# *A Bayesian Hybrid LCA model of stochastic embodied greenhouse gas emissions in construction materials*

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A new method for stochastic embodied greenhouse gas emissions modelling is proposed. The method progressively integrates process analysis data into a prior probability distribution of embodied greenhouse gas emissions drawn from a disaggregated expansion of the U.K. Environmental Accounts. The UK Environmental Accounts are disaggregated using techniques from Maximum Entropy econometrics with the stochastic data extracted through use of random sampling from the space of potential supply trees feeding any given product sector. Data integration and posterior distributions are formed using Bayesian statistical techniques realized through application of the Markov Chain Monte Carlo (MCMC) discrete approximation method. The model offers the benefit of robust error estimation and the ability to 'learn' through the progressive integration of new process analysis data.

A stochastic model is developed to permit analysis of potential $CO_{2eq}$ emissions reductions obtainable through preferential selection of low embodied $CO_{2eq}$ material suppliers within material supply chains. Such analyses are important for assessing the extent to which emissions reductions can be achieved through economic mechanisms that drive preferential selection of low embodied carbon materials back through the supply chain – such as carbon taxes and emissions trading. This work is explained further in:

Shipworth, D. 2002, 'A stochastic framework for embodied greenhouse gas emissions modelling of construction materials' *Building Research & Information*, Vol. 30, No.1 pp.16-24.