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**
  - **http://www.northwestchptap.org/**
  Click on "Software, Resources and Links"
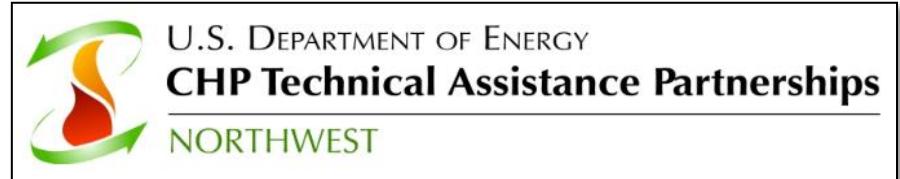
Program Overview

- **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**

| Capital Expenditures | Funding Plan | Purchases | Sales & Savings | Prod Incentives | O&M | Major Expenses | Taxes & Fees | Tax Credits | Depreciation |
| O_Purchased_Fuels | O_Operating_Costs | O_Operating_Income | O_IncomeStatement (Tax) | O_BalanceSheet (Tax) | O_UseOfFunds | O_CashFlow |

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 *www.dsireusa.org***

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

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

- **Lenders**
- **Equity investors**
- **Policy analysts**
- **Project developers**

	2017	2018	2019	
Project Year	1	2	3	
Income Statement (Tax Calculation)				
(+) Taxable Income & Savings	$ 1,633,270	$ 1,690,221	$ 1,749,214	$
(+) Non-Tiaxable Income & Savings	$ 157,000	$ 161,710	$ 266,498	$
(-) Cost of Sales	$ (1,114,369)	$ (1,148,243)	$ (1,183,154)	$ (
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	$

Results tabs are green.

O_Purchased_Fuels O_Operating_Costs O_Operating_Income O_IncomeStatement (Tax) O_BalanceSheet (Tax) O_UseOfFunds O_CashFlow

30 Year Analysis Period

- **Results Example: Proformas have a column for each year**

INCOME STATEMENT (TAX)						
Plant Name	Southern Oregon University CHP sensitivity Analysis					
Project Description	New CHP system Analysis					
Scenario Description	Biomass steam generation with extraction/condensing turbine					
	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
(+) Non-Tiaxable Income & Savings	$ -	$ -	$ -	$ -	$ -	$ -
(-) 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	$ -	$ -	$ -	$ -	$ -	$ -
EBITDA	$ 675,901	$ 700,593	$ 826,242	$ 856,642	$ 919,015	$ 985,163
(-) Depreciation (Tax)	$ -	$ -	$ -	$ -	$ -	$ -
Operating Income (EBIT)	$ 675,901	$ 700,593	$ 826,242	$ 856,642	$ 919,015	$ 985,163
(-) Interest Expense	$ -	$ -	$ -	$ -	$ -	$ -
(+) Interest Income		$ -	$ -	$ -	$ -	$ -
(-) Finance Charges	$ -	$ -	$ -	$ -	$ -	$ -
Net Profit Before Taxes	$ 675,901	$ 700,593	$ 826,242	$ 856,642	$ 919,015	$ 985,163
(-) Income Taxes	$ -	$ (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**

ENTER CAPITAL COST ESTIMATES	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
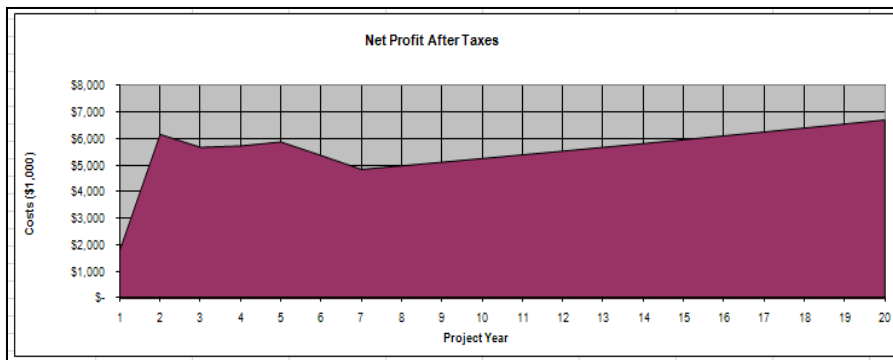
Example: Income statement in a particular year
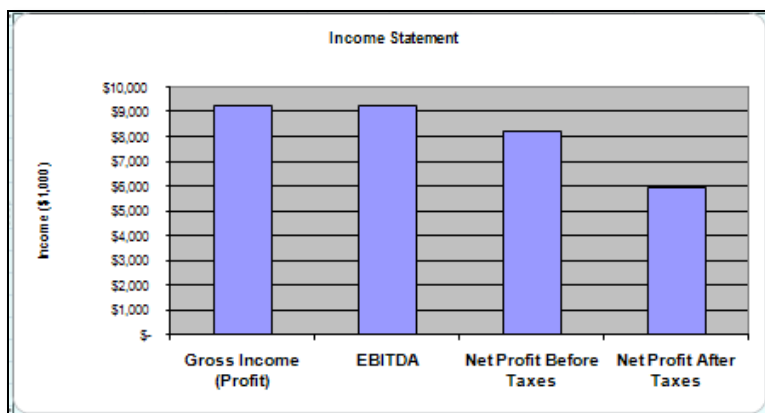
New graphs and charts can be added by user because its an unlocked Excel template

"WhatIf" 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			
Project Life	20	Years	
Life Cycle Cost Analysis		**Value**	
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		**Value**	
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)		**Value**	
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	R	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-Tax)			
Electricity Sales	G	$97.11	$/MWhr
Steam Production Savings	Y	$14.94	$ per 1000 lb

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**

SENSITIVITY FACTORS			
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	**20**	Years	
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%

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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**

  →Focus investigation on parameters with low slopes

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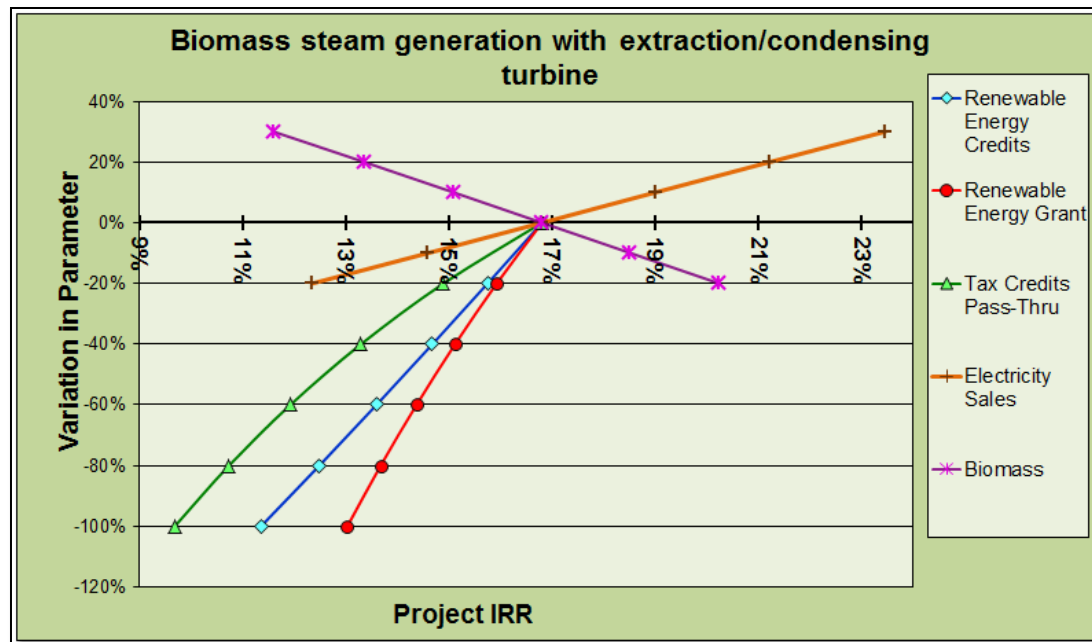
Incentive Summary

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	$ -	$ -	$ -	$ -	$ -	$ -	$ -
State	$ -	$ 5,072,792	$ -	$ -	$ -	$ -	$ -	$ 5,072,792
Local	$ -	$ -	$ -	$ -	$ -		$ -	$ -
Utility	$ -	$ 90,703	$ -	$ -	$ -			$ 90,703
Market	$ -	$ -	$ -	$ 2,705,269	$ -			$ 2,705,269
Private	$ -	$ -	$ 500,000	$ -	$ -			$ 500,000
Other	$ -	$ -	$ -	$ -	$ -			$ -
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
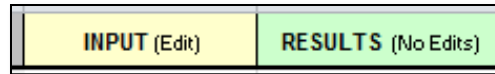
- **Inputs are yellow**
- **Calculated cells are green**
- **Change cell colors using "toggle" buttons on "General" tab**

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 → plant operating factor**

First project year can be 0 or 1

Example shows part year operation in first year & declining efficiency over time

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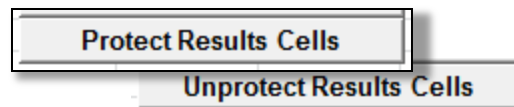
Capital Expenditures

Plenty of space

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

ENTER CAPITAL COST ESTIMATES		
		2014
Project Year		1
1. Equipment & Installation		
System Cost	$	450,000
Structural Modifications	$	100,000
Electrical Upgrade	$	50,000
Sub-Total	$	600,000
2. Engineering and Design		
Engineering Costs	$	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	

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Capital Expenditures

New

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	Include Category?
Equipment & Installation	True
Engineering and Design	True
Additional Equipment with Option 2	False

Select False to exclude category from total

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Funding Plan

Source #	1	2
Borrowed Funds		
Institution		
Description	SEP Low Interest Loan	
Source Tyoe	State	
Loan Type	Equal Payment	
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		
Description	Legislative Appropriation	
Source Tyoe	State	
Project Year	1	
Amount ($)	$ 2,100,000	
Investment method		
Investment Period (Annual pmt method ony)		
Grants		
Investor		
Description	Renewable Energy Gra	Tax Credits Pass-Thru
Source Tyoe	Federal	State
Project Year	1	1
Amount ($)	$ 1,552,000	$ 3,556,000
Grant method	Lump Sum	Lump Sum
Grant Period (Annual pmt method ony)		
Taxable (Federal)?	False	False
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.

Funding Plan

New
Identify *type* of funding sources

- **Appears on summary of total incentives by source**

Select source type from drop-down

Grants				
Investor				
Description	Renewable Energy Gran	Tax Credits Pass-Thru		
Source Tyoe	Federal	State		
Project Year	1	Federal		
Amount ($)	$ 1,552,000	State		
Grant method	Lump Sum	Local		
Grant Period (Annual pmt method ony)		Utility		
Taxable (Federal)?	False	Private		
Taxable (State)?	False	Market		
		Other		
		False		

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		$ -	$ -	$ -

Totals by source

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Purchases

Units and unit costs of purchases:

- **Inputs for each project year**

True = Multiply values
by operating factor

Purchase Type	Apply Operating Factor?	Quantities Description	Project Year Units	2017 1	
		ENTER UNITS AND UNIT COSTS OF PURCHASES			
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	$ 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

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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**

Units are user-defined

Taxable	Apply Operating Factor?	ENTER UNITS AND UNIT PRICES OF UP TO 9 REVENUE SOURCES			2017		2018	
Taxable		Revenues	Project Year		1		2	
Taxable	True	**Electricity Sales**						
		Units Sold (Stand-Alone)	kWh		15,700,000		15,700,000	
		Unit Cost (Stand-Alone)	$/kWh	$	0.061	$	0.061	$
		Total (Non-escalated)		$	959,270	$	959,270	$
		Total (With plant operating factor)		$	479,635	$	479,635	$
		Total (With sensitivity)		$	479,635	$	479,635	$
		Total (escalated + sensitivity + plant operating)		$	479,635	$	494,024	$
Taxable	True	**Avoided Costs, Existing HTG SYST**						
		Units Sold	total	$	674,000		674,000	
		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**

			ENTER UNITS AND UNIT PRICES OF PRODUCTION-BASED INCENTIVES			2017		2018	
Source Type	**Taxable?**	**Apply Operating Factor?**	Revenues	**Project Year**		1		2	
Market	Taxable	True	**Renewable Energy Credits**						
			Units Offset	kWh		15,700,000		15,700,000	
			Unit Cost	$/kWh	$	0.0100	$	0.0100	$
			Total (Non-escalated)		$	157,000	$	157,000	$
			Total (With plant operating factor)		$	78,500	$	78,500	$
			Total (With sensitivity)		$	78,500	$	78,500	$
			Total (escalated + sensitivity + plant operating)		$	78,500	$	80,855	$
			Total Incentve Over Project Life		$	1,352,635			
Market	Taxable	True	**Carbon Offsets**						
			Units	tons CO2e				15,000	
			Unit Cost	$/tons CO2e			$	5.0000	$
			Total (Non-escalated)		$	-	$	75,000	$
			Total (With plant operating factor)		$		$	37,500	$

Source type is used to for totals in Incentive Summary

Can be tax deductible

Are carbon credits tax deductible?
http://taxguru.in/income-tax/dtc-money-received-or-receivable-from-transfer-of-carbon-credits-will-be-treated-as-business-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 Operating Factor?		2017
	Project Year	1
False	**Misc Fixed O&M Costs**	
	Maintenance and repair	$ 815,000
	Utilities	$ 449,000
	Environmental costs	$ 141,000
	Total (Non-escalated)	$ 2,121,000
	Total (With plant operating factor)	$ 2,121,000
	Total (With sensitivity)	$ 2,121,000
	Total (Escalated + sensitivity + op factor)	$ 2,121,000
True	**Variable Costs**	
	Consumables (urea for ash treatment)	$ 341,000
	Startup and downtime fuel	$ 108,000
	Ash disposal	$ 267,000
	Total (Non-escalated)	$ -
	Total (With plant operating factor)	$ -
	Total (With sensitivity)	$ -
	Total (Escalated + sensitivity + op factor)	$ -
False	**Property Taxes and Insurance**	
		$ 457,000
		$ 254,000
	Total (Non-escalated)	$ 711,000
	Total (With plant operating factor)	$ 711,000
	Total (With sensitivity)	$ 711,000
	Total (Escalated + sensitivity + op factor)	$ 711,000
False	**Labor and Benefits**	

Four user-defined expense categories

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

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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 MAJOR EXPENSES									
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				
Franchise Fee (Gross Sales - Product #1)				

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

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Tax Credits

New:

- **Two state production taxes are possible**
  - **e.g. electricity and thermal**

- **Each tax credit has its own parameters**
  - **Refundable, carry forward, carry forward years**

ENTER TAX CREDIT INFORMATION			
PRODUCTION TAX CREDITS	FEDERAL PTC	STATE PTC1	STATE PTC2
Refundable tax credits?	False	False	False
Allow PTC carry forward?	True	True	True
Maximum years PTC carry forward?	10	5	5
Apply plant operating factor?	True	True	True
INVESTMENT TAX CREDITS	FEDERAL ITC	STATE ITC	
Refundable tax credits?	False	False	
Allow ITC carry forward?	True	True	
Maximum years ITC carry forward?	10	5	

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	

Select IRS MACRS depreciation schedule library on drop-down menus

Depreciation Schedule	05YR~150DB~HY~ANY
	05YR~150DB~HY~ANY
Description	05YR~150DB~MQ~Q1
Amount	05YR~150DB~MQ~Q2
Salvage %	05YR~150DB~MQ~Q3
Depreciation Base	05YR~150DB~MQ~Q4
Depreciation Schedule	05YR~200DB~HY~ANY
	05YR~200DB~MQ~Q1
	05YR~200DB~MQ~Q2

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

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**

Option to add escalation factors to 3% general inflation

Selected Forcast	Likely	(From "What If" tab)	
Include general inflation?	True		3.00% (Factor)

ENTER LIBRARY OF LIKELY, AGRRESSIVE, AND CONSERVATIVE FORECASTS

	Forecast: Likely			
	Project Year			
		2017	2018	2019
Escalation Above General Inflation		1	2	3
Description				
SALES & SAVINGS				
Electricity Sales			-1.00%	-1.00%
Avoided Costs, Existing HTG SYST			1.180%	1.18%
	0			

Electricity sales escalated at rate of 2% per year:
2% = 3% inflation minus 1%

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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 boi
Scenario Description	Biomass steam generatio
	SENSITIVITY FACTORS
Escalation Forecast Type	Likely
Environmental Credits	t Yr Unit
Renewable Energy Credits	$
Carbon Offsets	$
Production Tax Credits	1st Yr Unit
Federal PTC	100% $0

Dropdown options: Likely, Aggressive, Conservative, None

"Likely" forecast selected in this example.

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Cost Allocation

Allocation of costs of sales

- **Used in calculating levelized costs**

ALLOCATE COSTS OF SALES FOR LEVELIZED COSTS		
	2017	2018
PROJECT YEAR	1	2
Electricity Sales	56%	56%
Steam Production	44%	44%
0		
0		
0		
0		
0		
0		
0		
TOTAL	**100%**	**100%**

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

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

Resulting levelized costs shown on "What If" tab.

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

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

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 ?

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

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