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July 26, 2012

MEMORANDUM

TO: Power Committee

FROM: John Shurts, Tom Eckman

SUBJECT: Conservation measures and "cost effectiveness"

Power Committee members have asked for a discussion of "cost effectiveness" as it relates to planning for and the implementation of conservation measures. Accordingly, this topic is an agenda item at the August Committee meeting. The following memorandum provides a base of information to begin the discussion. It will be supplemented by a staff presentation during the meeting.

Statutory provisions on "resources," "conservation," "costs," and "cost effective." The place to start is what the Northwest Power Act has to say about "cost effective" conservation measures in the context of preparing a power plan. Section 4(e)(1) of the Power Act tells the Council, in its power plan, to "give priority to resources which the Council determines to be *cost-effective*." What is a "resource" for the purposes of power planning is defined in Section 3(19) and used in Section 4(e) to include "conservation" and "conservation measures." Thus, we know the Council's power planning has to include a method for assessing the costs of conservation measures and determining which conservation measures are cost effective.

Section 3(4) of the Power Act then defines the term "cost effective" in a way that directs the Council as to what costs to take into account in determining the costs of any particular resource and whether, by comparison, that resource is cost effective. The definition is long and has many parts, but the first two sections are worth quoting in full here:

> **3(4)(A)** "Cost-effective", when applied to any measure or resource referred to in this Act, means that such measure or resource must be forecast--
>
> **3(4)(A)(i)** to be reliable and available within the time it is needed, and
>
> **3(4)(A)(ii)** to meet or reduce the electric power demand, as determined by the Council or the Administrator, as appropriate, of the consumers of the customers at an estimated incremental system cost no greater than that of the least-cost similarly reliable and available alternative measure or resource, or any combination thereof.

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3(4)(B) For purposes of this paragraph, the term "system cost" means an estimate of *all direct costs* of a measure or resource over its effective life, including, if applicable, the cost of distribution and transmission to the consumer and, among other factors, waste disposal costs, end-of-cycle costs, and fuel costs (including projected increases), and such quantifiable environmental costs and benefits as the Administrator determines, on the basis of a methodology developed by the Council as part of the plan, or in the absence of the plan by the Administrator, are directly attributable to such measure or resource.

[All of Section 3(4) is excerpted in the attachment, as are the relevant provisions of Sections 4(e) and 4(f) concerning "cost effectiveness," "costs" and "conservation."]

Power *planning* and all direct system costs of conservation measures -- relationship to "total resource costs." Thus the terminology and method used in the statute for making a determination in the power plan as to whether resources are "cost effective" begins by estimating the "system cost" of the various resources, whether generating or conservation. And that "system cost" is defined to be broad, pulling in "all direct costs" of a conservation measure or generating resource, including what can be estimated about environmental and end-of-life costs.

As will be illustrated in the presentation at the meeting, the Council in its power plans has defined and used the "total resource cost" approach to mean just what is required by the statute in making a cost effective resource comparison. That is, the Council uses the term "total resource costs" to capture the statutory concept of the "system cost," and thus "all direct costs," of conservation measures and generating resources.

There are other ways to assess and compare resource costs, including the costs of conservation measures. This includes a "utility cost test" that looks only at the cost to a utility or program administrator of a conservation measure, even if some direct costs of the measure are borne by the consumer or others. This might be valid for some purposes (see below); it would not be a valid approach for the Council to take under the Power Act in the *power plan*, for obvious reasons. With regard to how the Council does its *planning,* there is no real alternative under the statute to the "total resource cost" approach -- if that term is understood to be the same as the "all direct system costs" requirement of the statute -- when the Council compares resources to determine which are cost-effective. It is irrelevant who bears the direct costs; all direct costs need to be captured.

A key point to emphasize is that *all* of the Council's power plans, from first to the sixth, have followed this "total resource cost" approach to assessing system costs and comparing resources, including the costs of conservation. This has not been controversial, and in fact has been the *planning* approach preferred by utilities and others, as consistent with the statute and necessary to place conservation measures on an even comparative basis with generating resources.

What does this mean for plan implementation and the funding/acquisition of conservation measures? The real issue is what all this means for *implementation*. That is, to what extent are Bonneville, individual utilities, conservation program administrators and the Council constrained by this approach to costs and "cost effectiveness" in deciding what conservation measures to fund and credit?

Individual utilities and program administrators acting outside of the Bonneville realm. Remember that the Council's power plan is a "plan" in the legal sense under the

Northwest Power Act only with regard to actions by Bonneville. Thus when utilities or conservation program administrators make decisions about how to spend their own money, they are *not* constrained in this way. They may and do look at conservation funding from a utility cost perspective as well as from a total resource cost perspective (and other perspectives). And depending on the context, funding some amount of conservation that makes sense from a utility cost test is reasonable and to be expected.

The Council, from a planning perspective, might say the region's economy would not be well served *if* the utilities and programs were to use their funds to leverage the addition of a *significant* amount of conservation that is not cost-effective from a total resource cost perspective but cost-effective from a utility perspective (that is, because the consumers cover a significant share of the costs). Even in that scenario, utilities and programs would have a free hand to act. More important, we have no reason to believe that is the situation across the region.

Bonneville and its customers, when satisfying Bonneville's obligations under the Power Act. Thus the real question is what this approach to cost effectiveness means for Bonneville and its customers when spending Bonneville money or acquiring conservation to satisfy Bonneville's obligation in Section 6(a) of the Power Act: "The Administrator *shall acquire such resources through conservation, implement all such conservation measures,* and acquire such renewable resources which are installed by a residential or small commercial consumer to reduce load, *as the Administrator determines are consistent with the plan*."

Framed in this way, the question becomes another version of the general question of what it means for Bonneville to act *consistent* with the Council's Power Plan (and Fish and Wildlife Program). And the answer is essentially the same as with all of the consistency analyses. Bonneville must be able to show it has a conservation program substantively and substantially consistent with the Council's power plan. That does not mean every individual action within that Bonneville program must be precisely consistent.

If all or the bulk of the conservation measures funded by Bonneville and its customers draw from the part of the Council's conservation supply curve that is cost-effective in terms of the "total resource costs" method used in the Power Plan, consistency is satisfied. If Bonneville and its customers happen to be acquiring a substantial amount of non-cost effective conservation by routinely applying a "utility cost only" perspective to acquire conservation that is non cost-effective from the perspective of the plan, that would not be consistent. But if Bonneville and its customers draw on occasion from above-the-line conservation measures that look reasonable from a utility cost perspective and reasonable from a particular context? That would not be a consistency problem, if the substantial bulk of the program is consistent and Bonneville explains any particular deviations as having a reasonable basis in particular circumstances and methods.

Flexibility in implementation while remaining consistent overall with the power plan is also possible due to the fact that the cost calculations in the plan are an estimate, usually based on a single estimate of costs for the next 20 years. Moreover, the plan's cost (and savings) estimates are "averages," and site-specific and program-specific applications may be more or less costly than captured in the plan. Moreover, not all potentially cost-effective measures are in the plan. To reiterate, what is important is substantial consistency with the plan from an overall perspective, with reasonable explanations for occasional decisions outside the plan's framework.

Northwest Power act provisions on “cost-effective” resources and conservation

3(4)(A) "Cost-effective", when applied to any measure or resource referred to in this Act, means that such measure or resource must be forecast--

> **3(4)(A)(i)** to be reliable and available within the time it is needed, and
>
> **3(4)(A)(ii)** to meet or reduce the electric power demand, as determined by the Council or the Administrator, as appropriate, of the consumers of the customers at an estimated incremental system cost no greater than that of the least-cost similarly reliable and available alternative measure or resource, or any combination thereof.

3(4)(B) For purposes of this paragraph, the term "system cost" means an estimate of all direct costs of a measure or resource over its effective life, including, if applicable, the cost of distribution and transmission to the consumer and, among other factors, waste disposal costs, end-of-cycle costs, and fuel costs (including projected increases), and such quantifiable environmental costs and benefits as the Administrator determines, on the basis of a methodology developed by the Council as part of the plan, or in the absence of the plan by the Administrator, are directly attributable to such measure or resource.

3(4)(C) In determining the amount of power that a conservation measure or other resource may be expected to save or to produce, the Council or the Administrator, as the case may be, shall take into account projected realization factors and plant factors, including appropriate historical experience with similar measures or resources

3(4)(D) For purposes of this paragraph, the "estimated incremental system cost" of any conservation measure or resource shall not be treated as greater than that of any nonconservation measure or resource unless the incremental system cost of such conservation measure or resource is in excess of 110 per centum of the incremental system cost of the nonconservation measure or resource.

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4(e)(1) The plan shall, as provided in this paragraph, give priority to resources which the Council determines to be cost-effective. **Priority shall be given: first, to conservation**; second, to renewable resources; third, to generating resources utilizing waste heat or generating resources of high fuel conversion efficiency; and fourth, to all other resources.

4(e)(2) The plan shall set forth a general scheme for implementing conservation measures and developing resources pursuant to section 6 of this Act to reduce or meet the Administrator's obligations with due consideration by the Council for (A) environmental quality, (B) compatibility with the existing regional power system, (C) protection, mitigation, and enhancement of fish and wildlife and related spawning grounds and habitat, including sufficient

quantities and qualities of flows for successful migration, survival, and propagation of anadromous fish, and (D) other criteria which may be set forth in the plan.

4(e)(3) To accomplish the priorities established by this subsection, the plan shall include the following elements which shall be set forth in such detail as the Council determines to be appropriate:

4(e)(3)(A) an energy conservation program to be implemented under this Act, including, but not limited to, model conservation standards;

4(e)(3)(B) recommendation for research and development;

4(e)(3)(C) a methodology for determining quantifiable environmental costs and benefits under section 3(4);

4(e)(3)(D) a demand forecast of at least twenty years (developed in consultation with the Administrator, the customers, the States, including State agencies with ratemaking authority over electric utilities, and the public, in such manner as the Council deems appropriate) and a **forecast of power resources estimated by the Council to be required to meet the Administrator's obligations and the portion of such obligations the Council determines can be met by resources in each of the priority categories referred to in paragraph (1) of this subsection** which forecast (i) shall include regional reliability and reserve requirements, (ii) shall take into account the effect, if any, of the requirements of subsection (h) on the availability of resources to the Administrator, and (iii) shall include the approximate amounts of power the Council recommends should be acquired by the Administrator on a long-term basis and may include, to the extent practicable, an estimate of the types of resources from which such power should be acquired;

4(e)(3)(E) an analysis of reserve and reliability requirements and cost-effective methods of providing reserves designed to insure adequate electric power at the lowest probable cost;

4(e)(3)(F) the program adopted pursuant to subsection (h); and

4(e)(3)(G) if the Council recommends surcharges pursuant to subsection (f) of this section, a methodology for calculating such surcharges.

4(e)(4) The Council, taking into consideration the requirement that it devote its principal efforts to carrying out its responsibilities under subsections (d) and (h) of this section, shall undertake studies of conservation measures reasonably available to direct service industrial customers and other major consumers of electric power within the region and make an analysis of the estimated reduction in energy use which would result from the implementation of such measures as rapidly as possible, consistent with sound business practices. The Council shall consult with such customers and consumers in the conduct of such studies.

4(f)(1) Model conservation standards to be included in the plan shall include, but not be limited to, standards applicable to (A) new and existing structures, (B) utility, customer, and government conservation programs, and (C) other consumer actions for achieving conservation. **Model conservation standards shall reflect geographic and climatic differences within the region**

and other appropriate considerations, and shall be designed to produce all power savings that are cost-effective for the region and economically feasible for consumers, taking into account financial assistance made available to consumers under section 6(a) of this Act. These model conservation standards shall be adopted by the Council and included in the plan after consultation, in such manner as the Council deems appropriate, with the Administrator, States, and political subdivisions, customers of the Administrator, and the public.

4(f)(2) The Council by a majority vote of the members of the Council is authorized to recommend the Administrator a surcharge and the Administrator may thereafter impose such a surcharge, in accordance with the methodology provided in the plan, on customers for those portions of their loads within the region that are within States or political subdivisions which have not, or on the Administrator's customers which have not, implemented conservation measures that achieve energy savings which the Administrator determines are comparable to those which would be obtained under such standards. Such surcharges shall be established to recover such additional costs as the Administrator determines will be incurred because such projected energy savings attributable to such conservation measures have not been achieved, but no case may such surcharges be less than 10 per centum or more than 50 per centum of the Administrator's applicable rates for such load or portion thereof.

Power Act Cost-Effectiveness Analysis Requirements and Implications for Bonneville and Utility Programs

August 7, 2012

Northwest Power and Conservation Council

The Council Plan's Definition of Resource Cost-Effectiveness Comes From the Regional Act

"Cost-effective," means that a measure or resource must be forecast:

- to be *reliable and available* within the time it is needed
- to meet or reduce the electric power demand of the consumers *at an estimated incremental system cost no greater than that of the least-cost similarly reliable and available alternative* measure or resource, or any combination thereof

Under the Act the term "system cost" means:

An estimate of ***all*** direct cost of a measure or resource over its effective life, including, if applicable:

- cost of distribution & transmission to the consumer
- waste disposal costs
- end-of-cycle costs
- fuel costs (including projected increases)
- and such quantifiable environmental costs and benefits as are directly attributable to such measure or resource using a methodology developed by the Council

Other Considerations in Act

- In determining the amount of power that a conservation measure may be expected to save, historical experience with similar measures shall be taken into account

- The “estimated incremental system cost" of any conservation measure can be 10 per higher than incremental *system cost* of the non-conservation resource and remain cost-effective

Council Uses Total Resource Cost Perspective in Planning

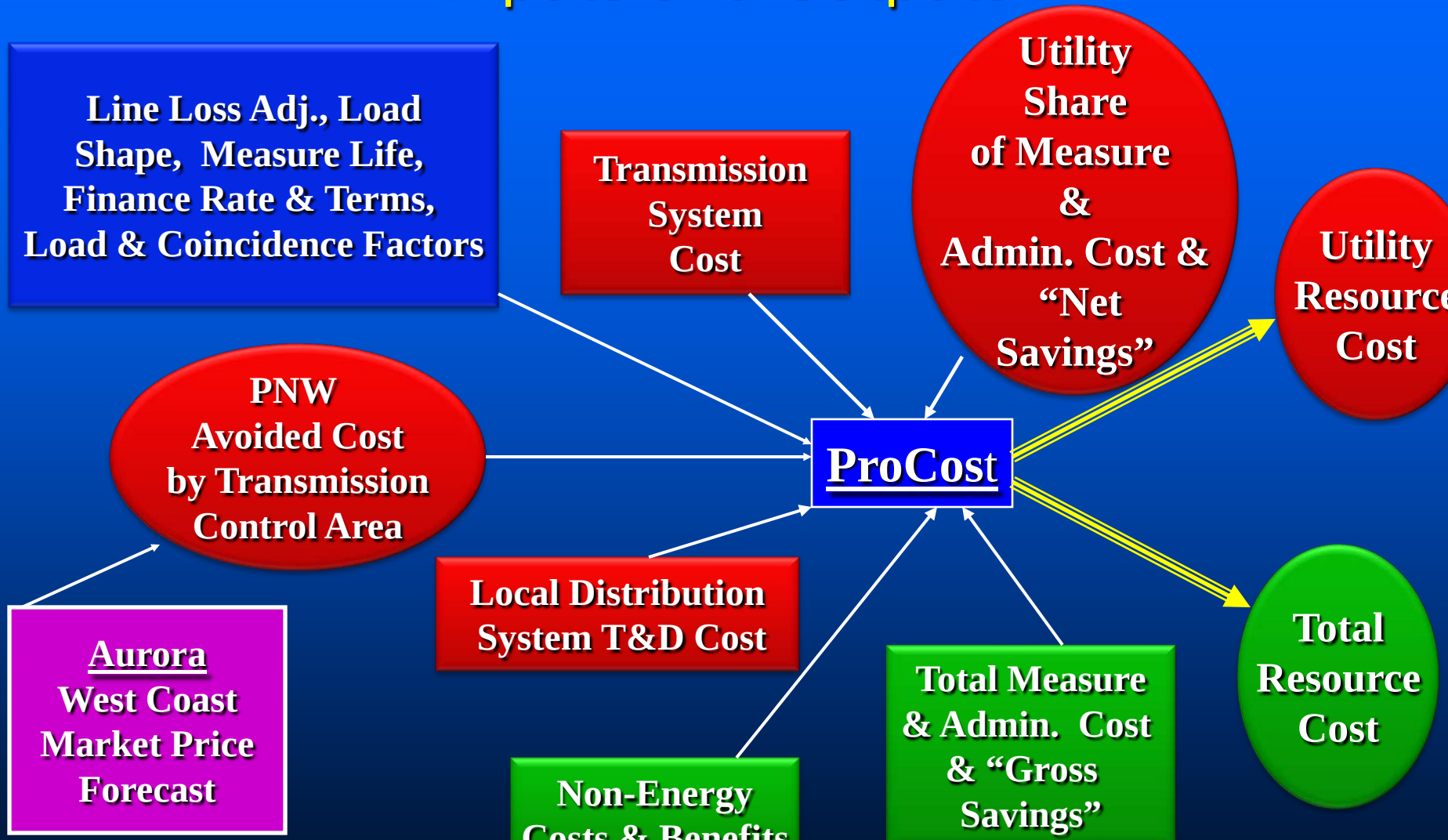
- The Council uses the "total resource cost" approach in the power plan to meet the requirements of the Regional Act
  - Includes all direct system costs regardless of who pays
  - Includes "System costs" described in the Act
  - Is a fair comparison to other resources considered for development
  - Assure economic for the power system AND the region as a whole
- Was *strongly* recommended by utilities in first Council Plan
  - Treat the cost of conservation symmetrically with new generation (i.e., include all of its cost, not just what utilities paid)
- Plan targets would be significantly higher if Council had used "Utility Cost"

Alternative Cost-Effectiveness Tests

- Total Resource Cost (TRC)
  - Cost and benefits from perspective of all the region or society
  - Includes all quantifiable costs & benefits regardless of who pays
- Utility Cost Test (UCT) or Program Administrator Cost Test (PACT)
  - Costs & benefits from the utility system's perspective
  - Utility incentive costs and program cost only
  - Utility benefits only (kWh , kW & deferred line expansion costs)
  - Excludes non-energy costs & benefits to customers (e.g.,water , other fuel savings)
- Rate Impact Measure (RIM)
  - Net change in electricity utility revenue requirements
  - Treats "lost revenues" (lower participant bills) as a cost
  - Shows rate impact on customers that do not participate in programs
- Participant Cost Test (PTC)
  - Costs and benefits from the perspective of a program participant
  - Uses consumer's retail rate and share of measure cost

Used in Council Planning

Conservation Measure Cost-Effectiveness "Inputs and Outputs"



Why All These Tests?

Each one has a different purpose

Utilities typically consider several tests to help them design utility programs

- TRC: Tests economics for region & all customers
- UCT: Tests economics for utility – helps set willingness to pay
- PCT: Tests economics for participants – indicates customers' willingness to adopt
- RIM: Tests rate impacts on customers

Example: A clothes washer might cost-effective on a TRC basis because of water & soap savings. But water & soap savings don't benefit the utility. Thus a utility might limit its incentive to assure the utility benefits of energy & capacity are cost-effective

Implications of Council's Cost-Effectiveness Methodology for Regional Efficiency Programs

- Council Plan
  - Establishes regional conservation targets based on economics considering all costs & all benefits identified in Regional Act
  - Identifies methods & assumptions to determine cost-effectiveness
  - Estimates costs & cost effectiveness for every measure
- Bonneville's resource acquisitions
  - Must be consistent with Council Plan
- WA I-937 utilities must estimate conservation potential
  - Using methods consistent with the Council

- *HOWEVER - The Act, Council Plan and BPA policies do not restrict which measures utilities pay for with their own funds nor how much they can pay for those measures*

Why is Cost-Effectiveness an Issue?
(Largely Due to Implementation Challenges)

- In FY2007 BPA stated that it will only fund those measures identified in the Council Plans as *cost-effective*
  - Assure that BPA funds used will benefit ALL customers
  - Consistent with Regional Act

- Some public utilities believe BPA or RTF should use a different definition of cost-effectiveness for implementation
  - Concern about reaching conservation targets if BPA limits funds to only cost-effective measures
  - Belief that local utilities are better positioned than BPA to determine which measures are best in their service area
  - Confusion about getting "credit" for savings from measures not TRC cost-effective even if not using BPA funds

Differences Between Planning & Implementation

- Measure cost-effectiveness in Plan are *estimates*
- Plan's cost & savings estimates are "typical"
- Not all possible measures are in the Plan
- Costs & savings can change between plans

- Implementation needs to be flexible
- Programs tailored to be utility- or site-specific
- Measures are bundled into packages or programs
- Situations where implementing some Non-TRC cost-effective measures may be beneficial

Situations where it may make sense for the utility system to pay for measures that are not "TRC cost-effective"

- Inclusion of the non-cost-effective measures increase market acceptance & leads to reduced costs & program cost-effectiveness
- Where it is more expensive or impractical to exclude a few non-cost effective applications of a measure that is cost-effective in most applications
- Where inclusion increases participation in a cost-effective program
- Where a package of measures cannot be changed frequently and the measure is expected to become cost-effective during the time between program changes, or
- Where the measure is a pilot or research project

Why Limit Utility Investments in Energy Efficiency Based on Cost-Effectiveness?

- Energy Efficiency reduces system costs, *only when it is less expensive than alternative supply*
  - The bigger the difference the greater the value
  - There are *no economic benefits* from energy efficiency that costs the same as alternative supply options
- Energy Efficiency reduces system risk, but is only a better choice *when it is less expensive than alternative risk reduction*
  - It carries no risk of fuel or climate change cost
  - It reduces variability of loads
  - It has value even when market prices are low

End

Cost-Effectiveness: A Matter of Perspective

- Example: High Efficiency Clothes Washer
  - Total Incremental Cost = $80
  - Annual Savings
    - » 160 kWh/yr with electric water heater & dryer
    - » 17 kWh/yr with gas water heater & dryer
    - » 7 therms/yr with gas water heater & dryer
    - » 4700 gals of water
  - Measure Life = 15 years

Cost-Effectiveness:
Total Resource Cost for "All Electric"

- Present Value of Savings
  - Electricity - $124
  - Deferred T&D - $24
  - Water & Waste Water - $383
- Present Value of Cost
  - Capital = $80
  - Administration = $16
- Benefit/Cost = $551/$96 = 5.5

Cost-Effectiveness:
Utility Resource Cost for "All Electric"

- Present Value of Savings
  - Electricity - $124
  - Deferred T&D - $24
- Present Value of Cost
  - Capital = $80
  - Administration = $16
- Benefit/Cost = $148/$96 = 1.54

Cost-Effectiveness:
Total Resource Cost for "All Gas"

- Present Value of Savings
  - Electricity - $13
  - Deferred T&D - $1
  - Water & Waste Water - $383
  - Natural Gas Savings - $50
- Present Value of Cost
  - Capital = $80
  - Administration = $16
- Benefit/Cost = $447/$96 = 4.65

Cost-Effectiveness:
Utility Resource Cost for "All Gas"

- Present Value of Savings
  - Electricity - $13
  - Deferred T&D - $1
- Present Value of Cost
  - Capital = $80
  - Administration = $16
- Benefit/Cost = $14/$96 = 0.14

Program Implications

- For the “all electric case” the electric power system benefits are $148
  - What level of rebate should be offered, given the large non-energy (water savings)
- What are the issues associated with offering incentives to all customers or only those with electric water heating and dryers?