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December 1, 2011 NWN Advice No. WUTC 11-6

VIA ELECTRONIC FILING

Dave Danner, Secretary and Executive Director
WASHINGTON UTILITIES &
TRANSPORTATION COMMISSION
1300 S Evergreen Park Drive, SW
Post Office Box 47250
Olympia, Washington 98504-7250

Re: Schedule G - "Energy Efficiency Services and Programs – Residential and Commercial"

Northwest Natural Gas Company, dba NW Natural ("NW Natural" or the "Company"), files herewith the following revisions to its Tariff WN U-6 stated to become effective with service on and after January 1, 2012:

Sixth Revision of Sheet G.1,
Schedule G
"Energy Efficiency Services and Programs – Residential and Commercial,"

Second Revision of Sheet G.4
Schedule G
"Energy Efficiency Services and Programs – Residential and Commercial,"

Third Revision of Sheet G.5
Schedule G
"Energy Efficiency Services and Programs – Residential and Commercial,"

and

Second Revision of Sheet G.6
Schedule G
"Energy Efficiency Services and Programs – Residential and Commercial."

The purpose of this filing is to revise Schedule G and the Company's Energy Efficiency Plan ("EE Plan" or "Plan) to include new program offerings, as well as a budget and performance metrics for the 2012 calendar year.

The EE Plan, which is by reference part of the tariff, is modified herein to reflect the program's transition out of its pilot phase. In accordance with the agreements reached with parties in UG-080546, the Company worked with its Energy Efficiency Advisory Group (EEAG), comprised of parties to the Company's last rate case, to develop and implement an energy efficiency program. The program became available to customers on October 1, 2009. During the first twelve months, the Energy Trust of Oregon (Energy Trust) provided program administration on a pilot basis. At the end of the first program year, the EEAG recommended that the Energy Trust continue in its role as program administrator. The EE Plan is revised to remove language specific to the review of the pilot year.

The EE Plan is further revised to clarify processes relevant to the program's ongoing oversight including the requirements for adding or removing measures from the program's portfolio, the filing of quarterly and annual reports, and the setting of an annual program year budget and corresponding performance metrics. Language is added to establish dates whereby the Company will annually update the Plan to include the budget and performance metrics for the next program year. In accordance with the procedures established, the Plan filed herein includes a budget and performance metrics for the 2012.

To reduce administrative work, program incentive offerings are removed from Schedule G and placed into Appendix A of the EE Plan. Attachment A to this filing provides a one page summary describing the new measures being added to the portfolio for the 2012 year, the estimated therm saved per measure and the incentive offering. Attached for each new measure is an Energy Trust "blessing memo," which describes the evaluation of the measure, and a benefit cost ratio (BCR) calculator demonstrating that the measure is cost effective.

The Company respectfully requests that the tariff sheets filed herein be approved to become effective with service on and after January 1, 2012.

As required by WAC 480-80-103(4)(a), I certify that I have authority to issue tariff revisions on behalf of NW Natural.

A copy of the filing is available for public inspection in the Company's main office in Portland, Oregon and on its website at www.nwnatural.com.

Please address correspondence on this matter to me with copies to the following:

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Rates & Regulatory Affairs
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Please call me if you have any questions.

Sincerely,

/s/ Jennifer Gross

Jennifer Gross
NW Natural

enclosures

NW Natural's 2011
Energy Efficiency Plan

I. Background

Northwest Natural, dba NW Natural ("NW Natural" or Company"), began offering its current energy efficiency programs to Washington customers on October 1, 2009. The Washington Utilities and Transportation Commission's ("WUTC's") Order No. 04 in the Company's 2008 rate case, docketed as UG-080546, directed NW Natural to create and begin offering a program.

II. Oversight

NW Natural's energy efficiency programs were developed and continue to evolve under the direction and oversight of the Energy Efficiency Advisory Group ("EEAG") which is comprised of interested parties to the Company's 2008 rate case. The EEAG includes representatives from NW Natural, Energy Trust of Oregon ("Energy Trust"), WUTC Staff, Public Counsel, Northwest Industrial Gas Users ("NWIGU"), The Energy Project, and NW Energy Coalition.

III. Program Administration

NW Natural's general energy efficiency programs are administered by the Energy Trust, which is an independent, nonprofit organization dedicated to helping utility customers save electric and gas energy. Energy Trust was formed in 2002 in response to Oregon legislation that restructured electric utilities[1] for multiple reasons including allowing non-residential customers to purchase their electricity from providers other than the utility and reassigning the responsibility for demand side management from utility operations to the Energy Trust.

NW Natural began using Energy Trust as the delivery arm for its Oregon energy efficiency program in 2003. Since NW Natural's Washington service territory is contiguous with its Oregon territory, it made sense to have Energy Trust extend the boundaries of the Oregon program offerings into Washington.

As agreed to in UG-080546, Energy Trust administered the Company's program for one pilot year. During this time, the EEAG monitored the program's performance and assessed whether Energy Trust should be the ongoing program administrator. On May 25, 2011, NW Natural made a compliance filing in UG-080546 wherein it stated the

[1] SB 1149, codified as ORS 757.612, mandated the creation of an independent entity capable of providing demand side management services to utility customers.

EEAG's opinion to allow Energy Trust to continue administering NW Natural's energy efficiency programs in Washington. On June 8, 2011, Public Counsel separately filed a letter supporting this decision.

NW Natural's Washington Low Income Energy Efficiency Program ("WA-LIEE") is administered by Clark County Community Action Agency, Klickitat County Community Action Agency and Skamania County Community Action Agency.

IV. Programs Offered

NW Natural offers the following general energy efficiency programs:

> Residential – Residential customers with gas heated homes are offered home energy reviews wherein an energy consultant identifies measures that could be installed to improve the customer's home's efficiency. Specific incentive offerings are also available for the installation of certain efficient gas appliances.
>
> New Homes – The New Homes program encourages builders to construct homes to an energy efficiency standard that is better than Washington building code. Qualifying homes must meet the criteria established in Energy Star's Builder Option Package ("BOP") for natural gas heated new construction.
>
> Commercial – Commercial customers are offered incentives for prescriptive efficient gas appliance installations, as well as efficient installations unique to the customer's facilities that are identified in a custom study.

Specific measure offerings are as listed in Appendix A to this Plan."

Under NW Natural's low income energy efficiency program, agencies administering the program leverage other funding sources with WA-LIEE dollars to provide whole-house weatherization services to qualifying customers. Agencies are paid $3,500 per home for cost effective energy efficiency installations as well as an average of $440 per home for health and safety repairs. Program details are available in the Company's Schedule I, "Washington Low Income Energy Efficiency Program (WA-LIEE)."

V. Program Evaluation, Monitoring and Verification ("EM&V")

Impact Evaluations

Deemed gross savings by measure are used to determine total therms reported as saved per program year. The deemed savings used will be consistent with the most current impact studies performed on the programs that the Energy Trust delivers in Oregon until after mid-2012 when such impact evaluations will include results from the Washington-delivered programs. The Energy Trust performs the impact study wherein they analyze customers' energy usage data before and after a measure is installed. The

savings from all measures' are analyzed annually unless sample sizes based on participation rates are not statistically significant. From the impact evaluation, the Energy Trust is able to determine if average savings are consistent with deemed savings. If they are not, the deemed savings are "trued-up" once annually to reflect the findings. A link to the annual true up report as well as a short summary of the results will be provided in the quarterly report following the report's release.

Process Evaluations

Besides impact evaluations, the Energy Trust annually issues a request for proposal ("RFP") for a third party to perform a process evaluation on all general energy efficiency programs offered. The third party studies and reports on the processes employed for each program. Study results are available on the Energy Trust's website: www.energytrust.org. A link to the annual process evaluation as well as a short summary of the results will be provided in the quarterly report following the report's release.

VI. Process for Program Changes

NW Natural will file to revise Appendix A of its Energy Efficiency Plan when it plans to add, change, or remove a long- term incentive offering. Every year the Company will consider if program year changes are needed. If they are, the Company will revise its EE Plan to make requested program modifications when it makes its annual advice filing, submitted no later than December 1, to revise the performance metrics and budget that are also included in the Plan. This does not preclude the Company from filing to revise Schedule G or its EE Plan at any time during the year. Advice filings revising or adding measures will include:

1) A benefit cost ratio ("BCR") calculator demonstrating the measure's life, measure cost, the quantifiable non-energy benefits, the utility system benefits and the societal BCR; and

2) A blessing memo which refers to an in-house Energy Trust document that summarizes the vetting of a measure before it is introduced as a program offering. The EEAG will be given the opportunity to review all tariff filings before they are filed. The Company will generally give the EEAG ten business days to review a draft filing. The EEAG's review process will not be less than five business days.

3) New programs proposed mid-cycle will include a program-specific plan addressing the possible need for program-specific metrics.

Please note that not all advice filings must include the EE Plan. The EE Plan will only be included when it is being revised.

The Company will work to resolve issues with EEAG members before filing. If the EEAG cannot completely recommend approval of a filing, the Company may still choose to make the filing with the WUTC with the understanding that EEAG members may intervene in that public proceeding.

VII. Annual Schedule for Program Planning

By November 15 of each year, the Company will provide the EEAG with the following proposals for the next program year, which will subsequently be filed with the WUTC in a new docket that will contain all the required reporting for the calendar year, including a link to the Purchased Gas Adjustment (PGA) filing wherein program costs are recovered:

Budget

The Company will provide a total estimated program budget for the next calendar year. The budget will present expected expenditures by program and customer class.

Please note that this budget forecast will be based on the best information available at the time. As the year progresses, budgeted dollars may be reallocated among various programs or new offerings that are approved by the WUTC.

Funding Schedule

A funding schedule is a contractually-agreed-to timeline between NW Natural and Energy Trust wherewith NW Natural will provide Energy Trust the necessary money for program administration and delivery. The amounts dispersed to the Energy Trust in one year are the sum of all funds needed for that program year determined by subtracting any unspent or uncommitted funds previously dispersed to the Energy Trust for the Washington program from the total forecasted budget.

Metrics

The Company will propose performance metrics that will address the following:

- Total program costs
- Projected therm savings consistent with most recent IRP
- Average levelized cost for measures
- A ceiling for average cost per therm
- Projected homes to be weatherized in the WA-LIEE program

The Company expects that Total Resource Cost (TRC) and Utility Cost (UC) at the portfolio level should always be greater than 1.0 and will report compliance to this on an annual basis.

The Company will come to agreement with the EEAG on the next year's budget and performance metrics before making a tariff filing with the WUTC to modify this plan so that it incorporates the next year's projected costs and metrics accordingly. This filing will be made annually not later than December 1 for a January 1 effective date.

Generally, milestones for the program year will be as follows:

Program Year Schedule	
January 1	Start of program year
April 25	Annual report for previous program year is filed.
May 25	Q1 report on January 1 through March 31 of current year
August 25	Q2 report on April 1 through June 30 and YTD
October 1	PGA filing is submitted. PGA will include the amortization of the prior year's program costs.
November 15	Share next year's budget range, funding schedule, and proposed performance metrics with EEAG no later than this date
November 25	Q3 report on July 1 through September 30 and YTD
December 1	Latest date to file EE Plan for next program year
January 1	Start of next program year; new EE Plan effective

VIII. Reporting

The Company will file all required reporting with the WUTC in the docket established for the current program year.

Quarterly

The Company will report on its program on a calendar year basis. Quarterly reports will be provided to the EEAG and filed with the WUTC on the following schedule:

1Q – May 25

2Q – August 25

3Q – November 25

Annual

An annual report will be due annually for the previous year by April 25th.

EEAG Review

The EEAG will meet either in person or by teleconference to review each quarterly and annual report.

Content of Reports

The quarterly reports will include

- Quarterly progress toward annual program metrics
- A breakdown of costs by program and customer sector
- A reporting on percentage of program costs spent on customer incentives
- The funding received to date
- The 2Q report will include a 6 month check in on WA-LIEE
  - program year costs,
  - homes served,
  - estimated total therms saved per home, and
  - total therm savings to-date
- The quarterly report following the annual release of the impact and process report will include a link to that report and a short summary of the findings

The annual report will include the following:

- Budget compared to actual results by program
- Cost-effectiveness calculations on a program by program and total portfolio basis
- Measure level participation (units installed and savings) under each program
- Reporting on achievement of metrics
- Evaluation results (if performed)
- WA-LIEE program results including:
  - total program year costs
  - homes served
  - estimated total therm savings, and
  - average therms saved per home.

IX. Cost Recovery

Budgets

Forecasted program costs for the next calendar year will be reviewed annually in November when metrics are also proposed for the following program year.

Actual Costs

Each year, the Company will file its annual report by April 25 which will detail costs and acquisitions for the previous program year. This filing will trigger the EEAG's review of general energy efficiency and WA-LIEE program costs.

X. Cost Recovery

Energy Efficiency and WA-LIEE program costs are currently deferred and later amortized for recovery in temporary rates which are adjusted annually with the annual PGA filing. Energy Efficiency Program costs are recovered from applicable customers on an equal cents per margin basis as established annually in Schedule 215. WA-LIEE program costs are recovered from all firm sales and interruptible sales customers on an equal cents per margin basis as established annually in Schedule 230.

The Company will continue working with Staff and Public Counsel to determine an approach to cost recovery that will include a separate tariff filing for the amortization of costs and a statement on the bill of the amount each customer is paying toward energy efficiency.

XI. 2011 Performance Metrics

Below are the 2011 program metrics. Each metric is followed by a statement explaining how it was determined.

- Total residential and commercial program costs will be between$1,468,165 and $1,614,982

The total costs for this metric correlate to the range of costs estimated to achieve all cost effective therms for the programs being offered as determined in the Company's 2011 Integrated Resource Plan ("IRP"), filed in Docket No. UG-100245.

- Therms saved will be between 212,553 and 250,062

The program's primary goal is to meet system demand with the least cost conservation as required per WAC 480-90-238(1). The therm savings target is aligned with the demand-side management targets for the programs offered as identified in the Company's 2011 Modified IRP.

- Average levelized cost for the portfolio of measures will not to exceed $0.65 per therm

This metric is unchanged from the prior year. The profile of NW Natural Washington service territory makes it harder to reduce the averaged levelized cost per therm than it would be in an area with more industrial customers since therm savings are acquired more cost effectively for bigger customers than for residentials.

- First year therms will cost less than $6.50 per therm

This metric is reduced from $8.00 per therm the first year and $7.00 the second.

- Total Resource Cost (TRC) and Utility Cost (UC) at the portfolio level are greater than 1.0

The TRC and the UC shall be calculated as prescribed in Schedule G. A value greater than 1.0 demonstrates that the benefits received are greater than the costs. This test is applied at the portfolio level to allow measures that are less cost effective to be bundled with more cost effective.

Schedule I, Washington Low Income Energy Efficiency (WA-LIEE) 2011 Performance Targets

In 2011, the WA-LIEE program will strive to weatherize 20-40 homes for a cost of $89,300to $178,600. Assumptions are as provided below in Table II.

Table II – WA-LIEE 2011 Performance Targets

Estimated homes served in 2012:	20-40
Estimated Average Cost of Incentives per home	$3,500
Maximum Cost per home ($3,500 incentives + $440 health, safety and repairs and $525 administration costs)	$4,465
Maximum 2012 cost based on estimated homes served	$89,300 to $178,600
Estimated therms saved per home	211
Total estimated therms saved in 2012	4220 to 8440

XII. 2011 Budget and Funding Schedule

Below is the 2011 budget for the residential and commercial energy efficiency programs and the WA-LIEE program.

Programs 2012 Budget		
Commercial		
Retrofit	$$596,829 to $673,346	121,678 to 143,150
Residential		
Retrofit	$$531,798 to $599,977	63-373 to 74,556
New Homes	$$302,834 to $341,659	27,503 to 32,356
Total For Schedule G Programs	**$$1,431,461 to $1,614,982**	**212,553 to 250,062**
WALIEE	$89,300 to $178,600	4220 to 8440
TOTAL	**$1,520,761 to $1,793,582**	**216,776 to 258,502**

APPENDIX A to EE Plan
The Company's Residential and Commercial Program offers incentives for measures as listed below.

RESIDENTIAL PROGRAM INCENTIVES

The following are offerings for Residential customers:

DESCRIPTION	INCENTIVE
Weatherization	
Air Sealing	50% of cost, up to $275
Air Leakage Test	$35.00 per site tested
Attic/Ceiling Insulation	$0.25 per square foot
Duct Insulation	50% of cost, up to $100
Floor Insulation	$0.30per square foot
Knee-Wall Insulation	$0.30 per square foot
Boiler Pipe Insulation	$0.50 per linear foot
Wall Insulation	$0.30 per square foot
Duct Sealing	50% of cost up to $325
Duct Leakage Test	$35.00 per duct system tested
Windows (0.25 to 0.30)	$2.25 to $3.50 per square foot
Heating	
Gas Furnace	$100.00
Direct Vent Gas Unit Heater	$100.00
Direct Vent Gas Fireplace	$100.00 to $150.00
Intermittent Pilot Ignition	$100.00
Gas Boiler	$200.00
Water Heating	
Gas Tankless Water Heater	$200.00
Gas Water Heater	$35.00
Clothes Washer with gas water heat (MEF 2.2+)	$30.00
Direct Install Measures	
Faucet Aerator	Free to customer
Home Energy Review	Free to customer
Showerhead	Free to customer
Shower wand	Free to customer
Water Heater Set Back	Free to customer
Distributor or Retail Buy Down	
Showerhead	$8.50

RESIDENTIAL NEW CONSTRUCTION

Tankless Hot Water Heating	$ 200.00 per unit
Energy Star Builder Option Package*	$ 600.00 per home
Showerhead	Free to customer
Clothes Washer with gas water heat (MEF 2.2+)	$30.00

* Building requirements are as stated on this site: http://www.energystar.gov/index.cfm?c=bop.pt_bop_washington

COMMERCIAL

General

Custom	$1 per therm

Heating

Steam Traps, Small Commercial, <12 hrs/day, small-med pressure	$ 100.00 per trap*
Gas-fired Condensing Boiler > 2500 kbtuh 0.9 EC	$ 4.00 per kBtu hr in
Gas-fired Condensing Boiler < 300 kbtuh 0.9 AFUE	$ 4.00 per kBtu hr in
Gas-fired Condensing Boiler >= 300 kbtuh, <= 2500 kbtuh 0.9 ET	$ 4.00 per kBtu hr in
Boiler Vent Damper	$ 1,000.00 per unit
High Efficiency Unit Heater - Non-Condensing with Electronic Ign	$ 1.50 per kBtu hr in
High Efficiency Condensing Furnace <225,000 kBtuh	$ 3.00 per kBtu hr in
Direct-fired Radiant Heating	$ 6.50 per kBtu hr in
Pipe Insulation	$2.00 to $6.00 per linear foot
Building Envelope insulation	$0.30 per sq ft
Rooftop Unit Tune Ups	$1,250 to $1,050
Greenhouse Thermal Curtain	$0.9 per sq ft

* Pre-verification of steam traps required for dry cleaners

Water Heating

Domestic Tankless/Instantaneous Water Heater with Electronic Ignit	$ 2.00 per kBtu hr in
Domestic Tankless/Instantaneous Water Heater with Standing Pilot	$ 1.50 per kBtu hr in
Condensing Tank	$ 2.50 per kBtu hr in
Commercial Clothes Washer, Gas Water Heat, Partial Gas	$ 200.00 per unit
Showerhead Gas	$ 6.00 to $10 per unit
Commercial Bathroom Faucet Aerators (0.5 gal per minimum; 15 unit minimum)	$3.00 each
Commercial Kitchen Faucet Aerators (1.5 gal per minimum; 15 unit minimum)	$5.00 each
Ozone Laundry System	$40 per pound of washing capacity up to a max of 35% of cost of system

APPENDIX A to EE Plan (Continued)

Food Service

Gas Full-Size Convection Oven	$ 300.00 per unit
Gas Fryer	$ 1,000.00 per unit
Gas Griddle	$ 150.00 per unit
Gas Steam Cooker	$ 1,300.00 per unit
Dishwasher - Single Tank Conveyor - Low temp - Gas hot water	$ 500.00 per unit
Dishwasher - Single Tank Door/Upright - Low Temp - Gas water heat	$ 400.00 per unit
Dishwasher - Single Tank Conveyor - High temp - Gas hot water	$ 500.00 per unit
Dishwasher - Single Tank Door/Upright - High Temp - Gas water heat	$ 400.00 per unit
Dishwasher - Undercounter - high temp - Gas water heat	$ 200.00 per unit
Turbo Pot – limit one per applicant	$40 per pot*

* Customers installing one other food service measure may receive one free turbo pot while promotional quantities last.

SPECIAL PROVISIONS

1. One time bonuses or coupons may be periodically offered to supplement standard incentives.
2. Limited time incentive offerings for measures may be offered.

NW Natural Washington Program
Summary of 2012 Measure Additions

Measure Name	Description	Therm Savings	Incentive $
RESIDENTIAL			
Clothes Washer with gas water heat (MEF 2.2+)	This point of purchase rebate is a collaborative incentive agreement in which Clark PUD pays $20 for electric savings and Energy Trust/The Company pays $30 for gas savings on all eligible clothes washers with gas water heat. Participant must be both a NW Natural and Clark PUD customer.	3.93	$30
High Efficiency Windows	The tier structure for high performance windows is changing from U-values of: .22 or less and .23-.30 -TO- .25 or less and .26-.30, while incentive payments will remain the same for the two tiers.	.25 or less: .42 per SF .26-.30: .29 per SF	.25 or less: $3.50 per SF .26-.30: $2.25 per SF
COMMERCIAL			
Commercial Insulation	Includes three different prescriptive retrofit measures for attic, roof and wall insulation in commercial buildings.	Attic: .18 Roof: .24 Wall: .16	$.30 per square foot
Rooftop Unit Tune-up Incentives	This suite of four incentives offers a variety of rooftop unit tune-up options including economizer installation, demand controlled ventilation, CO2 sensors and programmable 2-stage thermostats. Three of these measures also offer electric savings in which we hope to collaborate with Clark PUD on cost sharing. The gas-only incentive will be pursued in lieu of a Clark PUD agreement.	43 therms/ton	$735 - $1,050
Greenhouse Thermal Curtain	This highly cost-effective measure traps heated air below the curtain and forms an insulating barrier of air above the curtain that reduces conduction losses through the roof.	.49 per square foot	$.09 per square foot

Blessing Memo for Residential Clothes Washers in NW Natural Washington State Service Territory

End Use
Clothes washers in NW Natural service territory in Clark County, Washington.

Scope
Residential clothes washers with an MEF > = 2.2
At least 1.6 cubic feet in size.

Program
Based on the referenced analysis and associated cost-effectiveness screening, the measure described below is "blessed" on a prospective basis for inclusion in the New Homes and Products program.

This memo may be also applicable for sales of identical equipment in New Building Efficiency or Building Efficiency Multifamily programs, for multifamily buildings or residential uses in universities, etc. Care should be taken that we do not "double-incent" measures that are acquired through the retail channels that New Homes and Products is working with.

Description of the Measure
The Modified Energy Factor (MEF) is a per unit volume measure of the number of cycles required to use a kilowatt hour of energy. It combines mechanical energy used by the washer, water heating, and energy required to remove moisture content remaining after the spin cycle. The water heating fuel of the customer must be provided by a utility served by the Energy Trust.

Purpose of Evaluating Measure
This memo extends clothes washers to Clark County, Washington as part of a collaborative effort with Clark PUD and an incentive sharing agreement.

	Project	Measure	Measure Lifetime (Maximum 70 yrs)	Annual Gas Savings, therm	Total Cost	ETO Incentives	Non Energy Benefits (if any)	Gas Utility System BCR	Combined Societal BCR
18	Clark County	Gas DHW	14	3.93	177	30	288	1.17	2.33

Program Requirements
Retail clothes washers with a Modified Energy Factor equal to or greater than 2.2
All units 1.6 cubic feet more.
The water heating fuel of the customer must be supplied by NW Natural.

Measure Analysis
Savings for retail clothes washers have been adopted from the RTF analysis. On the recommendation of the RTF, the baseline MEF for single family homes is 1.92, which is the average of models in the California Energy Commission database.

Dryer fuel type has been factored into the savings, based on a weighted average of the dryer fuel types of past participants in the program.

Savings, Economics and Incentives
In CEE's tier II, retail clothes washers with an MEF from 2.2 to 2.45 and gas DHW have an average savings of 73 kWh and 3.42 therms. Electric savings are a combination of motor energy in the washer and an 87.4% share of electric dryers. A portion of the gas savings are from an expected 12.6% share of gas dryers. The dryer fuel share is based on the distribution that we have seen in the program in the past. In CEE's tier III, savings for retail clothes washers with an MEF greater than or equal to 2.46 are 116 kWh and 4.54 therms. The same fuel share for electric and gas dryers have been applied to this tier.

54.21% of washers in Clark PUD's two most recent months had an MEF between 2.0 and 2.45. 45.79% has an MEF greater than 2.45. The energy savings, incremental cost, and non-energy benefits in the cost effectiveness table above are weighted by those percentages.

In Washington, The Energy Trust uses the water and sewer rate from the City of Vancouver to calculate the non-energy benefit of reducing water consumption. The rate is $8.14 per 1000 gallons, as of January 1, 2011. Electrical energy savings from reduced dryer energy accrues to the societal BCR, but is not credited to the utility BCR because Clark PUD is claiming the electrical savings.

Program Integration
Clark PUD gives a $20 incentive for clothes washers with an MEF greater than or equal to 2.2 and electric DHW. They will now give the same incentive for clothes washers with gas DHW and Energy Trust will give $30. The total of $50 matches the incentive that Energy Trust gives for its first tier of clothes washers in Oregon, with the same minimum MEF. Clark PUD will claim the electrical energy saving from motor energy and electric dryers, even when the clothes washer is connected to gas DHW, and Energy Trust will claim energy savings from gas DHW.

Energy Trust of Oregon Savings Calculation													
Residential Sector													
Version: 05/25/10		Starting Year: 2010			Today's Date:	10/26/2011							
Projec													
Project Name:	2010 Clothes washers												
Organization Name													
Project Location:													
Installation Date:													
Program:	New Residential	*Select Electric Sponsor*	Other Utility	*Select Gas Sponsor*	Energy Trust								
Energy Conservation Measures: Input Yellow Cells													
	Project	Measure	Select Electricity Measure Description:	Electricity Load Profile	Select Gas Measure Description	Measure Lifetime (Maximum 70 yrs)	Annual Electricty Savings, kWh	Annual Gas Savings, therm	Total Cost	ETO Incentives	Non Energy Benefits (if any)	Gas Utility System BCR	Combined Societal BCR
18	Clark County	Gas DHW	Clothes Dryer	Clothes Dryer	Clotheswasher	14	93	3.93	177	30	288	1.17	2.33
Total							1,969	45	$2,567	$1,330	$5,217	1.53	2.86

Blessing Memo for High Performance Windows (U =< 0.25)

End Use
Replacement windows for existing single family and manufactured homes. Savings is primarily from space heat.

Scope
The specification for high performance windows is changing from a U-factor of equal to or less than 0.22 to a U-factor less than or equal to 0.25. The efficient window specification with a U-factor less than or equal to 0.30 has not changed.

Program
Based on the referenced analysis and associated cost-effectiveness screening, the measure described below is "blessed" on a prospective basis for inclusion in the Home Energy Savings, Home Performance with ENERGY STAR, and Existing Manufactured Homes programs, in both Oregon and Washington. Because the New Homes program uses an Energy Performance Score, we expect that they will incorporate these savings or develop similar estimates through their modeling tool but incent the measure differently.

Description of the Measure
Heat loss through windows can be reduced with insulating gases or a vacuum between window panes. Windows in the high performance category typically are double pane with a low-E coating on the fourth surface, but may achieve the specified thermal resistance with other techniques.

Purpose of Evaluating Measure
Energy Trust has seen little uptake for incentives offered for high performance windows and is adjusting the specification to increase market adoption, in alignment with a market assessment completed by the Northwest Energy Efficiency Alliance (NEEA).

Measure Analysis
RTF baseline of a U-factor of 0.35 is used for Energy Trust new and replacement windows measures. The current Energy Trust windows measure includes efficient windows with a U-factor equal to or less than 0.30. Prescriptive savings for this measure are 0.29 therms per square foot of glazing or 3.76 kWh per square foot, depending on the space heat fuel source.

Windows with a U-factor of 0.22 were previously given prescriptive savings of 0.55 therms per square foot and 7.10 kWh. Given a baseline U-factor of 0.35, the new high performance tier with a U-factor of 0.25 will yield 23% less savings, if the savings are directly proportional to U-factor. Energy savings for the new high performance tier are, therefore, 0.42 therms or 5.46 kWh per square foot.

The impact analysis on windows in the program in 2008 indicates a much lower savings amount for homes with gas space heat, but this memo does not incorporate the findings from the impact analysis because further research is needed. Unanswered questions include the average U-factor of the windows being replaced, the role of air infiltration around the frame of the window in decreasing the evaluated energy savings, and a comparison to homes with electric space heat.

Measure life remains 45 years, consistent with previous Energy Trust windows measures.

Savings, Economics and Incentives

Incremental costs for efficient and high performance windows are taken from RTF analysis. The RTF uses the cost of windows with a U-factor of 0.22 rather than 0.25, but it is used here, with the expectation that the new high performance tier will cost no more than the previous high performance tier which it replaces.

The proposed incentive for high performance windows will remain $3.50 per sq ft. It compares to an incentive of $2.25 per sq ft for windows with a U-factor of 0.30.

Program Requirements
High performance windows with a U-factor between equal to or less than and 0.25

BCR Calculator (link E:\Planning\EE Programs\Home Energy Savings\HOUSE TYPES AND measures\single family\windows\high performance windows\bencost\Efficient and High Performance Glazing CEC.xlsx)

	Project	Measure Lifetime (Maximum 70 yrs)	Annual Electricty Savings, kWh	Annual Gas Savings, therm	Total Cost	ETO Incentives	Gas Utility System BCR	Combined Societal BCR
8	Tier I - U-value < 0.30 - Gas	45		0.29	0.89	2.25	1.8	4.5
9	Tier II - U-value < 0.25 - Gas	45		0.42	2.25	3.50	1.7	2.6
10	difference between Tier I and Tier II	45		0.13	1.36	1.25	1.5	1.4

Paul Sklar, E.I.
Planning Engineer
& Fred Gordon, who merely edits and checks for bugs.

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Energy Trust of Oregon Savings Calculation

Residential Sector

Version: 02/14/08		Starting Year: 2010		Today's Date:	11/2/2011
Projec					
Project Name:	High Performance Glazing				
Organization Name					
Project Location:					
Installation Date:					
Program:	New Residential	*Select Electric Sponsor*	None	*Select Gas Sponsor*	Energy Trust

Energy Conservation Measures: Input Yellow Cells

	Project	Measure	Select Electricity Measure Description:	Electricity Load Profile	Select Gas Measure Description	Measure Lifetime (Maximum 70 yrs)	Annual Electricty Savings, kWh	Annual Gas Savings, therm	Total Cost	ETO Incentives	Non Energy Benefits (if any)	Gas Utility System BCR	Combined Societal BCR
1	Tier I - U-value < 0.30 - Gas	2010		na	Existing Space Heat	45		0.29	0.89	2.25		1.78	4.49
2	Tier II - U-value < 0.22 - Gas	2010		na	Existing Space Heat	45		0.55	2.25	3.50		2.17	3.37
3	difference between Tier I and Tier II	2010	None	na	Existing Space Heat	45		0.26	1.36	1.25		2.87	2.64
7			None	na	None							na	na
8	Tier I - U-value < 0.30 - Gas	2012	None	na	Existing Space Heat	45		0.29	0.89	2.25		1.78	4.49
9	Tier II - U-value < 0.25 - Gas	2012	None	na	Existing Space Heat	45		0.42	2.25	3.50		1.67	2.60
10	difference between Tier I and Tier II	2012	None	na	Existing Space Heat	45		0.13	1.36	1.25		1.47	1.35

Blessing Memo for Commercial Insulation

Based on the attached analysis the commercial retrofit insulation measures described below are blessed as cost effective on a prospective basis. The original analysis done by Aspen estimated savings for attic, wall, and roof insulation in commercial buildings using gas as the heating fuel. Recently the existing buildings program requested insulation measures for commercial buildings with electric heating. The proposed method was to take the therm/sqft savings from the existing estimate and covert to kWh, taking into account the different fuel sources. When using a heat pump as the heating source, we assumed an 80% system efficiency for the gas fuel and a COP of 2.5 for the electric system to convert the expected therm savings into kWh savings. When using electric resistance as the heating source, we assumed an 80% system efficiency for the gas fuel and a COP of 1.0 for the electric system to convert the expected therm savings into kWh savings. Also, in reviewing the therm savings estimate we realized that there were significant fan savings associated with the roof insulation measure which had failed to get into the previous gas measure definition. In addition to creating six new measures for electrically heated buildings, (one for each insulation type and for each heating source) we also added the fan savings to the existing roof insulation gas measure. Estimated kWh fan savings for attic and wall insulation were not large enough to warrant inclusion in the measures, and were therefore not included in the overall savings estimates for those measures (refer to savings shown in "Gas Incentive justification 5.xls" located in folder referenced below).

We also modified the measure definitions associated with these nine (3 existing, 6 new) measures to be consistent with the way these measures are being entered into FastTrack and to reduce data entry errors. In the measure definition we have set the incentive and savings estimate to the per sqft estimates shown below, whereas previously they were left blank. When entered into FastTrack, the total square feet of installed insulation should be entered in the quantity field; savings and incentive will then be multiplied by the quantity entered. This is consistent with the way these measures are currently being entered into FastTrack, except now the default override will be turned off eliminating the chance that these measures could be entered incorrectly.

Table showing savings estimates for all measures:

Gas Equipment	Measure Description	Efficiency Type for Qualification	Unit Incentive	Units	Annual Savings (Therms/Unit)	Annual Saving (kWh/Unit) for COP=1	Annual Saving (kWh/Unit) for COP=2.5	Total Annual Saving (kWh/Unit) Elec. Res.	Total Annual Saving (kWh/Unit) Heat Pump
Insulation	Attic Insulation	Minimum R-19	$0.20	/sq.ft.	0.18	4.11	1.65	4.14	1.67
Insulation	Roof Insulation	Minimum R-11	$0.20	/sq.ft.	0.24	5.58	2.23	6.97	3.62
Insulation	Wall Insulation	Minimum R-11	$0.20	/sq.ft.	0.20	4.69	1.88	4.68	1.86

Energy Trust of Oregon, Inc. Cost-Effectiveness Calculator Tool Commercial Sector				
Version: 08/11/05	**BE**	**Starting Year: 20**	**Today's Date**	10/26/2011
Project Description	Insulation from none to code			
Organization Name				
Project Name:				
Site Address:				
Program:	**Building Efficiency**	***Select Electric S***	Other Utility	***Select Gas*** Energy Trust
Energy Conservation Measures: Input White Cells				

Measure #	Energy Efficiency Measure Name	Program	Select Business Type	Select Electric Measure Description:	Select Natural Gas Load Profile	Measure Lifetime (Maximum 70 yrs)	Annual Natural Gas Savings (therms)	Total Incremental Cost of Measure from RTF	Based on	Total Potential Incentive If Measure is Cost-effective	Gas Utility System BCR	Combined Societal BCR
1	Gas - Attic	Building Efficiency	Small Office	None	Existing Space Heat	45	0.18	1.13	$1.67/therm	$0.30	13.307	3.540
2	Gas - Roof	Building Efficiency	Small Office	Cooling	Existing Space Heat	45	0.24	1.13	0.65/th + 0.10/kWh	$0.16	32.051	7.965
3	Gas - Wall	Building Efficiency	Small Office	None	Existing Space Heat	45	0.16	0.69	$1.85 /therm	$0.30	13.5	5.8
7		Building Efficiency							27% of cost	None	na	na
8		Building Efficiency							27% of cost	None	na	na
9		Building Efficiency							44/% of cost	None	na	na
10		Building Efficiency								None	na	na
Total											**na**	**na**

This spreadsheet calculates the benefit-to-cost ratio for efficiency measures and allocates cost,
considering both electric and gas savings as appropriate. The tool operates as follows:

1. Based on the business type, electric measure description, natural gas load profile and measure lifetime selected, the tool calculates a utility system present value per annual kWh saved and per annual t
   #N/A
   #N/A
3. The tool multiplies the total 0,000 therms saved per year for the natural gas measures listed above times the value of $22.34/annual therm to arrive at a natural gas savings present value of $0,013.
4. The incentives for therm and kWh savings are calculated for your project based on the program you choose under Select Program in column C.
5. If you have non-energy benefits, such as operation and maintenance savings, reduced sewer charges, higher net operating income, etc. enter the annual dollar amount in column K.
   The tool calculates the net present value of the non-energy benefits using the lifetime in column G and reports the result in column M.
6. The total energy savings from the measures listed above have a total utility system present value of $0,013 to the utility system in the State of Oregon.
7. Based on the business type, electric measure description, natural gas load profile, measure lifetime selected, the total incremental cost and the total incentive, the tool calculates a societal present value
   #N/A
   #N/A
9. Based on the total incremental costs of the measures the total societal cost is $0,000 and based on the total incentives for the measures the total utility system cost is $0,000.
10. To determine the SOCIETAL BCR, the total societal benefits, $0,037, are divided by the total societal costs, $0,000, to get:
    SOCIETAL BCR = a ratio of na. This ratio must be at least 1 or greater than 1 to be cost-effective.
11. To determine the UTILITY SYSTEM BCR, the total utility system benefits, $0,013, are divided by the total utility system costs, $0,000, to get:
    UTILITY SYSTEM BCR = a ratio of na. This ratio must be at least 1 or greater than 1 to be cost-effective.
11. Dividing line 8 by the cost in line 10, we get:
    SOCIETAL B/C RATIO = $0,037 divided by $0,000 or a ratio of na. This ratio must be at least 1 to be cost-effective.
12. Dividing line 7 by the cost in line 10, we get:
    UTILITY SYSTEM B/C RATIO = $0,013 divided by $0,000 for a ratio of na. This ratio must be at least 1 to be cost-effective.

BLESSING MEMO FOR ROOFTOP UNIT AND SPLIT SYSTEM TUNE-UP MEASURES FOR THE O&M SOLUTIONS INITIATIVE

End Use
Suite of O&M measures to improve the efficiency of existing 3-20 ton rooftop units and split systems located on existing commercial buildings including repair of existing economizers, installation of demand-controlled ventilation (DCV) systems, installation of 2-stage programmable thermostats, and installation of economizers where not existing.

Scope
Measures are "Blessed" for tune-up of existing rooftop units and split systems in retrofit applications, for use in the 2011 O&M Solutions Initiative. Revisions to the 2011 RTU tune-up program that differ from previous offerings include the following:

- Consolidation of packages into a smaller number due to contractor feedback and overall program direction,
- Averaging of savings for treatment packages across program offering instead of by individual package,
- Revision to savings estimates for program due to billing analysis results and recommendations,
- Allowance for other space types into the program other than office and retail that exhibit similar operational and behavioral characteristics,
- Re-screening for cost-effectiveness based on new packages, updating savings established through billing analysis and M&V efforts, and new package weightings based on past experience of average tonnages seen coming through the program

Program Applicability
Based on the referenced analysis and associated cost-effectiveness screening, the measures described below are "blessed" as cost effective on a prospective basis for use in the O&M Solutions Initiative for the following programs:

- Existing Buildings
- Production Efficiency

Within this market segment, applicability to the following building types are expected:

- Office
- Retail
- Other spaces exhibiting EUI's and occupancy characteristics similar to office and retail spaces.

TABLE 1 – Cost-effectiveness screening for Packaged RTU and Split System tune-ups and retrofit measures.
Tonnage used in screening based off a weighted average of RTU sizes which was found to be 3.8 tons for retrofits, 7.4 tons for Tune-ups, and 6.6 tons across the entire program.

NOTE: Table 1 reflects edits made specifically for the Northwest Natural Washington program and should not be used for any other programmatic purposes.

Measure #	Energy Efficiency Measure Name	Select Business Type	Select Electric Measure Description	Select Natural Gas Load Profile	Measure Lifetime (Maximum 70 yrs)	Annual Electricity Savings (kWh)	Annual Natural Gas Savings (therms)	Total Incremental Cost of Measure	Annual Non-Energy Benefits $ (if any)	Total Potential Incentive If Measure is Cost-effective	Gas Utility System BCR	Combined Societal BCR
1	Package #1 Retrofit RTU with new Economizer	Small Office	Cooling	Space Heat	5	1,294.2	74.7	$735.00		$735.00	0.3	1.0
2	Add DCV to Package #1	Small Office	Cooling	Space Heat	15		87.0	$140.00		$140.00	5.8	5.8
3	Package #1 Combined	Small Office	Cooling	Space Heat	8	1,294.2	161.8	$875.00		$875.00	1.0	1.7
4	Package #2 Tune-up RTU with existing Economizer, but no T'stat needed	Small Office	Cooling	Space Heat	5	2,531.2	146.2	$595.00		$595.00	0.8	2.3
5	Add DCV to Package #2	Small Office	Cooling	Space Heat	15		170.2	$200.00		$140.00	11.4	7.9
6	Package #2 Combined	Small Office	Cooling	Space Heat	8	2,531.2	316.4	$795.00		$735.00	2.2	3.8
7	Package #3 Tune-up RTU with existing Economizer	Small Office	Cooling	Space Heat	5	2,531.2	146.2	$735.00		$735.00	0.7	1.9
8	Add DCV to Package #3	Small Office	Cooling	Space Heat	15		170.2	$200.00		$140.00	11.4	7.9
9	Package #3 Combined	Small Office	Cooling	Space Heat	8	2,531.2	316.4	$935.00		$875.00	1.9	3.2
10	Package #4 Tune-up with existing Economizer Gas-only territory	Small Office	Cooling	Space Heat	5		146.2	$850.00		$850.00	0.6	0.6
11	Add DCV to Package #4 Gas-only territory	Small Office	Cooling	Space Heat	15		170.2	$200.00		$200.00	7.9	7.9
12	Package #4 Combined Gas-only territory	Small Office	Cooling	Space Heat	10		316.4	$1,050.00		$1,050.00	2.0	2.0

Program requirements

- Smaller units (<5-ton) are not expected to have economizers already installed, since these have not been required in the past by Oregon's building code to be included at the time of installation. Only units which have readily available OEM economizer kits will qualify for an economizer retrofit via the O&M Solutions Initiative. Therefore only 3-to-4 ton units will be targeted for economizer retrofits. (Package #1 shown in Cost-effectiveness Calculator)
- Only 5-to-20 ton units will be targeted for economizer tune-ups. (Packages #2 thru #4 shown in Cost-effectiveness Calculator)
- Existing economizers will be checked for proper operation and tuned-up if deemed necessary. Tune-up tasks will vary depending upon the tune-up package that is selected. The details of each package are listed below.
- A maximum total incentive of up to $1250 per unit, depending on package selected, will be provided to the service contractor upon tune-up completion. All additional costs associated with unit tune-up measures will be covered by participant and/or service contractor.
- Only units that are 10 years or younger will qualify for incentives
- A checklist will be used to confirm which measures were installed and services performed on each RTU or split system. The first 10 units treated by each trade ally participating in the program will be directly supervised by a technical field representative assigned by the PMC. Spot inspections will be performed on 20% of units served for the remainder of the O&M Solutions Initiative.

Details

The existing buildings program is looking to expand its HVAC offerings with O&M measures targeted for commercial rooftop units (aka "RTU") and split systems, specifically focused on improving economizer functionality or installing economizers where none currently exist. The O&M Solutions Initiative will provide incentives to a select group of pre-qualified service contractors in exchange for providing RTU or split system repair (or installation) services for qualified participants. The specific mix of repair measures to be performed will depend on the condition of the existing equipment at the time of pre-inspection, but will include one or more of the following in the packages listed below:

- Upgrade O/A sensor to approved dry-bulb temperature sensor with tighter deadband
- Install programmable thermostat with dedicated stage for economizer control where one does not previously exist
- Set thermostat for occupied/unoccupied schedule
- Install demand controlled ventilation (DCV) mechanism and associated CO2 sensor
- Clean coil(s) on both condenser and evaporator if warranted
- Check and adjust refrigerant charge only if Evaporator and Condenser delta T's are not within manufacturer specifications
- Verify and correct damper operation and minimum O/A setting
- Verify and correct changeover and control coordination
- Verify and correct O/A compressor lockout
- Install economizer system, controls, & thermostat with dedicated economizer stage (<5-ton unit only)

Service contractors will be paid an incentive to provide a suite of services which primarily focus on installing or optimizing economizers on units, following a pre-inspection to establish need for any of the services listed above. Small commercial office and small retail buildings will be primarily targeted by participating service contractors for diagnostic services and repair measures on an RTU or split system. Building use types that fall outside the classification of office or retail may still be considered for tune-ups if they appear to be good candidates and exhibit similar occupancy schedules and overall energy use patterns to office and retail spaces. The program will perform a preliminary screening to test for similar

EUI's and scheduling to ensure savings will track closely to expected values seen in the office and retail sectors.

Savings
Savings for the expanded O&M Solutions Initiative were developed in part by using the results from the 2009 pilot effort targeting tune-ups and retrofits on 3 to 20-ton RTU's. During the 2009 pilot, 82 units in total were serviced with metering done on 13 of those units that received an OEM economizer retrofit. The results from this short term metering showed that for a 3-ton unit, an average savings of 1042 kWh/ton could be realized when:

- Retrofitting the RTU with an OEM economizer,
- Installing the new Honeywell W7660 O/A sensor,
- Implementing a 2-stage thermostat with changeover setpoint of 63°F, (the program later changed to 68°F changeover)
- Providing thermostat scheduling with building owner/facility maintenance staff.

After a year of running the tune-up program using savings established from this short term metering effort, a billing analysis was performed on around 40 of the units from 20 different buildings that received a tune-up treatment in 2009. Results from this billing analysis indicated that the average savings per ton estimated from the metering effort was substantially lower than what was reflected in the bills. In part this had to do with the two-week monitoring period failing to reliably extrapolate savings to a full year. However even with these lower findings, program-wide the savings were seen as sufficient and still resulted in a cost-effective service being provided overall. Therefore, the program model was changed to combine all treatment types together and simply use the same estimated savings program-wide rather than attempt to break out savings by each treatment package. Several treatment variations will still exist to allow tune-ups to match conditions found in the field, however only incentive levels will vary with each package and savings will be representative of a program-wide average.

In addition to the billing analysis done for the tune-ups, metering for DCV installations was also planned to attempt to find savings associated with those RTU's that had DCV installed as part of the tune-up. Findings from this M&V effort indicated that although very few kWh savings were found, that around 23 therms/ton were realized from reduced ventilation rates in the building through the installation of DCV. Also, because DCV installations were not part of the tune-up program at the time of the previous billing analysis, the savings from this M&V effort became additive to the previously established savings estimates. A follow-up billing analysis is planned in 2011 after the heating season has ended to validate the savings from units that received DCV installations.

Through site visits it was discovered that many buildings in colder Oregon climates typically install split systems to avoid the potential issue of freezing condensate. The program has requested offering the same tune-up incentives for split systems in order to explore this market potential. For both small unit retrofits and large unit tune-ups, split systems are assumed to realize similar savings opportunities as RTU's since they are essentially the same type of equipment and subject to the same common problems as RTU's. Although some minor difference in baseline SEER levels may be present when comparing split systems to RTU's, and because a minor increase in fan energy can be expected due to adding outside air ductwork for an economizer, the majority of the savings claimed through the tune-up program are from thermostat scheduling and changeover setpoint, and therefore possible savings reduction due to fan energy increases and SEER differences is expected to be minor.

Package Descriptions
Please note: Package descriptions below are given on a **per ton** basis, while the cost-effectiveness calculator is displaying savings for each option based on the **weighted average tonnage** seen entering the program so far for each package.

Energy Trust views the DCV and the tune-up as a single choice because, as the cost-effectiveness screening shows, the tuneup is often not cost-effecitve without the DCV. Additionally, from a marketing perspective it is far more difficult to sell either piece without the other. The combination provides enough benefit to justify the cost of bringing the technician to the site. Energy Trust analyzed the benefits of the components separately because (as explained blow) they have different measure lives, and to appropriately allocate incentive costs by fuel.

Package #1 – Install new economizer on RTU's ranging in size between 3-4 tons that do not have an economizer already. Includes new Economizer package, new O/A Sensor, new 2-stage Programmable Thermostat and DCV control.

Package #2 – Add DCV control to unit w/ existing economizer. Includes adding DVC control, CO2 sensor, controller where necessary, and O/A sensor. Economizer must be operational and tuned up. Assumes the existing 2-stage thermostat is functioning (to be confirmed by Trade Ally) and that no new thermostat is needed. (Damaged dampers, damper linkage and damper motors shall be fixed prior to tuning up if found non-functioning.)

Package #3 – Perform all controls and tune up measures listed in Package #2 plus a 2-stage programmable thermostat. Includes add-on DVC control, CO2 sensor, controller where necessary, O/A sensor, and new 2-stage programmable thermostat. Economizer must be operational and tuned up. (Damaged dampers, damper linkage and damper motors shall be fixed prior to tuning up if found non-functioning.)

Package #4 – Add DCV control to unit w/ existing economizer in gas-only territories. Includes adding DVC control, CO2 sensor, controller where necessary, and O/A sensor. Economizer must be operational and tuned up. Assumes existing 2-stage programmable thermostat is functioning (to be confirmed by Trade Ally) and that no new thermostat is needed. (Damaged dampers, damper linkage and damper motors shall be fixed prior to tuning up if found non-functioning.)

Measure life

A weighted measure life was used in the screening for the tune-up packages based on consideration of the mix of corrective actions taken, some of which seem easier to reverse than others by the occupant, and some of which are hardware dependant and not easily changed. Because a majority of savings for tune-up measures (excluding DCV installations) are estimated to be derived from thermostat dependant settings, a shorter measure life was proposed in the cost-effectiveness screening to account for the possibility of occupant changes to these settings over time. However the tune-ups also require several hardware changes that would normally incur longer measure lives because they have no direct involvement with the occupant. Therefore a weighted measure life of 5 years was used in the cost-effective screening in an attempt to account for both the possibility of occupant adjustments to the thermostat settings over time as well as hardware settings that are more permanent.

For DCV installations, savings stem from the installation of a CO2 sensor and associated hardware controller within the RTU, and therefore have no interaction with the occupant at all. Therefore the regionally accepted measure life of 15 years for a controls based measure was used in the cost-effectiveness screening for DCV measures only.

To screen for cost-effectiveness for a complete tune-up package using the different measure lives assigned to both the tune-up portion and the DCV installation, a present value of benefits for each independent measure was first established. The combined package was screened using the additive savings of the combined tune-up and DCV installations and costs. The measure life was adjusted until it matched the sum of each individual tune-up present value. By doing this, an overall weighted measure life for a complete RTU tune-up with DCV installation can be analyzed. For measures in dual fuel territories, a 5-year measure life on a tune-up and a 15-year measure life on a DCV installation equates to around 8 years measure life when combined based on the present value of each measure. The same

logic was used for gas-only territories, but because most of the savings are from the DCV installation, the measure life increases to 10 years.

Individual runs are shown in the cost-effective calculator along with the compiled measures (in green highlight) for each package. These savings are derived using the average tonnage seen in the program for each package, which was found to be 3.8 tons for retrofits (<5 tons) and 7.4 tons for Tune-ups, (5-20 tons). To evaluate the program as a whole, a weighted tonnage of 6.6 tons was found to represent the entire program and used in the overall screening for cost-effectiveness (shown in red highlight).

Although independently evaluated savings persistence has not yet been established for the tune-up measures installed by the program, regional research designed to better establish savings persistence is underway by BPA and others, results of which will be used to revise this weighted measure life if a significant variance is found. To control the quality and permanence of these tune-ups for the measure life used in cost-effectiveness screening, only buildings with RTU's or split systems that are engaged in existing service contracts will be eligible for the retrofit/tune-up program. This will help ensure that annual preventative maintenance will be performed on the unit once the tune-ups are completed. Additionally, programmable thermostats that limit the adjustment of settings will be used in the tune-ups in an effort to control for potential occupant changes over time.

Incentive Structure
One of the lessons learned in the 2009 pilot effort was that incentives specified during the pilot were not consistent with actual trade ally labor costs and time requirements to complete services. Depending on the services performed, the incentives were either too high or too low. Therefore the PMC suggested changing the incentive structure to match the actual trade ally labor costs and time per service activity. The solution was to provide a fixed incentive for each tune up task based on the relative weighting of savings expected for each task. This new incentive structure is what is used in the cost-effective screening.

Cost
Lockheed Martin estimates that the average maximum cost for a complete tune-up and install of an economizer w/ DCV on an RTU will be $1,250. Split systems were quoted at a slightly higher cost of $1,600 per unit ($1,800 with DCV functionality) given the additional cost that will be needed to bring outside air into the building via ductwork. Any major repairs identified by service contractors will be completed prior to performing the tune-up service tasks listed above. As explained, costs for tune-ups are expected to vary on a per unit basis, as each will require a different procedure and/or parts associated with the tune-up option selected. Therefore, the cost of each option has been given a value that reflects the time and materials to complete the tasks specific to that option, and the incentive is then matched to that cost. In the case of split systems, the incentive levels deemed for RTU packages have been kept the same for ease of program implementation.

Single Fuel Territories
In an effort to spur growth in gas-only territories, the offering of the DCV tune-up measure w/o a 2-stage thermostat (Package #2) was found to be cost-effective in gas-only territories (screened separately as Package #4) and is therefore proposed for this phase of the O&M Solutions Initiative. The original intent was to allocate costs between non Energy Trust participating electric PUD's and a participating Energy Trust gas utility in the area to offer the same tune-up packages to those service contractors in single fuel territories. However, because the electric PUD's have not yet been able to participate in a cost allocation effort, and because the program is interested not only in spurring growth in the gas-only territories but also in maintaining consistency with its offerings, the decision was made to pay the full incentive cost even though only gas savings could be claimed for this package. In screening Package #4, the electricity savings are still captured under the societal test since the benefit still exists even if they are not in an Energy Trust territory. However the utility test reflects a BCR from only claiming the gas portion of the savings while paying the full incentive.

For electric-only EnergyTrust territories, a cost allocation partnership is underway to allocate incentive funds between the two efficiency providers, with each claiming the savings for their respective fuels. Although not finalized at this time, it is expected that incentive dollars will be split according to the percent of present benefit that they receive, which in the case of gas-only territories is close to a 70% benefit for gas. Therefore, it is likely that EnergyTrust would pay around 30% of its current incentive for tune-ups in these areas. Because tune-ups in electric-only territories are not cost-effective for EnergyTrust without the gas savings, this measure will not be offered in electric-only service territories unless an outside gas utility is involved in a cost allocation with EnergyTrust.

Follow-up Evaluation
Similar to the 2010 billing analysis, a representative sample of 2010 O&M Solutions Initiative participants that received a DCV installation will be analyzed for the purposes of calibrating savings for DCV tune-ups. Data obtained through this billing analysis will be used to true-up the savings estimates and possibly expand the O&M Solutions Initiative to a larger audience if a correlation between savings and packages can be well established.

Exceptions
As seen in the cost-effective screenings above the combined package for split systems is slightly non-cost effective because of the added increase in cost for installing an economizer and associated ductwork. In an effort to maintain consistency with the offering, and because this measure is not expected to be utilized very often for split systems, it is suggested to include this option in the program offering similar to the RTU offerings. Frequency of this option will be tracked during the O&M Solutions Initiative and if it is found that a high percentage of tune-ups utilize this package, it will be re-evaluated for the next phase of the program effort.

As stated previously, split system units are expected to incur a small increase in static pressure imposed by the addition of an outside air duct for an economizer retrofit. Although the majority of savings stem from setting thermostat scheduling and changeover set points, this issue will need to be explored during the proposed M&V effort. If it is found the split systems realize fewer savings due to static pressure increases in the fan, then savings will be adjusted accordingly.

Energy Trust of Oregon Cost-Effectiveness Calculator Tool Commercial Sector						
Version: 11/16/10	**Starting Year: 2010**		**Today's Date:**	**10/26/2011**		
Project Description:	2011 O&M Solutions Initiative - RTU Tune-ups					
Organization Name:						
Project Name:						
Site Address:						
Program:	Existing Buildings	**Select Electric Sponsor:**	Other Utility Prograr	**Select Gas Sponsor:**	Northwest Natural	
Current Utility Rates for payback calc:		**Electricity Rate ($/kWh):**	$0.072	**Gas Rate ($/therm):**	$0.995	

Average Retrofit Tonnage	3.8
Average Tune-up Tonnage	7.4
Average Program Tonnage	6.6

Measure #	Energy Efficiency Measure Name	Select Business Type	Select Electric Measure Description	Select Natural Gas Load Profile	Measure Lifetime (Maximum 70 yrs)	Annual Electricity Savings (kWh)	Annual Natural Gas Savings (therms)	Total Incremental Cost of Measure	Annual Non-Energy Benefits $ (if any)	Total Potential Incentive If Measure is Cost-effective	Gas Utility System BCR	Combined Societal BCR
1	Package #1 Retrofit RTU with new Economizer	Small Office	Cooling	Space Heat	5	1,294.2	74.7	$735.00		$735.00	0.3	1.0
2	Add DCV to Package #1	Small Office	Cooling	Space Heat	15		87.0	$140.00		$140.00	5.8	5.8
3	Package #1 Combined	Small Office	Cooling	Space Heat	8	1,294.2	161.8	$875.00		$875.00	1.0	1.7
4	Package #2 Tune-up RTU with existing Economizer, but no T'stat needed	Small Office	Cooling	Space Heat	5	2,531.2	146.2	$595.00		$595.00	0.8	2.3
5	Add DCV to Package #2	Small Office	Cooling	Space Heat	15		170.2	$200.00		$140.00	11.4	7.9
6	Package #2 Combined	Small Office	Cooling	Space Heat	8	2,531.2	316.4	$795.00		$735.00	2.2	3.8
7	Package #3 Tune-up RTU with existing Economizer	Small Office	Cooling	Space Heat	5	2,531.2	146.2	$735.00		$735.00	0.7	1.9
8	Add DCV to Package #3	Small Office	Cooling	Space Heat	15		170.2	$200.00		$140.00	11.4	7.9
9	Package #3 Combined	Small Office	Cooling	Space Heat	8	2,531.2	316.4	$935.00		$875.00	1.9	3.2
10	Package #4 Tune-up with existing Economizer Gas-only territory	Small Office	Cooling	Space Heat	5		146.2	$850.00		$850.00	0.6	0.6
11	Add DCV to Package #4 Gas-only territory	Small Office	Cooling	Space Heat	15		170.2	$200.00		$200.00	7.9	7.9
12	Package #4 Combined Gas-only territory	Small Office	Cooling	Space Heat	10		316.4	$1,050.00		$1,050.00	2.0	2.0

This spreadsheet calculates the benefit-to-cost ratio for efficiency measures and allocates cost,
considering both electric and gas savings as appropriate. The tool operates as follows:

1. Based on the business type, electric measure description, natural gas load profile and measure lifetime selected, the tool calculates a utility system present value per annual kWh saved and per annual therm saved.
   Using the measures listed above the utility system present value averages $0.45 per kWh and $6.01 per therm.
2. The tool multiplies the total 19,835 kWh saved per year for the electric measures listed above times the value of $0.45/annual kWh to arrive at an electric savings present value of $8,842.
3. The tool multiplies the total 3,112 therms saved per year for the natural gas measures listed above times the value of $6.01/annual therm to arrive at a natural gas savings present value of $18,709.
4. The incentives for therm and kWh savings are calculated for your project based on the program you choose under Select Program in column C.
5. If you have non-energy benefits, such as operation and maintenance savings, reduced sewer charges, higher net operating income, etc. enter the annual dollar amount in column K.
   The tool calculates the net present value of the non-energy benefits using the lifetime in column G and reports the result in column M.
6. The total energy savings from the measures listed above have a total utility system present value of $18,709 to the utility system in the State of Oregon.
7. Based on the business type, electric measure description, natural gas load profile, measure lifetime selected, the total incremental cost and the total incentive, the tool calculates a societal present value per annual kWh saved and
   Using the measures listed above the societal present value averages $0.45/kWh and $6.01/therm.
8. The total energy savings from the measures listed above, including CO2 benefits, have a total societal present value of $27,551 for the State of Oregon.
9. Based on the total incremental costs of the measures the total societal cost is $13,410 and based on the total incentives for the measures the total utility system cost is $13,170.
10. To determine the SOCIETAL BCR, the total societal benefits, $27,550, are divided by the total societal costs, $13,410, to get:
    SOCIETAL BCR = a ratio of 2.05447393527082. This ratio must be at least 1 or greater than 1 to be cost-effective.
11. To determine the UTILITY SYSTEM BCR, the total utility system benefits, $18,709, are divided by the total utility system costs, $13,170, to get:
    UTILITY SYSTEM BCR = a ratio of 1.42057091797619. This ratio must be at least 1 or greater than 1 to be cost-effective.
11. Dividing line 8 by the cost in line 10, we get:
    SOCIETAL B/C RATIO = $27,550 divided by $13,410 or a ratio of 2.05447393527082. This ratio must be at least 1 to be cost-effective.
12. Dividing line 7 by the cost in line 10, we get:
    UTILITY SYSTEM B/C RATIO = $18,709 divided by $13,410 for a ratio of 1.42057091797619. This ratio must be at least 1 to be cost-effective.

Blessing Memo for Thermal Curtain

Based on the attached cost effectiveness test, this memo officially blesses the following greenhouse measures as cost effective on a prospective basis (that is, subject to later evaluation but good for this year and further until we know more) according to the inputs and incentives listed below:

Energy Efficiency Measure Name	Measure Lifetime (Maximum 70 yrs)	Annual Natural Gas Savings (therms)	Total Incremental Cost of Measure	Total Potential Incentive If Measure is Cost-effective	Gas Utility System BCR	Combined Societal BCR
IR Film	3	0.27	$0.02	$0.01	63.4	25.430
Thermal Curtain	10	0.49	$0.25	$0.09	25.9	10.639
86% Unit Heater	12	0.08	$0.10	$0.04	11.9	4.9
Under Bench Heating	12	1.20	$3.00	$1.05	6.0	2.5

The IR film is sold with the glass when the greenhouse is constructed or the glass replaced. We think the most likely sales channel is by working closely with the vendors. There is a significant portion that is sold in the base case. We factored this in by assuming an adjustment to get to net savings of 50% (originally .54 therms savings/sq ft). The program managers have the option of backing that out for purposes of estimating contract savings, but we'll have to factor it back in for reportable savings. Let us know how you plan to handle this. Please let us also know if you change the incentives from those analyzed above; we'll want to update the B/C run.

Note: An adjustment was made to the B/C too. Previously, the 86% unit heater failed w/ B/C ratios reporting as '0'. It was discovered that the calculation in the tool were rounding down the societal and utility present values; with therm savings and incremental costs being a small number for the unit heater, the values were rounded down to zero. The PV calculations were adjusted to report the exact value of the present values, resulting in BCR's that now pass both the utility and societal test.

Energy Trust of Oregon, Inc. Cost-Effectiveness Calculator Tool Commercial Sector			
Version: 11/29/06	**Starting Year: 2006**	**Today's Date**	10/26/2011
Project Description	Efficiency Measures for Greenhouses		
Organization Name	IR Film as baseline		
Project Name:			
Site Address:			
Program:	***Select Electric Sponsor***	No Program	***Select Gas Sponsor*** Northwest Natural
Energy Conservation Measures: Input White Cells			

Measure #	Energy Efficiency Measure Name	Select Business Type	Select Electric Measure Description:	Select Natural Gas Load Profile	Measure Lifetime (Maximum 70 yrs)	Annual Electricity Savings (kWh)	Annual Natural Gas Savings (therms)	Total Incremental Cost of Measure	Total Potential Incentive If Measure is Cost-effective	Gas Utility System BCR	Combined Societal BCR
1	IR Film - Baseline	Other	None	Space Heat	3	0	0.27	$0.02	$0.01	63.4	25.430
2	Thermal Curtain	Other	None	Space Heat	10	0	0.49	$0.25	$0.09	25.9	10.639
3	86% Unit Heater	Other	None	Space Heat	12	0	0.08	$0.10	$0.04	11.9	4.9
4	Under Bench Heating	Other	None	Space Heat	12	0	1.20	$3.00	$1.05	6.0	2.5
Total						**500**	**503**	**$506**	**$177**	**11.1**	**4.6**

This spreadsheet calculates the benefit-to-cost ratio for efficiency measures and allocates cost, considering both electric and gas savings as appropriate. The tool operates as follows:

1. Based on the business type, electric measure description, natural gas load profile and measure lifetime selected, the tool calculates a utility system present value per annual kWh saved and per annual therm saved.
   Using the measures listed above the utility system present value averages $0.27 per kWh and $3.74 per therm.
2. The tool multiplies the total 0,500 kWh saved per year for the electric measures listed above times the value of $0.27/annual kWh to arrive at an electric savings present value of $0,080.
3. The tool multiplies the total 0,503 therms saved per year for the natural gas measures listed above times the value of $3.74/annual therm to arrive at a natural gas savings present value of $1,880.
4. The incentives for therm and kWh savings are calculated for your project based on the program you choose under Select Program in column C.
5. If you have non-energy benefits, such as operation and maintenance savings, reduced sewer charges, higher net operating income, etc. enter the annual dollar amount in column K.
   The tool calculates the net present value of the non-energy benefits using the lifetime in column G and reports the result in column M.
6. The total energy savings from the measures listed above have a total utility system present value of $1,959 to the utility system in the State of Oregon.
7. Based on the business type, electric measure description, natural gas load profile, measure lifetime selected, the total incremental cost and the total incentive, the tool calculates a societal present value per annual kWh saved and per annual therm saved.
   Using the measures listed above the societal present value averages $0.3/kWh and $4.41/therm.
8. The total energy savings from the measures listed above, including CO2 benefits, have a total societal present value of $1,960 for the State of Oregon.
9. Based on the total incremental costs of the measures the total societal cost is $0,506 and based on the total incentives for the measures the total utility system cost is $0,177.
10. To determine the SOCIETAL BCR, the total societal benefits, $2,310, are divided by the total societal costs, $0,506, to get:
    SOCIETAL BCR = a ratio of 4.56. This ratio must be at least 1 or greater than 1 to be cost-effective.
11. To determine the UTILITY SYSTEM BCR, the total utility system benefits, $1,959, are divided by the total utility system costs, $0,177, to get:
    UTILITY SYSTEM BCR = a ratio of 11.06. This ratio must be at least 1 or greater than 1 to be cost-effective.
11. Dividing line 8 by the cost in line 10, we get:
    SOCIETAL B/C RATIO = $2,310 divided by $0,506 or a ratio of 4.56. This ratio must be at least 1 to be cost-effective.
12. Dividing line 7 by the cost in line 10, we get:
    UTILITY SYSTEM B/C RATIO = $1,959 divided by $0,506 for a ratio of 11.06. This ratio must be at least 1 to be cost-effective.