Sustainable supply chains

Executive Briefing

Applying simulation techniques to the development of sustainable global supply chains

How to balance cost and environmental variables to achieve optimum and green distribution

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Abstract

Organisations are under huge pressure to reduce their carbon emissions and save money by eliminating waste from their processes. Happily the two sets of initiatives go hand-in-hand: the less energy you use and waste, the less energy you pay for.

However, the challenge lies not in recognition of the need to reduce energy use for the sake of the planet and the balance sheet, but in the ability to model processes to understand what energy is being used where, and for what. And further to that, how can we cut energy costs without having an impact on customer service, profitability and competitiveness?

Until recently, it has been difficult to find meaningful answers to those questions. But manufacturers and third party logistics (3PL) companies are increasingly recognising that they can use simulation techniques to model their use of, and investment in, energy supplies.

Lanner is a world leader in simulation software, which is used to model and optimise business processes within many types of organisation, has responded to market conditions and requirements by developing a green module that will allow businesses to understand much more detail about the cost and use of energy.

In this paper, we outline the high level market conditions that are driving the need for energy management in the supply chain; the challenges that manufacturers and 3PLs have when addressing this issue; and the role that Lanner can play to streamline the process.

Background

The pressure to reduce energy use in business stems from three main sources: one regulatory, one fiscal and one simply relating to doing the right thing for the environment.

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The new administration led by President Obama in the US will almost certainly lead to a renewed focus on sustainable business practices, with the previously reluctant US and Chinese governments discussing in September 2009 how they can reduce their contribution to climate change (estimated to measure 40% of the global total). In the UK, the Government has pledged to cut carbon emissions to at least 60% below their 1990 levels by 2050.

This focus on improving sustainable business will almost certainly lead to an end to the era of cheap oil – and this is exacerbated by the instability of oil producing nations. In a study of 60 US state energy regulators carried out by Deloitte in March and April 2009, 70% of regulators believe that the cost of electricity will increase this year.

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According to McKinsey, it was the availability of cheap oil in the past that has driven the development of global supply chains over the past decades and says that today the transportation of goods consumes 15 million barrels of oil a day, which is around one fifth of the world's total production.

The requirement to 'go green' may have started some years ago as a kind of 'green wash' with companies ticking the basic boxes of recycling paper and cutting back on travel. Today it is a necessary part of business reporting, corporate social responsibility and business practice. The world's largest brands now report on sustainable energy policies as a source of competitive positioning to prospective employees, customers and investors. For example, Electrolux hit the headlines for pledging it would 'slash energy use a further 15% by 2012; while Wal-Mart has announced a major global responsible sourcing initiative and M&S has scored massive credibility for its 'Plan A' campaign.

In the complex world of the global manufacturing sector, interlinked supply chains mean that once a major manufacturer adopts sustainable practices, these also have to be adopted by suppliers and sub-contractors. It is not enough for a major manufacturer to adopt self-contained CSR policies: more and more annual reports outline how these policies extend to suppliers and partners.

Energy efficiency is therefore at the top of the boardroom agenda for any organisation that is making, storing or shipping goods. Reducing the amount of energy used within the organisation and its supply chain saves money, improves corporate reputation and satisfies regulatory guidelines. The next question is how to go about achieving it.

How to build sustainable supply chains

For all of the reasons outlined above, there is now a whole industry growing up around sustainable business strategy consulting. For example, in an ongoing study of energy efficiency in supply chains, McKinsey has outlined six levers that illustrate possible next steps in reducing the amount of oil used to get goods from factory to retailer's shelf.

1.Increase value density
This is the measure of a product's economic value against its weight or value. An example of where this works in practice is the introduction of concentrated washing liquid: depending on the product involved a smaller but equivalent format costs 30% - 40% less to ship.

2.Reduce average transportation distance
If manufacturers redesign their processes to reduce the distance that products travel, they can achieve a 4% reduction in energy cost, mainly by sourcing sub-components closer to the manufacturing process or nearer to the end customer.

3.Change the mix of transportation modes
Shifting from air freight and trucking to shipping and rail could cut energy intensity by 4%.

4.Address asset technology
McKinsey advises carriers and manufacturers to work together to develop rail, tanker and trucking assets that are more energy efficient in their capacity and propulsion.

5.Assess usage of individual assets
By addressing variable factors such as speed, load, maintenance and route planning manufacturers could reduce energy use by 12%.

6.Assess usage of collective assets
Clearly this lever will work best when many players collaborate on smart traffic management policies and regulation to avoid congestion and upgrade transport infrastructure.

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As well as considering some or all of McKinsey's levers, organisations can also consider their use of electricity to run IT systems both within the data centre and outside. According to a counter-intuitive finding by industry analyst Forrester, 55% of organisations surveyed say that they use more IT electricity outside the data centre than within it.

And according to the Climate Group in its report Smart 2020: Enabling the low carbon economy in the information age, IT is directly responsible for 3% of the world's CO2 emissions, but could be used as an enabler to reduce another 15%. In its March 2009 report Mapping IT's Green Opportunities, Forrester describes how green IT is spreading outside of IT operations and infrastructure and moving from Green IT 1.0 (Green for IT) to Green IT 2.0 (IT for Green).

The former includes systems management and building automation; the latter carbon management, supply chain optimisation and climate change policies – including smart grids and greener cities.

A final trend is for industry not just to respond to the need for green in sustainable supply chains, but also to develop software, technology and other products to meet the needs of industry to cut emissions through reduced energy use. There are growing sections of industry engaged in the development of more energy efficient electric motors, sustainable energy generators and marine renewables. In all of these cases, manufacturers need to understand the impact of new technology on industry's energy use.

The role of simulation in understanding energy use

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In many ways, understanding energy use in industry is the same as in the home or office. Attitudes have changed over time so that companies as well as consumers now recognise the need to reduce energy use in order to slow climate change and save money.

But while the will to save is now in place, the wherewithal to achieve those savings is less obvious – organisations simply haven't had the tools that explicitly add energy analysis on top of other process rules and calculations. Investing in technology to make it easy to see the effects on energy use of manufacturing and supply chain changes has traditionally fallen into either the 'too difficult' or 'too expensive' category.

Now simulation software such as Lanner's WITNESS is entering centre stage to help with just those kinds of highly complex scenarios and calculations. WITNESS is already used extensively in the manufacturing and supply chain for planning and optimising processes. Lanner has responded to market requirements to build a green calculator into its software so that organisations can factor in the cost of electricity, oil, gas or other energy sources into scenarios and adjust calculations for the optimum outcome.

Organisations who already use WITNESS can apply the new module to existing models – making a very small adjustment to include energy usage costs alongside other variables such as machines used, routes taken or location and time. No programming is required to add the new module to WITNESS or to create standard reports and dashboards – all organisations need to know is the price of the energy sources involved.

Simulation is always about supporting choices and decisions between different options. Understanding the true cost of energy is not typically an intuitive process, and simulation can help organisations work with a graphical representation of the impact that different choices have on their energy use. What happens to our energy costs if we make or deliver a particular product once a day or every half an hour? What impact will sourcing sub-products locally have on our fuel bill?

Conclusion

All of the signs from the marketplace are that energy costs will continue to rise in line with the global sustainability agenda. Organisations have no choice but to reduce their energy bill, from a cost point of view and also because they need to be seen to embrace measures to cut the world's reliance on non-sustainable energy sources.

The challenge that we all have is how to do this without introducing risk to the business in terms of reduced product quality and customer service. Every organisation could reduce its costs by closing down their buildings for half the working week – but this would probably not help to grow the business.

A much more intelligent approach is to adjust energy use at a granular level. And only simulation software allows organisations to build energy costs into their existing business process models – achieving and proving prudent, sustainable energy use as a result.