Unexpected Cost Savings by Building Resiliency into Agricultural Biomass Supply Chains

a.k.a "Resiliency optimization of biomass to biofuel supply chain incorporating regional biomass pre-processing depots."

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Rating

8

- **9** Ability to Reduce Feedstock Cost
- **10** Ability to Decrease Supply Chain Risk
- **7** Ease of Implementation

Recommendation

Natural disruptions, such as droughts, floods, or pest infestations, are a real risk to agricultural biomass supply chains. Projects that depend on agricultural feedstocks must plan for these risks to ensure continual operations. However, traditionally it has been difficult to quantify and compare potential costs due to disruptions, based on different supply chain arrangements.

New methods can quantify an impact of a disruption through computer modelling. This paper incorporates the concept of optimization and resiliency to an agricultural supply chain. It shows significant disruption costs can be avoided if disruption risk is controlled through supply chain optimization—and a model to achieve this outcome.

This is a technical paper, however, it will be useful to project developers, investors and feedstock procurement managers who are planning or developing biomass supply chains and are concerned with de-risking feedstock supply.

In this summary, you will learn

- A new advanced computer modelling method to address risk in agricultural biomass supply chains.
- A method to quantify expected cost reductions through implementing resiliency into biomass supply chain design.

Summary

All biomass-based projects are prone to natural and man-made disruptions. Natural disruptions include events such as drought, flood, and pest infestation. Agricultural biomass supply chains are especially prone to these risks. This is because the disruptions may occur during harvest season, restricting the ability to harvest on time; or they can occur during the early part of the growing season, leading to complete crop failure. This paper models agricultural biomass supply chains and simulates natural disruptions, quantifying the expected cost of these disruptions to the supply chain.

The researchers find that by designing the supply chain with **resiliency** in mind, the expected disruption cost is reduced by **up to 38%.** Cost savings depend on the intensity and nature of disruptions, as well as feedstock type and distance from pre-processing depot. The larger the quantities of biomass, the more a biomass supply chain benefits from building in resiliency factors.

Resiliency means that a system is prepared to handle the expected variability and disruptions effectively as to minimize losses. There are four dimensions to resiliency: robustness, redundancy, resourcefulness, and rapidity. All of these dimensions were incorporated into the model to optimize supply chains.

"A resilient supply chain is better prepared to handle the expected variability and disruptions so as to minimize losses"

"Resiliency in [supply chain] design reduced the expected disruption cost by up to 38%"

"Siting locations that initially seemed ideal, were shows to be sub-optimal when potential disruptions were considered"

Reference:

- Maheshwari, P., Singla, S., Shastri, Y. (2017). Resiliency optimization of biomass to biofuel supply chain incorporating regional biomass pre-processing depots. *Biomass and Bioenergy.* Vol. 97: 116-131.

To discuss how you can use the concepts in this paper or to receive a copy of the paper, please contact us:

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