

Foreword by Lars Schernikau

Energy is all-encompassing, the basis of everything around us. As obvious and simple as it may be, it took me decades to truly internalize this. I grew up with energy and raw materials, from the day I opened my eyes, but started working with raw materials and energy only 20 years ago when I became a commodity trader. During that time, I spent a large portion of my professional career in the global coal markets. However, professionally I also started to deal with ore products such as iron ore, lithium ore, copper ore, chrome ore, and much more.

This clearly makes me biased in writing about electricity and writing critically about variable renewable energy. However, I would like you to consider that the fossil fuel business will thrive when energy shortages prevail. Because energy-starved times will always be accompanied by high raw material and power prices, leading to extra profits for anyone producing or even trading energy raw materials and generating electricity. This can be seen in the record profits earned by large oil, gas, and coal companies during 2021 and 2022. Thus, if anything, I am negatively incentivized to write about how the world can avoid energy shortages. I should, from a private economic point of view, keep quiet. However, this book is about what is right for the world, what we can do to optimize our energy production.

Reliable and affordable access to energy should never be political.

Unfortunately, energy has been misused by both sides of the political spectrum for exactly that, political agendas. It should be any government's interest to have a good energy mix, reduce dependencies, ensure affordability, reliability, and of course limit the environmental footprint. Unfortunately, history is full of examples of exactly the opposite. The 2022 Ukraine conflict yet again shows how intertwined energy and politics are. Remember, however, that energy shortages started in 2021, so Putin was not the cause, but made it worse and accelerated the process towards global energy starvation.

Over the long term, we need to find a solution for our energy problem. I have learned that we have hundreds of years of fossil fuels left in the ground. However, and quite obviously, we cannot dig fossil fuels up forever. Not only because there are not enough of them, but really because we will need so much more energy in the future. Oil, coal, and gas will be neither

sufficient nor efficient enough to sustain our substantial thirst for the amount of energy we will need for our natural, human, and scientific evolution and development in the centuries to come. That is what sparked my interest in learning more about electricity and energy beyond coal, oil, and gas; I strive to understand what the future of energy can be and what it cannot be. I continue learning every day and ask you for forgiveness already now for any inaccuracies in language or content you may find.

Humanity has amassed more scientific knowledge since World War II than over the previous one million years of human development. Following the agricultural revolution, made possible by a drastic temperature increase during the early Holocene (Figure 1), it took 10,000 years to create civilization in Europe. It only took a century for the steam engine to facilitate the development of modern industry. The nuclear force discovered in the mid-twentieth century increased the power available to a single human by a factor of one million.

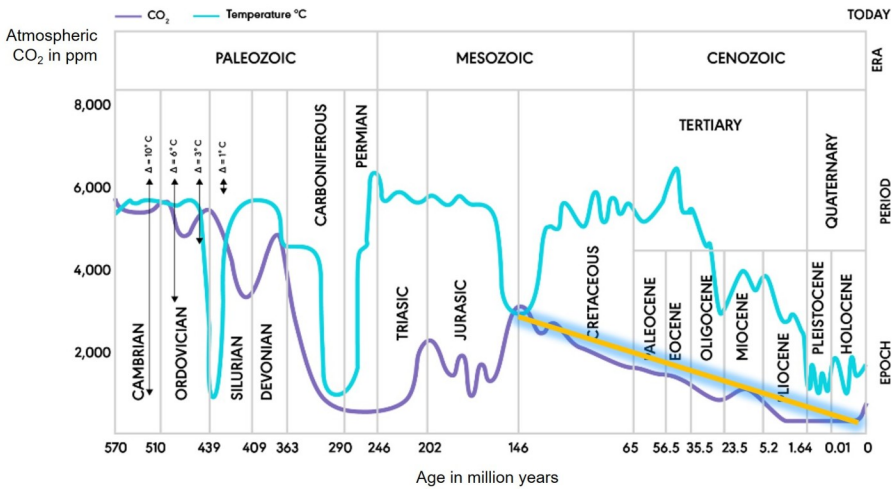


Figure 1: History of Earth's climate over 600 million years

Note: Graph of global temperature and atmospheric CO₂ concentration over the past 600 million years detailing Earth's recent eras, periods, and epochs.

Note: The Holocene started around 13,000 years ago and is what we call the current interglacial warm period. It forms part of the late Pleistocene Ice Age, which started less than two million years ago.

Source: Moore 2017 based on Nahle 2009.

Scientific progress will lead us to what is often referred to as Kardashev's Type 1 civilization in which humans are able to harness all the energy available to our home planet and store it for consumption (McFadden 2019). Michio Kaku believes this may only be 100-200 years away, which seems possible. This contrasts with a Type 0 civilization – today's world, a sub-global civilization that harnesses power primarily from raw materials.

Humanity's development, however, will not be limited to scientific advances but will also include spiritual advances that will allow us to better understand the energetic connection between matter and mind. The argument is, therefore, that our "energy problem" will be solved within a century or two through the ***New Energy Revolution***, as discussed in the last chapter of this book.

Nature has evolved in ways we often forget. Dinosaurs went extinct just 200 million years ago (not even 20 minutes ago in Earth's 24-hour history). Imagine a world without flowers; is that possible? Yes, it was possible just 120 million years ago; that is approximately when the first flowers appeared. Life did not require flowers for the previous hundreds of million years. It seems that flowers have no purpose other than to provide beauty. Obviously, nature has started to take advantage of flowers by fueling biomass reproduction, but really, it was not necessary.

Flowers, along with crystals, precious stones, and birds, have held special significance for the human spirit. What else will nature provide us with? Future human development will surely include a better understanding of how the world is connected. We will learn to better understand our mind and to use this newly found power to heal and to experience unimaginable happiness. Some of the world's most famous neuroscientists encourage us to embrace meditation and spirituality. Meditation provenly activates parts of our brain that help us heal and access knowledge and connections we have not yet dreamed of.

Why do I mention this? To make you aware of how little we know about the future, other than that evolution and development are vast, fast, and surprising. **The Future of Energy** will be developed by our human mind accessing all the knowledge that we don't yet even know that we don't know it. This is where my interest lies: in starting to learn more about the things I am not yet aware of and starting to see how we can truly make a positive difference to our world by being all-encompassing rather than limiting.

I strive to see the future differently and positively by inclusion, not by exclusion, by realizing physical limits but being open to what may be. I truly hope that you will find this book valuable in better understanding how energy works, and how it does not work.

I am looking forward to your feedback about this book

Lars Schernikau

Dr. Lars Schernikau is energy economist, entrepreneur, commodity trader, and author. Educated at NYU in the US, INSEAD in France, and TU Berlin in Germany, he has worked with commodities for 2 decades in Asia, Europe, Africa, and North America with focus on coal and ore products. Previously, he worked for the Boston Consulting Group in the US and Germany.