Energy Conservation: Speaking The Language Of Corporate Management

We know how to save energy dollars. Here's how to present those plans to a financial manager in terms he or she will understand and accept.

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Many innovative electrical projects, which are intended to save significant amounts of money, never get underway largely because we don't talk to financial managers in their own language. These projects would be done more often than not *if they were presented in financial terms.* We want you to be familiar with the viewpoint of those whom you ultimately ask to commit the resources to undertake the project. Just because the economic benefits of energy conservation seem so compelling to us *doesn't mean they are to a financial manager.* Here's how to analyze a project and make your case.

The time value of money

The key concept to remember is that, to a financial manager, *a dollar saved tomorrow isn't equal to a dollar in hand today.* A dollar in hand today could be invested in many different ways. Furthermore, even with relatively low inflation, the value of a dollar is eroding. For example, if inflation runs about 3%, today's dollar will only be worth about 50¢ in 24 years.

To account for this reality, there are standard tools a financial manager uses to put competing projects on a level playing field in terms of added value to the firm. Designing a job that saves lots of money is only the first part of the job. Because of the time value of money, we need to ask *when the project will save how much money.*

You can project energy expenditures more accurately than many other costs, which helps. There are plenty of highly accurate instruments that can measure energy demand, and the firm will have its utility billing records for the overall picture. Although the future cost of energy will always be somewhat unknown, particularly with the impact of increasing the inflation, the financial picture will be clearer than launching a new product. Be careful to use credible numbers; nothing will poison the water more effectively than a history of overly optimistic projections.

Annual cash flow impact

You begin by looking at the impact the project has on the flow of money into or out of the firm. In the case of energy conservation, the impact is on *avoided expense,* not income received. Remember, *your project is no different than launching a new* *product, financially speaking.* The financial manager will look at a proposed product launch in terms of how the new widget should increase revenue. Since energy conservation lowers operating costs, it only will make sense if those lowered costs, *adjusted for the time value of money*, bring a comparable benefit.

In general, cash flow must be estimated annually and figured for each year of the project. In the case of energy conservation, the life of the project would be taken to be the life of the new equipment required. For example, the life of an electronic ballast might be taken as 10 years. The general procedure for figuring cash flow impact in any year is as follows:

Add: Any increases in sales or revenues resulting from the project. In the case of energy conservation, this is normally zero.

Add: Any reductions in operating expenses from the project. This is where the biggest impact normally lies.

Subtract: Any increases in operating expenses. This should be zero.

Subtract: Depreciation expense taken that year for new equipment purchased for the project. In general, new equipment has a remaining value year after year. This is why the tax laws don't allow the full value to be deducted in the year a firm buys the equipment. In effect, the government says that the firm hasn't spent the money; rather, it has only exchanged one asset (cash) for another. Therefore, the firm only gets to deduct the amount by which the new equipment declined in value.

To a great extent, this is contrived. The government has historically manipulated depreciation schedules to suit political convenience. Some assets don't significantly decline in value and actually appreciate. In other cases, there are allowances for 100% depreciation in the year purchased.

In any case, depreciation expense is the amount the firm will be claiming on its tax return and *not* the depreciation that will be carried in other record keeping that the firm may do. For example, a firm may depreciate equipment over its own assessment of its working life, rather than the amount prescribed for tax purposes. In this analysis, however, we are using the tax depreciation because we are looking at the *tax impact* (cost) of the proposed expenditures for energy conservation. The result is the *pre-tax* project income.

Subtract: The tax on the project income, or in these cases, on the *increase* in income resulting from the *decrease* in operating costs. The financial officer can tell you what the firm uses for an effective tax rate (federal, state, and local combined); 40% is often used. The result is the *after-tax* project income.

Add: The depreciation expense that had been subtracted earlier. Obviously, no check was written for depreciation, *as this is a cash flow analysis;* therefore, the depreciation goes back in at this point.

The end result is the cash flow generated by your proposed energy conservation project. You need to calculate this over the life of the equipment (see sidebar "Cash Flow Example," on page 24).

CASH FLOW EXAMPLE

Suppose the installation cost for a group of new adjustable-speed drives is $50,000. You project the energy savings to bring a reduction in energy costs of $15,000 per year, and the utility will give a $5000 rebate. The useful life of the drives should be at least 10 years, and the firm will be depreciating them over a five-year period.

Initial cash outflow:	$50,000
Less utility rebate:	(5,000)
Net cash outflow, Year 0:	$45,000
Annual cash inflow:	
Increased sales or revenue:	$0
Reductions in operating expenses:	15,000
Increases in operating expenses:	(0)
Depreciation expense (50,000÷5):	(10,000)
Pretax savings:	5,000
Taxes (40%):	(2,000)
Net Income:	3,000
Depreciation:	10,000
Annual cash inflow, first five years:	$13,000

After the first five years, the picture changes due to the fact that, for tax purposes, the equipment is fully depreciated. This means that the taxes go up $4000 (40% of 10,000), reducing the annual positive cash flow to $9000.

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Payback time

We often see energy conservation projects described in terms of how many years it will take for the savings to equal the investment. In the example in the first sidebar, the payback would be $45,000 divided by $13,000 or 3.46 per year. Some firms set payback targets for this kind of a project. *As we will see, payback analysis may short-change energy conservation projects.*

Allowable payback periods generally run longer on projects with longer lives, provided the overall cash flow is there. If the firm is having cash flow difficulties, however, it will often require faster paybacks. Indeed, this is where many energy-saving initiativesstumble. A firm may

WEIGHTED AVERAGE COST OF CAPITAL (WACC)

A firm can raise money by going to a bank (or bondholders) and borrowing the money, or it can ask the public to invest in its enterprise through the purchase of shares of stock. The firm returns part of its profits to the shareholders in the form of dividends, based on market considerations, since its shareholders have other places for their money as well. Many firms do both. Here's a sample calculation based on 7% interest rate on the corporate bonds, and 18% return to the shareholders:

Long-term debt:	$300,000	@7%	$21,000
Shareholder's equity:	700,000	@18%	126,000
Total	$1,000,000		$147,000

The weighted average cost of capital is $147,000 ÷ $1,000,000 = 14.7%.

realize the value but be unable to raise the money internally regardless of the payback.

For this reason, there are new financial opportunities in the form of funds to finance energy conservation improvements. They, in effect, make some of the money on the energy conserved until the project is paid off, with the firm getting to keep all the savings thereafter. The result is a positive cash flow from the beginning.

Be careful with payback analysis, however, because it ignores those long-term benefits. It only looks at the cost of the project, *and not its ultimate profitability.* Again, referring to the example in the first sidebar, the variable speed drives will return $13,000 per year for the first five years, and $9000 for the next five.

Suppose someone goes to the financial officer with an alternate proposal to spend $45,000 on a project that returns $15,000 per year and has a useful life of four years, for a total return of $60,000. *The payback (three years) is faster, but the drive project returns ($13,000 × 5) + ($9000 × 5), or $110,000.* As you can see, the energy conservation project is far more profitable.

The rate of return

Look at the long term by first establishing what the long-term value of money is to the firm, and then consider how a financial manager brings future events back to present time. Energy conservation projects spend money to increase profits; if the same money were invested in other ways, would it earn more or less return?

Most firms establish a minimum rate of return based on their own cost of money. If a project doesn't make enough of a rate of return to offset the costs of borrowing money to undertake it, it cannot be considered. However, large firms also need to return enough money to their shareholders over and above the cost of borrowing. This number may be historically based and certainly won't be decided by electrical personnel. Nevertheless, this number will be crucial in judging capital projects.

The minimum rate of return begins with the weighted average cost of capital (WACC) (see sidebar above left). Then this number is increased based on the amount

of risk associated with the project. In other words, how tried and tested is the technology you are suggesting? At this point, electronic ballasts have a relatively low risk; some large-scale cogeneration initiatives may have a high risk, depending on the local political stability of the utility regulatory environment.

We will assume, for the rest of this article, that the risk associated with the variable speed drive project is 3.3%, resulting in a required rate of return equal to 18%. This is also called the *hurdle rate* and *it will vary from firm to firm;* don't make assumptions without checking with the appropriate financial officers.

Net present value

The way to incorporate the time value of money and hurdle rate into the financial decision-making process is by using them to evaluate future performance in terms of today's dollars. The financial officers do this by calculating the "Net Present Value" (NPV) of future earnings and expenses. Here's how it works.

You tabulate the cash flow for each year (refer back to the first sidebar). Then discount the value of that cash flow back to the present. The discount factor (see sidebar below) is the number that, after compounding, would equal $1.00 after the prescribed time interval. For example, look at the factor for year 3 (0.6086). If you invest $0.6086 at 18%, at the end of the first year you would have $0.6086 × 1.18 = $0.7182; at the end of the second year you would have $0.7182 × 1.18 = $0.8475; and at the end the third year you would have $0.8475 × 1.18 = $1.0000.

Note the critical factor of time in this analysis. For example, even though the equipment outlives the tax depreciation period and therefore the cash flow declines over the second five years, *the maximum benefit is in the first five years, where the dollars are more valuable.* A project with an NPV of *less than* zero will probably *not* be accepted because the firm has more productive places to inves. its money. A project with an NPV *greater than* zero has a *strong likelihood of acceptance,* but inevitably will be

NET PRESENT VALUE CALCULATION

If the adjustable speed drive project returns $13,000 for the first five years and $9,000 for the next five years, what is the current value of the future cash flows? The desired rate of return is 18%.

Year	Cash Flow	Discount Factor (18%)	Discounted Cash Flow
0	($45,000)	1.0000	($45,000)
1	13,000	0.8475	11,018
2	13,000	0.7182	9,337
3	13,000	0.6086	7,912
4	13,000	0.5158	6,705
5	13,000	0.4371	5,682
6	9,000	0.3704	3,334
7	9,000	0.3139	2,825
8	9,000	0.2660	2,394
9	9,000	0.2255	2,030
10	9,000	0.1911	1,720
		Net Present Value	$8,007

These calculations are tedious to do by hand but there are many computer programs and financial calculators that do the job quickly.

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compared with other projects competing for the same scarce resources.

Note that the NPV on this proposal of just more than $8000 means that even with an $8000 overrun on the installation costs, the project would still be worthwhile. Suppose, for example, the $5000 utility rebate suddenly disappeared. That would still leave an NPV of $3007, and again, the project would still be valid.

You can use the same techniques to compare *life cycle cost*, the total energy costs over the life of competing alternatives. Project the energy costs into the future, which were part of the cash flow analysis you had to do anyway, and then discount them to present dollars. After discussion with your utility (or in this era of wheeling, potential competing utilities as well) use a projected *rate of energy cost inflation* for this analysis. Some energy codes mandate these calculations for new construction anyway.

Internal rate of return

The same methodology can be reversed, with the future cash flows analyzed to answer, at what percent would I need to invest (in this case) $45,000 in order to make the same $110,000 profit over the 10 years, in the same time periods? In other words, at what interest rate would the NPV calculation come out zero? This is called the *Internal Rate of Return* (IRR). In this case, the IRR is just under 24%.

The IRR can be directly compared with the hurdle rate. This assumes, however, that all cash flows derived from the energy savings are reinvested at that rate of return which, if high, really isn't likely. Still, this is an objective measure of the rate of return for competing projects.

Conclusion

Energy conservation initiatives do very well in today's economic environment purely on their financial merits. You need to discuss them accordingly with the financial officers who make the decisions. The relative scarcity of commercial and industrial occupancies that are even somewhat modern in terms of energy efficiency shows that the message isn't getting through. ▪