It's almost a mantra: not only are fossil fuels bad for the environment, they will also run out in a few decades. But how to solve this problem? We can hardly put wind turbines or solar cells on every available square meter. And what if there's no wind or sun? Raw materials for nuclear fission are also limited, and the radioactive waste will haunt us for centuries. Nuclear fusion offers a much cleaner power source, and its fuels are widely available.

There is only one catch. We haven't got a ready-made fusion power plant yet.

Sure, there are already some lab-scale reactors, and ITER is being built to explore the physics of larger-scale devices. Only DEMO, the first demonstration fusion reactor, will really prepare for commercial power plants. It is for DEMO that some fundamental questions still remain unanswered. We know, for example, that tungsten can withstand the tremendous heat and neutron fluxes, but can alloying make it less brittle? Experimentally testing all possibilities would take ages, but many materials properties already follow from quantum mechanical simulations. We only need to investigate sufficient materials, and look for the most suitable one. Will we be able to bring nuclear fusion one step closer to reality?