Post FY06 Bonneville Program Measure Cost-Effectiveness Screening

Implications and Issues for RTF Work Products

New Goal for the RTF Process

- Original Charge - Establish the *value to the region's power system* of conservation and direct application renewable resources using Council's methodology and RTF assumptions

- Revised Charge – Establish *cost-effectiveness* of conservation and direct application renewable resources using Council's 5th Plan Methodology and Assumptions

Why is "Cost-Effectiveness" An Issue?

- BPA has stated that starting in Fiscal 2007 it will only fund those measures identified in the 5th Plan as *cost-effective*
  - BPA's existing Conservation and Renewable Resources Rate Discount Program (C&RD) does not include "cost-effectiveness" constraint
- Some utilities
  - Are concerned that they will not be able to reach their conservation targets (i.e., use all of the C&RD credits) if BPA only funds cost-effective measures*
  - Believe that BPA and/or the Council should use a different definition of cost-effectiveness; and/or apply the current definition less restrictively

*Council Plan and BPA policies ***do not*** restrict what measures utilities pay for with their own funds

Plan Uses Total Resource Cost (& Benefits) Perspective

- Best meets the requirements of the Regional Act
- Considers all quantifiable costs & benefits regardless of who accrues them
- Ensures that conservation expenditures are good for the power system, the customer and society
- Allows conservation to be compared to other resources considered for development by including all quantifiable costs & benefits
- Was *strongly* recommended by utilities in first Council Plan

Some Utilities Now Recommend Use of Utility Cost Test Perspective

- Considers only those costs & benefits that accrue to electric utility system
  - Energy kWh at avoided wholesale cost at time saved
  - Transmission & distribution kW benefits if coincident with system peak and at value of deferred expansion cost
  - Utility cost for incentives & program administration
- Does not count customer costs or benefits
- Ensure that conservation is good for the utility
- Acts as the upper limit on utility incentives for measures with large non-electricity benefits
- Used as a measure of utility cost efficiency
  - Striving for low utility cost share keeps revenue requirements lower

Why Council Uses TRC:

Avoids Potential Double Counting of the Savings

- Utility invest $2500 in efficient motor to acquire 5000 kWh/yr savings
  - Levelized Cost = 3.4 cents/kWh
  - B/C = 1.32
- Customer matches $2500 utility investment to save the same 5000 kWh/yr
  - Simple payback = 10 years, motor last 20
- Total of *all direct cost* is $5000 for 5000 kWh/yr of savings
  - Levelized cost = 6.8 cents/kWh
  - B/C ratio = 0.66

Why Council Uses TRC

Directs Funds Toward Measures That Optimize <u>Total</u> Utility and Customer Investments

- Utility invest $600 toward cost of $6000 solar PV system that saves 1200 kWh/yr
  - Alternatively utility and consumer could:
    - Invest $160 in 40 CFLs to save 1200, saving $440
    - Invest $600 to buy 150 CFLs, saving 5000 kWh
- Especially important when budgets are limited

Why Council Uses TRC

Avoids promoting measures that may impose non-energy costs on others

- Act directs the Council give second priority to the use of renewable resources
- Analysis in 1st Plan concluded that cost of using wood stoves to offset use of electric heat was below cost of electricity from new generating facilities
- 1st Plan *excluded* use of wood heat due to "non-energy" cost (air pollution) imposed on the region

Why Council Uses TRC:

Expands list of conservation options by considering quantifiable "non-energy" benefits

- Energy Star Clothes Washer in Homes with Gas Water Heater and Dryer
  - Present Value Capital Cost
    = $58/MWh
  - Present Value to Power System
    = $17/MWh (B/C = 0.3)
  - Value to Region/Society (includes natural gas, detergent & water savings)
    = $110/MWh (B/C = 2.0)
- Power system's "willingness-to-pay" for these savings *should be limited* to its present value benefits
  - Electric Utility could provide incentive up to $17/MWh for washer in a home with gas water and dryer heat

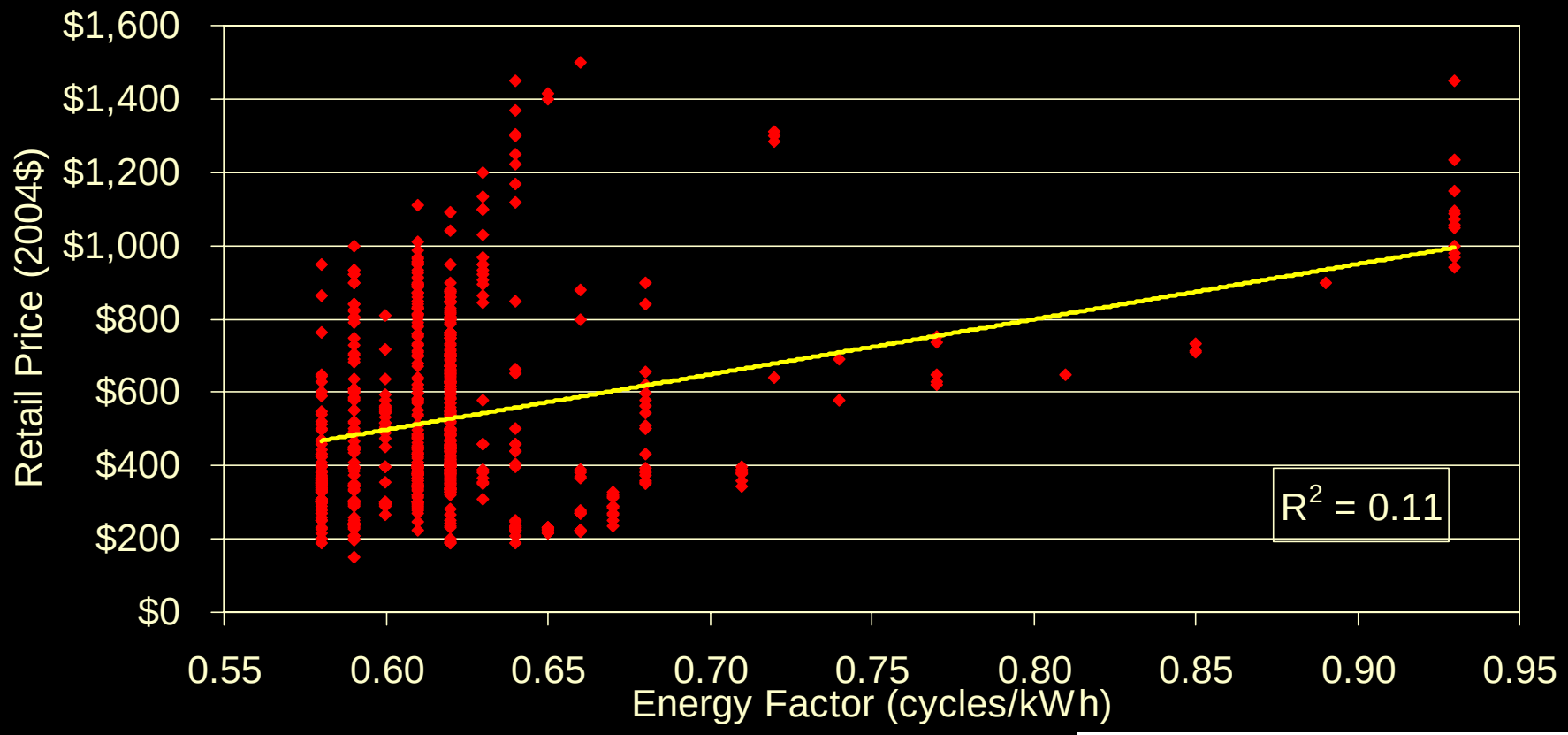
Care Must Be Used in Applying The Plan's Cost-Effectiveness Measure Level Results "Prescriptively"

- Not all measures are in the Plan
  - While the Plan contains over 1000 applications of specific efficiency technologies it is not an exhaustive list of all possible combinations of measures & applications
- Plan assumes administrative costs = 20% of capital cost
  - Administrative cost vary widely based on program design
  - Administrative cost may or may not be a function of measure cost

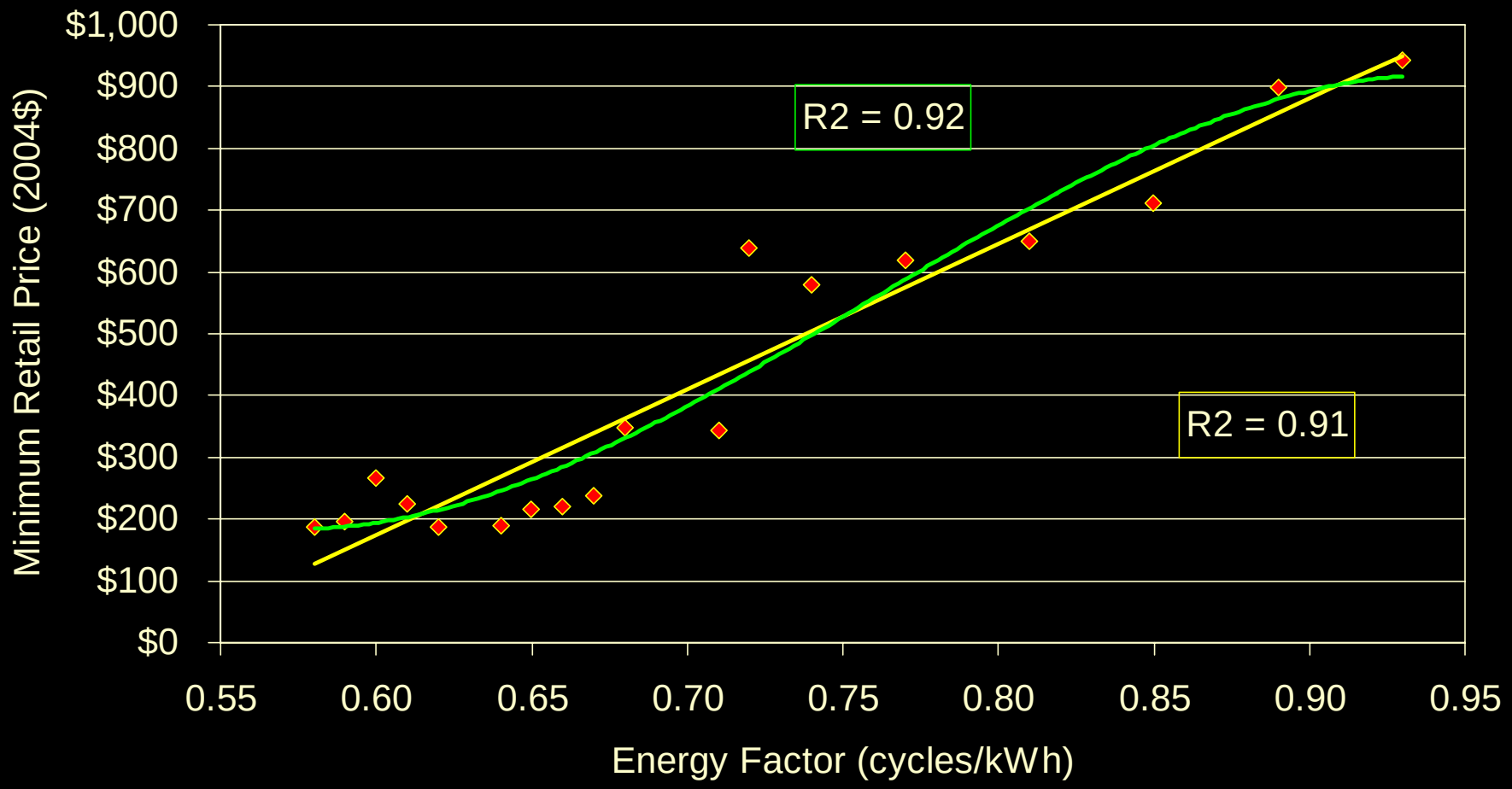
Care Must Be Used in Applying The Plan's Cost-Effectiveness Measure Level Results "Prescriptively"

- Plan contains "point estimates" of measure cost-effectiveness
  - Based on a single estimate of avoided costs for the next 20 years
  - Plan conservation targets are based on 750 different avoided costs and full portfolio model risk analysis
- Plan's Cost and Savings estimates are "averages"
  - Site specific applications may be more or less "cost-effective"

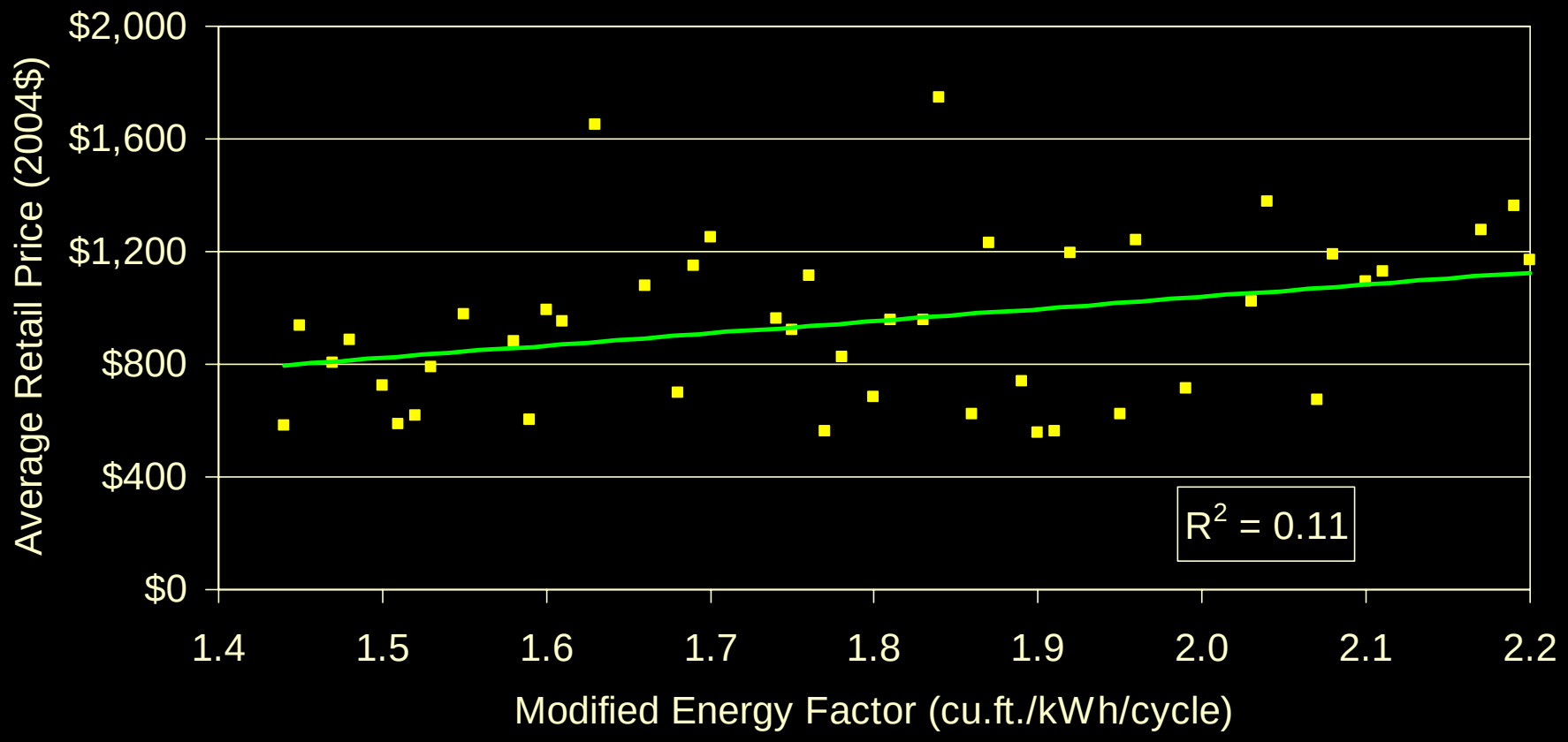
What's the Incremental Cost of Dishwasher Energy Efficiency Improvements?



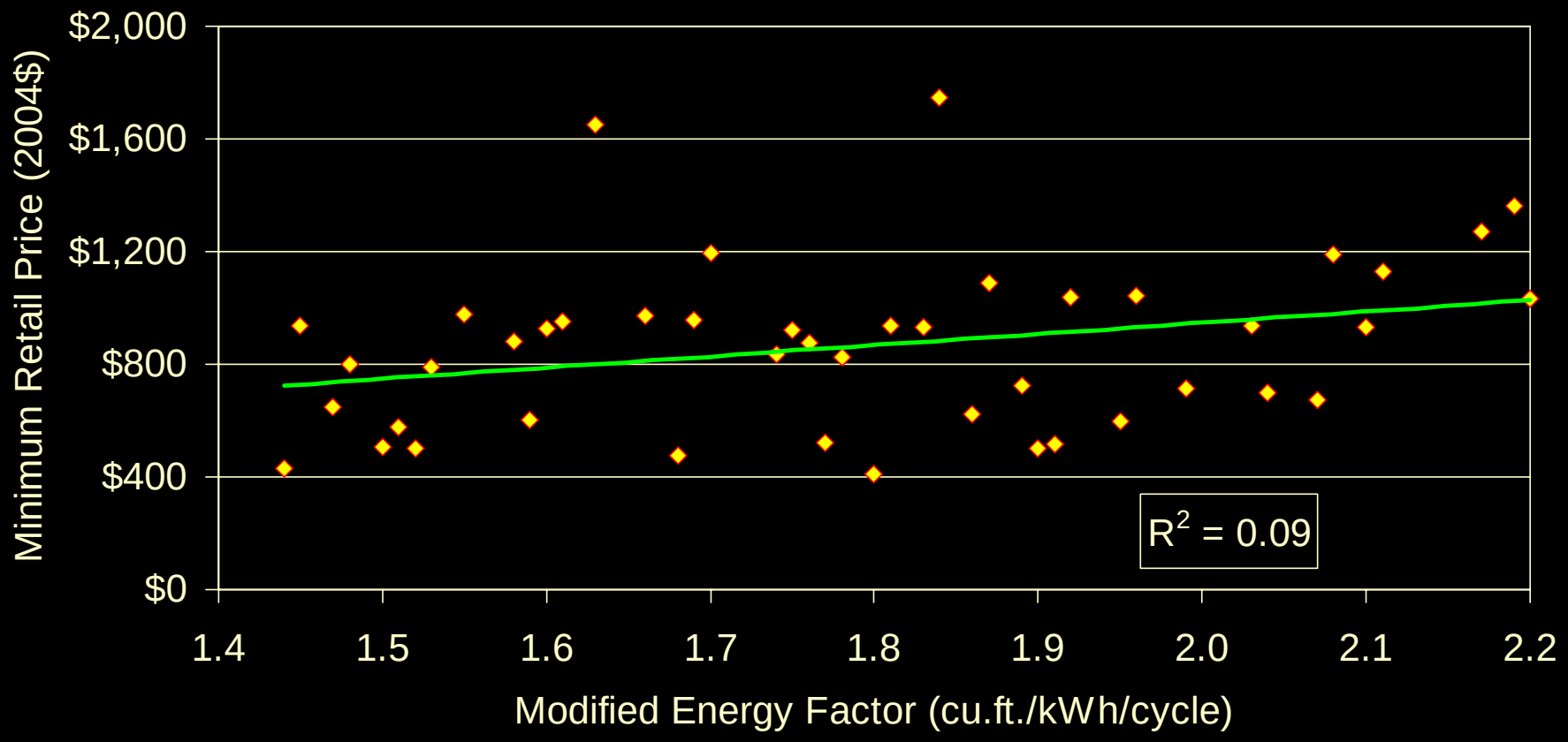
What's the Incremental Cost of Dishwasher Energy Efficiency Improvements?



What's the Incremental Cost of Clothes Washer Energy Efficiency Improvements?



What's the Incremental Cost of Clothes Washer Energy Efficiency Improvements?



What Does Tier 2 Efficiency Cost? Average Retail Price Of Energy Star Clothes Washers

Energy Star Level	Units	Average Retail Price	MEF	Water Factor
Total Units	15,568	$839	1.78	6.72
Tier 1 Units	7,564	$856	1.60	7.72
Tier 2 Units	8,004	$823	1.94	5.78

Where the RTF Fits In Council Recommendation

- Plan's Cost-Effectiveness Methodology should be used when "average" cost and savings assumptions inaccurately reflect specific conditions
- RTF should assist Bonneville and utilities
  - Apply the Council's TRC methodology
  - Identify measures & applications not in the 5th Plan that are cost-effective
  - Develop more "granular" measure cost-effectiveness estimates
  - To address "practical application" of TRC cost-effectiveness methodology
  - "Bundle" measures to improve marketing efficiency

Potential Technical Issues - Granularity

- Current deemed measure is
  - Too general (needs to be more granular)
    - Example – Can we specify “conversion @ time of replacement” for heat pump measure eligibility?
  - Too specific (needs to be bundled)
    - Example – Can we use single vintage for some measures?

How "Granularity" Can Impact Measure Cost-Effectiveness

Example - Heat Pump Conversions

Existing Space Conditioning System	Heat Pump Conversion Cost	Existing Space Heating System Replacement Cost	Existing Space Cooling System Replacement Cost	Incremental Heat Pump Conversion Cost
FAF w/o CAC to HP - Existing Furnace Working	$5,600	$-	$-	$5,600
FAF w/o CAC to HP - Existing Furnace Not Working	$5,600	$1,000	$-	$4,600
FAF w/ CAC to HP - Existing CAC Working	$5,600	$-	$-	$5,600
FAF w/ CAC to HP - Existing CAC Not Working	$5,600	$-	$3,600	$2,000
FAF w/ CAC to HP - Existing FAF & CAC Not Working	$5,600	$1,000	$3,600	$1,000

How "Granularity" Can Impact Measure Cost-Effectiveness

Example - Heat Pump Conversions

Existing Space Conditioning System	Present Value O&M Cost	Space Heating Savings (kWh/yr)	Space Cooling Savings (kWh/yr)	Total Savings (kWh/yr)
FAF w/o CAC to HP - Existing Furnace Working	$1,227	6,303	(751)	5,553
FAF w/o CAC to HP - Existing Furnace Not Working	$1,227	6,303	(751)	5,553
FAF w/ CAC to HP - Existing CAC Working	$238	6,303	186	6,489
FAF w/ CAC to HP - Existing CAC Not Working	$238	6,303	186	6,489
FAF w/ CAC to HP - Existing FAF & CAC Not Working	$238	6,303	186	6,489

How "Granularity" Can Impact Measure Cost-Effectiveness

Example - Heat Pump Conversions

Existing Space Conditioning System	PV TRC Benefits	PV TRC Cost	TRC B/C Ratio
FAF w/o CAC to HP - Existing Furnace Working	$4,297	$6,827	0.63
FAF w/o CAC to HP - Existing Furnace Not Working	$4,297	$5,827	0.74
FAF w/ CAC to HP - Existing CAC Working	$4,963	$5,838	0.85
FAF w/ CAC to HP - Existing CAC Not Working	$4,963	$2,238	2.22
FAF w/ CAC to HP - Existing FAF & CAC Not Working	$4,963	$1,238	4.01

Issue: How do utility program operators differentiate between these cases?

Potential Technical Issues – Bundling

- Bundling - Are there technical reasons cost-effectiveness should be determined at the "bundled-level"?
  - Measure savings are interactive (e.g., heat pump/duct sealing/commissioning)
  - Installation occurs simultaneously (e.g., fixture/lamp and ballasts)
  - Other?

Potential Technical Issues – Administrative Cost

- Where should administrative cost be applied in cost-effectiveness analysis?
  - Option 1 – Apply at “measure level”
  - Option 2 – Apply at “measure bundle level”
  - Option 3 – Apply at “program level”
  - Option 4 – Apply at “utility level”

  Note: Council applies “20% of capital cost” administrative burden at <u>program</u> level, but cautions against using this when actual administrative costs are known

Potential Technical Issues – Deemed Calculators & Protocols (1)

- Existing "deemed calculators" and "protocols" do not compute benefit/cost ratios
  - Should they be revised to do so*
    - If so, utilities (or someone) will need to supply incremental measure cost data
    - If not, how does a user demonstrate that the measure or application is "cost-effective"

*All 30+ deemed calculators will need to be revised to provide this data

Potential Technical Issues – Deemed Calculators & Protocols (2)

- Existing "deemed calculators" are designed to provide users with greater flexibility
  - When a "deemed measure" <u>is not</u> cost-effective should users be able to use an alternative "basis of savings" (e.g., deemed calculator, protocol) to demonstrate that a specific application <u>is</u> cost-effective?
  - When a "deemed measure" <u>is</u> cost-effective but a user uses an alternative "basis of savings" (e.g., deemed calculator, protocol) must they demonstrate that their specific application <u>is</u> cost-effective?

Potential Technical Issues – Point Estimates Future Market Prices

- 5th Plan's Targets are base on 750 possible future "avoided costs" forecasts
  - How should this be reflected in cost-effectiveness analysis
    - Option 1 (current approach) – Use point forecast as "expected value" (B/C ratio must be 1.0 or higher
    - Option 2 – Use range forecast to determine sensitivity of B/C ratio to differences in market price forecasts (accept B/C ratio's less than 1.0 – How much lower?)
    - Option 3 – Use 750 future market prices to establish "probability of B/C ratio 1.0" – accept X% or higher probability