

## **OIL VS WATER: CONFESSIONS OF A CARBON EMITTER**

Dr Andrew Forrest AO founded FMG Metals Group (FMG) 18 years ago. Now a global leader in the iron ore industry, recognised for its culture, innovation and industry-leading development of infrastructure and mining assets in the Pilbara, Western Australia.

Today, FMG generates just over two million tonnes of greenhouse gases every year. To put this into perspective, that is more than the entire emissions of Bhutan and its 800,000 inhabitants. However, it is only 0.004% of the 51 billion tonnes of greenhouse gas that enter the atmosphere every year.

FMG, led by the vision of Chairman and Founder Dr Forrest, is committed to decarbonisation and in 2020 established Fortescue Future Industries (FFI), a wholly owned subsidiary of FMG. Through FFI, the FMG family is committed to renewable energy, and to joining the global journey to defeat climate change.

China, as the second largest economic power in the world, will undoubtedly play a critical role in this journey. Climate change has already caused significant impact in China. The Southern provinces are reporting more heavy rainfalls and the Northern provinces have suffered from more droughts.

The answer to defeating climate change isn't to stop mining iron ore, which is critical to the production of steel, and therefore to humanity. FFI believes the answer is green zero-emissions energy and steel. Every day that the sun shines, the wind blows, rivers flow and the Earth's core radiates heat, we waste green energy in proportions that dwarf the energy produced by the entire global oil and gas sector. If these renewable energy resources were a power station, it would be millions of gigawatts in size. To put that into perspective, in 2020 China produced all of its electricity from 2200 gigawatts of power. FMG's home country of Australia produces all of its electricity from just 70 gigawatts of power. There's enough pollution-free renewable energy out there to last the entire Anthropocene.

The Anthropocene is known as the age of mankind, just as the Mesozoic was the age of dinosaurs. This era will not be defined by Tyrannosaurus rex teeth or asteroid craters, but it will be defined by giant landfills of single-use, plastic items like water bottles. We have no idea how long the Anthropocene will last, but if we don't stop warming our planet, it could be geological history's shortest era.

Dr Forrest and FFI believe the solution lies in hydrogen, the greatest natural resource in the world. Hydrogen is by far the most common element making up 75% of the mass of the Universe. Hydrogen is just as abundant on Earth, meaning we will not run out of it anytime soon. To make green hydrogen, you simply run electricity through water. If we had the technology and the scale, green hydrogen could replace up to 75% of our emissions.

Unfortunately, right now, we treat hydrogen as just an ingredient in various industrial processes, not as an energy source. Worse, it is made by burning fossil fuels, calling it grey hydrogen to hide the fact it's a pollutant.

Green hydrogen is virtually ignored by the economic world and FFI believes this means we are missing a colossal opportunity. The green hydrogen market could create revenues of US\$12 trillion by 2050, way more than any industry that exists today.

Economies around the world are putting their plans to replace fossil fuels with green energy into high gear. The energy markets have started to move quickly. In the past six months, every major Government in the world has pulled economic levers to transition away from polluting fuels.

The Chinese government have announced that they want over a million hydrogen vehicles on the roads by 2030, and by then Japan also wants 800,000 hydrogen fuel cell vehicles on the road and aims to be using ten million tonnes of hydrogen per year, although it's not clear whether that hydrogen will be grey or green.

South Korea has committed to six million hydrogen fuel cell vehicles by 2040.

In June 2015, China submitted the Climate Pledge to the United Nations Framework Convention on Climate Change, in accordance with the Paris Agreement. In it, China outlined aims to peak carbon dioxide emissions around 2030.

Then in September 2020, President Xi Jinping further pledged to the United Nations that China will scale up its voluntary emission targets under the Paris Climate Agreement and achieve carbon neutrality before 2060.

In addition, China will lower its carbon dioxide emissions per unit of GDP by over 65% from the 2005 level, increasing the share of non-fossil fuels in primary energy consumption to around 25%. China will also bring its total installed capacity of wind and solar power to over 1.2 billion kilowatts.

For China to achieve these targets, electricity production would need to more than double by 2060 and come largely from clean sources. This growth would be driven by a massive ramp-up of renewable electricity generation over the next 40 years. This requires collective efforts from Government, research and financing institutes, businesses, and civil society.

Australia has declined to commit to a zero-emissions target, but is investing AU\$300 million in hydrogen technology. Europe has allocated €1 trillion to reaching zero emissions by 2050, and the United States has pledged US\$2 trillion. Almost every major business in the world has committed to net zero emissions by 2050, including Australian companies, marching ahead of the Australian Government.

FFI strongly believes, despite these genuine ambitions, waiting until 2050 to act is not enough. To tackle climate change we are already way behind schedule. The science says we must limit global temperature rise to 1.5 degrees Celsius and to do this, we need to make major emission cuts every year between now and 2030.

At the current rate, the world is heading for a 3 degree Celsius increase in temperature. If this continues, we will see more out of control bushfires, more droughts and devastating weather conditions. There is only one solution, and it requires businesses to work closely with Governments.

Green energies need to be available at an industrial, global scale, and at a price that competes with fossil fuels. When fossil fuel energy becomes more expensive than renewable energy, the world will begin the journey to become zero carbon, not because it's the right thing to do but because it makes business sense.

FMG is well placed to be a real climate change challenger. The Company has a market capitalisation of less than US\$60 billion, but made a net profit, after tax, of US\$941 million in December 2020 alone. Based on this position of strength, the FMG board and management recently took one of their most important strategic decisions in the Company's history by launching FFI onto the world stage. Through FFI, FMG can become one of the world's biggest renewable energy production businesses,

to catalyse a global solution to climate change by rapidly increasing the supply of green energy. It's a plan FMG Founder Dr Andrew Forrest has been working on for two years and been thinking about for ten.

In August 2020, Dr Forrest and a team of 47 left behind the relative safety of Western Australia to visit almost 50 countries from the Democratic Republic of the Congo, to -30 degrees Celsius Tajikistan.

While the world was in lockdown, the FMG team found the diaries of political leaders were empty. Discussions were had with sovereign leaders, businesspeople, politicians, financiers and technology developers and FFI uncovered a thirst for green energy.

FFI travelled through American, Asian and Europe and was met with a tirade of enthusiasm for hydrogen. In Afghanistan, the Vice President displayed huge conviction that his country could play a major role in the world's green energy future.

When travelling home to Australia, the FFI team took an unusual flight path out of Central Asia; from Kyrgyzstan to Seoul, South Korea. This opened the teams eyes to the thousands of wind turbines and the foundations for what looked like tens of thousands more on the Mongolian-Chinese border. This is a massive move into green energy, and China is making it without fanfare.

China has slowed down the approvals of new thermal power plants since 2013. By the end of 2019, non-fossil fuels share in primary energy consumption had increased to more than 15 per cent, and carbon emission intensity had dropped by almost 50 per cent from 2015 levels. Both achievements were made ahead of the country's targets set up for their five-year plan period, up to 2020.

China has done tremendous work in monitoring and addressing climate change in its top ranked high emission industries such as power, steel, and cement. China has established regional carbon trading systems in eight pilot areas since 2011, covering over 20 industrial sectors, including steel, and over 3000 individual Companies.

In November 2020, China's Ministry of Ecology and Environment announced emissions trading scheme regulations will be rolled out nation wide to the power sector, which includes over 2000 companies. Steel and cement industries are expected to be included next, with another five sectors including petrochemical, metals and civil aviation to follow.

So against this backdrop, lessons from China's move in to renewable energies shows that FFI's ambitions, while risky, are far from radical. FFI's ambition to produce green hydrogen and its liquid form, ammonia, on a scale to begin to match the oil and gas industry is shared by many global leaders, including President Xi.

The question isn't whether or not green hydrogen will become the next global energy form, it's who will be the first to mass-produce it. Which company could be so strong that it could allocate sufficient risk to truly test green hydrogen at global industrial scale? In August 2020, the FMG Board and Dr Forrest decided FMG would be that first mover. The Company's first steps have locked in exclusive access to almost 300 gigawatts of hydro and geothermal power. That's more than four times what Australia currently consumes.

FFI is targeting hydro-power electricity, generated from the flow of rivers, and geothermal, which taps into heat from the Earth's core, because, unlike solar or wind, these renewables work around the clock. But we are scaling up wind and solar acquisitions too, exploring over 500 gigawatts of energy assets and potentially thousands more gigawatts will follow.

FFI aims to produce or help produce more than 1,000 gigawatts of zero-emissions energy to create so much momentum and value that consuming energy from a polluting source no longer makes sense.

Most of the world's iron ore formed roughly 3 billion years ago, when bacteria first evolved the ability to make oxygen. The oxygen reacted with the iron, sinking to the bottom of the ocean and creating the rich deposits in the Pilbara we have today. Ironically, this ancient event is what's allowing us to modernise today.

Iron ore is used to make steel, and steel is fundamental to everyday items from homes, cars, roads and bridges. FFI wants to investigate ways to make green, zero-carbon steel and aims to start building Australia's first green steel project in the Pilbara, powered entirely by green hydrogen from local wind and solar, in the next few years. Australia is in a unique position to scale green steel, and the Pilbara region has ideal conditions for renewable energy and also happens to be the largest iron ore province in the world.

By the end of the decade, all FMG trucks will run on renewable electricity, green energy with the entire fleet to ultimately switch to green hydrogen. FMG is also aiming to develop a green iron ore train that either runs on renewable electricity or a four-stroke combustion engine that is powered only by green ammonia. In addition, FMG will begin to settle designs that allow ships to run on green ammonia.

This knowledge and learning from these initiatives can be shared to assist other iron ore miners to also go green, including Vale, one of the largest iron ore mining company in the world. FMG recognises all Companies are all in the same boat, with emissions from shipping outstripping the emissions from our projects.

But where will all this hydrogen come from? In the Pilbara region of Western Australia, FFI is planning large-scale wind and solar generated electricity and hydrogen with a view to generating over 40 gigawatts of power, enough for every FMG operation and to make a dent in global industrial emissions.

With all these technologies, the day that Australia can mine iron ore without generating emissions is rapidly approaching. If a major player like FMG does it while substantially reducing operating costs, then the rest of the global mining industry will follow suit.

It is Dr Forrest's belief that change takes courage, and that should be encouraged by society. Individuals and Companies must be prepared to fail in pursuit of improvement, or individuals, societies and nations will stagnate.

All of FMG's Sovereign Agreements with countries all over the world come with strict conditions. For example all of hydro schemes include multiple, small dams along each river, rather than one huge dam. This is called run-of-river and it's environmentally respectful. If a country wants FFI's investment, it must commit in the contract to hitting targets, vanquishing forced marriage, child marriage and eliminating modern slavery in all its forms. Ensuring equality of education outcomes between girls and boys, that means equality of employment between women and men. No commitment to these requirements means there will be no green energy agreement.

When FMG founder Dr Forrest took on BHP and Rio Tinto to set up FMG, his detractors told him it was impossible and he was crazy. He persevered and succeeded, and in the process reduced costs from around US \$48 to \$13 a tonne. There was no one hero, there was no single great technology

that allowed for this success. It was thousands of people with great ideas, and thousands of improvements that made FMG's operations safer and more efficient day by day, year by year.

At FMG, this is called the flywheel. Using the momentum of pushing the wheel to ensure the systems work reduce costs, free up capital and create demand and then use that momentum to reduce costs even further, creating an even larger, more reliable supply, that again creates more demand. The flywheel begins to spin on its own, faster and faster. Now, at global scale, FFI is building the flywheel of green energy.

This will not be without challenges, as the fossil fuel sector will react to increasingly competitive green hydrogen prices by slashing the cost of oil and gas until it's almost zero. Big Oil's last stand will be to use fossil fuels to create blue hydrogen, storing the emissions underground and falsely peddling it as clean energy.

Similarly battery materials are finite and we will run out of fossil fuel probably before we destroy the planet. We will never run out of green hydrogen or the material we need to make it, and it can handle all parts of the global economy, not just cars or transport.

There are two possible futures, Humans flyless, drive less, live out in the open and stop killing the planet. Or the alternative one where we decouple economic growth from damage to the environment, damage that threatens our very existence.

It is the hope of FFI, that the world will choose hydrogen.

What will you choose?