

BEYOND

SMART CITIES

ENERGY SAVINGS PERFORMANCE AND
MEASUREMENT & VERIFICATION
ONLINE TRAINING COURSE

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ENERGY SPECIALIST CURRICULUM

ENERGY EFFICIENCY SPECIALIST

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ALTERNATIVE FINANCING - ADDITIONAL
FOR ENERGY PROFESSIONALS

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WHAT SHOULD YOU LEARN

Alternative Financing -
Additional

ENERGY EFFICIENCY SPECIALIST

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AFTER TAX CASH FLOWS

(Very dependent on specific tax laws of different countries)

- ✓ Financing Method Can Dramatically Affect LCC on ATCF
- ✓ Tax Advantages With True Leases and With Municipal Bonds (when appropriate)
- ✓ Example ATCF With Calculated Present Worth For All Methods in Appendix (obviously, if interest rate, MARR, IRR, is different, numbers would be different)



DIRECT PURCHASE WITH IN-HOUSE CASH

- ✓ Company uses available cash to implement project.
- ✓ The most profitable approach since company keeps all revenue (savings).
- ✓ Cash is in short supply so most projects are not implemented.
- ✓ Company must be willing to manage and maintain equipment



CASH FLOW DIAGRAM

For Purchase With In-House Cash

It is important to note here that these cash flow diagrams are for illustration purposes only. Changing the MARR, tax rates, interest rates on loans, etc. can dramatically change the ATCF and Present Value. Seeing how the method affects cash flows can be very revealing. That is why these tables are presented.

Investment = \$2,500,000

Savings = \$100,000/yr

Maintenance = \$50,000/yr

MARR, Loan Rate, Bond Rate, etc. stated in Table

Salvage Value = \$1,200,000 end of project (5 years)



ECONOMICS OF PURCHASING THE EQUIPMENT WITH CASH ON-HAND

EOY	Savings	Depr.	Principal	Payments Interest	Total	Principal Outstanding	Taxable Income	Tax	ATCF
0					2,500,000				-2,500,000
1	950,000	357,250				592,750	201,535	748,495	
2	950,000	612,250				337,750	114,835	835,165	
3	950,000	437,250				512,750	174,335	775,665	
4	950,000	312,250				637,750	218,835	733,465	
5	950,000	111,625				838,375	285,045	664,953	
5*	1,200,000	669,375				530,625	180,413	1,019,588	

2,500,000

Net Present Value at 18%:

\$320,575

Notes:	Loan Amount:	0	MARR =	18%
	Loan Finance Rate:	0%	Tax Rate	34%
	MACRS Depreciation for 7-Year Property, with half-year convention at EOY 5			
	Accounting Book Value at end of year 5:	669,375		
	Estimated Market Value at end of year 5:	1,200,000		
	EOY 5* illustrates the Equipment Sale and Book Value			
	Taxable Income:	=(Market Value - Book Value)		
		=(1,200,000 - 669,375) = \$530,625		

DIRECT PURCHASE USING BORROWED MONEY

- Company borrows money from lender (financial institution, insurance company, vendor, third party, etc.) to implement project.
- Return may not be as attractive as interest has to be paid unless borrowing rate is less than return on investment in which case company makes money (net return) on borrowed money. See example below.
- In-house cash is saved for other purposes.
- Interest on loan is tax deductible.
- Company must be willing to manage and maintain equipment as well as take risk. Cash Flow Diagram For Purchase With Borrowed Money

Cash Flow Diagram For Purchase With Borrowed Money

ECONOMICS OF USING A LOAN

EOY	Savings	Depr.	Principal	Payments Interest	Total	Principal Outstanding	Taxable Income	Tax	ATCF
0						2,500,000			
1	950,000	357,250	370,789	375,000	745,789	2,129,211	217,790	74,035	135,175
2	950,000	612,250	420,407	319,363	745,769	1,708,804	18,360	6,245	197,965
3	950,000	437,250	490,368	255,421	745,789	1,212,436	257,329	87,492	116,719
4	950,000	312,250	563,024	181,865	745,789	648,511	455,885	155,001	49,210
5	950,000	111,625	648,511	97,277	745,789		741,048	251,673	-47,761
5*	1,200,000	669,375				530,625	180,413	1,019,588	

2,500,000

Net Present Value at 18%:

\$757,121

Notes:	Loan Amount:	2,500,000 (used to purchase equipment at year 0)		
	Loan Finance Rate:	15%	MARR =	18%
			Tax Rate	34%
	MACRS Depreciation for 7-Year Property, with half-year convention at EOY 5			
	Accounting Book Value at end of year 5:	669,375		
	Estimated Market Value at end of year 5:	1,200,000		
	EOY 5* illustrates the Equipment Sale and Book Value			
	Taxable Income:	=(Market Value - Book Value)		
		=(1,200,000 - 669,375) = \$530,625		

DIRECT PURCHASE USING CASH FROM SALE OF BOND

- ☑ Company implements project using money obtained from sale of bond (another form of borrowed money).
- ☑ Characteristics similar to borrowed money option above plus.
- ☑ If bond issuer (company) is tax exempt, interest paid to bond holder is also tax exempt so bond holder is willing to take smaller yield to get larger effective yield (after taxes).

Cash Flow Diagram For Purchase Using Cash From Sale Of Bond

ECONOMICS OF USING A BOND

EOY	Savings	Dep:	Principal	Interest	Total	Principal Outstanding	Taxable Income	Tax	ATCF
0						2,500,000			500,000
1	850,000	357,250	375,000	375,000	2,500,000	2,175,000	74,000	0	575,000
2	850,000	612,250	375,000	375,000	2,500,000	1,875,000	46,830	528,165	485,065
3	850,000	437,250	375,000	375,000	2,500,000	1,575,000	282,750	157,540	2,085,540
4	850,000	312,250	375,000	375,000	2,500,000	1,275,000	463,375	180,413	1,019,588
5	850,000	111,025	2,500,000	375,000	2,875,000	0			
5*	1,200,000	669,375							
	2,500,000								

Net Present Value at 18%: 944,831

Note: Bond Amount: 2,500,000 (used to purchase equipment at year 0)
Coupon Interest Rate: 15% MARR = 18%
Tax Rate: 34%
MACRS Depreciation for 7-Year Property, with half-year convention at EOY 5
Accounting Book Value at end of year 5: 669,375
Estimated Market Value at end of year 5: 1,200,000
EOY 5* illustrates the Equipment Sale and Book Value
Taxable Income: $=(\text{Market Value} - \text{Book Value})$
 $=(1,200,000 - 669,375) = \$530,625$

DIRECT PURCHASE USING CASH FROM SALE OF STOCK

- ☑ Company implements project using cash from sale of new stock.
- ☑ This could be viable for very large projects.
- ☑ Balance sheet usually won't tolerate this option.
- ☑ Characteristics similar to other methods of in-house purchase plus.
- ☑ Dividends must be paid (similar to interest on borrowed money) but dividends are paid after company pays taxes thus, dividends are not deductible reducing attractiveness to company.
- ☑ Frankly, we have never seen this done for EMP.

Cash Flow Diagram For Purchase Using Money From Sale of Stock Stock are purchased end of project (5 years)

ECONOMICS OF A TRUE LEASE

EOY	Savings	Depr.	Principal	Interest	Payments Total	Principal Outstanding	Taxable Income	Tax	ATCF
0					400,000	400,000	-400,000		-400,000
1	1,000,000				400,000		600,000	204,000	396,000
2	1,000,000				400,000		600,000	204,000	396,000
3	1,000,000				400,000		600,000	204,000	396,000
4	1,000,000				400,000		600,000	204,000	396,000
5	1,000,000				400,000		1,000,000	340,000	660,000

Net Present Value at 18%: \$963,757

Notes: Annual Lease Payment:	400,000
MARR =	18%
Tax Rate	34%

LEASING OF EQUIPMENT USING A CAPITAL LEASE (EVENTUAL OWNERSHIP)

- ☑ In a capital lease, company leases equipment for a time after which it assumes ownership through some agreed upon option.
- ☑ Agreed upon option can be a bargain price at the end of the lease period.
- ☑ Characteristics
 1. Since company will own, only the interest portion of loan is deductible.
 2. Company can depreciate immediately so depreciation is deductible (note similarity to purchase by loan)
- ☑ Capital leases are very popular in performance contracts at least partially due to the flexibility.

Cash Flow Diagram For Capital Lease of Equipment

ECONOMICS OF A CAPITAL LEASE

EOY	Savings	Depr.	Principal	Interest	Payments in Advance Total	Principal Outstanding	Taxable Income	Tax	ATCF
0			619,218	0	619,218	1,880,782			-619,218
1	950,000	357,250	383,534	225,594	619,218	1,487,258	367,059	124,799	255,963
2	950,000	612,250	440,747	178,471	619,218	1,046,511	159,279	54,155	276,627
3	950,000	437,250	493,637	125,581	619,218	552,874	387,169	131,637	199,145
4	950,000	312,250	562,874	66,345	619,218	0	571,405	194,278	136,903
5	950,000	111,625					630,375	285,048	694,953
5*	1,200,000	669,375					530,625	180,413	1,019,588

Net Present Value at 18%: \$681,953

Notes: Total Lease Amount: 2,500,000
 However, Since the payments are in advance, the first payment is analogous to a Down-Payment
 Thus the actual amount borrowed is only = 2,500,000 - 619,218 = 1,880,782
 Lease Finance Rate: 12% MARR = 18%
 Tax Rate 34%
 MACRS Depreciation for 7-Year Property, with half-year convention at EOY 5
 Accounting Book Value at end of year 5: 669,375
 Estimated Market Value at end of year 5: 1,200,000
 EOY 5* illustrates the Equipment Sale and Book Value
 Taxable Income: = (Market Value - Book Value)
 = (1,200,000 - 669,375) = \$530,625

LEASING OF EQUIPMENT USING A "TRUE LEASE" (RENTING)

☑ In a true lease, lessor owns the equipment, the company only leases or rents that equipment.

☑ Characteristics

1. Lease period is significantly shorter than equipment life.

2. Company never owns the equipment or agrees to buy the equipment. Once the lease is over, ownership may be an option but the original agreement cannot specify that.

3. Equipment never appears on company balance sheet, lessor depreciates equipment

☑ Since a true lease is renting, total payment is deductible as an expense.

Cash Flow Diagram For True Lease Of Equipment Lease Payments: Start of each year

ECONOMICS OF SELLING STOCK

EOY	Savings	Depr.	Stock Transactions Sale of Stock Repurchase Dividend Payments	Taxable Income	Tax	ATCF
0			\$ 2,500,000 from Stock Sale is used to purchase equipment, thus		ATCF = 0	
1	950,000	357,250		400,000	592,750	201,535
2	950,000	612,250		400,000	337,750	114,835
3	950,000	437,250		400,000	512,750	174,335
4	950,000	312,250		400,000	637,750	216,835
5	950,000	111,625	2,500,000	400,000	836,375	285,048
5*	1,200,000	669,375			530,625	180,413
		2,500,000				1,019,598
						477,033

Notes: Value of Stock Sold (which is repurchased after year	2,500,000 (used to purchase equipment at year 0)
Cost of Capital = Annual Dividend Rate:	16% MARR = 16%
	Tax Rate 34%
MACRS Depreciation for 7-Year Property, with half-year convention at EOY 5	
Accounting Book Value at end of year 5	669,375
Estimated Market Value at end of year 5	1,200,000
EOY 5* illustrates the Equipment Sale and Book Value	
Taxable Income:	=(Market Value - Book Value)
	=(1,200,000 - 669,375) = \$530,625

PERFORMANCE CONTRACTING (PC)

☑ PC can and often does include several of the financing options above.

☑ PC can be just about anything the ESCO and company desire.

☑ Typical performance contracting options.

1. Outsourcing (agreement as to services provided and price, chauffage)

2. Shared savings

3. Guaranteed savings.

PERFORMANCE CONTRACTING (PC)

✓ Characteristics

1. Company gets use of new equipment without spending capital.
2. Company is using a share of future savings to pay for equipment today.
3. Company usually does not maintain equipment (ESCO does).
Company can concentrate on building widgets (its core objectives).
4. There can be a capital lease involved if company wants to "get back in"

Cash Flow Diagram For Performance Contracting (Shared Savings Shown)

ECONOMICS OF A PERFORMANCE CONTRACT

EOY	Savings	Dep.	ESCO Payments		Principal Outstanding	Taxable Income	Tax	ATCF
				Total				
0								
1	1,000,000			800,000		200,000	68,000	132,000
2	1,000,000			800,000		200,000	68,000	132,000
3	1,000,000			800,000		200,000	68,000	132,000
4	1,000,000			800,000		200,000	68,000	132,000
5	1,000,000			800,000		200,000	68,000	132,000

Net Present Value at 10% \$412,787

Notes: ESCO purchases/operates equipment. Host pays ESCO 80% of the savings = \$800,000.
The contract could also be designed so that PizzaCo can buy the equipment at the end of year 5.

CHARACTERISTICS AFFECTING WHICH OPTION IS BEST

✓ Company Characteristics

1. Availability of rebates to company
2. Tax status (tax free; low int. bonds)
3. Company strategy (support for maintenance, desire to concentrate on core object support of energy manager)
4. Cash flow status

✓ Project Characteristics

1. Project risk
2. Depth and breadth of skills required
3. Project need for management and maintenance
4. Equipment life and time horizon of need

CHARACTERISTICS AFFECTING WHICH OPTION IS BEST +

☒ Financial Characteristics

1. Present value or other criterion
2. Impact on corporate capital structure
3. Flexibility
4. Warranty





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