Northwest **Power** and **Conservation** Council

September 30, 2014

MEMORANDUM

TO: Power Committee

FROM: Charlie Grist

SUBJECT: Financial Inputs for Cost of Saved Energy

Presenter: Charlie Grist

Summary: Staff will present recommendations for financial inputs used in estimating the cost of saved energy used for the draft Seventh Power Plan. The choice of these inputs has a relatively modest impact on the cost of energy efficiency resource potential.

The cost of energy efficiency resources depends, in part, on how efficiency is paid for. The Council's analysis takes a total resource cost perspective, a method that attempts to capture all costs. Who pays these costs, and how they are paid is influenced by the financial inputs for cost of saved energy - which is the subject of the presentation. The financial inputs should reflect realistic expectations of how efficiency resources will be paid for.

Key input assumptions include:

- Which costs are borne by consumers, utilities and Bonneville?
- Whether costs are expensed or financed
- If financed, what are the interest rates and terms?

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

The Regional Technical Forum (RTF) has reviewed and made recommendations on the financial inputs for cost of saved energy. The Conservation Resources Advisory Committee will take up the issue at its October 3 meeting. Staff will summarize input from these committees as part of the presentation.

Relevance: The cost of saved electricity is a primary metric by which the amount of conservation found to be cost-effective in the Council's analysis is determined. The Council's assumption regarding the share of the cost of conservation resource development borne by consumers versus funded by utility and Bonneville rate revenues has a direct bearing of the cost of saved electricity.

Workplan: 1.D. Update conservation resource assessment

Background: The staff has presented previously on the calculation of the levelized cost of energy at both GRAC meetings and Council meetings. The staff will also be presenting a primer on the Council's conservation assessment methodology at the October Council meeting.

More Info: For a primer on the LCOE calculation, see the April 2013 presentation http://www.nwcouncil.org/media/6838753/4.pdf The Regional Technical Forum (RTF) has reviewed and made recommendations on the financial inputs for cost of saved energy. http://rtf.nwcouncil.org/meetings/2014/09/Global%20Inputs%20CSE%20for%20RTF%20September%202014%20v3.pptx

851 S.W. Sixth Avenue, Suite 1100
Portland, Oregon 97204-1348
www.nwcouncil.org

Steve Crow
Executive Director

503-222-5161
800-452-5161
Fax: 503-820-2370

Conservation Resources Financial Assumptions

October 7, 2014

Inputs for Cost of Saved Energy

- Purpose: Agree on input financial assumptions used to calculate the levelized cost of energy efficiency resources for use in Draft 7th Plan
- Financial Input Assumptions
  - Share of costs paid by sponsor
  - Sponsor financing rates and terms
  - Treatment of federal tax incentives
  - Program administration cost

Approach Used

- Same as Fifth and Sixth Plans
  - Use weighted after tax cost of capital (WACC) by resource sponsor
  - Assumed 20% program administration cost
- Change from Fifth and Sixth Plans
  - Treat federal tax incentives for conservation and generating resources the same
- Update values for cost of capital, sponsorship shares, etc.
- Reviewed by RTF and CRAC
- Today - Council review and approval for use in development of draft 7th Plan

Financial Parameters

- Cost of capital and financing terms differ by sector
  - Residential, Commercial, Industrial, Utility
- Analysis Reflects Prior Council Agreement
  - Analysis in "real" (net of inflation) 2012 dollars
  - Discount rate 4%
    - With sensitivity analysis at 3% and 5%

Financing Terms for Energy Efficiency Acquisition

- Act's definition of cost-effectiveness requires consideration of all direct costs of resource development, regardless of who pays
- Energy Efficiency *measure costs are* borne by multiple sponsors
  - Customer
  - Wholesale power supplier (BPA)
  - Utility (IOU, POU, Muni, Coop)

- Different financing parameters for each

Financing Input Assumptions

Sponsor Parameters	Customer	Wholesale Electric	POU Electric	IOU Electric
Real After-Tax Cost of Capital				
Financial Life (years)				
Sponsor Share of Initial Capital Cost				
Sponsor Share of Annual O&M				
Sponsor Share of Periodic Replacement Cost				
Sponsor Share of Administrative Cost				
Last Year of Non-Customer O&M & Period Replacement				

If financed, what is cost of capital? Interest rate on cost of borrowed money

Four cost categories

Four sponsors

Proposed Share of Costs by Sponsor

Customer	35%
BPA	20%
POU Direct	5%
IOU	41%
Sum	100%

6P Estimate. Is it still appropriate?

Utility EE Spending History							
	2008	2009	2010	2011	2012	average	forecast
Total Utility Expenditure from RCP (2006$)	221	278	360	408	370	327	
BPA-Funded Direct Expenditure (2006$)	50	59	104	181	85	96	
BPA Share of Total	23%	21%	29%	44%	23%	29%	30%
POU Self Fund							8%
IOU							63%
BPA-Funded Direct Expenditure (2011 Red Book, Table D2 'Direct' in nominal)	53	63	112	199	95		
Deflator to 2006$	0.95	0.93	0.92	0.91			

Assume Bonneville continues to fund and finance most of its EE at levels similar to past. POU portion set at 25% of Bonneville assuming utilities pick up 25% of cost in addition to BPA portion. IOUs fund remainder. Results are consistent with RCP reports 2008-2012.

Utility Financing of Energy Efficiency Assumptions

- Only BPA finances any portion of EE
- All other utility and program administrators (e.g. ETO) sponsors expense EE – no finance costs
- Proposal
  - Use same data for cost of capital as Council used to select discount rates
  - Use after-tax *Cost of Borrowing* by sponsor as finance rate
  - Assume only customer and BPA finance efficiency
- Alternative assumptions result in modest changes in the levelized cost of conservation resources

Customer Financing of EE

Purchaser	Method Proposed	Tax Treatment
Residential Consumer	DOE method. Weighted mix of 12 types of debt and equity in the average U.S. household using data from the Federal Reserve Board's Survey of Consumer Finances (SCF) for 1989, 1992, 1995, 1998, 2001, 2004, and 2007.	Individual tax rate adjustment 27%
Business Consumer	DOE Method: Capital Asset Pricing Model. Over 4000 businesses surveyed. Mix of debt & equity financing costs. Weighted by ownership class & debt/equity ratios	Corporate tax rate adjustment 35% for private. Zero tax adjust for public ownership

Summary of Proposed Sponsor Financial Parameters for EE

Sponsor Parameters	Customer	Bonneville	POU	IOU
Real After-Tax Cost of Capital		4.39%	4.34%	5.45%
Financial Life (years)	12	12	1	1
Sponsor Share of Initial Capital Cost	35%	20%	5%	41%
Sponsor Share of Annual O&M	100%	0%	0%	0%
Sponsor Share of Periodic Replacement Cost	100%	0%	0%	0%
Sponsor Share of Administrative Cost	0%	30%	8%	63%
Last Year of Non-Customer O&M & Period Replacement		20		

Customer Finance Cost

Residential =	4.3 %
Commercial =	6.8 %
Industrial =	8.5%
Agriculture =	6.8%
Utility System (DEI) =	0%

One-year finance term equivalent to expensing

Impact of Financial Assumptions on Cost of Saved Energy

Measure Savings	1 aMW
Measure Life	12 Years
Measure Cost	$4.0 million
Discount Rate	4%
Finance Term	12 Years

	Interest Rates
Residential	4.3%
Commercial	6.8%
Industrial	8.5%
BPA	4.4%

		Levelized Cost		
Share Paid by Consumer		Residential Measures	Commercial Measures	Industrial Measures
35%	Reference Case	$ 34.4	$ 38.2	$ 40.8
100%	Consumers Finance All	$ 34.5	$ 41.2	$ 46.0
100%	Consumers Expense All	$ 33.8	$ 34.9	$ 35.6

		Levelized Cost		
Regional Share Funded by BPA		Residential Measures	Commercial Measures	Industrial Measures
20%	BPA Finances	$ 34.4	$ 38.2	$ 40.8
20%	BPA Expenses	$ 34.3	$ 36.0	$ 40.7

Additional Proposed Assumptions for Cost of Saved Energy

- Treat Federal Tax Credit same as generation
  - Tax credit (30%) for ground-source heat pump thru 2016
  - Also for Solar PV & Solar Water Heat
- Program administration costs = 20% of measure capital cost
- Regional Act 10% Conservation Cost Premium ("110% of avoided power system cost"
  - Use *medium* case wholesale gas and wholesale electric price forecast to calculate credit (~$4 - $5/MWh)

End

Backup Slides

Methods for EE Finance Rates

Purchaser	Method Proposed	Tax Treatment
Residential Consumer	DOE method. Weighted mix of 12 types of debt and equity in the average U.S. household using data from the Federal Reserve Board's Survey of Consumer Finances (SCF) for 1989, 1992, 1995, 1998, 2001, 2004, and 2007.	Individual tax rate adjustment 27%
Business Consumer	DOE Method: Capital Asset Pricing Model. Over 4000 businesses surveyed. Mix of debt & equity financing costs. Weighted by ownership class & debt/equity ratios	Corporate tax rate adjustment 35% for private. Zero tax adjust for public ownership
Bonneville	30-year Treasury bonds plus 90 basis points	No tax adjustment
Investor-Owned Utility	Weighted average cost of debt & equity. Debt based on AAA/Baa corporate bonds. Equity 10%. Debt ratio 50%.	Corporate tax rate adjustment 35% on debt
Municipal Utility	AAA Municipal bonds	No tax adjustment
Cooperative	Weighted average cost of debt & equity. Debt based on 30-Year Treasury bonds plus 100 basis points. Equity 6.5%. Debt ratio 50%.	No tax adjustment

Proposed Cost of Capital for Utility Sponsors

Weighted average cost of capital by individual

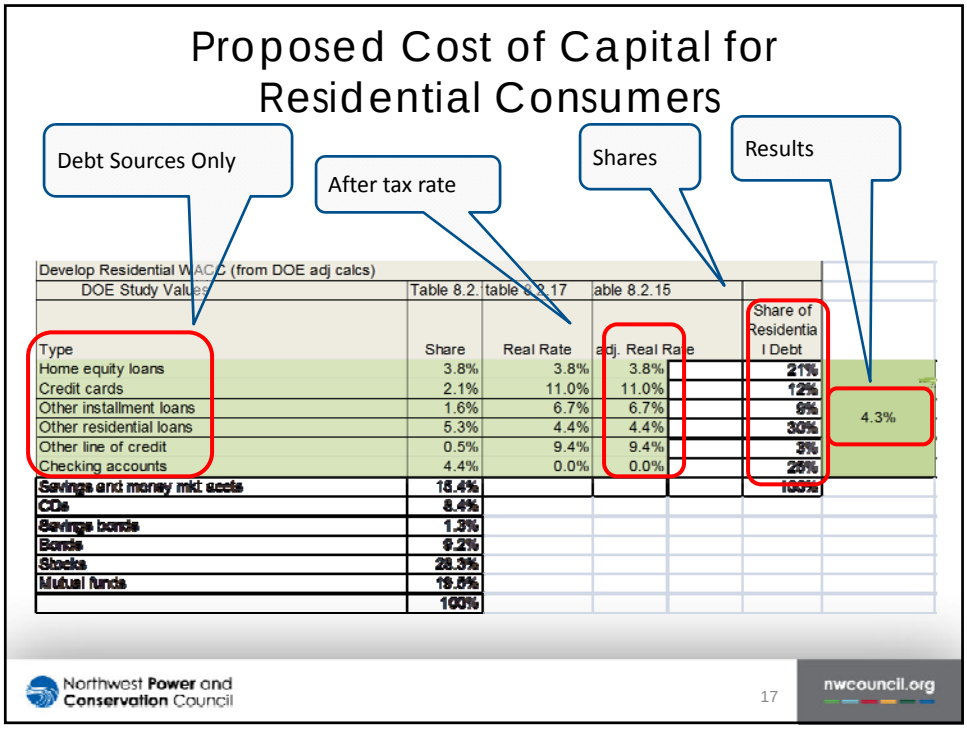
Weight by share of EE funding historical

Results
But only BPA rate is operative because only BPA is financing EE

Develop WACC by Sponsor

Cost of Capital	WACC	Share Capitalized	Share of Sales	Share of Utility Funding for EE)	Share of Non-BPA	Non-BPA WACC	WACC	Share of POU/Muni/Coop
IOU	5.48%	0%	52%	53%	55%		5.48%	
POU	4.66%	0%	22%	3.7%	5%	5.33%	4.34%	60%
Coop	3.79%	0%	9%	1.4%	2%			18%
Muni	3.79%	0%	14%	2.4%	3%			32%
BPA	4.36%	100%	5%	30%	0%	4.36%	4.36%	

Proposed Cost of Capital for Residential Consumers



Proposed Cost of Capital for Business Consumers

DOE Method: Capital Asset Pricing Model. Over 4000 businesses surveyed. Mix of debt & equity financing costs. Weighted by ownership class & debt/equity ratios

Agriculture

Industrial

Commercial is weighted by ownership class

Business Cost of Money (from Damodaran)	
sectors	Total
AG	6.8%
Com	7.6%
Ind	8.5%
Power	5.6%
Utility	5.3%
Grand Total	7.8%

By Shares for Commercial Property Ownership	Floor Area	Cost of Capital
Local	15%	3.8%
State	4%	4.4%
Federal & Military	2%	4.4%
Private	77%	7.6%
Unknown	2%	7.6%
Total	100%	6.8%

Proposed Program Admin Cost

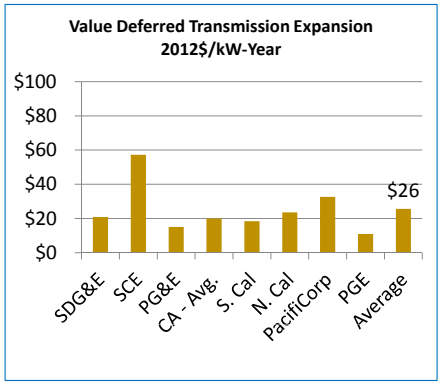
Proposal: 20% of Capital Cost
Average across all programs
(Same as past plans)

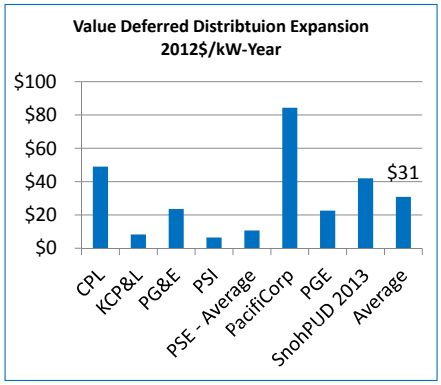
Share of Admin Costs based on historical shares of EE funding
IOU= 63%
BPA = 30%
POU = 7%

Develop WACC by Sponsor

Cost of Capital	WACC	Share Capitalized	Share of Sales	Share of Utility Funding for EE)	Share of Non-BPA	Non-BPA WACC	WACC	Share of POU/Muni/ Coop
IOU	5.46%	0%	52%	63%	69%		5.46%	
POU	4.69%	0%	22%	3.7%	5%	5.33%		50%
Coop	3.75%	0%	8%	1.4%	2%		4.34%	18%
Muni	3.75%	0%	14%	2.4%	3%			32%
BPA	4.35%	100%	8%	30%	0%	4.35%	4.35%	

Sources Deferred T & D Expansion Cost





Updates to Data & Methods for Cost of Saved Energy

- Updates to average line losses from EIA & Balancing Authority data
- Minor updates to value of deferred transmission and distribution (T&D) expansion
- Full implementation of marginal line loss calculation
- Updated method for efficiency impact on peak kW