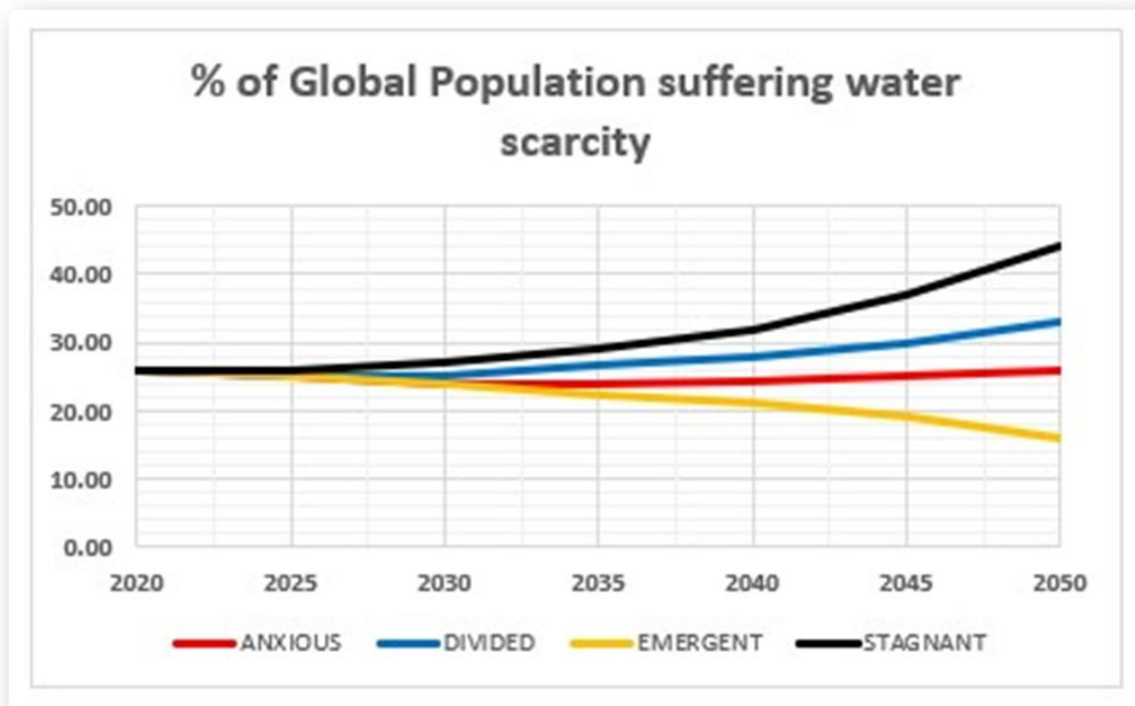


Figure 6: Water Availability: 2020-2050

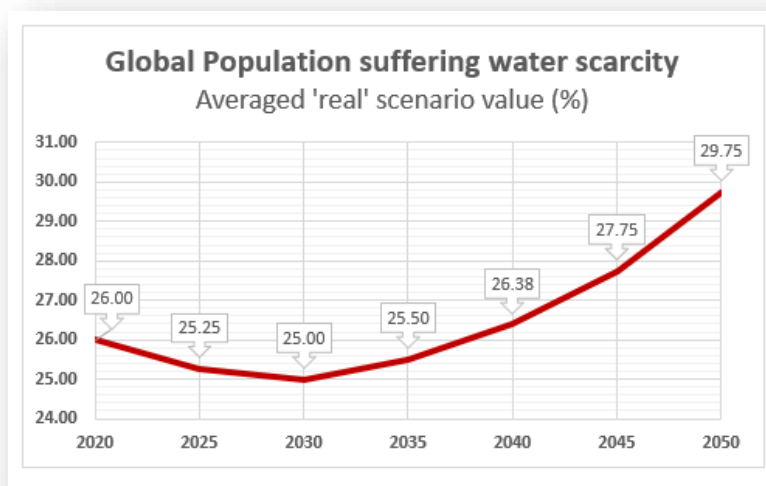


Figure 7: Averaged Segmented World Curves: Water Availability

**Interviewer:** Those are two very scary diagrams, even the averaged prediction has thirty percent of the world without clean drinking water by 2050.

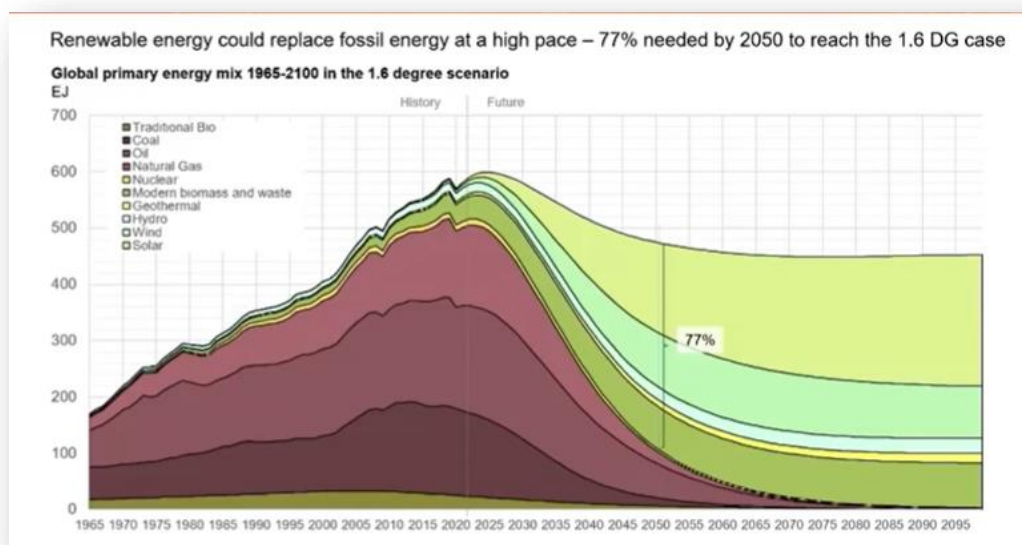
**FN:** And that is one of the reasons why, in three of the four worlds, the global population declines through the 2040's – many people having fallen to the base, or off, Maslow's Triangle.

**Interviewer:** I understand why you regard water availability as the most threatening of the Inanimate Resource parameters but, as we've discussed already, the shortage of energy products – notably fossil fuels - will have even wider impact, surely?

**FN:** I only rank water above energy because, for human beings there is no alternative, with the threat to life, measured in days. But, as you say, any major cut in the supply of our prime energy source – fossil fuels – poses a huge threat, to everyone.

**Interviewer:** And as *Figures 14 and 15* in Dialogue 2 showed, our current reliance on fossil fuels is enormous.

**FN:** And will remain so for some time to come. The next figure shows the output from the Rystad Energy, energy transition model and their 1.6-degree scenario - that could be described a 'stretch but achievable' model. But even in this case, the fossil fuel content in the energy mix is still 23% in 2050.



*Figure 8: Global Energy Transition Model for 1.6-degree scenario (Rystad Energy Webinar: COP 26: How close are we to 1.5 degrees)*

My concern is not the co-existence of alternatives and fossil fuels over the next thirty years - that is inevitable and, as the various Rystad Models show, can be compatible with a low global warming outcome. But this can only be achieved by a steady, albeit declining, supply of affordable hydrocarbons - an assumption that the **Raw Material Crises narrative** of the 'real' Model, challenges. Let's look at this module in a little more detail.

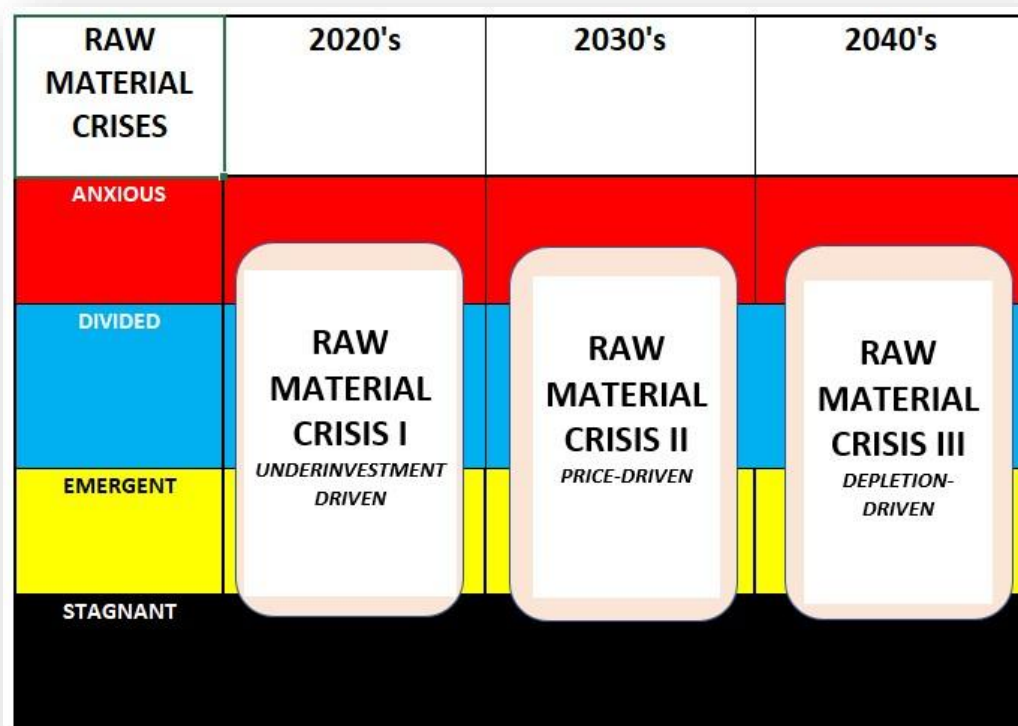


Figure 9: Scenario Chart: Raw Material narrative

**Interviewer:** Raw materials – that includes more than just fossil fuels.

**FN:** Yes, the narrative refers to all extracted naturally occurring substances, including the minerals on the extinction list we discussed in our second talk.

**Interviewer:** So, what you're saying is that the problem is not one of demand but *supply*?

**FN:** This is what defines **Raw Material Crisis I**. The 'continuous investment model' that the world relied on to maintain the supply of fossil fuels has been broken for the past decade. Added to that global exploration success ratios have been dropping sharply. In oil and gas, for example, from just over 70% in 2010 to around 17% in 2020 (*Rystad Energy 2020*). And if that is not bad enough, all this has now been exacerbated in the past two years by the drop in demand and fall in price due to the Covid pandemic. With a lead time for bringing on new production, anywhere between five to fifteen years and with little surplus production capacity in the existing system, the immediate raw material problem is one of *underinvestment*.

As noted earlier, this becomes an acute problem in the Anxious World of the 2020's – where, the importance of fossil fuels in maintaining global energy supply are ignored, creating an even greater shortage by the end of the decade. The problem is least felt in the Stagnant and Divided Worlds in the 2020's where support for fossil fuels as the main energy source remained strong.

By the 2030's, however, the era of cheap commodities (in particular, oil and gas) are over, introducing a new crisis (**Raw Material Crisis II**) simply driven by consumer affordability. The global economies, of all four worlds, are already suffering by this time from increasing inflation and costs, limiting the scope for higher prices and therefore the reserves that the energy companies are able develop. For oil and gas, Tverberg (*OurFinteWorld.com* 2020) estimates that oil prices of over \$120/bbl. may be required to provide enough profitability for the remaining reserves to be developed. This increased cost to consumers, has a profound impact on the highly, fossil fuel – geared, Stagnant and Divided Worlds – though in the latter case, like the Emergent World - substitutions for fossil fuels, that had begun to be developed in the 2020's, provide some protection from this rising cost.

The benefit of having re-directed innovation into such things as substitutes for fossil fuels and also certain critical minerals, pays even greater dividends in the 2040's, when *innate* depletion kicks in. This heralds the start of **Raw Material Crisis III**. Only the Emergent World – with very strict global controls on raw material usage and widespread distribution of substitutes – rides out this crisis and avoids the steep slide in living standards.

**Interviewer:** And the parameter you use to reflect these Raw Material Crises is the **Total Energy provided by Fossil Fuels**.

**FN:** Yes . . . and that, of course, includes coal and burnt biomass.

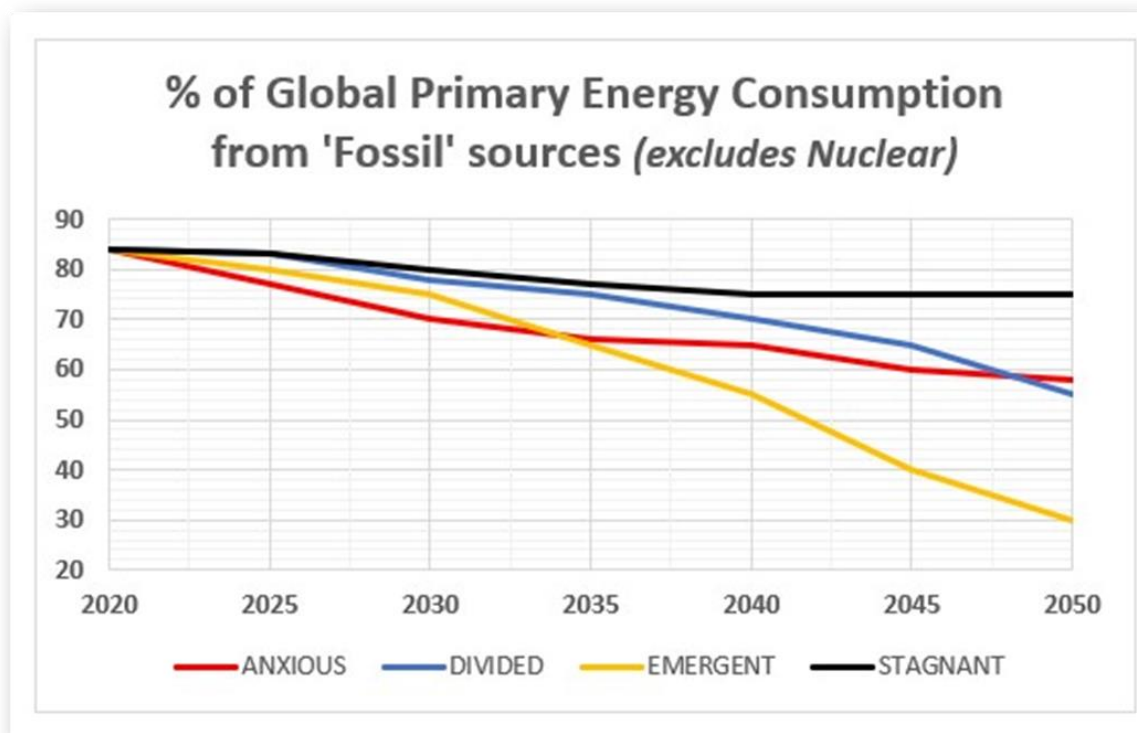
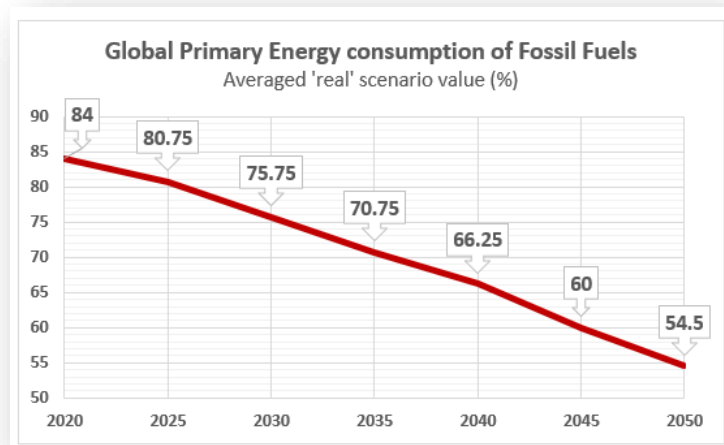


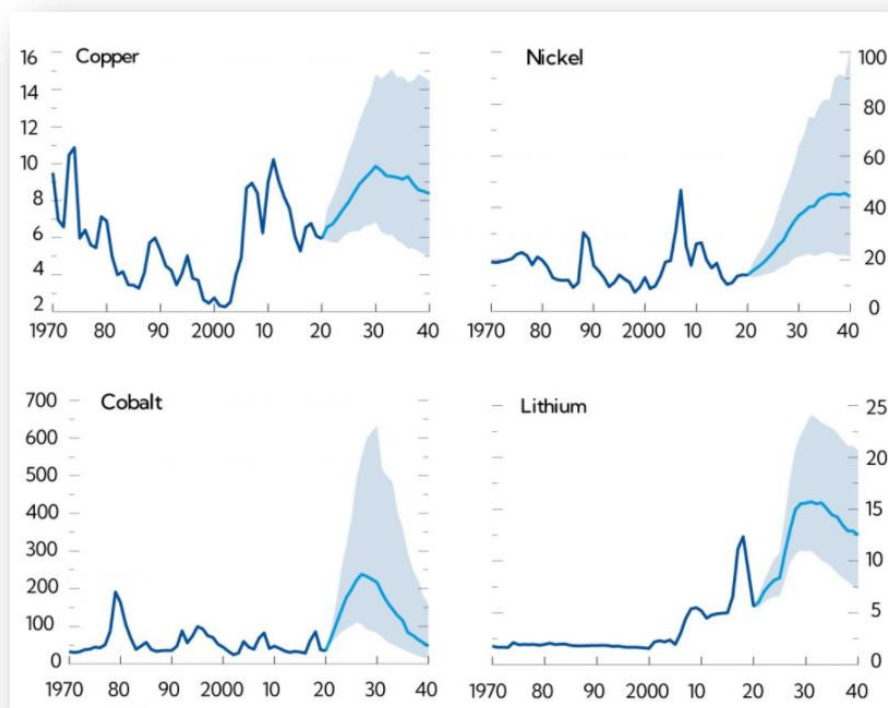
Figure 10: Primary fossil energy consumption: 2020-2050



**Figure 11: Averaged Segmented World Curves: Primary Fossil Energy consumption**

**Interviewer:** And the depletion of critical minerals?

**FN:** As we discussed in Dialogue 2, that is work in progress, held up not only by inadequate, historical reporting but also, with regards to forecasting, the huge uncertainty over the demand for different minerals. The narratives are currently informed by external projections, such as the metal price scenarios below, that shows the price response through Raw Material Crises 1 and 2.



**Figure 12: Metal Price forecasts for net-zero 2050 scenario with confidence levels (IMF Blog Boer et al. November 2021)**

Cobalt, lithium, and nickel prices all rise by several hundred percent from 2020 levels – the surge in price being caused by the demand for renewable energy components such as wind turbines or batteries and the long lead time to start up new production. As with fossil fuels, the uneven distribution of these minerals becomes a key factor in geopolitical relations between the Powerblocks and certain StaticLand countries. This is well illustrated by another figure from the IMF (*December 2021*)

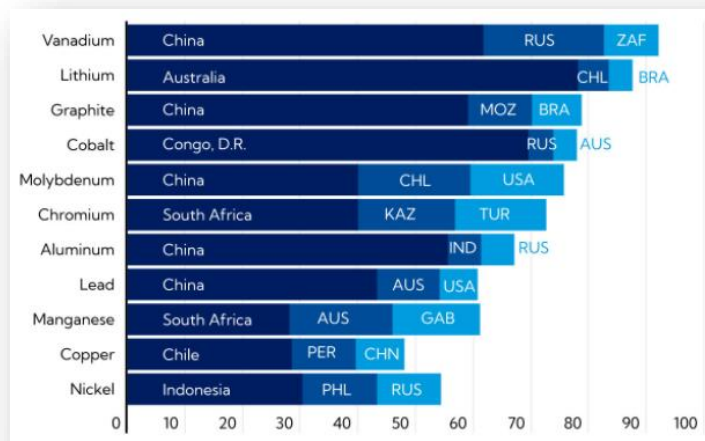


Figure 13: Major producers of critical ‘green energy transition’ metals (IMF 2021)

**Interviewer:** For **ANIMATE RESOURCE**, I imagine you have made scenario-based forecasts for the four parameters you outlined in *Dialogue 2*?

**FN:** For the two general indices: **Living Planet** and **Mean Terrestrial Species Abundance**, the Emergent and Anxious Worlds follow similar pathways with biodiversity and habitat protection improving – despite the economic distress. In contrast, in the Stagnant and particularly in the Low Utility territories of the Divided World, biodiversity and habitat protection suffer significant decline.

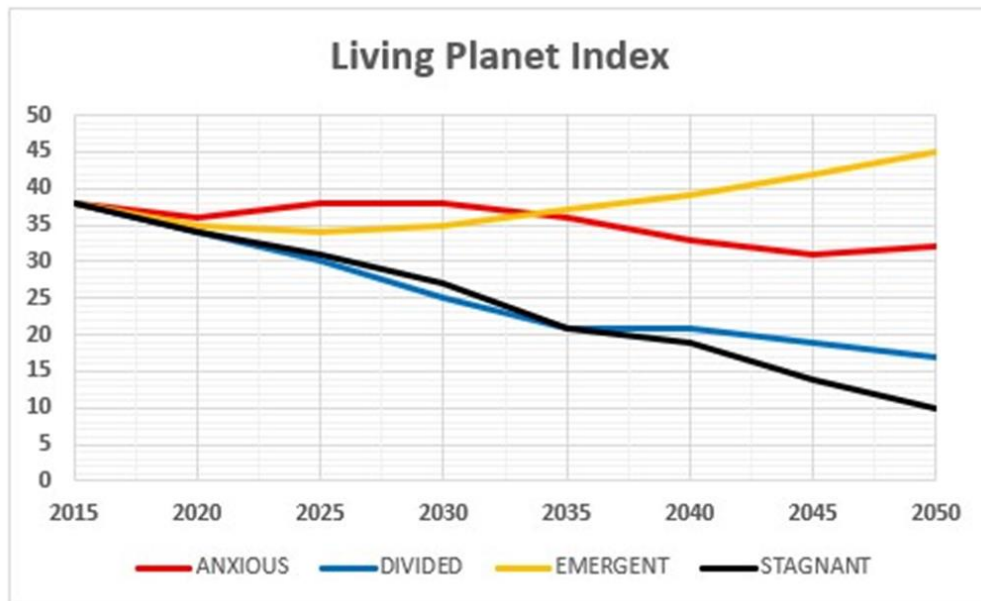


Figure 14: Living Planet Index: 2020-2050

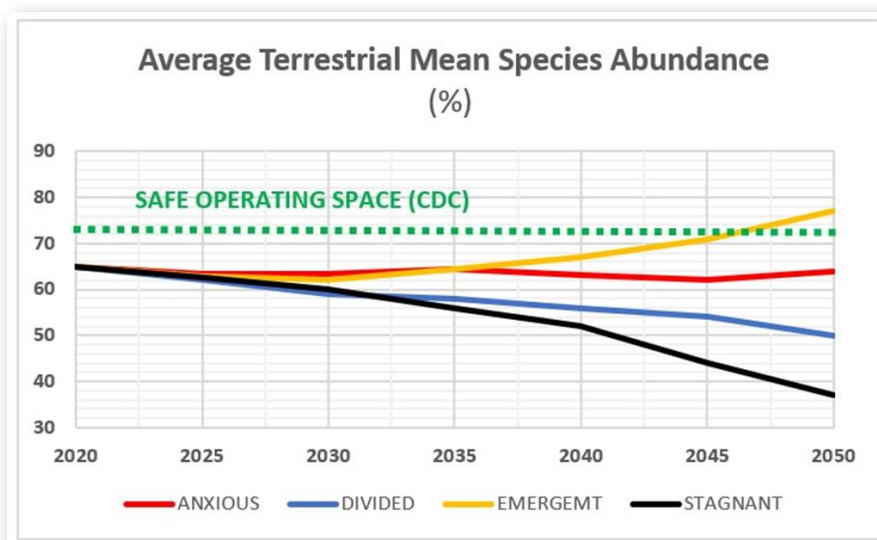


Figure 15: Terrestrial Mean Species Abundance: 2020-2050

**Interviewer:** ANIMATE RESOURCE is also represented in the Model by two specific phenomena: **deforestation** and **fish stocks**. Do they follow the same pathways as before in the different worlds?

**FN:** The north-south divide in deforestation – I described in our second talk - intensifies as the Powerblocks in the Stagnant and Divided Worlds exploit the StaticLands in the south. But as economic decline increases, along with higher levels of global warming, destruction of forested areas spreads into parts of the Powerblocks for these two worlds by the 2040's. This is reflected in forecasts of **Global Tree Change**.

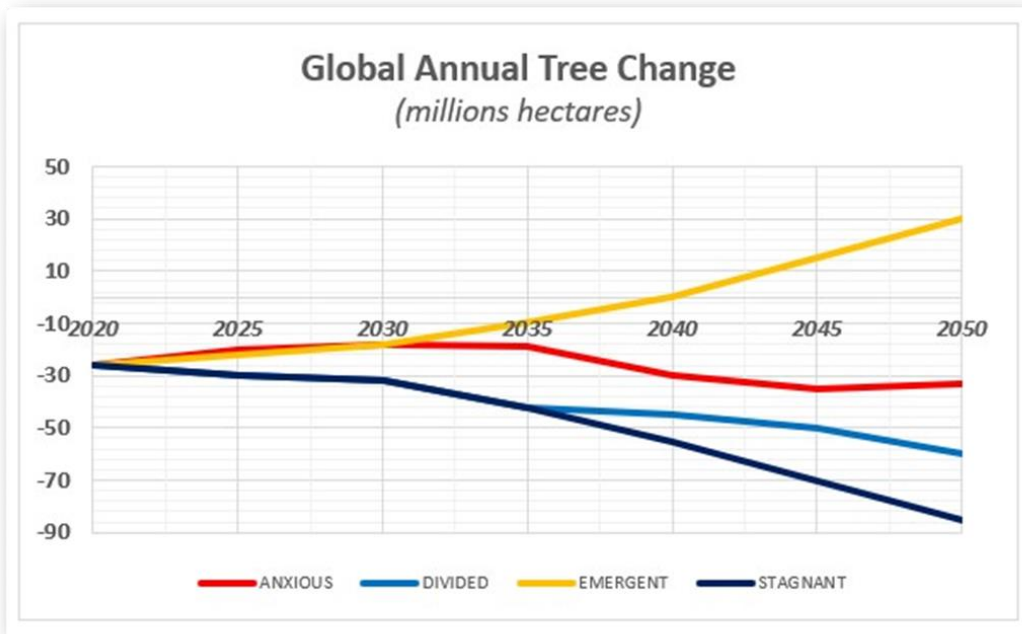


Figure 16: Global Tree Change: 2020-2050

**Interviewer:** From this next figure there is also a huge difference between how the Stagnant and Emergent Worlds manage **Sustainable Fish Stocks**.

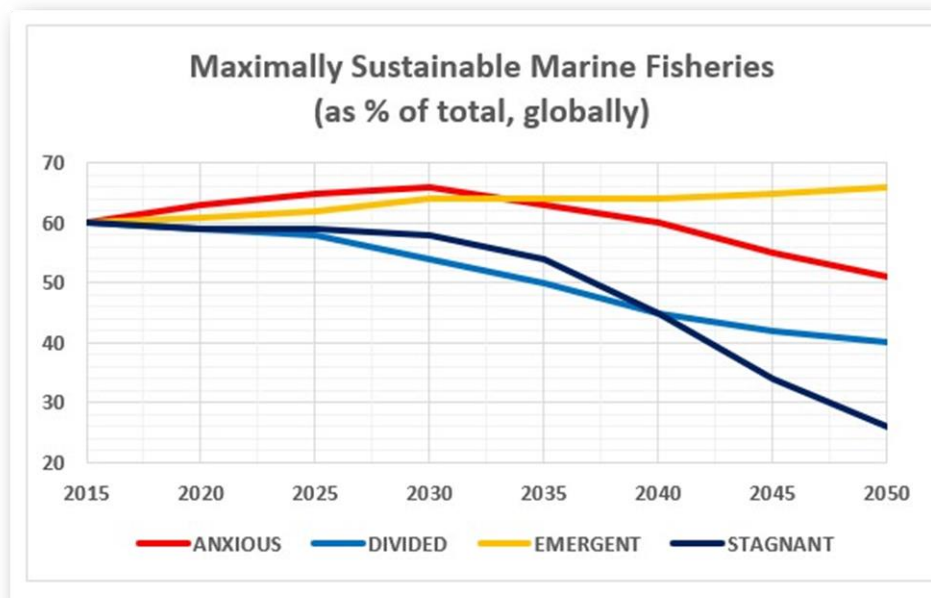


Figure 17: Global Fish Stocks: 2020-2050

**FN:** A factor that is difficult to assess at present, is the negative impact of global warming on fish stocks. In the Stagnant World the three-degree plus warming by 2050, combined with the loss of global agency to monitor compliance with codes of conduct, contributes to the rapid fall in sustainable fisheries. Only in the globally managed, Emergent World, where the

current FAO codes of conduct are rigorously applied, do sustainable stocks gradually increase.

**Interviewer:** OK, so that concludes the thirty-year look ahead for the Global Driver parameters. I see a big pile of diagrams on the table for the next talk for the Model prediction of the Inevitable Consequence parameters.

**FN:** Let's move straight on to those, before those dark clouds over there force us inside.