



COMPREHENSIVE EVALUATION OF POTENTIAL FUTURE UK BIOENERGY VALUE CHAIN GREENHOUSE GAS EMISSIONS

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Successful collaboration between [North Energy](#), [Forest Research](#) and [NNFCC Ltd](#) has seen completion of the “Carbon Life Cycle Assessment Evidence Analysis” project for the [Energy Technologies Institute](#). Starting in July 2016, this project has evaluated the total greenhouse gas emissions associated with potential relevant future bioenergy value chains for the United Kingdom.

Careful definition of the clear and detailed goal and scope of this work established the need to apply consequential life cycle assessment. Following appropriate screening of 147 potentially-relevant bioenergy life cycle assessment studies, 49 full critical reviews were conducted. This revealed a lack of transparency and inadequate coverage which demonstrated the basic limitations of any meta-analysis for the valid comparison of LCA results.

Instead, suitable workbooks were developed for calculating greenhouse gas emissions consistently and comprehensively for 510 possible bioenergy value chains consisting of the production of heat and/or electricity, hydrogen and ethanol from pellets derived from conventional forests, short rotation forests, short rotation coppice, miscanthus and straw. These workbooks were supported by a compendium of 7,518 individual values of data compiled from 176 original sources. They were used to generate 2,385 comparable results, in the form of estimated total greenhouse gas emissions, all calculated using consistent methodology and emissions factors. They were then used to examine the effects of variability and to provide 19,462 results for analysing sensitivities, including modelling uncertainties.

Important knowledge gaps, consisting of choices of forest management scenarios and practices, wood products, counterfactuals, and waste management; emissions from biomass storage; indirect land use change; and non-carbon dioxide emissions from biomass feedstock combustion and conversion, were identified and practical means for addressing them were prescribed.

