FY05 Goal – Life Cycle Assessment

- Determine and implement 2 application-specific tools

1) Lawn care (process)
2) Light bulbs (product)

Determining and implementing two application-specific Life Cycle Assessment (LCA) tools was target number 6 on the P2 (Pollution Prevention)/Sustainability Committee's FY05 Activities and Targets (Short Term) list.

Walter Kocher developed a LCA tool that will analyze alternatives either qualitatively, comparing salient attributes of each alternative; or quantitatively, using more detailed analysis of costs and steps in the life cycle of the product or process. That is, the qualitative analysis takes a general overview, especially when both environmental and cost benefits are obvious. The quantitative analysis is best when alternatives are more similar in their attributes, or when a project is much more complex (and costly) and difficult to analyze in a general summary overview.

The qualitative analysis was used to compare alternatives for a process (lawn care) and a product (light bulbs). The qualitative tool worked equally well for both. Weights were added within each LCA to stress the most important rating categories. The lawn care LCA weighed more heavily for budget constraints, employee health, toxic releases, hazardous waste, energy, and water. The light bulb LCA weighed more heavily for energy use, global issues, water and resource conservation, and potential toxic releases (since household hazardous waste, such as light bulbs, are usually thrown out instead of being properly taken to a disposal facility).

Lawn Care

Five alternatives were reviewed, in descending order, considering use of supplies (whether chemical or organic):

- Chemical lawn care - by a popular company (status quo)
- Full organic care - by a professional organic company
- Organic "Light" - by the same professional organic company (least maintenance as possible, responding to needs as organically as possible, with standard chemicals as necessary for the first and second year)
- Organic "Light" with overseeding - Add overseeding to strenghthen the lawn against weeds
- Reactive / personal management - duplicate the efforts of a local university: maintenance only as needed, with some preventive measures, responding to what the lawn needs

The attached matrix analyzes each alternative for environmental preferability, price, and performance. A summary matrix ranks each alternative from 1-5, and a graph displays the results.

The graph indicates that full chemical care is the least preferable, mainly due to the inefficiency and cost of spraying every inch of lawn, whether it needs care or not. Also, nearly every chemical is a carcinogen, and the chemicals are "addictive" and actually harm the lawn ecosystem, killing beneficial insects and creating the need for more pesticides. The lawn is less healthy, requiring more care.

The remaining four alternatives ranked closely, with full organic being the least preferable. Full organic would use many more chemicals (even though they are organic) than necessary, which is a waste of resources and raw materials. Glenn doesn't need a showcase lawn. The contract standards indicate "maintain to industry standards," which leaves a lot of room.

Organic "Light" with overseeding fared the best, due to the reactive nature of this process (as-needed maintenance). But the process also combines just enough preventive maintenance to encourage a healthy ecosystem by providing overseeding to strengthen the lawn against weeds.

The final two alternatives, ranking nearly even, and right behind Organic "Light" with oveseeding, were Organic "Light" and Reactive/Personal. Both minimized used of resources and managed the lawn as needed, with some level of preventive healthy maintenance.

Light bulbs

Three alternatives were considered:

- Standard (incandescent) bulbs
- Compact fluorescent lights (CFLs)
- Halogen bulbs

The attached matrix analyzes each alternative for environmental preferability, price, and performance. A summary matrix ranks each alternative from 1-5, and a graph displays the results.

The graph indicates that CFLs are far and above the best alternative. Since standard bulbs and halogens use heat as light, 90% of the energy they use is wasted. CFLs create light with a chemical reaction (you can touch them after they've been lit for hours). Less heat also means less air conditioning (and the energy used to run A/C) in the summer. The price of CFLs may be more than twice that of standard bulbs, but the 75-80% energy savings and longer life of

the bulb (ten times that of standard bulbs), the cost savings per bulb can be around $50.

Halogen bulbs can last twice as long as regular bulbs, since they use halogen gas to lengthen the life of the tungsten filament that is heated to create light. The possible use of halogen gases (fluorine, chlorine, bromine) may create a concern for ozone depletion. This has not yet been verified after consulting many sources. Halogen bulbs heat quickly (and reach high temperatures) once a light has been turned on, which creates an immediate burn hazard.

All alternatives need to be disposed of as household hazardous waste, so the lead tip of the base can be captured instead of left in a landfill. The CFLs' mercury gas should also be captured.

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