

Sustainable Energy – without the hot air

David JC MacKay

About the author

David MacKay is a Professor in the Department of Physics at the University of Cambridge. He studied Natural Sciences at Cambridge then obtained his PhD in Computation and Neural Systems at the California Institute of Technology. He is internationally known for his research in machine learning, information theory, and communication systems, including the invention of Dasher, a software interface that enables efficient communication in any language with any muscle. He has taught Physics in Cambridge since 1995. Since 2005, he has devoted increasing amounts of time to public teaching about energy. He is an alumnus of The Climate Project (Cambridge, 2007). He is a member of the World Economic Forum Global Agenda Council on Climate Change.



About the book

Sustainable Energy – without the hot air is a free book for the thinking public.¹ It picks up where *An Inconvenient Truth* ends. Accepting that we must get off our addiction to fossil fuels, the book explores the questions: “How can we get sustainable energy? Could we live on renewable power alone? What would a sustainable energy plan look like, for a typical European country such as Britain?”

The book emphasizes the *numbers* that must be understood in order to make energy plans. It’s not enough to know that we have “huge” renewable resources – our consumption is also huge! To compare one “huge” with another, we need numbers, not adjectives. David MacKay explains the numbers in an entertaining style, accessible to high school students. How much power does a modern lifestyle use? How much power could each sustainable source provide? How do they add up? To make these consumption and production numbers accessible, comparable, and memorable, they are all expressed *per person* in a single consistent set of human-scaled units.

Once the numbers are laid out, two important conclusions can be drawn. First, to make a difference, renewable facilities have to be astonishingly large: they have to be country-sized. They need to be large because renewable power flows are all so diffuse. For example, to supply one fifth of Britain’s total power consumption from wind power requires wind-farms with an area equal to that of Wales. (Wales has the same area as New Jersey; it’s about 10% of the UK.) Second, many developed countries have population densities that are simply too high for them to be able to live on their own renewable power sources, at a European standard of living – even if the most stringent efficiency measures were adopted, to reduce the power consumption of transport and heating. The book uses Britain as a case study, but its technical content is useful for readers worldwide; thanks to the consistent adoption of “per person” units throughout, it’s easy to apply the calculations to other countries.

In sum, the message of the book is that it is not going to be easy to make a sustainable energy plan that adds up – *but it is possible*. The book’s goal is to promote the building of a constructive political consensus, committed to the radical action that is required.

¹The book is available for free on the website www.withouthotair.com, and will remain free online after the book is published on paper (December 2008). David MacKay wants the book to be free so that everyone can read it, regardless of ability to pay.