Applying Total Cost of Ownership to Sustainability Purchasing

WORKBOOK

Tim Reeve & Barb Everdene

The Sustainability Purchasing Network is a coalition of organizations with a mission to promote the growth of sustainability purchasing practices and advance economic sustainability.
Authors

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Barb Everdene serves as the Coordinator of the Sustainability Purchasing Network. She is a sustainability consultant and M.A. graduate of UBC’s School of Community and Regional Planning with expertise in the area of ethical and sustainable purchasing and sustainability management systems. Barb has worked in private, public and NGO sectors on community social and environmental planning initiatives and sustainable purchasing strategies. She served as West Coast Environmental Law’s Environmental Dispute Resolution Fund Coordinator for three years.

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Acknowledgements

This Total Cost of Ownership Workshop and Workbook are brought to you in part through a partnership of the following organizations:

- **Vancity**
  Vancity is Canada’s largest credit union. Formed in 1945, today Vancity has $10.5 billion in assets, more than 315,000 members and 42 branches throughout Greater Vancouver, the Fraser Valley and Victoria. Vancity and its subsidiary companies are guided by a commitment to corporate social responsibility, and to improve the quality of life in the communities where members live and work.

- **BC Hydro**
  BC Hydro is a crown corporation responsible for much of the hydroelectric power generation and distribution in the province. BC Hydro has taken a Triple Bottom Line approach to its business practices and tracks its performance along environmental, social and economic bottom lines. The crown corporation is renowned for its Power Smart Program, Aboriginal community development programs and other sustainability initiatives.

- **Mountain Equipment Co-op**
  Mountain Equipment Co-op was conceived in 1971 by a small group of students needing a place to buy gear not carried by conventional retailers and today has grown to more than two million members in 192 countries and is now Canada’s largest supplier of quality outdoor equipment. MEC has a cooperative structure and a core purpose to support people in achieving the benefits of self-propelled wilderness-oriented recreation. The co-op has also been a sustainability leader and innovator in the area of sourcing and factory conditions, greening its operations, and in its community involvement.

- **Fraser Basin Council**
  The Fraser Basin Council (FBC) is a not-for-profit organization focused on advancing sustainability throughout the entire Fraser River Basin. The long-term vision of the FBC is to ensure that the Fraser Basin is a place where social well-being is supported by a vibrant economy and sustained by a healthy environment. Since it was established in 1997, the FBC has played a key leadership role as an impartial, transpartisan, independent and non-political body. The FBC is the secretariat for the SPN program.
About the Facilitator & Speakers

*** Tim Reeve, B.A. 
This workshop is facilitated by sustainability purchasing expert Tim Reeve, who has fifteen years of experience in planning, implementing and managing corporate sustainability programs. Tim has a specialization in procurement and supply chain management and served on secondment to the 2010 Bid Corporation helping to plan purchasing, sustainability and social responsibility strategies. Prior to launching his own consultancy, Tim spent nearly 15 years helping a variety of public, private and non-profit organizations optimize their environmental and community programming.

*** Bari Kellington, C.PP. 
Bari has over 30 years of experience in the Supply Management profession, and has worked in various industries, including manufacturing, distribution, health care services and most recently serves as the Manager, Purchasing Services for Vancity. Bari has extensive knowledge of quality and supply chain practices and “values-based” procurement that incorporates ethical and sustainable supply chain strategies. Bari is a member of the Purchasing Management Association of Canada, the Institute for Supply Management (USA) and Supply Chain & Logistics Canada.

*** Mark Jeffrey, B. Eng, M.A. 
Mark has 18 years experience in industrial and institutional process efficiency, eco-industrial networking, high-performance (green) buildings, environmental management and broader issues of sustainability. Mark holds a Bachelor of Engineering degree in Materials from McMaster University, and a Master of Arts degree in Applied Behavioural Science. Recently, Mark was involved with the award winning Maplewood Community Eco-Industrial Project in the District of North Vancouver and the Tilbury Eco-Industrial Project in Delta, BC. Currently, Mark is the Senior Sustainability Programs Manager for Vancity, where he assists Vancity business units integrate sustainability considerations into their operations.

*** Chris Mazur, B.A. 
Chris Mazur is the District Sales Manager Technology for the BC Region of Grand & Toy. Chris was born and bred in the Prairies, and a graduate of the University of Regina with a Bachelor of Administration. Early on in his career he helped grow Grand & Toy’s business throughout central Canada as a Business Development Executive. After a period of teaching in central Mexico, Chris returned to Grand & Toy and has worked with numerous enterprise accounts seeking to implement Total Cost of Ownership, including
the Interior Health Authority, Vancity and Teekay Shipping. Chris leads Grand & Toy's Operational Excellence Philanthropic committee.

●●● John Gleeson

John Gleeson is a Grand and Toy Business Development Executive for the BC Region. He came to Grand & Toy one year ago after four years in the transportation industry. During his tenure in commercial sales he has worked with accounts such as Source Medical, Mercury Marine, Accpac International, The Fraser Health Authority, MacDonald Dettwiler and Mercedes Benz. Before joining Grand and Toy, John was awarded President’s Club standing during his last two consecutive years at Purolator Courier.
About this Workbook

Purpose

This workshop and workbook are intended to help you understand the concept of Total Cost of Ownership (TCO) and how you can use it to make your everyday purchasing decisions more cost-effective and sustainable. You will gain the knowledge you need to apply the TCO approach within your organizations and to build the business case for sustainability purchasing.

The initial cost of a product or service is often a very small portion of the total cost of owning the product over its lifetime or maintaining a service relationship over the long term. Total Cost of Ownership (TCO) evaluation can help you make more sustainable and profitable decisions by accounting for the full range of hidden and direct costs of a given product or service from production to disposal.

The Learning Objectives of this workshop are threefold:
1. to investigate and understand the concept of Total Cost of Ownership (TCO);
2. to understand how total cost of ownership is applied in the purchasing process; and,
3. to understand the components and use of a TCO tool.

The workbook is designed to provide all the materials necessary for this workshop, including a case study for the group exercise and an evaluation form. It is also designed to be a stand-alone resource with a reference section on the most up-to-date and user friendly online resources. Keep this workbook on your desk and revisit the tools, tables and case studies when evaluating your upcoming purchasing decisions!

Special Note:

Catering service is a common purchase and another area in which you can add sustainability value to your organization. To provide refreshments for this workshop, the Sustainability Purchasing Network retained Potluck Catering, a business branch of the Potluck Café Society. The Society grew out of a “youth-at-risk” employment initiative in Vancouver’s Downtown Eastside (DTES) called Binners Dinners, with the goal of providing a range of services to build the community capacity of the DTES and to improve the economic strength of the neighbourhood. Potluck’s social programs are offset with its business revenues. Since opening in April 2002, the Potluck Café has served over 170,000 meals and has employed many residents of varying abilities and capacities. It has become known for its attention to producing a quality, consistent and creative product and for its excellent customer service.
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About the Sustainability Purchasing Network

Connecting Organizations to Buy Smart and Foster Economic Sustainability

What is the Sustainability Purchasing Network?
Established in 2005, the Sustainability Purchasing Network has a mandate to support organizations in their efforts to develop and improve their sustainability purchasing practices and to ultimately influence positive environmental, social, ethical and economic impacts for British Columbia and beyond. The Network is currently funded by a consortium of corporate and government stakeholders with an interest in, or mandate to promote, sustainable purchasing. To date, the project has been coordinated and managed by three collaborating consultants based in Vancouver, BC (Tim Reeve & Associates, Strandberg Consulting and Charlene Easton).

What does the Sustainability Purchasing Network Offer?
The Network provides opportunities for the expansion of professional skills and knowledge through its service-oriented research, information, training and networking programs. It provides opportunities for purchasers to collaborate with one another and with suppliers to help improve the social and environmental performance of products and services and support the growth of socially and environmentally responsible businesses. The Network offers the following services, some of which are in development:

- Best practice sustainability purchasing case studies
- The business case for sustainability purchasing
- Tools for advancing sustainability purchasing policy and practice
- Training workshops
- Practitioner learning circles and online dialogues to share best practices and work together
- Collaborative projects such as buyers clubs, product fairs and initiatives to support economic sustainability
- A newsletter with events, resources, tools and updates
- Technical assistance and advisory services

Why Participate in the Sustainability Purchasing Network?
By participating in the Network, your organization can:

- Save costs, advance innovation and align operations with values
- Receive assistance in overcoming barriers to effective sustainable purchasing
• Join other progressive organizations in building a new movement
• Help create new opportunities in the marketplace
• Better assess environmental, social and ethical risks associated with products and services
• Build strong supplier relationships to improve reliability, trust and performance

By participating in the Network, you can:
• Develop expertise in an emerging purchasing specialty area
• Help enhance your organization’s reputation
• Connect with like-minded professionals and practitioners
• Access leading edge best practices, information and resources
• Seek solutions to your purchasing challenges
• Work with others to advance the growth of a sustainable economy

Who Can Join the Sustainability Purchasing Network?
Membership is open to BC organizations with an interest in sustainability purchasing whether your organization is just starting out or has advanced practices. Suppliers are welcome to join in their role as purchasers. If you are a private, public, or non-profit sector purchaser, office manager, policy advisor or sustainability professional, you are invited to participate in the Network and be part of this emerging organizational trend. To subscribe to our newsletter and learn more about workshops, events and resources, please contact Network Team members Charlene Easton, Tim Reeve or Coro Strandberg at spn@fraserbasin.bc.ca. Watch for the SPN’s website in summer of 2006.

Who’s Leading the Way?
The Network’s current participants include representatives from all levels of government, large and small business, labour, academic and non-profit sectors. The Network is advised by a multi-stakeholder Steering Committee with representatives from:

• BC Hydro
• Bell Canada, Western Division
• Business Alliance for Local Living Economies (BALLE BC)
• City of Vancouver
• Fraser Basin Council
• Greater Vancouver Regional District
• Hemlock Printers Ltd.
• Mills Basics
• Ministry of Labour and Citizens’ Services, BC Government
• Public Works and Government Services Canada
• Purchasing Management Association of Canada
• Vancity Credit Union
Module 1

Total Cost of Ownership & How It Can Advance Sustainability Purchasing

- What is Sustainability Purchasing?
- What is Total Cost of Ownership evaluation?
- Business case for Sustainability Purchasing
Total Cost of Ownership & How It Can Advance Sustainability Purchasing

Purpose:
The purpose of this module is to help you understand the concept of Total Cost of Ownership (TCO) and how you can apply it in your purchasing process to make more cost effective and sustainable decisions.

What is Sustainability Purchasing?
Sustainability purchasing is the process in which organizations buy supplies or services by taking into account:
- the best value for money (price, quality, availability, functionality)
- environmental aspects over the life cycle of products, and
- social and ethical aspects (e.g. local jobs, community impact, working conditions)

The intent of sustainable purchasing is to shift spending away from goods and services that negatively impact the environment and society towards products that are more environmentally sound and socially beneficial.

The concept encompasses procurement, materials management, logistics, supply chain management and strategic sourcing activities. Operationally, this means looking at whether products are really needed, and what products are made of, where they come from, how they were made and how they will be disposed.

Many organizations around the world are practicing sustainability purchasing in order to align their values with their purchasing decisions, improve product and service quality, increase resource productivity, reduce risk, enhance competitiveness and advance economic sustainability.

What is Total Cost of Ownership?
A Sustainable Purchasing Strategy serves as the management framework within which Total Cost of Ownership analysis is applied. Total Cost of Ownership is a decision support method or approach linked to “Total Cost Assessment”, “Full Cost Accounting” and “Life Cycle Analysis” – other ways of evaluating environmental and financial costs.
As Figure 1 demonstrates, Total Cost of Ownership encompasses a broader range of direct, indirect, contingent and less quantifiable costs in purchasing decisions, but does not attempt to consider external social or environmental costs borne by society. Though there are differences in scope, the principle behind all these terms is the same: evaluating the full range of costs associated with the purchase of a given product or service over its lifetime from production to disposal.

The assessment is carried out in financial terms: the technique accounts for the financial costs that accrue to each part of a product or service’s life cycle. Using this approach, purchasers are encouraged to consider not just the acquisition costs of new capital, but also staff costs, training, training aids, support equipment, transportation and logistics costs, operating costs, maintenance costs, and withdrawal from service and disposal costs. Life cycle analysis helps to identify comparative value for money of different options over the whole-life period. Its use can lead to wiser product choices among alternatives.

What is the Business Case for Total Cost of Ownership (TCO) Evaluation?
A term “business case” has two different meanings:
Total Cost of Ownership & How It Can Advance Sustainability Purchasing

In financial terms, to build a business case means to prove by quantitative and qualitative means that it is worthwhile for a company to pursue one decision over another.

In operational terms, a business case refers to a change in the way a company does business. This could be investing in new equipment, adopting a new process, or outsourcing part of the business. An “option” is a scenario within a selected business case.

Example of an Operational Business Case:

Operational Business Case: Invest in New Equipment
Option A: Keep using printers that can only print single-sided paper
Option B: Invest in printers that can print double-sided pages

Total Cost of Ownership (TCO) evaluation is often partnered with a sustainable purchasing strategy. TCO is designed to assess the true profitability and sustainability of business investments by considering the time horizon that reflects the entire life cycle (and the economic costs associated with each phase of the cycle) of a product or service. While conventional purchasing evaluation focuses on the acquisition cost of a product or service, TCO evaluation examines hidden costs from production to disposal in addition to the acquisition cost. Some of these costs are associated with process inputs, outputs, material, labor and risks/liabilities.

Where is Total Cost of Ownership Most Useful?

Though hidden costs are often uncertain, indirect, and difficult to quantify, taking time to address them through a partial or complete TCO can yield considerable savings, enhanced quality, and opportunities for sustainability value. TCO is particularly useful in situations where the decision involves a large amount of money relative to the size of the company or operation, the decision involves potential risk or an uncertain outcome, the competition within the company for financial resources is stiff, the process generates significant waste, particularly hazardous wastes, and indirect costs such as permitting, spill prevention and clean-up may be significant. However, using TCO can yield value in even ordinary, every day purchasing decisions. Check out the six case studies in Module 3 for some examples.
Total Cost of Ownership & How It Can Advance Sustainability Purchasing

How TCO Can Advance a Sustainability Purchasing Strategy

Purchasers tasked with implementing a sustainability purchasing strategy are responsible for identifying, quantifying and presenting policy factors to management as part of the procurement process. Total Cost of Ownership (TCO) evaluation is an important companion to a sustainable purchasing policy because it takes a life cycle perspective, and creates a systematic process for measuring and tracking both financial and sustainability performance of prospective purchases and actual acquisitions. As well as driving more effective sourcing strategies, this process allows for indicator development and benchmarking that can inform broader corporate responsibility analysis and decision-making.

Working together, a sustainability purchasing strategy – which may involve a policy, guidelines, or program - and Total Cost of Ownership approach facilitate insightful communication between internal departments and with suppliers. Strategy and tool have the potential to internally support a long-term, strategic approach to sustainability and drive innovation in the sustainability marketplace.
Module 2
Total Cost of Ownership in 6 Steps

- Step 1: Identify Needs and Drivers
- Step 2: Define Objectives and Scope
- Step 3: Identify Direct & Indirect Costs
- Step 4: Analyze Financial & Sustainability Performance
- Step 5: Develop Recommendations / Make the Decision
- Step 6: Measure Impacts
Total Cost of Ownership in 6 Steps

Purpose:
The purpose of this module is to help you understand each step of a Total Cost of Ownership (TCO) evaluation.

Performing a Total Cost of Ownership (TCO) evaluation involves moving through a number of logical steps. In our view, a practical TCO evaluation is a six step process as described by Figure 2.

![Figure 2 - 6 Steps of Total Cost of Ownership](image-url)
Total Cost of Ownership in 6 Steps

Step 1: Identify Needs and Drivers
The first step in doing a TCO evaluation is to identify what your sourcing needs are and what factors are driving these needs. Start by identifying what the underlying need is to make sure you are giving yourself as much opportunity for creativity as possible.

Example:
Instead of identifying a specific product or service such as “photocopiers”, as one example, you may identify that your company has a need for reproducing and printing documents.

Purchasers can document the needs and drivers and create a process diagram for a decision you are currently working on using Worksheet A.

Step 2: Define Objectives and Scope
The second step in doing a TCO analysis is to identify the sourcing options that are going to be evaluated and compared for their ability to meet the needs identified in Step 1. In addition to the conventional business criteria of price, quality, and the performance characteristics sought, you may be seeking to obtain some sustainability value from your purchase.

You may be already working within a management framework or purchasing policy that defines objectives, scope, and/or guidelines for environmental, social, and/or ethical sustainability. You may be interested in specific product or service specifications and/or information on vendor practices.

If you are not working within a set sustainability framework, you can investigate on a case by case basis different sustainability values to build into your purchases that can
Total Cost of Ownership in 6 Steps

pay off over the long term. What are some of the sustainability objectives to consider?

Some possible environmental objectives are detailed in the following chart:

<table>
<thead>
<tr>
<th>Environmental Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodegradability of products and substances</td>
</tr>
<tr>
<td>Energy efficiency of products or operating systems</td>
</tr>
<tr>
<td>No genetically modified organisms (GMOs)</td>
</tr>
<tr>
<td>Organic and natural characteristics</td>
</tr>
<tr>
<td>Recycled material composition / eco-efficient materials</td>
</tr>
<tr>
<td>Packaging and/or product take-back programs</td>
</tr>
<tr>
<td>Recyclability of products, packaging or components (including electronics)</td>
</tr>
<tr>
<td>Reduced emissions to air, land and water</td>
</tr>
<tr>
<td>Reduction or elimination of toxic and hazardous material substances</td>
</tr>
</tbody>
</table>

Some possible social and ethical objectives are detailed in the chart below:

<table>
<thead>
<tr>
<th>Social &amp; Ethical Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local job creation and locally produced products &amp; services</td>
</tr>
<tr>
<td>Local community development</td>
</tr>
<tr>
<td>Fair Trade and human rights</td>
</tr>
<tr>
<td>Product health and safety implications (worker health and safety)</td>
</tr>
<tr>
<td>Animal welfare</td>
</tr>
<tr>
<td>Corporate responsibility</td>
</tr>
<tr>
<td>Governance and accountability framework for vendors / suppliers</td>
</tr>
<tr>
<td>Internationally accepted (ILO) standards for factory conditions</td>
</tr>
<tr>
<td>Supplier human resources policies</td>
</tr>
</tbody>
</table>

Setting a scope on the types of sustainability objectives you would like to achieve may involve discussions with the functional departments that will be using the products or services. Depending on the nature of the organization, it may also necessitate consulting a wider range of stakeholders.
Total Cost of Ownership in 6 Steps

The objectives you choose may come from your organization’s sustainability framework or policy.

Example:

Mountain Equipment Co-op has a number of policies that direct what the co-operative’s environmental, social and ethical priorities should be in evaluating suppliers and making purchasing decisions. Some of its policies are a Product Sourcing Policy, Sustainability Policy, Old Growth Free Policy and its Supplier Code of Conduct. For detailed information, check out: www.mec.ca

Depending on your needs and drivers, you may wish to prioritize certain aspects of sustainability over others. The objectives chosen will form the basis of the criteria and clauses in your specifications for purchases after a decision is made (Step 5). Make sure you document your objectives and scope, along with any other reasons for carrying out the study. Specify your target audience. For example, your audience may be an internal management team, or an external advisory committee. As data and information are collected (in Step 3), various aspects of the scope may require modification in order to meet the original goal of the analysis. Any changes should be documented.

At this point in the process, purchasers may wish to create specifications for Request For Proposal (RFP) or Request for Tender (RFT) documents and once submissions are received, evaluate them using Step 3 and Step 4. Alternatively, purchasers may wish to proceed through to step four and evaluated product or service types before creating specifications for RFP and RFT documents.

Step 3: Identify Direct & Indirect Costs

Some of your sustainability objectives may provide a strategic advantage to your organization that can be directly measured in qualitative or quantitative terms. In this step you will define the relevant range of direct and indirect costs across the life cycle of ownership of the product or service. We define these terms as follows:

Direct Costs: Costs that can be easily and directly traced to the production, manufacture or purchase of a product or service. The best example is the original “sticker price” of the product or service.
Total Cost of Ownership in 6 Steps

**Indirect Costs:** Costs that cannot be easily associated with specific product manufacture or product or service purchase but are incurred throughout its use. Examples include depreciation and administrative expenses. Indirect costs can also be lost benefits that occur later in the life cycle of the product or service, such as lower disposal costs due to packaging or product take back, or a reduction in health and safety liability from substituting toxic cleaning products with environmentally benign ones.

Try to include as many relevant direct and indirect costs through the life cycle of a product as possible in your decision-making. For a listing of various hidden and indirect costs, please refer to Worksheet B. As a brief summary, some hidden or indirect costs may include:

**Material**
- Additional operations unique to a product, such as lighting or heating
- Manufacture and maintenance of capital equipment
- Costs associated with specialized equipment versus non-specialized equipment
- Property protection needs (warehousing costs and type)
- Inputs and outputs in manufacturing processes
- Recycling, disposal, and treatment
- Decommissioning of capital equipment

**Example 2:**
Companies can facilitate recycling for products at the end of their useful life by taking extended producer responsibility into account in their purchasing decisions. For example, items such as lead-acid batteries, paint, and motor oil have regulated stewardship programs in place in BC. Instead of going to the landfill, companies can send these items back where they came from (‘cradle to cradle’) to be dealt with responsibly.

**Labor**
- Labor costs associated with using products
- Training of specialized employees
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Total Cost of Ownership in 6 Steps

- Program management including monitoring and auditing (e.g. emissions management)
- Storage, distribution, and transportation

Example:

In the receipt and product distribution step, there are major opportunities for energy efficiency and waste reduction – both key strategies for greater sustainability. Companies can work with suppliers to receive less packaging, recycled content packaging, and/or recyclable packaging on purchased products. Firms who perform their own distribution function can take actions such as reviewing their distribution logistics for greater efficiency and less travel time, training their drivers to conserve fuel in their driving habits, and considering the purchase of vehicles that run on higher performance, alternative, or renewable fuel sources.

Risks/Liabilities

- Registration/regulatory costs and potential fines
- Environment Health and Safety (EHS) requirements that are attributed to the various products or systems
- Unexpected events associated with the goods or services that may cause injury, damage or other contingent costs
- Other considerations related to impact assessment

Step 4: Analyze Financial & Sustainability Performance

Once you’ve documented relevant, significant hidden and indirect costs in Step 3, you need to ascribe measurement units to each one and run calculations for all the business options you are considering – including a calculation of the status quo. Depending on the scope and range of objectives, your calculations may be quite simple and general in some cases and very detailed in others.

For very large and technical projects, you may wish to consider building a model or using software applications to process your financial and ecological data, examine a spectrum of business options, and balance a range of parameters. Software models can be particularly useful if they allow users to view the data in differing presentation formats.
Total Cost of Ownership in 6 Steps

This allows various functional departments to draw upon specific information relevant to their needs. Models also allow for testing various parameters to see where the greatest savings and benefits can be attained. One example of a readily available and useful software application is the GVRD's Business Case Total Cost Assessment Tool. See the Resources section in this Workbook for more information.

In this step, you will create a set of indicators to help you track what you want to achieve in specific economic/financial and sustainability terms. Some sustainability strategies and frameworks are based on a set of indicators to track financial and/or sustainability performance. Examples include the ISO 140001 environmental management system and the Natural Step Framework. Your organization may already have a set of indicators for you to use.

Key Performance Indicators (KPIs) help to simplify complex systems by measuring key components that represent the system as a whole in values that readily allow for comparison. Usually indicators measure current conditions, rate of change, or both conditions and rate of change. Most importantly, choosing a good set of indicators at this stage will help you stock the most relevant data. Make sure that the data collected in your analysis is the actual measurement of your indicators. You can also use the set of KPIs to measure the performance of your suppliers when you are managing your contracts.

Common measurement units may include:

- Purchase Price ($)
- Usage (Litres)
- Relative waste production (% of usage)
- Packaging type (kg per Litre)
- Wastewater parameters (BOD, TSS, P, Flow)
- Energy Use (kW)

Although quantitative data is easiest to work with, keep in mind that all data categories may include a mixture of quantitative and qualitative measured, calculated or estimated data. Document everything as you go.
TCO WORKSHOP

Module 2

Total Cost of Ownership in 6 Steps

When you are ready to analyze the various costs you have identified in specific units of measurement, you may want to do a combination of the following:

- Measure direct cost savings (cost out, using traditional financial data);
- Measure value impact (value in), e.g. tonnes of greenhouse gas emissions avoided, or tonnes of waste diverted from landfill; and/or,
- Estimate environmental benefits.

The ultimate goal of the analysis is to determine whether there is a business and sustainability case for choosing one of the options over the others. At this point in the process, purchasers may wish to create specifications for Request For Proposal (RFP) or Request for Tender (RFT) documents and evaluate the submissions again using Step 3 and Step 4. As your knowledge of the environmental and social impacts of products and services you currently purchase increases, you will be increasingly better prepared to develop new, more sustainability-focused, specifications.

Step 5: Develop Recommendations / Make the Decision

The results of the analysis should reveal advantages and disadvantages of each option, pointing to one leading option over others. At this stage, you may have to make some tradeoffs between different types of sustainability benefits and considerations of price, quality, and functional performance. At this point, you can use your internal organizational process to review recommendations and make the decision.

Step 6: Measure Impacts

Measuring impacts is the step in which you assess the sustainability impacts of the selected purchasing option. Information gathered is most valuable if it is quantifiable. The recording of financial, ecological, and social impacts can be integrated into various types of reporting, positive messaging, and can be used to create or recalibrate the sustainability management framework for better performance.

Accurate and consistent measurement of a selection of useful indicators can position firms to capitalize on these opportunities. The KPIs (Key Performance Indicators) selected in Step 4 to run the numbers and determine the Total Cost of Ownership of various options can now be used to track results and impacts over time. Keep in mind that reporting on impacts may include a mixture of measured, calculated or estimated data and experiential data such as stories or personal testimonies.
Module 3: Case Studies in Success

- Tripod Data Systems
- Lighting Research Center
- Fairmont Hotel Vancouver
- Xerox
- Hewlett Packard
- New York City Transit
Case Studies in Success

Purpose:
The purpose of this module is to provide an insight into how other organizations have applied a Total Cost of Ownership approach to sustainability purchasing.

What’s Important to Purchasers in Greater Vancouver
In Spring 2006, the Sustainability Purchasing Network completed a survey of purchasing professionals in the Lower Mainland and discovered which product and service areas were of keen interest to purchasers. Based on the feedback of 68 organizations, we learned that most purchasers seek sustainability information in five product and service areas. In this section, we have highlighted specific case studies in these key areas that demonstrate how TCO has been successfully applied for environmental, social and economic benefits. These key areas and their respective case studies are:

- Electronic equipment See Case Studies #1, #2 and #3
- Office products, supplies and furniture See Case Studies #4 and #5
- Waste management services See Case Study #5
- Toxics, cleaning supplies and custodial services See Case Study #3
- Fleets, fuels and vehicles See Case Study #6

Case Study #1: Portable Handhelds – More than a Drop in the Bucket
Organization: Tripod Data Systems
Timeline: 2003

Context
Portable Handheld Computers (also known as Personal Data Assistants or PDAs) – such as the well-known Blackberry (TM) - have become a great business convenience
Case Studies in Success

for busy professionals. While portability has major advantages, studies have determined that it leads to greater product wear, tear and breakage. Rugged handheld computers, by contrast, undergo extensive testing to ensure that they are able to withstand various environmental challenges, particularly ingress from dust and water and damage by dropping. The shorter lives of consumer-grade (a term referring to non-rugged units) handhelds leads to an overall increase in the flow of electronic products to landfills, with potential for their toxic components to leach into the soil and groundwater. As a result, choosing durable and long-lasting products over more breakable alternatives has a clear sustainability advantage.

TCO Analysis

A Total Cost of Ownership analysis demonstrates that purchasing durable handheld computers has a clear cost advantage, too. Tripod Data Systems retained Venture Development Corporation (VDC) to do a TCO analysis that encompassed the direct and indirect costs accumulated over the lifecycle of the handhelds. VDC, an independent technology market research and consulting firm, analyzed the following range of costs:

<table>
<thead>
<tr>
<th>Direct Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware and accessories: handheld devices, plus peripherals such as docks, scanners, power supplies, protective cases, radio cards, expansion sleeves, etc</td>
</tr>
<tr>
<td>Maintenance: software and hardware maintenance and service, extended warranties, spares, modifications and testing to support new hardware</td>
</tr>
<tr>
<td>Operations: fees (ASP, airtime, etc.), consumables, etc</td>
</tr>
<tr>
<td>Services: integration, training, management, curriculum development, support, etc</td>
</tr>
<tr>
<td>Software: license fees, application software, development and customization costs, etc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indirect Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposal and electronic product stewardship considerations</td>
</tr>
<tr>
<td>Downtime: time spent backing up, troubleshooting, restoring and servicing devices, as well as reentering data and recovering work lost due to device failures</td>
</tr>
<tr>
<td>IT support: help desk, troubleshooting, management and logistics, testing, training, etc</td>
</tr>
<tr>
<td>Business losses: costs associated with lowered customer service levels, dissatisfied customers, lost business opportunities, etc</td>
</tr>
</tbody>
</table>
Case Studies in Success

Results
Venture Development Corporation’s study found a significant TCO advantage for rugged handhelds over a five-year period and across all eight operational areas (such as supply chain and field services) studied. Over the lifespan of the equipment, maintenance and support costs, as well as intangible costs, were 10 to 40% higher for consumer-grade as opposed to rugged devices. In particular, by the second year of ownership, the study found the initial price savings of consumer-grade computers disappeared under the weight of 44% higher IT support requirements, as well as lost productivity. By the five year mark, organizations with rugged handheld computers saved an average of $1,610 compared to those with consumer-grade devices. The consumer units, with their lower initial costs, ended up costing $12,631 over five years, compared to $8,569 for rugged devices.

Case Study #2: An Illuminating Shopping Experience with LED
Organization: Lighting Research Center (Rensselaer Polytechnic Institute)
Timeline: 2005

Context
Lighting up a retail window is a key marketing tool for businesses wanting to display their products at their best. A May 2005 Total Cost of Ownership study by the Lighting Research Center (Rensselaer Polytechnic Institute) in New York City has found that retailers can dazzle potential customers, save money, and make a sustainability impact by choosing LED (Light-Emitting Diode) lighting instead of conventional incandescent lighting in their store windows. The colored lighting effects created with these tiny semiconductors can cut lighting energy in retail windows by 30 to 50% and offer greater flexibility to designers. Given that stores often use many high-wattage accent lights to highlight mannequins and merchandise for 12 or more hours every day, this represents a huge energy efficiency and cost savings! In fact, the US Department of Energy reports that lighting is a retailer’s biggest energy expense – accounting for a whopping 37%.

TCO Analysis
The Lighting Research Center field study was primarily designed to determine whether energy-efficient, colored window lighting could draw the interest of shoppers, reduce energy consumption in store windows, and maintain or improve retail sales. However, this case study emphasizes important Total Cost of Ownership principles because all conditions were kept equivalent (aside from the different lighting technologies used) with the assumption that the LED lights had to achieve a 30 to 50% reduction in energy use.
Case Studies in Success

in each retail window. Although specific numbers were not available for this case study, the range of cost parameters studied would have involved:

<table>
<thead>
<tr>
<th>Direct Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware and accessories</td>
</tr>
<tr>
<td>Maintenance and service</td>
</tr>
<tr>
<td>Operations (energy costs)</td>
</tr>
<tr>
<td>Designer service fees</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Indirect Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disposal and electronic product stewardship considerations</td>
</tr>
<tr>
<td>Ineffective or sub-optimal marketing losses: costs associated with lowered consumer interest and lost business opportunities, etc</td>
</tr>
</tbody>
</table>

Results

The LRC estimates that given current LED lighting system costs and estimated energy and maintenance savings, the typical LED lighting system payback is less than two years. In sustainability terms, the average store can reduce power demand from lighting store windows by up to 1 kilowatt, saving 5,500 kilowatt-hours per year (based on 2,000 watts of window lighting and 14 hours of use per day).

After eight weeks and more than 700 surveys, the Lighting Research Center field study concluded that the colored LED lighting was a hit with shoppers – overwhelmingly they preferred the colored LED window with a 30-50% reduction in power over the typical high-energy lighting design. Ninety-one percent confirmed that the 30% reduced accent lighting did not diminish the visibility of the window mannequins and merchandise. Cutting the power consumption further to 50% in each window resulted in no significant difference in shoppers’ opinions compared with the typical lighting. Sales data gathered by the retailer showed no significant change in sales at the three test stores during the study period, even with a 50% reduction in power consumption.
Case Study #3: Taking a Healthier Plunge

Organization: Fairmont Hotel Vancouver
Timeline: 2001 onwards

Context
The Fairmont Hotel Vancouver is a large complex with over 500 rooms and suites, a dozen meeting rooms, two restaurants, a health club, pool, spa and retail shops. The Fairmont Vancouver has joined with the Green Partnership Program, an initiative of Fairmont Hotel & Resorts created in 2001, to reduce its environmental impacts. One of the foci of the Green Partnership Program is to manage hazardous wastes more effectively. The Fairmont Hotel Vancouver has a hazardous waste management program that includes reducing toxics, properly storing and maintaining fuels and recycling materials with toxic wastes. The Fairmont focused this program on transforming its saline pool sanitation system into one more sustainable. To do this, the Fairmont investigated alternatives to concentrated chlorine – in particular, a baking soda/rock salt solution – to sanitize pool water.

TCO Analysis
A simple Total Cost of Ownership analysis demonstrates that using rock salt and baking soda rather than concentrated chlorine as a pool sanitation solution is both more cost-effective and sustainable than using concentrated chlorine. Although specific numbers were not available for this case study, the range of cost parameters studied would have involved:

<table>
<thead>
<tr>
<th>Direct Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware and accessories (differential costs associated with specialized and</td>
</tr>
<tr>
<td>non-specialized equipment, storage containers)</td>
</tr>
<tr>
<td>Materials (e.g. sanitation compounds such as rock salt, baking powder,</td>
</tr>
<tr>
<td>chlorine, etc.)</td>
</tr>
<tr>
<td>Construction and installation of sanitation equipment</td>
</tr>
<tr>
<td>Start up and training</td>
</tr>
<tr>
<td>Maintenance and service (program management including monitoring, testing</td>
</tr>
<tr>
<td>and auditing)</td>
</tr>
</tbody>
</table>
Case Studies in Success

### Indirect Costs

<table>
<thead>
<tr>
<th>Cost Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Downtime and productivity loss due to worker health and safety considerations (including unexpected events associated with the goods or services that may cause injury, damage or other contingent costs)</td>
</tr>
<tr>
<td>Waste management fees</td>
</tr>
<tr>
<td>Environment Health and Safety (EHS) requirements that are attributed to the various products or systems</td>
</tr>
<tr>
<td>Registration/regulatory costs and potential fines</td>
</tr>
<tr>
<td>Disposal and electronic product stewardship considerations</td>
</tr>
<tr>
<td>Business losses: costs associated with customer preferences, customer health and safety, dissatisfied customers, lost business opportunities, etc</td>
</tr>
</tbody>
</table>

### Results

Based on their TCO analysis, the Fairmont decided to install a saline pool sanitation system less harmful to workers, guests, the environment, and their bottom line! The saline system eliminated the need to purchase concentrated chlorine. Chlorine is now generated by applying an electrical current to a baking soda/salt solution. Prior to installing this system, the hotel spent $2,700 a year to purchase chlorine granules as compared to $750 for rock salt and baking soda, an annual net saving of $1,950, or 72% - and that is only a fraction of the overall benefits.

### Case Study #4: Doubling Product Lifespan through Product Stewardship

**Organization:** Xerox Corporation  
**Timeline:** 1999 onwards  

**Context**

Xerox Corporation is a $16 billion global enterprise that helps businesses find better ways to work through innovative technology integrated with document-management services. Over the last decade, Xerox has duplicated its sustainability focus across departments to create many sustainable and cost-effective office supply solutions for its own corporate performance – as well as for its products and services. And considering the scope of Xerox’s impact across offices everywhere, this is an amazing reproduction of sustainability indeed! One key initiative is to offer a leasing program where Xerox takes back and refurbishes 75% of the equipment it sells. Xerox also runs a recycling program for its copy/print cartridges, waste toner (dry ink) and toner containers to keep toxics out of landfills.
Case Studies in Success

Xerox co-administers a program with the National Cristina Foundation where Xerox’s customers can donate their used old printers and other technology to non-profit organizations, public agencies, and schools that train people with disabilities, students at risk, and economically disadvantaged persons. The sustainability impact is enormous – by offering this electronic product stewardship option to its customers, Xerox diverts tones of harmful electronic waste to landfills and defers expenditure of energy, water, and materials in new product manufacturing. Valuable products then meet the office needs of community-minded organizations that can spend less on overhead and more on their direct programs. When scrutinized under the lens of the Total Cost of Ownership, this take-back program also represents a substantial cost savings.

TCO Analysis
A simple Total Cost of Ownership analysis demonstrates that designing "waste-free" products built in "waste-free" plants rather than continuing to run operations along conventional lines is both more cost-effective and sustainable. Along with its more eco-efficient design, Xerox has invested in innovation that delivers measurable benefits to the environment and supports educational and community projects around the world, doubling up on its marketing and branding value. Although specific numbers were not available for this case study, the range of cost parameters studied would have involved:

<table>
<thead>
<tr>
<th>Direct Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equipment and hardware</td>
</tr>
<tr>
<td>Materials</td>
</tr>
<tr>
<td>Construction and installation of equipment</td>
</tr>
<tr>
<td>Start up and training</td>
</tr>
<tr>
<td>Maintenance and service (program management including monitoring, testing and auditing)</td>
</tr>
</tbody>
</table>


# Case Studies in Success

## Indirect Costs

<table>
<thead>
<tr>
<th>Cost Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take-back and donation program administration</td>
</tr>
<tr>
<td>Avoidance of downtime and productivity loss due to worker health and safety considerations (including unexpected events associated with the goods or services that may cause injury, damage or other contingent costs)</td>
</tr>
<tr>
<td>Avoidance of disposal and waste management fees</td>
</tr>
<tr>
<td>Environment Health and Safety (EHS) requirements that are attributed to the various products or systems</td>
</tr>
<tr>
<td>Avoidance of registration/ regulatory costs and potential fines</td>
</tr>
<tr>
<td>Benefits to non-profit organizations that need printing and photocopying equipment for their operations</td>
</tr>
<tr>
<td>Marketing and brand image gains / Avoidance of ineffective or sub-optimal marketing losses: costs associated with lowered consumer interest and lost business opportunities, etc</td>
</tr>
</tbody>
</table>

## Results

Xerox’s case demonstrates that for a relatively small investment in time and energy in conducting a TCO, great opportunities to raise corporate profits and make a sustainability impact can be discovered. By designing environmentally safe products that it can take back and recycle, Xerox estimates that it has saved more than US$2 billion and kept 1.2 billion pounds of electronic waste out of landfills. In 1999 alone, Xerox Corporation was able to generate cost savings of approximately $47 million in 1999. In 2004, Xerox’s supplies return initiatives prevented more than 13.8 million pounds of waste from entering landfills worldwide. You may wish to check out Xerox’s Business Guide to Waste Reduction and Recycling, which provides a blueprint for design and implementation of reduce, reuse and recycle programs.

## Case Study #5: A Business of a Different Color

**Organization:** Hewlett Packard

**Timeline:** 1996 onwards

### Context

This case study is not as much about Total Cost of Ownership directly as it is about the profile of a firm that has made sustainable purchasing a total, organization-wide business decision while enjoying financial success.
Hewlett Packard is a technology company that operates in more than 170 countries around the world. HP Canada is ranked number one in the technology industry as a world leader in corporate social responsibility by Report on Business Magazine, and would go on to be ranked first again in 2005, also receiving the highest environmental ranking in the IT sector. Over the past decade, HP has embarked on an ambitious program of corporate environmental and social responsibility while achieving sufficient profit to finance company growth and creates significant value for its shareholders. HP believes that a balance of long-term and short-term objectives is the key to profitability – a concept that is central to Total Cost of Ownership. Well on its way to achieving its goal of recycling 1 billion pounds of electronic products and supplies by 2007, HP has recycled more than 750 million pounds since 1987.

Sustainable Purchasing Strategy
With the help of its extensive environmental, health and safety (EHS) management system, HP has identified that its primary areas of environmental impact arising from its operations are climate change, energy use and waste.

HP has developed a Supply Chain Social and Environmental Policy applicable to its worldwide network of suppliers and has co-developed and adopted the new Electronic Industry Code of Conduct, which formalizes HP’s supplier labor, human rights, health, safety, environmental and ethical expectations. The firm has strengthened its supplier contract and purchasing agreements to reflect its new expectations, audits supplier facilities, and has developed requirements for supplier performance reporting and corrective actions for non-conformance.

Electronic Product Stewardship
Through its extensive electronic product stewardship program HP Planet Partners, HP facilitates Total Cost of Ownership benefits in organizations around the globe. As one critical example, since 1992, HP has reduced the average number of parts used in monochrome HP LaserJet print cartridges by 53% and reduced the number of plastic resin types by 69 percent, thus improving recyclability of HP LaserJet print cartridges. At the same time, the average number of pages printed per gram of weight in monochrome HP LaserJet print cartridges has increased 139% since 1990, clearly showing that customers get more today from a cartridge built using less material. HP has now created five scanners of 100% recycled plastic material.
Case Studies in Success

The Planet Partners program is multi-dimensional and based on consumer financial incentives—some of the highlights are:

- Environmental design of computer hardware (safe to use, minimizes energy and natural resource consumption, and enables end-of-life recycling);
- Computer hardware (of any brand), inkjet and laser jet supply take-back – these are then recycled and re-processed into new hardware and supplies;
- Online quoting system for hardware recycling, where product owners can see how much of their assets they can recover on a trade-in before sending material;
- $50 e-coupons to be used for new hardware products when consumer computer hardware is recycled; and,
- Envelope-in-the-Box Inkjet cartridge return and recycle program in Canada, where a pre-addressed and postage prepaid envelope makes recycling used materials easier for consumers.

Case Study #6: Taking NYC to a Sustainable Future

Organization: New York City Transit
Timeline: 1999

Context
With an interest in how much hidden value they could tap into, New York City Transit, JohnsonDiversey Inc., and BASF and formed a partnership to demonstrate the applicability of Total Cost of Ownership in their procurement decisions. The companies were interested in evaluating similar products and services to see what their true costs of business actually were. With this in mind, they retained Five Winds International to build a TCO model and system that they could then test and use to competitively position their products and services and improve their environmental performance.

In 1999, New York City Transit’s Department of Capital Program Management became the first public agency in the USA and the first transit entity in the world to have an Environmental Management System certified to ISO 14001. Driven in part by state regulation (Executive Order No.111) and by the ISO management framework, NYC Transit focused the TCO analysis on evaluating the potential use of natural lighting, alternative, renewable sources of energy (e.g. photovoltaic panels, fuel cells), rainwater harvesting, green buildings and demolition waste recycling – to name only a few.
## Case Studies in Success

### TCO Analysis

Five Winds’ Total Cost of Ownership analysis included an evaluation of including a range of energy and water efficient strategies into the design of NYC Transit’s Corona Maintenance Shop, Grand Avenue Depot and Central Maintenance Facility, Roosevelt Avenue Station, Stillwell Avenue Terminal and its 2nd Avenue Subway Line. Although specific numbers were not available for this case study, some of the many cost parameters studied include the following:

<table>
<thead>
<tr>
<th>Direct Costs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Equipment &amp; hard supplies</strong> (specialized transit, energy and building</td>
<td><strong>Materials</strong></td>
</tr>
<tr>
<td>equipment and supplies)</td>
<td></td>
</tr>
<tr>
<td><strong>Energy, Water and Wastewater related costs</strong></td>
<td><strong>Construction and installation of equipment &amp; hard supplies</strong></td>
</tr>
<tr>
<td><strong>Specialized labour and services</strong></td>
<td><strong>Maintenance and service</strong> (program management including</td>
</tr>
<tr>
<td></td>
<td>monitoring, testing and auditing)</td>
</tr>
<tr>
<td><strong>Indirect Costs</strong></td>
<td></td>
</tr>
<tr>
<td>**Downtime and productivity loss due to equipment failure or worker health</td>
<td><strong>Disposal and waste management fees</strong></td>
</tr>
<tr>
<td>and safety considerations (including unexpected events associated with the</td>
<td>**Environment Health and Safety (EHS) requirements that are</td>
</tr>
<tr>
<td>goods or services that may cause injury, damage or other contingent costs)</td>
<td>attributed to the various products or systems**</td>
</tr>
<tr>
<td><strong>Registration/regulatory costs and potential fines</strong></td>
<td><strong>Deferred capital investment costs</strong> (associated with increased</td>
</tr>
<tr>
<td></td>
<td>water and energy use)</td>
</tr>
<tr>
<td><strong>Liability, reporting, handling and insurance costs</strong></td>
<td><strong>Property protection needs</strong></td>
</tr>
<tr>
<td>attributed to amounts of hazardous substances used</td>
<td><strong>Reduced greenhouse gas emissions and smog, pollution, etc</strong></td>
</tr>
<tr>
<td><strong>Industry leadership:</strong> many features of the system serve as demonstration</td>
<td>**Improved air quality, water quality, and reductions in energy</td>
</tr>
<tr>
<td>projects for private sector and other public sector agencies. Improved air</td>
<td>use benefit the public at large and NYC citizens and businesses.</td>
</tr>
<tr>
<td>quality, water quality, and reductions in energy use benefit the public at</td>
<td></td>
</tr>
<tr>
<td>large and NYC citizens and businesses.</td>
<td></td>
</tr>
</tbody>
</table>
Case Studies in Success

Results
The outcome of the partnership study that NYC Transit participated in was that using a range of sustainable technologies in its maintenance shops, terminals and lines would make a tremendous sustainability impact and save money. Cost-effectiveness was an important criterion for NYC Transit and the TCO analysis helped to justify higher initial purchase prices in some cases. Based on the study, the Transit agency estimated outcomes for the following projects – sustainability achievements are detailed in the chart over the page:

<table>
<thead>
<tr>
<th>Project</th>
<th>Project Sustainability Strategies &amp; Outcomes</th>
</tr>
</thead>
</table>
| Corona Maintenance Shop          | • Photovoltaic cells, fuel cells and city grid power in combination expected to perform 30% more energy efficiently than state Code  
• Subway car washing facility will use and recycle wash water and pre-treat effluent discharge to city water system  
• Shop materials will incorporate sustainably managed forest products and materials with low embodied energy, low VOCs and high recycled content |
| Roosevelt Avenue Station         | • Translucent and conventional photovoltaic roofs to provide 215 kW of the Station and Terminal electricity needs  
• 86% of demolition waste was diverted from landfill to recyclers  
• Natural lighting and energy efficient fixtures on timers and sensors will reduce electricity needs |
| Grand Avenue Depot and Central Maintenance Facility | • Paint booths will be equipped with VOC abatement systems  
• System will recycle 85% of wash water. Stores rain water in underground tanks allowing system use during droughts  
• 100kW roof mounted solar photovoltaics and a 200kW fuel cell will help save energy costs and reduce peak loads on grid |
| 2nd Avenue Subway Line           | • In the conceptual design stage, New York City Transit is focusing on energy efficiency, waste management, material and resource conservation; fresh air ventilation and natural lighting are key priorities |
| System-Wide                      | • Buildings to follow LEED and Energy Star standards  
• Procurement of Energy Star® products for new or replacement equipment  
• 50% of light-duty vehicles acquired (100% by 2010) shall be alternative fueled such as hybrid electric |
Group Activity Case Study:
Sustainable Packaging at United Parcel Service

Context and Company Background

The Courier Industry
Today, businesses and consumers send and receive millions of overnight express packages every day. This disposable packaging creates solid waste, air and water pollution, and consumes large quantities of paper, plastic and associated raw materials, energy and water. In part, this situation results from the competitive intensity of the express delivery industry. Among the five largest companies in North America, battles for customers are fierce and have historically focused on the traditional parameters of cost and service.

United Parcel Service
United Parcel Service (UPS) is a $36 billion corporation and the world's largest express package delivery company, delivering 12 million packages every day. UPS manages the flow of goods, funds, and information in more than 200 countries and territories worldwide. The corporation is continuing on a trajectory of financial success - in the first quarter of 2006, operating profit increased 12.3% to $1.6 billion. Eight years ago, UPS embarked on a 10 month joint project with the Alliance for Environmental Innovation (an arm of major US non-governmental organization Environmental Defense) to improve the environmental performance of its packaging.

Total Cost of Ownership Analysis

The Alliance approached UPS with a pre-prepared business case that discussed the current types of packaging used, and identified numerous environmental improvement opportunities that could be implemented rapidly, cost-effectively, and at a cost savings to the company. The business case was essentially a Total Cost of Ownership analysis.

UPS took up the challenge of meeting and exceeding some of the Alliance’s suggested environmental improvements. The Alliance reports that the collaborative implementation of the preferred TCO business option has yielded substantial environmental, customer and business benefits - and specifically, decreased costs to UPS.

Let's walk through the Total Cost of Ownership following the six steps outlined in this Workbook. Since this case study deals with a TCO analysis that resulted in an
implemented project, we will not go through Step 5: Develop Recommendations / Make the Decision.

●●● Step 1: Identify Needs and Drivers

Both the Alliance for Environmental Innovation and UPS agreed that environmental improvements in UPS’ express packaging needed to be achieved while also maintaining performance, appearance and cost-competitiveness. The Alliance’s pre-prepared business case discussing a preferred TCO business option for packaging was shopped to five express delivery firms: Airborne Express, DHL, FedEx, UPS and the US Postal Service – only UPS embraced the challenge issued in the Alliance report. Mapping out the needs and drivers might have looked like this:

- **COMPANY NEED:**
  
  To achieve environmental improvements without sacrificing product or service functionality and without incurring extra cost

- **DRIVERS**
  
  - Desire to Save $ & Increase Profit
  - Opportunity to Gain Competitive Advantage over Industry Peers
  - Opportunity for low cost collaboration with ENGO
  - Desire to Create Sustainability Benefit

●●● Step 2: Define Objectives and Scope

Using the business option report as a starting point, the United Parcel Service and the Alliance for Environmental Innovation (“the Alliance”) negotiated a number of key objectives and a scope of activity for the project. They decided on the following:
Objectives

- Enhance consumer reusability of products
- Increase the post-consumer recycled content in paper and plastic products
- Decrease the amount of material used in packaging
- Eliminate the use of bleach

Scope

- Focus reusability on envelopes
- Focus increases in recycled content in boxes, Express Letter envelopes, and Plastic Paks
- Eliminate bleached paper from all packaging

Step 3: Identify Direct & Indirect Costs

<table>
<thead>
<tr>
<th>Business Option 1: Status Quo</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Cost</strong></td>
</tr>
<tr>
<td>Inputs and outputs in manufacturing processes</td>
</tr>
<tr>
<td>Purchase price of packaging products</td>
</tr>
<tr>
<td>Use of packaging products</td>
</tr>
<tr>
<td>Registration/regulatory costs and potential fines</td>
</tr>
<tr>
<td>Disposal and waste management fees</td>
</tr>
<tr>
<td>Ineffective or sub-optimal marketing losses: costs associated with lowered consumer interest and lost business opportunities, etc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Business Option 2: Increase Reusibility and Recyclability of Boxes and Packages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Cost</strong></td>
</tr>
<tr>
<td>Inputs and outputs in manufacturing processes</td>
</tr>
<tr>
<td>Purchase price of packaging products</td>
</tr>
<tr>
<td>Use of packaging products</td>
</tr>
<tr>
<td>Process efficiency and project management services (in house)</td>
</tr>
<tr>
<td>Supplier consultation program (in house)</td>
</tr>
<tr>
<td>Customer service benefits: improvements in package functionality &amp; convenience for customer</td>
</tr>
<tr>
<td>Reduction in need to store and retrieve new envelopes</td>
</tr>
<tr>
<td>Enhanced brand image; advanced standing as industry leader - Clear</td>
</tr>
</tbody>
</table>
Business Option 2: Increase Reusibility and Recyclability of Boxes and Packages

- leadership position as first express delivery company to offer reusable innovation
- Increased market share & opportunity for competitive win (enable the capture of new corporate accounts)
- New product offers specific benefits and expanded service for target markets, e.g. legal-size reusable envelope fills unmet customer needs to send legal-size documents
- Potential to create market differentiation in broad market

Step 4: Analyze Financial & Sustainability Performance

Choosing Metrics

In this case study, we will identify some important metrics that were chosen for the Total Cost of Ownership analysis. These metrics were used to create a model and perform a financial and environmental analysis. See the chart below:

<table>
<thead>
<tr>
<th>Objective &amp; Scope</th>
<th>Measurement Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance consumer reusability of envelopes</td>
<td>- Number of instances of reuse</td>
</tr>
</tbody>
</table>
| Increase the post-consumer recycled content in boxes, Express Letter envelopes & Plastic Paks | - Percentage of post-consumer fibre
- Percentage of post-consumer resin
- Percentage of virgin materials / year
- Litres of water
- Percentage reduction in hazardous air
- Litres of wastewater / year
- Percentage reduction in generation of solid waste in kgs / year
- Percentage plastics diverted from landfill / year |
| Decrease the amount of material used in packaging      | - Percentage of total unit weight in grams              |
| Eliminate the use of bleach from all packaging         | - Percentage of film used
- Energy consumption in KW/hrs / year
- Water consumption in L / year
- Discharge of toxic chlorinated organic compounds / year
- Reduction of absorbable organic halogens in kg / year |

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Sustainability Purchasing Network
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Step 6: Measure Impacts

Results

According to the Alliance, the Project’s results set in motion remarkable changes in many aspects of UPS’ packaging. Moreover, because the benefits extend well beyond environmental improvements, the project serves as a model to other businesses of the many advantages that arise from examining products and operations through a Total Cost of Ownership evaluation.

The TCO determined that the cost of recycled paper used in shipping packaging is less than or competitive with the price of its virgin counterparts. For example, recycled board now costs about 30% less than bleached board. Bleached paper, including bleached corrugated liners, usually costs more than their unbleached alternatives because of the additional processing that it requires to manufacture.

What about sustainability benefit? The TCO analysis and subsequent implementation of the UPS-Alliance Project resulted in significantly lower environmental impacts, consuming fewer raw materials, water and energy during manufacturing, emitting less water and air pollution, and generating less solid waste, both in production and disposal after use. As one example, eliminating all bleached paper from UPS’ packaging will reduce the emissions of toxic chlorinated organic compounds to rivers and streams.

Increasing the post-consumer recycled content of the paper and plastic envelopes has multiple benefits of reducing demand for virgin resources, creating demand for recycled materials, and reducing solid waste requiring disposal. Making the packaging lighter will mean that fewer material resources are used in the manufacturing process. Importantly, UPS’ introduction of a reusable letter envelope, and its commitment to test reusable options for its other packaging to determine market viability and fit with customer needs, signal a new direction for express packaging. Reusable options significantly reduce environmental impact; for example, a two-way envelope decreases environmental impacts by half.

See the chart below for a detailed summary of the gains made:

<table>
<thead>
<tr>
<th>Objective &amp; Scope</th>
<th>Reduction</th>
<th>Sustainability Impact¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enhance consumer reusability of envelopes</td>
<td>• Introduce the industry’s first two-use reusable envelope, available in letter, A4, and legal sizes (Express Letter)</td>
<td>• When reused, the envelope cuts material use, waste and pollution by half</td>
</tr>
</tbody>
</table>

¹ Study calculations were made using models based on data gathered for the Paper Task Force (Paper Task Force (1995) by the Alliance for Environmental Innovation.
<table>
<thead>
<tr>
<th>Objective &amp; Scope</th>
<th>Reduction</th>
<th>Sustainability Impact¹</th>
</tr>
</thead>
</table>
| Increase the post-consumer recycled content in boxes & Express Letter envelopes | Boxes & Express Letter envelopes contain almost 70% more post-consumer recycled content and use 57% less virgin fiber | 13% average improvement across multiple environmental parameters for all packages  
29% lower use of virgin materials  
Over 19 million litres (5 gallons) (14%) less water use annually  
49% reduction in hazardous air  
Reduces manufacturing wastewater by 16 million litres (4.2 million gallons) (16%) annually  
Reduces generation of solid waste by over 285,000 kgs (627,000 lbs) (12%) annually |
| Increase the post-consumer recycled content in Plastic Paks | Post-consumer resin in plastic Pak will increase from 0 to 15%  
Decrease weight of the polyethylene film by 9%, from 26.3 to 24 grams | Consumes 11% less energy to manufacture  
Reduces the consumption of virgin plastic by 315 million tonnes (347 million tons) (22%)  
Reduces solid waste generation by 121 tonnes (134 tons) annually (9%)  
Reusable packaging achieves pollution reduction of 50% with every reuse  
Overall, changes to the box result in a decrease in pollution of 15% averaged across a broad range of environmental parameters |
| Decrease the amount of material used in packaging | 20% lower cost for reduced-weight single-use Paks | Commensurate average improvement across multiple environmental parameters |
| Eliminate the use of bleach from all packaging | The plastic Pak envelope will use almost 10% less film  
Eliminate use of bleached fiber in the top liner of Express Box & Tube | Elimination of bleaching process reduces energy and water consumption and discharge of toxic chlorinated organic compounds  
Reduction of 1.5 to 2 kilograms of absorbable organic halogens (AOX²) for each ton of pulp used |

**Supplier Engagement in Project Implementation**

During the implementation phase, the UPS-Alliance Project Team worked closely with UPS' current suppliers to identify and examine packaging options. In several instances, these suppliers developed creative designs and technological innovations to meet the Project Team’s goals. In some cases, they revised their manufacturing processes to create packaging that was both functionally and environmentally superior. For example,

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² AOX is a measure of the quantity of chlorinated organic compounds in wastewater, many of which are toxic and bioaccumulate in fish.
one of UPS’ plastic envelope suppliers went through several design iterations to modify its plastic film, both to reduce the weight of the film, and to incorporate post-consumer recycled resin while maintaining product performance and appearance. Similarly, a supplier of recycled paperboard worked proactively with the Project Team to develop and refine the design of the industry’s first reusable envelope. The supplier created a quick-release coating for the label area of the packaging, and improved the recloseable features of the envelope.

The close involvement of UPS suppliers in achieving the project’s goals – and UPS’ significant purchasing power – created two additional benefits from the project. First, each of the suppliers gained practical experience in including the environment as a key design feature in its product offerings. Second, and perhaps more important, these suppliers, especially those whose products were recommended by the Project Team, are realizing market advantage due to their environmental innovation.
References


Resources

Business and Sustainable Development Website: Total Cost of Ownership

www.bsdglobal.com

This website is hosted by the International Institute for Sustainable Development and provides an extensive number of tools and case studies, including those related specifically to Total Cost of Ownership. Note the sector by sector list of web resources to find information suitable to your industry. Some key resources are:

- Definition of TCO Concept; and,
- TCO Case Study of Fletcher Challenge, BC

Environmental Defense (Alliance for Environmental Innovation)

www.environmentaldefense.org/corporate_innovation.cfm

Founded in 1967 as the Environmental Defense Fund, Environmental Defense is an American not-for-profit environmental organization of 400,000 members focused on finding innovative, practical ways to solve the most urgent environmental problems. The organization has forged partnerships with corporations to look for positive environmental solutions and has a number of resources applicable to sustainable purchasing and Total Cost of Ownership. There are many case studies of innovative projects that are particularly useful. Some key resources are:

- Achieving Preferred Packaging (UPS & Environmental Defense)
  http://www.environmentaldefense.org/documents/520_AchievingPP.pdf
- Getting in Gear: Environmental Defense and FedExExpress (Hybrid Technology)
- Life Cycle Cost and Performance of a Hybrid Electric Vehicle
- A New Norm in Catalogues (Norm Thompson Outfitters and Environmental Defense)
- Greener Cartons -- A Buyer's Guide to Recycled-Content Paperboard
- Paper Supplier Evaluation Form
- Paper Calculator
  http://www.environmentaldefense.org/papercalculator/

Five Winds International

www.fivewinds.com/aboutUs/aboutUs_ourStory.cfm

Five Winds International was founded in 1998 as a small environmental-management consultancy and has grown to an internationally recognized firm on environmental and
sustainability initiatives. Five Winds has worked on major Total Cost of Ownership projects with clients such as Johnson Wax Professional, BASF and New York City Transit. Check out these online resources:

- Sustainable Purchasing Guide;
- Green Procurement: Good Environmental Stories for North America;
- Why Take A Life Cycle Approach?
- Tools and Concepts: Life Cycle Assessment; and,
- Check out their Publications section for extensive case study resources.

Gartner Website: Total Cost of Ownership

www.gartner.com

Gartner is a large information technology management consultancy with over 1,200 research analysts and consultants working in 75 countries. Gartner has published a large number of reports on Total Cost of Ownership as it is applied to IT products and services with very useful and up-to-date financial cost assessments of purchasing decisions. Reports are easily downloadable from Gartner’s website but come at a price – costs for documents range from $100 to $1000 each. Some relevant reports available online include:

- Best Practices in PC Life Cycle Services (March 2006);
- Use Total Cost of Ownership to Save On Printing (December 2005);
- How Long Should You Keep Your Printers? (March 2006); and,
- How to Use IT Cost Metrics Effectively (November 2004).

Global Environmental Management Initiative

www.gemi.org

The Global Environmental Management Initiative (GEMI) is a non-profit organization of leading companies dedicated to fostering environmental, health, and safety excellence and corporate citizenship worldwide. GEMI has published an expansive document entitled “Forging New Links: Enhancing Supply Chain Value through Environmental Excellence”. With the busy reviewer in mind, GEMI has turned aspects of the publication into an interactive online tool at www.gemi.org/supplychain. Take a moment to use the “Value Wizard” that will help you identify value creation opportunities based on your company’s specific characteristics and priorities.

Greater Vancouver Regional District Website: Total Cost Assessment

www.gvrd.bc.ca/smartsteps

The GVRD’s Smart Steps for Business program web presence contains a wide array of useful and regionally relevant Total Cost of Ownership tools, case studies, and
discussion papers, as well as information on fees and costs associated with regional services. Some of the online resources available include:

- An online Total Cost Assessment Tool and Companion Tutorial;
- Business Case Total Cost Assessment Guidelines;
- Case Studies;
- Sector Guides;
- Sustainable Purchasing Guidebook;
- Industry Specific Information and Database of Smart Products and Services; and,
- Permit Fees and Charges Guide.

Institute for Supply Management Website: Total Cost of Ownership

*www.napm.org/*

The Institute for Supply Management™ (ISM) is an American not-for-profit association that provides opportunities for the promotion and professional development of the purchasing profession - the largest supply management association in the world. The website has a number of articles on what TCO is and how to use it, but can only be accessed by Institute members. Some resources include:

- Total Cost of Ownership Models: An Exploratory Study;
- Effectively Selecting Suppliers Using Total Cost of Ownership;
- Applying TCO to Capital Equipment; and,
- Applying TCO to Inventory.

Manitoba Green Procurement Project Inc.

*www.solutions.ca/manitoba_gponline_course/Home.asp*

The Province of Manitoba and Manitoba Crown Corporations partnered on a project to develop tools for green procurement that range from checklists to sample specifications to sample tender clauses and policies. They also created a web-based green procurement tutorial that can be taken for a $40 fee. Visit the website above or contact Colin Goldstone at 204.945.4798 or cgoldstone@gov.mb.ca for more information.

North American Green Purchasing Initiative (NAGPI) ECO SAT

*www.nagpi.net*

The North American Green Purchasing Initiative was developed by the Commission for Environmental Cooperation and has grown to a wide network of organizations working to accelerate the demand for safer, more environmentally preferable products. NAGPI undertakes many activities and stockpiles many publications online. Plan to spend some time if you can on the website checking out activities and training opportunities, funding opportunities, sector-specific resources, the ECO-SAT (Self Assessment Tool) tool and
the Annotated Bibliography of CEC Publications and Work on Green Purchasing in North America.

Venture Development Corporation Website: Total Cost of Ownership

Venture Development Corporation is an independent technology market research and consulting firm that offers unbiased, fact-driven research, analysis and strategic advisory services. To date, VDC has done research studies on total cost of ownership in communications products, two of which are both easily downloadable and free of charge on their website:

- Total Cost of Ownership Models for Mobile Computing and Communications Platforms - Industrial and Harsh Commercial Environments (January 2004); and,
- What is the Total Cost of Ownership in Enterprise Mobility Solution Deployments? (August 2004).
Worksheet A

Supplement to Module 2 - Step 1:

Needs and Drivers for Purchasing Decision

COMPANY NEED:

DRIVERS
### Worksheet B

**Some Types of Hidden and Indirect Costs**

<table>
<thead>
<tr>
<th>Capital &amp; Equipment</th>
<th>Materials</th>
<th>Labour &amp; Services</th>
<th>Contingency &amp; Less Quantifiable Future Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Fees</td>
<td>- Packaging</td>
<td>- Administrative costs</td>
<td>- Regulatory compliance &amp; Permitting</td>
</tr>
<tr>
<td>- Commissions</td>
<td>- New supplier set-up</td>
<td>- Contractor, vendor, consulting fees</td>
<td>- Permit amendments</td>
</tr>
<tr>
<td>- Taxes</td>
<td>- Brokerage</td>
<td>- Contract management</td>
<td>- Remediation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Installation</td>
<td>- Disposal &amp; residual management</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Public relations</td>
<td>- Pre-treatment</td>
</tr>
</tbody>
</table>

|                     | - Supplier managed inventory | - Contingency (capital) costs | - Legal Costs |
|                     | - Storage                    | - Fines                      | - Personal injury |
|                     |                             | - Property damage           | - Service quality |
|                     |                             | - Lead time                  | - Logistics and distribution |
|                     |                             | - Expediting/rush shipment costs | - Changing technology |
|                     |                             | - Design obsolescence & flexibility | - Software (licenses, maintenance, upgrades) |
|                     |                             | - Availability               | - Financing costs |
|                     |                             | - Depreciation               | - Reliability/downtime/ Productivity loss |
|                     |                             |                              | - Repairs & Maintenance |
|                     |                             |                              | - Warranty |
|                     |                             |                              | - Salvage value |
|                     |                             |                              | - Demolitions and clearing |
|                     |                             |                              | - Emergency management |
|                     |                             |                              | - Sampling & testing |
|                     |                             |                              | - Labeling & documentation |
|                     |                             |                              | - Reporting |
|                     |                             |                              | - Customs, Duty/Exchange |
|                     |                             |                              | - Price stability/inflation |
|                     |                             |                              | - User satisfaction - Customer specifications |
|                     |                             |                              | - Customer perception |
|                     |                             |                              | - Capacity utilization |
|                     |                             |                              | - Perishability |
|                     |                             |                              | - Turnover |
|                     |                             |                              | - Opportunity costs |
|                     |                             |                              | - Workers Compensation Board |
|                     |                             |                              | - Lost business opportunity |
|                     |                             |                              | - Future compliance |
|                     |                             |                              | - Indirect revenue losses |
|                     |                             |                              | - Negative image with customers, investors, staff & insurers & regulators |
|                     |                             |                              | - Production losses (e.g. accidents or clean up) |
|                     |                             |                              | - Improved credit rating & flexibility with lenders |
|                     |                             |                              | - Natural resource damage |