

To: Janine Migden, Brady Bancroft, Bridgette Mariea, Dave Festa, Catherine Morris, Paul Chernick

From: Ned Ford

October 5, 1995

The following article came to my attention today. It was printed in the CG&E Collaborative Newsletter, for Fall of this year. I intend to write a rebuttal, but that won't be printed until the Winter issue comes out, probably after New Year's.

I may circulate my rebuttal prior to the newsletter, depending on what the current events are at the time I get it written.

I hope this lends some flesh to your understanding of the PUCO staff thinking on RUC.

DSM and the Transition to a Competitive Industry

By Steve Puican

Economist, Public Utilities Commission of Ohio

Over the last decade, the Total Resource Cost (TRC) test has become the dominant method of comparing the costs and benefits of demand-side management (DSM) programs. Yet the TRC test fails to recognize the negative rate impacts from reduced kilowatt-hour consumption. DSM advocates argue that more extensive DSM programs will compensate for this flaw. If all customers have an opportunity to participate in a DSM program, they claim, customers' total bills will fall in spite of rising rates that pay for the DSM investments. This argument rings hollow in an electric industry increasingly governed by market forces. The price increases needed to pay for largescale DSM programs will undermine a utility's competitive position in that market.

Some jurisdictions are attempting to address this issue by requiring a Ratepayer Impact Measure (RIM) test that eliminates programs with any meaningful impact on sales. Several proposals have sought a middle ground between TRC and RIM, but these proposals tend to be short on tangible techniques to assist regulators in screening programs. They typically require the quantification of unquantifiable theoretical variables, adding an additional layer of uncertainty to an already uncertain analysis.

The true value of DSM remains its potential to defer a utility's need to add capacity, and thus save the cost of additional resources. All else equal, deferring capacity will lower revenue requirements and result in lower long term rates. The standard for cost-effective DSM programs should ask whether the value of the capacity deferral is greater or less than the cost of the DSM program. A DSM

CONTINUED on Next Page

DSM and the Transition to a Competitive Industry

investment should only be undertaken if the direct costs are less than the costs of the alternative supply-side resource. By contrast, the TRC includes the stream of energy cost savings over the life of the DSM technology as an additional benefit. Certain programs can pass a TRC test analysis because of their avoided energy costs, even though they have minimal impact on deferral of capacity. If cost-effectiveness is measured by TRC, even utilities with excess capacity will be required to make substantial investments in conservation programs. These programs benefit participating customers, but lead to unnecessary rate increases to the detriment of all others. The illogic of this outcome is even clearer when viewed in the context of a more competitive electric industry where the negative consequences of rate increases will be further magnified. The TRC test also does not recognize that in that competitive marketplace, the kilowatt-hours saved through DSM will likely be resold.

A More Accurate Test

I propose that regulators exclude from the analysis any costs or benefits that do not directly affect long-term ^{non-fuel} revenue requirements, or provide some other direct benefits to nonparticipating customers. Let's call this test the Revised Utility Cost (RUC) test.

Figure 1 on page eight breaks out the costs and benefits of the various tests currently used in DSM program evaluation, as well as the RUC. These tests recognize four types of DSM program costs: the utility's program costs (administrative and promotional), utility incentive payments, net participant costs, and the revenue loss from reduced kilowatt-hour consumption. Note carefully the disaggregation of incremental DSM technology costs between the rebate paid by the utility and the participant's net out-of-pocket costs. The TRC test does not distinguish between costs paid by the utility

and costs paid by the participant, even though the participant's out-of-pocket costs have no impact on the utility's cost of providing service.

Note also that the RIM test includes the lost revenue from the DSM program. The overall level of sales over which future revenue requirements will be spread obviously has an impact on rates. However, since there is no lost revenue counterpart on the supply side (although supply addition also has an impact on sales), including lost sales skews the analysis in favor of the supply-side option. More important, since lost revenues are a function of current and projected rates, including them introduces the utility's embedded costs into what is otherwise a marginal analysis. A RIM test standard would thus reject programs for any utility with high rates, regardless of that utility's capacity needs. Including revenues lost over the life of a DSM program as a direct cost inappropriately distorts the comparison between alternative supply- and demand-side investments. The RUC test includes only those costs that directly impact the utility's long-term revenue requirements. On the cost side, this makes it equivalent to the Utility Cost (UC) test.

A fundamental premise of the proposed RUC test is that fuel-cost savings are not a valid benefit of a DSM program. The RUC test includes only those items that can provide a quantifiable systemwide benefit to all ratepayers in the form of either reduced nonfuel revenue requirements or lower system-average fuel costs. In Ohio, as in most jurisdictions, fuel costs are passed through a fuel adjustment clause instead of base rates. A utility's reduced fuel consumption has no impact on nonfuel revenue requirements and thus provides little

CONTINUED on Next Page

DSM and the Transition to a Competitive Industry

or no systemwide benefits. As such, it is generally inappropriate to include fuel savings in a cost comparison of supply- versus demand-side investments. An exception would be reduced fuel requirements that enable a utility to purchase a less costly mix of fuels. Since this exception would lower the average fuel costs faced by all customers, the incremental fuel cost savings would be included in the analysis on a kilowatt-hour basis. Other exceptions are certain to be identified as well. The legitimacy of any avoided energy-related benefits will depend on whether they provide benefits to both participants and nonparticipants. The RUC test provides a more appropriate comparison of the true systemwide costs and benefits of a DSM program.

How the RUC Differs

The RUC test differs from the UC test only in its exclusion of fuel-related avoided energy costs. The benefits of a DSM program as measured by the UC test will always be greater than or equal to, in the case of certain load-shifting programs) the benefits measured by the RUC test. Since these two tests are identical on the cost side, the RUC test benefit/cost ratio will never exceed the comparable UC test ratio.

The TRC and RUC tests differ on both the cost and benefit side, but those differences are partially offsetting. All else being equal, the RUC's exclusion of customer costs will increase the benefit/cost ratio, while its exclusion of fuel-cost savings on the benefit side will reduce that ratio. Because the RUC test reduces the benefits over the life of the technology, in most cases, the reduction in benefits should be greater than the reduction in costs achieved by excluding the net customer costs. Thus, in general, the RUC ratios should be lower than the TRC ratios as well.

The main difference between the RIM and RUC tests is that the RIM includes avoided

fuel costs on the benefit side and revenue loss on the cost side. The relationship between these tests will depend on the magnitude of the kilowatt-hour impacts (which are the basis of both avoided fuel costs and the lost revenues) relative to the kilowatt impact, and on the relationship between average and marginal costs. The actual relationship among the TRC, RUC, and RIM tests can only be determined on a case-by-case basis.

How the RUC Compares

Since the RUC test largely measures avoided capacity, its impact on a DSM portfolio will reflect the timing of the utility's capacity expansion plans. At a utility with little need for additional capacity, the test may not show DSM programs to be cost-effective, but will likely show the opposite for the same programs at a utility with more immediate needs. For a utility with high avoided capacity costs, the RUC test will also select programs according to onpeak impacts. This will result in greater emphasis on load-shifting and other programs with significant onpeak kilowatt impacts relative to kilowatt-hour impacts. This method will select fewer programs that cause adverse rate impacts.

Table 1 on page eight compares TRC, RUC, and RIM test benefit/cost ratios using actual data for an Ohio utility with low avoided capacity costs. The results demonstrate the advantage of the RUC test over the TRC. A TRC test standard for the low avoided capacity cost utility would conclude that DSM is appropriate even though no significant capacity is being avoided. This result is clearly wrong and demonstrates why the TRC test should not be used as a stand-alone evaluation tool. The RUC test reaches the more reasonable conclusion that DSM is not appropriate for a utility with no foreseeable

CONTINUED on Next Page

*Value of
Capex
avoided*

DSM and the Transition to a Competitive Industry

need to add capacity. It is counterproductive for a utility in this position to make an investment that will increase rates while providing minimal systemwide benefits.

Table 2 on page eight compares the same programs/measures using actual data for an Ohio utility with a much more immediate need for capacity additions. In this case, all but two of the programs/measures that pass the TRC also pass the RUC. All programs/measures fail the RIM test for both utilities.

Obviously a RUC test standard gives more reasonable results. The TRC test inappropriately rewards energy savings and results in expenditures that are not justified on the basis of lowering long-term system-supply costs. The RIM test, on the other hand, inappropriately penalizes programs with significant energy savings by including the associated lost revenue as a direct cost. As a result, programs are eliminated in spite of their potential to avoid more costly capacity.

Unlike the TRC, the RUC test will screen out programs that lack significant capacity savings. Unlike the RIM, it will not screen out conservation programs as long as those programs also have significant capacity savings. Since the RUC test includes only costs and benefits that impact a utility's nonfuel revenue requirements or otherwise benefit all ratepayers, it is a more valid comparison of a demand-versus supply-side investment. The RUC test is also much more consistent with a competitive generation services market. A competitive supplier of generation

services will underwrite DSM activities among its customers if the DSM cost plus the variable production cost is less than the market price at which the DSM-derived energy can be resold to other customers. The RUC test closely mimics this economic result when the variable production costs of the kilowatt-hour being generated for resale is included. If those variable production costs were included in a TRC test, on the other hand, they would be exactly offset by the avoided energy on the benefit side. The TRC test would only compare the DSM costs to the sale price, causing a financial loss on each transaction for which the DSM cost exceeds the sale price less the variable costs. If the TRC is manifestly deficient in a profit-driven environment, it should also be rejected in a regulated environment, especially one that is likely to undergo massive changes in the not-too-distant future.

The movement toward a competitive electric industry puts the long-term value of DSM in question. Nonetheless, most jurisdictions will retain their DSM requirements while waiting for the fog of uncertainty regarding competition to clear. During this interim period, regulators should require only those DSM programs that clearly provide meaningful system-wide benefits. The test proposed here is a more valid approach to evaluating whether that standard is being met. It involves simple adjustments to the existing tests, and no new evaluation tools or additional research techniques. The RUC test can serve as a transitional test while we debate the need for DSM in the upcoming competitive environment.

Reprinted by permission of the author.

... Community Bulletin Board ...

Energy Decisions Workshops for Teachers

Theme: To encourage teachers to include DSM related goals in their instruction.

When: Saturday, December 2, 1995

Where: CG&E Hartwell Recreation Center
Caldwell & Vine St., Cincinnati

Cost: \$20 material fee. One graduate credit upon completion of the workshop and a follow-up assignment.

See/ Doug Haskell, U.C. Center for Economic Education

Phone: (513) 556-2948, or FAX: (513) 556-2953

... Looking Ahead ...

(Large Collaborative now meets Quarterly)

Large Collaborative	10/26/95
Steering Team (October)	10/5/95
Steering Team (November)	11/2/95
Steering Team (December)	12/7/95

Figure/Tables Associated with DSM and the Transition to a Competitive Industry

Figure 1

Comparison of Cost-Effectiveness Tests*

B E N E F I T S	Total Resource Cost (TRC)	Ratepayer Impact Measure (RIM)	Utility Cost (UC)	Revised Utility Cost (RUC)
	Avoided Capacity	Avoided Capacity	Avoided Capacity	Avoided Capacity
	Avoided Non-Fuel Energy Costs	Avoided Non-Fuel Energy Costs	Avoided Non-Fuel Energy Costs	Avoided Non-Fuel Energy Costs
	Avoided Fuel	Avoided Fuel	Avoided Fuel	Avoided Fuel
C O S T S	Utility Program Costs	Utility Program Costs	Utility Program Costs	Utility Program Costs
	Incentives	Incentives	Incentives	Incentives
		Revenue Loss	Revenue Loss	
	Net Participant Costs			

* Adapted from a diagram created by Barakat & Chamberlin.

Table 1
Utility With Low Avoided Capacity Cost

	TRC	RIM	RUC
Residential			
Water Heating Measures	4.30	0.30	0.50
Weatherization Measures	2.80	0.30	0.10
Compact Fluorescent Bulbs	1.20	0.20	0.10
High-Efficiency Heat Pumps	1.00	0.40	0.20
Audit/Direct Install Program	0.90	0.20	0.05
Commercial/Industrial			
Motors:			
51-125HP	1.30	0.40	0.20
>125HP	1.10	0.30	0.30
Lighting:			
Compact Fluorescents	1.30	0.30	0.50
2 blb. T-8 New Constr.	3.40	0.40	0.70
2 blb. T-8 system, retro.	0.70	0.40	0.60
4 blb. T-8 system, retro.	1.10	0.40	0.60

Table 2
Utility With High Avoided Capacity Cost

	TRC	RIM	RUC
Residential			
Water Heating Measures	1.80	0.50	0.70
Weatherization Measures	1.20	0.60	0.50
Compact Fluorescent Bulbs	1.40	0.50	1.10
High-Efficiency Heat Pumps	1.10	0.60	1.20
Audit/Direct Install Program	3.70	0.70	2.20
Commercial/Industrial			
Motors:			
51-125HP	1.80	0.90	1.90
>125HP	1.50	0.90	1.80
Lighting:			
Compact Fluorescents	1.30	0.90	2.00
2 blb. T-8 New Constr.	1.70	0.80	1.40
2 blb. T-8 system, retro.	1.00	0.80	1.50
4 blb. T-8 system, retro.	2.70	0.90	2.80

REVISED FIGURE 4-16
THE CINCINNATI GAS AND ELECTRIC COMPANY AND SUBSIDIARIES
SUBSIDIARY OF CINERGY CORP.
DSM BENEFIT / COST TESTS FOR 1995 IRP

	TRC *	RIM *	UTILITY	PART. *	RUC	RTRC
RESIDENTIAL						
DIRECT LOAD CONTROL EAC/EWH	1.72	1.11	1.18	INF.	1.14	1.65
HEAT PUMP REBATE	1.09	0.47	1.14	2.35	0.60	0.57
ELECTRIC HOME AUDIT	1.22	0.42	1.51	9.35	0.67	0.54
LOW INCOME HOME AUDIT **	0.98	0.35	0.98	15.80	0.37	0.38
GAS HOME AUDIT WITH EAC **	0.73	0.51	0.92	2.94	0.63	0.50
SECURITY LIGHTING - HPS **	0.77	0.33	1.33	2.93	0.00	0.05
REFRIGERATOR / FREEZER REMOVAL**	0.68	0.26	1.33	INF.	0.25	0.25
COMMERCIAL / INDUSTRIAL						
NEW INTERRUPTIBLE RATE	7.21	3.16	3.20	2.86	3.04	6.89
SMALL COMMERCIAL DIRECT INSTALL **	0.97	0.64	2.28	1.55	0.94	0.42
NEW CONSTRUCTION LIGHTING	1.26	0.78	4.71	1.63	1.89	0.51
CUSTOM EFFICIENCY AUDITS (INCLUDES ALL PROGRAMS BELOW)	1.15	0.67	3.81	1.74	1.86	0.52
CUSTOM FINANCIAL INCENTIVE	1.26	0.64	3.65	1.97	2.23	0.77
HIGH-EFFICIENCY MOTORS	1.31	0.77	3.15	2.11	1.37	0.61
RETROFIT LIGHTING	1.27	0.75	5.20	1.68	2.18	0.52
VARIABLE SPEED DRIVES	2.49	1.14	6.63	2.35	1.52	0.57
THERMAL ENERGY STORAGE **	0.79	0.30	2.87	2.75	2.22	0.61
OTHER						
STREET LIGHT REPLACEMENT	0.81	2.48	0.81	0.00	0.00	0.00

* USING DSMANAGER RUNS WHICH UTILIZED MARGINAL COSTS OF A SUPPLY-SIDE ONLY IRP PLAN

**PROGRAMS WERE PASSING TRC WHEN INCLUDED IN DSM BUNDLES USED IN FINAL IRP

NOTES:

EAC= ELECTRIC AIR CONDITIONING; EWH=ELECTRIC WATER HEATER

Via Fax To: Maureen Grady

Company: Hahn, Loeser & Parks

Phone:

Fax:

From: Susan Geller

Company:

Suite 1000, 18 Tremont Street, Boston MA 02108

Phone:

Fax:

Date: 02/16/96

Pages: 2

Re: **Suggestions for cross of S. Puican**

- I. Puican believes that the Company should not be forced to base its resource decisions on any of the cost-effectiveness tests—including the RUC test:

Although we don't know the future structure of the electric industry it will almost certainly involve a growth in supply alternatives that, over time, will likely depress capacity costs to their more efficient, market based levels. Since avoided capacity costs are future costs, and since future cost trends, although uncertain, are likely downward, any present cost estimate would be biased upward, skew the results of the RUC test, and result in over-investment in DSM. (p. 4)

- A. Can do some cross to show how capacity costs in competitive world could be higher:
1. In regulated environment, utility would keep surplus capacity on line because it is assured of cost recovery. But in a competitive environment, the utility is likely to retire or mothball units if revenues do not cover their operating costs. As a result, the market will be tighter and price will reflect the added costs of re-activating these units.
 2. In a market, surplus capacity has value. In Puican's model, avoided capacity costs are zero until a new unit is needed.
 3. Under competition, the market will extend to other utilities and power pools. This will increase the demand for the utility's capacity.
 4. Non-regulated firms will have a higher overall cost of capital because:

- a) will use a greater percentage of equity;
- b) will have to pay a higher return on equity because of greater business risk: the utility's net income in a competitive world will be more volatile and cost recovery will not be assured.
- c) higher taxes

B. What is the basis for Puican's expectation that future costs are declining? Does he have a study that says that?

II. Puican recommends a cap on DSM spending to reduce potential stranded asset exposure. How about replacing deferral accounting with a current cost recovery mechanism?

QUESTION: Puican refers to deferral of shared savings. Does the Company collect incentives as well as lost revenues in the deferral account?

1. Clarification of Puican's interim proposal:

- a) cap expenditures at \$⁴3.5 million to prevent stranded investment (Tr at xx, 36)
- b) Company may continue to defer lost revenues for existing participants in existing approved programs, but not for additional participants as of the time of the Order, unless these programs pass the RUC (Tr at 31)
- c) Company may *not* defer shared savings for additional participants or new programs, even if they pass the RUC. Company has already received shared savings for existing participants, because shared savings area one-time, upfront payment. (Tr. at 32)
- d) Not proposing to limit cost recovery to programs that pass the RUC test or the TRC test, or any test. Rather permit Company to implement any programs it wants to, subject to an after-the-fact prudence review. (Tr. 33) Puican considers this a move away from "an upfront, heavy-handed approach." *Thanks but no thanks.*
- e) No deferral of expenses; no recovery of expenditures made outside the test year. Deferral only of lost revenues. (Tr. 34)
- f) recommends as the best course of action that the Commission abandon all cost-effectiveness tests as the basis for selection of DSM programs. Or as a fallback position, recommends reliance on the RUC test. (Tr at 35). Contends that the move to a more competitive environment "largely nullifies the underpinnings of those tests." (Tr at 38):

The idea of making long-term 20-year investment decisions based on capacity investments that are simply not likely to occur in the way they're envisioned today so invalidates those tests that they're not reliable enough to make decisions..." (Tr at 39)

2. Puican acknowledges that uncertainty of avoided cost applies to IPP contracts as well as to DSM. What distinguishes DSM from supply contracts, according to Puican, is "you don't know to what extent the DSM resource is actually going to be there in the future." (Tr at 26).

- a) What does uncertainty of DSM reductions have to do with competition? This is the "competitive" factor that drove Puican's change of heart?
 - b) Acknowledges that the power contract can be breached by the IPP (Tr at 52)
3. Acknowledges that there currently is a market for long-term power purchases, but:
- a) utility supply plans and avoided cost estimates assume utility construction;
 - b) cannot rely on current market prices to project avoided costs. Acknowledges that utilities do commit to long-term contracts based on long-term forecasts. But contends that utility will not commit to long-term contract starting 5 years down the line based on today's projection of costs and market price (Tr at 45)

Response:

- i) Utilities must make long-term decisions based on uncertain future.
- ii) acknowledges that in competitive market, distribution company will have to procure power on the wholesale market (49), enter into long-term contracts (49) that will have very definite stated avoided capacity cost over the length of the contract (50).
- iii) Does utility have to commit to DSM in five years based on current projections?
- iv) Just because utility plans and avoided cost estimates have been over-simplifications or just plain incorrect does not mean that reliable avoided cost estimates are unobtainable
- v) "When market opens and when you get a true market price" will utility be any more willing to commit to long-term contracts starting 5 years or more down the line?