

# Making Investment Decisions Using Vehicle Life-cycle Cost Analysis

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The financial analysis concepts and techniques utilized in this presentation are based on Generally Accepted Accounting Principles (GAAP) as established by the American Institute of Certified Public Accountants.



# What is Life-cycle Cost Analysis?

- A financial analysis technique that takes into account the total cash flows associated with a business scenario over the total life of that scenario
- When properly applied it can be an excellent tool for evaluating business investment alternatives – Including the utilization of hybrid and alternative fueled trucks

# Concept vs. Application

- Widely accepted in concept
- Actual application is more limited
- More often than not results are suspect due to a failure to accurately identify and account for all applicable cash flows

# Application to Hybrids and Alternative Fuel Trucks

- As early adopters of these systems you are helping to develop the technology
  - Long term potential for cost savings
  - Social & Environmental responsibilities
  - Current projects are subsidized by government and business
  
- ***Ultimately, in order to be sustainable, these technologies must pay for themselves***

# Return of Investment vs. Return on Investment

- ❑ Many so called life cycle cost studies try to determine how long it will take to recover an investment (total or incremental) on a dollar for dollar basis
- ❑ This approach fails to recognize the time value of money
  - A dollar 5 years in the future is worth less than a dollar in hand today

# Return of Investment vs. Return on Investment

- ❑ This means that when making a life cycle cost analysis future cash flows must be discounted to reflect their “Present Value”
- ❑ The discount (interest) rate used when determining the present value of a future sum varies

# Return of Investment vs. Return on Investment

- For a business the discount rate may be:
  - The business's weighted cost of debt and equity (minimum acceptable rate)
  - Alternative opportunity costs (greater than minimum)
  - An arbitrary rate determined by management
  
- For a government entity the rate may be:
  - The weighted cost of all bonded indebtedness
  - The bond rate for a specific project

# The Time Value of Money

- ❑ At any given internal rate of return (discount rate) greater than zero, \$1 in hand today is worth more than \$1 at some point in the future
- ❑ Today's value of \$1 at some given future point is known as the Present Value (PV)
- ❑ Present Value —  $PV = F_n / (1+r)^n$



# Net Present Value

- The sum of a series of related present values associated with any given scenario is known as the Net Present Value (NPV)
- If the net present value of a life cycle cost analysis is equal to or greater than zero the scenario being evaluated is earning at or above the desired rate of return

# What Should be Included in a Life-cycle Cost Analysis?

- Primary cost and revenue components
- Secondary cost and revenue components
- Financial components

*Secondary and financial components are often hidden and are easily overlooked*

# What Should be Included in a Life-cycle Cost Analysis?

- If we assume that a hybrid or alternative fueled vehicle is transparent to the user we will be primarily concerned about:
  - Incremental first cost
  - Incremental maintenance & operating costs
  - Incremental Infrastructure costs (prorated)
  - Associated after tax cash flows

# Income Taxes and the Tax shield

- ❑ In a “for-profit” business, income taxes have a significant impact on net cash flows
- ❑ Taxes reduce the true cost of expenses by acting as a “tax shield”
- ❑ This reduction is equal to your total effective income tax rate



# Tax Shield

- ❑ Example: Based on a tax rate = 10%
- ❑ Income tax is \$10 per \$100 earned for a net income of \$90
- ❑ The expenditure of \$1 will reduce your income to \$99 and your tax to \$9.90 for a net income of \$89.10
- ❑ Therefore, the actual cost of the \$1 expenditure is only \$0.90 after taxes

# Government vs. Private Business

- ❑ Equivalent life cycle costs for government entities and private businesses can vary significantly
- ❑ What makes good sense for one may not make sense for the other
  - Cost of debt
  - Alternate opportunity costs
  - Impact of taxes for private businesses

# Timing of Cash Flows

- The timing of cash flows have a significant impact on life cycle costs due to the discounting of future values
  - Front end loaded expenditures have a greater impact on life cycle costs than future expenditures
  - Future savings and returns have less impact on life cycle costs than front end savings and returns

# Take the Time to do it Right

- Life cycle cost analysis can be a useful tool for evaluating investment decisions when properly done
- Learn how to make a proper after tax, net present value analysis
- Be sure to identify all of the associated cash flows and avoid including sunk costs in your analysis
- Alternatives must have equal life cycles

Thank You for Your Attention

