The Energy-Climate Continuum: Lessons from Basic Science and History

Where will we end up if we do not change direction in global energy trends? Scientists should take the lead in informing society on problematic and delicate issues, such as energy supply, environmental and climate changes, making difficult things understandable.

If you were to ask a member of the public about the meaning of the 450 climate change mitigation scenario, they might wonder, "What on earth has this to do with us?". Indeed, not so long ago scientists were considered a closed society living in ivory towers, spending much of their time in exotic laboratories and academic institutions. Nowadays, there is a growing commitment of scientists to share our knowledge and opinions with society. Scientists should take the lead in informing society and policy-makers on problematic and delicate issues, such as energy supply, environmental and climate changes. This book addresses the threats and opportunities facing the global energy systems, explaining in a readable way how strongly the energy and climate debates are interconnected.

The best strategy to succeed in science should be based on our capability to explain the laws of nature in a transparent way. Antoine Bret explains in his book the science behind the energy-climate continuum problem, trying to make difficult things understandable, illustrating facts with the feeling of orders of magnitude.

The book covers physics fields with relevance for all energy technologies and their impact on climate, including:

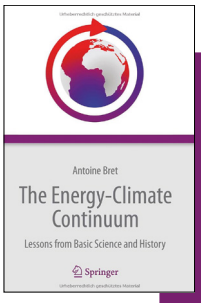
- ✓ The energy problem in a world presently dominated by the use of fossil fuels, how we know the influence of their usage on climate and introducing elements of climate modelling.
- ✓ Elements of solution by non-fossil energy sources pointing out: a) the impact of replacing conventional fossil or nuclear energy sources by intermittent renewable energy sources, b) the development of massive energy sources, like fission/fusion, since the dominance of fossil fuels must decline, c) the requirements for fossil power plants and technologies to reduce CO_2 emissions and feasibility of large–scale CO_2 storage, and, d) physical capabilities of energy storage systems.
- ✓ History as a learning strategy, where the issue of energy has a direct impact on economic capacity and social stability.

It is clear that we are facing an energy transition phase with new global drivers like climate change and globalization. Indeed, we need a society with a critical knowledge that should understand how much energy based on fossils we need to substitute compared with previous transitions, which are much greater than at any other time. The quest for energy is a global endeavour and new energy strategies require technologies for energy production, storage, conversion, transmission and savings.

The book, which is very much worth reading by everyone who wants to understand the present energy-climate debate, shows that we need the development of all potentially viable options for low-carbon energy, promoting research and favouring innovation without jeopardising the security of energy supply. The reader will find some clues to form an opinion and to answer key energy-related questions like: "Where will we end up if we do not change direction in global energy trends? What are the energy options and their pros and cons? What is the impact of energy on social stability?"

Energy is the life-blood of today´s society, and new strategies for the development of sustainable energy sources are needed to reduce energy-related carbon emissions. We cannot afford to delay further actions to tackle climate change if the long-term target of limiting the global average temperature increase to 2 °C, as analysed in the 450 scenario [the 450 referring to a parts-per-million (ppm) concentration of carbon dioxide (CO_2) in the atmosphere], is to be achieved at a reasonable cost.

But we should be realistic: the need for new strategies for energy generation, conversion and storage is a colossal challenge. A global challenge where the dynamics of energy markets are increasingly due to population growth, increase in economic output and energy demand. A global challenge that would require a multi-decade approach, keeping a coherent and sustained energy policy that strengthens the mutually beneficial relationship between education, research and innovation. ■



ABOUT

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