Financing Options, Techniques, and Strategies

What Types of Financing Should Manufacturers Consider?

Manufacturers seeking financial assistance to improve their energy efficiency, production processes, and overall competitiveness have an array of financing options to choose from, including:

- Federal or State financial assistance;
- commercial loans, including those backed by Federal or State guarantees;
- lease-purchase or vendor financing;
- energy services or shared savings contracts (through ESCOs);
- utility rebates or incentives;
- equity financing (including stock sales) and venture capital.

Manufacturers need to remember that the most appropriate approach will vary, company by company, depending on a number of factors, such as the size of the operation, nature of investment needed, primary purpose of capital proceeds, cash flow situation, and/or financial health of the company, etc. This section will lay out these options, and highlight a few special considerations.

Federal or State Financial Assistance

The Federal Government offers several loan and loan guarantee programs that manufacturers can tap to support energy efficiency and production modernization activities. Nearly all of these are general business development assistance programs that manufacturers—along with commercial and service enterprises—are eligible to use. The *Federal Programs* section of this Toolbook is devoted to Federal assistance programs. Each description includes program specifics such as:

- basic program objectives and description;
- eligibility and application process;
- services available, and their cost; and,
- regional and headquarters program contacts.

Only one Federal financing initiative—tax-exempt industrial development bonds—is targeted exclusively to manufacturers. Therefore, ***the challenge manufacturers face when contemplating use of Federal or State programs is linking their specific financing needs with broader program criteria, and building a competitive case for their applications***. Federal technical assistance programs, also profiled in the *Federal Programs* section, can prove useful in this regard.

Every State offers a host of financing programs applicable to manufacturing needs, although few of them are reserved exclusively for manufacturing use. Accordingly, ***manufacturers must figure out how to make the fit between State program requirements and their own needs***. The *State Programs* section provides brief information on the most suitable financial assistance efforts offered by States within this Department of Energy region, along with contacts and other pertinent information.

Commercial Loans

Firms seeking funds in private lending essentially compete with one another. Lenders scrutinize the risk and potential rate of return each deal offers. Based on this assessment, companies gain or are denied access to capital. The cost of capital will be lower to those with lower risk and higher return, while more expensive capital, or none at all, will go to those with higher risk and uncertain return.

The majority of commercial loans made to industrial companies are used to purchase inventory goods or raw materials, and typically the term on them is for one year or less. These are also known as working capital loans. These are typically secured by accounts receivable or the materials they acquire. Established manufacturers usually have little difficulty getting such financing.

Manufacturers periodically need to borrow money for longer terms, up to ten years (or even longer), to finance new equipment, more capital-intensive efficiency improvements, or building renovation or acquisition. These loans are often more difficult to secure, for reasons noted in the prior section.

In addition to its discussion of various types of financing, this section of the Toolbook will also focus in-depth on issues of risk and other factors that affect commercial lenders' willingness to provide financing to manufacturers.

Many lenders are more inclined to provide money to manufacturers if they can gain the extra comfort afforded by a loan guarantee. At the Federal level, the Small Business Administration (SBA) may participate in loans for these purposes. ***Manufacturers should keep in mind that SBA typically guarantees up to 90% of the principal balance of loans up to $155,000, and 85% of loans up to $500,000, to make them more acceptable, and less risky, to participating private lenders***. SBA assistance usually comes with more advantageous terms than purely private loans—longer loan maturities (seven years for working capital, ten years for equipment, and 25 years for fully amortized real estate); and greater debt-to-equity ratios (often 4:1). And in recent years, SBA has worked to reduce paperwork requirements and loan processing times. However, ***manufacturers must realize that SBA loans are not giveaways; they require adequate collateral and personal guarantees from company owners***.

SBA has designated several hundred lenders from around the country as Preferred Lenders; these banks have expedited decision-making authority delegated to them by SBA. ***Manufacturers should identify SBA-designated preferred lenders in their local area. Manufacturers should also note that SBA-backed loans are not necessarily cheap money***; rates range from prime-plus 2.25% to prime-plus 2.75%. More information on SBA programs may be found in the *Federal Programs* section of this Toolbook. Finally, ***manufacturers should remember that SBA is not a monolithic institution, but rather an agency that operates in large part through the private banking system. Thus, if one SBA lender decides not to finance a project, another one might; while SBA's basic qualifications are uniform, the specific lender's underwriting criteria may vary***.

Lease-Purchase or Vendor Financing

Most manufacturers are familiar with the leasing concept. Leasing can be an attractive financing option to use to get new equipment. For many companies, in practice, leasing is a way for them to borrow money without putting any liabilities on their balance sheet. In the case of energy-related project financing, the energy efficiency savings realized from new equipment—the bottom line impacts on the electric or gas bill—usually can offset the lease payment. This will result in a positive cash flow situation for the company. Sometimes the value of the equipment and the cost of its installation is amortized over the term of the lease, making its eventual acquisition by the lessee more affordable. In many cases, the lease term is shorter than the useful life of the equipment; most such leases include a purchase option pegged to the fair market value at the end of the lease. ***Manufacturers should explore the two types of lease arrangements that are typically available***. The right choice will depend on a number of factors, ranging from the cost and type of equipment needed, to the anticipated shelf-life of the equipment, to the company's tax situation.

Manufacturers must recognize that the cost and length of available lease terms will depend on both the equipment itself, as well as the manufacturer's own creditworthiness. Reasons for the latter are similar to those of conventional bank financing. In the case of the former, the equipment's life span and potential for resale will influence the terms and costs of the lease. Operations characterized by rapidly changing technologies will find equipment more expensive to finance than will companies using more durable equipment with longer staying power.

1. **Finance Leases** are essentially installment purchases. ***Manufacturers pursuing this option will need little or no initial money to purchase the equipment***. The lessee company is considered the owner of the equipment for tax purposes, and is entitled to take deductions for depreciation and the interest portion of the payments to the lessor. Finance leases may be offered by leasing companies, ESCOs, suppliers, installation contractors, and utilities.

2. **Operating Leases** are also known as vendor financing. In this scenario, the lessor owns the equipment and leases it out for a pre-determined contract period. In some cases, vendor financing companies finance one type of equipment, or serve a specific industry. In other situations, the lessor is the maker of the equipment being acquired. ***Manufacturers should explore these lease financing options, since these companies understand the equipment best and typically offer the best terms***. In the case of energy efficiency equipment, ***the vendor often guarantees that the customer/manufacturer will pay no more for the lease than the energy savings it generates***. Vendors, on occasion, may act as an ESCO and offer a broader range of services. The lessor takes the tax benefits, and the lessee writes off the lease payments as a business expense.

Lease financing options offer several advantages over conventional bank financing:

- the entire cost of the property or equipment is financed (and many lease payments can be structured to also include soft costs such as installation charges and license fees);
- company constraints on taking on new debt or using lines of credit can be circumvented, and (in terms of company accounting) debt-to-equity ratios are decreased and current level of financial liabilities reduced;
- more flexible payment schedules can be structured (for example, to reflect seasonal business cycles);
- more advantageous tax treatment (i.e., a lease is treated as an operating cost that can be expensed rather than as a capital investment recoverable over a longer period of time).

From a practical operations standpoint, leasing also allows manufacturers to determine the usefulness of equipment before investing in it. In addition, plant managers will find that leases make it easier to upgrade production equipment as improved versions are introduced.

This approach also carries several disadvantages:

- contracts may carry penalties upon cancellation, an important consideration if the equipment becomes outdated before the lease expires;
- higher real cost of acquisition, after taxes, when payments over the total term are considered;
- no ownership value of the property or equipment at the end of the lease term, even if value remains;
- cost of removal usually borne by lessee if the equipment is not purchased or leased again at the end of the lease term;
- loss of certain tax advantages such as accelerated depreciation.

Energy Service Companies (ESCOs) and Shared Savings Contracts

ESCOs provide energy efficiency improvements and energy management services to companies, and get paid out of the savings realized from the improvements. Unlike many traditional vendors, most ESCOs do not require or expect any cash up-front for the energy efficiency measures they acquire and install on behalf of participating companies. This makes ESCO projects especially attractive for companies where cash flow or environmental concerns make traditional financing hard to get or much more costly to secure.

Utility Incentives

Some electric utilities offer incentives such as rebates to help their manufacturing customers reduce the initial cost of energy-efficiency improvements. With a rebate, the utility reimburses the company for some portion of the cost of implementing or installing the improvement. Depending on the utility program rebates they may be based either on the actual cost of the improvement or on the level of energy load reduction.

Some utilities offer different types of incentives. For example, they may cover some or all of the cost of installation of energy saving equipment. Utilities may help pay for technical plant assessments designed to uncover opportunities for enhanced energy savings, pollution prevention, and larger productivity gains. They may also offer low-interest financing for energy efficiency projects. ***Manufacturers should contact their utility account representatives to identify the types of incentives that may be available, their cost, and the level of financial support that may be available to carry out projects***. Utilities almost always require projects to show some link to energy efficiency as a condition of offering assistance. Therefore, ***manufacturers need to think creatively about operation improvements in the context of energy efficiency***. Some manufacturers, in areas as diverse as rural Iowa and Boston, have demonstrated how creative that link can be—getting utility financial assistance for projects ranging from plant layout to toxic waste minimization by showing the energy efficiency connection.

In addition, ***manufacturers need to be aware that the electric utility industry is in an era of uncertainty***, as Congressionally mandated deregulation starts to take hold. Eventually, every electricity user will be able to choose his service provider, from any place in the country. For the utility, this means placing much greater emphasis on customer service, to maintain their existing client base and guard against customer raids from other utilities based in different parts of the country. For the manufacturer, deregulation could mean the loss of rebates and traditional types of utility assistance, as utilities explore more effective marketing strategies. On the other hand, many energy analysts see manufacturers in a position to benefit from the upheaval in the electricity industry. ***Deregulation could prove beneficial for savvy manufacturers wishing to use their energy needs as a negotiating tactic to gain financial or technical assistance.***

Deregulation could give manufacturers:

- the ability to explore new, better, and more tailored assistance packages from current energy providers, who are seeking to retain the manufacturer as a long-term customer;
- the ability to encourage utilities to provide better technical assistance, and links to ESCOs and other financial providers to make improvements, as part of a long-term service agreement; and/or,
- reduced rates, many believe, over the long haul.

Venture Capital or Equity Financing

Equity financing, or venture capital, is by nature risk capital. Venture capitalists are investors who are not interested in a company's collateral assets; they are hooked by a company's potential cash flow and the profits their investment will generate. Their profit is derived from their part-ownership, or equity position, in the companies they support. ***Manufacturers need to shed their common perception that venture capital only lands in high-tech arenas; in fact, venture capitalists will invest in any company in any sector poised for big growth and significant profits***. Venture capitalists take big risks, and they expect big returns.

Venture capitalists fall into two categories: *traditional* and *informal*. Traditional venture capital firms are typically partnerships capitalized by large institutions, such as private or public pension funds, major corporations, or insurance companies. ***Manufacturers need to realize that, in practice, traditional venture capital opportunities may be limited, since traditional venture capital firms historically fund less than one percent of all companies seeking assistance***. Many traditional venture firms focus on existing companies with considerable growth potential, or on the leveraged buy-out of strong companies.

The bulk of available venture capital comes from informal sources, typically, the so-called "angels" (wealthy individuals with money to risk). A network of informal venture capital intermediaries has sprung up to link angels with promising deals; this network includes investment bankers; financial consultants; loan brokers; and venture capital clubs. SBA is developing a new computerized system, called ACE-Net, to link small companies and private angel venture investors. (See the *Federal Programs* section for more details.)

Manufacturers need to know that a key constraint to finding informal venture capital is not necessarily the nature of the project itself, but the simple lack of information about who has venture capital to invest, how they want to invest it, and where it is.

Venture capitalists are driven by the goal of making a lot of money, and they rarely make their investments on purely objective reasons. But companies that gain resources commonly:

- offer a proprietary product or service;
- feature significant potential for growth (many traditional venture investors look for at least $50 million in product revenue) within a definable time period, usually five to ten years;
- demonstrate the potential for a high return to investors—most venture capitalists demand an average of at least 20% annually over the life of their investment;
- feature strong, able, and creative management teams;
- are able to define a clear "exit strategy" for the investor, typically, through sales of stock.

SBA's Small Business Investment Company program (SBIC) provides traditional equity financing to small businesses. (See the *Federal Programs* section for more details.) SBICs are owned by investment groups, other companies, and often by banks. Banks often participate in SBICs because this provides them with a way to become involved with potentially more lucrative venture capital projects, and offers them an institutional mechanism to serve companies that normally would not qualify for conventional loans in their commercial loan departments. Thus, ***manufacturers refused conventional financing should inquire if the bank participates in an SBIC***. SBICs are at the root of success for many companies who have made it big, including Apple Computer and Federal Express.

Conventional Lenders and Risk: What Influences Their Approach to Manufacturing Projects?

What do manufacturers need to know about their lenders? Various factors affect any given lender's basic view about financing manufacturing projects. Therefore, industrial manufacturers must know their lenders. When seeking financing for energy efficiency or process improvements, they should try to determine the following:

- the lender's **market policy-making structure**—are they a local bank with purely local interests, are they a National bank with policies set in a distant home office, etc. This will influence the lender's flexibility and approach to specific local situations.
- the lender's **sphere of activity or market niche**—is the lender's focus primarily on commercial projects, multi-family housing projects, shopping malls, or industrial projects; determining this will offer some sense of the lender's receptivity to manufacturing modernization and energy efficiency projects.

- the lender's **level of sophistication and knowledge** base—the more the lender knows about and understands industrial facility issues and needs, the more willing they are likely to be to finance such projects.
- the lender's **past experience** in financing similar modernization and energy efficiency projects—financiers who have undertaken such projects are less likely to be swayed by horror stories and more likely to be open to this type of loan
- lender **"trigger" issues**—the types of red flags that will dissuade it from lending, such as past problems with collateral disposition or adequacy of value, etc.
- lender's **comfort level with new technologies**, and its internal capacity to understand how new technologies can work and how likely it is to achieve the projected benefits.

In short, ***manufacturers must remember that rejection by one lender may only reflect that financier's view of the risk involved with that sector or technology, and not the broader credit-worthiness of the applicant***. Therefore, manufacturers should seek out lenders that may be a better fit with the project needing financing. In addition, ***manufacturers need to realize that their loan applications may be "victims of circumstances***"—assigned to an overly-conservative loan officer, assigned to a loan officer with little clout within his or her institution, or submitted to a bank at a time when it is bumping up against its own loan limits and, consequently has tightened its lending standards. A creative loan officer, and an aggressive bank, can find ways to make loans work.

What are the faces of Risk?

Risk—ways to quantify it, avoid it, and manage it—is the number one concern of lenders. As they consider it, many bankers follow the credo of the so-called ***"Five Cs of credit,***" namely:

- ***Capacity*** to repay the loan, determined through a company's financial statements (which many lenders report are typically poorly prepared); bankers like to see evidence of a consistent increase in profits and retained earnings devoted to the business;
- ***Collateral*** offered to secure the loan, and evidence that the collateral (such as equipment or real estate) will hold its value for the duration of the loan;
- ***Capital*** on hand—the company's liquid assets or cash-on-hand; lenders also find it attractive if the owner has a good net worth-to-debt ratio;
- ***Conditions—***special situations or extenuating circumstances that could impact the borrower during the life of the loan; and,
- ***Character*** —borrower's reputation for integrity and forthrightness (in presenting information to underwriters, the position in the community, and similar types of intangibles).

Within these parameters, the decision-making process is a fluid one within any given bank, in the context of loan officer interpretations, the reputation of the loan officer (within the bank) who may be handling your loan request, the nature of the bank loan committee and their comfort with basic data presented, and so forth.

Manufacturers must remember that, in the final analysis, the key factor is risk—the chances that problems are likely to arise with a project, relative to the potential payoff for the lender. Risk may take many forms, depending on the financial institution, its perceptions of various manufacturing situations, and the specific circumstances of the individual manufacturing project. ***Manufacturers must realize that, in the case of projects involving new process equipment or new technologies, the nature of the risks that lenders fear as they consider loan applications fits into one of the following categories***:

- the equipment or technology will not perform as promised, undermining the ability of the manufacturer to repay the loan based on predictions of that performance;
- the equipment or technology is so tailored to the specific borrowing company that it will not be marketable to others and that its purchase price will not be recovered in the event of a foreclosure (even accounting for normal wear and tear);
- basic concerns over environmental liability, prominent in many heavy industrial manufacturing sectors (such as printing or metalplating), will translate into one of two situations, either (1) the lender will not be able to gain liability-free access to manufacturing facilities to reclaim equipment used as collateral in the event of default, or (2) borrowers will be saddled with environmental cleanup costs and their ability to repay the loan may be jeopardized.

Numerous factors affect any individual lender's decision whether or not to lend to manufacturers seeking to finance equipment acquisition or capital improvements related to competitiveness. ***Manufacturers must recognize that some of these factors will be out of the prospective borrower's control and may not even be relevant to the specific loan request at hand***; some lenders clearly follow the "once burned, twice shy" philosophy when dealing with projects in certain industrial sectors. Therefore, ***manufacturers often have to make a considerable effort to educate their lenders on the nature of their industry and the scope of the project they propose to undertake***. In many cases, they are not successful in establishing a necessary level of comfort. Thus, ***manufacturers are encouraged to try other lenders if the first one they approach rejects their application.*** Technical information available through the Department of Energy and various State programs can prove valuable in this regard.

What Types of Manufacturing-related Risks do Lenders Most Often Consider?

Most lenders are traditionally conservative in their lending policies, often because they feel that their own regulators place them in that position. This varies for a number of reasons, but the size, specialty, and expertise of a given institution plays a key part. For example, some financial institutions focus on certain types of commercial lending; others may be much more open when considering loan requests from manufacturers. Some lenders are much more versed in environmental issues. Moreover, within a specific institution, some loan officers are more conservative than others, for a variety of reasons. ***Manufacturers must not forget that some lenders simply do not understand various manufacturing technologies and processes***. And no bank officer wants to be party to a bad or "nonperforming" loan. The fact of the matter is that manufacturing loans are perceived—rightly or wrongly—as having a greater chance of going awry than most other types of lending.

Lenders concern themselves with various types of risk, but how a manufacturer addresses the following three types will be crucial in a lender's decision on a manufacturing project loan request.

1. **Basic credit risk**—the likelihood that the borrower will be able to make payments. Lenders address this risk by looking at the credit rating and financial situation of the borrower, to review such factors as past record of loan repayments and current debt to income ratios.
2. **Collateral risk**—the possibility that the lender will not be able to recover the loan amount due in the event of foreclosure because of a decline in collateral value (with manufacturing equipment, these concerns arise because the equipment is not viewed as marketable to others at a sufficient price).

Manufacturers need to know that lenders confront this risk in two related ways: (1) by minimizing the value of the collateral to a level they are comfortable with (in the case of equipment, this may involve reducing its value to scrap value); or (2) by reducing the loan-to-value ratios they will accept for the project to a level they feel addresses the uncertainty. For equipment loans, this means, in practice, that lenders might only provide 20 or 30% of the purchase price, rather than the 70 or 80% that they might loan in other situations.

Manufacturers must remember that loan-to-value is an important concept in financing, and is especially key in evaluating potential risks in manufacturing loans. Basically, the smaller the loan request relative to the size of the overall project, the lower the loan risk to the lender, and the more likely the loan is to be approved. This boils down to a simple cash flow issue; the profits that manufacturers would earn from their own investment in the project could be shifted to cover the loan payments if that became necessary. In practice, this may mean that if manufacturers have limited cash to commit to a modernization strategy, they might be better off tackling initial segments, rather than a major effort. Thus, the gains from the initial investments can be used to make subsequent projects less risky and more bankable. In this way, it may be possible to get financing for a greater share of the purchase price; in the example above, perhaps 40% instead of 20% or 30%.

3. **Liability risk—**lender's concerns that they will somehow be exposed to environmental risk for contamination if they move to claim collateral at a facility where production results in environmental contamination.

Lenders have interpreted the rulings in several court cases in the 1990s as particularly onerous barriers. In one instance, the manner of removing equipment used as collateral from a bankrupt manufacturer triggered Superfund liability. Lenders want to avoid such situations at all cost, and many do so by simply not lending to such companies. ***Manufacturers must remember that, to overcome lender concerns, they usually must provide environmental assessments and other detailed information to their banks about the condition of their facility, the nature of their production, and their waste disposal plans***. All of this drives up transaction costs considerably.

Manufacturers may be able to circumvent environmental fears over collateral value for specific equipment acquisitions simply by offering alternative collateral. For example, some banks may accept other real estate holdings, or other assets such as stocks or bonds as collateral for the equipment loan. (In practice, of course, this forces manufacturers to make some hard decisions about what they are willing to risk to secure the loan.)

Finally, insurance products are available that provide lenders the comfort they need when considering loans where environmental risks may be present. However, in practice, such insurance is very expensive (although the costs of typical coverage have dropped by more than a third over the past few years and continue to decline as an actuarial track record in this arena is developed). Currently, policy fees typically make such insurance prohibitively expensive for projects needing less than $500,000 in capital.

Choosing the Right Lender: Size May Matter

Given the nature of manufacturing lending, prospective borrowers may have to search for the right match between their needs and the inclinations of the prospective lending institution. For example, loan size/complexity and bank size may have to matched properly. In some instances, if the needed amount of loan proceeds is small and for routine purposes, the best bet may lie with a small community bank that specializes in tiny loans for projects in the local area. In other cases, where the technology proposed may be complex or relatively new, or a sizable amount of financing may be needed, the right lender may be a large, multi-billion lender with staff expertise and experience in making such loans.

Advantages of small lenders (with less than $100 million in assets)

- tend to focus on smaller loans;
- market niche is the local area, and they may be more interested in making loans in their immediate community.

Disadvantages of small lenders

- project size may exceed maximum loan amount (while such banks often participate in local lending consortia to meet higher capital needs, working through such an arrangement adds to the transaction costs);
- may be rigid when dealing with contamination concerns (automatically rejecting applications for this reason) or overly conservative when faced with loan requests involving innovative technologies or equipment.

Advantages of large lenders (with more than $100 million in assets)

- tend to be more open when considering loans involving manufacturing equipment and contamination concerns, because of greater staff expertise and experience;
- can consider larger size loans (because of their size, any individual loan will constitute a small proportion of their loan portfolio, allowing risk to be spread).

Disadvantages of large lenders

- minimum threshold for a loan may be too large for the typical manufacturing equipment loan need (in some cases, lenders have established floors of as much as $10 million)
- some may view manufacturing loans as too complex, and their servicing too time-consuming (basically, they may have easier ways to make more money, via commercial or real-estate lending).

Other Factors Affecting Lender's Willingness to Lend on Manufacturing Projects

Finally, manufacturers need to know that sometimes, other factors will affect a bank's willingness to finance manufacturing-related projects—even if they have little or no direct bearing on either the specific project or the prospective borrower. They may include the following:

- basic institutional attitude towards certain types of risk—top bank leadership simply decrees that the organization will not finance this type of project;
- the lender's need to make loans—"hungry" banks needing to shore up their level of lending activity may be more willing to finance innovative manufacturing projects than institutions having a number of prospective borrowers at their door competing for limited loan funds;
- the extent to which the lender pursues good ratings under the Community Reinvestment Act and needs to make qualifying loans to maintain those ratings—a factor that can work to the advantage of smaller companies in distressed community areas who employ local, lower-income persons;
- environmental factors.

The latter can have a significant, if more invisible impact on a lender's openness to lending. Historically, many manufacturing operations are viewed as "dirty"—rightly or wrongly—and companies seeking financial assistance must be prepared to prove that they can still meet the 5 Cs of credit and will not compromise a participating lender in terms of environmental liability. ***Manufacturers need to be aware that lenders continue to be very nervous over the prospect of incurring liability for environmental contamination from loans they make***. While Congress and the Federal EPA have acted over the past year to reduce this risk, many lenders remain extremely reluctant to lend on manufacturing projects. This is particularly true of loans for improvements to long-time manufacturing operations. ***Manufacturers need to be aware that certain types of situations which will raise red flags with lenders, and they could require additional borrower effort to establish the right lender comfort level.*** These include the following.

- use of the facility for what may be viewed as "dirty" manufacturing operations, including those which involve the use of toxic substances, such as cyanide or lead;
- presence of discarded industrial batteries, paints, pesticides, or other chemicals, or waste ponds or lagoons;
- evidence of lead-based paint, asbestos, or underground storage tanks, or transformers, capacitors, or hydraulic equipment that may contain PCBs.

Total Cost Assessment

Pollution Prevention and Energy Efficiency

Until recent years, Federal and State policy and practices at most industrial firms focused on pollution management and mitigation using "end-of-pipe" pollution control regulations and technologies. Although this approach was effective in promoting the first wave of pollution reduction, it was very costly. The next wave of environmental improvement will require pollution prevention and energy efficiency which focus on eliminating the sources of pollution and improving processes and energy efficiency so there will be less need for pollution control measures. Pollution prevention and energy efficiency techniques include substitution away from harmful chemicals, improvements in process efficiency or housekeeping that reduce waste and energy use, or in-process recycling of waste materials. Pollution prevention is also closely related to energy efficiency, which prevents pollution by reducing energy demand in place of increasing energy supply.

Because pollution prevention and energy efficiency focus on process improvements and waste elimination, they involve capital investments and process changes that are often profitable. Avoiding the costs or regulatory compliance, hazardous waste management, energy use, liability, and risks to worker health is simply good business.

Financial Analysis and Total Cost Assessment (TCA)

Financial analysis is the process by which companies evaluate potential investments. Financial analysis assigns an indicator of profitability to each investment option to aid business decision making. Conventional financial analysis methods often neglect indirect or hidden costs, focusing on short-term costs and benefits instead.

Total Cost Assessment (TCA) is an approach to removing potentially unwarranted and misleading financial barriers to energy efficiency and pollution prevention and other related investments. It does so by assisting managers and other staff—research and development, product design, financial, energy, environmental, and operations—to develop a comprehensive financial analysis of the true profitability of environmental investments. TCA differs from conventional project analysis methods in four key ways:

- the inventory of costs, savings, and revenues includes indirect, less tangible items typically omitted from project analysis, such as compliance, training, testing, and liability.
- costs and savings are directly allocated to specific process and product lines instead of being pooled in overhead accounts.
- time horizons for calculating profitability are extended to capture longer term benefits.
- profitability indicators, such as Net Present Value (NPV) and Internal Rate of Return (IRR), capable of incorporating the time value of money and long term costs and savings are used.

Although developed for use with pollution prevention, energy efficiency and other related projects, the TCA approach can be used for the financial analysis of any industrial project under consideration by a firm.

Comprehensive Cost/Savings Inventory

A comprehensive cost/savings inventory is a critical component in carrying out a financial analysis, particularly for energy and environmental projects. For example, a pollution prevention project that reduces the use of a hazardous substance as a raw material, therefore decreasing hazardous waste generation from the manufacturing process, can affect not only waste disposal costs, but also less-tangible items such as corporate or product image, and waste-related liabilities (such as Superfund liability). Analyses often omit these issues because they are problematic, difficult to quantify, or both.

The inventory component of TCA includes as many relevant and significant cost/savings items in the analysis as possible. Starting with the universe of potentially relevant costs and benefits, managers should consider each item for relevance to the project at hand. Some items (such as capital costs and basic labor/materials costs) are obvious and easily

quantifiable. Other relevant items may require more effort to track down the information necessary to attach a dollar figure to the activity. If the best cost estimate is actually a range of costs, sensitivity analysis can determine how much the uncertainty affects the bottom-line profitability of the project.

Although an attempt should be made to evaluate all cost items (including less tangible items, e.g., liability), the same level of analysis is not necessarily appropriate for every item. In some cases, the analysis of a particular item will go further than simply determining that the item is not significant enough to warrant the time and effort that would be needed to rigorously quantify it. It is important to determine not only whether a particular cost item is relevant to the analysis, but also whether the item is significant in comparison to more readily quantifiable capital and operating costs.

Appropriate Cost Allocation

Other relevant cost items may be omitted because of inappropriate cost allocation within the firm's accounting system. For example, environmental management costs, such as labor time for internal waste handling (e.g., manifesting) spill reporting, or compliance planning are often retained in general facility overhead accounts rather than being allocated to the process or product that is actually responsible for the activity. Even when these costs later are allocated back to processes/products for purposes such as product pricing or capital budgeting, the basis for allocation (for instance, amount of raw materials used per production line) may not accurately relate the overhead costs to the actual activity generating the cost.

In general, each cost item contained in overhead should be allocated to processes and products using an appropriate allocation basis. Under Activity Based Costing (ABC), overhead costs are first assigned to activities with a direct relationship to cost generation; these activities are in turn allocated to processes and products. This two-stage technique facilitates selection of appropriate allocation bases, and provides valuable information for managing overhead costs. Although ABC is typically applied to a facility-wide or company-wide managerial accounting system, its methods and concepts are also valuable for capital budgeting.

Long Analysis Time Horizon

Total Cost Assessment takes into account costs and benefits that accrue over the life of a project. The relevant time horizon could be, for example, the expected lifetime of the equipment purchased. For projects with very long expected life (15 to 20 years or more) a time horizon of a least 10 to 15 years enables the analysis to capture costs, savings, and revenues that occur in investment out-years, such as recurring waste disposal savings or future avoided liability savings. Unfortunately, many companies restrict capital budgeting to time horizons of 5 years, 3 years, or less.

Profitability Indicators and the Time Value of Money

When summing costs and benefits over many years, it is important to recognize that cash flows in the future are less valuable than cash flows of the same magnitude in the present. In a large part, this is because a present cash flow can be invested (for example, in Government bonds) to yield a greater value in the future. This preference for receiving cash in the present is reflected through a discount rate—for most companies, the operative discount rate is their weighted-average cost of capital.

Profitability indicators, such as Net Present Value (NPV) and Internal Rate of Return (IRR), use the discount rate to appropriately value out-year cash flows in terms of present-year dollars, by contrast, other indicators such as simple payback neglect both the time value of money and out-year costs/ benefits, both of which may have a significant impact on the analysis.