Managing Environmental Sustainability Using Target Costing Principles
Managing Environmental Sustainability Using Target Costing Principles
The Consortium for Advanced Management—International (CAM-I) Environmental Sustainability Best Practices Interest Group

Providing Guidance and Support in Cost Management

About CAM-I
This document is part of a series authored by the Consortium for Advanced Management—International (CAM-I) exploring how the Consortium’s proven cost, performance and process management tools can be applied to environmental sustainability. The paper *Environmental Sustainability, Activity-based Costing/Management (ABC/M)* looks at how organizations can use ABC/M to better understand and improve their environmental sustainability and cost structure.

The Consortium for Advanced Management—International (CAM-I) is a research organization consisting of sponsoring companies and academics who work in collaboration to study and solve management problems and critical business issues common to the group in the areas of cost, process and performance management. More information can be found at: [www.cam-i.org](http://www.cam-i.org)

Primary Author
James R. Hendricks, The Boeing Company

Contributors
Andrea Civichino, Chartered Professional Accountants of Canada; Mark Lemon, Grant Thornton; David Malone, Weber St. University; Anthony Pember, Pilbara Group; Todd Scaletta, Chartered Professional Accountants of Canada.
# Table of Contents

**Preface**

What Is the Issue?  
1

Why Is it Important?  
1

What Can be Done?  
1

**Introduction**

3

**What Is Target Costing?**  
5

The Impetus for Addressing Environmental Sustainability  
9

Ford of Europe’s Product Sustainability Index (PSI)  
20

Is My Organization Ready to Implement Target Costing Principles with Environmental Sustainability?  
22
  - Capacity for Change  
  - Data Maturity Required  
  - Process Maturity Required  
  22
  22
  23

**Conclusion**  
27
Preface

What Is the Issue?
Consumers, shareholders and other stakeholders are pressuring organizations to consider environmental issues and the way they relate to an organization’s bottom line.

Why Is it Important?
The process of designing environmentally sustainable features into an organization’s products involves the entire supply chain. Understanding how to measure and meet enterprise environmental sustainability goals can put an organization at a competitive advantage. One of the challenges of doing this, however, lies in determining how to quantify accurately the impact an organization’s products has on the environment.

What Can be Done?
Organizations can integrate key environmental metrics, such as energy usage, greenhouse gas (GHG) emissions, recycling rates, etc. into their overall decision-making framework. The use of proven strategic management tools—such as target costing—will enable organizations to better manage the environmental-sustainability-related costs of doing business.
Introduction

An environmentally sustainable organization balances its strategic and financial objectives with long-term preservation and usage of natural resources. Today, organizations face numerous pressures—strategic, regulatory and otherwise—to reduce their impact on the environment through responsible environmental stewardship. These pressures require organizations to change the way they do business and assign additional costs to address the environmental impact of their operations. When an organization understands the impact its products and operations have on the environment, as well as the actual costs associated with reducing that impact, it has a competitive advantage over organizations that cannot quantify or evaluate their environmental impact.

It is common practice for an organization to include an environmental report within its annual report, or a separate public interest report (as a minimum, material environmental risks and information are required to be included in regulatory reports and filings). This typically consists of multiple charts with down-sloping trend lines indicating reduced energy usage, pollution-emissions reduction, or some related measure. The charts and metrics are also used internally to measure an individual business unit’s or a particular geographic site’s contribution to reducing an organization’s environmental impact. The data is used to compare current, actual progress toward the organization’s planned environmental goals (e.g. energy intensity reduction).

While quantifying the impact an organization’s operations have on the environment is typical practice, it is uncommon for an organization to use support tools to reduce its impact on the environment proactively. Organizations may have sufficient measurement tools, but lack an improvement tool or set of improvement tools. Simply collecting and graphing large sets of historical energy usage data is insufficient, because it does not identify the specific factors that helped an organization reach its environmental goals, or, more
importantly, indicate how those goals were achieved. Metrics and methodologies must be put in place to help managers make informed decisions about which projects to implement.

This paper addresses how target costing can help an organization meet its environmental sustainability goals. These goals include making an organization’s facility infrastructure more efficient, designing environmentally sustainable features into products, and using environmental sustainability to an organization’s competitive advantage by deploying target costing tools and methodologies.
What Is Target Costing?

Target costing\(^1\) is a cost management best practice process aimed at producing a product, given a market price, at the most efficient cost over the product’s full life cycle. This approach seeks to preserve desired profit margins as market prices become more competitive over time, and assess how the customer values environmentally friendly features. Utilizing, applying and integrating target costing principles with the organization’s enterprise environmental sustainability strategy may lead to a more successful result. An organization can use target costing principles to design eco-friendly products and processes, improve the efficiency of facilities’ operations and form part of a comprehensive business strategy. We will later examine how various organizations have implemented environmental initiatives. These examples will show that select target costing principles are being applied now—whether intentionally or not—to help drive environmental sustainability initiatives. Fully understanding target costing principles and employing them in a holistic, enterprise-wide manner can help an organization meet its financial obligations while having a positive impact on the environment.

The Consortium for Advanced Management—International (CAM-I) is a recognized leader in the development of the principles and implementation of target costing and has published several books and articles on the subject in recent years.\(^2\)

CAM-I defines target costing as “...a system of profit planning and cost reduction that manages costs before they are incurred, is committed to continual improvement in product and process designs, is externally focused on

---

1 The term “target costing” is used throughout this paper; the authors recognize, however, that organizations may be using the same target costing principles, but under a different name.

2 See CAM-I Publications at [www.cam-i.org](http://www.cam-i.org)
customers and competition, and systematically relates the complex web of value-chain and cross-functional relationships into a cohesive and integrated planning and execution system.”

There are six fundamental principles that provide a key foundation for target costing.

1. **Price-Led Costing** — A target costing system sets cost targets by subtracting the required profit margin from the competitive market price. The target costing process is driven by active competitive intelligence. This information is used for meeting or pre-empting competitive threats or challenges. In target costing, price is determined by the competitive market—an organization’s target cost is derived by subtracting the desired profit from the market price.

When designing products with environmental sustainability considerations in mind, the environmental impact is addressed in the same way as customer-driven features—it is simply another customer requirement to satisfy. For example, an organization participating in the U.S. automobile market is required to produce a vehicle at a cost that not only yields the prescribed desired profit, but also adheres to current or anticipated Corporate Average Fuel Economy (CAFE) standards. In meeting the standard, regulation drives product design.

Alternatively, if an organization finds itself in a marketplace that has evolved into valuing environmentally friendly products and the organization wishes to compete in this market, it will face unique customer value preferences. In this instance, as above, the market is driving prices with additional environmental-related costs that could place the organization at a competitive disadvantage. On the other hand, if an organization wants to be environmentally proactive, the standard is self-imposed and a function of the externality targeted for reduction (e.g., lower GHG emissions product profile, lower resulting solid waste, etc.). Competitors in this market are not operating under a self-imposed constraint. Instead, these organizations recognize the potential strategic value of being first to market with an environmentally superior product or consumers who are willing to pay a premium price for an environmentally friendly product. The “price led” component of target costing adds an environmental component as an additional design constraint. Target costing, in this instance, becomes an even more valuable tool.

---

3 See *Target Costing: The Next Frontier in Strategic Cost Management, A CAM-I/CMS Model for Profit Planning and Cost Management*, Shahid L. Ansari, Jan E. Bell and the CAM-I Target Cost Core Group, p. 3.
2. **Focus on Customers** — The voice of the customer is continuously represented throughout the target costing process, guiding product and process decisions and cost analysis to ensure that customer value is met within the customer’s price expectations.

3. **Focus on Design** — The product and processes to build the product are keys to cost management. Costs need to be managed before they’re incurred. Target costing systems challenge engineers to look at the cost impact of product, technology, and process designs. Engineering decisions are filtered through a customer value impact assessment before being incorporated into the design. Target costing encourages simultaneous engineering of products and processes rather than conducting them sequentially. Target costing processes can be extended and applied to service industries such as the financial and healthcare sectors.

4. **Cross-Functional Involvement** — Target costing encourages participation from all involved functions (e.g., engineering, estimating, etc.) to examine designs, before change implementation occurs, and to minimize product and process re-design. Product and process teams are formed, and are responsible for all aspects of the product design.

5. **Life-Cycle Orientation** — Target costing considers all costs of owning a product. The goal is to minimize life-cycle costs for both the customer and producer, and emphasize the benefits of addressing this early in the project’s life cycle (Figure 1). Figure 1 illustrates the benefit of recognizing that downstream costs are significantly committed once design has matured beyond the preliminary stage.

*Figure 1—Committed and Expended Cost at Given Program Acquisition Phase*
In conventional target costing, a life-cycle perspective is adopted and extends from a product’s design to its retirement or disposal. In an environmentally sustainable organization, adopting a life-cycle perspective (versus a shorter-term product life view) is the difference between choosing to implement illusory sustainable designs and real sustainable designs with concrete, measurable results.

6. **Value-Chain Involvement**—Target costing involves all members of the value chain, including suppliers, dealers, distributors, and service providers, in the target costing process. This encourages sharing cost reduction efforts throughout the extended enterprise and helps develop long-term, mutually beneficial relationships. An organization is well advised to assess both upstream and downstream environmental impacts to their products by the value stream. Doing so may uncover risks and opportunities which may affect the organization’s product, brand, and market success.

Management may have difficulty seeing target costing as a strategic tool; however, a key tenet of target costing is dispelling the notion that it is purely a cost-reduction activity, and repositioning it as a discovery process of a product’s best value. The following example illustrates how target costing can play a role in strategic development. It is an example of a target costing implementation in the auto industry, where the offering price not only wasn’t lower, but was indeed higher than its competition. The higher price, however, offered the customer a better perceived value.

*Henry Ford did not invent the car or the assembly line, but he did apply assembly line techniques to auto manufacturing, which enabled a reduction in the time required to assemble a car from approximately 12 hours to 1.5 hours. The Ford Model T was introduced in 1909 at a price of $825. By the mid-1920s the price dropped to as low as $265. Despite this low price, General Motors (GM) was able to make industry inroads with a higher-priced model. For example, one of its models—the 1925 Chevrolet Tourer—was priced at $510, which was significantly more expensive than the Model T, but offered a long-overdue updated design. GM offered installment credit, which made it easier for customers to make car purchases through monthly payments. Henry Ford, on the other hand, refused to offer installment credit.*

*By 1925, many people who wanted a vehicle now owned one. Additional features had to be offered so that the customer demographic/market could expand. This move was the start of the “model year” that we’re all familiar with, whereby the current year’s auto model is refreshed.*
What Is Target Costing?

annually with a subsequent, updated model. Ford nearly went out of business as a result of failing to respond to this trend, and had to retool manufacturing operations to survive in the new business environment.

Figure 2—Target Costing Strategy Automobile Case Study Illustrating Best Value Can Actually Mean a Product at a Higher Price

In this case, the value for which the customer was willing to pay was enhanced feature options, rather than paying a lower cost for vehicles with fewer features.

The Impetus for Addressing Environmental Sustainability

For years, shareholders and other stakeholders (consumers, government entities, and non-governmental organizations, etc.) have pressured organizations to address environmental issues. Consumers have become increasingly aware of environmental concerns and are demanding better accountability and sustainable product offerings from organizations. Similarly, shareholders and other stakeholders want organizations to address environmental issues in a financially responsible manner. Governments have also increased the number of environmental regulations that require firms to limit and/or clean up pollution. These and other factors are influencing organizations to improve their environmental performance.
Together, the industrial, transportation, and commercial sectors represent approximately 80 percent of energy consumption in the U.S. Large, energy-consuming industrial industries include petroleum refining and the manufacturing of steel, aluminum, chemical, paper and cement. In transportation, automobiles, trucks, aircraft, etc., are heavy users of petroleum products, and consequently are large emission generators. The intermediate and end products of these industries are process and energy intensive. Target costing can help determine the significant source drivers of these energy uses in terms of both products and processes, set energy and emission reduction targets, and monitor progress towards environmentally sustainable goals.

“While the majority of consumers around the world (83 percent) say it’s important that companies implement programs to improve the environment, only 22 percent say they will pay more for an eco-friendly product, according to The Nielsen Company’s 2011 Global Online Environment & Sustainability Survey of more than 25,000 internet respondents in 51 countries. In addition, about three in four (76 percent of) global consumers say raw materials influence their decisions on where to shop and what to buy.”

Figure 3—Consumers Place Value on Eco-Friendly Products

Source: The Nielsen Company

Target costing has multiple tools to apply to these activities, such as value engineering / analysis, quality function deployment, and process costing.\textsuperscript{5}

Organizations are commonly subject to environmental sustainability improvement policies. In government organizations, legislation and executive orders mandate a broad set of improvement guidelines and quantitative goals to be met. Commercial organizations have published enterprise roadmaps with goals centered on improving energy efficiency, conservation, reducing pollution, etc. A status-to-target chart can be created for each of these sustainability objective measures of interest, with cost being replaced with an appropriate unit substitution, such as:

- Improvement of facilities’ energy efficiency
- Water conservation
- Increased usage of renewable energy
- Reduction in greenhouse gas emission
- Reduction in usage of fossil fuel
- Diversion of solid waste

Integrating the capabilities of target costing tools and applying them to the development of a joint environmental sustainability and target costing strategy leverages the strength of the underlying practices and leads to a more holistic, strategic approach. Given this, it makes sense to consider how environmental practices will influence future business and formulate a strategy to include this new requirement. Although consumers indicate that an organization’s environmental programs are important to them, they are also unwilling to bear the additional purchase costs of products. Therefore, target costing can be a useful tool to help determine the allowable product cost. The target costing principle “Focus on Customers” responds to the voice of the customer by recognizing what influences customers to make purchase decisions.

\textsuperscript{5} Value Engineering focuses on analyzing the functions of products, processes, and services to achieve these functions at the lowest overall cost with no reduction in required performance. Quality Function Deployment is a systematic way of arraying information about important objectives in any business decision. It is a process which ensures product design and quality meet customer requirements. Process Costing, or operations costing, is the analysis of costs by manufacturing processes to determine the cost drivers for each step in the manufacturing process.
How Can Target Costing Support Environmental Sustainability?

Target costing establishes specific, quantifiable goals for product costs, constrained by market price for a product’s functionality. It focuses on the principles of setting goals early, developing cost-effectiveness trade-off studies to explore a broad trade-off space, and selecting an affordable, best value solution. These principles have a natural fit in their applicability to environmental sustainability.

Target costing can be applied as a tool for holistic, enterprise-wide environmental sustainability management and decision support. The first step companies often take is to use free online calculators to calculate energy usage or to provide an environmental impact point estimate for events such as aircraft and airline flights. To meet carbon reporting requirements, an organization is more likely to use sophisticated software. While calculating a carbon footprint meets most regulatory requirements, the process of managing its reduction or making other energy-related improvements is still needed for supplementary guidance. Target costing principles can provide status-to-target visibility and help manage the risks and opportunities related to meeting environmental sustainability goals.

An integral part of target costing is the active management of the product configuration and its associated current cost estimate, as it compares to the defined target cost of the product for successful market pricing. This management entails monitoring the current cost via tracking metrics, and understanding how the current cost compares to the cost objective. This estimate also includes related risks and opportunities that can cause the product cost to increase or decrease. Risks and opportunities can take three forms: cost, technical, or schedule. Though there are often overlapping impacts regarding risk or the type of opportunity, target costing manages the cost impacts of risks and opportunities.

Additionally, pursuing opportunities may involve associated risks and vice versa. Let’s say, for example, that the product being designed is a refrigerator. A possible cost risk is that if the cost of stainless steel material were to increase by 20 percent prior to our bringing our product to market, our unit cost would increase by $15.75. A possible opportunity might result if the configuration could be redesigned so that the evaporator and condenser coils are adjacent to one another, which would reduce our unit cost by $4.10, due to saved material costs. Note that these risks and opportunities are product-, not enterprise-, related and are monitored and managed at the appropriate team level.
The metrics noted above are then recorded in cost target tracking charts and are used as a status mechanism in project management reviews. The charts can also include forecasted cost projections and extend the current committed cost-estimate trend lines to future review periods to give an indication of whether the cost gap, if one exists, will be closed or not before product launch.

*Figure 4—Typical Target Costing Status to Target Chart*

[Diagram of a chart showing cost status over time with various lines indicating projected costs, risks, opportunities, and goals.]

Organizations can adapt a sample tracking chart to manage the environmental sustainability domain. The analytic process used to assess the environmental impact of a product in its appropriate units can be applied as well to target costing and its evaluation of the cost/benefit of product features in dollars per unit.

Figure 5 illustrates the type of information that can be tracked using target costing techniques. It is similar to Figure 4, with the exception of the y-axis units (energy usage is plotted instead). The purpose of this chart is to facilitate the management of the effort to reduce the amount of energy required to create product A, and highlight the progress to date. Management will be able to determine whether the effort being made to reduce the product energy usage is occurring at the appropriate rate to meet long-term goals.
Although the sample chart in Figure 5 shows energy usage for a product’s annual volume, the same chart could be used for managing the target goals of a building or facility, campus (multiple buildings), regional site, or enterprise (multiple sites). Only the system scale under review changes and increases as facilities and sites are added. The principle for determining the status of current metrics against goals remains the same.

Measuring the gap between the product’s current configuration of sustainability impacts or costs versus what the business objective calls for is important to review in project status meetings. When this information is reviewed, managers will be able to see whether the current configuration is or is not meeting the organization’s goal. Over time, as the time series data is recorded, it can be observed whether the rate at which the gap is or isn’t being closed requires additional action. This progress trend line will indicate whether the configuration adjustments meet the end goal and if changes are needed. For example, if the downward trend line is reducing at a rate deemed to be too shallow, this could indicate the need to take action, such as: 1) redoubling the efforts of reduction through brainstorming, value or lean engineering trade-off studies, or 2) abandoning the product development because the product won’t get to market soon enough or with the right environmental quality to be successful. Through this metric monitoring, a project is able to arrive at a best-value solution that now incorporates extended environmental sustainability product requirements into its design.
Target costing principles can be applied to help an organization become more sustainable. The following suggested methods offer a more structured approach to implementing target costing principles, but are not intended to represent a particular process step sequence of implementing target costing:

• **Include target costing principles in an organization’s business strategy.** For example, an organization could market itself or its product combining its advantage of reduced costs (through lean engineering or improved material yield) and enhanced brand reputation through its sustainable operations or design. Furthermore, organizations can use this information as a competitive discriminator between itself and its industry competitors, by advertising side-by-side product comparisons.

• **Consider target costing principles in the development of a business’s products and services.** In the next section, a research project conducted by The Boeing Company and Oregon State University, demonstrates a method of comparing environmental impacts of manufacturing a part using alternative manufacturing processes and materials.

• **Use target costing to improve internal operations.** A focus on improved internal operations reduces overhead costs, improves cost effectiveness and lowers an organization’s environmental impact. Additionally, the U.S. Department of Energy’s (DoE) Handbook 135 outlines the process for calculating life-cycle costs for building retrofits, and evaluates trade-offs for implementing various energy-efficiency measures into facilities. The DoE’s Building Life Cycle Cost (BLCC) cost model is a tool, consistent with Handbook 135, which supports this methodology. Target costing principles call for minimizing life-cycle costs (the sum of development, production and support costs). Identifying and implementing lean operational improvements is a contributing factor to achieving this minimization.

Manufacturers are now evaluating, as part of their early product trade-off studies, the best manufacturing / fabrication processes for building a particular product, and are considering energy efficiency and other environmentally
sustainable criteria. These side-by-side impact assessment comparisons are made between alternate production methods and indicate which production process is superior for a given set of sustainability criteria.

The following summary of a research study entitled *Development Of A Sustainability Assessment Method For Fabrication Of Metal Aircraft Components, Final Report, October 7, 2011* demonstrates how target costing principles “Focus on Design” and “Life Cycle Orientation” can be applied to assess and improve design configuration with respect to the environmental sustainability of a product’s component parts and attributes (elements of other target costing principles are also present, but these two are highlighted). It shows how environmental considerations can be successfully designed into its product and process operations.

Boeing and Oregon State University have collaborated on a research project that compares the impact of designing and manufacturing a titanium torque tube from four different manufacturing processes on environmental sustainability measures (economic, environmental, social). The manufacturing processes are:

1. Machined from titanium block (GEN1)
2. Machined from near net shape forging (GEN2)
3. Solid state friction weld joining (GEN3)
4. Substitute titanium with 15-5 stainless steel (GEN4)

The methodology used is Life Cycle Assessment (LCA). Several environmental metrics were chosen for comparison: input material non-flyaway content, waste to recycle, on-site energy consumption, off-site energy consumption, water use, greenhouse gas emissions (GHG), pollutant emissions, water discharge, waste to landfill, and hazardous waste.

The following graphs illustrate select results from this research and analysis, and show how part-configuration trade-off studies can be designed to identify improvement options that align with sustainability metrics. In general, subsequent configurations resulted in improved sustainability metric values. Note also that cost and social metrics were more favourable with subsequent design changes, suggesting again that designing for environmental sustainability can be financially beneficial—often a sticking point when managers assume that one must be weighed against the other. Target costing can serve

---

6 A life cycle assessment (LCA) is a technique to assess environmental impacts associated with all the stages of a product’s life from cradle to grave (i.e. from raw material extraction through materials processing, manufacture, distribution, use, repair and maintenance, and disposal or recycling).
as a supporting method for analyzing design to environmental sustainability in a way that is analogous to analyzing design to cost. Compelling arguments for the feasibility of integrating target costing and environmental sustainability exists combined.

*Figure 6—Cost Comparison for Four Torque Tube Design Generations*

Operating costs consist of energy, raw materials and process consumables. Reductions in costs were driven primarily by reduction in material purchased and removed during manufacturing.

*Figure 7—Input Material Non-Flyaway Content for Four Torque Tube Design Generations*
Reductions in material wasted resulted in improved material efficiencies with successive design generations. The term “non-flyaway” refers to material waste not remaining on the final manufactured part, as installed on an aircraft ready to fly. Each successive measure builds on the previous measures, leading eventually to a composite metric.

*Figure 8—On-Site Energy Consumption for Four Torque Tube Design Generations*

This measure is related to energy consumed on-site to perform the machining operations necessary to manufacture a part. Energy use decreases for each successive design iteration—except for the last design, which substituted stainless steel material for titanium.

*Figure 9—GHG Emissions for Four Torque Tube Design Generations*
Less material production and fewer machining operations for successive part configurations resulted in lower greenhouse gas emissions.

**Figure 10—Sustainability Assessment Summary for Four Torque Tube Design Generations**

Figure 10 combines all cost, environmental, and social metrics together (note that, in the interest of brevity, not all contributing component metrics were previously shown in this paper), allowing for simultaneous examination of all individual contributing factors to the part-design evaluation.

Collectively, this research shows how product-and-process data analysis, trade-off studies, and tracking can translate directly into operational decisions that will improve a company’s products’ environmental sustainability profile. Top contributing factors to a given measure can be identified to drive the lean and value-engineering-change activities. It is fully supportive of a target costing implementation.
The next section of this report shows that the type of methodologies being used in the research lab just reviewed can also be applied directly to a consumer product ready for sale (Ford Galaxy), at Ford of Europe.

**Ford of Europe’s Product Sustainability Index**\(^7\) (PSI)

Like the Boeing and Oregon State research study, Ford of Europe is designing environmental sustainability into its automobiles. This application of target costing leaves Ford of Europe’s research lab and moves into the consumer market with real business implications. Ford of Europe’s sustainability index and accompanying process has matured over its ten years of use and to date has been applied to several models.

Ford of Europe has identified an effective way to track sustainable design performance of passenger vehicles across three dimensions of sustainability (environmental, social / societal and economic) using the Product Sustainability Index (PSI). Ford’s PSI is a compilation of multiple sustainability indicators. The table that follows lists the PSI indicators and descriptions.

<table>
<thead>
<tr>
<th>PSI Indicator</th>
<th>Indicator Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Life Cycle Global Warming Potential</td>
<td>Greenhouse emissions along the life cycle, part of an life cycle cost assessment (LCA) according to ISO14040</td>
</tr>
<tr>
<td>Life Cycle Air Quality Potential</td>
<td>Photochemical Ozone Creation Potential (POCP) along the (volatile organic compounds (VOCs), nitrous oxides (NOx), part of an LCA according to ISO14040</td>
</tr>
<tr>
<td>Sustainable Materials</td>
<td>Recycled and natural materials</td>
</tr>
<tr>
<td>Restricted Substances</td>
<td>Vehicle Interior Air Quality, including allergy-tested interior and management of substances along the supply chain</td>
</tr>
<tr>
<td>Drive-By Exterior Noise</td>
<td>Noise level</td>
</tr>
<tr>
<td>Safety</td>
<td>Level of safety for both pedestrian and occupant</td>
</tr>
<tr>
<td>Mobility Capability</td>
<td>Mobility includes luggage compartment volume plus weighted number of seats related to vehicle size.</td>
</tr>
<tr>
<td>Life Cycle Ownership Costs</td>
<td>Vehicle price, plus three years of fuel costs, maintenance costs, taxation, and insurance minus residual value</td>
</tr>
</tbody>
</table>

Ford’s PSI is linked to the existing Ford Product Development System, allowing the PSI to be implemented in a process driven, top-down approach. Ford specialists developed a simple and comprehensive spreadsheet, enabling the non-specialist to track PSI efficiently and accurately. The data-capture time

---

\(^7\) Source: W. Schmidt, Product Sustainability Index, Germany: Ford of Europe, 2007.
required to support PSI is approximately 10—15 hours for the whole product-development process. The result is that PSI makes the overall impact of vehicle attributes and trade-offs visible. Figure 11 shows a sample application of the methodology on a redesign of a vehicle (Galaxy mini-van) and its result in a spider plot.

Ford’s PSI sustainability management approach facilitates product development by:

• Holding product development accountable for contributions towards a more sustainable corporation
• Setting vehicle targets that lead to improvements in all areas of sustainability
• Visualizing trade-offs between conflicting sustainability vehicle attributes
• Tracking progress across vehicle development milestones
• Relating vehicle performance relative to its vehicle segment as well as to all passenger vehicles

The PSI process has been used since 2002 and has been used to develop the 2006 Ford S-MAX and Galaxy, as well as the 2007 Mondeo, 2008 Kuga, 2009 Fiesta and 2011 Focus. The Focus is the first Ford vehicle developed using the PSI system that is being sold globally, as referenced in the Ford Sustainability Report 2010/2011.

*Figure 11—PSI of New and Prior Ford Galaxy*
Reflecting on the target costing fundamental principles introduced earlier in this paper, one will be able to identify which principle Ford of Europe utilizes. “Focus on Design” is being applied by looking at the environmental sustainability impacts on product design. Cross-functional Involvement is also being applied to some extent, as indicated by the fact that specialists, non-specialists, and product development staff are responsible for making contributions to sustainable products and the corporation overall. “Life Cycle Orientation” is also being addressed, as “Life Cycle Ownership” costs are explicitly embedded in Ford’s PSI metric. It can be seen here that there is a natural fit between what target costing offers and the common end goal of designing and producing environmentally sustainable products. Ford is demonstrating progress towards implementing multiple target-costing principles and the company is on its way to realizing the full benefits of a holistic, target-costing approach.

Is My Organization Ready to Implement Target Costing Principles with Environmental Sustainability?

To answer this question, an organization needs to consider many factors, including its capacity for change, whether data is available to support the initiative, and whether processes are in place to operate from in a standard, defined way.

Capacity for Change
For an organization that is already using target costing principles and has some ongoing environmental sustainability effort already established, it is a relatively small step to make the connection between the two processes and benefit from their linkage. In the absence of this foundation, the typical change-readiness evaluation would need to be accomplished first, and would include an assessment of recent support for target costing efforts, openness to improvement initiatives, past experience responding to change, etc.8

Data Maturity Required
All business processes require a certain amount of data to support their successful use. The following data and process elements should be in place to help ensure success:

- An accounting mechanism to collect product/process/site data and the ability to aggregate it to the required level

---

8 CAM-I publication Hitting the Target: The CAM-I Target Costing Implementation Guide comes with a CD offering guidance on how to perform a change-readiness capacity assessment.
• A target-setting process must be established that is supported by executive management and which results in target decomposition of the enterprise environmental sustainability goals.
• An implementation process and sufficient funding to ensure there is a practical and realistic pathway to meeting the set goals.
• A tool to assess and monitor management processes and respond to unexpected results in the tracking trends.

**Process Maturity Required**

The CAM-I Target Costing Interest Group has produced two books on the subject of target costing. The first book, *Target Costing: The Next Frontier in Strategic Cost Management*, introduced the theory and principles of target costing. The second book, *Hitting the Target: The CAM-I Target Costing Implementation Guide*, was created as the “how to” manual for implementing target costing in an organization. It is worth examining, in a summary fashion, the major steps to implementing target costing and to highlight the potential differences between a pure target-costing implementation, and one geared more toward its derivative application in environmental sustainability.

The implementation steps of target costing are:

1. **Obtain a Mandate.** Senior management emphasizes the importance of target costing, and there is a shared vision between senior management and the implementer with regard to the scope of change required for processes, expectations, and strategic alignment. While it may appear that the implementation of target costing is voluntary, its application to environmental sustainability may already have direct or indirect mandates in the form of government regulations, company policies or published commitments. Competitors’ behaviour may also provide the impetus for launching new initiatives or accelerating progress toward environmental sustainability.

2. **Build Support.** This involves building a credible case for supporting the initiative and having key personnel participate in the relevant processes and their underlying tasks. For environmental sustainability, the strategic importance must be emphasized and outlined. Whether the reason is compliance, competitive advantage, or improved business operations, the incentive for taking action must be clear for the needed accompanying organizational and process changes to happen successfully.

3. **Pilot Project.** Develop a small-scale test project to use as a learning opportunity. The goal is to become familiar with the new processes, metrics, and data required to support the larger initiative. It is recommended that the
product selected for the test be at an early phase of its life cycle, and that it be part of the organization’s core business, so as to derive the most benefit from the test. For environmental sustainability, all of the pilot project recommendations for target costing still hold. What will likely be unique is the development of a new thinking process and value system measured in units beyond dollars—such as kilowatt-hours, therms, tonnes of greenhouse gas emissions, percentage of recycled material, gallons of water saved, etc.

4. **Develop an Implementation Plan.** This describes the transition plan from the pilot project to full implementation. This will be a multi-year roadmap which outlines important milestones, such as conducting an implementation maturity assessment, identifying technical and cultural gaps, defining performance measures, and defining the actions necessary to close the gaps. While the development of an implementation plan is a common project management activity, environmental expertise in the domain of energy use and the environmental impacts of design choices and manufacturing processes is likely not a heritage core competency at many organizations. Consequently, this knowledge will need to be grown, slowly and organically, over time. In circumstances where a more rapid rate of change is required, however, it would be advisable to contract with a specialized consultancy which could accelerate this knowledge gain.

5. **Form Teams.** This refers to the formation of central implementation, product, and functional support teams, and structuring these teams for success. For environmental sustainability, it is also recommended to form at the outset a central implementation team to provide specialized support to the satellite product teams. As movement toward environmental sustainability may represent a significant change to an organization’s business approach, explaining the metrics, training staff and providing technical consultation will be important elements of a successful implementation. Building a culture where teams care about the downstream impact of the company’s products and services is important. These same teams do most of the heavy lifting when it comes to meeting targets.

6. **Provide Training.** Training programs should be designed to build awareness and acceptance, facilitate communication, and increase staff members’ technical capabilities. Training should match the implementation plan timeline developed earlier. For environmental sustainability, some of the base skills needed (e.g., design of trade-off studies) may already be present. New curricula and course content, however, would need to be developed for new subject matter (e.g., environmental analysis methodology, data collection techniques, metric definitions and use, etc.)
7. **Acquire Tools and Data.** Data and tools are necessary to support any business process. This implementation step relates to identifying the tools and data required to support the initiative, perform a survey to determine gaps, and create an acquisition plan to fill the gaps. For environmental sustainability, new data requirements—such as energy requirements for manufacturing processes, emissions information for purchased raw material, and others—will certainly arise.

Target costing has tools for its core processes:

- a. Customer requirements analysis
- b. Target-cost decomposition
- c. Cost-estimation tools
- d. Cost trade-off analysis
- e. Target-cost tracking

Environmental sustainability would definitely benefit from using the cost trade-off and target-cost tracking tools (target tracking tools are described in more detail earlier in this paper).
Conclusion

Target costing has been in use for decades. It has been successfully employed as a strategic tool by Japanese companies since the 1960s, and organizations worldwide have since adopted its use to improve the competitiveness of their businesses. Managing the target cost of a company’s products becomes a necessity when faced with a weak economic business environment. The use of target costing has since broadened from serving merely as a purchasing-department tool for managing suppliers to a systemic approach that includes collaboration across systems engineering, design, production, and supplier functions.

Ultimately, as consumer culture trends toward valuing eco-friendly products and businesses, organizations will need to evaluate the environmental impacts of their products and operations in a manner similar to the way in which costs are now evaluated. The same principles and methodologies that assist in building affordability into a product can be applied to environmental sustainability considerations, but with units of energy or emissions being substituted for dollars. The switch is relatively easy.

Target costing principles can be used for several purposes: to design eco-friendly products and processes, improve the efficiency of facilities’ operations and as part of a comprehensive business strategy. By adopting these principles and factoring both cost and environmental measures into business decisions today, management can strengthen a company’s business positioning now and in the future. The environmental impacts that will result from these decisions are a positive by-product from which the company and the community at large will benefit.