

## PART II

# Environmental Responsibility

**I**n many ways, environmentally responsible design is still in its infancy, yet it is already a complex, multilayered subject that can be daunting for engineers. It can be next to impossible to identify and measure the full range of environmental impacts of a single product or service, let alone determine priorities for improving environmental performance. The issues you have to deal with include

- Determining the carbon footprint of a product or service
- Understanding the impact of different sources of electricity
- Knowing which chemicals and materials are desirable—and which should be avoided
- Maximizing the recyclability and minimizing the waste of a product
- Determining the fresh-water footprint of a product or service

In this part of the book, we'll use a two-part approach to tackle this large and complex design challenge. First, we'll break down the problem using a basic lifecycle model, focusing on how a product or service is made, used, and renewed. With this model we can examine the environmental impact of materials extraction, manufacturing, supply chain and employees, packaging, operation, recycling, take-back, and more.

However, *our approach does not require you to analyze and act on every conceivable variable that may relate to the lifecycle model.* Instead, as the second part of our approach, we'll present a framework to prioritize your actions—from determining the areas of greatest potential impact to identifying the low-hanging fruit for simple improvements.

We believe this approach will help you increase the eco-effectiveness<sup>1</sup> of your products quickly and see opportunities you might otherwise have missed—not just for creating better products, but also for improving business results through environmental responsibility. And while this approach works for individual products, it can also be used for product lines, or, with small changes, whole companies. In fact, we use a variation of this approach as we work to decrease the overall impact of Sun Microsystems as a company, and we have found that it accommodates many different scenarios.

This topic is very broad, and the specific set of challenges will vary from one situation to another. Therefore, the intent is to provide you with a starting point—a way to reason through the complexity and find the best approach for your specific situation.

Let's begin with a closer look at some of the variables that go into “environmental impact” and a discussion of what we, as engineers, can do to begin to minimize these impacts.