

EXAMPLE 1

ROI Financial Charter Type: Replacement Project with Incremental cost difference

Purpose: To analyze the impact of converting the existing HID units to LED units.

Notes:

1. Existing HID garage lighting is approx. 20 yrs old and in need of replacement due to aging condition and availability of repair parts.
2. Life expectancy of both HID and LED fixtures are roughly 15yrs however LED has a bulb life of 130,000 hrs vs HID bulb life of 12,000 hrs.
3. Operating Savings assumes cost savings due to less wattage usage.
4. Maintenance savings assumes a cost savings due to fewer replacements.
5. Estimated savings and cost were provided by consultant (Constellation Energy Projects Services Group) after conducting survey.
6. ROI and survey was conducted on the replacement of ~1009 fixtures.
7. ACT 129 estimate for rebate provided by Duquesne Light.
8. Survey cost of \$6,250, half of the PIRF No. 100507 \$12.5K, has been assigned to this ROI due to PIRF referencing two lighting projects.
9. Total capital outlay is \$1,105,025.

Project Costs	Option A- HID	Option B-LED	Delta
Construction Cost	\$412,560	\$1,105,025	\$692,464
ACT 129 rebate	\$0	(\$147,000)	(\$147,000)
Lighting survey costs	\$6,250	\$6,250	\$0
Grand Total Project Cost	\$418,810	\$964,275	\$545,464

Savings	LED
KW Savings	162
KWh Savings	1,419,120
KWh Rate	\$0.0816
Operating Savings	\$115,800
Maintenance	\$13,594
Total Savings	\$129,394

Key Financial Indicators	15	Net Present Value of 5 Year Cash Flow	\$625
Useful Life of Investment (Years)	15		
Cost difference of Investment	\$545,464	Profitability Index	1.00
5 Year Incremental Cash Flow Savings	\$686,971	Modified Internal Rate of Return at year 5	8.0%
Reinvestment Rate	8.0%	Payback Period (Years)	4.03

	Year	0	1	2	3	4	5
Operating Costs Savings (3% inflation)			\$115,800	\$119,274	\$122,852	\$126,538	\$130,334
Maintenance savings (3% inflation)			\$13,594	\$14,002	\$14,422	\$14,855	\$15,300
Construction Cost difference ACT 129 rebate		\$692,464 (\$147,000)					
Incremental Cash Flow Savings		\$129,394	\$133,276	\$137,274	\$141,393	\$145,634	
Depreciation Expense		\$545,464	\$36,364	\$36,364	\$36,364	\$36,364	\$36,364
Incremental Operating Margin Savings		\$93,030	\$96,912	\$100,910	\$105,028	\$109,270	
Cumulative Incremental Net Cash Flow		(\$545,464)	(\$416,070)	(\$282,794)	(\$145,520)	(\$4,127)	\$141,507
Present Value			\$119,809	\$114,263	\$108,973	\$103,928	\$99,116

EXAMPLE 2

ROI Financial Charter Type: Replacement Project with Incremental cost difference

Purpose: To analyze the impact of converting the existing HID units to LED units.

Notes:

1. Existing HID garage lighting is approx. 20 yrs old and in need of replacement due to aging condition and availability of repair parts.
2. Life expectancy of both HID and LED fixtures are roughly 15yrs however LED has a bulb life of 130,000 hrs vs HID bulb life of 12,000 hrs.
3. Operating Savings assumes cost savings due to less wattage usage.
4. Maintenance savings assumes a cost savings due to fewer replacements.
5. Estimated savings and cost were provided by consultant (Constellation Energy Projects Services Group) after conducting survey.
6. ACT 129 estimate for rebate provided by Duquesne Light.
7. Survey cost of \$5,560 PIRF No. 100505 has been assigned to this ROI.
8. Total capital outlay is \$484,424.

Project Costs	Option A- HID	Option B- LED	Delta
Construction Cost	\$189,190	\$484,424	\$295,234
ACT 129 rebate	\$0	(\$44,246)	(\$44,246)
Lighting survey costs	\$5,560	\$5,560	\$0
Grand Total Project Cost	\$194,750	\$445,738	\$250,988

Savings	LED
KW Savings	71
kWh Savings	621,899
kWh Rate	\$0.0869
Operating Savings	\$54,043
Maintenance	\$8,609
Total Savings	\$62,652

Key Financial Indicators	
Useful Life of Investment (Years)	15
Net Present Value of 5 Year Cash Flow	\$13,426
Cost difference of Investment	\$250,988
Profitability Index	1.05
5 Year Incremental Cash Flow Savings	\$332,628
Modified Internal Rate of Return at year 5	9.1%
Reinvestment Rate	8.0%
Payback Period (Years)	3.84

	Year	0	1	2	3	4	5
Operating Costs Savings (3% Inflation)			\$54,043	\$55,664	\$57,334	\$59,054	\$60,826
Maintenance savings (3% Inflation)			\$8,609	\$8,867	\$9,133	\$9,407	\$9,690
Construction Cost difference ACT 129 rebate		\$295,234 (\$44,246)					
Incremental Cash Flow Savings			\$62,652	\$64,532	\$66,468	\$68,462	\$70,515
Depreciation Expense		\$250,988	\$16,733	\$16,733	\$16,733	\$16,733	\$16,733
Incremental Operating Margin Savings			\$45,920	\$47,799	\$49,735	\$51,729	\$53,783
Cumulative Incremental Net Cash Flow		(\$250,988)	(\$188,335)	(\$123,804)	(\$57,336)	\$11,125	\$81,641
Present Value			\$58,011	\$55,325	\$52,764	\$50,321	\$47,992

EXAMPLE 3

ROI Financial Charter Type: Replacement Project with full cost of new project

Purpose: To analyze the cost impact of replacing inefficient lighting system with a highly efficient LED lighting system.

Notes:

1. Federally mandated T-12 bulb elimination in 2012.
2. Constellation Energy Projects Services Group summarized the audit report and provided estimated Construction cost and operating/maintenance savings.
3. Fixtures are at the end of life span and this analysis assumes a complete fixture replacement.
4. Construction Cost encompasses labor and material estimates provided by the Constellation Energy Projects Services Group.
5. KWH Rate is budgeted Electric rate for 2011.
6. ACT 129 estimate for rebate provided by Duquesne light.
7. Survey cost of \$4,125 (33% of PIRF value) is from PIRF 100507.
8. Operating Savings assumes cost savings due to less wattage usage.
9. Maintenance savings assumes a cost savings due to fewer replacements.
10. Total project outlay is \$319,888.

Project Costs	
Construction Cost	\$319,888
ACT 129 rebate	(\$35,825)
Lighting survey costs	\$4,125
Grand Total Project Cost	\$288,188

Savings	
KW Savings	44
KWh Savings	434,842
KWh Rate	\$0.0819
Operating Savings	\$35,614
Maintenance Savings	\$5,889
Total Savings	\$41,503

Key Financial Indicators	
Useful Life of Investment (Years)	15
Cost of Investment	\$288,188
5 Year Incremental Cash Flow Savings	\$220,342
Reinvestment Rate	8.0%
	Net Present Value of 5 Year Cash Flow
	Profitability Index
	Modified Internal Rate of Return at year 5
	Payback Period (Years)
	0.61
	-2.2%
	6.48
	-\$113,033

	Year	0	1	2	3	4	5	6	7	8
Operating Costs savings (3% inflation)			\$35,614	\$36,682	\$37,782	\$38,916	\$40,083	\$41,286	\$42,524	\$43,800
Maintenance savings (3% inflation)			\$5,889	\$6,066	\$6,248	\$6,435	\$6,628	\$6,827	\$7,032	\$7,243
Construction Cost		\$319,888								
ACT 129 rebate		(\$35,825)								
Lighting survey cost		\$4,125								
Incremental Cash Flow Savings		\$41,503	\$42,748	\$44,030	\$45,351	\$46,711	\$48,113	\$49,556	\$51,043	
Depreciation Expense		\$288,188	\$19,213	\$19,213	\$19,213	\$19,213	\$19,213	\$19,213	\$19,213	\$19,213
Incremental Operating Margin Savings		\$22,290	\$23,535	\$24,817	\$26,138	\$27,499	\$28,900	\$30,344	\$31,830	
Cumulative Incremental Net Cash Flow		(\$288,188)	(\$246,685)	(\$203,938)	(\$159,908)	(\$114,557)	(\$67,846)	(\$19,733)	\$29,823	\$60,866
Present Value		\$38,428	\$36,649	\$34,952	\$33,334	\$31,791	\$30,319	\$28,916	\$27,577	

EXAMPLE 4

Interior Lighting Retrofit/Conversion

ROI Financial Charter Type: Replacement Project with full cost of new project

Purpose: To analyze the cost effectiveness of replacing current incandescent with fluorescent and LED lighting while retrofitting existing inefficient T-12 fixtures with more energy efficient T-8 and T-5 fixtures

Notes:

1. Federally mandated T-12 bulb elimination in June 2012.
2. Constellation Energy Projects Services Group summarized the audit report and provided estimated Construction cost and operating/maintenance savings.
3. Construction Cost encompasses labor and material estimates provided by the Constellation Energy Projects Services Group.
4. kWh Rate is UPMC budgeted Electric rate for 2011.
5. ACT 129 estimate for rebate provided by Duquesne Light.
6. Survey cost represents 33% of early study PI RF amount.
7. Operating Savings assumes cost savings due to less wattage usage.
8. Maintenance savings assumes a cost savings due to fewer replacements.
9. Total project outlay is \$220,209.

Project Costs	
Construction Cost	\$220,209
ACT 129 rebate	(\$63,375)
Lighting survey costs	\$6,765
Grand Total Project Cost	\$163,599

Savings	
kW Savings	93
kWh Savings	636,337
kWh Rate	\$0.0667
Operating Savings	\$42,444
Maintenance savings	\$4,697
Total Savings	\$47,141

Key Financial Indicators	
Useful Life of Investment (Years)	15
Cost of Investment	\$163,599
5 Year Incremental Cash Flow Savings	\$250,276
Reinvestment Rate	8.0%
Net Present Value of 5 Year Cash Flow	\$35,351
Profitability Index	1.22
Modified Internal Rate of Return at year 5	12.3%
Payback Period (Years)	3.42

	Year					
	0	1	2	3	4	5
Operating Costs savings (3% inflation)		\$42,444	\$43,717	\$45,028	\$46,379	\$47,771
Maintenance savings (3% inflation)		\$4,697	\$4,838	\$4,983	\$5,133	\$5,287
Construction Cost	\$220,209					
ACT 129 rebate	(\$63,375)					
Lighting survey cost	\$6,765					
Incremental Cash Flow Savings	\$47,141	\$48,555	\$50,012	\$51,512	\$53,057	
Depreciation Expense	\$163,599	\$10,907	\$10,907	\$10,907	\$10,907	\$10,907
Incremental Operating Margin Savings	\$36,234	\$37,648	\$39,105	\$40,605	\$42,151	
Cumulative Incremental Net Cash Flow	(\$163,599)	(\$116,458)	(\$67,903)	(\$17,892)	\$33,620	\$86,677
Present Value	\$43,649	\$41,628	\$39,701	\$37,863	\$36,110	

EXAMPLE 5

Interior Lighting Retrofit / Conversion

ROI Financial Charter Type: Replacement Project with full cost of new project

Purpose: To analyze the cost effectiveness of replacing current Incandescent with fluorescent and LED lighting while retrofitting existing inefficient T-12 fixtures with more energy efficient T-8 and T-5 fixtures

Notes:

1. Federally mandated T-12 bulb elimination in 2012.
2. Eaton Electrical Services and Systems summarized the audit report and provided estimated Construction cost and Energy savings.
3. Construction Cost encompasses labor and material estimates provided by Eaton Electrical Services and Systems.
4. KWH Rate is budgeted Electric rate for 2011.
5. ACT 129 rebate was estimated by Eaton. Awaiting response from DQL.
6. Survey cost represents 33% of early study PIRF 100433. Total PIRF is for \$21K.
7. Operating Savings assumes cost savings due to less wattage usage.
8. Maintenance savings assumes a cost savings due to fewer replacements.
9. Total project outlay is \$81,000.

Project Costs	
Construction Cost	\$81,000
ACT 129 rebate	(\$39,000)
Lighting survey costs	\$6,930
Grand Total Project Cost	\$48,930

Savings	
KW Savings	37
kWh Savings	157,418
kWh Rate	\$0.0727
Operating Savings	\$11,444
Maintenance	\$500
Total Savings	\$11,944

Key Financial Indicators			
Useful Life of Investment (Years)	15	Net Present Value of 5 Year Cash Flow	\$1,479
Cost of Investment	\$48,930	Profitability Index	1.03
5 Year Incremental Cash Flow Savings	\$63,414	Modified Internal Rate of Return at year 5	8.6%
Reinvestment Rate	8.0%	Payback Period (Years)	3.92

	Year	0	1	2	3	4	5
Operating Costs savings (3% inflation)			\$11,444	\$11,788	\$12,141	\$12,505	\$12,881
Maintenance savings (3% inflation)			\$500	\$515	\$530	\$546	\$563
Construction Cost		\$81,000					
ACT 129 rebate		(\$39,000)					
Lighting survey cost		\$6,930					
Incremental Cash Flow Savings			\$11,944	\$12,303	\$12,672	\$13,052	\$13,443
Depreciation Expense		\$48,930	\$3,262	\$3,262	\$3,262	\$3,262	\$3,262
Incremental Operating Margin Savings			\$8,682	\$9,041	\$9,410	\$9,790	\$10,181
Cumulative Incremental Net Cash Flow		(\$48,930)	(\$36,986)	(\$24,683)	(\$12,011)	\$1,040	\$14,484
Present Value			\$11,060	\$10,548	\$10,059	\$9,593	\$9,149

EXAMPLE 6

Interior Lighting Retrofit / Conversion

ROI Financial Charter Type: Replacement Project with full cost of new project

Purpose: To analyze the cost effectiveness of replacing current incandescent with fluorescent and LED lighting while retrofitting existing inefficient T-12 fixtures with more energy efficient T-8 and T-5 fixtures

Notes:

1. Federally mandated T-12 bulb elimination in 2012.
2. Eaton Electrical Services and Systems summarized the audit report and provided estimated Construction cost and Energy savings.
3. Construction Cost encompasses labor and material estimates provided by Eaton Electrical Services and Systems.
4. kWh Rate is budgeted Electric rate for 2011.
5. ACT 129 rebate was estimated by Eaton. Awaiting response from DQL.
6. Survey cost represents 33% of early study PIRF 100433. Total PIRF is for \$21K.
7. Operating Savings assumes cost savings due to less wattage usage.
8. Maintenance savings assumes a cost savings due to fewer replacements.
9. Total project outlay is \$46,000.

Project Costs	
Construction Cost	\$46,000
ACT 129 rebate	(\$20,000)
Lighting survey costs	\$6,930
Grand Total Project Cost	\$32,930

Savings	
kW Savings	24
kWh Savings	140,935
kWh Rate	\$0.0691
Operating Savings	\$9,738
Maintenance	\$250
Total Savings	\$9,988

Key Financial Indicators	
Useful Life of Investment (Years)	15
Net Present Value of 5 Year Cash Flow	\$9,223
Cost of Investment	\$32,930
Profitability Index	1.28
5 Year Incremental Cash Flow Savings	\$53,028
Modified Internal Rate of Return at year 5	13.5%
Reinvestment Rate	8.0%
Payback Period (Years)	3.23

	Year	0	1	2	3	4	5
Operating Costs savings (3% inflation)			\$9,738	\$10,030	\$10,331	\$10,641	\$10,960
Maintenance savings (3% inflation)			\$250	\$258	\$265	\$273	\$281
Construction Cost		\$46,000					
ACT 129 rebate		(\$20,000)					
Lighting survey cost		\$6,930					
Incremental Cash Flow Savings		\$9,988	\$10,288	\$10,596	\$10,914	\$11,242	
Depreciation Expense		\$32,930	\$2,195	\$2,195	\$2,195	\$2,195	\$2,195
Incremental Operating Margin Savings		\$7,793	\$8,092	\$8,401	\$8,719	\$9,046	
Cumulative Incremental Net Cash Flow		(\$32,930)	(\$22,942)	(\$12,654)	(\$2,058)	\$8,856	\$20,098
Present Value		\$9,248	\$8,820	\$8,412	\$8,022	\$7,651	

EXAMPLE 7

ISO Covers ROI

Purpose: To analyze the impact from installing removable insulated valve covers.

Notes:

1. Uninsulated and Insulated BTU/HR/SqFT based on DOE standards.
2. Annual Hours of Operation assumes 24hrs/day for 365 days/yr.
3. Total Sqft is the total exposed surface on the pipe valves that are covered by the ISO cover (Insulating blanket).
4. Fuel cost are based on budgeted gas costs for FY 2011. Fuel cost were converted from MCFs to BTU. Natural gas will cost \$9.53 for every million BTU consumed.
5. Investment Cost was provided by vendor (Fort Pitt Group). Assumes vendor will do installation.

Key Metrics

	Uninsulated	Insulated
BTU/HR/SqFT	918	96
Annual Hours of Operation	8,760	8,760
Total Sqft	200.63	200.63
Total BTU/Year Loss	1,613,402,258	168,721,805
Total mmbTU Loss	1,613.40	168.72

	Total annual mmbTU Loss	Fuel Cost per mmbTU	Annual Natural Gas Loss
Uninsulated	1,613	\$9.53	15,376

	Total annual mmbTU Loss	Fuel Cost per mmbTU	Annual Natural Gas Loss
Insulated	169	\$9.53	\$1,608
Total Annual Savings	1,445		\$13,768

Key Financial Indicators

Useful Life of Investment	10	Net Present Value of 5 Year Cash	\$47,672
Cost of Investment	\$10,433	Profitability Index	5.57
5 Year Incremental Cash Flow	\$73,095	Modified Internal Rate of Return	36%
Reinvestment Rate	8.0%	Payback Period (Years)	0.8

	Year	0	1	2	3	4	5	6	7	8	9	10
Investment Cost (2.5% Inflation)		\$10,433	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
Operations Savings (3% Inflation)		\$13,768	\$14,181	\$14,606	\$15,044	\$15,496	\$15,961	\$16,439	\$16,933	\$17,441	\$17,964	\$17,964
Incremental Cash Flow Savings		\$13,768	\$14,181	\$14,606	\$15,044	\$15,496	\$15,961	\$16,439	\$16,933	\$17,441	\$17,964	\$17,964
Depreciation		\$1,043	\$1,043	\$1,043	\$1,043	\$1,043	\$1,043	\$1,043	\$1,043	\$1,043	\$1,043	\$1,043
Incremental Operating Margin		\$12,725	\$13,138	\$13,563	\$14,001	\$14,452	\$14,917	\$15,396	\$15,889	\$16,397	\$16,921	\$16,921
Cumulative Cash Flow		(\$10,433)	\$3,335	\$17,516	\$32,122	\$47,166	\$62,662	\$78,623	\$95,062	\$111,995	\$129,436	\$147,399
Present Value		\$12,748	\$12,158	\$11,595	\$11,058	\$10,546	\$10,058	\$9,592	\$9,148	\$8,725	\$8,321	\$8,321

EXAMPLE 8

ROI Financial Charter Type: Replacement Project with full cost of new project

Purpose: To analyze the cost effectiveness of making more efficient use of the new boilers installed during recent campus expansion by running only one boiler instead of two.

Notes:

1. New boiler big enough to support both old and new facility vs running two separate boilers.
2. Fitching Marstiller, Rusbarsky and Wolf Engineering, Inc. supplied estimated construction cost and gas savings evaluating actual data from Apr thru July 2010 and estimates for Aug thru Oct 2010 compared to same timeframe 2009. Utilized one boiler in 2009 vs two in 2010.
3. Construction Cost includes both labor and material as well as a one time \$6K charge for drying out old boiler.
4. Water Gallons savings is a conservative estimate provided by engineering. Vendor provided an estimate twice as high.
5. Maintenance savings is not factored in ROI.
6. Total project outlay is \$225,994.

Project Costs	
Construction Cost	\$225,994

	Gas Total	% Savings	Gas Savings	Water Gallons Savings
Apr-10	\$60,240	25%	\$15,060	\$1,500
May-10	\$26,306	35%	\$9,207	\$1,500
Jun-10	\$51,454	35%	\$18,009	\$1,500
Jul-10	\$21,147	40%	\$8,459	\$1,500
Aug-10	\$21,147	40%	\$8,459	\$1,500
Sep-10	\$26,476	35%	\$9,267	\$1,500
Oct-10	\$26,951	25%	\$6,738	\$1,500
			\$75,198	\$10,500

Key Financial Indicators	
Useful Life of Investment (Years)	30
Net Present Value of 5 Year Cash Flow	\$135,681
Cost of Investment	\$225,994
Profitability Index	1.60
5 Year Incremental Cash Flow Savings	\$454,982
Modified Internal Rate of Return at Year 5	18.7%
Reinvestment Rate	8.0%
Payback Period (Years)	2.69

	Year	0	1	2	3	4	5
Gas savings (3% inflation)			\$75,198	\$77,454	\$79,778	\$82,171	\$84,636
Water Gallon savings (3% inflation)			\$10,500	\$10,815	\$11,139	\$11,474	\$11,818
Construction Cost		\$225,994					
Incremental Cash Flow Savings			\$85,698	\$88,269	\$90,917	\$93,644	\$96,454
Depreciation Expense		\$225,994	\$15,066	\$15,066	\$15,066	\$15,066	\$15,066
Incremental Operating Margin Savings			\$70,632	\$73,203	\$75,851	\$78,578	\$81,388
Cumulative Incremental Net Cash Flow		(\$225,994)	(\$140,296)	(\$52,027)	\$38,890	\$132,534	\$228,988
Present Value			\$79,350	\$75,676	\$72,173	\$68,831	\$65,645