ROCKY MOUNTAIN POWER
A DIVISION OF PACIFICORP

EMBEDDED
COST OF SERVICE MODEL
INSTRUCTION MANUAL

AUGUST 2009

Table of Contents

1. About the Embedded Cost of Service Instruction Manual

This manual is intended to help third parties better understand and operate the mechanics of the Embedded Cost of Service Model that PacifiCorp uses for rate filings. The Cost of Service Model is opened as a spreadsheet within Microsoft Excel. There are several Microsoft Visual Basic macros that the study employs. This guide was designed to show users how the model works, specifically how data and calculations flow through the model to produce class results. This model is not intended to explain the rationale behind different cost of service methodologies, but to inform users about how to use the tool and understand its inner workings.

2. Reminders and Quick Tips

2.1. Working with Iterations

The cost of service model employs iterative calculations. As such, when an input within the model is changed, all cells within the model that have formulas linked to the input changed will not update themselves without being prompted. In order to have the cost of service model calculate the formulas within all cells and apply an update that has been made, a user must press the F9 key.

2.2. Working with Named Ranges

Within the cost of service model, a large number of named ranges are used. A named range is simply a reference to a specific cell or range of cells within worksheets. To navigate to a specific named range, click on the drop-down box on the upper left-hand portion of the screen. The named cell range can quickly be found by typing in the first letter of the name. Once the named cell range is chosen, automatically a specific cell or range of cells will be highlighted by the cursor.
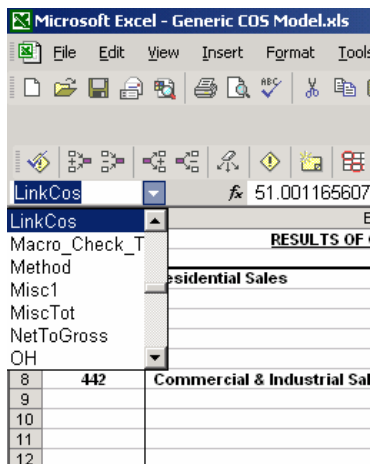
LinkCos begins here.
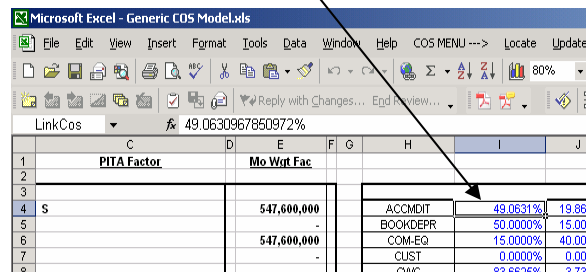
3. Cost of Service Model Process Overview

The Cost of Service Model performs 3 basic steps; functionalization, classification, and allocation. These steps divide costs between function (generation, transmission, distribution, etc.), classification (generation-demand, generation-energy, distribution-poles and wire, distribution-transformers, etc.), and allocation (residential, irrigation, small general service, etc.). Costs are first apportioned to their functional and classification groups, before being allocated to rate class. Functionalizing costs provides additional detail and also more easily provides a basis for apportioning costs that can not be easily identified with a particular function or class. The overall cost of service process can be viewed conceptually as the cube displayed below:

Figure 1. Functionalization-Classification-Allocation Cube
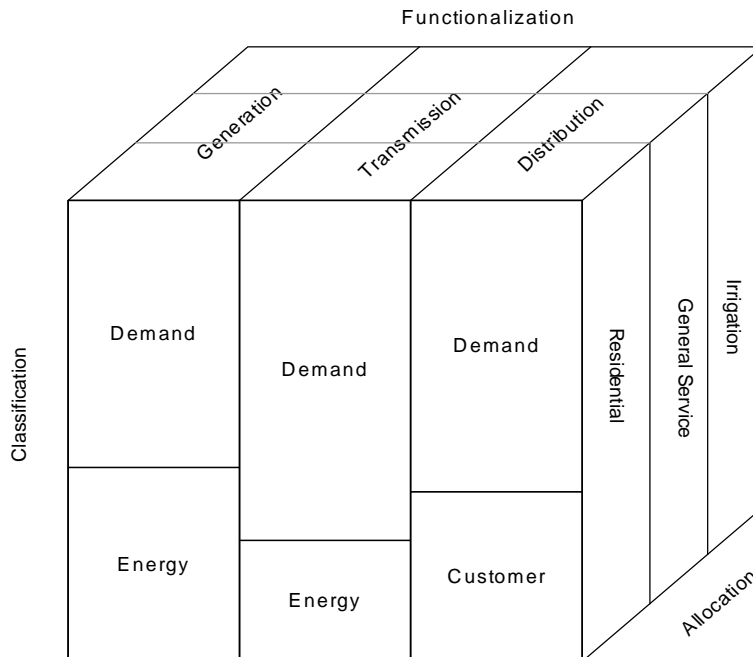
4. Functionalization: The first step in cost of service

4.1. Overview

During the functionalization process, the costs from the JAM (jurisdictional allocation model) which contain costs by FERC account for the whole jurisdiction are downloaded into the cost of service model and apportioned to each function (Generation, Transmission, Distribution, etc.). The apportionment of costs to their function primarily takes place within the "Func Study" tab. The diagram below shows what the model does during the functionalization process.

Figure 2. Functionalization Process within the Model
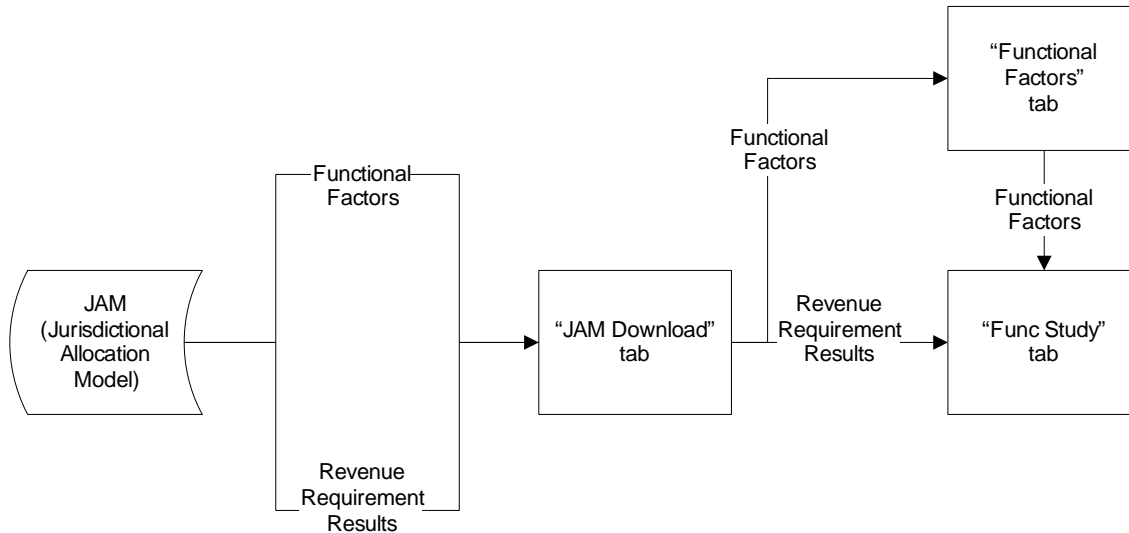
4.2. Downloading the JAM

The JAM (jurisdictional allocation model) is the model that PacifiCorp uses to determine the share of costs for which a particular state is responsible. The Company uses this model to determine the revenue requirement amount that it will file for a rate case. Also within the JAM, functional factors are developed that will be used within the cost of service model. The JAM is relayed to the cost of service. Cost of service department downloads it into the cost of service model.

To Download the Jam:

1. Open both the cost of service and JAM models in MS Excel.
2. In the cost of service model, select the drop-down menu option Update: JAM Inputs.
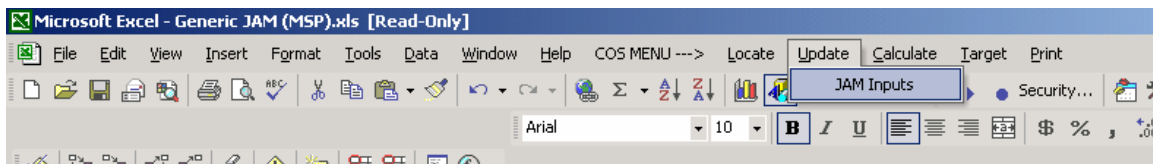
Selecting this menu option runs the UpdateJAMInputs macro, which selects the LinkJAM (named cell range) area in the JAM model under the tab labeled "Function", copies these cells and then selects the LinkCos (named cell range) area within the "JAM Download" tab of the cost of service study and pastes the values.

Note: If the JAM Download macro does not work, it is likely that the filename of either the JAM or the cost of service model is different from what is in the macro's code.

To check the macro:

1. In the cost of service model, select the drop-down menu Tools: Macro: Visual Basic Editor.
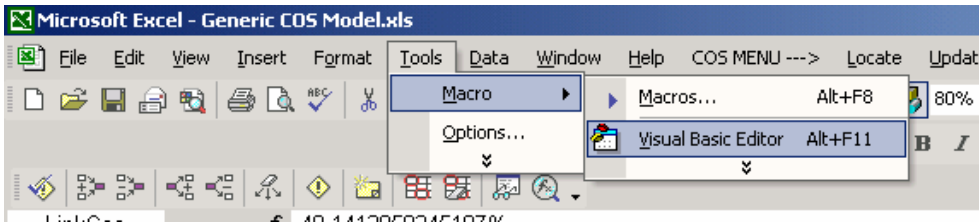
2. Microsoft Visual Basic will load up. Within Visual Basic, select View: Project Explorer.
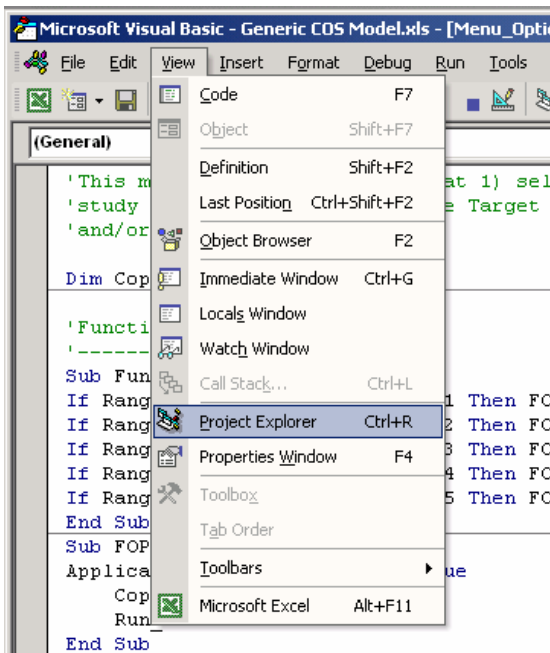
3. Project Explorer should open on the left-hand side of the screen. Click on the plus sign next to "Modules" under "Cost_study (Generic COS Model.xls)" to expand the selection. Double click on "Menu_Update_COS".

Step 1
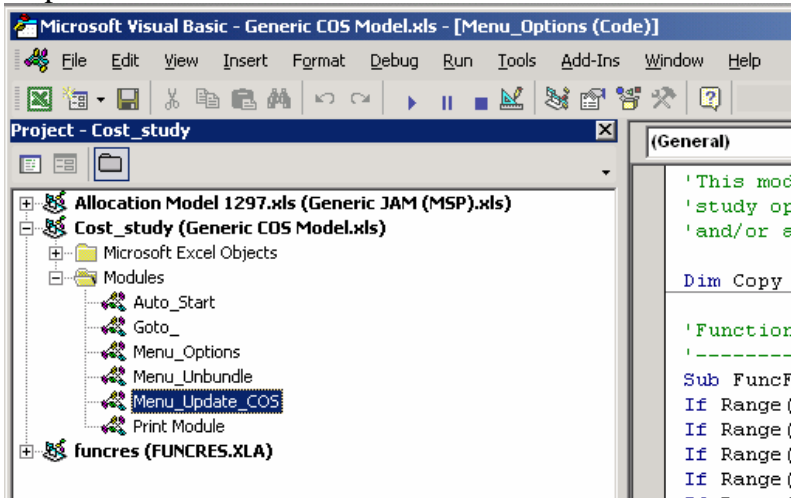
Step 2
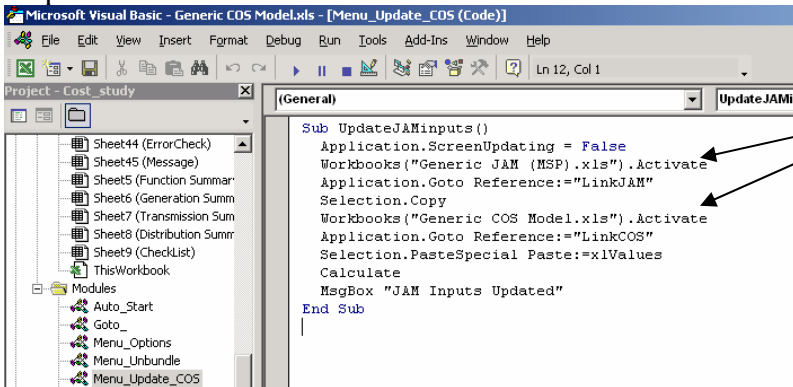
Filenames

4. Within the macro's coding are two filenames. If these do not match the filenames for the JAM and cost of service model that you are updating, change them accordingly and close down Visual Basic. Try to download the JAM again.

4.3. Internal and External Functional Factors

Take note that within the JAM are both internally and externally developed functional factors. The internal functional factors are developed from costs within the JAM on the "Function" tab of the JAM study. For example, the "PTD" functional factor is calculated by determining the percentages of plant that are production, transmission, and distribution within the JAM. External functional factors are calculated elsewhere and have therefore had their values pasted into the JAM. An example of an external functional factor is the "FERC" functional factor, which is calculated outside the JAM and is based on Form 582 that the Company files with FERC. The percentage values for this functional factor were pasted into the JAM.

4.4. Using Functional Factors

The "Func Factor Table" tab within the cost of service study links to the downloaded functional factors that are located on "JAM Download" tab for easier viewing and organization.

Within the "Func Study" tab, several tasks are performed. FERC account line items are brought forward from the "JAM Download". All line items, except for retail revenues, are apportioned among the functions and sub-functions by use of the functional factors. Functional Results are developed.

4.5. Functionalization Mechanics

Beginning on row 250 of the "Func Study" tab, the cost of service model begins apportioning costs among the functions, which is the process referred to as functionalization.

On Column H, the line items from the JAM are linked from the "JAM Download" tab. These items are the revenues, expenses, rate base additions and rate base subtractions that are used by the Company to develop jurisdictional revenue requirements. Many of these line items are further identified by the portions that are applicable to specific PITA factors. For example account 456 on rows 318 through 322 shows the Other Electric Revenue by PITA factors S, CN, SE, SO, and SG. The PITA factors are listed on Column F. On Column I, the choice of functional factor is displayed for each FERC account by PITA factor.

On columns J through N, each line item displayed on Column H is apportioned among the functions according to the functional factor choice listed. The formulas used to perform this apportionment employ the VLOOKUP function within Microsoft Excel to find the appropriate percentage within the "Func Factor Table" tab and multiply this percentage by the line item amount.

For example, on cell J378 the percentage value for the PTD functional factor is looked-up within the "Func Factor Table" (in this case that value is 51.48%) and is multiplied by the Account 421 value ($42,042) that is on the SO PITA factor resulting in the general total for that account ($21,644).

At the top of the "Func Study" tab on cells A1 through K81, functional summary results are displayed. As can be seen, Generation has Total Operating Expenses of $1,340,427,359 (cell G13). Distribution has State Income Taxes of $(2,148,467) (cell I18). Retail has Total Rate Base of $11,253,563 (cell J54).

5. Classification

5.1. Overview

Classification is the process where costs are classified into the following three categories: demand-related, energy-related or customer-related expenses. Demand-related costs are fixed costs imposed by the company when meeting maximum demand. Such costs may include generation facilities and transmission lines. Energy-related costs are variable costs associated with the output of energy (kWh). Such costs may include fuel costs. Customer-related costs are determined by the number of customers served. These costs are associated with meter reading, service drops, billing, etc. Depending on the cost causal relationship, functionalized costs (G, T, D, R, or M) may be classified to more than one of the three categories mentioned above.

Figure 3. Classification Process within the Model
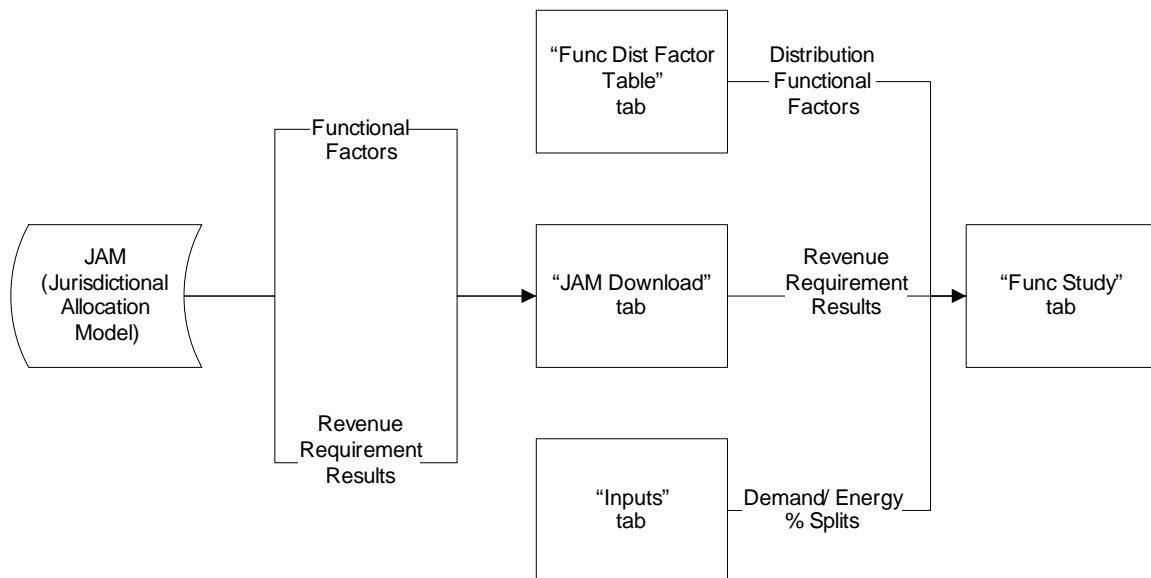
5.2. Classification Mechanics

The classification process occurs within the "Func Study" tab. On this worksheet, the costs are first functionalized as shown in the example below and as described in the functionalization section.

Functionalization

The costs in columns J through N have been determined by multiplying the costs from the JAM (column J) by the appropriate functional factor (column I). These calculations begin in cell J254 of this worksheet.

Once the costs have been functionalized, almost all costs are classified into one of following 9 sub-functions:

- Generation-demand
- Generation-energy
- Transmission-demand
- Transmission-energy
- Distribution-substation
- Distribution-poles and conductor
- Distribution-transformer
- Distribution-meter
- Distribution-service

Generation and transmission are classified as either demand or energy-related. The calculations start in cell Q254 of the "Func Study" tab. See below.

Classification of Generation and Transmission Sub-functions

Generic COS Model.xls

iew Insert Format Tools Data Window Help COS MENU ---> Locate

Arial 8

P	Q	R	S	T	U
O	P	Q	R	S	T
Total	Demand	Energy	Total	Demand	Energy
D / E Total	GEN Demand	GEN Energy	D / E Total	TRN Demand	TRN Energy
75%	-	-	75%	-	-
	-	-		-	-

Distribution costs are classified as shown below. This process starts in cell W254. The functionalized dollar amount from column L, row 254 is multiplied by the distribution factor listed on column V. The model accomplishes this by using MS Excel's VLOOKUP function and looking up the appropriate distribution functional factor from the "Func Dist Factor Table" tab. The named distribution factor is shown in column V. The distribution factor value is found on the "Func Dist Factor Table" tab.

Distribution Functional Factors

Classification of Distribution Function

Microsoft Excel - Generic COS Model.xls

File Edit View Insert Format Tools Data Window Help COS MENU ---> Locate Update

Arial 8 B I U

A244

	U	V	W	X	Y	Z	AA
244							
245							
246	T	U	V	W	X	Y	Z
247							
248	Energy						
249							
250	TRN	DIS	DIS	DIS	DIS	DIS	DIS
251	Energy	FACTOR	SUBS	P & C	XFMR	METER	SERVICE
252		MSP					
253							
254	-	DRB	-	-	-	-	-
255	-		-	-	-	-	-
256							
257							
258	-	DRB	-	-	-	-	-
259	-	DRB	-	-	-	-	-
260	-	DRB	-	-	-	-	-
261	-		-	-	-	-	-
262							

As an example of classification, Account 580 - Operation Supervision & Engineering is classified on cells W746 through AA748 on the "PLNT" distribution functional factor found on the "Func Dist Factor Table" tab. For the Distribution-substations sub-function, the "PLNT" distribution functional factor has a value of 15.48%. The total Account 580 value for the Distribution-substations sub-function is $1,453,518 (cell W748)

6. Allocation

6.1. Overview

Allocation is the process of spreading the costs among customer classes. Once the costs are functionalized and classified, the last step is allocation. Allocation takes place in the factor input tabs; the "COS Factors" tab, the "Func Study" tab, and the "Hot Sheet" tab and produces the unbundled tabs (Generation, Transmission, Distribution, Retail, and Misc). The development of the unbundled tabs is achieved by use of the "Unbundle_Function" macro. The unbundled tabs aggregate to both the "Summary Table" tab and the "G+T+D+R+M" tab. Some of the results within the "G+T+D+R+M" tab and unbundled tabs are used in the development of the cost of service factors on the "COS Factors" tab. Since the cost of service factors impact the results on the "G+T+D+R+M" tab and the results from the "G+T+D+R+M" tab are used to create some of the cost of service factors, several iterations must be completed.

Figure 4. Allocation Process within the Model
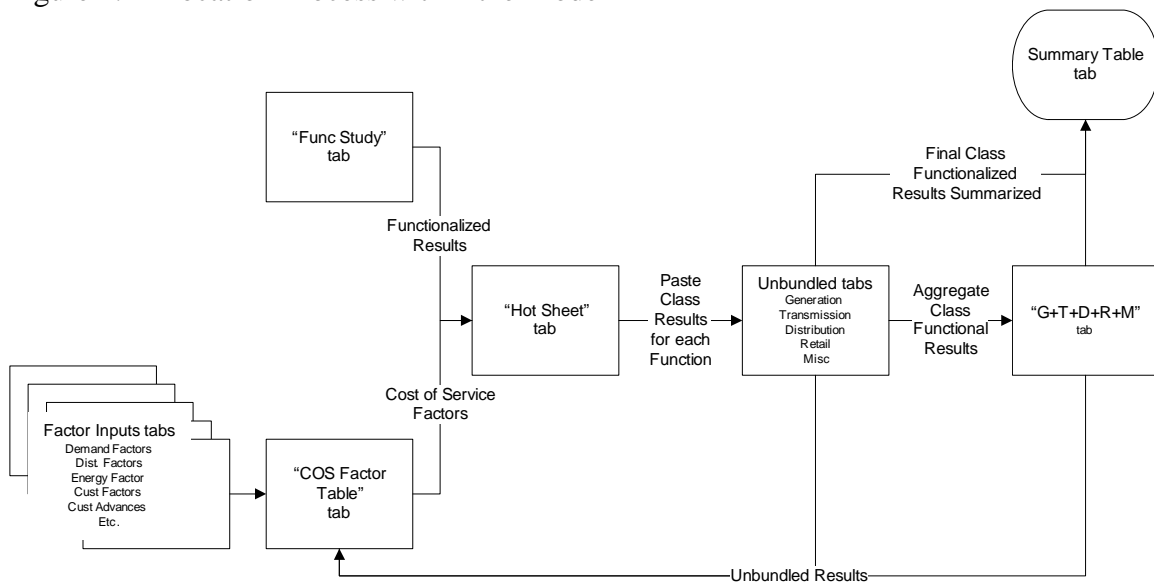
6.2. Factor Input Tabs

The inputs that occur in the model mostly occur within the following tabs labeled "Inputs", "Demand Factors", "Dist. Factors", "Energy Factor", "Cust Factors", "Cust Advances", "MeterServices", "Uncollectables", and "Revenues".

The "Inputs" tab contains the rate increase dollar amount, the target rate of return, the allocation / calculation option selections, tax rates, the net to gross factor, the proposed capital structure, the loss factors, the system and substation peaks, the demand / energy splits for several factors, the overhead / underground split for factor 134, and primary / secondary split for various distribution plant accounts. Below is description of where each item within the "Inputs" tab is used:

- The target rate of return is used within the "Function Summary", "Class Summary", and functional summary tabs to develop return on rate base across the functions at the target level. See section 9.1.
- The allocation / calculation factors determine which sets of factors will be used for functionalization or allocation. When selected, they move a set of factors from either the "Func Allocation Options" or "COS Allocations Options" tab and place that set onto either the "Func Study" or "Hot Sheet" tab.
- The net to gross factor is used within the "Function Summary", "Class Summary", and functional summary tabs to develop an equal rate of return across the functions. See section 9.1.
- The capital structure is used to develop the return on equity from the rate of return on the "G+T+D+R+M", "Hot Sheet", and "Func Study" tabs as wells as the functional output tabs ("Generation", "Transmission", etc.)
- The loss factors are used to bring demand and energy values from the sales level to the input level on the "Demand Factors", "Dist. Factors", "Energy Factor" tabs.
- The system peaks are used on the "Demand Factors" tab to weight the monthly system coincident peaks. The substation peaks are used on the "Dist. Factors" tab to weight the monthly distribution peaks.
- The demand / energy splits are used on the "Demand Factors" tab.
- The overhead / underground split for account 134 is used on the "COS Factor Table" tab.
- The primary / secondary splits for various distribution plant accounts are used on the "DistInvest" tab.

The "Demand Factors" tab contains raw data from load research for coincident system peaks. Data is entered according to rate schedule and voltage level at the Sales (meter) level and is increased to the Input (generator) level by multiplying the value by the loss factor located on the "Input" tab in cell D28. See below.

Rocky Mountain Power
KW Loads Coincident To System Peak
Merged Company Peaks
12 Months Ended Dec 2020
Coincident Peaks @ Input

	Sch	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20
Month:	COS										
Peak Date:	COS	1	3	17	4	25	27	17	3	7	31
Peak Time:	Sch	09:00	09:00	09:00	09:00	16:00	16:00	17:00	17:00	17:00	09:00
Residential											
Sch 001 sec	1	878,350	878,350	878,350	713,680	549,120	1,097,800	1,317,250	1,098,460	713,900	713,900
Sch 007 sec	7	-	-	-	-	-	-	-	-	-	-
Sch 025 sec	25	1,650	1,650	1,650	1,320	880	2,200	2,750	1,540	1,100	1,100
Sch 025 pri	25	-	-	-	-	-	-	-	-	-	-
Residential Total		880,000	880,000	880,000	715,000	550,000	1,100,000	1,320,000	1,100,000	715,000	715,000
General Service											
Sch 006 com	6	1,000,000	1,000,000	1,000,000	1,000,000	1,100,000	1,350,000	1,300,000	1,250,000	1,150,000	900,000
Sch 008 com	8	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Sch 007 sec	7	-	-	-	-	-	-	-	-	-	-
Sch 009 sub trn	9	424,000	424,000	424,000	424,000	424,000	424,000	424,000	424,000	424,000	424,000
Sch 023 sec	23	165,000	165,000	165,000	165,000	275,000	330,000	330,000	330,000	275,000	165,000
Cust A	contract	31,800	31,800	31,800	31,800	31,800	31,800	31,800	31,800	31,800	31,800
Cust B	contract	-	106,000	106,000	106,000	106,000	-	-	-	-	106,000
Cust C	contract	79,500	79,500	79,500	79,500	79,500	79,500	79,500	79,500	79,500	79,500
Gen Service Total		2,000,300	2,106,300	2,106,300	2,106,300	2,316,300	2,515,300	2,465,300	2,415,300	2,260,300	2,006,300
Irrigation											
Sch 010 sec	10	550	1,100	2,200	16,500	33,000	55,000	55,000	55,000	33,000	16,500
Street Lights											
Sch 011 sec	7	-	-	-	-	-	-	-	-	-	-
Sch 012 sec	7	-	-	-	-	-	-	-	-	-	-
Sch 104 sec	12	825	825	825	825	825	825	825	825	825	825
Sch 205 sec	12	-	-	-	-	-	-	-	-	-	-
St Lighting Total		825	825	825	825	825	825	825	825	825	825
State of Utah		2,881,675	2,988,225	2,989,325	2,838,625	2,900,125	3,671,125	3,841,125	3,571,125	3,009,125	2,738,625

The "Dist. Factors" tab contains raw data for distribution peaks and non-coincident peaks (billing demand) at the sales and input levels, which is also provided by load research and entered by rate schedule. See below.

State of Utah
Monthly Vgt Factors
12 Months Ended Dec 2020
Distribution Peaks @ Sales

Description	Sch	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20
COS	Sch	19	4	2	11	23	22	17	12	11	22	14
		12:00	14:00	12:00	11:00	15:00	17:00	16:00	16:00	16:00	14:00	12:00
Residential												
Sch 001 sec	1	798,500	798,800	598,900	598,800	898,500	1,697,000	1,398,000	1,298,000	1,098,300	599,000	698,900
Sch 007 sec	7	-	-	-	-	-	-	-	-	-	-	-
Sch 025 sec	25	1,500	1,200	1,100	1,200	1,500	3,000	2,000	2,000	1,700	1,000	1,100
Sch 025 pri	25	-	-	-	-	-	-	-	-	-	-	-
Residential Total		800,000	800,000	600,000	600,000	900,000	1,700,000	1,400,000	1,300,000	1,100,000	600,000	700,000
General Service												
Sch 006 com	6	1,100,000	1,000,000	1,100,000	1,000,000	1,300,000	1,100,000	1,300,000	1,400,000	1,400,000	1,200,000	1,100,000
Sch 008 com	8	275,000	275,000	275,000	275,000	275,000	275,000	275,000	275,000	275,000	275,000	275,000
Sch 007 sec	7	-	-	-	-	-	-	-	-	-	-	-
Sch 023 sec	23	300,000	300,000	250,000	250,000	300,000	300,000	250,000	300,000	350,000	250,000	200,000
General Service Total		1,675,000	1,575,000	1,625,000	1,475,000	1,875,000	1,675,000	1,825,000	1,975,000	2,025,000	1,725,000	1,575,000
Irrigation												
Sch 010 sec	10	500	500	2,000	15,000	45,000	50,000	50,000	45,000	35,000	15,000	5,000
Street Lights												
Sch 011 sec	7	-	-	-	-	-	-	-	-	-	-	-
Sch 012 sec	7	-	-	-	-	-	-	-	-	-	-	-
Sch 104 sec	12	750	750	750	750	750	750	750	750	750	750	750
Sch 205 sec	12	-	-	-	-	-	-	-	-	-	-	-
St Lighting Total		750	750	750	750	750	750	750	750	750	750	750
State of Utah		2,476,250	2,376,250	2,227,750	2,090,750	2,820,750	3,425,750	3,275,750	3,320,750	3,160,750	2,340,750	2,280,750

Dist Peaks @ sales		Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20
Sch 001 (sec)	1	800,000	800,000	600,000	600,000	900,000	1,700,000	1,400,000	1,300,000	1,100,000	600,000	700,000
Sch 025 (sec)	25	1,500	1,200	1,100								

The "Energy Factor" tab has MWh sales data from customers as provided by the pricing department. The MWh within this tab are also increased to the input level. See below.

	COS Sch	Jan-20	Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	
			Cost Of Service By Rate Schedule							
			State of Utah							
			Monthly Wgt Factors							
			12 Months Ended Dec 2020							
			mWh @ sales							
Residential										
Sch 1 sec	1	600,000	500,000	500,000	400,000	400,000	500,000	750,000	700,000	50
Sch 2 sec	1	200	200	200	150	200	200	250	250	
Sch 3 sec	1	15,000	15,000	15,000	15,000	15,000	17,000	20,000	17,000	1
Sch 25 sec	25	1,000	1,000	1,000	750	750	1,000	1,200	1,000	
Residential Total		616,200	516,200	516,200	415,900	415,950	518,200	771,450	718,250	5
General Service										
Sch 6 sec	6	507,520	507,520	507,520	507,520	507,520	507,520	556,296	605,072	50
Sch 6 pri	6	12,980	12,980	12,980	12,980	12,980	12,980	14,204	15,428	1
Sch 8 sec	8	93,651	93,651	93,651	93,651	93,651	109,259	109,259	109,259	10
Sch 8 pri	8	56,349	56,349	56,349	56,349	56,349	65,741	65,741	65,741	6
Sch 9 sub trn	9	304,000	304,000	304,000	304,000	304,000	304,000	304,000	304,000	30
Sch 23 sec	23	100,000	100,000	100,000	100,000	100,000	115,000	130,000	130,000	1
General Service Total		1,074,500	1,074,500	1,074,500	1,074,500	1,074,500	1,114,500	1,179,500	1,229,500	1,1
Irrigation										
Sch 10 sec	10	500	500	1,200	10,000	25,000	35,000	40,000	35,000	2
Street Lights										
Sch 7,11,12,13 sec	7,11,12,13	7,835	7,835	7,835	7,835	7,835	7,835	7,835	7,835	
Sch 12 sec	Traffic signals	500	500	500	500	500	500	500	500	
Sch 12 sec	Metered outdoor lgt	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	
Street Lighting Total		9,335	9,335	9,335	9,335	9,335	9,335	9,335	9,335	

The "Cust Factors" tab uses the average number of customers by class as provided by the pricing department and the Account 901 and Account 902 weighting factors to develop Factors 40 through 48. See below.

		A	B	C	D	E	F	G	H
		Customer Factors Detail							
				Rocky Mountain Power					
				Cost Of Service By Rate Schedule					
				State of Utah					
				Monthly Wgt Factors					
				12 Months Ended Dec 2020					
				Weighted Customer Factors					
		A	**B**	**C**	**D**	**E**	**F**	**G**	**H**
				COS Schedule	Average Customers	Account 902	Total Acct 902 Customers	Account 903	Total Acct 903 Customers
		Description			**(F 40)**	**Weighting**	**(F 41)**	**Weighting**	**(F 42)**
	1	**Residential**		1	700,000	1.00	700,000	1.00	700,000
	2			2	500	1.00	500	1.00	500
	3			3	25,000	1.00	25,000	1.00	25,000
	4			25	15	2.00	30	1.00	15
	5	Total			725,515		725,530		725,515
	6								
	7								
	8	**Commercial**		6	15,000	3.00	45,000	1.25	18,750
	9			8	200	3.00	600	1.25	250
	10			9	25	7.00	175	6.00	150
	11			23	75,000	2.25	168,750	0.75	56,250
	12	Total			90,225		214,525		75,400
	13								
	14								
	15	**Industrial**		6	1,500	3.00	4,500	1.25	1,875
	16			8	125	3.00	375	1.25	156
	17			9	100	7.00	700	6.00	600
	18			23	5,000	2.25	11,250	0.75	3,750
	19			Cust B	1	300.00	300	6.00	6
	20			Cust C	1	300.00	300	6.00	6
	21			Cust A	1	300.00	300	6.00	6
	22	Total			6,728		17,725		6,399
	23								
	24								
	25	**Irrigation - annual cust**		10	2,500	4.00	10,000	1.40	3,500
	26			TOD	250	4.00	1,000	1.40	350
	27	Total			2,750		11,000		3,850
	28								
	29	**Irrigation - ave billing**		10	1,500	4.00	6,000	1.40	2,100
	30			TOD	150	4.00	600	1.40	210
	31	Total			1,650		6,600		2,310
	32								
	33								
	34	**Street Lighting**		11	1,000	-	-	1.00	1,000
	35			12	500	-	-	1.00	500
	36			13	750	-	-	-	-

The "MetersServices" tab develops meter and service drop factors. Customer counts broken out by load size and voltage level from the pricing department as well as the cost of newly installed meters and service drops from engineering are input into this tab. Additionally, the percentage split of overhead and underground is used to develop weighted service drop costs for each customer level. Factors 60 and 70 are developed in this section of the model. See below.

The "Customer Advances" tab lists deposits and contribution in aid of construction for customers in each class. Factors 50 and 51 are developed on this worksheet. See below.

PacifiCorp
Utah Marginal Cost Study
Summary of Average Installed Costs
Service Drops

Line	Load Class	(A) Service Conductor	(B) Installed Cost 2008	(C) Indexed to 2009 (Col B = .9793 - O/H, Col B = .9547 - U/G)	(D) Percent Use	(E) Total Cost per Service
1	**Residential**					
2	OH - small load	#2 Triplex	$425.00	$416.20	30.80%	$128.19
3	OH - all electric	1/0 Triplex	$500.00	$489.65	4.20%	$20.57
4	UG - small load	1/0 triplex	$425.00	$405.75	57.20%	$232.09
5	UG - all electric	4/0 triplex	$485.00	$463.03	7.80%	$36.12
6						$416.96
7						
8	**0 - 30 kW**					
9	kW - 0, 1 Phase	OH - 1/0 Triplex	$550.00	$538.62	35.00%	$188.52
10		UG - 1/0 triplex	$560.00	$534.63	65.00%	$347.51
11						$536.03
12						
13	kW - 0, 3 Phase	OH - 1/0 Quadruplex	$750.00	$734.48	35.00%	$257.07
14		UG - 1/0 quadruplex	$800.00	$763.76	65.00%	$496.44
15						$753.51
16						
17	kW > 1, 1 Phase	OH - 4/0 Triplex	$800.00	$783.44	35.00%	$274.20
18		UG - 4/0 triplex	$600.00	$572.82	65.00%	$372.33
19						$646.54
20						
21	kW > 1, 3 Phase	OH - 4/0 Quadruplex	$950.00	$930.34	35.00%	$325.62
22		UG - 4/0 quadruplex	$850.00	$811.50	65.00%	$527.47
23						$853.09
24						
25	**30 - 100 kW**					
26	1 Phase	OH - 2 - 4/0 Triplex	$1,500.00	$1,468.95	35.00%	$514.13
27		UG - 2 - 4/0 triplex	$1,100.00	$1,050.17	65.00%	$682.61
28						$1,196.74
29						
30	3 Phase	OH - 2-4/0 Quadruplex	$1,800.00	$1,762.74	35.00%	$616.96
31		UG - 2-4/0 quadruplex	$1,600.00	$1,527.52	65.00%	$992.89
32						$1,609.85
33						
34	3 Phase WKVAR	OH - 2-4/0 Quadruplex	$1,800.00	$1,762.74	35.00%	$616.96
35		UG - 2-4/0 quadruplex	$1,600.00	$1,527.52	65.00%	$992.89
36						$1,609.85

Customer Advances Factors (F50-F51)

Rocky Mountain Power
Cost Of Service By Rate Schedule
State of Utah
Monthly Wgt Factors
12 Months Ended Dec 2020
Customer Advances Factor

	Description	A Residential Sch 1	B General Large Dist. Sch 6	C General >1 MW Sch 8	D Street & Area Lighting Sch. 7,11,12	E General Trans Sch 9	F Irrigation Sch 10	G Traffic Signals Sch 12	H Outdoor Lighting Sch 12	J Gener Small D Sch 2
1	**Revenue**									
2	Residential	546,200,000								
3	Com / Ind		423,575,000	120,000,000		156,200,000				103,525
4	Irrigation						10,000,000			
5										
6	**Customer Advances**									
7	Residential	900,000								
8	Com / Ind		2,741,927	776,796		1,011,129				670
9	Irr						75,000			
10	Total Cust Advances	900,000	2,741,927	776,796	-	1,011,129	75,000	-	-	670
11					-					
12	**FACTOR 50**	14.5749%	44.4037%	12.5797%	0.0000%	16.3746%	1.2146%	0.0000%	0.0000%	10.85
13										
14										
15	Security Deposits	2,000,500	133,000	500,000	10,500	180,000	125,000	1,000	15,000	3,000
16										
17	**FACTOR 51**	30.0150%	1.9955%	7.5019%	0.1575%	2.7007%	1.8755%	0.0150%	0.2251%	45.01

Contribution in Aid of Construction

UT Residential	900,000	
UT Commercial	1,200,000	
UT Industrial	4,000,000	
UT Irrigation	75,000	
Total	6,175,000	

Deposits Charged by State

08RESD0001	2,000,000	Res
08RESD0002	500	Res
08GNSV0006	30,000	Sch 6
08GNSV0006A	100,000	Sch 6
08GNSV0006B	3,000	Sch 6
08GNSV0008	500,000	Sch 8
08OALT007N	10,000	Sch 7,11,12
08OALT007R	500	Sch 7,11,12
08OSLOU1202	1,000	Sch 12 (TS)
08OSLOU1203	15,000	Sch 12 (MONL)

The "Uncollectables" tab lists the written-off dollar amount due to non-payment and recovery dollar amounts through collection activities by class. Factor 80 is developed on this worksheet. See below.

Uncollectables	Writeoffs	Recoveries	Net Write-offs
Residential	(5,000,000)	1,900,000	(3,100,000)
Commercial	(750,000)	300,000	(450,000)
Industrial	(50,000)	30,000	(20,000)
Irrigation	(5,000)	250	(4,750)
Total	(5,805,000)	2,230,250	(3,574,750)

The "Revenues" tab lists revenues by rate schedule. See below.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
				General Large Dist.	General +1 MW	Street & Area Lighting	General Trans	Irrigation	Traffic Signals	Outdoor Lighting	General Small Dist.	Mobile Home Park	Industrial	Industrial	Industrial	
	Customer Class		Residential Sch 1	Sch 6	Sch 8	Sch. 7,11,12	Sch 9	Sch 10	Sch 12	Sch 12	Sch 23	Sch 25	Cust A	Cust B	Cust C	Total
Line																
1	Residential		546,200,000	-	-	-	-	-	-	-	-	1,000,000	-	-	-	547,200,000
2																
3	Commercial		-	368,250,000	60,000,000	-	12,000,000	-	-	-	100,000,000	-	-	-	-	540,250,000
4																
5	Industrial		-	55,250,000	60,000,000	-	126,200,000	10,000,000	-	-	3,500,000	-	3,000,000	25,000,000	22,000,000	310,950,000
6																
7	Lighting		-	-	-	10,580,000	-	-	500,000	800,000	-	-	-	-	-	11,880,000
8																
9	OSPA		-	75,000	-	-	18,000,000	-	-	-	25,000	-	-	-	-	18,100,000
10																
11	Interdepartmental		-	-	-	-	-	-	-	-	-	-	-	-	-	-
12																
13																
14	Total Revenues		546,200,000	423,575,000	120,000,000	10,580,000	156,200,000	10,000,000	500,000	800,000	103,525,000	1,000,000	3,000,000	25,000,000	22,000,000	1,428,380,000
15																
16																
17	Total AGA Revenues		339,263	2,157,665	455,653	-	324,240	-	20,000	-	562,442	731	-	-	-	3,920,000
18	Misc Revenues		-	-	-	-	-	-	-	-	-	-	-	-	-	-
19	Gross Receipts Adj.		-	-	-	-	-	-	-	-	-	-	-	-	-	-
20	Commercial Vol Discount		-	-	-	-	-	-	-	-	-	-	-	-	-	-
21	Industrial Vol Discount		-	-	-	-	-	-	-	-	-	-	-	-	-	-
22	Unbilled Revenue Adj.		-	-	-	-	-	-	-	-	-	-	-	-	-	-
23	Firm Revenue		546,539,263	425,732,665	120,455,653	10,580,000	156,524,240	10,000,000	520,000	800,000	104,087,442	1,000,731	3,000,000	25,000,000	22,000,000	1,432,300,000
24		F141	38.16%	29.72%	8.41%	0.74%	10.93%	0.70%	0.04%	0.06%	7.27%	0.07%	0.63%	1.75%	1.54%	100.00%
25																
26	Non-Firm		-	-		-	-	-	-	-	-	-	-	-	-	-
27																
28																
29	Total Revenue		546,539,263	425,732,665	120,455,653	10,580,000	156,524,240	10,000,000	520,000	800,000	104,087,442	1,000,731	3,000,000	25,000,000	22,000,000	1,432,300,000

6.3. Cost of Service Factors

On the "COS Factors Table" tab, the cost of service factors are developed from the various inputs tabs described in the section above. Additionally many of the cost of service factors are developed from the "G+T+D+R+M" tab and unbundled tabs. Factors 10 through 96 and 141 are developed from the various inputs sheets. Factors 101 through 140 are developed from the "G+T+D+R+M" tab and the unbundled tabs. See Table 1 from in the Appendix for a listing where each cost of service factor is derived. The cost of service factors are used to allocate the functionalized costs to each customer class within the "Hot Sheet" tab.

6.4. Hot Sheet Iterations

To develop the tabs labeled "G+T+D+R+M", "Generation", "Transmission", "Distribution", "Retail" and "Misc", the five functional results are copied over from the "Func Study" tab to the "Hot Sheet" tab and allocated amongst the customer classes. When the command Calculate: Entire Model is selected, all five functions and all 9 sub-functions are copied into the "Hot Sheet" tab, calculated and then pasted into their unbundled tabs. Below is a conceptual diagram and illustration.

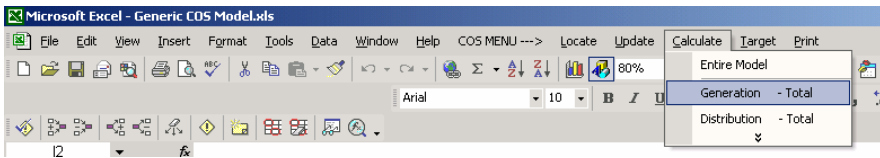Figure 5. Conceptual Illustration of Allocation

Functional and Sub-functional
Results by Class

	Residential Sch 1	General Large Dist. Sch 6	General 1 MW+ Sch 8	Street & Area Lighting Sch 7,11,12	General Trans Sch 9	Irrigation Sch 10	....

Functional Results

- Generation
- Transmission
- Distribution
- Retail
- Misc

Sub-Functional Results

- Generation Demand
- Generation Energy
- Transmission Demand
- Transmission Energy
- Distribution Substations
- Distribution Poles & Conductor
- Distribution Transformers
- Distribution Service Drops
- Distribution Meters

"Func Study" tab
Functionalizes and Classifies Costs to Function and Sub-Function

"Hot Sheet" tab
Performs Allocation to Customer Classes

Unbundled tabs
("Generation", "Transmission", "Distribution", "Retail", and "Misc" tabs)

Under the "Calculate" menu selection, any of the functions or sub-functions can be unbundled individually or the entire model can be calculated.

To follow the allocation of the generation function, follow the steps below:

1. Make sure that the cost of service model is open and the JAM is closed. (Having the JAM open at the same time will cause the cost of service model to run slowly.)

2. Select the menu option Calculate: Generation - Total.

3. The model should just have unbundled the generation function. Go to the "Hot Sheet" tab. Notice that the heading in cell E1 has been changed to read "Generation – Total – Unbundled". The "Hot Sheet" tab now displays the unbundled results for the total generation function. This will mirror what is in the "Generation" tab.

6. Open up the MS Visual Basic code for the unbundled macro by selecting Tools: Macro: Visual Basic Editor.

7. Microsoft Visual Basic will load up. Within Visual Basic, select View: Project Explorer.
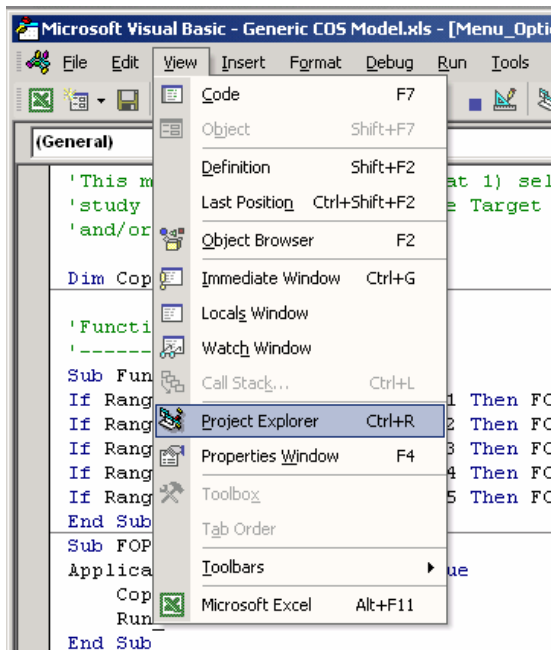
8. Project Explorer should open on the left-hand side of the screen. Click on the plus sign next to "Modules" under "Cost_study (Generic COS Model.xls)" to expand the selection. Double click on "Menu_Unbundle".
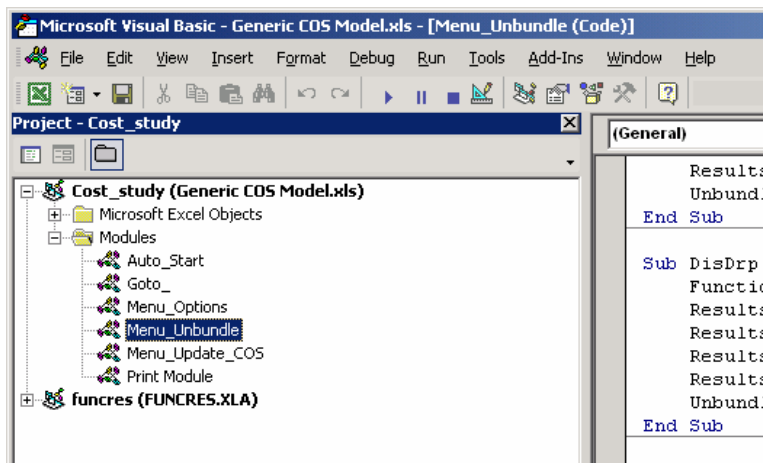
9. About mid-way down the coding, notice the TotGen() sub-routine. This piece of coding sets the term "Function_Source" to the "GenTot" named cell range and the term "Results_Paste" to the "Generation1" named cell and then runs the Unbundle_Function sub-routine.
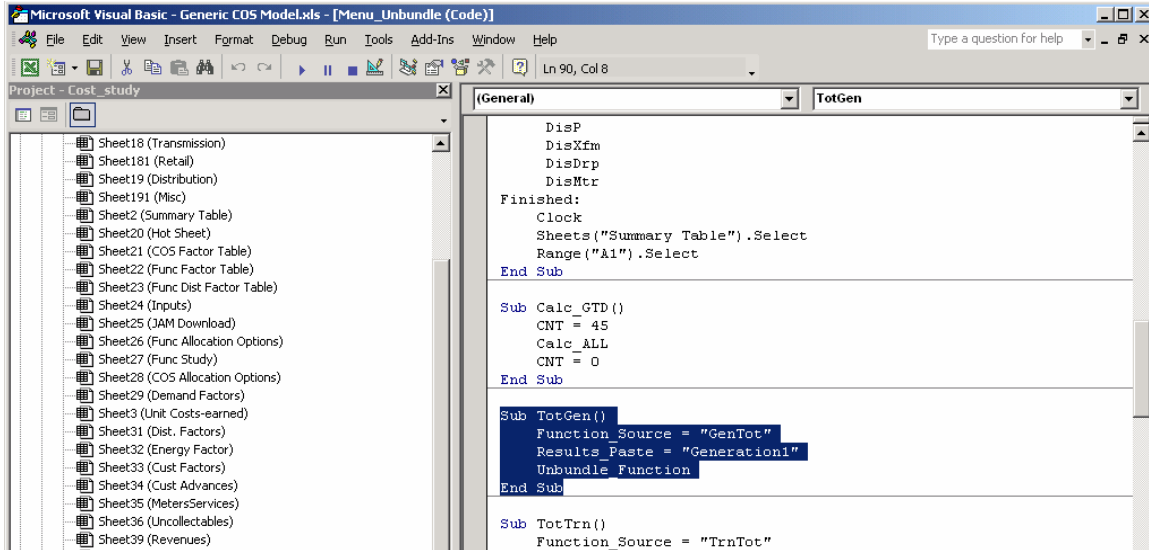
The Unbundle_Function() sub-routine slightly further down on the coding describes that it will do the following

1. Go to the term Function_Source, which has been set to the named cell range of "GenTot".
2. Copy this range.
3. Go to the named cell range of "UACCT".
4. Paste the values.
5. Calculate.
6. Go to the named cell range "Results".
7. Copy this range.
8. Go to the term Results_Paste, which has been set to the "Generation 1" named cell range.
9. Paste the values.
10. Calculate.
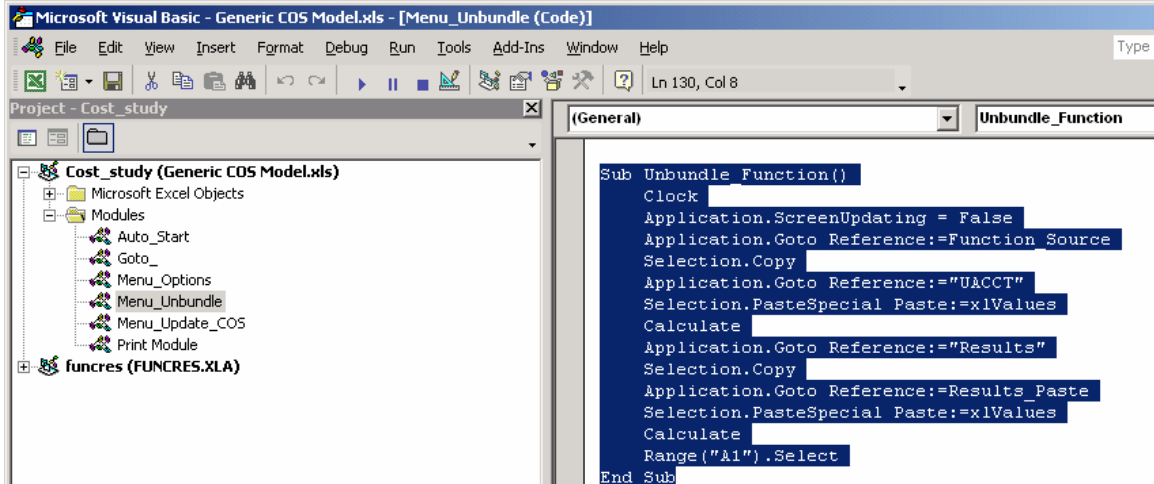
This same coded logic can be followed manually. To follow the coding manually, follow these steps:

1. Select GenTot named range by clicking on the upper left-hand drop down box and navigating to GenTot. For convenience type in the letter "g" to go straight to this section.
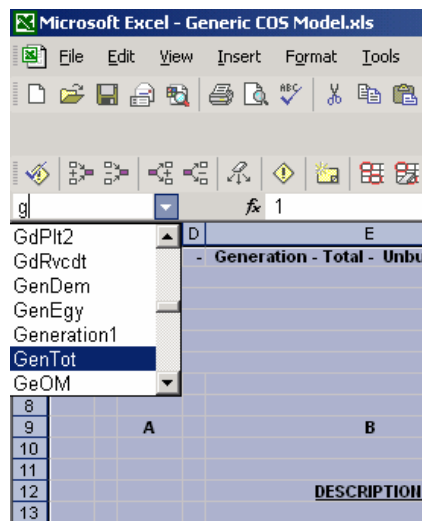
2. The destination for the named range cells is J250:J2463 of the "Func Study" tab.
3. Copy this range by hitting Ctrl-c or by selecting the Edit: Copy from the menu.
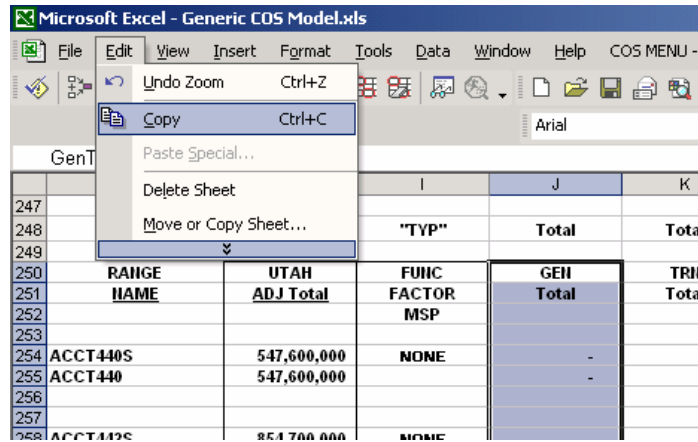
4. Go to the UAcct named cell range following the same procedure completed in step 1.
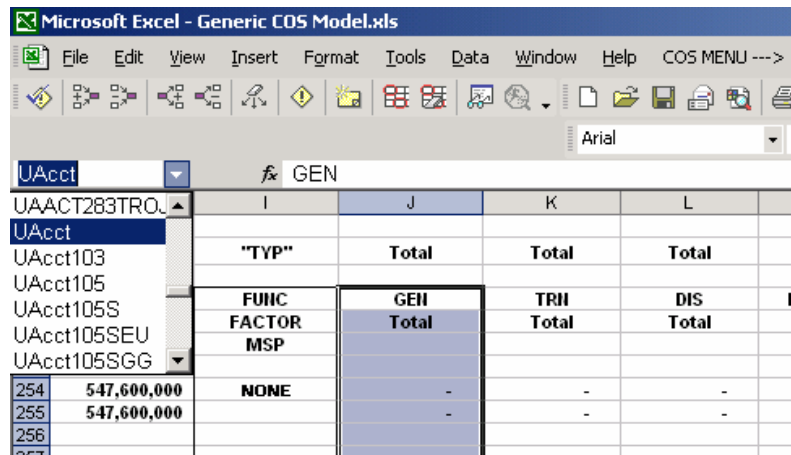
5. Select the Edit: Paste Special from the menu.
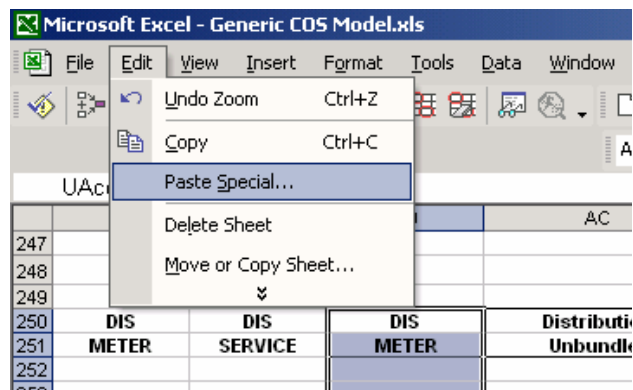
6. Select values and hit OK.
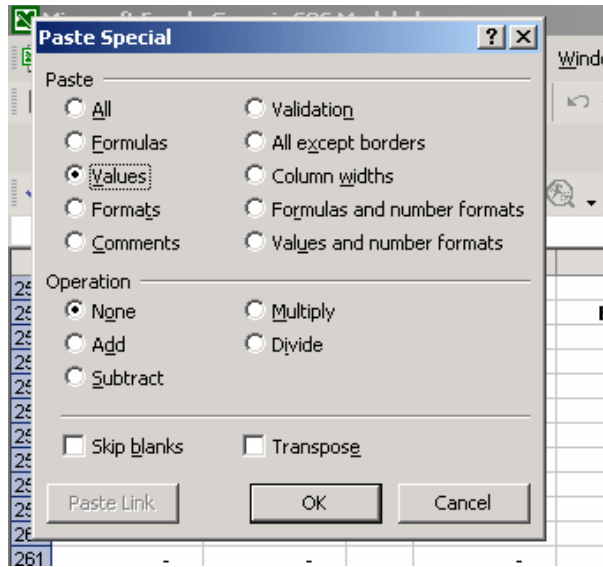
7. Hit F9 to calculate. The functionalized results for generation that were in the "Func Study" tab have just been copied and pasted into the "Hot Sheet" tab. The calculations from the "Hot Sheet" are employed to allocate to the customer classes
8. Go to the named cell range labeled "Results".
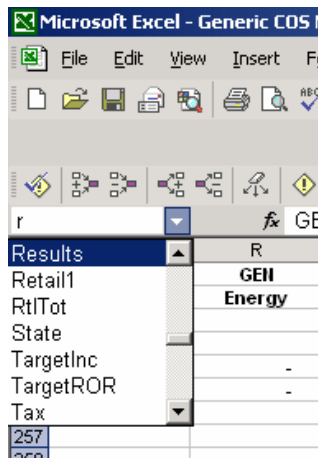
9. Copy this range by hitting Ctrl-c or by selecting the Edit: Copy from the menu.
10. Go to the named cell range "Generation 1".
11. Select Edit: Paste Special from the menu.
12. Select Values and hit OK.
13. Hit F9 to calculate. The results for the generation function as they have been allocated to the customer classes have been pasted to the "Generation" tab from the "Hot Sheet" tab. All instructions have been completed for the generation function.

The unbundling for the other four functions can be done by following the code in the same way for the TotTrn(), TotDis(), TotRet(), and TotMisc() sub-routines. The coding can also be followed for the unbundling of the sub-functions, by walking through the GenDE(), GenEG(), TrnDE(), TrnEG(), DisSUB(), DisP(), DisXfm(), DisMtr(), and DisDrp() sub-routines. When the menu option "Calculate: Entire Model" is selected, all

of the functions and sub-functions are unbundled several times. This ensures that all cost of service factors and functionalized class results have been fully developed.

Another way to follow the macros is to step through each macro line-by-line and watch the results as they happen. To do this, follow the steps below:

1. Open up the MS Visual Basic code for the unbundled macro by selecting Tools: Macro: Visual Basic Editor.
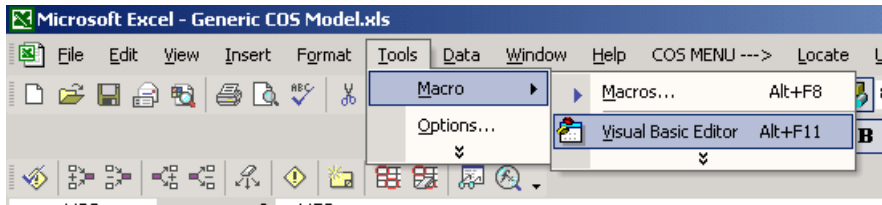
2. Microsoft Visual Basic will load up. Within Visual Basic, select View: Project Explorer.
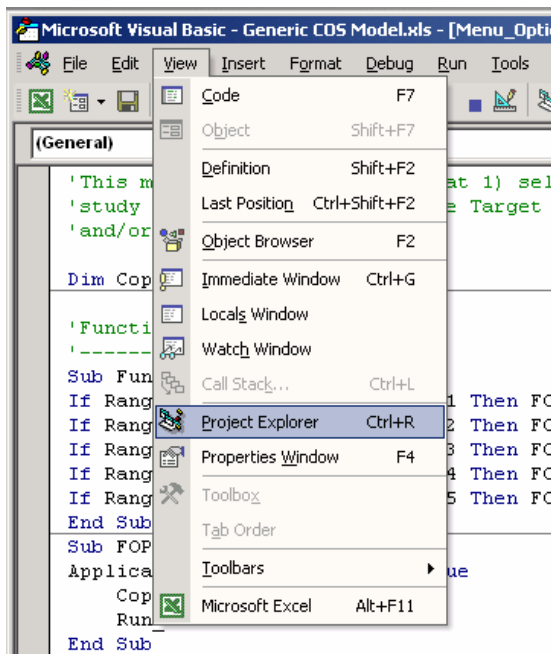
3. Project Explorer should open on the left-hand side of the screen. Click on the plus sign next to "Modules" under "Cost_study (Generic COS Model.xls)" to expand the selection. Double click on "Menu_Unbundle".
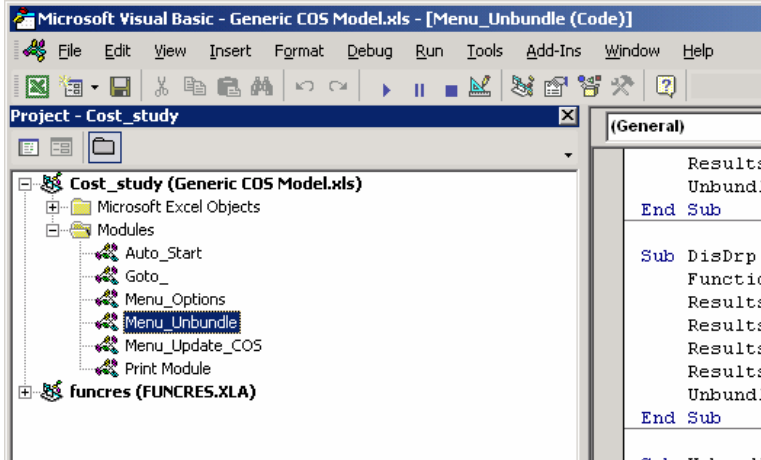
4. Split the screens as shown below so that the actions from Visual Basic can be seen in Excel. This can be done by minimizing both Excel and Visual Basic and sizing each to half the size of the screen.
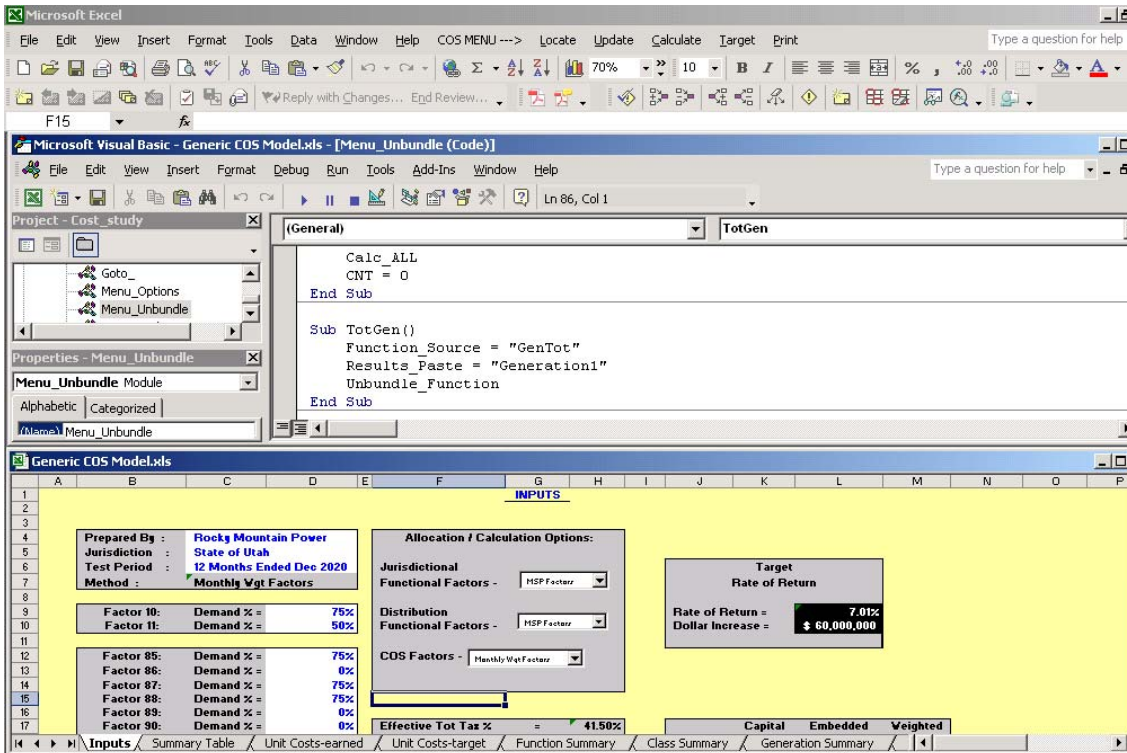
5. In Visual Basic, place cursor in front of "Sub TotGen ()" as shown below.

Cursor
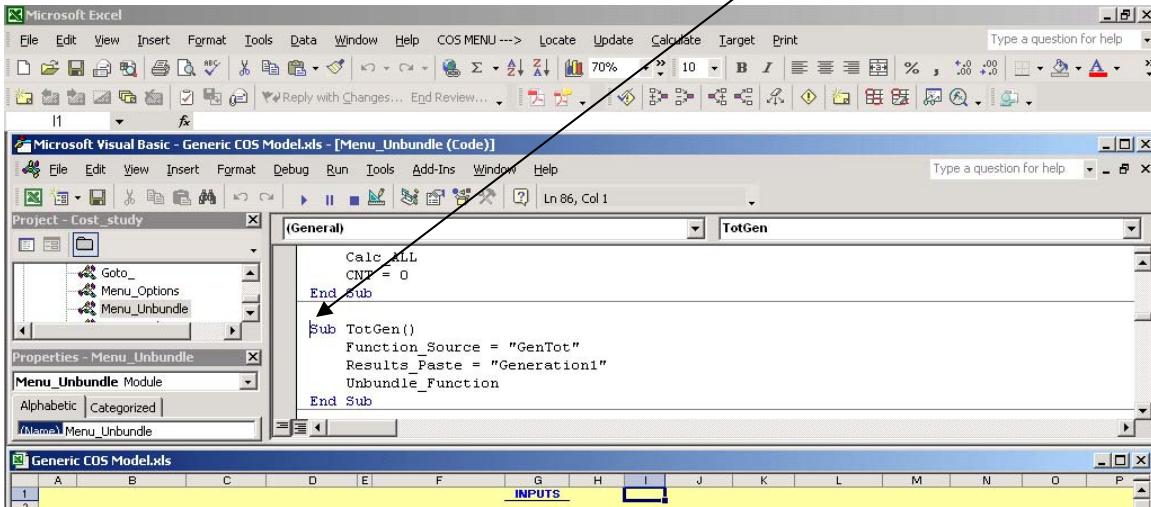
6. Press F8 to follow the Visual Basic code line-by-line. Below in Excel, the actions occur as the Visual Basic code is followed above. Continue to press F8 until that section is complete and the cursor is on "End Sub" as shown below.

       1. Once the cursor is on "End Sub", click the stop button to stop Visual Basic.

       2. Please note that some of the coding will go through the clock mechanism built into the Visual Basic coding. This can be ignored.
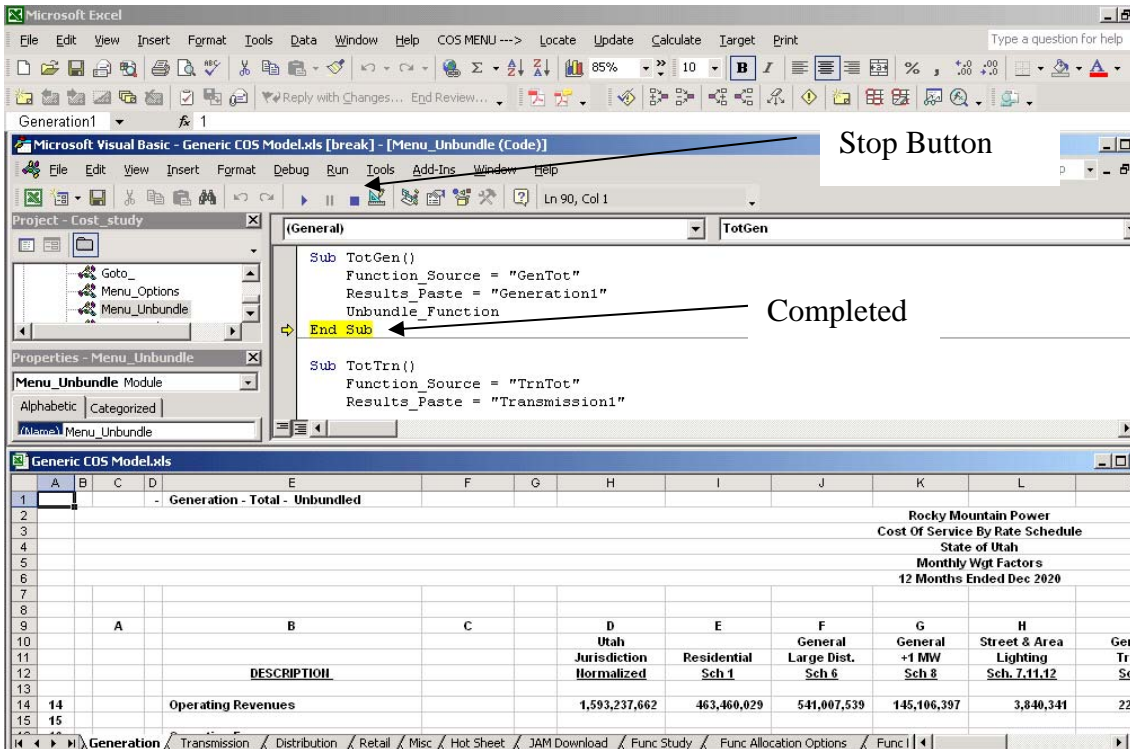
7. Step 6 can be completed for each function: TotTrn(), TotDis(), TotRet(), and TotMisc() sub-routines. The coding can also be followed for the unbundling of the sub-functions, by stepping through the GenDE(), GenEG(), TrnDE(), TrnEG(), DisSUB(), DisP(), DisXfm(), DisMtr(), and DisDrp() sub-routines.

9.1. Setting Equal Rate of Return Across the Functions

One of the main underlying principles within the cost of service study in determining required revenue from the classes is that return on rate base is held equal across all functions and rate classes. In other words, for every dollar of rate base allocated to the functions and classes, a specified return is required to bring each class to cost of service. It is important to realize that three different types of rate of return are used in the study: overall rate of return at the target level, overall rate of return at the earned level, and actual rate of return for each rate class. These values represent what each class should be earning at the requested revenue level, what each class should be earning at the current revenue level, and what each class is actually earning respectively.

On the "Function Summary", "Class Summary", "Generation Summary", "Transmission Summary", "Distribution Summary", "Retail Summary", and "Misc Summary", both overall target and earned return on rate base is calculated by multiplying the rate of return by the total rate base within each summary sheet. Return on rate base, revenue credits and operating expenses are added together to get revenue requirements. For target revenue requirements, the operating expenses are adjusted for taxes using the net to gross factor from the "Inputs" tab. The target rate of return is located within the "Inputs" tab and is determined based upon user input of a target overall rate increase or target rate of return percentage. The earned rate of return is developed within the "G+T+D+R+M" tab.

Within the "G+T+D+R+M" tab, the overall earned rate of return is developed at the top summary level section by dividing the overall Operating Revenue for Return by the Total Rate Base. See cell H61 within the generic model which also has the named cell value of "ActualROR". Total rate base comprises the allocated rate base additions and deductions. Operating revenues are determined by subtracting allocated expenses from revenues. Revenues for each rate class are derived from the actual retail revenue and allocated portions of other revenue types such as Sales for Resale and Other Electric Operating Revenues.

The overall earned rate of return which is developed within the "G+T+D+R+M" tab influences revenue requirements at the earned level which influences the cost of service allocation factors, which in turn influence the "G+T+D+R+M" tab. The setting of an overall rate of return across the functions and sub-functions is therefore an iterative process which is developed as the unbundled macro progresses.

Along with overall earned and target rates of return, individual rates of return are developed for each rate class within the "G+T+D+R+M" tab based upon the same method. Since revenues, rate base, and expense vary by rate class, each rate class is shown to be achieving a different rate of return. See cells I61 through U61 on the "G+T+D+R+M" tab of the generic model. These individual rates of return are used within the "Hot Sheet" tab to develop operating revenues by function and sub-function. These operating revenues within the "Hot Sheet" tab are then used in each of the unbundled tabs to show the increase or decrease in revenue required to bring each class to the overall average rate of return. This is done, because retail revenue is not available by function and the various functional output sheets need to show this detail.

Revenue requirements for all classes and functions are developed upon an overall jurisdictional return on rate base. The "G+T+D+R+M" tab and the output sheets ("Generation", "Transmission , "Distribution", etc.) show results at the earned level and the summary sheets ("Function Summary", "Class Summary", "Generation Summary", "Transmission Summary", etc.) show results both at the earned and target levels. The "Summary Table" tab shows how each rate class's actual return on rate base from present revenue levels varies from the overall jurisdictional return on rate base at both earned and target levels. See the diagram below for an illustration of how each rate of return fits into the cost of service model.

Figure 6. Rates of Return in the Cost of Service Study
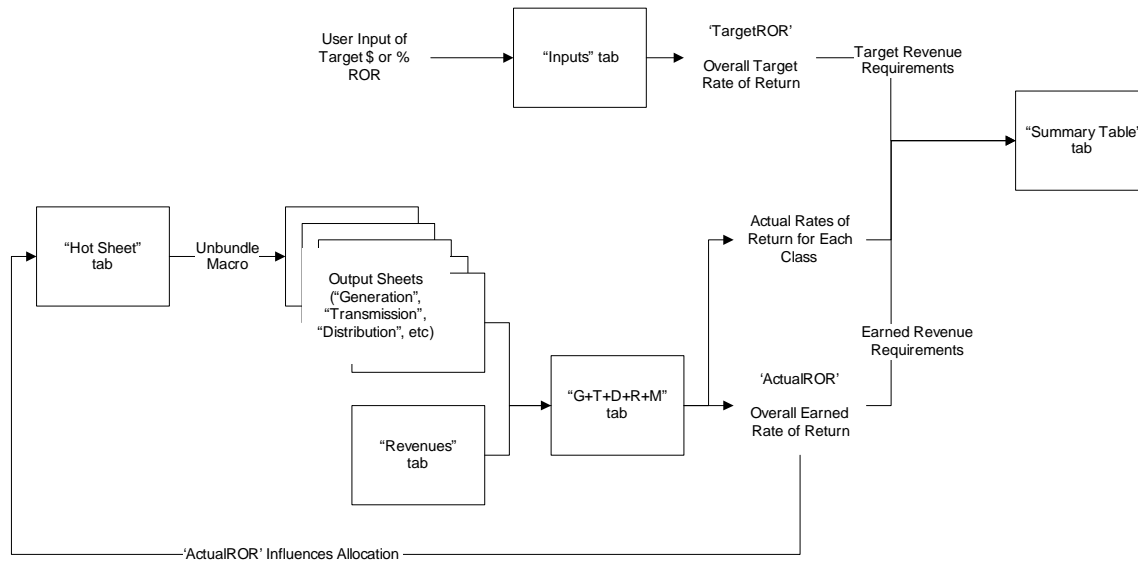
7. Changing and Customizing the Cost of Service Model

7.1. How to Change Demand/Energy Percentages

To change the demand and energy percentages, only the F10 (cell D9) demand percentage on the "Input" tab needs to be changed. The energy percentage will automatically change after the demand percentage has been changed. By making the changes on the "Input" tab, the calculations will flow through the entire model. To complete calculations, hit F9 after each percentage change and re-calculate the entire model. See below for an illustration.

F10
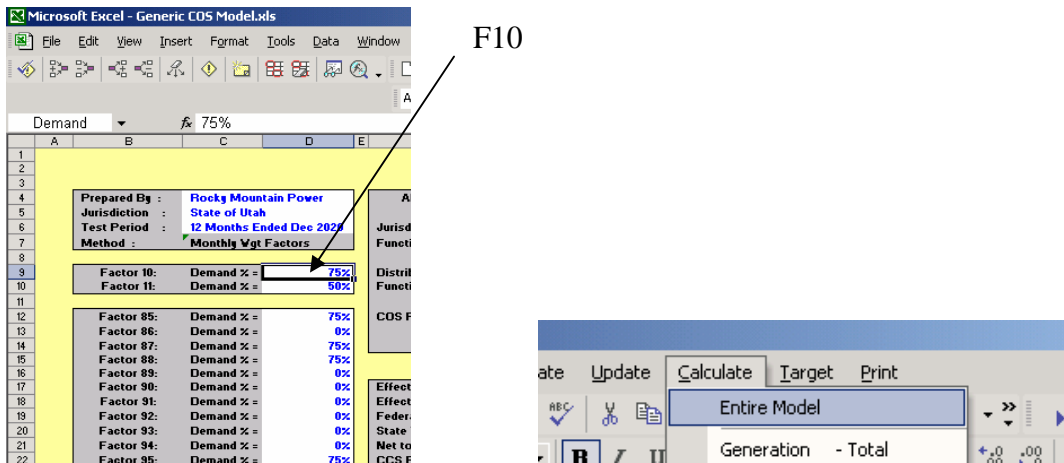
7.2. How To Change System Coincidental Peak Months

To include or exclude a month, changes are made on the "Input" sheet. See below for an illustration.


Make changes in the highlighted area (I28:I39) above. Enter a zero (0) to exclude the month or enter a one (1) to include a month. After making the changes, hit F9 and re-calculate the entire model.

7.3. How To Change Cost Allocation Factors

To make changes to the cost allocation factors, changes are completed on the "COS Allocation Options" tab. See below.

Depending on model type, rolled-in or MSP, change the factor in columns E and F respectively. For a complete list of factors, see Appendix. For convenience, two optional sets of cost of service factors located on columns J and L have been provided. These two options along with rolled-in and MSP can be toggled between on the "Inputs" tab. See below.
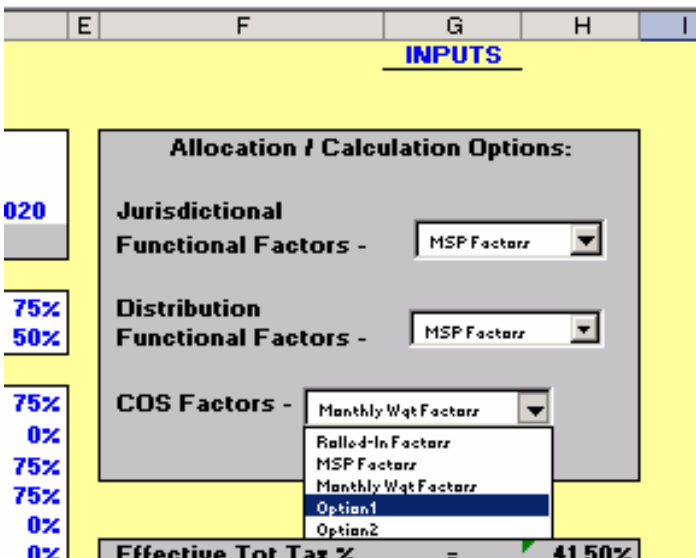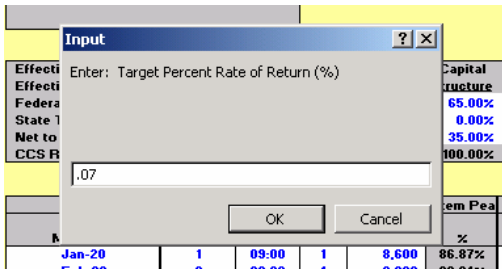

7.4. How to Change the Target Rate of Return

The target rate of return can be changed either by entering a percentage or a dollar amount. See below for illustration.
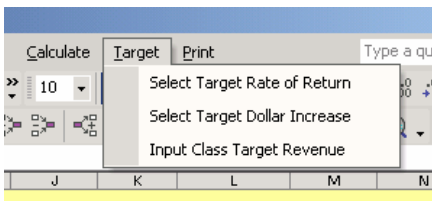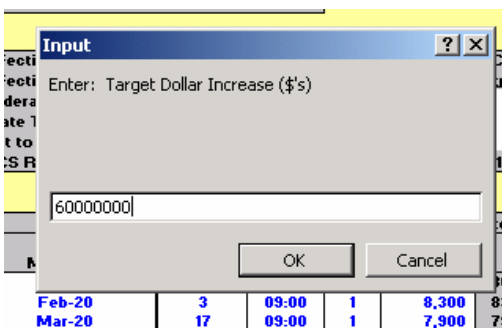

Choose either target rate of return or dollar increase from the menu.

If percent is chosen, enter the number as a decimal.

If the dollar amount is chosen, enter the amount in whole dollars.

Once the target rate of return has been entered, changes can be seen on the "Input" tab and on the "Summary Table" tab.

By going to the macros under Modules – Menu_Options, and scrolling to the bottom of the programming language, the code can be followed for the macro that sets the rate of return.
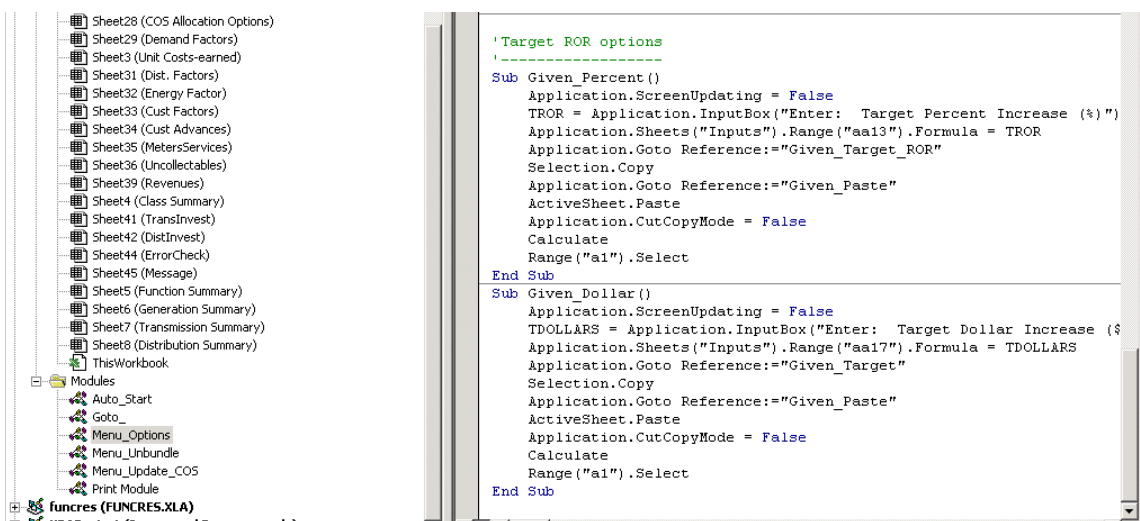
If a target percent is selected, the input that the user puts into the box is placed onto cell AA13 on the "Inputs" tab. The "Given_Target_ROR" (cells AA13:AA14 on the "Inputs" tab) named cell range is then pasted onto the "Given_Paste" named cell range (cells L9:L10 on the "Inputs" tab). The macro then re-calculates.

If a target dollar amount is selected, the input that the user puts into the box is placed onto cell AA17 on the "Inputs" tab. The "Given_Target" (cells AA16:AA17 on the "Inputs" tab) named cell range is then pasted onto the "Given_Paste" named cell range (cells L9:L10 on the "Inputs" tab). The macro then re-calculates.

8. Scenarios

Scenarios have been added to this manual to demonstrate how specific, somewhat realistic scenarios could be developed within the cost of service model. Please note that these scenarios do not constitute an endorsement of any methodology but are rather intended to inform users of how they might modify the model.

8.1. Adding another row to the "Hot Sheet"

Suppose there was additional information concerning account 547 and the user wanted to create an additional sub-category within the account. Within the generic cost of service model, there is roughly $200 million dollars within this account. Suppose that $10 million of this natural gas fuel was burned during the hours of the 12 monthly system coincident peaks, and there is a proposal to allocate this amount of the $200 million to factor 12. Below are the instructions for developing such a scenario:

1. Before any scenario is developed, save the Generic COS Model as a different file so that the scenario that is developed can be compared to the original.

2. This scenario's change relates to a fuel expense account, so it should be functionalized 100% to generation and classified 100% to generation-energy-related. No change will therefore need to be made to the "Func Study" tab.

3. Since this change deals with allocation to the rate classes, the primary change will be made to the "Hot Sheet" tab. Changes to other tabs will be mostly to accommodate the change made in the "Hot Sheet" tab. Within the "Hot Sheet" tab go to account 547 (rows 331 through 333). Insert a new row above 333 by highlighting the row and going to Insert: Cells on the drop-down menu.

4. Since the "Hot Sheet" unbundles results by class for all functions and sub-functions, the new row will only contain $10 million when the "Hot Sheet" is unbundling generation. Because of this, a formula is needed that identifies the

function or sub-function and returns the value of $10 million if it is either Generation or Generation-Energy Related. On cell H333, type in "=IF(Function="gen",IF(OR(classification="total",classification="energy"),10 000000,0),0)"

Essentially, this formula reads that if the "function" named range equals "gen" and the "classification" named range equals either "total" or "energy", return the value of $10 million, otherwise return zero. Both of these named ranges are on the "Func Study" tab. They are changed to each function and sub-function as the calculate macro runs through each iteration.

5. To make sure that the formula is doing what it is intended to do, run the Generation –Total macro by selecting Calculate: Generation - Total. After the macro runs, go to cell H333 to ensure that $10 million is shown. Repeat the process with Generation – Energy and with Generation – Demand. Cell H333 will show $10 million on Generation – Energy, but zero on Generation – Demand.

6. Label the newly created row within the "Hot Sheet" tab the following: "Fuel at the Time of System Peak" on cell E333.

7. Now an allocation factor can be assigned to this new line item. Type "F12" onto cell F333 as shown below.

8. The formulas which look up this allocation factor and assign costs to the customer classes need to be copied down. Highlight cells I332 through V332. Select Edit: Copy.

Microsoft Excel - Generic COS Model - Scen 1 - new row on Hot Sheet.xls

File Edit View Insert Format Tools Data Window Help COS MENU ---> Locate Update Calculate Target Print   Type a questi

=VLOOKUP($F332,FactSum,'COS Factor Table'!F$135,FALSE)*$H332

	L	M	N	O	P	Q	R	S	T	U	V
328											
329	416	15,396	799	27	53	5,770	50	1,013	3,672	2,532	-
330											
331	832,788	30,843,610	1,543,811	53,145	106,291	11,581,273	98,867	2,029,185	7,342,387	5,072,962	-
332	42,784	1,584,565	83,183	2,730	5,461	592,109	5,038	104,248	378,095	260,619	-
333											1R x 13C
334	875,572	32,428,175	1,626,994	55,876	111,751	12,173,382	103,905	2,133,433	7,720,482	5,333,581	-
335											

Microsoft Excel - Generic COS Model - Scen 1 - new row on Hot Sheet.xls

File Edit View Insert Format Tools Data Window Help COS MENU ---> Locate Update Calculate Target Print   Type

I332   Undo Typing 'F12' in F333   Ctrl+Z   2,FactSum,'COS Factor Table'!F$135,FALSE)*$H332
       Repeat Macros   Ctrl+Y
       Cut   Ctrl+X
       Copy   Ctrl+C
       Office Clipboard...
       Paste   Ctrl+V

		O	P	Q	R	S	T	U
328								
329		27	53	5,770	50	1,013	3,672	2,532
330								
331		53,145	106,291	11,581,273	98,867	2,029,185	7,342,387	5,072,962
332		2,730	5,461	592,109	5,038	104,248	378,095	260,619
333								
334		55,876	111,751	12,173,382	103,905	2,133,433	7,720,482	5,333,581

9. Highlight cell I333 and select Edit: Paste.

Microsoft Excel - Generic COS Model - Scen 1 - new row on Hot Sh

File Edit View Insert Format Tools Data Window Hel

I333   Undo Typing 'F12' in F333   Ctrl+Z
       Redo Paste   Ctrl+Y
       Paste   Ctrl+V
       Paste Special...

|		J	K
328			
329		28,040	
330			
331		6,133,811	16.66

10. The formulas are now copied down so that the $10 million value is being allocated on this row to the customer classes based upon factor 12. Press F9 to re-calculate the model to see the new values calculated.

11. To ensure that allocation factor options within the "COS Allocation Options" tab are consistent with those in the "Hot Sheet" tab, insert a row on the "COS Allocation Options" tab above row 216.

Microsoft Excel

File Edit View Insert Format Tools Data Window He

A216   Cells
       Worksheet
       Name
       Comment

Generic COS Mo   v on Hot Sheet.xls

|	A		C	E
208				
209				
210				
211				
212	546		ring	F30
213				
214	547	Fuel		F30
215			SSECT - Simple Cycle Combusti	F30
216				
217				
218	548	Generation Expense		F30

Func Dist Factor Table \ COS Allocation Options \ C

12. On this new row, type F12 onto cell E216 and copy and paste onto cells F216 through L216.
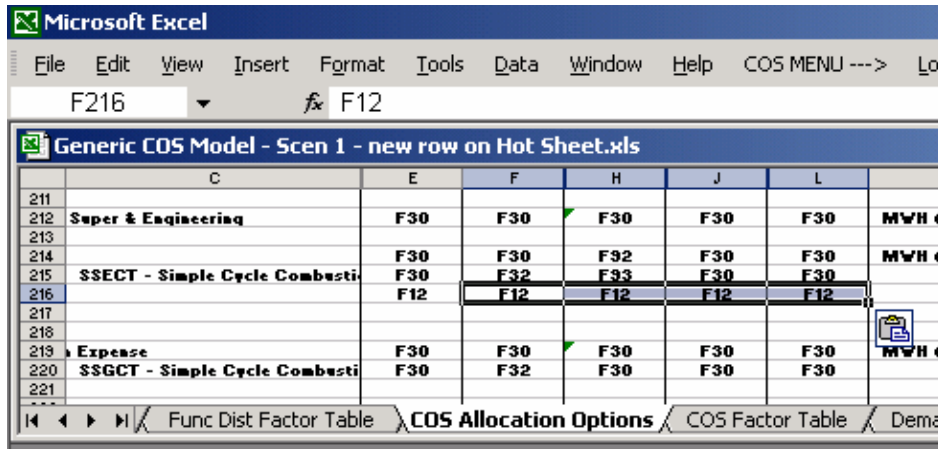
13. On the "Hot Sheet" tab, the $10 million value needs to be deducted from the total $200 million already in the account. For simplicity, only row 331 which has about a $190 million value will subtract this amount. Go to cell H331 and type in "-H33" at the end of the formula.
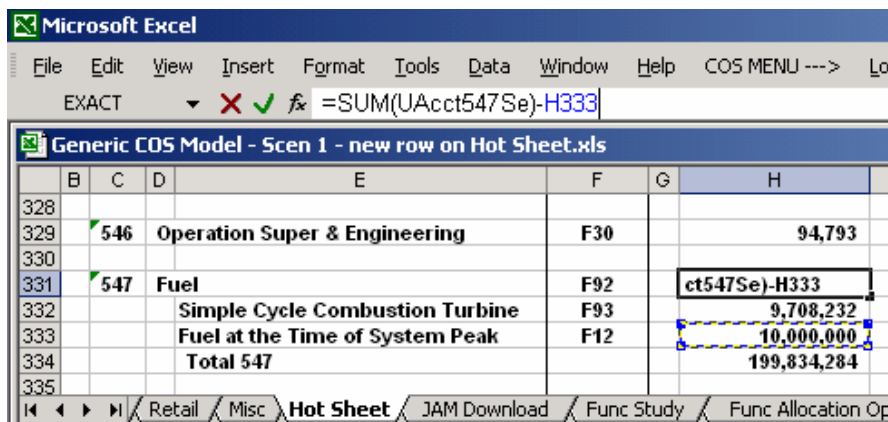

14. The total account 547 line on row 334 needs to be changed so that the totals pick up the new row that has been added. To do this, go to cell H334. Change the formula so that it picks up cell H333.
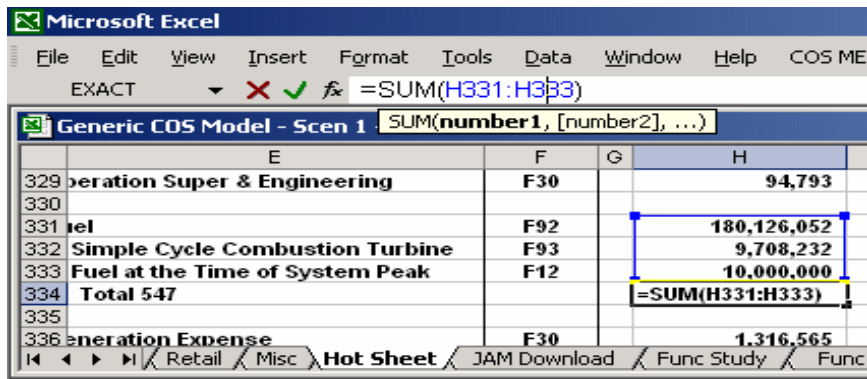

15. Copy cell H334 and paste onto cells I334 through U334. Hit F9 and make sure that error check on V334 is zero.

16. The "Hot Sheet" is now set up so that when Generation or Generation-Energy Related are being calculated; $10 million will be separated from the total for account 547 and allocated to the rate classes based upon factor 12. Since a new row has been added, the "Generation", "Transmission", "Distribution", "Retail" and "Misc." tabs are not in sync with the "Hot Sheet". These tabs will be aggregated incorrectly within the "G+T+D+R+M" tab and cause errors in the model. To fix this, go to the "Generation", "Transmission", "Distribution", "Retail" and "Misc." tabs and insert a row above row 333 on each. No other changes are necessary on these tabs, since the unbundled macro will copy and paste the correct values and formatting.
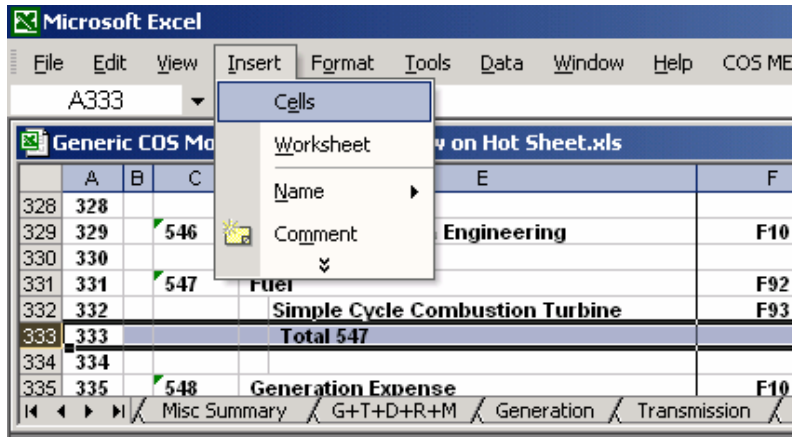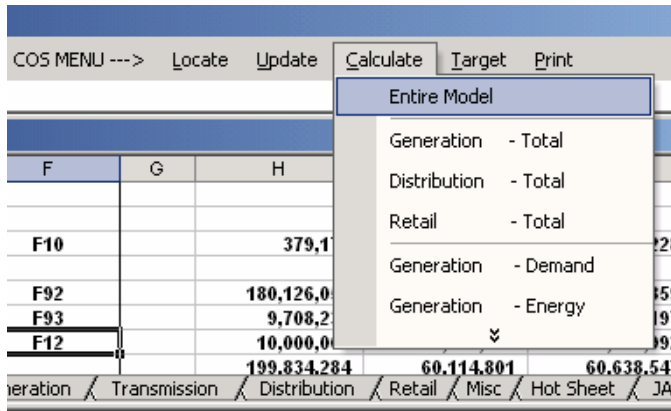

17. Also go to the "G+T+D+R+M" tab and insert a row above line 333.
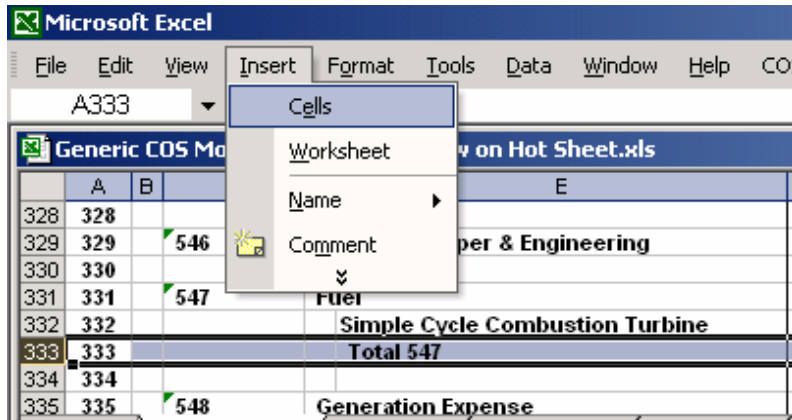
18. On the "G+T+D+R+M" tab, copy cells H332 through V332. Go to cell H333 and paste.

19. Rename cells E333 and F333 respectively, "Fuel at the Time of System Peak" and "F12".

20. Re-calculate the model to see the results. Select Calculate: Entire Model.

21. Compare the "Summary Table" from the new scenario file with the "Summary Table" from the original generic model. By comparing the target change in revenues for the residential class on cell M66 on each, the change results in a benefit to the residential class of roughly $0.6 million. Also, the change results in a $0.5 million benefit to Schedule 9.

8.2. Adding a new allocation factor

Suppose there is additional information and account 547 should be allocated on a new factor that is based upon the price of natural gas at different times coincident with MWH sales at those times. Under such circumstances, this information could be used to development a new allocation factor to apportion account 547 to the classes. Below are the instructions for developing such a scenario:

1. As with the first scenario, save the new scenario as a separate file so that the base case can be compared to the original.

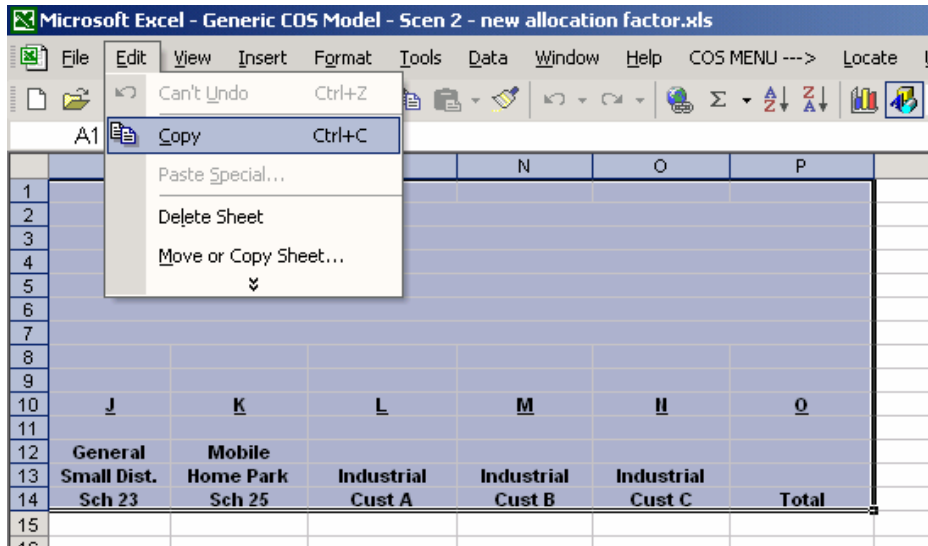2. Within the model, insert a new worksheet by selecting Insert: Worksheet.
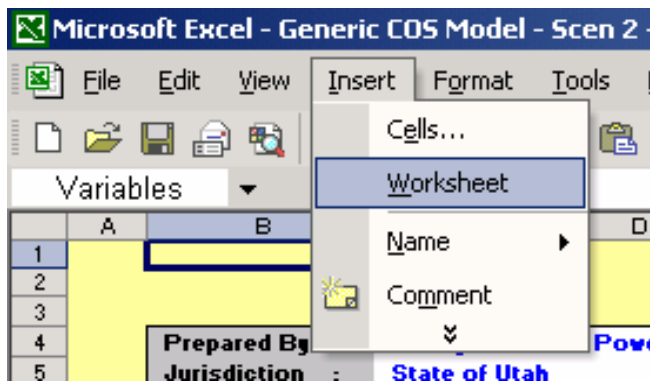
3. Rename the new sheet to something such as "Gas Price Weighted MWH" by double clicking on the tab at the bottom.
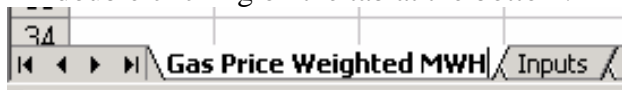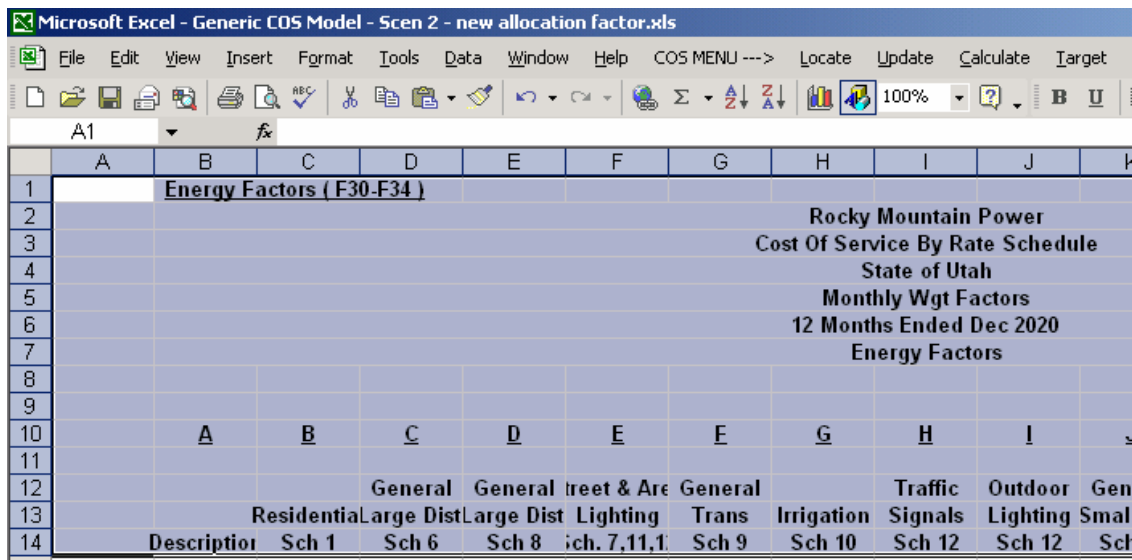

4. Drag the tab over next to the "Energy Factor" tab, so that it is in the same area as the model's input sheets.
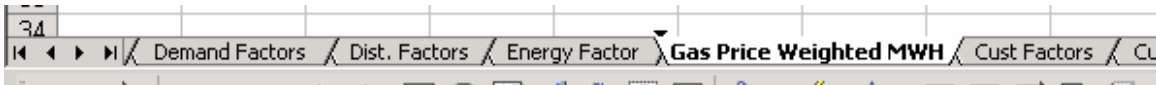
5. Within the "Energy Factor" tab, copy cells A1 through P14.

6. Go to the new "Gas Price Weighted MWH" sheet and select cell A1. Select Edit: Paste.

7. Now headings are shown for each rate class within the cost of service study and a new allocation factor or factors can be developed. The column widths can be widened so that each rate schedule can be seen. Also, cell B1 can be changed to read "Gas Weighted Energy Factors (F97)" and cell B7 can be changed to read "Gas Weighted Energy Factors". Type "FACTOR 97" on cell B15.

8. For simplicity, MWH sales by time period and natural gas prices used in this example are entirely fictitious. Weightings can be developed in separate worksheet or manually entered into the model like this example. Enter the following fictitious percentages for each rate schedule. Starting in cell C15 and ending on cell O15, enter the following values: 0.45, 0.2999, 0.05, 0, 0.03, .01, 0, 0, 0.1, 0.0001, 0.02, 0.02, 0.02. These cells can be formatted into percentages for easier viewing.

9. On cell P15, enter "=SUM(C15:O15)". The end result should be 100%.

Now a set of factor values for each rate class is stored on this sheet. Developing this new sheet is not a necessary step to developing a new allocation factor. The

factors themselves could be directly input into the "COS Factor Table" sheet. However, storing the back-up for the derivation of allocation factors in the cost of service study is a good idea and has therefore been presented in these instructions. A fully developed scenario would have back-up calculations on this sheet instead of fabricated percentages.

10. In the "COS Factor Table" sheet, highlight row 57 and select Insert: Cells from the menu.
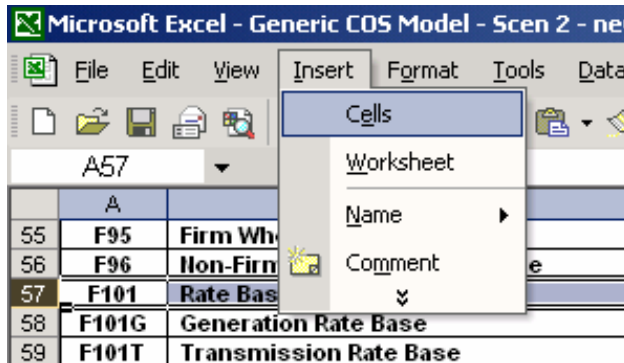
11. On cell A57, enter in "F97". On cell B57, enter "Gas Price Weighted Energy". On cell F57, enter "='Gas Price Weighted MWH'!C15".
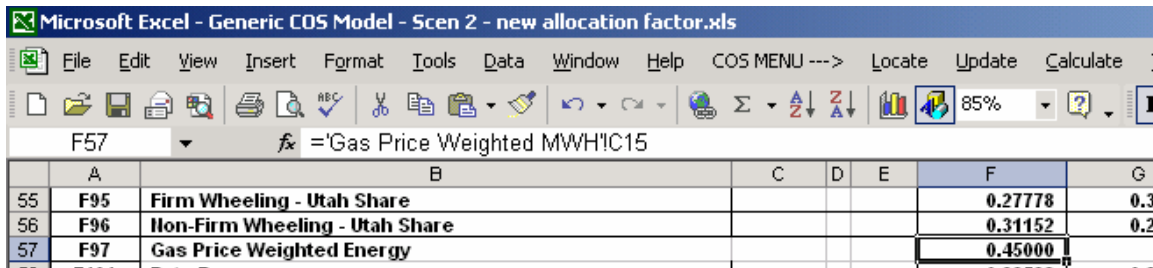
12. Copy cell F57 and paste into cells G57 through R57. Hit F9. Copy cell S56 and paste into cell S57. Hit F9. This cell will equal 1.00000.
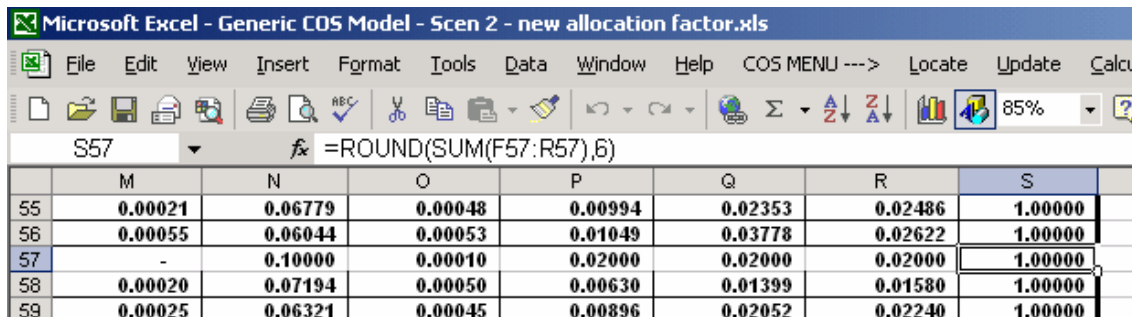
13. Since this allocation factor was inserted between other allocation factors, no named ranges will need to be updated. If a factor were inserted at the beginning or end of the allocation factors, the "FactSum" named range would need to be modified.

14. Go to account 547 within the "Hot Sheet" tab. Enter "F97" in cells F331 and F332.
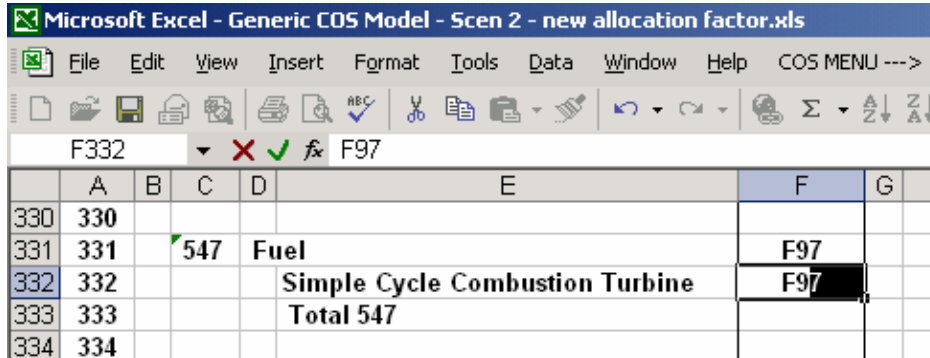
All of account 547 should now be using the newly created factor 97 to apportion itself to the rate classes. Functionalization does not need to be altered, because 547 will still be functionalized entirely to generation.

15. Select Calculate: Generation from the menu so that the generation function's calculations can be viewed within the "Hot Sheet" tab.
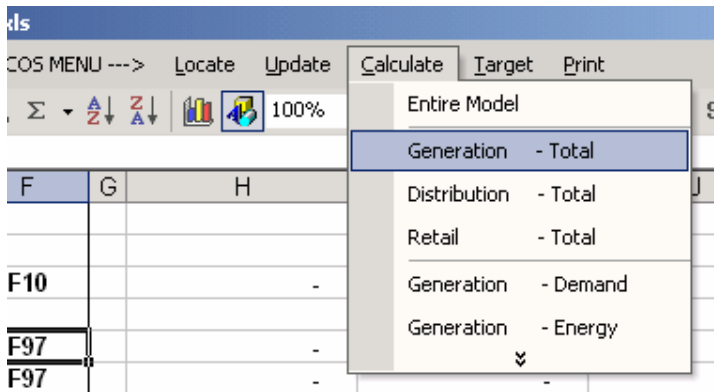
16. Go to rows 331 through 333 of the "Hot Sheet" tab. Confirm that factor 97 is being applied to account 547.

17. Select Calculate: Entire Model to run the scenario through all functions.

18. Compare the "Summary Table" from the new scenario file with the "Summary Table" from the original generic model. By comparing the target change in revenues for the residential class on cell M66 on each, the change results in a detriment to the residential class of roughly $29.2 million. Also, the change results in a $26.5 million benefit to Schedule 9.

9. Appendix

Table 1. Source location of cost of service factors.

Source Location	Factor	Factor Description
"Demand Factors"	F10	Coincident Peak, System

Source Location	Factor	Factor Description
tab		
""	F11	Coincident Peak, System
""	F12	Coincident Peak, System
""	F13	Seasonal System Capacity Combustion Turbine
""	F14	Seasonal System Generation Combustion Turbine
""	F15	Seasonal System Capacity Cholla
""	F16	Seasonal System Generation Cholla
""	F17	Seasonal System Capacity Purchase
""	F18	Seasonal System Generation Contract
"Dist. Factors" tab	F20	12 Weighted Distribution Peaks
""	F21	Transformers - NCP
""	F22	Secondary Lines - NCP
"Energy Factor" tab	F30	MWH @ Input
""	F32	Seasonal System Energy Combustion Turbine
""	F33	Seasonal System Energy Cholla
""	F34	Seasonal System Energy Contracts
"Cust Factors" tab	F40	Average Customers
""	F41	Weighted Customers Acct 902
""	F42	Weighted Customers Acct 903
""	F43	Residential Split
""	F44	Commercial Split
""	F45	Industrial / Irrigation Split
""	F46	Lighting / OSPA Split
""	F47	Wtd Customers Acct 902 - irrigation
""	F48	Wtd Customers Acct 903 - irrigation
"Cust Advances" tab	F50	Contribution in Aid of Construction
""	F51	Security Deposits
"MetersServices" tab	F60	Meters
""	F70	Services
"Uncollectibles" tab	F80	Uncollectables
"NPC Factors" tab	F85	Firm Sales - Utah Share
""	F86	Non Firm Sales - Utah Share
""	F87	Firm Purchases (Non-Seasonal) - Utah Share
""	F88	Seasonal Purchases - Utah Share
""	F89	Non firm Purchases - Utah Share
""	F90	Coal (Non-Seasonal) - Utah Share
""	F91	Seasonal Cholla Coal - Utah Share
""	F92	Gas (Non-Seasonal) - Utah Share
""	F93	Seasonal CT Gas - Utah Share
""	F94	Other Generation - Utah Share
""	F95	Firm Wheeling - Utah Share
""	F96	Non-Firm Wheeling - Utah Share
"G+T+D+R+M" tab	F101	Rate Base
"Generation" tab	F101G	Generation Rate Base
"Transmission" tab	F101T	Transmission Rate Base
Source Location	**Factor**	**Factor Description**
"Distribution" tab	F101D	Distribution Rate Base
"Retail" tab		Retail Rate Base

Source Location	Factor	Factor Description
	F101R	
"Misc" tab	F101M	Misc Rate Base
"G+T+D+R+M" tab	F102	SGP - System Gross Plant
"Generation" tab	F102G	SGGP - System Gross Generation Plant
"Transmission" tab	F102T	SGTP - System Gross Transmission Plant
"Distribution" tab	F102D	SGDP - System Gross Distribution Plant
"Retail" tab	F102R	SGTP - System Gross Retail Plant
"Misc" tab	F102M	SGDP - System Gross Misc Plant
"G+T+D+R+M" tab	F103	SGP - System Gross Plant (Regulatory fees)
""	F104	SNP - System Net Plant
"Generation" tab	F104G	SNP - System Net Generation Plant
"Transmission" tab	F104T	SNP - System Net Transmission Plant
"Distribution" tab	F104D	SNP - System Net Distribution Plant
"Retail" tab	F104R	SNP - System Net Retail Plant
"Misc" tab	F104M	SNP - System Net Misc Plant
"G+T+D+R+M" tab	F105	STP - System Prod & Trans Plant
"Generation" tab	F105G	SGGP - System Gross Generation Plant
"Transmission" tab	F105T	SGTP - System Gross Transmission Plant
"Distribution" tab	F105D	SGDP - System Gross Distribution Plant
""	F105R	SGTP - System Gross Retail Plant
""	F105M	SGDP - System Gross Misc Plant
"G+T+D+R+M" tab	F106	STP - System Transmission Plant
""	F107	STP - System Trans & Dist Plant
"Generation" tab	F107G	SGGP - System Gross Generation Plant
"Transmission" tab	F107T	SGTP - System Gross Transmission Plant
"Distribution" tab	F107D	SGDP - System Gross Distribution Plant
""	F107R	SGTP - System Gross Retail Plant
""	F107M	SGDP - System Gross Misc Plant

Source Location	Factor	Factor Description
"G+T+D+R+M" tab	F108	SGP - System General Plant
"Generation" tab	F108G	SGGP - System Gen Generation Plant
"Transmission" tab	F108T	SGTP - System Gen Transmission Plant
"Distribution" tab		SGDP - System Gen Distribution Plant

| Source Location	Factor	Factor Description
	F108D	
"Retail" tab	F108R	SGTP - System Gen Retail Plant
"Misc" tab	F108M	SGDP - System Gen Misc Plant
"G+T+D+R+M" tab	F110	SIP - System Intangible Plant
""	F118	Account 360
""	F119	Account 361
""	F120	Account 362
""	F121	Account 364
""	F122	Account 365
""	F123	Account 366
""	F124	Account 367
""	F125	Account 368
""	F126	Account 369
""	F127	Account 370
""	F128	Account 371
""	F129	Account 372
""	F130	Account 373
""	F131	Account 581 thru 587 & 591 thru 597
""	F132	Account 364 + 365
""	F133	Account 366 + 367
""	F134	Account 364 + 365 + 369 (OH)
""	F135	Account 366 + 367 + 369 (UG)
""	F136	Account 902 + 903 + 904
""	F137	Total O & M Expense
"Generation" tab	F137G	Generation O & M Exp
"Transmission" tab	F137T	Transmission O & M Exp
"Distribution" tab	F137D	Distribution O & M Exp
"Retail" tab	F137R	Retail O & M Exp (Customer)
"Misc" tab	F137M	Misc & Customer O & M Exp
"G+T+D+R+M" tab	F138	GTD O&M Exp (less fuel, purchased p & wheeling)
"Generation" tab	F138G	Generation O & M Exp (less fuel & purchased power)
"Transmission" tab	F138T	Transmission O & M Exp - (less wheeling exp)
"Distribution" tab	F138D	Distribution O & M Exp
"Retail" tab	F138R	Retail O & M Exp (Customer)
"Misc" tab	F138M	Misc & Customer O & M Exp
Source Location	**Factor**	**Factor Description**
All Unbundled Tabs	F140	Revenue Requirement Before Rev Credits
"Generation" tab	F140G	Revenue Requirement Before Rev Credits
"Transmission" tab	F140T	Revenue Requirement Before Rev Credits
"Distribution" tab	F140D	Revenue Requirement Before Rev Credits

"Retail" tab	F140R	Revenue Requirement Before Rev Credits
"Misc" tab	F140M	Revenue Requirement Before Rev Credits
	F141	Firm Revenues

Table 2. Description of Tabs within Cost of Service Study.

COS Tab	Tab Description
"Inputs"	Input area for system peaks, substation peaks, loss factors, tax rates, capital structure, methodology choice, etc.
"Summary Table"	Shows the overall summary of class results by function.
"Unit Costs-earned"	Shows the functional and sub-functional unit-costs by class at the earned level.
"Unit Costs-target"	"" at the target level.
"Function Summary"	Shows the overall summary results for each function.
"Class Summary"	Shows the overall summary results for each class.
"Generation Summary"	Shows the generation function summary results for each class.
"Transmission Summary"	Shows the transmission function summary results for each class.
"Distribution Summary"	Shows the distribution function summary results for each class.
"Retail Summary"	Shows the retail function summary results for each class.
"Misc Summary"	Shows the miscellaneous function summary results for each class.
"G+T+D+R+M"	Aggregates the unbundled functional results by class.
"Generation"	Output sheet for unbundled generation results by class.
"Transmission"	Output sheet for unbundled transmission results by class.
"Distribution"	Output sheet for unbundled distribution results by class.
"Retail"	Output sheet for unbundled retail results by class.
"Misc"	Output sheet for unbundled miscellaneous results by class.
"Hot Sheet"	Develops functional and sub-functional results by class and imports to the various output sheets.

COS Tab	Tab Description
"JAM Download"	Stores the results from the jurisdictional allocation model including the functional factors.
"Func Study"	Develops functional and sub-functional results and imports to the "Hot Sheet".
"Func Allocation Options"	Provides different options for functional factors used within the "Func Study".
"Func Factor Table"	Shows the values and descriptions for each functional factor.
"Func Dist Factor Table"	Provides different options for distribution sub-functional factors used within the "Func Study".
"COS Allocation Options"	Provides different options for COS allocation factors used within the "Hot Sheet".
"COS Factor Table"	Shows the values and descriptions for each COS allocation factor.
"Demand Factors"	Shows development of demand allocation factors. Location for input of system coincident peaks.
"Dist. Factors"	Shows development of distribution-related allocation factors. Location for input of distribution system coincident peaks and non-coincident peaks.
"Energy Factor"	Shows development of energy allocation factors. Location for input of MWH sales.
Cust Factors"	Shows development of customer allocation factors. Location for input of customer counts.
"Cust Advances"	Shows development of customer advances factors. Location for input of contributions in aid of construction and customer deposits.
"MetersServices"	Shows development of meter and service drop factors. Location for input of meter and service drop costs.
"Uncollectibles"	Shows development of uncollectibles factors. Location for input of write-offs and recoveries.
"NPC Factors"	Shows development of net power cost factors. Location for input of net power costs.
"Revenues"	Shows development of revenue factors. Location for input of revenues.
"TransInvest"	Shows transmission account direct assignments that are input into the "Hot Sheet".
"DistInvest"	Shows distribution account direct assignments that are input into the "Hot Sheet".
"ErrorCheck"	Checks for consistency within the COS Model.
"Message"	Displays run-time progress during calculations.
"Dialog"	Initial display that is shown when the COS Model is opened.

Diagram 1. Relationship between Tabs within the Cost of Service Model
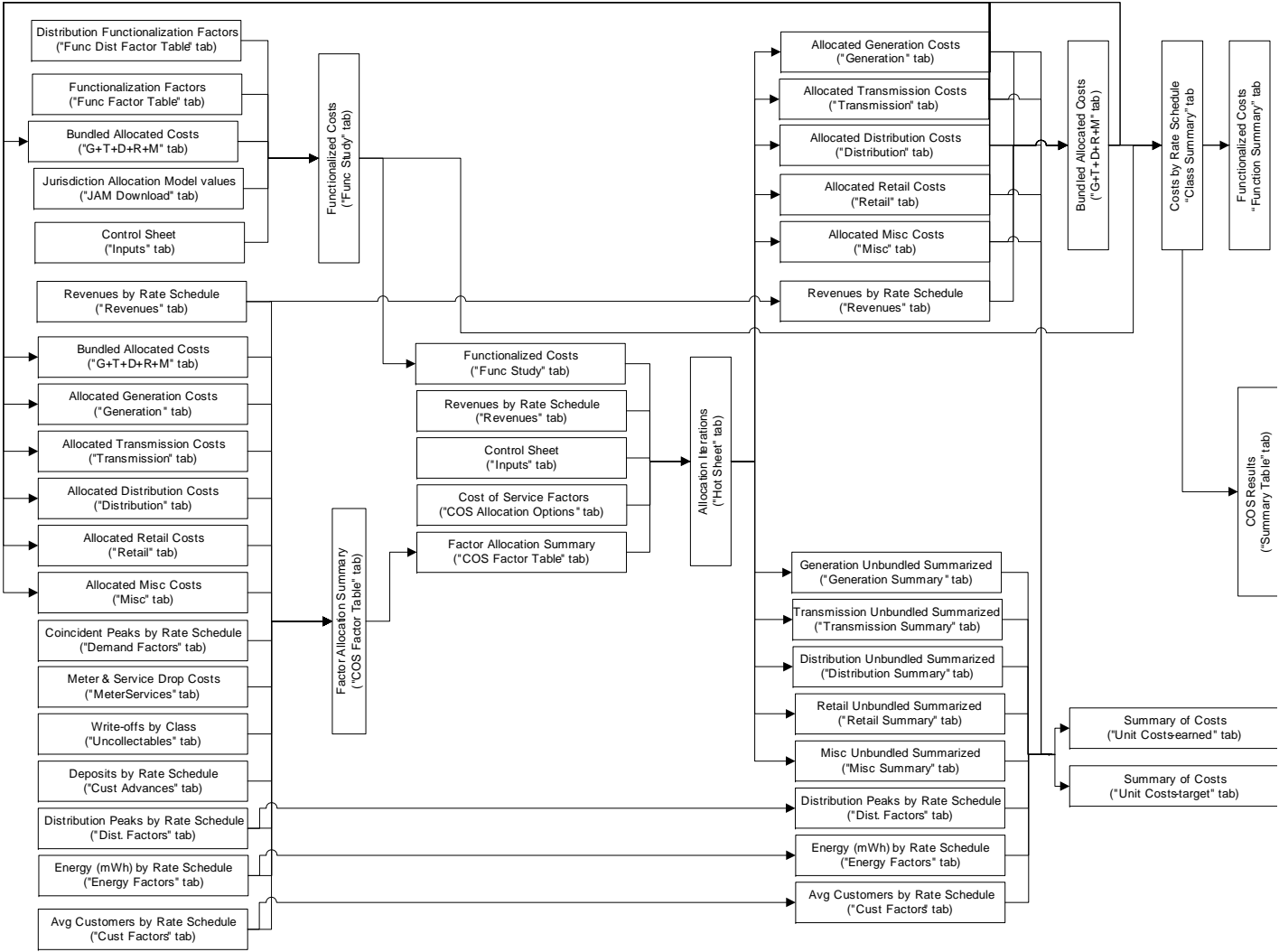
Technical Support

For questions related to using or understanding PacifiCorp's Cost of Service Model, please do not hesitate to contact one of the following persons:

Craig Paice
Pricing / Cost of Service Consultant
Work Phone: (503)-813-6063
Email: Craig.Paice@PacifiCorp.com

Robert Meredith
Pricing / Cost of Service Analyst
Work Phone: (503)-813-5017
Email: Robert.Meredith@PacifiCorp.com

Terrica Reyes
Pricing / Cost of Service Analyst
Work Phone: (503)-813-7042
Email: Terrica.Reyes@PacifiCorp.com