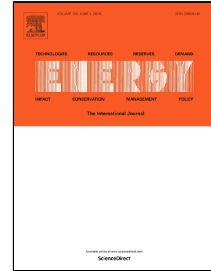


# Accepted Manuscript

A stochastic programming approach toward optimal design and planning of an integrated green biodiesel supply chain network under uncertainty: A case study

Zabih Ghelichi, Mohammad Saidi-Mehrabad, Mir Saman Pishvaei



PII: S0360-5442(18)30923-X  
DOI: 10.1016/j.energy.2018.05.103  
Reference: EGY 12938  
To appear in: *Energy*  
Received Date: 24 June 2017  
Accepted Date: 15 May 2018

Please cite this article as: Zabih Ghelichi, Mohammad Saidi-Mehrabad, Mir Saman Pishvaei, A stochastic programming approach toward optimal design and planning of an integrated green biodiesel supply chain network under uncertainty: A case study, *Energy* (2018), doi: 10.1016/j.energy.2018.05.103

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# A stochastic programming approach toward optimal design and planning of an integrated green biodiesel supply chain network under uncertainty: A case study

Zabih Ghelichi <sup>a</sup>, Mohammad Saidi-Mehrabad <sup>a</sup>, Mir Saman Pishvaei <sup>a\*</sup>

<sup>a</sup> School of Industrial Engineering, Iran University of Science and Technology, Tehran, Iran

---

## Abstract

Biodiesel has recently attracted much interest as an appropriate alternative for the fossil diesel which is mostly consumed in the transportation sector. Meanwhile, *Jatropha Curcas L.* has emerged as one of the most promising biofuel feedstocks due largely to its salient features such as compatibility with arid and semi-arid lands. In this regard, this paper unveils a two-stage stochastic programming model for the design of an integrated green biodiesel supply chain network from *Jatropha Curcas* feedstocks. The concerned biodiesel supply chain design is an environmentally friendly mixed-integer linear programming, multi-period and multi-product model. Furthermore, a flexible stochastic programming approach is developed and applied to the supply chain network model. This proposed approach is indeed an extension of a two-stage scenario-based stochastic programming approach which incorporates min-max relative regret in a soft worst-case framework. Given the natural variability of long-term decision-making, fuel demand and *Jatropha Curcas* trees yielding are hemmed in by uncertainty in this model. The performance of the proposed framework and biodiesel supply chain network design is corroborated through ten realizations and a myriad of various analyses in a real case study of Iran. The derived results and their analyses acknowledge the efficiency and applicability of the model.

**Keywords:** *Jatropha curcas L.*, Biodiesel supply chain network, Two-stage stochastic programming, Maximum relative regret, Greenhouse gas emission

---

## 1. Introduction

### 1.1 Definitions and motivations

Current global energy consumption shows a significant increasing trend until 2030 and liquid fuels would constitute the greatest portion of fuel demand for the transportation sector [1]. Moreover, population growth, fossil fuel depletion, environmental concerns, economic development, climate changes, food crisis and volatile fuel price pose serious challenges for new energy supply planning and management. In addition, the reduction in fossil fuels dependency and finding sustainable energy resources call for a wide variety of renewable resources that can be substituted for fossil fuels. For these reasons energy policy makers and researchers have concentrated their attention on sustainable and renewable energy sources.

---

\* Corresponding author: School of Industrial Engineering, Iran University of Science and Technology, Narmak, Tehran, Iran  
Postal code: 16846-13114, Tel.: +98 21 73225016; fax: +98 21 73225098  
Email addresses: [zabih\\_ghelichi@ind.iust.ac.ir](mailto:zabih_ghelichi@ind.iust.ac.ir) (Z. Ghelichi), [mehrabad@iust.ac.ir](mailto:mehrabad@iust.ac.ir) (M. Saidi-Mehrabad), [pishvaei@iust.ac.ir](mailto:pishvaei@iust.ac.ir) (M.S. Pishvaei)

Download English Version:

<https://daneshyari.com/en/article/8071371>

Download Persian Version:

<https://daneshyari.com/article/8071371>

[Daneshyari.com](https://daneshyari.com)