ENGINEERING PHARMACEUTICAL INNOVATION

Energy Management &Life Cycle Cost Analysis for Pharmaceutical Facilities

ISA Tarheel Capital Area Section

Setting the Standard for Automation™

North Carolina Biotechnology Center

ISPE ENGINEERING PHARMACEUTICAL INNOVATION

Carolina-South Atlantic Chapter

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PURPOSE OF THIS CASE:

1. Discuss iterative process for developing a viable energy efficiency project

2. Explore the financial case in depth

SUMMARY

1. Early identification of financial metrics
2. Buy in from finance team critical
3. Continuous collaboration with ops team
4. Detailed financial analysis that demonstrates cash flow effect on business, not simple payback
5. Iterative approach to modify project as business priorities dictate

PROJECT GOALS:

1. To identify measures to reduce energy and operating cost

2. To develop an implementation plan that was both operationally viable and economically viable

A Simple Model for Superior Energy Management

Where are you?	Where do you want to go?	How do you get there?	How do you stay there?
Preliminary Audit	**Investment Grade Audit**	**Implementation**	**Maintain for Efficiency®**
Nominal fee to produce estimate of Energy Savings & Installation costs	Identify installation costs, energy savings and present proposal to implement	Contract for and install work proposed in Investment Grade Audit (IGA) phase	Keep systems performing at peak efficiency

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STEPS IN THE PROCESS

1. Identification of financial requirements
   - Meet profitability index of > 1
   - PI = Cash In/Cash Out
   - ROI of 100% or greater

2. Investment Grade Energy Audit

3. Identify initial measures that may meet requirement

4. Discuss measures with Ops team to determine operational viability

STEPS IN THE PROCESS

5. Agree on list of measures for detail evaluation
6. Model impact of measures. Develop install cost estimates
7. Run first pass financial model
8. Optimize project for best return
9. Present recommended measures to client team
10. Negotiate with client team for project implementation

MEASURES SELECTED FROM PROCESS

1. Upgrade Lighting to T8, Electronic Ballasts, & Occupancy Sensors
2. Install Occupancy Sensors in Distribution Center
3. Retrofit Steam Traps with Tunstall Retrofit Kits
4. Upgrade Chiller Controls
5. Install DDC and Demand Control Ventilation Controls in Administrative Buildings
6. Reduce Air Change Rate in Inactive Production Areas
7. Install Non-Chemical Water Treatment System
8. Retro-Commission All HVAC Controls

FINANCIAL ANALYSIS

Assumptions	
Program Cost	$2,451,561
Estimated Current Energy Cost	$2,124,323
Estimated Annual Energy Savings	$572,782
Estimated Program Annual Maintenance Savings	$44,651
Annual Benefit of Depreciation	$20,785
Estimated EPACT Tax Credit	$135,524
Estimated Utility Incentive	TBD
Maintenance Escalation Rate	3%
Energy Escalation Rate	3%
Discount Rate	15%

Base Case (Current Conditions)					
Year	1	2	3	4	5
Annual Energy Costs	($2,124,323)	($2,188,053)	($2,253,694)	($2,321,305)	($2,390,944)
Total Annual Cash Flow	**($2,124,323)**	**($2,188,053)**	**($2,253,694)**	**($2,321,305)**	**($2,390,944)**

Recommended Program Capitalization					
Year	1	2	3	4	5
Program Cost	($2,451,561)				
Annual Energy Cost	($1,551,541)	($1,598,087)	($1,646,030)	($1,695,410)	($1,746,273)
Annual Maintenance Costs Improvement	$44,651	$45,991	$47,370	$48,791	$50,255
Benefit of Depreciation Expense	$20,785	$20,785	$20,785	$20,785	$20,785
EPACT Tax Credit	$135,524				
Estimated Utility Incentive					
Total Annual Cash Flow	**($3,802,142)**	**($1,531,312)**	**($1,577,874)**	**($1,625,834)**	**($1,675,233)**
Cash Flow Relative to Base Case	($1,677,819)	$656,741	$675,820	$695,471	$715,711
NPV of 10 Yr Cash Flow	$1,526,408				

PROGRAM OUTCOMES

Economic Summary	Capital Project	PI with Year 2 Free Cash	5 yr. Lease
Project Cost (year 1 outflows)	($2,451,561)	($2,451,561)	($2,401,025)
NPV of Positive 5 Yr Cash Flow (inflow)	$2,314,790	$571,079	$3,027,995
Profitability Index (Inflows/Outflows)	0.94	0.23	1.26
NPV of 10 year cash flow	$1,526,408		$3,209,112
NPV of 7 year Cash Flow	$838,861		$1,695,761
NPV of 5 Year Cash Flow	$235,453		$626,970
Simple Payback on year 2 Savings	2.55		
Discounted Simple Payback	3.14		
10 year cashflow difference	$4,969,993		$4,636,261

ENVIRONMENTAL IMPACT

Source Greenhouse Emission Factors from Electricity Generation

Compound	lbs/MWh	MWh Saved	Annual Reduction, Tons
CO2	1,296	6,789	4,399
N2O	0.0212	6,789	0.072
CH4 (Methane)	0.0105	6,789	0.036

Source: "Updated State-Level Greenhouse Emission Factors for Electricity Generation", March 2001. Energy Information Administration, U.S. Dept. of Energy

Source Greenhouse Emission Factors from Natural Gas Combustion

Compound	lbs/MMBTU	MMBTU Saved	Annual Reduction, Tons
CO2	117	16,848	986
CO	0.040	16,848	0.33696
NO2	0.092	16,848	0.775008
SO2	0.001	16,848	0.008424
Particulates	0.007	16,848	0.058968
Hg	0.000	16,848	0

Source: "Natural Gas Issues and Trends" 1998 Energy Information Administration, U.S. Dept. of Energy from NaturalGas.org website

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