



ALL IN! Introduction

Energy is the key to prosperity and development. History shows this very clearly: from the mastery of fire, to the utilisation of wind, water and biomass in the Middle Ages, to the Industrial Revolution. When coagulated solar energy, which had been stored in the earth's crust for millions of years, was successfully extracted in large quantities, people had an abundance of energy at their disposal for the first time. In the many thousands of years before that, everyday life for the vast majority had been characterised by scarcity, poverty and hunger.

Today, we are once again at a similarly important milestone: the world needs a future-proof and sustainable energy system, firstly because fossil CO₂ emissions have thrown the climate out of balance - with unforeseeable consequences - and secondly so that billions of people in developing and newly industrialising countries can finally be lifted out of poverty! If this does not succeed, global tensions will continue to rise: New wars are already on the horizon, migration flows are swelling.

The vision of **ALL IN!** is to defuse the climate problem for a life in freedom, with adequate prosperity, in social balance and in peace with nature for 10 billion people.

This goal is achievable in the period between 2050 and 2070. The guiding idea is to create global energy prosperity through innovation and the market instead of managing energy scarcity. We believe we have found a viable way to achieve this goal and thus a reference solution: technically feasible, affordable and within the limits of nature. Today, many rich countries are primarily concerned with solving energy and climate problems at home and are therefore on the wrong track, because climate nationalism is not getting us anywhere. The problem can only be alleviated globally - or not at all.

ALL IN! is also a counter-proposal to the All Electric programme being pursued today. The idea is to massively expand energy generation, primarily from solar and wind, until coal, gas and oil have been completely replaced. Fossil fuels should simply remain in the ground (defossilisation). In such a world, as many processes as possible will be electrically powered, with electrons. Where this is not possible, electricity-based molecules are used: green hydrogen and the gaseous or liquid energy sources produced from it.

The realisation of All Electric inevitably goes hand in hand with a great deal of morality and sacrifice, because energy is becoming scarce. The result is a decline in prosperity in rich countries. Germany is a striking example of this. The poorer countries will remain poor because All Electric is too expensive for them. The developing and newly industrialising countries will not go down this path.

All Electric is a mistake for many reasons. Core technologies of the concept, such as electrolyzers, cannot be produced as quickly as they would be needed. More importantly, more than 80 per cent of global primary energy currently comes from coal, gas and oil. A global energy system cannot be converted in the blink of an eye. The entire history of technology only recognises transformations that have taken place step by step and over decades.

The demand for complete defossilisation is also a frontal attack on the countries that produce coal, gas and oil. They will defend their business model, militarily if necessary. What remains? Strictly speaking, it is not fossil fuels that are the problem, but fossil emissions. These need to be captured and disposed of. The technology for this is safe and proven: carbon capture.

ALL IN! focuses on all available forms of energy that are climate-neutral and safe: renewable energy, fossil energy with carbon capture, nuclear energy, battery electricity, hydrogen and climate-neutral fuels. Currently, 14 per cent of global primary energy comes from renewables (6 per cent from hydropower, 8 per cent from other renewables). Moving this volume towards 50 per cent will be a Herculean task. Other solutions are needed for the second 50 per cent, including nuclear energy, which currently supplies 4 per cent of global primary energy. Coal, gas and oil are deeply embedded in today's value chains, as energy sources and in the production of cement and steel. In any case, mankind will continue to use fossil fuels for decades to come - which is another reason why carbon capture is so important.

ALL IN! relies on a stable electricity system, which is essential for industry and therefore for prosperity. However, wind and sun cannot always deliver. Electricity storage systems are either too small or too expensive, or they require large quantities of raw materials that are not available in sufficient quantities worldwide - for batteries, for example. The volatility of PV and wind power plants must therefore be offset by affordable and reliably controllable energy, primarily from fossil (gas) power plants with carbon capture or from nuclear energy. Two pillars are therefore essential for a reliable electricity system: volatile renewables on the one hand and nuclear energy or fossil energy with carbon capture on the other.

ALL IN! focusses on all forms of energy transport. In addition to electricity (electrons), climate-neutral fuels (molecules) are also needed on a large scale. This applies above all to mobility. For aeroplanes and ships, there is no way around e-fuels or bio-fuels. It is an illusion to electrify the global fleet of almost 1.6 billion cars and lorries, especially as it is long-lived and continues to grow. This is why climate-neutral fuels are needed in large quantities.

ALL IN! favours pragmatism and openness to technology. Advanced technology helps to generate more energy, more products and more services with less consumption of natural resources. This opens up the opportunity for greater prosperity for all. And if you do it right, this can also be achieved in conjunction with consistent environmental protection and resource conservation. Innovation is the key - also for sustainability. But technology alone will not be enough.

Framework conditions that ensure the realisation of ecological and social concerns are also crucial.

ALL IN! is committed to global cooperation. To achieve this, the global economy needs a fair framework: global markets with ecological and social guard rails. Competition ensures high (cost) efficiency in economic processes. The goals that are achieved depend on the framework conditions under which competition takes place. This is the principle of a global eco-social market economy. Global financing instruments and cooperation are crucial, also in order to put many things back in order that have been destroyed in recent decades.

ALL IN! is counting on all countries of the world, because the climate issue is not decided in Germany or Europe, not even in the United States, but in China, India and Africa. The greatest challenges for solving the global climate problem lie - not surprisingly - in the developing countries.

and emerging economies. It is largely unavoidable that decisive growth processes are taking place here, both in terms of population size and the economy. Economic growth is a political imperative for these countries; it is also objectively necessary and accepted within the international community. Developing and newly industrialising countries do not have to reduce their CO₂ emissions, which are already low per capita. On the contrary, their emissions should be allowed to grow. Only with economic growth can all 17 sustainability goals of the UN 2030 Agenda be achieved: **ALL IN!**

ALL IN! aims to quadruple the gross domestic product of developing and newly industrialising countries to 80 trillion US dollars by the middle of the century. Considerable efforts are required to ensure that the targeted growth processes - an average annual GDP increase of 6 per cent in the Global South - do not run counter to the ecological support systems and in particular the climate system: starting with energy efficiency, plus a mix of different energy technologies plus relief of the atmosphere through nature-based solutions.

ALL IN! focusses on technology *and* nature. Nature is an important CO₂ reservoir. Plants absorb CO₂ from the atmosphere. Soils, especially in wetlands, store CO₂ when they are intact. The same applies to the oceans. This ability to bind CO₂ helps us to tackle the climate problem. After all, around a third of man-made emissions are absorbed by nature. It is important to strengthen this further. One of the quickest and most effective methods of climate protection is the preservation of tropical rainforests. For every hectare that remains standing, money must flow, year after year. Monitoring using satellite technology ensures success. This is how cross-financing should work: Money for performance.

ALL IN! focuses on three programmes for nature-based solutions: in addition to preserving the rainforest, these include long-term programmes for the large-scale reforestation of degraded areas in the countries of the Global South and the improvement of soils, for example through humus formation using biochar. These measures can create millions of new jobs in developing countries. At the same time, they can relieve the global CO₂ balance by around 10 billion tonnes of CO₂ emissions per year after the ramp-up and bind the carbon permanently.

ALL IN! is committed to Net Zero for all greenhouse gases, not just CO₂. Methane emissions alone account for 16 per cent of global

emissions and are a key starting point for reducing greenhouse gases. The focus is on best practices for minimising emissions in the extraction, transport and use of natural gas as well as in the aftercare of depleted deposits.

ALL IN! relies on cooperation between industrialised countries and developing and emerging countries, in their own interests. Without substantial co-financing from the countries of the Global South, this will not work. If you really want to make a difference in the relationship between rich and poor, you need considerable resources. All historical experience shows this, just think of the Marshall Plan after the Second World War or German reunification. Large parts of the funds have to be granted as lost subsidies, so the money does not have to be repaid. Why should the rich countries do this? The money from the Global North is not a charitable donation or charity, rather the rich countries pay for services provided by the Global South to stabilise the ecological and social systems. For example, they pay to keep the rainforests standing so that humanity can continue to benefit from their biodiversity. The Global North pays for the developing countries to make large areas of land available for reforestation, which creates humus that absorbs CO₂ from the atmosphere. The money is used to end poverty and hunger and reduce migration flows. These human tasks should finally be tackled. If this succeeds, we can rightly hope for a new global economic miracle - for the benefit of the industrialised countries too.

ALL IN! estimates a maximum annual financing requirement of 1.2 trillion US dollars, which must be raised in the industrialised countries. This corresponds to an average of 800 US dollars per capita per year. This does not mean that each individual has to raise this amount. Rather, there will be clever financing instruments, and there are plenty of plans and ideas for this. On the other hand, there will be major relief for the rich countries. This is because the costs of avoiding CO₂ are many times lower in the Global South. A rough calculation: the German energy transition will cost more than 1 trillion euros by 2030, or 2,000 euros per year for every citizen. And because it is only aimed at the national level, this energy transition will not solve the global climate problem! If the energy transition were to be freed from the shackles of the all-electric philosophy and be open to technology and market-orientated, it would be many billions of euros cheaper.

ALL IN! is pragmatic, open to technology, affordable - in other words, realistic. This is what a number of co-authors of this book stand for,

who have decades of experience in business, technology and international plant engineering. **ALL IN!** is also visionary. The concept is based on the thinking behind "World with a Future", a book published by the two main authors in 2007 and in an expanded edition in 2011. This book describes in detail the foundations of a global eco-social market economy. When "World with a Future" was published, there was still no 2030 Agenda and no Paris Climate Agreement. In the meantime, Europe has set itself the goal of becoming the first climate-neutral continent. Germany is particularly ambitious and wants to achieve net zero by 2045. Many new technologies have emerged or been further developed. Artificial intelligence will change our lives in many areas, for example in the world of work. Many new questions and problems have arisen. Many mistakes have been made. In the meantime, the UN has set the target of an "inclusive green economy", i.e. an "eco-social economy". However, hardly anything has moved at the action level so far.

On the contrary, the situation has become increasingly difficult. All of the challenges facing humanity are unresolved. Chaotic natural systems - not only the weather and climate, but also volcanism - affect complicated and disruption-prone infrastructures, such as supply chains or communication and energy systems. All Electric would only exacerbate the situation because the approach amounts to a technical monoculture. For example, a country that largely relies on renewables would no longer be able to act in the event of a major volcanic eruption.

This book begins with a discussion of our planet's carbon cycle (Chapter 1). Evolutionary and technological developments have brought humanity to the point where we are today. If it were possible to capture large quantities of the carbon produced by burning coal, gas and oil, deposit it in the earth's crust or recycle it, this would be a game changer.

Originally, the authors' search for a global and prosperity-compatible solution to the world's energy and climate problems took a completely different direction. Initially, we orientated ourselves on the Desertec approach, which relies on the Earth's solar deserts and aims to bring the abundant energy available there to consumers in the form of electrons or molecules. Yes, this approach does indeed harbour huge potential. However, this solution cannot be realised on a global scale in the foreseeable future, for technical and logistical reasons alone. Furthermore

You can rest more securely on several pillars than just one. In uncertain times, resilience and redundancy are crucial. Therefore: **ALL IN!**

In Chapter 2, we discuss the initial situation in the political arena and outline a possible solution framework. We recall Indira Gandhi and her speech as Indian Prime Minister at the first UN World Environment Conference in Stockholm in 1972. Her message: environmental and climate protection can only succeed if the well-being of people in developing and newly industrialising countries is also taken into consideration. This is the core concern of global sustainable development, and it remains unrivalled to this day. We also recall a serious mistake at the climate negotiations in Copenhagen in 2009, when the United States and China abandoned a global solution, specifically a cap-and-trade system that was supposed to follow the guiding principle of climate justice. This failure ultimately led to the Paris Climate Agreement of 2015, which is based on individual climate protection plans of the nation states. However, it is in no way binding under international law. If national commitments are not honoured, there are no consequences. The logic of the agreement has created a difficult situation in which states are focussing primarily on their national tasks. In reality, however, the climate problem is a global challenge.

Chapter 3 gets down to the nitty-gritty: money and funding for the global reference model. Specific proposals are presented for this. We also show how **ALL IN!** can be implemented in practice using the example of the electricity system: a concrete alternative for a feasible, affordable and resilient energy transition in the electricity sector in Germany is described. Unlike the German government, which is planning a full expansion of renewables, we consider a share of around 50 per cent photovoltaic and wind energy to be adequate. As long as this share does not exceed 50 per cent on an annual average, the fluctuating supply of wind and solar energy (volatility) can still be controlled by the remaining 50 per cent, for example from gas-fired power plants with carbon capture. However, if the proportion of renewables is increased, the problem of volatility will become ever greater - and electricity more expensive. The sun may not send us a bill, but there are still significant costs associated with managing volatility. The stabilisation of the grids, electricity transport, storage - and not least the reserve power plants, which have to remain in play but are being used less and less often - all cause costs. The bottom line is that our proposals will lead to investment savings in the order of 300 billion euros compared to official figures.

Chapter 4 shows key messages from the book in the form of graphics with accompanying texts and chapter 5 provides a conclusion and outlook.

In recent years, there have been few winners and many losers in the development to date, in Germany and even more so globally. New wars have emerged. The interests of the major powers are clashing, economically, politically and even militarily. The future will not be an easy one. We are naming the problems and would like to put forward a concrete proposal for a solution for discussion, focussing on energy and the climate. Because energy is the key to prosperity and development - and to a future in peace.