

Engineers Embrace Stakeholder Dialogue to Make More Sustainable Decisions

By Jeffrey Gangemi and Lise Laurin

On Friday, February 10, a group of 20 engineers gathered in Orlando for a workshop that would challenge their ability to tolerate ambiguity in making sustainability-related decisions. The goal of the daylong session was to analyze the potential risks and benefits of biofuels in comparison with fossil fuels.

The workshop, which concluded the inaugural Carbon Management Technology Conference, was billed as “Sustainability Metrics for Carbon Management Technologies: Use of Life Cycle and Full Cost Accounting.”

To kick off the session, Lise Laurin, Founder of EarthShift, introduced many of the current tools used to assess sustainability including Life Cycle Assessment (LCA), Risk Assessment, Ecosystem services valuation and Sustainability Return on Investment (S-ROI). The workshop considered each methodology using the example of soy biodiesel and petroleum diesel. To bring all the concepts together, the group chose a specific example to use in an S-ROI exercise: To determine the benefits (if any) of retrofitting a petroleum diesel bus fleet to run on soy-based biodiesel.

Because today’s corporations are increasingly responsible for their environmental and societal impacts, Sustainability Return on Investment (S-ROI) bakes in the ability to measure the social, economic and environmental returns on sustainability initiatives. The methodology was originally developed by companies like Dow Chemical and Merck, in partnership with the American Institute of Chemical Engineers (AIChE) to take uncertain environmental and health costs into account in decision-making.

Instead of a general investigation of the advantages and disadvantages of using one fuel or the other, the workshop was designed to examine a decision-making process from the viewpoint of multiple stakeholders. While Life Cycle Assessment (LCA) rigorously analyzes environmental impacts decisions – mostly product-related – from cradle to grave, workshop attendees were asked to look beyond those measurable, mostly internal, costs.

If the conversion to biofuels was to be undertaken, it would obviously need to be profitable for the bus operator, but what about for the state government, or for local residents?

Using the S-ROI method, which is sometimes referred to as Total Cost Assessment (TCA) for its ability to calculate positive return on sustainability-related investments, the group’s mandate was to decide whether New Castle County, Delaware should make the conversion to soy-based biodiesel. In the end, the output of the S-ROI methodology, which assigns probabilities and dollar values to both costs and benefits, would offer three scenarios: best, most probable, and worst-case.

The challenge: make the decision such that all three scenarios offer positive Net Present Value for as many stakeholders as possible.

A tall order for a six-hour workshop? Absolutely, but time constraints helped workshop participants narrow the goal and scope of the project. “You first have to know what question you’re trying to answer,” says workshop organizer Lise Laurin, founder of sustainability consultancy EarthShift. Otherwise, the vigorous debate among the PhD engineers in the room – about the type and intensity of potential air and water pollutants, the liability of the bus company for spill-related litigation, among other discussions – could distract from the fundamental question being asked. That is, should New Castle County convert its bus fleet, or not?

The constraints also highlighted the importance of the “functional unit,” i.e. the real outcome driven by the decision being made. For workshop participants, the question was not whether one type of diesel offers better transportation. Rather, to what extent would transporting bus riders with a biodiesel fleet be advantageous, given social, environmental, and economic considerations? Would it result in a positive ROI, not just for the decision-maker, but for the majority of the stakeholder groups?

To determine that, engaging in vigorous stakeholder dialogue is vital, says long-time LCA practitioner Laurin.

If integrating social, environmental, and economic considerations sounds complex, then the S-ROI methodology is designed to reduce that complexity. In fact, EarthShift is developing software to help that process along. “In the US, we often want to avoid any metrics that have a lot of uncertainty or value judgments built in. Unfortunately that either leads to paralysis or all decisions being based on one metric,” says Laurin.

For example, Energy Star is only based on energy use, and evaluations of biofuels are only based on GHG emissions. LCA and S-ROI are useful, argue their practitioners, because they help avoid “burden shifting,” where one harmful impact is simply traded for another.

Of all groups, engineers understand the importance of bringing analytical rigor to making more sustainable products, processes and decisions. “Sustainability is not a defined state, so it’s best to look at it as a relative concept, not an absolute concept,” says Subhas Sikdar, associate director for science for the National Risk Management Research Lab at the USEPA, who introduced and participated in the workshop.

Measuring and accounting for inputs and outputs using Life Cycle Assessment (LCA) helps to illuminate the potential impacts of a decision, says Sikdar. “If you have some objective in mind, serviced by two or three different products, then you can compare among two or three and determine which is more sustainable than the rest,” adds Sikdar.

But what about when impact isn’t confined to inputs and outputs? That’s where the benefits of S-ROI come in. “We can get beyond that paralysis and single-criteria decision

making into a richer model that shows the benefits and drawbacks to individual stakeholders, as well as to society as a whole," Laurin says.

Still, the process explored in the workshop can be challenging for engineers, because there is some uncertainty inherent in working with probabilities. "We as engineers are used to mathematics and precision and accuracy and stats and numbers with significant digits," says workshop participant Mary Ellen Ternes, an engineer-turned-lawyer with the law firm McAfee & Taft.

In many cases, decision-makers use the S-ROI methodology to determine whether there is a business justification for initiatives that don't show a positive ROI based on traditional costing methods. Laurin offers several other types of decisions where S-ROI has been useful in the past, citing a project where the methodology showed positive ROI for the Japanese government to support construction of a biogas factory.

Other potential decisions where S-ROI analysis can help ensure maximum benefits include whether to invest in pollution prevention devices, whether to make an acquisition, or even whether or not to expand a facility. Laurin points to an experience working for a mining company in Africa, where investing in HIV/AIDS education didn't make sense from a traditional accounting perspective. However, when costs to society were included in the ROI calculation, the project was clearly net positive in its result, both for the company and for the surrounding communities.

But this is not about philanthropy. Instead, S-ROI uses traditional cost accounting terminology, with results calculated in Net Present Value - terms readily understood and accepted by financial experts in the firm. And it uses Bayesian probability, which is an individual's calculation of a given event occurring. That's why engaging expert stakeholders is so critical to the process.

So, how do you perform an S-ROI analysis? First, you define the goal and scope of the decision. A traditional ROI analysis and a Life Cycle Assessment follow that. Then, you identify stakeholders and bring them on board, get buy in, and streamline the analysis.

The workshop in Orlando expedited the initial stages, fast-forwarding to the stakeholder engagement phase. Participants brainstormed all potential stakeholders, then identified potential risks and opportunities, costs and benefits.

The final stages involve impact assessment, interpretation, and then...the actual decision. To switch to soy-based biodiesel, or not to switch?

Utilizing methodologies like S-ROI is becoming critical in making decisions with obvious potential societal impacts. "If we have something for which we need to muster public support or political will – not just an internal corporate position, then it becomes an interesting process to go through a larger group to identify stakeholders," says workshop participant John Carberry, a chemical engineer and retired 43-year veteran of DuPont Chemical.

“Who might be outraged, or who might become strong supporters? Having done that, you can begin to deal with it - bring them in, or address concerns so that their reasons for outrage are diminished legitimately,” says Carberry.

The challenge for many engineers is how and when to integrate feedback from external stakeholders into what has traditionally been an internal corporate decision. “The crowd ensures the more complete data set,” effectively “normalizing the oscillation of public perception,” Ternes says. The methodology explored in the session provides the framework to achieve that normalization.

Conducting a full-scale S-ROI process with a client can be expensive, says Laurin. Besides that, many engineers will undoubtedly balk at the prospect of sitting in a room, brainstorming with a big group of stakeholders.

“If you want people to adopt a LCA process, you have to do it in a way where you can assign it to an engineer and they can sit in their office and do it,” says Ternes.

That’s another reason EarthShift is currently developing a software package, complete with interactive tools and social media capability. It’s designed to enable easier collaboration and dialogue, particularly across geographic boundaries.

When stakeholders engage in the process, the S-ROI methodology is designed to avoid the bias that comes from one individual completing the analysis in a vacuum. Only by breaking out of traditional work patterns, argues Laurin, will organizations make decisions that maximize return for the most stakeholders. Engineers like those at the Carbon Management Technology Conference have a vital role to play in making that vision a reality.

For more on the TCA/S-ROI methodology, please visit <http://www.earthshift.com/start/total-cost-assessment-methodology> .