



Larry Lapide is Research Director at the MIT Center for Transportation & Logistics. He welcomes comments on his columns at [llapide@mit.edu](mailto:llapide@mit.edu).

## The Link Between Oil and Supply Chain Design

***As oil supply becomes more volatile and prices less predictable, companies need to take a critical look at their conventional “best practices.”***

To paraphrase Senator Hillary Clinton, “It will take a village to reduce the supply chain’s dependency on oil.” As I discussed in my last Insights column, many supply chains are insidiously permeated with this historically cheap, nonrenewal energy resource. This has happened more often by design than by necessity. What this means for many companies is that in order to become less dependent on oil and more resilient to supply chain shocks, they will need to redesign their supply chains.

My earliest recollection of how design can influence oil consumption dates back to 1980, after I started working at Data General, a mini-computer manufacturer that has since been acquired by EMC. I was invited on a tour of a nearby systems-integration plant. The guide described how computer components and peripherals were brought in from around the world to be integrated and tested before being shipped.

The only part of the tour that I remember was the description of how disk drives were made. They were comprised of bits of core memory that had to be manually strung together before being put into a washing machine-sized chassis. Our tour guide remarked how amazing it was that the memory bits were actually made in the United States, sent to Asia for the stringing process, and finally brought back to the United States for sale. We asked: Why ship components half way around the world only to bring them back again? The response: It was cost-justified because U.S. labor costs were too high. Fast forward to 2007 and you find that nothing much has changed. Semiconductor chips travel across several oceans before they become part of a product delivered to a consumer.

In the good old days of cheap oil, these types of so-called best practices may have made sense in

many high-margin industries like high tech. But with the advent of higher oil prices in 2003 and its more recent acceleration over the past year, such practices need to be revisited and revised. With developing countries competing against developed countries for a shrinking worldwide reserve of oil, prices promise to become more volatile and rise even higher. That’s a combustible combination that makes today’s supply chains all the more vulnerable.

### Develop Oil Footprints

How does a company protect itself against this increasing volatility and price uncertainty? One answer can be found in the scenario planning and risk management work we’ve been doing as part of MIT’s Supply Chain 2020 Project, a comprehensive investigation into the future of supply chain management. In particular, the 2020 Project identified what we call a “no-regrets strategy”—or a strategy that the decision maker will not regret regardless of what happens in the environment. We are at a juncture where companies need to adopt a no-regrets strategy when it comes to making their supply chains less dependent on oil.

An important first step is to understand how much oil a product has consumed by the time it reaches the consumer. Companies have made great strides in developing landed costs; what they need to do now is measure the product’s landed oil consumption, or its landed “oil footprint.” That footprint essentially defines how many barrels of oil it takes to get a product to the consumer’s doorstep. (Oil footprints are related to, but not the same as, carbon footprints, which deal with environmental emissions.)

Most managers will be shocked to discover the oil intensity of their supply chains. All products

are comprised of commodity materials (including oil itself) drawn from the land, air, or sea. A lot of energy is used to extract these materials, convert them before they are delivered to a consumer for use or consumption. (See Exhibit 1.)

Footprints are a key to developing solutions for becoming less oil-dependent. Some of these solutions can be done independently of your supply chain trading partners. Obvious approaches include making your facilities and transportation and warehousing equipment more energy efficient and better able to use alternative fuels.

Other solutions for reducing oil dependency require cooperation among your trading partners. Downstream manufacturers, for example, need to know how much oil has been consumed by the materials and components they buy from suppliers. Suppliers need to understand the implications of their delivery methods on oil consumption. Similarly, customers need to recognize the implications of their delivery demands. When the trading partners develop and share these footprints, then the real progress begins.

Some of the best solutions will center on redesigning and reversing the practices that have historically been put in place to reduce cycle times. Traditionally, the quest to shrink process cycle times has focused on the transit portion by leveraging premium freight (which tends to be oil-intensive) rather than on other aspects of the process (such as handling, order entry and management, decision making, and approval activities). In addition, contingency plans often involve leveraging premium

freight to make up for delays in these other aspects. To become less oil-intensive, companies should consider using freight modes with longer lead times, while shrinking these other aspects and making them more reliable.

One proven technique is demand shaping. Demand-shaping solutions

**Where oil dependency is concerned, remember the Golden Rule: “Do unto others as you would have them do unto you.”**

can help a supply chain become less oil dependent, provided that customers are willing to accept the solutions and relax stringent service demands. Offering full-truckload delivery programs is one example. Working with customers to relax their fixed-delivery windows and just-in-time requirements is another approach. However, these solutions may require customers to hold more inventories. So, as quid pro quo, you may be asked to provide additional services or grant price concessions. But at the end of the day, these solutions would lead to less oil consumption, without materially affecting overall costs or customer service levels.

Often freight costs are bundled into the price of a product so customers don't realize how oil-intensive their service demands really are. If that information is made known to them and they still don't want to work with you on a full truckload program, for example,

they then should be required to pay for the incremental freight costs incurred in shipping less-than-truckload (LTL) or air. Alternatively, you should at least unbundle the freight costs from the price so that they can see the implications of their demands.

Similarly, you should address the oil-consumption implications of your demands on suppliers. Sticking to stringent delivery windows to support just-in-time programs to reduce inventories may not be “best practice” in terms of oil consumption. Work with suppliers, just as you want customers to work with you, to become less oil dependent. Where oil dependency is concerned, remember the Golden Rule: “Do unto others as you would have them do unto you.”

**Resiliency Rules**

In summary, revisiting some of the so-called best practices of the past in the context of oil consumption leads to an inescapable conclusion: You need to redesign your supply chain to make it more resilient to oil disruptions and price shocks.

Why is this so important? If you're more resilient than your competitors, you can respond more efficiently and effectively than they can when oil shocks hit. There's one more important benefit to becoming less dependent and more resilient. In addition to improving your oil footprint, you'll be improving your carbon footprint. And this means you're doing something for the environment. So in a very real sense conserving oil is about gaining competitive advantage *and* being altruistic.

