

**Briefing Files**  
**Minimising Energy in Construction (EP/P033679/2)**  
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<b>File name</b>	<b>Authors</b>	<b>Title</b>	<b>Content</b>
Allwood et al., 2011.pdf	Julian M. Allwood, Michael F. Ashby, Timothy G. Gutowski, Ernst Worrell	Material efficiency: A white paper	Four major strategies for reducing material demand through material efficiency are discussed: longer-lasting products; modularisation and remanufacturing; component re-use; designing products with less material
Allwood, "In a Nutshell".pdf	Julian Allwood, Jonathan Cullen	Energy and Material Efficiency, In a Nutshell	A brief guide to where energy savings might be made.
Carruth et al., 2011.pdf	Mark A. Carruth, Julian Allwood, Muiris Moynihan	The technical potential for reducing metal requirements through lightweight product design	This paper examines the opportunity to reduce requirements for steel and aluminium by lightweight design
Kaethner and Burridge., 2012.pdf	S Kaethner, J Burridge	Embodied CO2 of structural frames	Demonstrates that there is a significant opportunity for structural engineers to reduce the embodied CO2 of the final structure by careful specification.
Moynihan and Allwood, 2014.pdf	Muiris C. Moynihan and Julian M. Allwood	Utilization of structural steel in buildings	This paper analyses over 10,000 Beams to show that average utilization is below 50% of their capacity
Orr et al., 2017.pdf	Orr, J., Bras, A., Ibell, T.	Effectiveness of design codes for life cycle energy optimisation	This paper uses an industry facing survey to explore for the first time the potential use of performance measurement to create new drivers for lighter and more usable designs
Thirion, MPhil Thesis.pdf	Clement Thirion	Putting the material in the right place: Investigations into the sustainable use of structural materials to reduce the initial embodied environmental impact of building structures	This MPhil thesis examines the potential for beams and floors to be optimised.
Wise and McCann.pdf	Chris Wise and Ed McCann	MArginal Gains In Construction: UK industry strategy to deliver more Value with less Cost	Briefing paper on routes to saving energy and cost. Evidence that savings in the £bns are possible whilst reducing material use.