

## Chapter 5

# Sustainable Supply Chain Development: An Energy Management Approach

**Shounak Basak**

*Indian Institute of Management Calcutta, India*

**Sudhanshu Shekhar**

*Indian Institute of Management Calcutta, India*

**Kushal Saha**

*Indian Institute of Management Calcutta, India*

### ABSTRACT

*Sustainability has assumed increased importance in view of the international focus on pollution control and climate change. Specifically, the development of sustainable supply chain can help in important ways to reduce pollution and address environmental concerns. Energy efficiency forms an important aspect of this movement towards sustainable supply chain. Energy efficiency can be achieved through judicious energy management initiatives at the supply chain level. A metrics-based approach provides an effective mechanism to implement energy management programs in supply chain operation. The chapter explores the utility of energy balance sheet as a metric to implement such energy management programs. It further looks at the challenges and opportunities faced by supply chain partners in implementing energy management programs. It uses the case study of Firozabad glass industry to illustrate the implementation of energy management for developing sustainable supply chain.*

### INTRODUCTION

Supply chain management involves activities starting from the manufacturing the product to its transition through various value adding processes and lastly the delivery of the product to the consumer. The supply chain structure plays a major role in determining the actual cost incurred to manufacture and make the product market ready. Therefore it has a significant bearing on the price that the consumer pays for

DOI: 10.4018/978-1-5225-5424-0.ch005

the product. The way a supply chain is managed has economic, environmental and social implications. Economic costs refer to various costs associated with the movement of the product along the supply chain - starting from raw materials to infrastructural costs. Environmental costs involve degradation of the environment due to the carbon footprints left by the supply chain. Additionally, the global reach of supply chains has also led to social implications across the world. In this context, supply chain management is expected to be more responsible in alleviating environmental concerns and providing social and economic benefits (Haavisto & Kovács, 2014). This leads us to the concept of sustainable supply chain management (SSCM) which is defined as the management of material, information and capital flow along with cooperation among the firms involved in the supply chain to achieve the three dimensions of sustainable development viz. economic, environment and social (Beske & Seuring, 2014). Sustainable supply chain management evidently brings strategic benefits in corporate reputation (Roberts, 2003) and better operational and financial performance (Carter & Rogers, 2008; Rao & Holt, 2005).

Firms need to devise ways of conducting business that is both profitable and sustainable (Beske & Seuring, 2014; Porter & Kramer, 2011). They need to keep in mind the trade-off between profitability and sustainability while taking decisions related to operational designs (Hahn, Figge, Pinkse, & Preuss, 2010; Marshall & Brown, 2003). With climate change emerging as an important matter of concern in the public policy domain, firms have begun addressing the same voluntarily or involuntarily. Various regulations enacted by the government have coerced the firms to follow a more sustainable mode of operation. As defined by the World Commission on Environment and Development<sup>1</sup>, “sustainability” is the economic development that meets the needs of the future generations along with the present generation. However, the pertinent question is what strategies do a firm need to adopt to achieve this sustainable mode of development. An important question is as to how the environmental protection-based strategies will lead to economic gains. Energy management has emerged as an important mechanism that provides a win-win solution to achieve both the economic and environmental objectives. Energy management reduces the energy costs incurred by the company thus leading to a reduction in production. It also leads to environmental wellbeing by designing innovative technologies which are less polluting. Thus sustainability of firms and supply chain can be achieved by implementing a properly designed energy management system (Schaltegger & Figge, 2000).

Various frameworks have been developed for the implementation of sustainability performance (Epstein & Roy, 2001) and creating sustainable value (SL Hart & Milstein, 2003). These approaches take into account various dimensions of the sustainable development. Technology is considered one such important dimension (Seliger, Kim, Kernbaum, & Zettl, 2008) and can be used to develop SSCM practices. Thus, technology can be considered a fundamental driver for achieving sustainable goals. Technology usage is related to energy usage which plays a major role in sustainable supply chain development. Reducing the energy usage in supply chains entails innovation in developing alternative technologies which consume less energy. Usage of energy at almost all the steps of a supply chain structure makes a significant contribution to the overall economic cost. Additionally, energy usage (especially in the developing world) involves the use of non-renewable resources which lead to significant environmental and social costs. Therefore, it would not be imprudent to say that efficient use of energy would play a major role in the development of the sustainable supply chain.

Energy plays a central role in the industrial production of a country and, hence, important in determining the GDP of a country. However, amount of energy usage with respect to the GDP output of a country is an indicator of the efficiency of the country. Asian countries and especially India has high energy usage per unit of GDP output in comparison to other developed countries and even other Asian

20 more pages are available in the full version of this document, which may be purchased using the "Add to Cart" button on the publisher's webpage:  
[www.igi-global.com/chapter/sustainable-supply-chain-development/211831](http://www.igi-global.com/chapter/sustainable-supply-chain-development/211831)

## Related Content

---

**Institutional and Cultural Aspects of Logistic Management in the Chinese E-Commerce Sector**  
Yueben Wu, Aili Cai, Sabitha R. and Prathik A. (2022). *International Journal of Information Systems and Supply Chain Management* (pp. 1-17).

[www.irma-international.org/article/institutional-and-cultural-aspects-of-logistic-management-in-the-chinese-e-commerce-sector/305848](http://www.irma-international.org/article/institutional-and-cultural-aspects-of-logistic-management-in-the-chinese-e-commerce-sector/305848)

**Inhibitors of Industry 4.0 and Circular Economy in Manufacturing Industry Supply Chains**  
Rimalini Gadekar, Bijan Sarkar and Ashish Gadekar (2022). *International Journal of Information Systems and Supply Chain Management* (pp. 1-24).

[www.irma-international.org/article/inhibitors-of-industry-40-and-circular-economy-in-manufacturing-industry-supply-chains/304367](http://www.irma-international.org/article/inhibitors-of-industry-40-and-circular-economy-in-manufacturing-industry-supply-chains/304367)

**Supply Chain Models and Functions of Food Service Chains in Japan: The Food SPA at Saizeriya**

Hitomi Nakagawa (2022). *Frameworks and Cases on Evolutional Supply Chain* (pp. 194-214).

[www.irma-international.org/chapter/supply-chain-models-and-functions-of-food-service-chains-in-japan/302806](http://www.irma-international.org/chapter/supply-chain-models-and-functions-of-food-service-chains-in-japan/302806)

**Fuzzy Random Periodic Review Mixture Inventory Model With Shortage Dependent Backorder Rate**

Wasim F. Khan and Oshmita Dey (2022). *International Journal of Applied Logistics* (pp. 1-15).

[www.irma-international.org/article/fuzzy-random-periodic-review-mixture-inventory-model-with-shortage-dependent-backorder-rate/309982](http://www.irma-international.org/article/fuzzy-random-periodic-review-mixture-inventory-model-with-shortage-dependent-backorder-rate/309982)

**Process Excellence and Industry 4.0**

Felipe Martinez (2018). *Analyzing the Impacts of Industry 4.0 in Modern Business Environments* (pp. 328-350).

[www.irma-international.org/chapter/process-excellence-and-industry-40/203128](http://www.irma-international.org/chapter/process-excellence-and-industry-40/203128)