Book review

Sustainable Materials – with Both Eyes Open

Julian M. Allwood and Jonathan M. Cullen. UIT, Cambridge, 2012, ISBN 978-1-906-86005-9, £24.95, also available as a free PDF (<http://withbotheyesopen.com/read.php>)

This is an excellent book that is strongly recommended reading for a wide audience and particularly for civil engineers of all persuasions. In some areas it might be regarded as 'popular science' but the results of the science and the resulting messages are unlikely to be popular. The book goes beyond the normal 'hype' of sustainability as a mere catchphrase and starts to put numbers on the actions that need to be taken to achieve real sustainability. The authors have no affiliation with any industry, process or government organisation and this is apparent in their approach. They negotiate the maze of sustainability with admirable clarity and provide a road-map for meaningful action – a considerable achievement in a area that is often subject to bias and confusion.

The first part of the book looks at where current emissions come from and the materials that are primarily responsible (steel and aluminium). The current uses of these materials and the predicted future demand patterns are used to provide estimates of the future emissions if no action is taken; that is, emissions are likely to double in the next 40 years even though the need is to halve them.

The second part of the book deals with the effectiveness of the current 'one eye open' approach to reducing emissions. This approach is primarily interested in improving process efficiency by methods such as improving energy efficiency, improving heat capture, developing new process routes, implementing 'clean' electricity and implementing carbon capture and storage. These methods are all extensively examined and quantified in terms of what they can deliver. The result of the 'one eye open' approach is that, even with the most optimistic view of process efficiency improvements, it is simply not possible to halve emissions if demand doubles.

The third part of the book deals with the need for a 'both eyes open' approach to reducing emissions. This approach examines not only process efficiency but also material use efficiency. Improving material use efficiency involves actions such as: using less material by improved design, reducing high current process yield losses, diverting and reusing what is currently

regarded as scrap, re-using material without melting the metal (to avoid the high-energy input required for melting) and designing products for longer life to reduce final demand. Each of these material efficiency options is amply illustrated by real-life examples of what can and has been done to reduce material use in practice. This is not so much about theory as about rolling out current best practice. The result of the 'both eyes open' approach is that emissions can be reduced by 50% even if demand doubles and still live well – simply by using less new material.

This book is about finding out what has to be done to really make a difference in the future and is concerned with the scale of the challenges facing society. Scale is beautifully illustrated by reference to the current noisy debate about plastic carrier bags. It turns out that if we all stopped using all plastic carrier bags in the UK then it would have the same effect as if we all drove 4 miles per year less or as if we turned off one 60 W light bulb each for one day per year! Banning plastic carrier bags may make good PR but it is not going to get us where we need to be. This book provides an essential road map for the journey that we all have ahead of us.

The book is beautifully illustrated with diagrams that are dense with information content (particularly the Sankey diagrams) and that not only reward detailed study but are also essential to understanding the overall argument.

The mass of the book is somewhat daunting and could have been reduced significantly without detracting from its overall argument and validity. The authors are engineers and scientists and obviously want to make a convincing argument, but this does sometimes detract from the clarity of the overall thrust of the book. Fortunately for those of limited attention span (policy-makers please note) an excellent summary of the book is available from the web site noted below. This presents the main arguments in 27 clear and concise slides. If you do nothing else then download these and study them.

The message of the book is so important that the authors have also made it available as a free download from www.withbotheyesopen.com. Buy it or download it but read it and walk away with both eyes open.

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