

Cost minimization of microalgal biomass as renewable fuel feedstock through species/feedstock selection and technology portfolio optimization

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The single largest issue facing microalgae-based fuel and chemical production is the high cost of biomass production, which current stands at \$750/ton. For further TRL advancement of the biorefinery, promising technology components must be screened out through integrated process “breadboard” evaluations. Despite this, the complexity and nascence of the biorefinery means that modelling and simulation through platforms such as AspenPlus™ is infeasible. In this study, we have estimated a baseline biomass production cost through “P-to-X” analysis as well as performed cost minimization through feedstock variation, species selection, and technology screening. Through a consistent evaluation method, we conclude that the cost of biomass production is highly variable on plant location and technology selection, varying anywhere from \$215/ton to \$1295/ton. In addition, we present a methodology for “breadboard” evaluation of the cultivation process for technology portfolio optimization. The methodology addresses the need to characterize component processes as well as defining a reasonable criteria for technology screening.