THE RESIDENTIAL CONSERVATION SERVICE
A RETROSPECTIVE

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The statute directed the Department of Energy (DOE) to promulgate regulations for the utility program, called the Residential Conservation Service (RCS). Each state was directed to work with its large electric and gas utilities in preparing, pursuant to the regulations, a state residential Energy Conservation Plan for submission to DOE.

All but four states completed and submitted their proposed RCS Plans by mid-1980. To date, DOE has approved 44 state plans and 32 nonregulated utility plans. Six months after final DOE approval of a state plan, utilities in that state must begin sending program announcements to all eligible customers and offering audits and other assistance. Programs should commence in most states in summer 1981.

In the midst of utility and state efforts to comply with the initial RCS requirements, Congress passed the Energy Security Act (ESA) of 1980 which made major changes in the RCS program. These included:

- o Extending the program to all multi-family buildings and to small commercial customers;
- o Removing the prohibition on direct utility financing and expressly allowing utilities to subcontract for installation;
- o Disallowing audit charges to customers in excess of $15; and
- o Reducing minimum warranty requirements from three years to one year.

The DOE has proposed implementing rules for the commercial and multi-family programs and for other changes to the original RCS. After a final rule is issued, the states and utilities will have 180 days to prepare plans for implementing the expanded mandate.

I. INTRODUCTION

In its first attempt to establish a comprehensive national energy conservation program, the United States Congress in November 1978 passed the National Energy Conservation Policy Act (or "NECPA," PL 95-619). The Act directed the Department of Energy to establish a National Energy Conservation Utility Program, with the objective of encouraging implementation of energy conservation and renewable resource measures and practices in existing residential buildings. Under these provisions, the larger gas and electric utilities were required to offer conservation assistance to residential customers (in buildings with less than four units). This assistance was to include:

- o On-site energy "audits" to identify potential savings and estimated costs of conservation and renewable resource measures;
- o Educating customers on energy practices;
- o Help in selecting and arranging for contractors and loan financing; and
- o Consumer protection, including inspection and warranties.

Utilities themselves were prohibited by law from financing or installing most measures, and customer participation--either in requesting an audit or choosing to install recommended measures--was to be entirely voluntary.

Before the passage of the Act, a number of utilities around the country had already initiated their own conservation programs for residential customers. The federal Act did make some provision for "grandfathering" these diverse preexisting programs, but the general thrust of the law was to establish a single, uniform residential conservation program nationwide.

In the course of the congressional debate over NECPA and in the development of state plans, question has arisen as to whether RCS is the best means to achieve residential conservation. Specific uncertainties have included whether customers will even request audits in a voluntary program, and when they do whether they will be motivated and financially able to follow the auditor's advice and actually install measures. Will the auditors be adequately trained and the most appropriate measures considered? Will the participants be primarily from higher income groups? Are supplementary utility finance programs necessary to achieve the energy savings the program is predicated upon, and if so, can they be designed to increase the savings lower income ratepayers receive from both the RCS and finance efforts? As program complexity and audit costs increase, can the test of cost effectiveness be met, and in the end result, will a voluntary program approach be adequate to actually achieve the desired energy and consumer cost savings?

In fact, recent policy pronouncements by the Reagan Administration and some members of Congress have raised fresh questions about how rapidly and vigorously the RCS program will be pursued and even whether the program will remain mandatory for utilities throughout the country. Assuming, however, that some version of the RCS program will be the central focus of utility conservation efforts in the residential and small commercial sectors for the next several years, the immediate challenge is to identify the factors that will contribute to successful, cost-effective programs, so that ratepayer money is spent in a fashion which saves energy most effectively and equitably. The following sections provide a background of the RCS program and analyze several outstanding program design issues which include cost effectiveness, audit effectiveness, equity concerns, anticompetitive and antitrust considerations, and general concerns in state plan development. The purpose of the review is to provide background information to legislators and other decision makers who, though not immediately involved in program administration, will be evaluating the mandate and implementation progress over the coming year.

II. BACKGROUND

Program Summary

The National Energy Conservation Policy Act (Title II, part 1) requires the federal Department of Energy (DOE) to establish a residential energy conservation and renewable resource program for the nation's large electric and gas utilities. Utilities covered by this mandate include any investor-owned or municipal utility that sells at least ten billion cubic-feet of natural gas or 750 million kilowatt-hours of electricity during a given calendar year. Under the mandated program, utilities are required to perform energy audits (at a maximum direct customer charge of $15) to determine which federally and state recognized conservation or renewable energy measures are cost effective for a particular residential customer. The utility will then assist the customer in arranging for the purchase, installation and financing of those measures.

Following DOE guidelines (10CFR456, November 1979, as amended), each state was to work with its regulated utilities to prepare an RCS plan. In preparing their plans, states could require non-regulated utilities and fuel oil dealers to participate in the program; any large nonregulated utility or fuel oil dealer which was <u>not</u> included in a state plan was required to submit a separate plan meeting the same requirements and also was required to submit to the Secretary of Energy a biennial report on plan implementation. If a state (or a covered utility) does not have an approved RCS plan, or an approved plan is not being adequately implemented, the Secretary of Energy can promulgate a plan that meets the requirements of the legislation and order its implementation. Violators of such orders are subject to civil penalties.

State Requirements. To be approved, state plans must contain certain basic provisions. First, there must be some provision for informing residential customers of available energy conservation or renewable resource "hardware" measures and low-cost or no-cost techniques for saving energy. The savings likely to result from adopting these conservation measures must also be estimated. Second, the utility must offer each residential customer an energy audit to identify recommended conservation measures for their home, estimate the cost of purchasing and installing them, and calculate the savings in utility bills likely to result from such measures. Third, each state plan must include provisions for supplying customers with lists of conservation and renewable resource product suppliers, installers, and lenders. New customers of a utility must be informed of the RCS program and offered the services within 60 days of hook-up. Finally, in defining utility roles and responsibilities, the state RCS plans must include measures to prevent unfair discrimination among customers, suppliers, and contractors and to avoid deceptive or anticompetitive practices.

The 1980 Energy Security Act required that utility RCS programs inform customers of financing available under the Solar Energy and Energy Conservation Bank Act.* Further, it allowed utilities to offer loan financing programs themselves, if they first seek funds from local lending institutions. In addition, if RCS plans are to include the direct sale and installation of energy conservation measures by utilities, such activities must be carried out under contract with independent suppliers and contractors.

*The Bank's status is still under debate in the Congress. Final regulations have not been issued, but it may be funded in FY 1982.

States may also include home heating-oil suppliers in their RCS plan, but programs proposed for heating-oil suppliers must take into account their limited resources. While the requirements for oil suppliers are basically the same as for utilities, their participation in the program is voluntary. Home heating-oil suppliers are also authorized to make direct loans to residential customers for the purchase and installation of energy conservation measures.

Conservation and Renewable Resource Measures. For purposes of the RCS audits, the NECPA and DOE regulations carefully define a "residential building" and what residential energy conservation measures must be considered. The NECPA originally defined a residential building as one containing fewer than four dwelling units and a system for heating and/or cooling. The Energy Security Act changed this definition, beginning January 1, 1982, to include in the RCS program buildings with more than four dwelling units (and smaller non-residential customers). Excluded from the RCS program are all new buildings covered by the proposed federal Building Energy Performance Standards.*

Under the program, "residential energy conservation measures" include caulking and weatherstripping of doors and windows; furnace efficiency modification (including new furnaces, flue vent dampers, or electronic ignitions); clock thermostats; ceiling, attic, wall, or floor insulation; water heater insulation; storm doors and windows; multi-glazed windows and doors; heat absorbing or heat reflecting glazed window and door material; load management devices; devices to use solar or wind power for residential use; and "any other measures decided upon by the Secretary" or proposed and approved in a state

*These standards have been deferred by the DOE, pending congressional and administration action.

plan. Under the original Act these conservation measures were to have at least a three-year warranty from the manufacturer, but the 1980 amendments changed this warranty requirement to a one-year warranty for manufacturers, installers, and suppliers.

Utility Financing. Under the original Act, utilities were prohibited from supplying, installing, or financing any residential energy conservation measures unless they were granted a specific exemption. Exceptions were made for utility personnel to install furnace efficiency modifications, clock thermostats, and load management devices. Also, utilities were allowed to extend directly conservation loans to residential customers, provided the loan did not exceed $300.

The 1980 amendments removed the prohibition on utility supply and installation of measures, as long as the utility subcontracted for the actual work with independent suppliers or contractors listed by the state lead agency. Utilities must select contractors in a fashion that does not hinder competition and seeks the lowest price possible for customers. As mentioned previously, the 1980 amendments also ended the prohibition against direct utility financing. If offered, utility loans must be made available whether the work is done by a contractor or the homeowner. The minimum repayment period for utility loans cannot be less than three years unless a customer specifically requests a shorter time period. Finally, before a utility can offer conservation loans, it must first make a maximum effort to seek funds from local lending institutions.

Utility Costs. The federal legislation clearly outlines the requirements for utility accounting and repayment of costs associated with the RCS program. General administrative costs and the direct costs of audits can be expensed or recovered in the rate-base at the discretion of the state Public Utilities Commission; customers can be directly charged only up to $15 (or the actual cost of the audit and inspection service, whichever is less). Conservation loans are to be repaid by customers, but billing for loan payments must be stated separately from billing for regular utility services. Utilities may not terminate utility service if a customer fails to pay for services provided under the RCS program. At the request of a participating lending institution, utilities can collect payments for other loans in the utility's regular billing process.

Anticompetitive Considerations. The 1980 Energy Security Act requires DOE, in conjunction with the Federal Trade Commission (FTC), to monitor the utilities' financing, installation, and supply activities and report to Congress. The FTC is also required to issue a report to Congress by January 1, 1982, on the activities of utilities and home heating oil suppliers in making or arranging for conservation loans and installations. The report must consider the effects of such activities on competition among contractors, suppliers, and lenders within a given service area and to report on the availability and prices of each RCS energy conservation measures and the number of actual and expected installations.

DOE Implementing Regulations

DOE's implementing regulations for the RCS program are extremely detailed, with some 90 sections contained in 8 subparts and 3 appendices. A detailed discussion of the DOE regulations is not within the scope of this paper, but the most significant sections of the Final Rule are summarized and discussed in Appendix 2.

Both the Draft and Final Rules were strongly criticized for being too specific and not taking into consideration the diverse needs and resources of the states. For example, many states complained that the DOE rules did not give them enough time to bring existing programs into compliance with RCS. The requirements for publicizing the RCS program announcement (Section 456.206) and the designs of audit procedures (Section 456.307) were particularly troublesome. Futhermore, the passage of the 1980 ESA will require significant revision of state plans, in most cases after utilities have made major investments in program planning and start-up. Worse, the Reagan Administration may propose further major revisions.

Current Status

In spite of disputes over the regulations, 47 states and territories (and the Tennesee Valley Authority) have submitted state RCS plans for DOE's approval. The states of Utah and North Dakota did not draw up plans because they did not feel they had adequate resources to prepare and enforce a plan. The Energy Division and the Public Utilities Commission of the State of Virginia agreed with the general intent of RCS but did not submit a plan because it was felt they should not be required to manage and finance a federally mandated conservation program. Meanwhile, the utilities in West Virginia are voluntarily participating in RCS, without the benefit of a state lead agency. These states, as well as any state whose plan is not approved (or is not implemented adequately), will fall under the jurisdiction of a federal RCS plan.

Of the 47 states which have submitted state plans, 44 had been approved or received conditional approval from the DOE review committee as of July 1981. The plan of one state, Washington, has been disapproved; the others are still being reviewed by DOE. Thirty-two of the 33 nonregulated utility plans have also been approved. Those with approved plans generally indicate that implementation will be on schedule, with program announcements being distributed in summer 1981.

However, both the status of the present RCS regulations and the expected level of federal fiscal or technical support to participating states and utilities are now unclear. As of this writing, these questions await the final outcome of the Reagan Administration's proposed budget cuts and the regulatory program review by the Secretary of Energy.

III. PROGRAM DESIGN ISSUES

In the midst of this uncertainty and upheaval in program regulations and scope, the states and utilities are nonetheless approaching full-scale implementation. Several issues related to program evaluation and implementation are reviewed in the following sections, including cost effectiveness, audit effectiveness, equity considerations, anticompetitive and antitrust concerns, and general issues in state plan development.

1. Evaluating the Cost Effectiveness of RCS

It is not possible to determine *a priori* the cost effectiveness of the RCS program, since this will depend upon the detailed design and operation of individual utility efforts (e.g., costs of audits, percent of audits that result in retrofits, types of retrofits which do occur) and actual energy savings--tempered by occupant behavior--that result. Thus, cost-effectiveness assessments prior to implementation must be based on best estimates of prospective costs and savings.* Several questions related to RCS cost effectiveness are reviewed in subsequent sections, including DOE's initial estimate of RCS cost effectiveness, the cost effectiveness of similar utility programs that predated the RCS, and experiences in existing programs concerning audit costs and response rates.**

*It should also be noted that any discussion about overall cost effectiveness begs the equity questions such as those discussed later at page 38 and those of price vs. RCS inducement of energy saving consumer behavior.

**Response rate is defined as the percentage of residential customers who choose to obtain audits. A key assumption is that 75 percent of households receiving an audit will install all measures with a payback period of six years or less (not including tax credits).

DOE Assessment of RCS Cost Effectiveness. DOE has prepared an exhaustive analysis of the expected costs and impacts of the RCS program, excluding the recent extention to apartments and small commercial buildings (DOE, 1979b). DOE's analysis considers conservation measures and renewable resources measures separately. It projects the total program costs of developing and administering the conservation measures part of the program portion at $2.9 billion over the five years of the program. This includes costs to government, utilities, and home-heating suppliers--but not the cost to the consumer for the retrofits themselves. Assuming a 7 percent annual response rate, households are expected to invest an additional $6.7 billion cumulatively for purchase and installation of conservation measures alone. The resultant gross savings in energy costs are estimated at $29.7 billion over the useful life of the measures. The DOE study projects an annual decrease of 0.38 quad in household energy use by 1985 as a result of conservation measures installed under the program. (The total energy saved over the useful lives of all such measures installed is estimated at 8.2 quad.)

For the renewable resources part of the program, the development and administration costs are estimated at $2 billion, with consumer investment in purchase and installation expected to total $3.1 billion. The analysis of the resultant energy savings is assumed to be .0165 quad annually by 1985, and .331 quad over the useful life of RR measures.

These figures thus indicate extremely high cost effectiveness for the conservation portion of the mandate—a $9.6 billion investment to save $29.7 billion in energy costs. While the renewable resources part of the program appears not to be as cost effective, the RCS program taken in its entirety remains cost effective: a total investment of $14.7 billion is expected to yield energy savings of 8.53 quad, presently valued at almost $30 billion. Using a more conservative assumption of a consumer response rate of 1.5 percent,* the conservation measures alone would impose development and administration costs of $1.1 billion and household investments of $1.4 billion, resulting in an estimated gross savings in energy costs of $6.4 billion and energy savings of .08 quads. A 1.5 percent consumer response rate for the renewable resources measures was apparently not calculated, but considering the relatively insignificant aggregate savings resulting from a 7 percent response rate, the total savings from the renewable resources measures at the lower rate of response would be trivial, while program development and administration costs would still be significant. The program costs by sector for both assumed response rates are summarized in Tables 1 and 2.

Thus, according to the DOE analysis, the RCS program is clearly cost effective—the value of saved energy is much greater than total program development, administration, and consumer investment costs. Even under the modest 1.5 percent response rate, the benefit cost ratio is on the order of 3:1. These estimates do not take into account the impacts of tax credits or utility low interest conservation loan programs which, in states such as California, will increase the response rate and make the assumed rate of actual installation (75 percent) more plausible.

*This lower response rate assumes customers are charged no more than $15.00 for the audit; the 7 percent response above assumed free audits.

Table 1

AGGREGATE TOTAL COSTS[1] OF THE
FIVE-YEAR RCS PROGRAM BY SECTOR

7 Percent Annual Response Rate

Sector[2]	Five-Year Aggregate Total Expenditures[3] (Billion $)	
	range	
Governments:		
Federal	$0.021	$0.021
State	0.129	0.209
Local	N/A	N/A
Utilities	3.578	3.578
Home Heating Suppliers	1.157	1.157
Subtotal	4.885	4.965
Subtotal Average	$4.925	
Households	9.804	
Total	$14.729	

1. All figures are in billions of dollars.

2. Household expenditures are segregated from the other sectors because the savings in energy costs resulting from the RCS Program directly benefit only those households which purchase measures. Governments, covered utilities, and home heating suppliers receive no direct benefits from the savings in energy costs. Industry is excluded because the expenditures of households on energy conservation measures flow to the industry sector, and the costs to this sector are assumed to be recovered through sales to households.

3. Expenditures reflect energy conservation measures component and renewable resources component of the RCS Program.

Source: U.S. Department of Energy (DOE, 1979b).

Table 2

AGGREGATE TOTAL COSTS[1] OF CONSERVATION PORTION OF THE FIVE-YEAR RCS PROGRAM BY SECTOR

1.5 Percent Annual Response Rate

Sector[2]	Five-Year Aggregate Total Costs[3]	
	range	
Governments:		
Federal	$0.021	$0.021
State	0.098	0.172
Local	N/A	N/A
Utilities	0.471	0.471
Home Heating Suppliers	0.496	0.496
Subtotal	$1.086	$1.160
Subtotal Average	$1.12	
Households	1.42	
Total	$2.54	

1. All figures are in billions of dollars.

2. Household expenditures are segregated from the other sectors because the savings in energy costs resulting from the RCS Program directly benefit only those households which purchase measures. Governments, covered utilities, and home heating suppliers receive no direct benefits from the savings in energy costs. Industry is excluded because the expenditures of households on energy conservation measures flow to the industry sector, and costs to this sector are assumed to be recovered through sales to households.

3. Expenditures reflect energy conservation measures component of the RCS Program; expenditures associated with the renewable resources component are explicitly excluded.

Source: U.S. Department of Energy (DOE, 1979b).

Cost Effectiveness of RCS Prototype Programs. Several utilities, either voluntarily or under the mandates of state legislatures or regulatory agencies, have implemented residential conservation programs resembling the RCS, and experience in these efforts is useful in evaluating prospective utility RCS program (and the DOE results just described). A review of the prototype RCS-type utility efforts has been conducted by the Technical Development Corporation (Rosenberg, 1980a; Rosenberg and Lanoue, 1980), and though the programs reviewed varied in design and estimated aggregate amounts of energy saved, the studies indicated that the prototype utility residential conservation programs were cost effective when all costs and benefits were taken into account. In all cases, the value of energy saved exceeded the cost of new energy supplies: "The cost of 'conservation energy'--of saving a unit of energy--is still less than that of new energy supplies even when customer costs for installation of energy-saving products are added to utility costs for audits and services" (Rosenberg and Lanoue, 1980). Illustrative costs, with and without customer installation costs, are summarized in Tables 3 and 4.

As the tables show, the relative degree of cost effectiveness varied markedly among utility programs, due to variation in program design, customer response, and the utility system specific value of the displaced energy.* The intent here is not to compare the cost effectiveness of programs but to show that several existing residential audit programs have already demonstrated that energy can be saved at a cost well below that of providing the energy. This is not news to numerous major

*Cost evaluations were based on utility estimates of energy savings and avoided costs.

Table 3

ESTIMATED COST EFFECTIVENESS OF RESIDENTIAL CONSERVATION PROGRAMS:

Installation Costs to Customers Included

	Costs to utility and customer/unit of energy[1]	New Supplies: Gas	New Supplies: Electricity
Pacific Power & Light, 1978 (Oregon)	1.49¢/kWh range 0.87 - 1.99¢/kWh ceiling insulation--storm windows	---	4.2¢/kWh
Pacific Gas & Electric, 1979 (California)	$1.23/mmBtu (gas); 2.9¢/kWh (electricity)	$2.34/mmBtu	6.07¢/kWh ($17.80/mmBtu)
New York Public Service Commission, 1980 (9 utilities)	$2.33/mmBtu (gas) $2.64/mmBtu (oil)	$3 - 5/mmBtu (gas) $7/mmBtu (oil)	---
ICF, Inc., 1976			
- Michigan Consolidated Gas & Public Service Electric and Gas of New Jersey	$.97 - $1.51/mmBtu	$1.75/mmBtu	2.4¢/kWh ($7.00/mmBtu)
- Southern California Gas	$1.66 - $2.99/mmBtu		
Tennessee Valley Authority, 1980	2.1¢/kWh	---	3.1¢/kWh (average cost)

1. 1¢/kWh = $2.90/mmBtu

Source: Technical Development Corporation (Rosenberg and Lanoue, 1980)

Table 4

ESTIMATED COST EFFECTIVENESS OF RESIDENTIAL CONSERVATION PROGRAMS

Utility Program Expenses Only

	Cost to company (of the RCS program) to save energy			Cost of new supplies	
	Year	Gas	Electricity	Gas	Electricity
Pacific Power & Light	1978	---	1.15¢/kWh[1]	---	4.2¢/kWh
	1980	---	1.2 - 1.4¢/kWh	---	6.3¢/kWh
Pacific Gas & Electric	1979	12.5¢/mmBtu	0.32¢/kWh	$3.09/mmBtu	6.22¢/kWh
	1980	79.7¢/mmBtu	0.69¢/kWh		
San Diego Gas & Electric	1980	$1.14/mmBtu	1.5¢/kWh	---	---
Tennessee Valley Authority	1979	---	0.67¢/kWh	---	Avg. cost = 3.1¢/kWh

1. 1¢/kWh = $2.90/mmBtu

Source: Technical Development Corporation (Rosenberg and Lanoue, 1980)

utilities, who in fact have taken up a "demand management" style of operation, with conservation audits and financing the major thrust. Notes Pacific Power and Light Vice President, C.P. Davenport: "We're developing energy--and that's the way we look at it, for 15 mills per kilowatt-hour, as compared to our avoided cost today of 65 mills per kilowatt-hour" (Davenport, 1980).

With regard to the magnitude of utility costs for RCS-type programs reviewed by the Technical Development Corporation, all cost less than 0.5 percent of the utility's current operating revenues and in most cases less than $2.00 per residential customer per year (Rosenberg and Lanoue, 1980). The data for several utilities are summarized in Table 5.

Implementing the full federal requirements of the RCS program will undoubtedly cost utilities more than these early programs because of expanded audit requirements, more extensive publicity, evaluation and other administrative costs, plus the extra cost of the expanded program for multi-family buildings and small commercial customers. In a more recent draft paper, the TDC recently attempted an illustrative _a priori_ assessment of program costs and benefits, albeit limited by the lack of any actual implementation data. The results indicated a positive benefit/cost relationship, though significantly less than the 3:1 estimate by DOE (TDC, 1981, draft). It remains unlikely, however, that RCS implementation will entail significant increases in the fraction of utility annual operating revenues as mentioned above.

Audit Costs and Response Rates in Existing Programs. As noted earlier, program cost effectiveness is centrally dependent on both audit cost and customer response rates for audits and retrofits.

Table 5

TOTAL PROGRAM COSTS

Company	Year	Audit Progam Cost	% of Revenues	Number of Audits	Number of Residential Customers	Cost Per Resitial Customer
New York (9 companies)	6/78-9/79	$2.911 million	0.05%[1]	14,900[4]	5,479,000[5]	$0.53
PG&E (California)	1979	$9.29 million	0.2%[2]	25,000	2,795,000[5]	$3.32
Pennsylvania Electric	1979	$149,000	0.03%[1]	1,442	506,000	$0.29
	1981*	$2.4 million	0.5%[1]	25,000		$4.74
Seattle City Light	1980*	$406,000	0.4%[1]	500	214,000	$1.90
Northern States Power (Wisc.)	1978	$193,000	0.3%[1]	3,000	130,000	$1.48
Arizona Public Service	1980*	$187,500	0.05%[1,3]	---	275,000	$0.68
Sacramento Metro. Utility Dist.	1980*	N/A	2%	N/A[7]	280,000	$8.50[7]
Laclede Gas Co. (Missouri)	1981*	$3.96 million	N/A	35,000	500,000	$7.92

1. Percent of 1978 electric revenues.
2. All conservation programs cost $37 million, 0.8% of revenues.
3. Thirteen conservation programs, including RCS, are projected to be 1% of revenues in 1981.
4. Plus 1,300 B audits, 163,000 C audits.
5. 1978 residential customers.
6. Though several studies report total costs per residential customer, under the RCS regulations commercial and other customers will also pay for the program.
7. SMUD's program includes a loan program, arranging services, seminars, commercial-industrial-agricultural audits, weatherization training, solar, and load management.

*Projected

Source: Technical Development Corporation (Rosenberg and Lanoue, 1980)

Audit costs in existing programs ranged from $28 to $100 (Table 6), with an average of $60 - 65. As noted above, higher costs for actual RCS audit implementation is likely, due to inflation and increased complexity of the federal requirements and incorporation of renewable resource measures. Current estimates in California, for example, range from $80 - 168 for the full RCS audit.

Estimating the actual rate of installation of conservation measures involves two components: the percent of customers requesting audits and the percent of audits that result in installations. TDC has done a survey of 14 utilities, and the results are summarized in Table 7. As indicated, audit request rates ranged from 0.1 to 17 percent, varying as might be expected by the amount of the audit cost charged to the customer. Data indicates that at costs above $30 per audit, requests for audits drops off sharply. The 1980 amendments to the NECPA limit to $15 the amount that can be changed directly for an audit, with the balance being borne by all utility ratepayers, but any charge for audits will depress demand by lower income homeowners.

Aggressive promotion is also important in generating a significant number of requests for audits. Though many utilities rely primarily on bill advertising, the Technical Development Corporation study indicates that "bill stuffers" tend to generate only a 1 - 3 percent response rate. Southern California Gas Company, however, found that customer response to direct mail offers was three times greater than the response to bill inserts. Direct mailings of the Massachusetts Project Conserve audit form yielded a 23 percent response rate (Berry et al., 1981).

Table 6

COSTS PER AUDIT FOR SPONSORING UTILITIES[3]

State	Utility	Cost per Audit
Arizona	Arizona	$40
California	Pacific Gas & Electric	50
	Sacramento Metropolitan Utility District[1]	40
	San Diego Gas & Electric	65[2]
Florida	Tampa Electric	90
Georgia	Georgia Power	50[2]
Iowa	Iowa Public Service	60
Maryland	Baltimore Gas & Electric	89
Missouri	Springfield City Utilities[1]	36
New York	Consolidated Edison	90
	Niagra Mohawk	60
	Rochester Gas & Electric	90
Oregon	Northwest Natural Gas	40
	Pacific Power & Light	100
Tennessee	Memphis Light, Gas & Water Division[1]	45
Texas	Guadalupe Valley Electric Coop[1]	75
	Gulf States Utilities	60
	San Antonio Public Service Board[1]	34
Washington	Seattle City Light	75
Wisconsin	Madison Gas & Electric	45
	Northern States Power	72
	Wisconsin Gas	52
	Wisconsin Natural Gas	69
	Wisconsin Power & Light	92
	Wisconsin Public Service	28

Summary Statistics:	Mean	Standard Error
All programs (25)	$61.88	$\pm$ $21.38
I.O.U.'s (20)	$65.85	$\pm$ $20.86

1. Municipal power systems or rural coops

2. The companies explicitly state that these costs exclude overhead.

3. These are the costs that companies report for A audits. Many do not meet RCS standards. A number may exclude some overhead costs.

Source: Technical Development Corporation (Rosenberg and Lanoue, 1980)

Table 7

USE OF AUDIT PROGRAMS

Company	Audit Charge	Response Rate	Installation Rate	Conservation Rate[5]
Baltimore Gas & Electric	$25	0.1%	64%	0.06%
Con Edison (New York)	10	2.7%	44%	1.19%
Rochester Gas & Electric (NY)	10	0.5%	33%	0.17%
Tampa Electric (Florida)	15	0.4%	65%	0.26%
Iowa Public Service	0	17%	35%	5.95%
Northern States Power—Wisconsin	0	8.3%	40%	3.32%
Wisconsin Public Service	0	6.4%	33%	2.11%
Wisconsin Gas	0	6%	70%	4.20%
Gulf States Utilities (Texas)	0	1%	77%[1]	0.77%
Pacific Power & Light (Oregon)	0	7.2%	55%	3.96%
Northwest Natural Gas (Oregon)	0	2.8%	22%	0.62%
Portland General Electric (OR)	0	13.0%	32%	4.16%
Georgia Power	0	N/A	49%	N/A
Tennessee Valley Authority	0	N/A	41%	N/A

1. Self-selected sample; may overstate installation rate.

2. 35 percent of audited customers sign a contract for insulation or other professional work. PP&L estimates an additional 20 percent to install measures on their own.

3. Rates or signing of contracts by audited customers; see attached note.

4. Percent who say they take a "major" measure (not including caulking or weatherstripping)

5. The conservation rate = response rate x installation rate.

Source: Technical Development Corporation (Rosenberg and Lanoue, 1980)

The most effective method appears to be announcements in the mass media using well-known figures, such as local elected officials. While all types of advertising improve response rates, television and newpaper ads have particular success. Seattle City and Light increased audit requests from 75 to 275 in 1 program of television and radio ads; the New York State Residential Insulation Survey found that most people relied on television (39 percent) or newspaper ads (34 percent) for conservation information (Berry et al.). Carefully coordinated timing of program advertising and implementation capability is, of course, crucial to successful program operation.

For the RCS programs to be cost effective, utility customers must not only request audits but also be motivated and able to implement the recommendations for hardware measures (or no-cost, energy saving "practices"). Preexisting programs varied widely in their effectiveness, with the retrofit rates ranging from 10 - 30 percent. Some programs, however, have reached the 50 percent level, a few even more. While there have been factors identified that contribute to the success of audits, it is clear there is not a complete understanding of all the factors involved or how they contribute to consumer decision making. Some known important factors are:

- The quality of auditor training, both in technical understanding and sales technique;
- The ability of utilities to deliver audits in a timely fashion;
- The type of financing available;

- o The tie-in with marketing by suppliers and installers; and

- o The way in which utilities follow up on the audit.

These factors are discussed in detail in the following section.

2. Increasing the Effectiveness of Audits

Overview. The major tool RCS programs will use to realize residential energy conservation is the Class "A" home energy audit. Under the provisions of NECPA (Section 215), this audit will consist of an on-site inspection of a residential dwelling by trained personnel to identify specific opportunities for cost-effective energy conservation (or use of renewable resources). Calculations of the costs and estimated savings of various energy conservation measures (or no cost practices) will be completed by manual or computerized methods. The results will then be presented as recommendations to the homeowner.* One key to program effectiveness is thus the individual auditor's ability to arrive at appropriate and complete recommendations and then convince homeowners to take action.

Auditor Training. Auditors must have sufficient technical training to be able to properly identify the opportunities for energy conservation within a given home. In the process they must also try to increase the homeowner's knowledge of conservation and convince the residential customer that the auditor knows what he or she is doing. According to Rosenberg (1980 a,b), the Department of Energy regulations provide a

*After one year of RCS operation, a Class "B" or computer analysis of data collected by the resident must be made available.

satisfactory basis for states and utilities to design at least the technical aspects of auditor training. Some professionals in residential conservation, however, have expressed reservations as to the capability of these new "experts" (DiAngelo 1980). Hilton (1980) suggests that auditors receive substantial technical training to insure that they will add to, and not simply confirm, homeowners' understanding of energy use and efficiency. Many of those commenting on the Department of Energy regulations felt that it would be too difficult and expensive to provide all RCS auditors such highly technical training (Department of Energy, 1979). With the status of continued DOE technical assistance (including auditor training funding) uncertain, the availability of an adequate number of well-trained auditors may be a major stumbling block for utilities.

Just as important as the auditor's technical sophistication, however, is his or her marketing ability as an energy conservation "salesperson". Many persons who have reviewed or operated existing audit programs feel that the relationship between auditor and consumer during the audit is an important factor in motivating consumer action (Rosenberg, 1980b; Lamb, 1980; DiAngelo, 1980; McCluskey, 1980). Although Department of Energy regulations require each state to establish technical training procedures and a certification process for RCS auditors, they do not emphasize training in salesmanship or customer relations. The DOE regards the auditors' general knowledge of energy issues as important in motivating customers, but no specific requirements for customer relations training are required (Department of Energy, 1979).

The importance of integrating customer relations into auditor training has been stressed by those involved in the TVA Home Insulation Program (Lamb, 1980) and is reflected in TVA's RCS plan (Tennessee Valley Authority, 1980). The TVA refers to auditors as "advisors." Certification of auditors in their program requires supervised field work in addition to classroom instruction. Classroom time will include training in customer relations, communications, salesmanship, and the role of the "advisor" in his/her relationship with the residential customer. The California state plan also calls for training auditors in sales and effective communications (California Energy Commission, 1980b).

Timing of Audit Delivery. The success of the RCS program will also be affected by the ability of the utility to schedule audits within a reasonable time after the customer's request. DiAngelo (1980) states that based on his experience as an insulation contractor, it is important to "strike while the iron is hot." When a customer requests an RCS audit, the service should be provided before their interest cools. Rosenberg (1980a) also points out that even an expectation of long waiting time between request and delivery of audits will serve to dampen consumer interest.

The timing of audit delivery will be affected by the number of auditors trained and employed by utilities (or their subcontractors), the magnitude of demand for audits (and how accurately it was forecasted), and the effectiveness of each utility's management of the program. The Department of Energy (1979) is allowing utilities to phase in their audit programs, by staggering start-up dates for different parts of their service area. This should decrease the potential for backlogs that would delay audit delivery (as well as for over-estimates of the demand for RCS audits, which could lead to extra expense in the form of idle auditors). State plans require an audit must be furnished within a fixed period of time, usually 45 days, even if the utility has to hire outside part-time help to meet the workload. Since the demand for audits is expected to be seasonal--peaking in the months preceding high bill-out seasons--marketing techniques will be important in leveling the load somewhat.

Consideration of customers' schedules can also increase participation in RCS programs. Berry, Soderstrom, and Hirst (1981) found that offering audits on weekends and evenings improved customer response. These authors also found that advertising campaigns introduced just before the high bill-out season (fall for winter-peaking utilities and spring for summer-peaking utilities) prompted higher levels of audit requests.

Availability of Financing. While it is generally assumed that lack of capital is a major barrier to energy-saving investments by many consumers (Blumstein et al., 1980), it is unclear how many homeowners perceive this as the major barrier or what sort of financing options will encourage the most energy conservation. Studies by Rosenberg (1980) and Hilton (1980) found that most of those installing conservation measures in response to an energy audit paid in cash, and homeowners who actually invested in conservation expressed little interest in borrowing money to do so. The New York state residential insulation survey found that 7.4 percent of audited customers used financing, but also found that those most likely to want financing are less affluent homeowners, renters, landlords, and those investing in expensive conservation packages (Berry et al., 1981). A DOE study indicates no more than 25 percent of audited customers (usually between 5 - 15 percent) seek financing (DOE, 1978), though recent research by TDC indicates that 40 - 50 percent of the motivated and informed audit customers indicated they felt constrained from making cost-effective improvements by the lack of ready cash.

This disparity may well illustrate the importance of very low- or zero-interest rate considerations in design of utility financing programs. As indicated in studies by Hirst (1979), zero-interest utility loan programs in Oregon and Washington are stimulating homeowners to conserve. Pacific Power and Light in Oregon reports that of the consumers receiving audits, 35 percent of them take retrofit action, and half of these customers use the zero-interest loan program. And in the TVA program, 50 percent of audited households take conservation action, and 70 percent of those installing measures use the TVA financing package. These rates of consumer action compare to 10 - 30 percent for most "audit only" utility programs (Rosenberg 1980a). While this does not clearly resolve the relative importance of interest rates, the low- or zero-interest rates surely contributed to the success of these utility programs.

Leibovitz (1980a) also suggests that partial subsidization of interest rates by utilities is essential to success, citing popular state programs in Maine and New Jersey using subsidized interest rates. He also stresses extended loan payback periods, on the order of 20 years, to further stimulate consumer response. The deferred repayment option such as in Pacific Gas and Electric's ZIP program as approved by the California PUC is also expected to promote customer installation of auditor recommended measures.

While financing may be an important factor in encouraging conservation, it is clear that financing is not the only key to a successful RCS program. Rosenberg (1980a) points out that there are other utilities besides Pacific Power and Light in Oregon which provide zero interest loan programs, and that these utilities, on average, have only a 30 percent ratio of conservation actions to audits. This may be further evidence that aggressive promotion and successful consumer relations through auditor "salesmanship" and follow-up is important. TDC emphasizes that loan programs, even with interest subsidized, "do not sell themselves," and must be carefully orchestrated and integrated with other program components (TDC, 1981, draft).

Audit Follow-up. The way in which utilities follow-up their audits appears to be important in stimulating customers to make energy conservation investments. In many cases, simply completing an audit and providing a list of installers and lenders does not provide enough motivation for consumer action (Lamb, 1980; Rosenberg, 1980b). In light of this, DOE regulations require RCS audit results to be delivered in person. The hope is that this procedure will be more effective in getting customers to act. In addition, utilities cannot simply distribute a list of installers, suppliers, and lenders. They must either provide a list of contractors who have agreed to install the specific measures recommended in an audit, at the cost estimated by the auditor, or assist customers in obtaining bids.

Based on the results and preexisting programs, these DOE requirements should make the RCS program more effective. Oregon's Pacific Power and

Light, for instance, actually obtains bids from contractors on their list, and presents the consumer with a list of bids ranked by price. TVA, while not going quite this far, provides consumers with information on how to select a contractor, encourages them to seek bids, and provides assistance in preparing loan applications (Rosenberg, 1980a). Hilton (1980) recommends that auditors be required to make personal postaudit contact with all customers to check on implementation of recommended conservation measures.

3. Retrofit Experience and Building Science Considerations

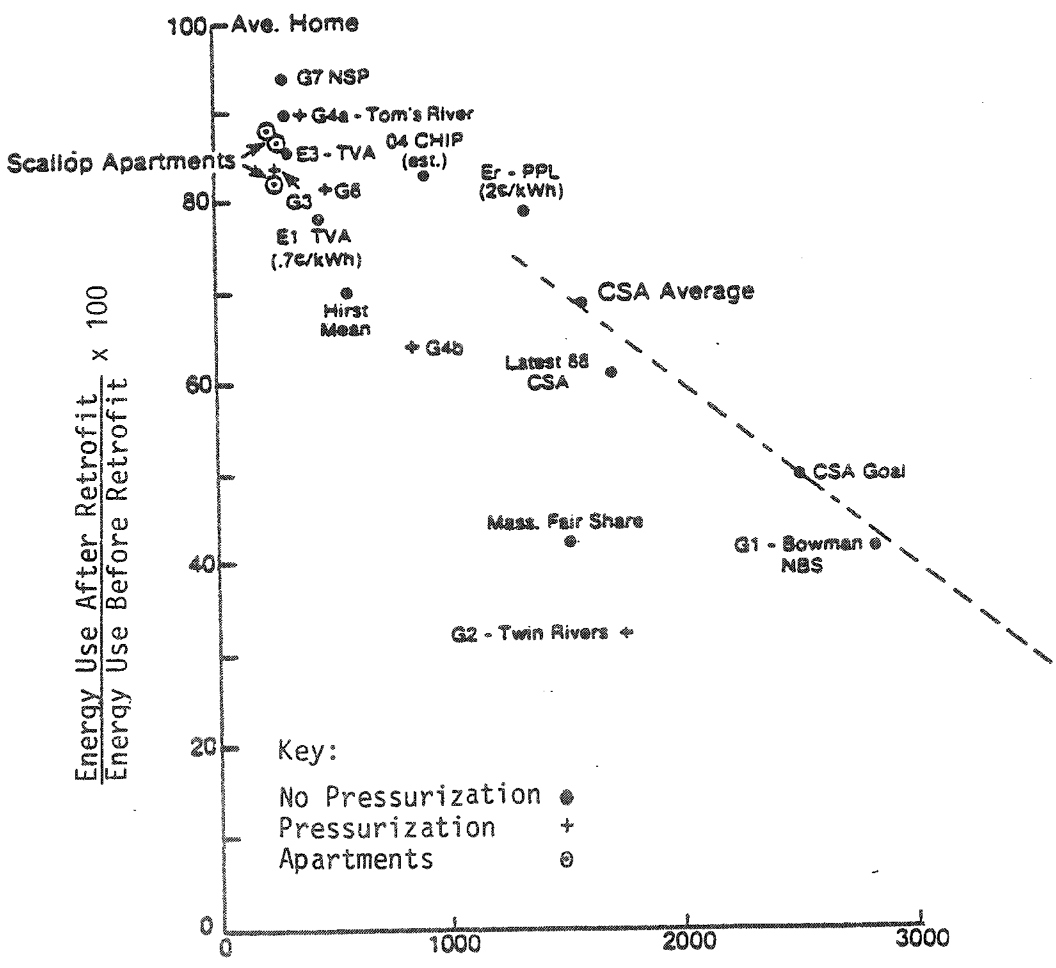
It is becoming widely recognized that improved energy efficiency in buildings can save more energy, more rapidly, and at less cost than virtually any other policy. Thus, the urgency expressed by Congress in establishing a utility RCS mandate is understandable. Engineering studies of the potential savings from residential retrofits suggest a range of 30 - 60 percent per household, depending on building characteristics, climate, and occupant behavior (Ross and Williams, 1980). Another study estimated potential savings in the residential sector at 2.3 million barrels/day oil equivalent by 1990, with comparable savings suggested in the commercial sector (OTA, 1980).

These savings potentials have been confirmed in retrofit field studies, RCS-type utility programs, and low-income weatherization programs (Figure 1). In a major case study completed in Twin Rivers, New Jersey, by the Princeton Center for Energy and Environmental Studies, heating savings averaged 25 percent with inexpensive, partial retrofits, and reached as high as 68 percent after an intensive, research type retrofit (Harrje et al., 1979). Low-income Weatherization Grant programs have achieved 10 - 40 percent savings (Ross, 1980), and a similar range of savings results have been achieved in utility RCS type programs (Rosenfeld, Grimsrud et al., 1980).

The range of savings achieved in these different projects highlights the need for variation in program approaches and specific techniques for retrofitting, as both the audit approach and the choice of retrofit measures will greatly influence not only the energy savings but the cost of achieving them. The range in savings achieved also illustrates to some extent how recent and still incomplete is the present understanding of "building science." Little research was done until the mid 1970s on phenomena such as infiltration and thermal conduction in buildings, and the actual field experimentation and applied research has been underway for an even shorter time. Given the enormous variety of building types, climates, and occupant characteristics that affect retrofit opportunities, it is difficult to overstate the importance of continuing research, and the need for carefully designed and monitored audit-retrofit demonstrations. Several research and demonstration topics with particular relevance to RCS are briefly discussed below.

Heat Flow In Buildings. While some common retrofit measures--attic and water heater insulation, storm windows and weather stripping--are becoming familiar to homeowners, other simple but not yet widely known retrofit techniques can more than double the potential savings by strategically altering the heat flow patterns in the structure. As has been extensively discussed by Dutt (1979 - 1980) and others, these techniques

FIGURE 1



Residential Retrofit: Survey of Actual Energy Savings (%)

(Adapted from Energy Efficient Buildings, Appendix III, "Residnetial Retrofit Survey"), Lawrence Berkeley Laboratory, Berkeley, California. (Draft - July, 1980).

are designed to remedy less obvious paths of heat loss (especially those in homes with frame construction) such as openings in walls and attic floors around plumbing vents and furnace flues, openings made for electrical wiring, and dropped ceilings over kitchens or bathrooms. These more obscure infiltration and heat loss paths are difficult to find without some simple instruments, but once identified are often inexpensive and easy to remedy (Dutt, 1980). If not taken into account, however, they can greatly reduce the actual energy savings from the better known retrofits. Energy savings in the Twin Rivers project, for example, increased from 10 - 15 percent to 25 percent when thermal bypasses were remedied and reached 68 percent when air infiltration losses were significantly reduced (Ross, 1980).

"House-Doctoring." At the present time, RCS measures and audit techniques do not adequately address these retrofit considerations (Becker and Dutt, 1979), the importance of which has been demonstrated by the "house doctor" research at the Princeton Center. This approach entails a pair of auditors who visits an "ailing" house armed with a kit of diagnostic tools, such as a blower door; an infra-red camera; a furnace combustion efficiency analyzer; a digital temperature probe; and several rolls of duct tape, batts of insulation, and cans of caulking foam. A thorough instrumented analysis pinpoints the areas in need of insulation, tightening, storm windows, or other measures. The housedoctors fix the most serious heat leaks ("bypasses"), generally leaving the homeowner with an assured initial energy savings of 10 - 20 percent. These "guaranteed" savings partially compensate for the increased cost of the house doctor visit, compared to a standard RCS audit. The housedoctor also leave behind a list of "conventional" retrofits to be done by a contractor or the homeowner (Sonderregger, 1980).

The emphasis of the housedoctor approach is therefore on: 1) "hands-on" diagnosis of the house; 2) partial retrofit during the first visit; and 3) well-trained and well-equipped auditors. In the most recent version greater emphasis is placed on a more accurate, technically sophisticated analysis of the needed retrofits, using a portable microcomputer program developed by LBL. Utilization of the LBL computerized instrumented audit can greately increase audit sophistication in any utility program whether or not the full housedoctor audit plus retrofit approach is adopted (Sonderregger, 1980).

Indoor Air Quality. With the increased interest in energy conservation in buildings has come an increased awareness of indoor air quality. From the limited monitoring done to date, it appears that some fraction of the existing building stock (entirely unrelated to the presence or absence of energy conserving infiltration reduction measures) is periodically characterized by a significant indoor air quality problem due to pollutants such as nitrogen dioxide and carbon monoxide (from gas furnaces, ranges, and water heaters); particulates (from these same appliances and tobacco smoke); asbestos and formaldehyde (from building materials and furnishings); and radon that is naturally present in soil or groundwater but can be trapped and concentrated in buildings. If these contaminants reach excessive indoor concentrations, they could impair the health or comfort of residents. Moisture can also be a problem in some well sealed buildings, although it may affect wood, paint, and fabrics more seriously than occupants.

Energy efficiency measures designed to reduce infiltration in today's generally leaky homes can save significant amounts of heating and cooling energy but could also conceivably exacerbate any existing problems with indoor air pollution. There is, however, little agreement in the United States or elsewhere on the amount of ventilation air required for health, safety, and comfort of occupants (Hollowell et al., 1979).

In its final environmental impact statement (EIS) on the RCS program, DOE concluded that "with the possible exception of potential problems associated with radon..., it is not believed that the health impacts (of caulking, weatherstripping, and installing storm doors and doors) will be significant." (DOE, 1979c) As measures to mitigate the slightly adverse effect of air infiltration reduction upon indoor air quality, DOE suggested the use of appliance exhaust fans, heat exchangers, air cleaning equipment, and building sealants to prevent radon and formaldehyde emanation into living areas. Due to uncertainty about the health effects of typically encountered indoor air pollutant concentrations, DOE declined to require that the RCS program implement any of these measures.

In response to DOE's EIS, the Environmental Protection Agency (EPA) in 1980 recommended:

> "...that criteria be developed for energy auditors which identify those situations under which tightening of a home can occur without high probability of decreasing infiltration below 1 air change per hour (ac/h). Auditors should be instructed that any time a recommendation is made that would reduce the air infiltration rate below 1 ac/h, effective remedial measures for maintaining air quality should also be prescribed." (EPA, 1980)

Experts on indoor air quality, however, have questioned an approach keyed solely to hypothetical exchange rates, as reduction in air exchange rates alone would not significantly increase the danger from indoor pollutants. Notes Dr. Anthony Nero of Lawrence Berkeley Laboratory:

> "An essential fact is that the amount of these pollutants emitted into buildings, including residences, can vary by factors of ten to a thousand from one case to another i.e., from one home to another. It is this variation in source strength, rather than differences in ventilation or air exchange rate, that is the dominant factor accounting for differences in indoor pollutant concentrations among U.S. residences."
>
> "...Thus modest measures to control infiltration, such as the traditional use of weatherstripping and caulking, will not change indoor concentrations substantially: concentrations that would have been low will remain low and concentrations that would have been unacceptably high will remain so." (Nero, 1981)

The California Energy Commission has studied indoor air pollution in conjunction with its recently approved efficiency standards for new residential buildings (CEC, 1981a; CEC, 1981b; CEC, 1981c). In addition to existing requirements that new houses include weatherstripping and caulking, the Commission Staff's proposed standards would have required caulking of exterior joints and soleplates, minimum infiltration standards for windows, electrical outlet gaskets, and limited infiltration from fireplaces. This combination of measures would have potentially reduced typical new home air exchange rates from 1.3 ac/h to 0.6 ac/h.*

*The Commission did note that these air change rate (ac/h) calculations are gross approximations, and account only for ventilation between joints and cracks. "Actual total air exchange rates are greatly increased by natural and mechanical ventilation (opening windows, opening doors, use of heating and cooling systems, fireplaces, etc." (CEC, 1981c)

The final standards actually adopted by the Commission embodied a more cautious approach by foregoing any requirement for continuous infiltration barriers and electrical outlet gaskets, which allowed projected air exchange rates of roughly 0.9 ac/h. These standards will nevertheless result in new residential housing construction being considerably tighter than typical existing residences, even those retrofitted with caulking and weatherstripping.

In sum, RCS implementation should not be unduly hindered by concern for indoor air quality. Rather, any potential problems should be addressed directly with measures to control pollutant sources or to remove contaminants from indoor air without sacrificing maintenance of overall building tightness and infiltration control. The RCS auditors can further this effort by identifying those homes where preexisting conditions could pose a problem, (i.e., masonry construction, unvented gas appliances, occupants who smoke) and by suggesting any appropriate direct mitigation measures such as those mentioned above.

Solar Conservation Interface. With the RCS program covering both conservation and renewable resource measures, specific recommendations for using solar energy will be presented to most utility customers for the first time. As solar energy systems are incorporated into retrofit programs, more intensive research is needed to determine the optimal combinations of conservation measures and solar energy systems for different buildings and climates. Better information is needed on how passive and active systems can best be combined and what combinations of conservation and solar measures may be more cost effective than either one alone (Office of Technology Assessment, 1980).

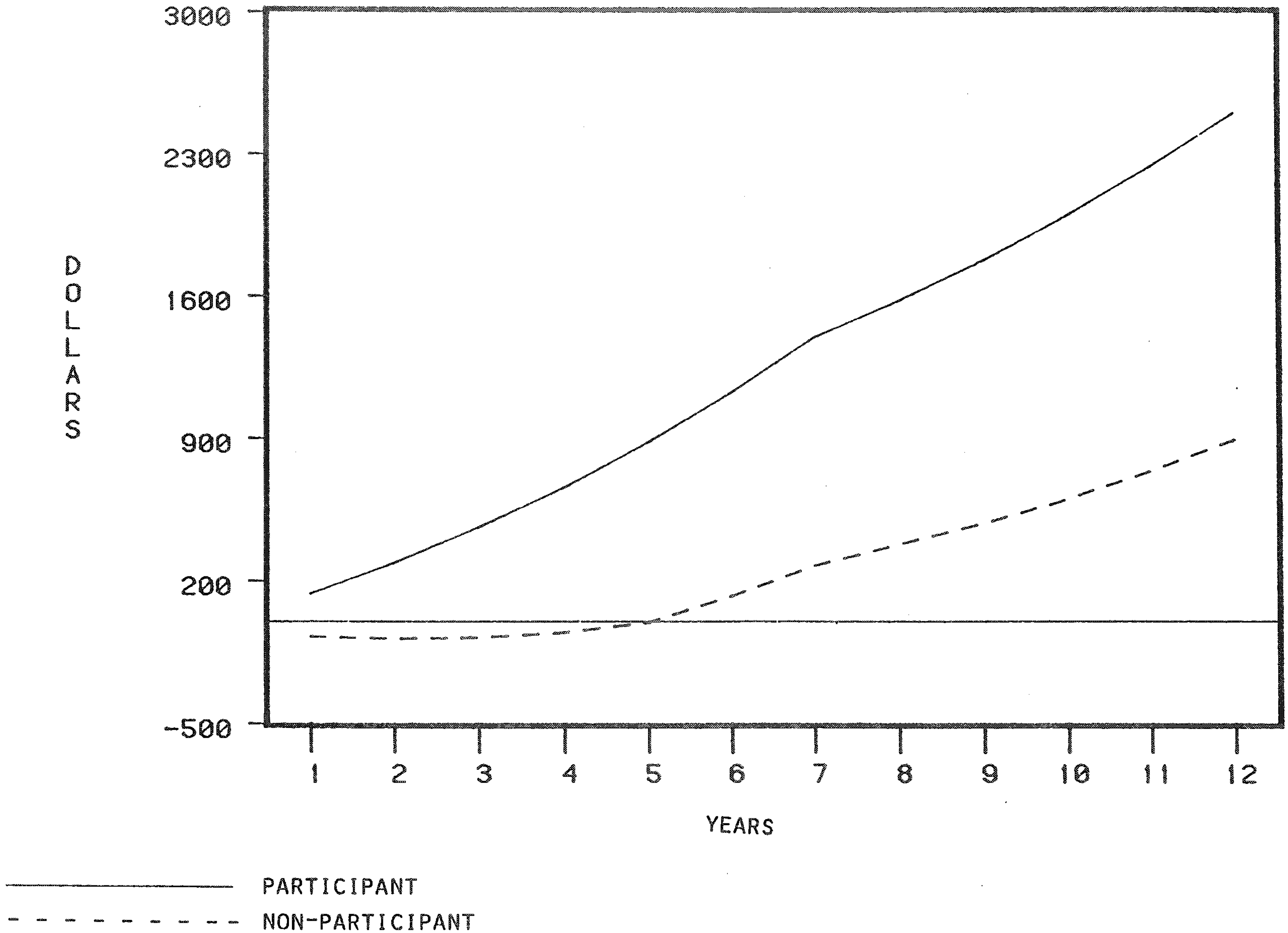
4. Equity Concerns in RCS Implementation.

A particularly pressing concern in implementing the RCS mandate is assuring that the costs and benefits of the program are distributed as equitably as possible. The RCS mandate entails the utilities--through the rate structure--implementing a government taxation and expenditure policy. As such, the program would ideally at least distribute its benefits among classes of consumers in proportion to the incidence of the charges (TDC, 1981, draft).

The specific concern is thus that the federal government and state regulatory agencies not mandate or approve utility programs which result in a large number of customers who pay for the program receive none, or a disproportionately small share, of the direct benefits. Although studies indicate that RCS-type utility programs (including financing) can be designed so that all customers ultimately benefit, the distribution of benefits is skewed heavily in favor of participating households (California Energy Commission, 1979). This disparity in distribution is illustrated in Figure 2, which represents the impact of a hypothetical RCS-type utility program, with zero interest, deferred-payment financing provisions such as in the Pacific Power and Light loan program (Praul and Marcus, 1980). Although nonparticipants do benefit substantially over the program's lifetime, their share is far smaller, and their net benefits are actually negative in the early years of the program.

If all ratepayers had genuinely equal opportunities to participate in utility conservation programs, this concern over distribution of program

FIGURE 2



Benefits of Conservation Financing to Participant and Non Participant Ratepayers.

Source: Energy Service Corporations: Opportunities for California Utilities. (Praul and Marcus, 1980).

benefits might be moot, but this is clearly not the case.* Actual data on past RCS-type utility programs (with and without direct loan financing) bear out the premise that it is predominantly higher than average income, nonrenter customers who use the program:

> "There is a consensus among utility program officials that RCS customers tend to come from higher-than-average income groups. Homes that are audited tend to be in the more affluent parts of service areas. Few customers use unsubsidized loan programs; most are able to pay $200 - 500 in cash for their insulation work. Renters almost never participate; for example Con Edison has audited a total of 27 renters and 3,931 owner-occupants. Renters as a group tend to be poorer than homeowners." (Rosenberg and Lanoue, 1980)

TVA's program participation was 98.4 percent by owner occupants, (ICF 1979), and other utility programs have been restricted to single family or owner-occupied residences (Praul, 1981).

It is urgent that program participation be broadened in full-scale RCS implementation for both equity and energy savings goals. Poor households are most in need of relief from increasing utility rates and tend to occupy a disproportionate share of the nation's older, less efficient housing stock which has the highest potential energy savings payback (National Institute of Building Sciences, 1980).

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*It should also be noted that the concern with nonparticipants, while important, appears to have emerged only in policy discussions of RCS-type utility programs. Historically, little if any attention has been paid to assuring that all ratepayers benefit equally from rate decisions and utility system additions (Ross, 1980). In particular, approval of ratepayer support for "construction-work-in-progress" (CWIP) to fund new utility projects extraordinarily penalizes those who are not responsible--the "nonparticipants"--for increasing energy demand.

As the national data presented in Table 8 indicates, in fact, family income is positively related both to the likelihood that a household will occupy a reasonably weatherized home and that it will implement conservation measures (TDC, 1981, draft).

If it is actually implemented by Congress and DOE, the 1980 Energy Security Act extension of RCS to include all multi-family residences will have some impact in broadening participation in the program. Throughout the rental sector, however, the basic difficulty will remain that property owners must make energy-saving investment decisions, while generally tenants receive the immediate benefit from the improvements. Thus, under the voluntary RCS scheme, landlords will have little incentive to seek or act on any RCS audit recommendations, and participants will continue to be primarily owner-occupants. Rentals account for 26 million (or 35 percent) of all residential units in the United States. (Multi-family and rental sector concerns are discussed in greater detail in the ACEES Proceedings, in the paper by D. Bleviss.)

Though most conservation programs to date have had little or no impact in resolving the problem of split incentives in the rental sector, this does not mean that retrofitting programs inevitably represent transfers from the poor to those better off, and in any case, deregulation of fuel prices and state and federal conservation tax credits probably have much larger equity impacts than RCS programs. But it is clear that conservation programs should be carefully designed to mitigate any regressive distribution effects, as well as to assure that the large energy savings potential of the rental sector is realized. In fact, the consensus among

Table 8

ENERGY-RELATED CHARACTERISTICS OF THE EXISTING HOUSING STOCK (WINTER 1978 - 79)
AND CONSERVATION MEASURES UNDERTAKEN (1978)
By 1977 Family Income

	Total Households	Less than $5,000	5,000 to 9,999	10,000 to 14,999	15,000 to 19,999	20,000 to 24,999	$25,000 or more	Total Poor
STOCK '78-'79								
Some or all storm windows and doors and attic insulation	41%	22%	30%	36%	45%	52%	55%	20%
One or more of these types of insulation	45	47	52	48	46	39	38	48
Units with none of these types of insulation	14	31	18	16	9	9	7	32
MEASURES UNDERTAKEN--1978								
Any Measures	33	22	28	33	39	39	38	25
Insulation (Total)	6	3	3	6	6	8	9	4
Attic	4	2	2	4	4	5	7	2
Basement or Sill	2	1	1	2	2	3	3	2
Outside Walls	2	2	1	2	2	3	3	2
Storm Windows	4	2	2	5	4	6	5	3
Insulation and/or storms	10	4	5	11	9	12	14	6
Inexpensive Measures only	24	17	22	23	30	26	23	19

Source: DOE/EIA, Residential Energy Consumption Survey, Tables 7B, 28B.

participants in the ACEES Santa Cruz Summer study was that equity concerns need not foreclose policy options, such as RCS, from realizing the enormous potential energy and dollar savings available through retrofit. Maximum energy savings, as well as greater equity, can be achieved if utility programs are designed to reach renters and such special populations as lower-income, elderly, and minority persons. Designing a program to in first order benefit these special needs groups would entail:

- Requiring utilities as part of their RCS program to provide all customers with "low-cost/no-cost" measures such as water heater blankets, low-flow plumbing devices, and weatherstripping material;
- Requiring low or zero-interest, deferred-payment loan programs which will be as attractive as possible to owners of rental property and also help assure that "poor risk" homeowners have access to financing;
- Selecting conservation retrofit measures that include necessary basic building envelope repairs (such as fixing broken windows) when done in conjunction with other energy-saving retrofits;
- Prioritizing the delivery of low-cost/no-cost conservation audits and financing programs geographically, to benefit the targeted populations;
- Assuring that utilities contract with local community groups for some percentage of "outreach" and actual RCS audit services;

- o Requiring multi-lingual program announcements and advertising; and
- o Establishing financial incentives that reward utilities for demonstrated success in retrofitting low-income and rental units.

The California Public Utilities Commission has reviewed equity concerns associated with utility finance programs in detail in their recently completed investigation of Pacific Gas and Electric's proposed zero-interest conservation loan program (CPUC Decision No. 92653, January 28, 1981). They have established precedent for some of the above measures by allowing up to $200 to be spent on basic building envelope repairs, allowing low-income homeowners more favorable credit verification and repayment terms, and requiring multilingual promotional and outreach efforts in minority areas. PG&E was also directed to provide more favorable loan terms to individually metered rental properties and to initiate a program certifying apartments for energy efficiency, in hopes of establishing some landlord incentive. Finally, PG&E was required to submit a plan for insuring that ZIP is made available to renters, the elderly, and minorities (for example); with the owner approval, tenants can purchase conservation measures and require subsequent tenants to continue monthly loan payments until the measures have been paid for.

The Technical Development Corporation work also reviewed equity concerns in some detail and concluded that program operators and overseers must take affirmative steps to get low-income and elderly households, as well as owners and occupants of multi-family buildings to participate.

Specific TDC recommendations included:

"- the enlistment of organizations used to dealing with the "left-out" groups to publicize and, in some cases, deliver the services;

- coordination of RCS activities with targeted housing rehabilitation and social service programs; and

- orchestration of financing programs suitable to low-income owners and owners of property occupied by low- and middle-income households." (TDC, 1981, draft)

These equity concerns also highlight the need to supplement voluntary RCS-type programs with statewide standards requiring the retrofit of all existing dwellings. Such legislated standards are the surest means of implementing rental property retrofit, so that tenants as well as homeowners will benefit from lower utility bills, and the full energy savings potential can be realized.

5. Utility RCS Roles and Competition in the Marketplace

The RCS program and the Congressional debate over its enactment highlight one of the most fundamental institutional changes resulting from the oil price and supply crises of the 1970s. In response to higher prices, consumer energy expenditures are beginning to be redirected from traditional suppliers of energy to those who market alternative "energy service" products, such as insulation or fluorescent lights. This redirection has placed the utilities, historically the monopoly suppliers of electricity and natural gas, in an unprecedented circumstance.

Conservation, which they formerly discouraged in an era of declining marginal costs and aggressive sales campaigns, has suddenly become the premier good. It is also a good which they have had essentially no experience at producing or marketing and for which they hold no monopoly, either "natural" or government-endowed.

Congress, however, in an effort to speed the utilization of conservation and renewable resources, has required the utilities through RCS to begin delivering new types of "energy services" on a relatively massive scale. As the Congressional record reflects, in doing so they raised enormous controversy over the acceptability of utility involvement in nontraditional energy service delivery, particularly the financing and installation of conservation and solar measures. Actual implementation of the Energy Security Act amendments allowing utility direct financing and installation by subcontractor lies with the states, however, and the controversy is likely to continue as they adjust their RCS plans to provide for these new utility roles. In the following sections some of the relevant concerns are reviewed, along with options that the states could consider to resolve conflicts between utilities and (1) private sector suppliers of conservation and renewables* and (2) lending institutions.

As utilities' new roles in energy service evolve, they must attempt to simultaneously satisfy several competing demands, such as maintenance of competition, cost minimization, assurance of equitable consumer access, and achievement of the maximum feasible energy savings.

*This category would include not only materials suppliers, but service suppliers such as private auditing and energy management firms.

The concern for anti-competitive practices can best be balanced with the others if regulators pay attention to the type of market a utility plans to enter. Competitive issues are obviously most important where the utility is one of the largest suppliers in a given market, or where the survival or market entry of other businesses is dependent upon the demand which the utility either creates or meets. There are also important concerns where utility entry may stifle technical innovation through conservative approaches to serving a large market share. Impacts on competition are less important in markets where the utility's size is not disproportionate relative to other participants, where the survival of existing businesses is not at stake, or (possibly) where no current market exists.

Relationship to Private Suppliers and Contractors. The greatest potential for anticompetitive practices in utility RCS type programs are in those programs competing with contractors who operate in a limited geographic area. The homeowner selects a contractor to do the work; the utility then pays the contractor after a postaudit inspection. Although the utility-lender has a legitimate concern that the work be done properly, competitive considerations suggest that the contractor selection process should not be controlled by the utility. RCS procedures appear to provide adequate safeguards, by establishing a master list of contractors and requiring a utility to furnish the customer at least three names selected at random. However, some members of the solar industry have objected to this procedure, as well as to the whole utility audit and inspection requirement of RCS. They fear that:

- If utilities are in a position to approve solar system designs, innovation would be stifled.

- An audit requirement imposes excessive bureaucratic transactions costs on people who simply want to finance solar systems.

- If utilities rather than existing lending institutions become the major source of loans for solar retrofits, too much power is centralized within the utilities, who, after all, have a substantial investment in competing, conventional energy sources.

Proponents of utility involvement and direction respond that:

- Solar system designs are approved by the Energy Commission through a legislated laboratory testing procedure;

- Utilities should not be forced to finance (with the ratepayers money) solar systems without assuring that they will in fact save energy, particularly since RCS may require utilities to stand behind a warranty if a manufacturer or contractor goes out of business;

- Audits and postinstallation inspections are necessary to avoid wasting scarce utility capital and ratepayer monies on expensive solar retrofits (or conservation devices) where cheaper, more cost-effective measures have not been undertaken;

- While utility audits will impose some transactions costs on a customer, obtaining a conventional loan may impose even more of an administrative burden than obtaining direct financing from the utility (see below); and

- o The alternative to utility lending may be no financing at all given the customary lack of bank financing for small projects or poor risk customers.

Where there is a potential competitive impact, the means of alleviating the impact vary with the technology. Where the technology is still evolving (as is the case with most solar technologies) direct marketing by utilities may not only put contractors out of business but may also tend to standardize system designs prematurely. For these technologies, it may be wise to limit or prohibit both utility marketing and installation, but not necessarily direct loans by utilities. Utility quality control through financing criteria, audits, and inspections would help to assure that the ratepayer's money is well spent, particularly since the utility would have no financial interest in promoting a particular system or product. For better established technologies such as ceiling insulation, there may still be competitive impacts due to utility marketing, but the opportunity for cost reductions could be a balancing factor, since the marketing and job-site estimating costs for dozens of private firms to bid on the same home ceiling insulation job may represent a significant share of the final cost. From the viewpoint of the customer, a strictly "private market solution" may not be the most efficient (or convenient). One option is for a utility to seek bids from contractors on a standardized cost per "R-factor" for a specified number of jobs in an area and then choose those contractors with the lowest bid. More realistically, the utility could distribute jobs among all contractors who submitted bids within a certain range of the lowest bid. Utilities who have used this method of contractor selection have sometimes managed to lower insulation costs by 25 to 40 percent, without a significant decline in installation quality. At the same time, if the utility has a role in both insulation financing and marketing, it should not be allowed to restrict its financing to its own services.

Relationship to Financial Institutions. As with contractors, the primary issue in the relationship between utilities and lending institutions is to maintain competition where it helps to minimize costs to the ratepayer (both administrative and interest costs), while assuring that all consumers have equal access to financing.* If the utility has access to lower-cost capital or can administer a program cheaply (because of its existing billing system and RCS audit/inspection activities), it should loan money directly, subject to the requirements in the 1980 Energy Security Act.** If there are other reasons for channeling conservation loans through existing private lending institutions, the utility could still provide interest rate subsidies, "outreach," or technical advice on conservation and solar projects.

Accurate accounting and valid comparisons of costs for different loan programs can be complex, and the results depend heavily upon the utility's method for raising capital. If a utility's sources of new capital for conservation loans are similar to its overall mix of capital

*It should be noted that the lenders did not raise these concerns directly to the DOE or California Energy Commision, nor did they raise them in the California PUC hearings on the PG&E ZIP proposal.

**The Act provides that "...Whenever any public utility undertakes to finance its lending program for residential conservation measures through financial institutions, the utility shall (to the extent such utility determines feasible, consistent with good business practice, and not disadvantageous to its customers) seek funds for such financing from financial institutions located throughout the area covered by the lending program."

revenue sources, capital costs will tend to be relatively high. This is because the rate of return generally paid to common equity is higher than that for preferred stock or debt. Moreover, the utility must in general pay income taxes on the returns to common and preferred stock but not on repayments of debt. Alternatively, if a utility can "leverage" its investment by increasing the proportion of bank or bond debt to utility equity, as it obtains new funds for conservation loans (or any other purpose), its capital costs may be less than those of the lending institutions. It has been shown that utility rate-basing options are more expensive than bank loans, with leveraged utility programs being the least costly option (Kahn, 1980).

Some conventional lending institutions have argued that their administrative costs for conservation loans would be less than those of utilities, because they already have the necessary personnel and procedures in place. However, the operation of the loan program that private lenders envision may be very different from a program run by utilities. Administration of a utility program may be much simpler, especially if the usual criteria for loan qualifying (income, neighborhood characteristics, etc.) might not be necessary, and principal payments may not need to be processed. Moreover, many conventional institutions find loans of less than $1,500 to $2,000 too costly to process and thus the utility would be in the position of administering the more expensive smaller loans, while the financial institutions "skimmed the cream" of larger, more profitable ones.

Finally there are considerations beyond cost and overhead. In particular, reliance on conventional financial institutions may conflict with goals of providing energy-saving devices to low-income people and renters. Private lender programs might understandably choose (or be forced by their own regulatory agencies) to adopt loan qualifying criteria which would prove a barrier to many of those particularly in need of retrofits. A vice president of the Bank of America, for example, formally advised Pacific Gas & Electric that:

> "There is an inherent conflict between the objective of maximum market penetration, particularly of the lower income and of the (rental) market and the required credit quality... The record we have reviewed does not address the financial qualifications for borrower eligibility, and the appraisal procedures and standards to be used...."
>
> "On the issue of security, your prepared testimony speaks of liens on the property being improved... Enforcement of junior liens can be expensive and risky. Equity values may not hold up in declining neighborhoods." (Moran, 1980)

Moreover, lending institutions may not approve of the deferred loan repayment feature that can be of key importance in promoting the market penetration of a utility loan program necessary to achieve the full energy savings potential. The Bank of America letter continues:

> "The inclusion of an amortization program starting immediatedly upon installation and keyed to sharing the savings between the participants, the nonparticipants, and PG&E, would add considerable credibility to the program, and would tend to reduce the degree of support required from PG&E."

Therefore, there may be reasons other than cost for supplementing loan programs of conventional financial institutions with targeted utility loan programs or some form of jointly administered program (subsidized, capitalized, and/or partially underwritten by the utility).

6. Antitrust Considerations in RCS Implementation

As outlined in the preceding section, implementation of the Residential Conservation Service has sparked debate about public utilities involvement in the unregulated conservation and renewable resource markets. As well, concerns have been expressed that certain provisions in the RCS legislation may lead to antitrust violations among utilities, suppliers, and installers in the marketing, financing, and installation of conservation services. Some critics have raised the dangers of price-fixing and market allocation arrangements between suppliers and contractors, of kickbacks from contractors to auditors, and of anticompetitive activity in the lending market. Others are concerned over the opportunity utilities might have for utilities to subsidize unregulated comercial activities with revenues from their traditionally regulated services (cross-subsidization). At present, neither the validity of these claims nor the applicability of antitrust law to public utilities has yet been resolved.

Antitrust Issues

Price Fixing. DOE regulations require utility RCS auditors to provide each homeowner with an estimate of the cost of hiring a contractor to install the suggested conservation measures [44 Fed. Reg. 65669, Section 456.307(c)]. These estimates must be based on "typical local prices for materials and installation...." [Section 456.307(6)(4)]. Some critics fear that as a result of auditors quoting an "average price," actual prices will tend to center around each utility's Estimated Installation Cost, much the same as if installers and suppliers themselves were to exchange price information (Dolan, 1980).

The practice of publishing average prices was of concern to the Federal Trade Commission (FTC, 1979):

> "We are concerned that the process of gathering information and establishing procedures for making estimates, which will require a consideration of prices actually charged for these services in the marketplace may encourage conscious or unconscious agreement on prices among contractors and suppliers."

The Commission also called attention to more formal price-fixing agreements:

> "There is also the possibility that a utility and the contractors doing business in its region might attempt to fix prices, in this case, the contract (containing price information) filed with the utility would be an excellent method of policing the price-fixing agreement."

These concerns have been addressed in RCS by having the state lead agency responsible for preparing the price lists and estimated costs. Information given to the customer <u>is in the form of a range</u> rather than a fixed price, with an explanation that actual costs will vary depending on the specifics of the site.

<u>Market Allocation</u>. A second concern is that market allocation of contractor and supplier services might be the practical result of providing each customer with the names of three contractors from the master list and collecting average price information (DOE, 1980). If the use of estimated installation costs effectively limits price competition, as discussed in the previous paragraph, and a minimal quality of work is assured once a contractor has been placed on a master list, customers will have little basis for choosing one contractor over another. The random referral process required by the programs then might work to assure every participating contractor an equal share of the conservation market.

In addition, the RCS legislation enjoins utilities from activities that "result in providing to any supplier or contractor an unreasonably large share of the contracts for the supply or installation of residential energy conservation measures" [216 (c)], and this provision is seen as possibly leading to market utility allocation among suppliers and contractors (Dolan, 1980 and DOE, 1980).

Kickbacks Among Contractors and Auditors. Under the random referral process a contractor may have a very difficult time increasing his or her share of the conservation market. With utility auditors in a position to influence customers, there is a potential for special arrangements among utilities and contractors and suppliers.

Discouraging Economies of Scale. The random referral process and the provisions of RCS that limit the share of contracts for any one contractor could constrain development of economies of scale in the supply and installation business.

Anticompetition in the Lending Market. A number of questions have been raised concerning utility loan programs in the conservation market (California Public Utilities Commission, 1981). One such concern is that utilities will preempt the market for home weatherization loans by offering financing to residential owners at rates below the prevailing market rates. Another concern is that if a utility offers an attractive loan program, fewer conservation improvements will take place outside that program, and this could adversely effect the do-it-yourself market. Moreover, customers may have less incentive to carefully compare prices among contractors if the money they use for home improvements is not their own, and contractors, responding to this indifference among consumers, might be led to charge exactly the "average" price quoted by the utility. In the end, a conservation market that develops around low interest utility loans might reinforce price stabilization around "average prices" (Dolan, 1980).

Cross Subsidization. As a rule, RCS legislation prohibits utilities from supplying or installing energy conservation measures, but this rule has certain exceptions [NECPA 216(d)(e)]. Those utilities that, on the date of NECPA's enactment, were already supplying or installing measures may continue to do so, and other utilities may be granted waivers of the prohibition by the Secretary of Energy. It has been suggested that utilities exempted from the prohibition might use cross-subsidization techniques to successfully transfer their market power from their regulated "natural monopoly" markets to the unregulated conservation market (FTC, 1981).

Legal Context

In some measure due to the above concerns, the language of NECPA and the Energy Security Act reflect Congress's intent that participation of utilities in the energy conservation market be supervised with an eye toward maintaining competition in the market. However, the relationships between federal antitrust law, the "state-action" antitrust exemption, and utility activities pursuant to NECPA are complex (the recent amendments to NECPA only add to the complexity). While it appears that antitrust violations resulting from RCS activities will not be exempt from prosecution, no conclusions have been reached about the applicability of the antitrust laws to utility conduct (FTC, 1981). NECPA and the ESA amendments each contain "savings" provisions designed to leave intact (though not necessarily apply) the body of federal and state antitrust laws. In the broader context, however, any discussion of the potential antitrust or anticompetitive implications of the proposed program should be considered against the background of a dramatically expanded market for existing and prospective manufacturers and installers of energy conservation measures which would inevitably result from the RCS mandate.

In light of NECPA's references to the federal antitrust laws, it is important to clarify the relationship between those laws and state regulation of public utilities. Until recently, utilities were considered to enjoy broad antitrust exemption. In Parker vs. Brown [317 US 341 (1943)], the Supreme Court articulated a "state action" doctrine, whereby state-approved utility conduct was declared exempt from application of the Sherman Act. However, in Cantor vs. Detroit Edison Company [428 US 579 (1976)], the Court significantly narrowed the state-action exemption. It found "no logical inconsistency" in subjecting a utility to regulation "insofar as it is exercising its natural monopoly powers," while at the same time requiring the utility to meet antitrust standards "to the extent that it engages in business activity in competitive areas of the economy." As a result of this and other decisions, regulated utilities, including municipally owned utilities, may be held liable for anticompetitive conduct when they engage in business in unregulated markets.* Thus, the anticompetitive effects of utility operation in such

*Subsequent cases of importance include City of Lafayette v. Louisiana Power and Light Company, 435 US 389 (1978); California Liquor Dealers v. Michael Aluminum US, 65 L.Ed. 2nd 233 (1980).

unregulated markets as the supply, installation, and financing of energy conservation measures may carry antitrust liability unless they are the result of clearly articulated and actively supervised state policy to supplant competition.

In a related decision, the California Public Utilities Commission concluded in January 1981 that Pacific Gas & Electric's proposed zero interest loan program does not violate antitrust laws by reason of being anticompetitive in the lending market:

> "The antitrust laws do not prevent this Commission from authorizing PG&E to engage in a residential weatherization ZIP program to make conservation measures available to a broad spectrum of PG&E's customers in furtherance of the compelling national and state goals of achieving significant energy savings. Should financial institutions or any other party offer evidence of violation of the antitrust laws with respect to the financing aspects of ZIP..., such evidence will receive full and careful consideration by the Commission." (CPUC, 1981)

7. <u>General Issues in State Plan Development</u>

As reviewed in the background section earlier, a DOE approved State RCS Plan is the main vehicle by which the program is organized within each state. These plans must include the entire procedure for listing and delisting installers and suppliers of energy conservation measures and participating lending institutions, detailed contents of the RCS program announcement to be sent to all residential customers, a detailed description of audits, auditor and inspector training, and other program specifics.

It was not feasible to undertake a detailed survey of all state plans, but the states generally faced similar problems in the task of plan development. The major issues discussed here are the scope of the program in relation to state capabilities, the costs of certain program elements, the apparent lack of public participation in the development of many state plans, the inflexibility of the Department of Energy regulations (especially in relation to measures required to be included in RCS audits), and listing and delisting procedures.

Scope of Program. Even in states as large as California, which has its own energy staff of several hundred professionals, the development of the state plan was not a simple task. While this is undoubtedly due in part to California's strong energy conservation policies and its desire to expand upon the Department of Energy's minimum standards for RCS (California Energy Commission 1980a), it is also a function of the scope and specificity of the basic RCS program. Unlike California, most states have very small energy offices which are funded only through DOE's "basic" and "supplemental" state energy conservation grants. For many of these states, the scope of the RCS program is overwhelming (Barfield, 1980; Rosenberg, 1980b). The states of North Dakota and Utah could not develop state plans due to lack of resources (Department of Energy, 1980b). Many states have simply reiterated the minimum federal requirements in their plans; they lack the staff to be able to customize the RCS program for maximum cost-effective implementation in their region (Rosenberg, 1980b; Leibovitz, 1980b).

This problem is intensified by the fact that the Department of Energy is not providing enough technical assistance to states in need of help in

RCS planning and implementation. Leibovitz (1980a) indicates that the states were given little incentive to develop innovative programs beyond the minimum guidelines specified in DOE regulations and argues that DOE needs to take a much more active role in promoting innovative programs. He feels that the department should recommend to the states various ways of approaching difficult and important issues and in this way possibly stimulate more innovative and enthusiastic response. This alternative approach may be particularly appropriate for DOE when it writes implementing regulations for utility financing programs.

Cost to States. In addition to the scope of the program, the cost of complying with RCS planning requirements raised difficulties for most states. Even the minimum guidelines that most states followed were costly to plan for and will be costly to implement, especially given the limited budgets of most state energy offices (Barfield, 1980). Even developing the California plan has strained the state's budget (McCluskey, 1980).

The most expensive program activities appear to be developing and maintaining the master lists of installers, suppliers, and lenders; developing and maintaining the cost data upon which auditors base their cost-benefit calculations; and delisting investigation. If these activities present financial difficulties for California, without question other states must be straining financially to implement RCS programs. To lessen the impact of these high costs, many states will be charging either the utilities or the contractors a listing fee.

Public Participation. Another much discussed aspect of state plan development is the lack of actual public participation in the planning process. Although some states, such as California and Wisconsin, encouraged comments from the public, this was apparently not so in all states. In Illinois, for example, public participation was not promoted. Leibovitz (1980a) stresses the need for broader public involvement in developing more innovative programs. California's plan, for instance, calls for the formation of local advisory panels within each service area to assist utilities in coordinating their programs on the local level. In addition, a citizen RCS Advisory Committee has been established to advise the Energy Commission on program implementation. This was done in response to comments during the Commission's hearings on the RCS plan (McCluskey, 1980).

A major issue remains with regard to amendments to state plans. Shorey (1980) has strongly objected to DOE's proposal to allow states to waive, for "good cause," public hearings on amendments to state plans for implementing the Energy Security Act or DOE program revisions that may be made in mid-1981. Again, the concern is that an absence of vigorous public participation in this process will make plans much less innovative, less flexible in responding to local concerns, and consequently less effective in achieving energy savings in all sectors, particularly since customer participation in the program is voluntary.

Inflexibility of DOE's Final Rule. Many of those who commented on the Final Rule felt that the DOE targeted the overall RCS program at states with underdeveloped conservation agendas, and thereby acted to constrain innovative utilities (Federal Register, 1979). Those states which had utilities operating conservation programs and had carefully analyzed and tested program measures were treated identically to those states which had no conservation programs and had not researched various approaches to conservation. Respondents to the Final Rule suggested, for example, that the decision regarding inclusion of active and passive solar systems and wind systems as program measures not be made at the national level but left to the states. It was suggested that these measures only be included in those geographical areas that a state believed would benefit from it. Several utilities questioned DOE's decisions on the appropriateness of solar domestic water heating systems in their regions; some protested its inclusion by DOE, while others protested its omission. DOE's response was to reexamine its climatic data and econometric models; in the end, each of the renewable resource measures was retained in the Final Rule. This infuriated many states, not so much because they thought their data base was better than DOE's, but because DOE was operating on the assumption that states would abuse any flexibility they were granted.

A number of commentators requested that DOE be flexible in allowing ongoing programs to continue, thus giving utilities and states more time to bring existing programs into compliance with the DOE requirements. There were also requests to allow equivalent programs as a permanent substitute for the program outlined in the rule. In general there was little sympathy to this request on the part of DOE, and most states chose not to deal with the complicated approval process. Some states also complained that even though their plan was almost identical to DOE's rules, the DOE returned their plan requesting that minor changes be made.

Developing Master Lists. One of the most burdensome but potentially important activities for states is establishing the master lists of suppliers, installers, and lenders. This includes developing application forms, distribution methods, and listing and delisting procedures, and keeping the master lists up-to-date. This process was made perhaps unnecessarily difficult due to the inflexibility of the DOE rules precluding the use of preexisting state services on agencies such as the Contractor's Licensing Board and Bureau of Consumer Affairs.

Consumer protection is stated as the prinicipal motivation behind the listing process. Once the RCS program is in operation, if a consumer makes a complaint or an inspector discovers a violation, the listing agency is notified. The agency can "delist" a supplier, lender, or installer for failing to meet the RCS criteria, which include installing energy conservation measures that meet Department of Energy standards (including warranties); compliance with all federal, state, and local laws; and carrying proper insurance (Department of Energy, 1979).

While listing may pose the threat of anticompetitive practices if all potential suppliers, installers, and lenders are not notified of the program, it is the process of delisting that has raised the most concern. In California, if a consumer complaint or a postinstallation inspection uncovers a violation, the participating business is requested by the listing agency to rectify the situation. If the business fails to resolve the problem on more than one occasion, delisting can be initiated.*

*If the situation in need of correction threatens public health or property, however, only one such failure is necessary before delisting.

Many concerned parties, including the chairman of the California State Contractor's Licensing Board, strongly object to the fact that delisting can occur summarily. In both the California and the TVA plans, for RCS, the decision on whether to delist a business immediately, or instead to initiate an investigation and hearing process, is made at the discretion of the listing agency. While immediate delisting will obstensibly occur only in the most serious of cases, some contractors are concerned that the present system may work to deny due process of law (DiAngelo, 1980).

In a legal sense, due process is not an issue in cases of special agreements, such as agreements by contractors to abide by the RCS requirements. In this case, it is clear that a contracter who violates this previous voluntary agreement and refuses to rectify the violation may be delisted accordingly. However, if the complaint involves a violation of existing criminal or civil law, immediate delisting might have the effect of depriving contractors of due process. In California, the State Contractors Licensing Board already has standard procedures it uses in cases of malpractice, including an appeals process. This issue is especially important in California, since the state's new energy conservation tax credit relies heavily on the RCS audit process to establish eligibility for tax credits. Consequently, unlisted or delisted contractors could be excluded from much weatherization business.

Other Issues. An exhaustive treatment of the myriad issues which have arisen in state plan development is not feasible, but other questions of continuing significance include:

- How can the needs of utility customers in geographic areas not covered by a state plan be served?

- How can small home heating oil suppliers find the resources for program participation during a severe financial squeeze due to rising prices, conservation, and fuel switching?

- How can the varying impacts of conservation actions on gas utilities be taken into consideration, given their particular supply sources, contractual commitments (such as take-or-pay contract), or federal curtailment policies?

- How can utility programs best be designed to reach special needs groups? What, if any, marketing techniques will be most successful, or is there something inherent in the utility-customer relationship that irrevocably "alienates" special needs customers?

- How can the need not to discriminate among products and not stifle innovation (which lengthens audit time and measure lists) be balanced with the need to keep audit time and costs within practical limits?

IV. EPILOGUE

The RCS mandate is based on the presumption that homeowners are not being economically rational in their conservation investment decisions because they lack trustworthly information regarding the technical nature and benefits of these improvements. The program is thus designed to correct a failure of the market, i.e., imperfect information on the part of consumers.

As was noted earlier, in the course of the congressional debate over NECPA and in the development of state plans, question has arisen as to whether RCS is the best means to achieve residential conservation. It seems evident that RCS will succeed in providing consumers with information, thus remedying the aforementioned market failure, but will it be adequate to actually achieve the desired energy and consumer cost savings? Specific uncertainties have included whether customers will even request audits in a voluntary program, and when they do, whether they will be motivated and financially able to follow the auditor's advice and actually install measures. Will the participants be primarily from higher income groups? Are supplementary utility finance programs necessary to achieve the energy savings the program is predicated upon, and, if so, can they be designed to increase the savings lower-income ratepayers receive from both the RCS and finance efforts?

Will a test of cost effectiveness be met, and, in the end result, will a voluntary program approach be adequate to actually achieve the desired energy and consumer cost savings? How should the utilities new roles in energy service delivery be circumscribed to not unduly burden competition or raise antitrust disputes? These concerns and others have been explored in this review, and, while none can be definitively resolved without the benefit of actual program implementation experience, some overall conclusions can be drawn.

First, it surely appears that near-term improvements in program design can be made, as outlined in some of the preceding sections. Immediate implementation efforts should be made, for example, to require auditor capability in customer relations and salesmanship and to streamline audits to keep costs as low as possible. As well, lower income neighborhoods should be targeted and programs designed to assure utilities contract for audit/outreach services with community groups. Provisions should be made for installation of low-cost/no-cost measures during the audit. Supplementary programs for landlord incentives should also be designed and uniform mandatory retrofit requirements pursued.

A more fundamental and important conclusion is that although legitimate program design concerns do exist, none appear insurmountable or necessarily preclude implementation of the program as scheduled. Many have already been addressed in state plans or could be with modest plan adjustments. Others, such as participation and installation rates and program cost-effectiveness simply cannot be assessed a priori. And, until actual implemention data is available, they provide no basis for rejecting the program. They in fact instead suggest that implementation proceed as quickly as possible in concert with a conscientious monitoring and research program. If the monitoring is done capably and the research adequately funded, some basis for a thorough program evaluation, redesign, or cancellation could be established within 6 - 18 months.

The nature of this needed research has been outlined elsewhere in this report. As noted in Section III, pressing research topics include both basic and applied building science research and field measurements of actual retrofitted houses, as a means of continued refinement of the audit procedures and listed measures. Experimental programs using instrumented, "hands-on" audit-retrofit approaches need to be funded as well as continued evaluation of the health and mitigation implications of decreased indoor air quality.

Research is also needed on consumer behavior in order to evaluate the factors underlying response rates, establish energy price elasticities, and investigate the relative importance of reducing energy bills versus increasing comfort, and to explore the use consumers make of the conserved energy.

This research will clearly be complemented by the data gathered in specific program performance monitoring activities. Key questions for evaluation of utility programs or retrofits by private contractors include:

- What is the magnitude of customer response to marketing activities, e.g., offers of home energy audits?
- What are the characteristics of the customers and types of housing being reached? Are special-needs groups being served?
- How quick is the response to customers' requests for audits or actual installations?
- How many actual retrofits occurred, and to what extent can they be attributed to a given program (as opposed to tax incentives, response to rising energy prices, etc.)?

- What measures are retrofitted, and are they done in the most cost-effective sequence?

- What overall energy savings are being achieved?

- What are the rates of postinstallation inspection? What is the quality of installations and equipment performance? How well trained are the auditors? Are the listing/delisting procedures functional and acceptable?

- How do the costs and results of the various utility and different state programs compare?

Only with answers to these questions can the basis for program design adjustments (or for outright rejection) be established.

This detailed monitoring is also required to close the loop between conventional energy demand forecasting, utility supply planning, and the consideration of conservation and renewables as "energy supply equivalents." While in the past there was often little or no economic penalty for utility overbuilding, the present circumstances of rapidly rising costs of new energy supplies merit a more immediate connection between conservation-related demand reduction and utility investments in new capacity. This linkage in fact is crucial to <u>achieving the full cost savings</u> from RCS and related utility programs.

Putting conservation and renewable energy programs on a common footing with generation capacity planning does, however, require constant monitoring of program effectiveness in order to reach the optimal combination of utility investments in conventional capacity and alternatives.

The RCS experiences to date perhaps best illustrate that it takes more than just passing a law and writing regulations to get things to occur effectively and efficiently on a large scale. However, the magnitude of the task (and potential energy savings) of retrofitting the United States' residential infrastructure will probably inevitably entail a concentrated effort generally of the nature and ambitiousness of the RCS mandate. Substantial implementation struggles remain, and success will require the strengths of federal, state, and local governments in concert with individuals and interests in the private sector. Until the effort is at least attempted and early program success evaluated, there is little basis for the Administration's and recently defeated Congressional initiatives to preclude program implementation.

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APPENDIX 1

Summary of Legislation by Section

The National Energy Conservation Policy Act (NECPA)
Public Law 95-619: Title II, Part I: Sections 210-225

(Residential Conservation Service)

SECTION	HIGHLIGHTS
210	Definitions. (Amended by the Energy Security Act, Sections 541 and 542.)
211	Evaluation of which public utilities are covered under this part.
212	Rules of the secretary for submission and approval of state and nonregulated utility residential energy conservation plans. [Amended by the Energy Security Act, Section 542(b).]
213	Requirements for residential energy conservation plans submitted by states for regulated utilities. [Amended by the Energy Security Act, Sections 542(c), 543, and 546(b) and (c).]
214	Requirements for residential energy conservation plans submitted by nonregulated utilities and by states for home-heating suppliers.
215	Specific requirements of residential energy conservation programs to be undertaken by utilities. (Amended by the Energy Security Act, Section 544.)
216	Prohibition of supply, installation, and financing of residential energy conservation measures by utilities. [Amended by the Energy Security Act, Sections 545, 546, and 547.]
217	Specific requirements of residential energy conservation program to be undertaken by home-heating suppliers.
218	Authorization for the secretary to approve, under certain conditions, temporary utility residential energy conservation programs that do not satisfy all the requirements of Sections 215 and 216.
219	Outlines federal standby authority to promulgate and enforce a residential energy conservation plan for any state or covered nonregulated utility that does not have a plan approved by a certain deadline.
220	Relationship of this part to local laws and regulations. [Amended by the Energy Security Act, Sections 542(d) and 550.]

222 Requirements for the secretary to consult the National Bureau of Standards and the Federal Trade Commission regarding rules concerning standards for energy conservation devices and materials.

223 Authorization of appropriations.

224 Requirements for the secretary to report to Congress within six months concerning the potential for energy conservation in apartment buildings.

225 Requirements for the Federal Trade Commission to report to Congress by January 1, 1982, concerning the business activities of utilities and home-heating suppliers in relation to this act.

210 This section contains the definitions of terms used in Part I, Title II, of the National Energy Conservation Policy Act (NECPA). A "residential building" is defined as a building containing at least four dwelling units that has a system for heating and/or cooling and which is not covered as a new building under the Building Energy Performance Standards of the Energy Conservation and Production Act.

A "residential energy conservation measure" includes caulking and weather stripping of doors and windows; furnace efficiency modifications (more efficient replacements, flue vent dampers, or electronic ignitions); clock thermostats; ceiling, attic, wall, or floor insulation; water heater insulation; storm doors and windows; multi-glazed windows and doors; heat absorbing or reflecting glazed window and door materials; load management devices; devices to use solar and/or wind power for residential use; and any other measure decided upon by the secretary. In addition, all "residential energy conservation measures" must have at least a three-year warranty from the manufacturer.

"Suggested measures" are those residential energy conservation measures to be recommended to consumers based upon differences in regional climate, building type, and method of construction.

As amended by the Energy Security Act, Sections 541 and 542, a residential building is redefined as of January 1, 1982, to include buildings with more than four dwelling units that do not have central heating systems. The Energy Security Act also eliminates the warranty requirement as written in NECPA and substitutes a one-year warranty for manufacturers, installers, and suppliers of residential energy conservation measures in Section 212.

211 This section establishes the limits of coverage of the act based on the magnitude of retail sales by utilities. Covered under this part for a given calendar year is any public utility if it sells 10 billion cubic feet of natural gas or 758 million kilowatt-hours of electricity during the second preceding calendar year. The secretary is required to publish a list of covered utilities before the

beginning of each calendar year, and the states are required to inform the secretary as to which covered utilities are regulated.

212 Section 212 requires the secretary to promulgate rules concerning the content and implementation of residential energy conservation plans 95 days after the enactment of NECPA that meet the requirements of Sections 213 and 214. The secretary must coordinate with other agencies, give interested persons opportunity to comment, and his rules must include:

(1) Suggested energy conservation measures for residential buildings, taking into account differences in regional climate, type of building construction, and any other relevant factor;

(2) Standards concerning the safety, effectiveness, and installation of energy conservation measures;

(3) Standards so as to avoid unfair competition resulting from requirements of NECPA, especially in relation to the development of lists of qualified suppliers, contractors, and lending institutions;

(4) Standards assuring redress for those who might claim injury; and

(5) Other necessary regulations as the secretary sees fit.

Section 212 also requires the states to submit residential energy conservation plans for regulated utilities (and nonregulated utilities, if they concur) that meet the requirements of the secretary's rules. A time frame for the implementation of the act is established, including deadlines for the promulgation of rules and submission and approval of state plans. At the Governor's discretion, home-heating suppliers may be included in state plans, though their participation is voluntary.

As amended by the Energy Security Act, Section 542, the secretary's rules shall include provisions to insure that manufacturers, suppliers, and installers of residential energy conservation measures will offer residential customers at least one-year warranties.

213 This section discusses the requirements for residential energy conservation plans submitted by states for regulated utilities. To be approved, these plans must:

(1) Meet the specific requirements regarding utility programs as outlined in Section 215;

(2) Include methods for obtaining all qualified installers, suppliers, and lending institutions on a list to be provided to residential customers;

(3) Include adequate measures to prevent unfair, deceptive, or anticompetitive acts or practices in relation to the implementation of residential energy conservation plans. Utility programs should not result in unfair discrimination among residential customers, suppliers, contractors, or lending institutions;

(4) Insure that utilities will charge fair and reasonable rates of interest to customers for the purchase and/or installation of energy conservation measures; and

(5) Insure that utilities will not inspect or modify any furnace that uses a fuel not supplied by that utility unless specifically requested to do so by a residential customer.

As amended by the Energy Security Act, Sections 542, 543, and 546, residential energy conservation plans must also inform customers of financing available under the Solar Energy and Energy Conservation Bank Act. Provisions must be included to insure that utilities, if financing programs themselves, will seek funds from local lending institutions. In addition, if energy conservation plans are to include the supply and installation of energy conservation measures by utilities, such activities must be engaged in under contract with independent suppliers and contractors as outlined in Section 216(c).

214 Section 214 concerns the specific requirements for energy conservation plans submitted by nonregulated utilities or by states for home-heating suppliers. Nonregulated utility plans must meet the requirements outlined in Section 213 for regulated utilities, in addition to which they must submit a biennial report to the secretary concerning the status of plan implementation.

States may include home-heating suppliers in their residential energy conservation plans. These plans must meet the requirements of Section 213 [except for (1) above] and those outlined in Section 217. Plans proposed for home-heating suppliers by states must take into account the resources of small home-heating suppliers.

215 This section outlines the specific requirements for regulated utility energy conservation programs proposed in state energy conservation plans. These programs must include:

(1) Methods for informing residential customers of suggested energy conservation measures and the savings likely to result from the installation of these measures;

(2) Methods of informing residential customers of no-cost techniques they can use to conserve energy, such as changing energy use patterns and household activities, and the savings likely to result from these techniques;

(3) Plans to offer to each residential customer the opportunity for an audit to estimate the cost of purchasing and installing suggested measures in their home and the savings in energy costs likely to result from such installation (audit results must be kept on file for at least five years for subsequent owner inspection); and

(4) Plans to offer to assume the role of project manager by arranging for installation and financing of energy conservation measures and to provide each residential customer with the state lists of qualified suppliers, installers, and lending institutions.

New customers must be informed of the residential energy conservation program and offered services within 60 days of starting regular utility service.

In addition, this section outlines requirements for utility accounting and repayment of costs associated with the implementation of the residential energy conservation programs. Costs incurred to supply information to residential customers are to be rate-based. General administrative costs and costs associated with audits and project management are to be either rate-based or charged directly to the residential customer for whom the services are provided. The state regulatory authority (or, as the case may be, the nonregulated utility) may choose which method of repayment will be utilized. Any costs incurred by a utility in labor or materials for the purchase or installation of energy conservation measures shall be recovered from the residential customer for whom the services are provided.

Billing to customers for these services must be stated separately from billing for regular utility service, and utilities may not terminate regular service for lack of payment by customers for services provided under a residential energy conservation program. At the request of participating lending institutions, utilities will collect loan payments as part of a customer's regular utility bill. Utilities providing this service can recover associated costs from the lender.

When utilities make loans to customers (as allowed under Section 216), the repayment period will not be less than three years unless a customer specifically requests a shorter time period.

As amended by the Energy Security Act, Section 544, general administrative costs and costs of project management are still to be recovered in the manner determined by the state regulatory authority or nonregulated utility. However, if these costs are not rate-based, residential customers can be directly charged \$15 or the actual cost of services provided, whichever is less.

216 Under this section public utilities are prohibited from supplying, installing, or financing any residential energy conservation measure unless specifically exempted. Utilities may install furnace efficiency modifications, clock thermostats, and load management

devices. They are permitted to finance these improvements and may also extend loans to residential customers for other purposes provided these loans do not exceed $300.

Also exempt are utility supply, installation, or financing activities already in preparation or such activities when they were permitted or required by law or regulation before the enactment of NECPA.

The secretary can waive the prohibitions of this section if utility activities are not resulting in unfair competition, deceptive business practices, or unfair interest rates. If waivers are granted, however, utilities must bring their energy conservation activities in line with the requirements of Section 215 in a reasonable period of time, unless they are carrying out a program required of them by a law or regulation that was in effect before the enactment of NECPA.

Allowable utility financing must be offered at reasonable terms and rates. Installation, supply, and financing activities must not have adverse effects upon competition or be carried out in a deceptive or unfair manner. The secretary may prohibit all such activities if, upon consultation with the Federal Trade Commission, it is determined that these conditions are not being met.

Violators of the prohibitions in this section will be subject to a civil penalty of $25,000 per violation.

As amended by the Energy Security Act, Sections 545, 546, and 547, the prohibition of supply and installation does not apply to measures supplied or installed by a utility through contract with independent suppliers or contractors who are on the published list referred to in Section 213. Utilities must select contractors and suppliers by methods that minimize, to the maximum extent possible, the cost to the residential customers and which do not result in unfair competition with the individual or firm receiving an unreasonably large share of available contracts.

In addition, this section as amended no longer prohibits utilities from making loans to customers for residential energy conservation measures. Utility financing, however, must be available for work done by any qualified contractor or for the purchase of conservation measures if the residential customer is to install them himself. Loans from utilities will not classify as taxable income for residential customers. If utilities are going to finance programs themselves, they must seek funds from local lending institutions to the maximum extent possible (from Section 213, as amended).

The Energy Security Act also requires the secretary, in conjunction with the Federal Trade Commission, to monitor utility financing, installation, and supply activities and report to Congress.

217 Section 217 outlines the specific requirements for home-heating supplier energy conservation programs. While these requirements are

basically the same as utility requirements, participation in the program is voluntary and the relatively small resources of home-heating suppliers can be taken into account to exempt them from any requirements as the secretary or a given state see fit.

Home-heating suppliers are directly authorized to make loans to residential customers for the purchase and installation of energy conservation measures under the provisions of NECPA. Regular fuel deliveries cannot be terminated due to lack of payment on these loans, and residential customers must be offered at least a three year payback period.

218 Under the provisions of Section 218, the secretary can authorize a temporary utility energy conservation program if the state or public utility making such an application shows that:

(1) Fair and reasonable interest rates will be charged on loans;

(2) Anticompetitive acts and deceptive business practices will be prevented; and

(3) It is likely that as many energy conservation measures will be installed under this program as would be under a program meeting the requirements of Section 215.

Authorization by the secretary for such programs will not exceed three years.

219 If a state or a covered nonregulated utility does not have an approved energy conservation plan by a specified deadline or an approved plan is not being adequately implemented the secretary can promulgate a plan which meets the requirements of the relevant sections and order its implementation. Violators of such orders are subject to civil penalty, and the process of assessing this penalty is detailed in this section.

220 Under this section no local laws or regulations shall be superseded, unless such laws or regulations prohibit public utilities from taking actions associated with conservation programs or permit them to take actions prohibited by this part of NECPA.

As amended by the Energy Security Act, Sections 542 and 543, activities of public utilities under energy conservation programs shall be construed as consistent with actions allowed under the Public Utility Holding Company Act of 1935.

221 This section authorizes the secretary to promulgate whatever rules are necessary to carry out this part of NECPA.

222 Section 222 requires the secretary to consult the National Bureau of Standards in establishing rules regarding the safety, energy efficiency, efficacy, and other attributes of energy conservation materials, products, or devices. The secretary is also to consult the Federal Trade Commission to insure that these standards do not serve to deceive consumers.

223 Under this section appropriations of five million dollars each year are authorized for fiscal years 1979, 1980, and 1981.

224 Section 224 requires the secretary to prepare a report on the potential for energy conservation in apartment buildings. This report is to be delivered six months after the enactment of NECPA and must consider:

(1) Energy control measures that could result in conservation;

(2) The potential for energy conservation by applying utility programs to apartment buildings;

(3) The need for federal monetary assistance to achieve conservation; and

(4) Recommended legislation.

225 This section requires the Federal Trade Commission, by January 1, 1982, to issue a report on the activities of utilities and home-heating suppliers with regards to:

(1) Making and/or arranging for loans to residential customers;

(2) Making and/or arranging for the installation of energy conservation measures, considering the effects of such activities on competition among contractors, suppliers, and lenders within a given service area;

(3) The availability of supplies of energy conservation measures and their price; and

(4) The number of installations which have occurred and which are likely to occur in the future for each energy conservation measure included in residential conservation programs.

APPENDIX 2

DOE RCS REGULATION SYNOPSIS

The DOE regulations implementing the RCS legislation are extremely detailed, with some 90 sections contained in 8 subparts and 3 appendices. A careful analysis of each of these sections is beyond the scope of this paper. In this appendix we provide a brief summary of each of the eight subparts and discuss the more controversial sections, including those that will be affected by the subsequent passage of the Energy Security Act (ESA). We begin with a brief history of the promulgation of the Final Rule.

DOE gave advanced notice on January 9, 1979, that they would issue proposed rules for the implementation of the RCS program. Proposed rules were issued on March 19, 1979; the draft Environmental Impact Statement on July 16, 1979; and the Final Rule on November 7, 1979.

On June 30, 1980, the Energy Security Act (ESA) was enacted. Title V, Subtitle B, of the ESA amends many significant provisions of the RCS portion of the National Energy Conservation Policy Act (NECPA). In order that the plan review process not grind to a halt, DOE issued on August 11, 1980, their "interpretation" of the effect of the ESA on the plan review process. On October 8, 1980, DOE issued proposed rules implementing the ESA amendments, and final rules were to follow shortly. In order to speed up the review process, DOE will individually advise states and utilities who have submitted RCS plans on what changes are required to bring their plans into compliance with the ESA amendments.

Section III

Subpart A, Sections 456.101 - 456.106 (General Provisions and Definitions)

Subpart A of the Final Rule deals with general provisions and definitions. This subpart discusses petitions concerning conflicts of laws, defines covered utilities, and explains utility and home-heating oil supplier liability. The definitions included in this section are, among others: measures warranty, eligible customer, program announcement, energy audit, and energy conservation practices.

Subpart B, Sections 456.201 - 456.208 (Preparation, Submission, and Approval of State Plans and Temporary Programs)

This subpart identifies the responsibilities of the states and the Tennessee Valley Authority (TVA) in preparation and submission of state RCS plans. These responsibilities include choosing a lead agency, listing which nonregulated utilities and home-heating suppliers, if any, will be subject to the state plan, and coordinating the plan between the lead agency and state regulatory agency, if they are not the same.

Also included are requirements for public comment and hearings.

This subpart also details the procedures for approval of the state plan by the assistant secretary of DOE. Included in these procedures is the process by which a governor or lead agency may submit proposed amendments to an approved state plan.

Lastly, this subpart explains the procedures for submission and the criteria for approval of temporary programs, which exempt one or more utilities from compliance with certain provisions of RCS.

Comment: Section 456.202

Section 456.202 (b) of the proposed rule reflected DOE's interpretation that if the lead agency includes any nonregulated utilities in the state plan, then it must include all of them. In light of the comments DOE received about this interpretation of federal intent, DOE has reinterpreted this provision of NECPA to include selected nonregulated utilities. In addition, DOE clarified NECPA's position on home-heating suppliers, stating that home-heating suppliers are not required to participate but do so on a voluntary basis.

Comment: Section 456.208

A number of commenters wanted DOE to liberally approve temporary programs so that there would be more time to bring ongoing programs into compliance with RCS. DOE was not particularly sympathetic to this argument but reminded states that requests for temporary programs can be made for specific elements of a plan or for entire programs.

Subpart C, Sections 436.301 - 456.319 (Content of State Plans)

The success of RCS will be measured by the success with which states and utilities can submit state plans which they can realistically implement and enforce and which can satisfactorily fulfill the intention of Congress. Because of the extreme importance these sections had for states and utilities, this subpart was the longest and most comprehensive and contained the most controversial sections of the rules and regulations.

The state plan is required to identify all home-heating oil suppliers and nonregulated utilities which are subject to the state plan. The state is also required to identify any covered utilities which request exemptions under the "temporary programs" clause. The plan is to include adequate procedures for investigating and enforcing compliance with the state plan. The plan shall require that each covered utility which supplies, installs, or finances an energy conservation or renewable resources measure be placed on a master list, along with a specific description of each utility's activities in these areas. The state plan must describe the circumstances under which customers are entitled to such benefits as a warranty, supply or installation of a measure postinstallation inspection, and redress procedures.

The state plan must require each covered utility and each participating home-heating oil supplier to distribute a program announcement, to perform an energy audit, and to arrange installation and financing of approved conservation measures for any eligible customer. The regulations in this subpart also describe how state plans are to make provisions for utilities to recover the costs of these services. The regulations explain how state plans should deal with customer billing, repayment of loans, and termination of service. State plans must include mandatory postinstallation inspections, qualification procedures for installers and inspectors, and complaint processing procedures. The state plan must consider the limited resources of home-heating oil suppliers and provide for their voluntary withdrawl from the program. The subpart ends with an explanation of how a state may add its own energy conservation or renewable resources measures to those approved nationwide for the RCS program.

Comment: Section 456.303 (Investigation and Enforcement)

Several state agencies felt they did not have adequate authority to enforce state plan provisions and could not promise that legislation providing such authority would be passed. The Final Rule provides flexibility for each state to design a means of enforcing the state plan, including voluntary compliance; however, DOE insists that it will not approve any plan unless it contains "adequate state enforcement procedures."

Nonregulated utilities objected to the establishment of new state authority over nonregulated utility operations, but DOE feels they have made it clear that Congress did not intend states to regulate the rates of nonregulated utilities by reason of their inclusion in a state RCS plan.

Comment: Section 456.304 (Exemptions and Waivers for Utility Supply, Installation, and Financing)

Regarding utility financing, some concern was expressed that requiring "fair" interest rates could prohibit zero interest utility loan programs. Similarly, requirements on prices might prohibit "free" (fully subsidized) utility installation of some low cost measures. DOE replied that the term "reasonable prices and rates of interest" should be interpreted as a "ceiling" rather than a "floor." Some commenters expressed concern that enforcing "fair" prices might be in conflict with federal antitrust laws and requested guidance on judging "anticompetitive" activity. DOE is currently working on clarifying this definition.

Comment: Section 456.306 (Program Announcement)

The major disputes that arose from DOE's interpretation of this requirement were (1) the expression of energy savings estimates in terms of dollars; (2) the scheduling of the distribution of the announcement; and (3) the content of the announcement.

NECPA requires the announcement to include "the savings in energy costs that are likely to result from installation of the suggested measures in a typical residential building" [NECPA Section 215 (a)(2)]. Initially, DOE interpreted this to mean savings expressed in dollars, but the arguments against such an interpretation were convincing, and the Final Rule allows savings to be expressed in dollars, ranges of dollars, or as percentage reductions in energy bills for a specified period of time.

A criticism of this announcement was that if it contained all the material DOE required it would be an "information overkill" and would not be read by most consumers. Several utilities thought a phased approach to providing the information would be more effective than sending it all out within six months. DOE agreed that the six-month period might be too short but felt that the statute required this information to be diseminated within six months.

However, at least one exception has already been made to this strict interpretation. The State of Wisconsin submitted a plan for an alternative Program Announcement. Because Wisconsin utilities have extensive experience in providing audits and conservation services and wish to avoid a large backlog, DOE has approved a plan whereby they can extend their distribution period from six months to one year. In return they must send at least one announcement per customer per year.

<u>Comment:</u> Section 456.307 (Requirements for Program Audits)

The Final Rule allows states considerable discretion in adding measures with DOE approval to the minimum list of program measures which must be addressed in an RCS audit. The states also have the right to lower or raise insulation levels from those required in the rule (Appendix 1).

DOE has somewhat clarified its position regarding possible duplication of audits by gas and electricity utilities serving the same customer. According to NECPA Sections 213 (a) and 215 (b), each covered utility must offer an audit to its customer. DOE has not stated that subcontracting or other inter-utility agreements for auditing services are permissible, but it is still left largely to states (or individual utilities) to resolve most jurisdictional questions.

DOE has permitted utilities to provide their customers with "Class B" (do-it-yourself) audits, but not as a precondition to receiving an on-site audit by the utility.

Utilities felt that DOE was being unreasonable in requiring the delivery of audit results in person, because this would greatly increase the cost. DOE disagreed with this argument but will consider proposals by states which would be equally or more effective in motivating customers to take action. A number of states and utilities suggested that DOE allow audits to be staged on the basis of neighborhood levels of customer energy use, or otherwise scheduled to even out fluctuating demand. This approach has been adopted by DOE in its Final Rule: the offer of a program audit in the Program Announcement can be prioritized on a geographic basis or the amount of energy used (higher users first, users who spend a larger fraction of household income on utility bills), provided that the state plan includes methods for eventually contracting all customers. At a minimum, all customers must receive an offer for a program audit at least once every two years.

Because of the substantial variation among solar water heating and space heating systems, DOE wants auditors to inform customers about the specific system on which their savings estimates are based. Many commenters expressed concern over the accuracy of available energy audit procedures and requested financial and technical aid from DOE. In response, DOE has put together a model audit, which is now awaiting final approval. According to the RCS Final Rule, each state must either validate the RCS audit procedures it uses or submit the procedures to DOE for validation.

Lastly, the EPA has expressed some concern about reductions in air infiltration that would be caused by certain energy conservation measures. As a consequence, DOE will soon issue an amendment to Section 456.307, requiring auditors to to inform their customers about proper ventilation.

Comment: Section 456.308 (Arranging Installation)

DOE has made clear that the mere distribution of lists of contractors, as required by NECPA, cannot be considered an "arranging" service. The utilities must provide a list of contractors who have agreed to perform the installation at the auditor's estimated cost, or else the utilities must assist the customer in obtaining installation bids.

Comment: Section 456.310 (Accounting and Payment of Costs)

Many commenters felt that allowing utilities to expense the full cost of audits would give them unfair advantages over auditors in the private sector. DOE has left the recovery of these costs to the discretion of the state regulatory authority or the governing board of each nonregulated utility. However, according to the ESA amendment to this section, the amount recoverable from the residential customer for all utility information, auditing, and "arranging" services shall not exceed a total of $15 per dwelling unit. The ESA also removed the NECPA requirement that restricted the practice of expensing all RCS costs (i.e., providing services at no direct charge to participating customers).

Also removed by the ESA was Section 215 (f) of NECPA, which among other things allowed lenders to require lump-sum payments of outstanding principle and interest if a customer defaulted on conservation loan payments. Finally, the ESA removed the prohibition against loan prepayment penalties.

Comment: Section 456.312 (List of Suppliers, Contractors, and Lenders)

The most common objections to the RCS postinstallation inspections were that they are not required by statute, are contrary to its intent, and are too costly. Although recognizing that the postinstallation inspection requirement is a potentially costly provision of the Final Rule, DOE believes such inspections are necessary to ensure that standards and other listing requirements are met. However, to reduce the coverage and costs of postinstallation inspections, DOE has allowed a program of random inspections for all measures except vent dampers, electric furnance ignition systems, and wind energy systems, which require 100 percent inspections for safety reasons.

Comment: Section 456.314 (Qualification Procedures for Auditors, Inspectors, and Installers)

The auditor qualifications required in the Final Rule are extensive, and many people questioned the need for auditors to be knowledgeable in such diverse areas. There are certainly some geographic areas where auditors will never need to consider certain measures. DOE agreed that some measures may be requested infrequently, especially in certain locations, and also might require specialized equipment and skill that would be best handled by specialists. The Final Rule reflects this view. Nevertheless, a utility receiving a request for a comprehensive audit must have access to auditors who can cover all possible conservation or renewable measures, even if this means subcontracting for specialized skills.

Comment: Section 456.315 (Complaints Processing Procedures)

The Final Rule has been modified to accommodate most, if not all, existing state procedures to provide redress for consumer complaints under the RCS program. To provide states with additional flexibility, DOE will approve any procedure which meets the criteria of Section 456.315 (b). In addition, DOE will approve any existing procedures which the state demonstrates can meet most of these criteria and would be costly or difficult to amend.

Subpart D, Sections 456.401 - 456.408 (Nonregulated Utility Plans)

This subpart parallels closely the statutory responsibility of covered nonregulated utilities as explained in NECPA Section 214.

Comment:

The only major argument involving this subpart was that nonregulated utilities, according to many commenters, should be required to meet the same provisions as regulated utilities of comparable size. DOE felt that if a state chose not to include a nonregulated utility in its plan, the utility should not be forced into compliance with the state plan but would of course have to comply separately with federal laws and regulations.

Subpart E, Sections 456.501 - 456.508 (Supply, Instrumentation, and Financing by Utilities)

This subpart is drawn directly from the ESA amendments to NECPA Section 216. In addition, this subpart also sets forth certain requirements for utility financing programs.

Comment:

Section 216 (c) (2) (?) of the ESA amended the more stringent NECPA requirements on utilities and installers to prevent "anticompetitive" activity. Because of DOE's concern that uncertainty about the definition of "anticompetitive" might hinder utility participation, they are currently clarifying this section.

Subpart F, Sections 456.601 - 456.606 (Federal Standby Authority and Enforcement Provisions)

This subpart specifies the procedures to be followed to ensure that eligible customers receive the services of the RCS program in the event that a state or a nonregulated utility does not submit an acceptable plan or fails to adequately implement an approved plan. This subpart explains the federal enforcement provisions and the maximum penalty for any violations.

Comment:

There was very little controversy surrounding DOE's promulgation of this subpart, primarily because these provisions are drawn directly from NECPA and are essentially identical to it. DOE reiterates that where standby authority is invoked due to inadequate implementation of an approved plan, DOE is under no obligation to follow the state plan. To date, four states have not submitted plans. The states of Montana, Utah, and North Dakota did not feel they had adequate resources to prepare and enforce a plan. The State of Virgina did not feel that the RCS program was of any practical benefit. Utilities in these four states, as well as in any other state whose plan is not approved or not implemented adequately, will be subject to the Federal RCS plan. The federal plan was scheduled for completion by January 1981.

Subpart G, Section 456.701 - 456.706 (Renewable Resource Installation and Materials Standards)

This subpart contains both the installation and materials standards for renewable resource measures. Only for solar domestic water heating and active solar space heating systems have the material and installation standards been set. Standards for the remaining renewable resource measures addressed in this section will be proposed shortly.

Subpart H, Sections 456.801 - 456.815 (Energy Conservation Material Standards)

This subpart identifies and describes minimum standards for product safety and effectiveness of certain energy conservation measures used in the RCS program. The subpart begins with general requirements, such as prohibitions against insulation materials containing asbestos, and continues with detailed definitions for the aronyms sprinkled liberally throughout the discussion of standards. The rest of the subpart describes those standards in detail.

Comment:

The standards included in subpart H are not intended for the lay reader but are legal requirements. However, the required label "conforms to DOE standard" should help the consumer determine if a specific product meets DOE's minimum requirements for safety and effectiveness.

The bulk of the arguments on this subpart dealt with the legal definitions and will not be repeated here. For those interested in such comments pages 64638 - 64641 of CFR (November 7, 1979) should provide some satisfaction.

An interesting comment that was made about this section concerned the right of states to promulgate standards which differ from the DOE standards (either more or less strict). NECPA does not give DOE clear authority to prohibit such action by states.

Subpart I, Sections 456.901 - 456.914 (Energy Conservation Installation Standards)

Subpart I is the companion to subpart H and contains the installation standards for the safe and effective installation of energy conservation measures under the RCS program. It follows the same pattern as subpart H, listing first definitions and general requirements and then listing pre- and post-installation standards. All of the standards included in subpart I are applicable only to existing residential buildings. Procedures included in the standards are general in nature. Specific insulation techniques, description of terminology, and fundamentals of residential construction and applicable local codes and regulations are not included.

DOE decided against giving state and local building code jurisdictions the major responsibility for defining installation standards, because most of these jurisdictions have little experience with the installation of RCS program measures. Where state and local codes specifically address these measures, they may apply.

In addition, DOE indicated in this subpart a willingness to provide exemptions for those products which meet RCS performance standards but cannot be safely and effectively installed following DOE standards.

APPENDICES

Appendix A to subpart I provide equations and tables for determining the steady-state efficiency of a furnace. Appendix 1 to part 456 details the climate zones for program measures and the categories of residential buildings.