

Introduction to RELCOST



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Overview of RELCOST Presentation Outline

- Program use
- Results
- A review of input screens
 - A quick look at each input screen to give you a sense of its look and feel and comprehensiveness
 - We will not go through all the details

RELCOST Financial Analysis of Energy Projects

• Developed by

Washington State University Energy Extension Program www.energy.wsu.edu USDOE Northwest CHP Technical Assistance Partnership http://www.northwestchptap.org

Free download

 <u>http://www.northwestchptap.org/</u> Click on "Software, Resources and Links"

WASHINGTON STATE UNIVERSITY EXTENSION ENERGY PROGRAM



Program Overview

Developed for a variety of energy projects

- Power generation
- District energy
- Combined heat and power
- Alternative energy
 - Wind, Solar, Biomass, Geothermal, etc.
 - Anaerobic digestion with multiple revenue streams

But, is a general purpose financial analysis tool

- Can be used for any project with income streams and expenses
- Interpret some terminology differently depending on the application

Program Use

Evaluate financial viability of energy projects

- Rank and prioritize alternatives
- Evaluate bids
- Use in contract negotiation
- Determine funding needs
- Determine sales price and valuation

Create statements needed for support

Pro formas and reports for applications

Evaluate effectiveness of incentives

- Grants and low interest loans
- Tax credits and deductions
- Production incentives
- Bonus depreciation

An Excel Spreadsheet Template

- Template facilitates input
 - Create templates of common project types
- Unprotected spreadsheet
 - Any user familiar with Excel can customize
 - All calculations visible
- Easy integration with other tools
 - Excel used as output and input for many programs
 - Extends reporting, analysis, & integration with the tools you use

• Should be familiar with Excel to take full advantage

What It Does Not Do

Must be used with other resources for analyses of:

- Energy use
- System design and sizing
- Cost estimation
- Emissions calculations
- Plant simulation
- Power generation
- Renewable energy
- Tax law and incentives
- → Requires input, such as system sizing, from other tools

Does not include a database of incentives available

Refer to DSIRE database <u>www.dsireusa.org</u>

Four Types of Results

More Than Life Cycle Cost Analysis

Pro-Forma Statements

- Income Statement
- Cash Flow Statement
- Balance Sheet
- Use of Funds

Life Cycle Cost Analysis

- Net Present Value
- Internal Rate of Return
- Benefit-Cost Ratio
- Discounted Payback

Financial Indicators

- Margins (e.g. Gross Margin)
- Ratios (e.g. Debt-Equity ratio)

Levelized Costs

Project Description	Hea	t Pump Del Ø	burr	hidification (Deyle	ng of Apple											PIEL	COST Financ	lel.	#2009 Washing	#on1	State Universit	ŋ Ex	ension I
Project Year		1		2		3		4		5		6	_	7	_	8		3		10		11		12
Income Statement [Tax Calculation]																			_					_
(+) Sales, income	1	704,515	5	721,950	\$	741,701	\$	761,197	\$	781,993	8	801,147	\$	822,456	\$	845,472	5	865,463	\$	883,941	8	518,993	8	94
(-)Cost of Sales	1	(168,280)	\$	(163,635)	\$	(171,065)	\$	[176,561]	\$	[191,383]	\$	(183,767)	\$	[187,480]	\$	[191,269]	\$	(287,902)	\$	[199,078]		[203,102]		207
Gross Income (Profit)	1	533,639	\$	552,011	\$	501.636	\$	594.837	\$	515,010	\$	617,300	\$	634,976	\$	654,204	\$	661,667	\$	694,003	\$	715.090		737
(-)OperatingExpense	1.				8		8				8		8		8						8		8	
EBITDA	11	538,639		552,311		568,636	\$	594,637	*	509,610	8	617,200	8	634,976	8	654,204	8	661,667	8	694,063	8	715,090	8	737
(-) Detreciation (Tas)	1	(60.000)		(102.000)		171.4000	1	(95.540)		(04.540)		(22,229)	*		÷		*		*		*		*	
Operating Income (EDIT)	1	479,629		450.211		497,226		517,997		522.970		534.060		634.976		654,204		661.667		694,062		715.090	1	727
(-)Interest Expense	11	(14.067)		(20.430)		(15.567)		(10.506)	8	(5,239)	8	(578)	8	(0)	8	(0)	8	(0)	8	193	8	101	8	
(-) Finance Charges	1 5	(8.325)	\$		\$		\$		\$		8		8		8				8		8		8	
Net Profit Before Taxes	1	453.227	\$	423,842	\$	411.669	\$	507,490	\$	\$17,731	\$	593,482	\$	634,976	\$	654,204	\$	661,667		694,003	0	715,090		737
(-)Income Tages	1.4	(107.468)		(103.860)		(190,259)		(200.459)		(204,504)		(233.475)		(250.075)		(258.430)		(261,250)		1274.471		(202.777)		(29
Net Profit Alter Tages	11	320,755	1	293.070	1	251.410	\$	307.832	\$	313,227	\$	252.006	\$	284.160	2	295,793	\$	400,000	\$	420.292	*	433.04	*	446
(-)Dividende	11								*		*		8		2		*		*		*		8	
Retained Earnings	Ti-	329,759	1	263.070	1	291,410	1	307,802	1	313,227	1	353.006	ĩ	384,160	ĩ	395,793	1	400,000	î.	420,292	1	433,894	1	440
Sales, Income (Detail)	-		-		-		-		-		_		-		-		_		-		-			
Nutural Ray Stations		704 5/5		218.007		711 198	٤	748.066	¢	781.027		778.298		293,653		819,730		825.925		842.441	•	359,292	•	176
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Local Production Incentives	12												2		2		*		2		*		1	
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Sub-total	1 é i	794.919		721.950		741.701		761.997		780.993		801.147	÷	822.456		\$45.472		\$69.469		892.941		919.992		344
Cost of Sales (Detail)	t i i		ń		-		-		-		-		ŕ		1		-		-		-		-	
and an annual second	-																							

	5	RESULTS
20 Years	20	Project Life
¥alue		Life Cycle Cost Analysis
G 18.	G	Equity IRR
G 18.	G	Project IRR
G \$ 13,789,04	G	Net Present Value
Y 1	Y	Benefit Cost Ratio (After Tax)
Y 1	Y	After-Tax Discounted Payback
¥alue		Simple Payback
G	G	Simple Payback (Calc Method 1)

FINANCIAL SCORECARD		
Scorecard Year	5	
Profitability Ratios (Margins)		¥alue
Gross Margin	G	37.2%
Operating Margin	G	33.2%
Pre - Tax Margin	G	33.1%
After - Tax Margin	G	23.8%
Liquidity Measures		
Current Batio	G	33.0

Levelised Cost (Pre-Taz)				
Electricity Sales	G	\$97.11	\$/MWhr	
Steam Production Savings	Y	\$14.94	\$ per 1000 lb	_
				- C

Pro Formas

Proforma financial statements can be printed out for records, funding applications, tax purposes, etc.

- Income Statement
- Balance Sheet
- Use of Funds
- Cash Flow

Stakeholders want to know your cash flow, earnings, expenses, etc. in every year of the project

O_IncomeStatement (Tax)

- Lenders
- Equity investors
- Policy analysts

O Operating Costs

O_Operating_Income

Project developers

Res	sults	tabs
are	gree	en.

O_Purchased_Fuels

	2017	2010	2019	
Project Year	1	2	3	
Income Statement (Tax Calculation)				
(+) Taxable Income & Savings	\$ 1,633,270	\$ 1,690,221	\$ 1,749,214	\$ 1
(+) Non-Tiaxable Income & Savings	\$ 157,000	\$ 161,710	\$ 266,498	\$
(-) Cost of Sales	\$ (1,114,369)	\$ (1,148,243)	\$ (1,183,154)	\$ (1
Gross Income (Profit)	\$ 675,901	\$ 703,689	\$ 832,557	\$
(-) Operating Expense	\$ -	\$ -	\$ -	\$
EBITDA	\$ 675,901	\$ 703,689	\$ 832,557	\$
(-) Depreciation (Tax)	\$ -	\$ -	\$ -	\$
Operating Income (EBIT)	\$ 675,901	\$ 703,689	\$ 832,557	\$
(-) Interest Expense	\$ -	\$ -	\$ -	\$
(+) Interest Income		\$ -	\$ -	\$
(-) Finance Charges	\$ -	\$ -	\$ -	\$
Net Profit Before Taxes	\$ 675,901	\$ 703,689	\$ 832,557	\$
(-) Income Taxes	\$ -	\$ -	\$ -	\$
Net Profit After Taxes	\$ 675,901	\$ 703,689	\$ 832,557	\$
(-) Dividends	\$ -	\$ -	\$ -	\$
Retained Earnings	\$ 675,901	\$ 703,689	\$ 832,557	\$

O BalanceSheet (Tax)

O UseOfFunds

G

O CashFlow

30 Year Analysis Period

• Results Example: Proformas have a column for each year

INCOME CTATEMENT (TAX)												
INCOME STATEMENT (TAX)												
Plant Name	Southern	Dregor	University (CHF	ensitivity	An	alysis					
Project Description	New CHP :	ew CHP system Analysis										
Scenario Description	Biomass ste	iomass steam generation with extraction/condensing turbine										
	2017	2017 2018 2019 2020						2021		2022		
Project Year	1		2		3		4		5		6	
Income Statement (Tax Calculation)												
(+) Taxable Income & Savings	\$ 1,790,	270 \$	1,848,835	\$	2,009,396	\$	2,075,778	\$	2,175,238	\$	2,279,609	S
(+) Non-Tiaxable Income & Savings	S	- \$	-	\$	-	\$	-	\$	-	\$	-	S
(-) Cost of Sales	\$ (1,114,	369) \$	(1,148,243)	\$	(1,183,154)	\$	(1,219,136)	\$	(1,256,222)	\$	(1,294,447)	\$
Gross Income (Profit)	\$ 675,	901 \$	700,593	\$	826,242	\$	856,642	\$	919,015	\$	985,163	\$
(-) Operating Expense	S	- \$	-	\$	-	\$	-	\$	-	\$	-	S
EBITDA	\$ 675,	901 \$	700,593	\$	826,242	\$	856,642	\$	919,015	\$	985,163	\$
(-) Depreciation (Tax)	\$	- \$	-	\$	-	\$	-	\$	-	\$	-	S
Operating Income (EBIT)	\$ 675,	901 \$	700,593	\$	826,242	\$	856,642	\$	919,015	\$	985,163	S
(-) Interest Expense	S	- \$	-	\$	-	\$	-	\$	-	\$	-	S
(+) Interest Income		S	-	\$	-	\$	-	\$	-	\$	-	S
(-) Finance Charges	S	- \$	-	\$	-	\$	-	\$	-	\$	-	S
Net Profit Before Taxes	\$ 675,	901 \$	700,593	\$	826,242	\$	856,642	\$	919,015	\$	985,163	\$
(-) Income Taxes	\$	- S	(66,556)	\$	(78,493)	\$	(81,381)	\$	(87,306)	\$	(93,590)	\$
Net Profit After Taxes	\$ 675,	901 \$	634,037	\$	747,749	\$	775,261	\$	831,709	\$	891,572	\$
(-) Dividends	\$	- \$	-	\$	-	\$	-	\$	-	\$	-	\$
Retained Earnings	\$ 675,	901 \$	634,037	\$	747,749	\$	775,261	\$	831,709	\$	891,572	\$

30 columns, one for each year -

• Input Example: Capital expenditures occurring in multiple years

	2017	2018	2019
Project Year	1	2	3
1. Installed costs			
Total Installed Costs, Phase 1	\$ 12,185,000		
Avoided Capital Costs (Boiler)	\$ (700,000))	
Total Installed Costs, Phase 2		\$ 5,000,000	
Total Installed Costs, Phase 3			\$ 5,000,000
Sub-Total	\$ 11,485,000	\$ 5,000,000	\$ 5,000,000

30 columns for input in any project year



Visuals of Pro Forma Statements

Example: Net profit after taxes over the project life



Example: Income statement in a particular year



New graphs and charts can be added by user because its an unlocked Excel template



"Whatlf" Summary Results

Summary of

- Life cycle cost analysis results
- Financial ratios
- Levelized costs

Visual indicators of viability

- Red, yellow and green indicators
- Decision values defined by user

RESULTS	3		
Project Life	20	Years	
Life Cycle Cost Analysis		¥alue	
Equity IRR	G	18.9%	
Project IRR	G	18.0%	
Net Present Value	G	\$ 13,789,042	
Benefit Cost Ratio (After Tax)	Y	1.36	
After-Tax Discounted Payback	Y	11.0	years
Simple Payback		¥alue	
Simple Payback (Calc Method 1)	G	3.7	years
Simple Payback (Calc Method 2)	R	6.9	years
FINANCIAL SCORECARD			
Scorecard Year	5		
Profitability Ratios (Margins)		¥alue	
Gross Margin	G	37.2%	
Operating Margin	G	33.2%	
Pre - Tax Margin	G	33.1%	
After - Tax Margin	G	23.8%	
Liquidity Measures			
Current Ratio	G	33.0	
Acid Test Ratio	G	33.0	
Cash Flow Ratios			
Debt Service Coverage Ratio	G	22.4	
Leverage Ratios			
Debt to Equity	B	0.03	
Debt Ratio	R	2.7%	
Equity Ratio	G	97.3%	
Debt-Asset Ratio	G	0.01	
Interest Coverage Ratio	G	711.19	
Levelised Cost (Pre-Taz)			
Electricity Sales	G	\$97.11	\$/MWhr
Steam Production Savings	Y	\$14.94	\$ per 1000



Sensitivity Analysis

Sensitivity or "What If" Analysis

- What if I have a cost overrun?
- What if I don't get the sales price I expect?
- What if I don't get the grant I'm expecting?
- → How does that impact my internal rate of return?

Sensitivity Factors and Results Side-by-Side

 Multiply inputs across many sheets all in one place for easy exploration of scenarios

S	ENSITIVITY F	ACTORS				
Escalation Forecast Type	Likely					
Environmental Credits		1st Yr Unit Costs				
Renewable Energy Credits	100%	\$0.010	\$/kWh			
Carbon Offsets	100%	\$0.000	\$/tons CO2e			
Production Tax Credits 1st Yr Unit Costs						
Federal PTC	100%	\$0.0000	\$/MWh/yr			
State PTC Electricity	100%	\$0.0000	\$/kWh/yr			
State PTC Thermal	100%	\$0.0000	MMBtu/yr			
Investment Tax Credits		Total				
Federal ITC	100%	\$-				
State ITC	100%	\$-				
Local ITC	100%	\$-				
Income		1st Yr Unit Costs				
Electricity Sales	90%	\$ 0.05499	\$/kWh			
Avoided Costs, Existing HTG SY	100%	\$ 1.00000	\$/total			

LIFE CYCLE COST RESULTS										
Project Life	Project Life 20									
Life Cycle Cost Analysis		Value								
Equity IRR	G	14.6%								
Project IRR	G	14.6%								
Net Present Value	G	\$ 8,377,754								
Benefit Cost Ratio (After Tax)	G	2.47								
After-Tax Discounted Payback	Y	9.3	years							
Simple Payback		Value								
Non-Discounted Payback	Y	7.4	years							
Simple Payback, First Year	Y	17.1	years							

 In this example, electricity sales price is 90% of what is expected. Sales throughout analysis are multiplied by 90%

Sensitivity Analysis

Spider Diagrams

- Used to visually identify parameters that most affect viability
- **Runs 30 scenarios automatically**
- Created using sensitivity factors to obtain several scenarios
 - Horizontal: Variation of a parameter from its expected value Vertical: Indicator of project viability (e.g. NPV or IRR)
- The steeper the slope, the less sensitive viability is to a variation in the parameter

 \rightarrow Focus investigation on parameters with low slopes



Incentive Summary

Modeling incentives in RELCOST

- Grants and low interest loans
 - "Funding Plan" tab

• Incentives proportional to a product (e.g sales, CO2e, heat) "Prod Incentives" or on "Sales & Savings" tabs

Investment and production tax credits

- "Tax Credits" tab
- Tax holidays

"Taxes & Fees" tab

- Property tax incentives
 - "O&M" tab
- Bonus depreciation

"Depreciation" tab

Incentives by source are tallied on "Incentive Summary" tab (new)

Source	Loans	Grants	Equity Investment	Renewable Energy Credits	Carbon Offsets	Production Tax Credits	Investment Tax Credits	TOTALS (not incl loans)
Federal	\$ 2,000,000	\$ -	S -	\$ -	\$ -	\$ -	S -	\$ -
State	s -	\$ 5,072,792	S -	\$ -	\$ -	S -	\$ -	\$ 5,072,792
Local	s -	S -	S -	S -	S -		S -	\$ -
Utility	s -	\$ 90,703	S -	S -	S -			\$ 90,703
Market	s -	\$ -	S -	\$ 2,705,269	\$ -			\$ 2,705,269
Private	S -	\$ -	\$ 500,000	S -	S -]		\$ 500,000
Other	S -	S -	S -	S -	S -			\$ -
TOTALS	\$ 2,000,000	\$ 5,163,495	\$ 500,000	\$ 2,705,269	\$ -	\$ -	\$ -	\$ 8,368,764

Overview of Inputs

Enter detailed input on a number of sheets

Enter most likely values for:

- Plant Operating Factors
- Capital Expenditures
- Funding Plan
- Purchases
- Sales & Savings
- O&M Expenses
- Major Expenses
- Production-based Incentives
- Taxes, Fees
- Tax Incentives
- Dividends
- Cost Escalation
- Cost Allocation
- Cash Accounts

Input tabs are yellow

Capital Expenditures / Funding Plan / Purchases / Sales & Savings / Prod Incentives / O&M / Major Expenses / Taxes & Fees / Tax Credits / Depreciation Cost Escalation / Cost Allocation / Dividends / Depreciation_Factors /

Cell Colors

By default

INPUT (Edit) RESULTS (No Edits)

- Inputs are yellow
- Calculated cells are green
- Change cell colors using "toggle" buttons on "General" tab



Do not overwrite calculations in green cells

- Make back up file of original version
- Protect and unprotect results with toggle button on "General" tab





First Input Sheet General Information

Enter basic info and financial assumptions

- Facility description
- Discount and inflation rates
- Dispatch and availability factors \rightarrow plant operating factor

PROJECT SUMMARY				
Plant Name	University C	ampus CHP		
Location	USA			
Project Description	Replace cer	ntral steam bo	ilers with can	npus CHP sys
Notes				
CENEDAL		-		
GENERAL				
Project Lite	20	years		
Pirst Year of Project	2017			
FINANCIAL ASSUMPTIONS				
Discount rate	3.50%			
General inflation rate	3.0%			
	2017	2018	2019	2020
Project Y	/ear 1	2	3	4
PLANT OPERATING FACTOR				· · · · ·
Dispatch Factor (a)	100.0%	100.0%	100.0%	100.0%
Availability (capacity) Factor (b)	50.0%	87.0%	86.8%	86.6%
Plant Operating Factor	50.0%	87.0%	86.8%	86.6%



Capital Expenditures

Plenty of space

- Three user-defined general categories, plus "below the line" expenses.
- Expenditures can occur in any project year

2014 Project Year 1 1. Equipment & Installation \$ System Cost \$ 450,000 Structural Modifications \$ 100,000 Electrical Upgrade \$ \$ Sub-Total \$ 600,000 Z. Engineering and Design \$ 100,000 Engineering Costs \$ 100,000 Sub-Total \$ 100,000 Sub-Total \$ 100,000	ENTER CAPITAL COST ESTIMATES		
Project Year 1 1. Equipment & Installation S 450,000 Structural Modifications \$ 100,000 Electrical Upgrade \$ 50,000 Image: Structural Modifications \$ 100,000 Electrical Upgrade \$ 50,000 Image: Structural Modifications \$ 600,000 Image: Structural Modifications \$ 100,000 Image: Structural Modifications \$ 100,000 Image: Structural Modifications \$ 100,000			2014
1. Equipment & Installation System Cost \$ 450,000 Structural Modifications \$ 100,000 Electrical Upgrade \$ 50,000	Project Yea	ir	1
System Cost \$ 450,000 Structural Modifications \$ 100,000 Electrical Upgrade \$ 50,000 Image: Structural Modifications Image: Structural Modifications Image: Structural Modifications \$ 50,000 Image: Structural Modifications Image: Structural Modifications Image: Structural Modifications \$ 600,000 Image: Structural Modifications \$ 100,000 Image: Structural Modifications Image: Structural Modifications Image: Structural Modifications \$ 100,000 Image: Structural Modifications Image: Structural Modifications Image: Structural Modifications Image: Structura	1. Equipment & Installation		
Structural Modifications \$ 100,000 Electrical Upgrade \$ 50,000 Image: Sub-Total Sub-Total \$ 600,000 2. Engineering and Design Image: Sub-Total S 100,000 Engineering Costs \$ 100,000 Image: Sub-Total S 100,000 Image: Sub-Total S 100,000 Image: Sub-Total S 100,000 Image: Sub-Total S 100,000 Image: Sub-Total S 100,000 Image: Sub-Total S 100,000	System Cost	\$	450,000
Electrical Upgrade \$ 50,000	Structural Modifications	S	100,000
Sub-Total \$ 600,000 2. Engineering and Design 5 100,000 Engineering Costs \$ 100,000	Electrical Upgrade	S	50,000
Sub-Total \$ 600,000 2. Engineering and Design 5 100,000 Engineering Costs \$ 100,000 Image: Sub-Total \$ 100,000 Image: Sub-Total \$ 100,000 Image: Sub-Total \$ 100,000 Image: Sub-Total \$ 100,000			
Sub-Total \$ 600,000 2. Engineering and Design 5 Engineering Costs \$ 100,000 Image: Sub-Total \$ 100,000 Image: Sub-Total \$ 100,000 Image: Sub-Total \$ 100,000 Image: Sub-Total \$ 100,000			
Sub-Total \$ 600,000 2. Engineering and Design 5 100,000 Engineering Costs \$ 100,000 Image: Sub-Total S 100,000 Image: Sub-Total S 100,000 Image: Sub-Total S 100,000		—	
Sub-Total \$ 600,000 2. Engineering and Design 5 100,000 Engineering Costs \$ 100,000 Image: Sub-Total \$ 100,000 Sub-Total \$ 100,000		_	
2. Engineering and Design Engineering Costs \$ 100,000	Sub-Total	5	600,000
Engineering Costs \$ 100,000 Image: Costs Image: Costs Image: Costs Image: Costs <td>2. Engineering and Design</td> <td>_</td> <td></td>	2. Engineering and Design	_	
	Engineering Costs	\$	100,000
Sub-Total \$ 100,000			
	Sub-Total	\$	100,000

Current dollars

 All inputs are entered in current dollars with escalated values calculated for future years

ENTER BELOW THE LINE COSTS		
Contractor Profit Factor		
	Equipment & Installation	30%
	Engineering and Design	
Contigencies		
	Equipment & Installation	10%
	Engineering and Design	10%
Value Added Tax (includes contigency)		
	VAT Rate	
	% Equipment & Installation	

Capital Expenditures

<u>New</u>

Categories of CapEx can be "included" or not

 Enables quickly excluding a group of expenses that are in one option but not in another

DEFINE CATEGORIES FOR CAPITAL COSTS	
CATEGORY DESCRIPTIONS Equipment & Installation Engineering and Design Additional Equipment with Option 2	Include Category? True True False
	Select False to exclu

category from total

🔪 Funding Plan 🏑 Fur res.

Funding Plan

Borrowed Funds Institution Institution Description SEP Low Interest Loan Source Tyoe State Loan Type Equal Payment Interest payment menthod (bonds only) Interest payment menthod (bonds only) Project Year 1 Loan Begin Month 6 Loan Fees (% amount) 1% Amount (\$) \$ 2,000,000 Annual Interest Rate 4% Term (months) 60 Equity Investor Investor Investor Source Tyoe State Project Year 1 Obscription Legislative Appropriation Source Tyoe State Investor Investor Amount (\$) \$ 2,100,000 Investment method Investment method Investment method ony) Investor Grants Investor Investment Period (Annual pmt method ony) State Project Year 1 1 Amount (\$) \$ 1,552,000 \$ 3,556,000 <tr< th=""><th>Source #</th><th>1</th><th>2</th></tr<>	Source #	1	2																																																																																																
Institution Institution Description SEP Low Interest Loan Source Type State Loan Type Equal Payment Interest payment menthod (bonds only) Interest payment menthod (bonds only) Project Year 1 Loan Begin Month 6 Loan Fees (% amount) 1% Amount (\$) \$ 2,000,000 Annual Interest Rate 4% Annual Interest Rate 4% Term (months) 60 Equity Investor Source Type State Project Year 1 Investor S 2,100,000 Source Type State Investment method Investment Investment method ony) Investment method Investment Period (Annual pmt method ony) Investment Grants Investor S 3,556,000 Grant Method Lump Sum Interest S, 3,556,000 Grant Period (Annual pmt method ony) S 3,556,000 S 3,556,000 Grant Period (Annual pmt method ony) Interest S, 3,556,000 S 3,556,000 Grant Period (Annual pmt method ony)	Borrowed Funds																																																																																																		
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	Taxable (State)?	False	False																																																																																																

Three funding source types

- Loans, grants, equity
- Multiple types can be used in same project period

Up to 10 sources for each type

- Any project year
- Multiple investors, lenders

This example shows

- one loan,
- one equity investment, and
- two grants

Each column represents one funding source.

res λ Funding Plan / Fur

Funding Plan

<u>New</u> Identify *type* of funding sources

• Appears on summary of total incentives by source

			dro	p-down
Grants	1			
Invest	r			
Descriptio	n Renewable Energy Gra	Tax Credits Pass-Thru		
Source Typ	e Federal	State	-	
Project Yes	ar 1	Federal		
Amount (5) \$ 1,552,000	State		
Grant metho	d Lump Sum	Utility		
Grant Period (Annual pmt method on	/)	Private		
Taxable (Federal	? False	Market Other		
Taxable (State	? False	Faise		
PRESENT VALUE OF TOTALS BY SOURCE		Loans	Grants	Equity
Federal		\$-	\$ 1,552,000	\$-
State		\$ 2,000,000	\$ 3,520,792	\$ 2,100,000
Local		\$-	\$-	\$-
Utility		\$-	\$-	\$-
Market		\$-	\$-	\$-
Private		\$-	\$ -	\$-
Other		\$-	\$-	\$-

Purchases



Units and unit costs of purchases:

Inputs for each project year

True = Multiply values by operating factor

						_
ENTER U	NITS AND	INIT COSTS OF PURCHASES				
Durchase	Apply	Quantities	Project Year		2017	
Туре	Factor?	Description	Units		1	
Fuel	True	Biomass	bdt		21,320	
Fuel	True	Natural Gas	MMBtu		3,325	
Non-Fuel	True	Purchased Electricity (kWh)	kWh		-	
Non-Fuel	True	Ash disposal	total	\$	12,800.00	\$ 12,
Non-Fuel	True	Electricity Wheeling Cost	kWh		15,700,000	15,7
		Unit Costs (non-escalated)				
Fuel		Biomass	\$/bdt	S	35.00000	\$ 35
Fuel		Natural Gas	\$/MMBtu	\$	6.65000	\$ 6
Non-Fuel		Purchased Electricity (kWh)	\$/kWh	\$	-	\$
Non-Fuel		Ash disposal	\$/total	\$	1.00	\$
Non-Fuel		Electricity Wheeling Cost	\$/kWh	\$	0.00594	\$ 0

Fuel and non-fuel categories appear on Purchases report

> Enter as present values Escalated values are calculated



Sales and Savings

• Revenue from sales and savings are equivalent

- Savings can be a positive revenue stream or a negative purchase (How you want it to appear on reports?)
- Can use for any revenue stream

					Uni	ts	are user	-0
		ENTER UNITS AND UNIT PRICES OF	UP TO 9 REVENUE SO	OUR	RCES			
	Apply			/	2017		2018	
Taxable	Factor?	Revenues	Project Year		1		2	
Taxable	True	Electricity Sales						
		Units Sold (Stand-Alone)	kWh		15,700,000		15,700,000	Γ
		Unit Cost (Stand-Alone)	\$/kWh	s	0.061	S	0.061	\$
			Total (Non-escalated)	S	959,270	\$	959,270	\$
		Total	(With plant operating factor)	\$	479,635	\$	479,635	\$
			Total (With sensitivity)	\$	479,635	\$	479,635	\$
		Total (escalated + sen	sitivity + plant operating)	\$	479,635	\$	494,024	\$
Taxable	True	Avoided Costs, Existing HTG SYST						
		Units Sold	total	\$	674,000		674,000	Γ
		Unit Cost	\$/total	\$	1.0000000	\$	1.000	\$
			Total (Non-escalated)		\$674,000		\$674,000	
		Total	(With plant operating factor)	\$	337,000	\$	337,000	\$
			Total (With sensitivity)	\$	337,000	\$	337,000	\$
		Total (escalated +	sensitivity + plant operating)	\$	337,000	\$	351,087	\$

In this example, avoided cost of operating existing system is treated as a revenue stream

Sales and savings are both taxable: http://www.energystar.gov/buildings/sites/default/uploads/tools/EPA_BUM_CH3_InvestAnalysis.pdf

Production Incentives

- Production-based incentives are entered in same format as Sales & Savings
 - Do not enter tax credits here

								()		1
				ENTER UNITS AND UNIT PRICES OF PI	RODUCTION-BA	SED II	NCENTIVE	S		
	Source	Tamakla 2	Apply Operating	Povonuos	Droject Veer		2017		2018	
	Туре	Taxable ?	Factor?	Revenues	Project rear		1		2	
	Market	Taxable	True	Renewable Energy Credits						
				Units Offset	kWh		15,700,000		15,700,000	
				Unit Cost	\$/kWh	S	0.0100	\$	0.0100	\$
				Т	otal (Non-escalated)	S	157,000	S	157,000	\$
				Total (With pla	int operating factor)	S	78,500	S	78,500	\$
				To	tal (With sensitivity)	S	78,500	S	78,500	S
				Total (escalated + sensitivi	ty + plant operating)	S	78,500	\$	80,855	\$
				Total Incent	ve Over Project Life	S	1,352,635			
	Market	Taxable	True	Carbon Offsets						
	1			Units	tons CO2e				15,000	
				Unit Cost	\$/tons CO2e			S	5.0000	\$
				Т	otal (Non-escalated)	S	-	S	75,000	\$
				Total (With pl	at approxima factor)	e		¢	27 500	¢
Source type is u to for totals in Incentive Summ	ised harv	Can b deduc	e tax ctible							

Are carbon credits tax deductible?

http://taxguru.in/income-tax/dtc-money-received-or-receivable-from-transfer-of-carbon-credits-will-be-treated-asbusiness-income-and-taxed.html



Operation & Maintenance

Plant operating factor applied to variable but not fixed costs.

ENTER ANNUAL O&M EXPENSES IN UP TO 4 CATEGORIES							
Apply			2017				
Factor?	Project Year		1				
False	Misc Fixed O&M Costs						
	Maintenance and repair	s	815,000				
	Utilities	S	449,000				
	Environmental costs	S	141,000				
	Total (Non-escalated)	\$	2,121,000				
	Total (With plant operating factor)	S	2,121,000				
	Total (With sensitivity)	S	2,121,000				
	Total (Escalated + sensitivity + op factor)	S	2,121,000				
True	Variable Costs						
	Consumables (urea for ash treatment)	S	341,000				
	Startup and downtime fuel	\$	108,000				
	Ash disposal	S	267,000				
	Total (Non-escalated)	\$	-				
	Total (With plant operating factor)	S	-				
	Total (With sensitivity)	S	-				
	Total (Escalated + sensitivity + op factor)	S	-				
False	Property Taxes and Insurance						
		\$	457,000				
		S	254,000				
	Total (Non-ascalated)	s	711.000				
	Total (With plant operating factor)	S	711,000				
	Total (With sensitivity)	S	711,000				
	Total (Escalated + sensitivity + op factor)	S	711,000				
False	Labor and Benefits						

Four user-defined expense categories

For example

- Misc. Fixed & Variable
- Property taxes & insurance
- Labor & benefits
- Overhead



Major Expenses

- Repeating or one-time major expenses
 - In example, a major maintenance expense of \$30,000 occurs every 3 years beginning in year 5

ENTER UP TO 10 PERIODIC MA	AJOR EXPENSES	5								
Expense #	1	2	3	4	5	6	7	8	9	
Periodic Major Expenses										
Description	Major Overhaul									
First Project Year	5									
Period (Years)	3									
Amount (\$)	\$ 30,000									
ANNUAL MAJOR EXPENSES										
	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Project Year	1	2	3	4	5	6	7	8	9	
Periodic Major Expense by Year										
Major Overhaul	\$0	\$0	\$0	\$0	\$30,000	\$0	\$0	\$30,000	\$0	
	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	

Income Taxes and Fees

• Multi-jurisdictional:

- Federal, state, local
- Tax rates can vary by project year

ENTER TAXES RATES, FEES AND ROYALTY PAYMENTS							
	2017	2018					
Project Year	1	2					
Income Taxes and Fees							
Federal Tax Rate	30.0%	30.0%					
State Tax Rate	0.0%	9.5%					
Local Tax Rate							
Econophica Eco (Oceano Soloo - Draduct #1)							

In this example, the state gives a tax holiday for first year of project.

Tax Credits

New:

• <u>Two</u> state production taxes are possible

e.g. electricity and thermal

• Each tax credit has its own parameters

Refundable, carry forward, carry forward years

5	ENTER TAX CREDIT INFORMATION			
6				
7	PRODUCTION TAX CREDITS	FEDERAL PTC	STATE PTC1	STATE PTC2
8	Refundable tax credits?	False	False	False
9	Allow PTC carry forward?	True	True	True
)	Maximum years PTC carry forward?	10	5	5
L	Apply plant operating factor?	True	True	True
2				
8	INVESTMENT TAX CREDITS	FEDERAL ITC	STATE ITC	
4	Refundable tax credits?	False	False	
5	Allow ITC carry forward?	True	True	
6	Maximum years ITC carry forward?	10	5	
7				



Depreciation

"Recovery" of the cost of an asset whose value declines over time

- Machinery, equipment, structures, etc.
- Define up to 3 classes of expenditures that can be accelerated at different rates

		-				
Depreciation for Tax Purposes (Tax)						
Class I						
Description	Power Plant					
Amount	\$ 4,500,000					
Salvage %	10%					
Depreciation Base	\$ 4,050,000	\$				
Depreciation Schedule	05YR~150DB~HY~ANY					
Class II						
Description	Leased property (exhausted CapEx)					
Amount	\$ 500,000					
Salvage %						
Depreciation Base	\$ 500,000	\$				
Depreciation Schedule	20YR~150DB~HY~ANY					
ou						



For more on depreciation:

Refer to IRS publication "How to Depreciate Property" <u>http://www.irs.gov/publications/p946/index.html</u> Table B-1 "Class Lives and Recovery Periods" <u>http://www.irs.gov/publications/p946/ar02.html</u>

Cost Escalation

Escalation factors can be selected for each item.

- Can be entered relative to inflation
- In this example
 - Option to add escalation factors and inflation is selected
 - General inflation rate is 3%
 - Electricity sales escalate at rate of 2% per year

		escalati 3% gen	on factors to eral inflation	ว า	
Selected Forca	st Likely ? True	(From "What If" tab) 3.00%	(Factor)		
ENTER LIBRARY OF LIKELY, AGRRESS	IVE, AND CONSE t: Likelv	RVATIVE FORE	CASTS		
	Project Year 2017	2018	2019		Electricity sales escalated at
Escalation Above General Inflation	1	2	3		rate of 2% per year:
Description				Ζ	2% - 3% inflation minus $1%$
SALES & SAVINGS			K		2/0 = 3/0 initiation minus 1/0
Electricity Sales		-1.00%	-1.00%		
Avoided Costs, Existing HTG SYST		1.180%	1.18%		
	0				

Option to add



Escalation Forecasts

Four escalation forecast types can be entered

- None costs are not escalated
- Conservative lowest cost escalation
- Likely most probable escalation
- Aggressive highest cost escalation

Forecast is selected on "What If" tab

RELCOST: What If?						
Plant Name	University Campus CHP					
Project Description	Replace central steam boil					
Scenario Description	Biomass steam generation					
SENSITIVITY FACTORS						
Escalation Forecast Type	Likely	T				
Environmental Credits	Likely	t Yr Unit				
Renewable Energy Credits	Aggressive Conservative	S				
Carbon Offsets	None	S				
Production Tax Credits		1st Yr Unit				
Endoral DTC	40.09/	60				

"Likely" forecast selected in this example.

Cost Allocation

Allocation of costs of sales

Used in calculating levelized costs

ALLOCATE COSTS OF SALES FOR L	EVELIZED CO	STS	. In
	2017	2018] <u> </u>
PROJECT YEAR	1	2	ar
Electricity Sales	56%	56%	
Steam Production	44%	44%	sa sa
0			
0			50
0]
0]
0]
0]
0]
TOTAL	100%	100%	
			I 🖌 Ke
			sho

In this example, 56% of costs are associated with electricity sales and 44% with steam savings

Cost Allocation

Resulting levelized costs shown on "What If" tab.

Levelised Cost (Pre-Taz)			K
Electricity Sales	G	\$97.11	\$/MWhr
Steam Production Savings	Y	\$14.94	\$ per 1000 lb

Calculate allocation by "efficiency method" http://www.arb.ca.gov/cc/ccei/presentations/CogenerationOptions.pdf

$$S = \frac{\frac{E_s}{\eta_s}}{\frac{E_s}{\eta_s} + \frac{E_e}{\eta_e}}$$

Other Inputs

"Stop-Light Indicators"

- Select decision values for Red-Yellow-Green color changes on WhatIf tab
- Currently set at defaults you may want to review For example
 - Red for IRR below discount rate
 - Yellow for IRR between 1X and 2X discount rate
 - Green above 2X discount rate

• Dividends

Custom logic required

Depreciation Schedules

- Custom schedules possible at bottom of sheet
- Useful for other countries or new U.S. schedules
- Checking & Savings Interest Rates
 - Enter on "Cash Accounts"

User's Manual

Guide to financial analysis using RELCOST

- Background on financial concepts
- References for cost data and typical values
- Modeling tips
- Information on incentives

(But not up-to-date)

Download at:

http://www.northwestchptap.org/ResourcesSoftwareLinks/Software.aspx



Questions ?

Carolyn Roos, Ph.D. Northwest CHP Technical Assistance Partnerships Washington State University Energy Program roosc@energy.wsu.edu

Download blank spreadsheet, examples, and User's Manual at

http://www.northwestchptap.org/ResourcesSoftwareLinks/Software.aspx