Greening California: Supply Chain Life Cycle Implications of Shipping Goods from Mexico vs. China

Justification

California is constantly increasing the trade of goods from all over the world. This trade represents economical benefits for the State. In addition, the Government tends to be on the leading edge of environmental awareness in several areas, such as transportation, production, energy supply among many others.

The environmental burden related to the trading of goods is not only composed by the materials and energy expend in their production. In fact, this may only represents a small fraction of the total (Matthews et al, 2008). Significant improvements can arise if we take into account the whole supply chain, including manufacturing operations, transport, distribution to the final trade point and end of life.

Motivation

The differences among countries and the complexity of global supply chains require an extensive evaluation and analysis of the issues associated with global reverse flows. Reverse flows can be managed in a supply chain mainly in two ways: reverse logistics or closed loop supply chain.

In reverse logistics the reverse flows may be done independently of the original manufacturer, meaning the system was not designed and managed for forward and reverse flows; in contrast to the closed loop supply chain, which is explicitly designed and managed for both flows. This is why frequently the reverse logistics process is much more difficult to operate and it’s rarely unchallenging to develop a viable value stream

The Problem

Shipping goods to the Californian market (e.g. LA area) from different manufacturing sites

Regional Energy Comparison

Average nation values for emissions by productivity sectors.

Energy mix values for primary energy

LCA methodology

Inventory analysis: identification and quantification of energy and resource use and environmental releases to air and land.

Impact analysis: the technical qualitative and quantitative characterization and assessment of the consequences on the environment

Improvement analysis: the evaluation and implementation of opportunities to reduce environmental burdens

Transport Processes for Mexico

Vehículo Gas LP

CO2

N2O

VOC

Non methane VOC

methane

Soot

CO

CO2

NOx

LCA methodology

Results of other transport vehicles have also been published as part of ITP’s database. A couple of them appear in the effectiveness that these LCA projects and the open literature while many of projects other transportation vehicles can be available upon request.

Test Case and Future Work

The test case of Si-PV-panels is analyzed

The regionalization of the LCA depends on the usage of transport and energy.

Identify “hot spots” along the supply chain and actions for improvement

Provide guidelines for business leaders interested in the NAFTA.