



## Key points of "Fusion for Future"

### Building a new SME market

Deep technology creates parallel momentum with the economy

**Nuclear fusion is making scientific and technical progress. Several international successes over the past five years underpin this confidence.**

Experts currently estimate the scientific timeframe at ten years – the final research questions must be clarified by around 2035. By then, technical norms and standards should have been outlined, maybe established. From then on, the industry will need another ten years to develop and ramp up a fusion power plant. The horizon therefore extends to around 2050.

That is a long way off. However, such planning would be revolutionary for nuclear fusion: the urgently needed renewable energy source could be introduced in stages by the middle of the century. Nuclear fusion replicates the sun's energy conversion process on earth. For small and medium-sized enterprises (SMEs), there is an opportunity to gradually develop a new market in consulting, service and supplier segments for nuclear fusion from the mid-2020s.

#### *Opportunities for a new SME market*

This new SME network will encompass many areas. Not all tasks and services are directly related to nuclear fusion, but they are components of it. This diversity of success factors requires orchestration. This should be neither state nor privately organised. The *MANKINDPROJECT Fusion for Future* association sees itself as an intermediary that can balance interests. It has been organising dialogue in the nuclear fusion network since 2024.

The association aims to establish and expand an exchange between basic research at state laboratories, research institutions and universities on the one hand and globally active start-ups in fusion and legislative organisations on the other. Technological issues are identified, open fields of research are recorded and scientific results are put into practice. The members of the association follow the tradition of Mode I-III knowledge generation. In the current development stage, Mode III, new knowledge is created through the interaction of multidisciplinary (various scientific disciplines) and organisationally transdisciplinary players (companies, civil society institutions and citizens as citizen scientists).

"It is not yet clear to SMEs where the economic opportunities in nuclear fusion lie," explains the association's chairman Aniceto Goraieb, who is himself the founder and managing director of two nuclear fusion companies. However, the diverse fields of application – ranging from health and safety, alloys, research and development of extreme materials, supply chain management and consulting in the renewable energy sector – speak for themselves. "We build bridges between the large research



tankers and the technically agile dinghies of the young fusion companies," explains Goraieb.

His company partner Markus Lemmens and co-chairman of the association adds: "The merger is comparable to a complex puzzle: countless pieces have to be researched, developed and put together, and the interfaces between research applications, business and market analyses and technology marketing have to be professionally designed." With the merger, we are moving into the field of deep technology. The *MAKINDPORJECT Fusion for Future* mission statement states that staying power and economic-political experience are important here, as the medium and long-term technology transfer can extend over ten years or more.

### Background

**Nuclear fusion is an example of deep technology.** Practical applications are based on technical and scientific knowledge, which is the core of the deep tech business model. It is not easy to copy these company models. This is what makes this form of business so durable. They are therefore a suitable field for spin-offs from research. Specialist similarities can be seen in aerospace, cancer and materials research, the life sciences as a whole, as well as polar and ocean research.

**The association makes the following contributions:** (1.) technical briefings on collaboration between basic fusion research and start-ups. (2.) Identification of research questions and business models in the SME sector. (3.) Political exchange of opinions on fusion and extended energy research. (4.) Marketing and communication of fusion as a renewable energy source.

**Movements such as "Fridays for Future" or "Last Generation" show** how strongly politics, business, research and the environment are already reflected by the public. The big human project is called "Fight climate change at all costs", even if this includes nuclear energy generation. However, safe nuclear energy is now within reach. "Generation 4" or compact small reactors and, of course, the "clean nuclear energy" of nuclear fusion will be available in the future. However, with all the possibilities, the complexity and the variety of approaches, it is almost impossible for anyone to keep an overview. What visionaries are able to inspire sponsors for today is often considered unfeasible by many scientists. In politics, public interest is taken up and new programmes are created, while industry waits, but would like to contribute its share. This quadrangle needs to be more dynamic and - above all - orchestrated.

**Programmes such as INFUSE in the US are good examples of this movement,** but also show the weaknesses. Many projects that are proposed have too long a time horizon or there are too few foundations in place. The focus must therefore be on medium-term technology transfer to demonstrate industrial scalability in 10 to 12 years. A new initiative is needed here, but one that is underpinned by many years of experience. It should not be profit-orientated, but should enjoy the trust of the various parties involved in the merger.

Our motto is therefore:



"The hype in Fusion does not last longer than the time horizon of the investors. But 'beyond the horizon, it goes on' (Udo Lindenberg) - for the merger, we want to help open the door a good deal and take responsibility for the dialogue."

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