

ELECTRICITY IMPACTS

FROM HISTORICAL, EXISTING OR COMMITTED STATEWIDE DSM PROGRAMS

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TABLE OF CONTENTS

I.	INTRODUCTION	ii
II.	MANDATORY STATEWIDE STANDARDS	
	A. Introduction	1
	B. Residential Sector	
	1. 1975 HCD Building Standards	2
	2. 1978 T24 Residential Building Standards.	3
	3. 1983 T24 Residential Building Standards (includes AB 163 & 1988 Revisions)4	4
	4. 1976-1982 T20 Residential Appliance Standards.	6
	5. 1984-1992 T20 Residential Appliance Standards (incl.1988 & 1990 Fed. App. Stds.) 8	8
	6. 1992-95 T24 Residential Building Standards.	9
	7. 1992 NEPA Equipment Standards.	10
	C. Nonresidential Sectors	
	7. 1977 T24 Nonresidential Building Standards (Commercial).	11
	8. 1978 T24 Nonresidential Building Standards (Industrial).	12
	9. 1984 T24 Nonresidential Building Standards (Office Buildings).	13
	10. 1985 T24 Nonresidential Building Standards (Retail/Wholes. incl. 1987 Mod.)	14
	11. 1976-82 T20 Commercial Equipment Standards	15
	12. 1984 T20 Commercial Equipment Standards	16
	13. 1992-95 T24 Nonresidential Building Standards	17
	14. 1992 NEPA Equipment Standards.	27
	D. Notes	28
III.	STATEWIDE DSM PROGRAMS ADMINISTERED BY PUBLIC AGENCIES	
	A. Introduction	32
	B. State and Federal Conservation Tax Credits (Residential and Nonresidential end-uses)	33
	C. State and Federal Solar Tax Credits (Residential and Nonresidential end uses)	36
	D. Miscellaneous Weatherization Retrofit Programs (Res. and Nonres. end uses)	39
	E. Facilities Grants and Matching Loans Program (Schools and Hospitals)	43
	F. Streetlight Conversion Program	46
	G. CEC Local Jurisdiction Energy Management Assistance Program	48
	H. Farm Energy Assistance Program	50
	I. California Energy Extension Service Schools Program	52

INTRODUCTION

This document describes the CEC Demand Analysis Office staff (Staff) data and assumptions relating to committed, existing or historical statewide building and appliance standards and public agency DSM programs. It is one of Staff's efforts to encourage common understanding of specific energy related effects from existing or committed standards and public agency programs.

This report has two parts. The first part discusses the impacts of mandatory statewide standards, while the second part reviews the effects of statewide DSM programs administered by public agencies.

INTRODUCTION to the 1995 EDITION

Changes to the last version of this report (which was dated February 8, 1993):

1. 1992 NEPA Equipment Standards impacts in Residential and Non-Residential sectors, overlooked in the 1993 edition, are included, though the future significance of their effects remains highly uncertain;
2. 1995 T24 Building Standards impacts are included in the description of the 1992 T24 Standards for Residential and Non-Residential sectors;
3. Facilities Grants and Matching Loans Program (Schools and Hospitals) impacts were updated to include 1993 and 1994 data;
4. D.E.O. Low Income Weatherization Assistance Program impacts were updated to include 1993 and 1994 data;
5. Farm Energy Assistance Program impacts were updated to include 1993 and 1994 data;
6. California Energy Extension Service Schools Program impact estimates have been extended through 1994. The estimated total impacts of this program are now slightly lower than were shown in the 1993 report.

Please direct comments and questions on this material to Dennis Smith at the CEC Demand Analysis Office, (916) 654-4780.

Mandatory Standard Impacts

Introduction

The description of the effects of California's Building and Appliance/Equipment Standards uses the following format:

1. Title The title of the standard (or in some cases, group of standards being described).
2. Portion of Customers Eligible The customer classes, building types or appliance/equipment types that are included in the standard(s).
3. End Use Affected, Technical Method of Effecting Change
4. Description of Impacts Estimates Calculation The methods and assumptions used to estimate the impacts. Includes description of compliance adjustments factors, useful life, degradation factor over lifetime. No replacement of energy saving devices is assumed. Peak impacts are assumed to be coincident with the utility system peak. No transmission or distribution loss factors are used.
5. Sources of data used Sources of data.

Please note:

1. The 1987 changes affecting retail and wholesale building lights are described in section on the 1984 T24 nonresidential building standards (retail/wholesale).
2. Federal appliance standards for the most part replicate impacts already described by the state standards covered in this document.
3. The 1988 Federal Ballast Standard (Nonresidential) is not discussed because it has no significant effect.

Mandatory Standard Impacts.

Title: 1975 HCD Residential Building Standards

Portion of Customers Eligible

All residential buildings constructed after 1975. Standards adopted by the California Department of Housing and Community Development.

End Use Affected, Technical Method of Effecting Change

Space heating and cooling in residential buildings constructed after 1975. Increased thermal integrity of building as a result of insulation requirements (R-19 for attics; R-11 for walls). Effects are modeled by estimating penetrations of the various measure for prestandards buildings. Penetration of the mandated measures are assumed to be 1.00 for post-standards buildings.

Description of Impact Estimates Calculations

Program impacts are a function of increased penetration levels of R-19 attic insulation and R-11 wall insulation for buildings constructed after 1975. The percent change between 1974 and post-standards vintage homes represents the estimated savings in 1987. Table A1 describes the standard's effects on a UEC/sq. ft. basis.

Sources of Data Used

Heat load simulations using DOE 2.1 produces estimates of consumption/square foot values as a function of conservation measures in place. See Notes.

Table A1

Effect of 1975 HCD Residential Building Standards on Consumption in Single Family Homes

Climate Zone	<u>Heating (gas therms/ft²)</u>		<u>Cooling (Electric kWh/ft²)</u>	
	<u>1974</u>	<u>post standards</u>	<u>1974</u>	<u>post standards</u>
1	.4719	.3775	.6178	.5616
2	.3360	.2800	.9422	.8565
3	.3337	.2781	2.2883	2.0803
4	.2381	.1984	.4981	.4528
5	.2866	.2388	.0780	.0709
6	.3472	.2893	1.1574	1.0522
7	.3371	.2809	3.0656	2.7869
8	.1698	.1415	.4881	.4438
9	.1854	.1545	.8158	.7416
10	.2528	.2107	1.4652	1.3320
11	.1685	.1404	.2517	.2288
12	.1885	.1571	.8192	.7447
13	.1475	.1229	.4793	.4357
14	.6818	.5454	.5224	.4749
15	.2566	.2138	3.5524	3.2295
16	.1763	.1469	.7575	.6886

Mandatory Standard Impacts
(Existing/Committed)

Title: 1978 T24 Residential Building Standards

Portion of Customers Eligible

All residential buildings of three stories or less constructed after 1975. The first set of Title 24 residential standards were adopted by the CEC in 1977 and became effective in 1978.

End Use Affected, Technical Method of Effecting Change

Space heating and cooling and water heating in residential buildings constructed since 1978. Space conditioning use affected by improved thermal integrity (weather stripping/ caulking) and restrictions imposed by standards which prohibit electric resistance heating unless (1) natural gas not available or (b) builder proves cost-effectiveness of resistance heating. Water heating affected by the building standards prohibition of electric resistance water heating unless it is shown to be more cost-effective on a life cycle basis than natural gas or when used as the backup fuel for a solar water heating system.

Description of Impact Estimates Calculations

Savings are derived from incremental penetration levels beyond the penetration levels of the 1975-78 building stock. The percent change between 1975-1978 and post-standards vintage homes represents the estimated savings in 1987. Table A2 describes the standard's effect on a UEC/sq. ft. basis.

Sources of Data Used

Heat load simulations using DOE 2.1 produces estimates of consumption/square foot values as a function of conservation measures in place.

Table A2

Effect of 1978 T24 Residential Building Standards
on Consumption in Single Family Homes

Climate Zone	Heating (gas therms/ft ²)		Cooling (Electric kWh/ft ²)	
	1977	post standards	1977	post standards
1	.3775	.3355	.5616	.5406
2	.2800	.2478	.8565	.8319
3	.2781	.2467	2.0803	2.0282
4	.1984	.1732	.4528	.4389
5	.2388	.2074	.0709	.0681
6	.2893	.2613	1.0522	.9852
7	.2809	.2377	2.7869	2.7010
8	.1415	.1179	.4438	.4436
9	.1545	.1300	.7416	.7410
10	.2107	.1802	1.3320	1.3095
11	.1404	.1170	.2288	.2253
12	.1571	.1299	.7447	.7360
13	.1229	.1016	.4357	.4337
14	.5454	.5424	.4749	.4725
15	.2138	.1749	3.2295	3.2021
16	.1469	.1241	.6886	.6800

Mandatory Standard Impacts
(Existing/Committed)

Title: 1983 T24 Residential Building Standards (AB 163), including 1988 revisions.

Portion of Customers Eligible

All residential buildings of three stories or less constructed after 1983. The original standards were adopted by the CEC in 1982; specific provisions of AB 163 (passed 1983) increased the "energy budgets" compared to the initial standards. The 1988 revisions were expected to change impacts in different climate zones with the net statewide impact not changing for residential building standards. This occurred along with a modification to the appliance standards. As an example, R-19 wall insulation dropped to R-11, while air conditioning efficiency increased to 8.9 - 9.5 and furnace efficiency dropping in climate zones 12 and 16.

End Use Affected, Technical Method of Effecting Change

Space heating and cooling in residential buildings constructed after 1983. Increased thermal integrity of the building shell as a result of insulation and air filtration requirements of the standards (e.g. R-30 attic insulation, R-19 wall insulation, double glazing, vapor barrier). Water heating is affected when the builder selects to meet an "energy budget" of standards by installing solar water heating, thus reducing conservation levels in the building shell.

Description of Impact Estimates Calculations

A percent reduction relative to building constructed in compliance with 1978 standards is applied to residential buildings constructed after 1983. Table A3 shows changes in consumption/ft² by climate zone for pre- and post-1983 standards homes. The percent reduction values represent the incremental savings associated with increased attic insulation (from R-19 to R-30), increased wall insulation (from R-11 to R-19), increase air filtration control (vapor barrier), double pane windows and shading. The level of increased conservation materials refer to "package D" houses. Table A4 lists the estimated penetration of measures for homes built after 1983 due to the AB 163 requirements.

Sources of Data Used

Heat load simulation using DOE 2.1 produces estimates of consumption/ft² values as a function of the conservation measures in place. See Notes.

Table A3

Effect of 1983 T24 Residential Building Standards
on Single Family Consumption

Climate Zone	Heating (gas therms/ft ²)		Cooling (Electric kWh/ft ²)	
	1982	post standards	1982	post standards
1	.3355	.2145	.5406	.4439
2	.2478	.1605	.8319	.6492
3	.2467	.1576	2.0282	1.7000
4	.1732	.1017	.4389	.3447
5	.2074	.1182	.0681	.0577
6	.2613	.1716	.9852	.6977
7	.2377	.1485	2.7010	2.3300
8	.1179	.0795	.4436	.3950
9	.1300	.0908	.7410	.6626
10	.1802	.1325	1.3095	1.1630
11	.1170	.0814	.2253	.1911
12	.1299	.0908	.7360	.6695
13	.1016	.0682	.4337	.3852
14	.5424	.4556	.4725	.4164
15	.1749	.1436	3.2021	2.8606
16	.1241	.0866	.6800	.6219

Table A4

Penetration of Measures for Homes Built
After 1983

	1983	1987	1988	1990	1997	2005
Attic Insulation						
R-19	.25	.25	.25	.20	.15	.10
R-30	.75	.75	.75	.80	.85	.90
Wall Insulation						
R-11	.05	.05	.95	.95	.95	.95
R-19	.95	.95	.05	.05	.05	.05
Dual Pane						
(No. Calif.)	.80	.80	.80	.80	.80	.80
(So. Calif.)	.70	.70	.70	.70	.70	.70
Weather/Caulk	.25	.25	.25	.25	.25	.25
Vapor Barrier	.75	.75	.75	.75	.75	.75
Shading	.75	.75	.75	.70	.60	.50
Thermal Mass	.75	.75	.75	.75	.75	.75

Mandatory Standard Impacts
(Existing/Committed)

Title: 1976-82 T20 Appliance Standards (Residential Sector)

Portion of Customers Eligible

Various major appliances sold for use in new or existing residential buildings. Appliances affected and implementation dates are as follows:

<u>Appliance</u>	<u>Product Class</u>	<u>CEC Adoption Date</u>	<u>Effective Date</u>
Refrigerators	Refrigerator	1976	11/3/79*
	Freezers	1976	11/3/79*
Air Conditioners	Central (less than 65,000 Btu/hr)	1976	12/22/80*
	Heat Pumps (less than 65,000 Btu/hr)	1976	12/22/80*
	Room A/C	1976	11/3/79*
Gas Space Heaters	Central (less than 175,000 Btu/hr)	1977	12/22/82**
	Wall, Floor & Room	1977	12/22/78
Water Heaters	Gas and Electric	1977	12/22/78*
Plumbing Fittings	Faucets and Shower-heads	1977	12/22/78
Gas Ranges	All	1976	7/8/78
Gas Dryers	All	1977	2/10/79
Pool Heaters (gas)	All	1982	2/24/84

* For these appliances, intermediate (less stringent) standards were adopted for a date earlier than shown; "effective date" refers to the date when the final requirements took effect.

** A court order prohibited enforcement until December 22, 1983.

End Use Affected, Technical Method of Effecting Change

Refrigerators, freezers, air conditioners (room and central air conditioners), water heaters, space heaters, gas kitchen ranges, gas clothes dryers, and pool heaters for appliances installed after the effective date of the standards (1977-1986). Improved efficiency of appliances compared to units installed prior to the standards.

Description of Impact Estimates Calculations

Program savings are a function of the total stock of appliances, the average life time of appliances, and the reduction in energy use per unit relative to the pre-standards appliance. Appliance life time assumptions and percent reduction values are as follows:

<u>Appliance</u>	<u>Lifetime</u>	<u>Percent Reduction</u>
	C ₃	
Refrigerators (auto defrost)	22.39	12
Refrigerators (manual defrost)	20	6
Freezers	25	6
Room Air Conditioners	10	26
Central Air Conditioners	15	12
Water Heater (Standby Loss)	11	60
Gas Space Heaters		
Single Family	22.39	13
Multi-Family	20	13
Mobile Home	10	13
Gas Cooking Ranges	19	70-90 of Pilot-Light
Gas Clothes Dryers	12	Negligible
Gas Pool Heaters	22	5

Table B1 shows base UECs for each service area. Greater detail on refrigerator and air conditioner standards is given in Notes. Since the "percent reduction" estimates are based upon use prior to the implementation date of the standard, the estimates of use prior to the standards is an important determinant of overall program savings. See Notes.

Table B1
Residential Appliance Standards
1976 Prestandards UECs (All Housing Types)

	<u>PGandE</u>	<u>SMUD</u>	<u>SCE</u>	<u>SDG&E</u>	<u>BGP</u>	<u>LADWP</u>
Refrigerators	1,082	1,015	1,128	1,084	1,055	1,047
Freezers	1,294	1,294	1,294	1,294	1,294	1,294
Room A/C	472	471	620	348	189	431
Central A/C	1,507	1,629	2,561	1,576	1,155	1,039
Water Heater (Basic Elec)	3,089	2,964	2,815	2,084	2,668	2,693
Gas Space Heat	568	576	491	235	369	409
Gas Cooking	76	76	77	76	75	79
Gas Clothes Dryers	32	32	33	33	31	36
Gas Pool Heaters	878	878	865	878	878	865

Sources of Data Used

Utility Residential Surveys (for current stock saturations), CEC Appliance Standards documents and heat load simulations (for space conditioning and water heating end uses). See Notes.

Mandatory Standard Impacts
(Existing/Committed)

Title: 1984-1992 T20 Residential Appliance Standards

Portion of Customers Eligible

Various major appliances sold for use in new or existing residential buildings. Appliances affected and implementation dates are as follows:

<u>Appliance</u>	<u>Product Class</u>	<u>CEC Adoption Date</u>	<u>Effective Date</u>
Refrigerators	Refrigerator	1984	Step 1 1/1/87
	Freezers	1984	Step 1 1/1/87
Refrigerators	Refrigerator	1984	Step 2 1/1/92*
	Freezers	1984	Step 2 1/1/92*
Air Conditioners	Central (less than 65,000 Btu/hr)	1984	Step 1 1/1/88*
	Heat Pumps (less than 65,000 Btu/hr)	1984	Step 1 1/1/88*
Air Conditioners	Central (less than 65,000 Btu/hr)	1984	Step 2 1/1/93*
	Heat Pumps (less than 65,000 Btu/hr)	1984	Step 2 1/1/93*

* Federal appliance standard also applies.

For greater detail on these standards, see Notes.

End Use Affected, Technical Method of Effecting Change

Refrigerators, freezers, and air conditioning. Improved efficiency of appliances compared to units installed prior to the current standards for those appliances. Improved efficiencies of refrigerators and freezers, quantified as a percent reduction, accomplished through some combination of more efficient compressors, better insulated shell or other measures. Improved efficiencies of central air conditioners, quantified as a percent reduction, accomplished primarily through more efficient compressors.

Description of Impact Estimates Calculations

Program savings are a function of the total stock of appliances, the average life of appliances and the reduction in energy use relative to 1977 appliances.

Percent Reduction Relative to 1977 Use

<u>Appliance</u>	<u>Step 1</u>	<u>Step 2</u>
Refrigerators (auto defrost)	32	52
Refrigerators (manual defrost)	32	52
Freezers	22	47
Central Air Conditioners	25	39

Since the percent reduction estimates are based upon a prestandard UEC, the estimates of use prior to the standards become an important determinant of overall program savings. See Notes. Base UECs for each service area are given in Table B1.

Sources of Data Used

Data from Association of Home Appliance Manufacturers (AHAM) and CEC Appliance Standards reports for percent reduction estimates. See Notes.

Mandatory Standard Impacts
(Existing/Committed)

Title: 1992-95 T24 Residential Building Standards

Portion of Customers Eligible

All residential buildings of three stories or less constructed after 1991. The standards were adopted by the CEC in May 1991. The standards were expected to simplify compliance and thus increase the rate of compliance among buildings. The principal thrust of the new regulations is to remove some ambiguities and anomalies from existing regulations. Accordingly, Staff anticipates no significant changes to residential buildings end-use energy forecast models from the 1995 Title 24 Building Standards.

End Use Affected, Technical Method of Effecting Change

Space heating and cooling in residential buildings constructed after 1992. Increased thermal integrity of the building shell as a result of increased wall insulation levels and greater thermal performance of windows.

Description of Impact Estimates Calculations

A percentage reduction in heating and cooling consumption relative to buildings constructed in compliance with the 1983 T24 Residential Building Standards. This reduction is applied to residential buildings constructed after 1992. Table B2 shows the percentage reduction by forecast climate zone for post 1992 standards homes.

Table B2

Percent Reduction Over Pre-1992 Construction
Due to 1992 T24 Residential Building Standards

<u>Forecast Zone</u>	<u>Heating</u>	<u>Cooling</u>
1	7	0
2	10	2
3	10	2
4	4	1
5	4	0
6	10	0
7	10	2
8	4	1
9	4	2
10	4	2
11	4	1
12	4	2
13	4	0
14	7	0
15	4	2
16	4	2

Sources of Data Used

Information provided in Draft Environmental Impact Report for 1991 Residential Building Energy Efficiency Standards, California Energy 6 Commission, January 1991. Consultation with staff of the Building and Appliance Efficiency Office in the CEC's Energy Efficiency and Local Assistance Division.

Mandatory Standard Impacts

Title: 1992 NEPA Equipment Standards (currently drafted by Energy Commission Staff as possible revised T20 Appliance Efficiency Regulations and affecting the residential sector).

Portion of Customers Eligible

Only a preliminary assessment of the 1992 federal appliance standards is possible. Until the federal government settles the administrative and technical details on implementing and enforcing the various provisions of the NECPA of 1992, one can only provide tentative estimates on the effects of the 1992 act. The effects of the new federal regulations could begin as early as 1994 for some appliances. Except for (1) commercial and industrial electric motors and (2) general service fluorescent and incandescent reflector lamps, the federal act virtually duplicates existing California appliance standards.

The effect of the act will differ among the various end use sectors, but available information on the standards suggests that it is likely to have a very slight effect overall. The residential sector will experience minimal impacts from the lighting regulations. The potential effects on home electricity consumption from the proposed standards for dishwashers, clothes washers and clothes dryers appear to be very small--at least until the effects of the act on actual appliance purchases can be assessed.

<u>Equipment</u>	<u>Adoption</u> <u>Date</u>	<u>Effective</u> <u>Date</u>
Fluorescent & Incandescent Reflector lamps	1992	Oct. 1995

Mandatory Standard Impacts

Title: 1977 T24 Nonresidential Building Standards (Commercial)

Portion of Customers Eligible

All commercial buildings (except hospitals) constructed after 1978. This first set of Title 24 nonresidential standards was adopted by the CEC in 1977 and became effective in 1978.

End Use Affected, Technical Method of Effecting Change

Space heating, cooling and lighting. Reduction in lighting use due to connected watt standards. Improved thermal integrity of building due to increased insulation levels.

Description of Impact Estimates Calculations

Lighting reduction computed as a percent reduction in connected watts relative to pre-standards buildings. HVAC reductions derived from heat load simulations based on pre and post standards building configurations and lighting levels. Percent change from heat load simulations are applied to consumption estimates for buildings in 1975. Reduction factors used by building type and end use are available in the CEC Staff's California Energy Demand: 1989-2009 Volume XI (Publ. No.: P300-89-013) Table 8.1-C1, pp. 3-15 through 3-17.

Mandatory Standard Impacts

Title: 1984 T24 Nonresidential Building Standards (Office Buildings)

Portion of Customers Eligible

All commercial sector buildings classified as "offices" built after 1985. Standards adopted by CEC in 1984. Regulations were voluntary until 1987, at which time they became mandatory.

End Use Affected, Technical Method of Effecting Change

Heating, cooling, ventilation and lighting for office buildings. Reduction in lighting use due to connected watt standards. Improved thermal integrity of building shell due to glazing and insulation requirements to accomplish energy budgets established by standards. Decreased internal loads resulting from lighting reductions result in increased heating loads relative to buildings constructed in conformance with 1977 standards.

Description of Impact Estimates Calculations

Lighting reductions computed as a percent reduction in connected watts relative to 1975 lighting use. Changes in HVAC end uses derived from heat load simulations based on 1978 and new standards building configurations. Reduction factors used by building type and end use are available in the CEC Staff's California Energy Demand: 1989-2009 Volume XI (Publ. No.: P300-89-013) Table 8.1-D1, p. 3-20.

Sources of Data Used

Heat load data sets are those used to develop standards with modified assumptions regarding ventilation, temperature set points and lighting connected loads. See Notes.

Mandatory Standard Impacts

Title: 1976-82 T20 Equipment Standard (Commercial)

Portion of Customers Eligible

All customers who purchase certain classes of appliances for use in commercial buildings after 1978. The classes of equipment and implementation dates of the standards are as follows:

<u>Equipment</u>	<u>Product Class</u>	<u>CEC Adoption Date</u>	<u>Effective Date</u>
Fluorescent Lighting Ballasts	F40T12 and F96T12	1982	1983
Air Conditioners	65,000-135,000 Btu/hr	1982	1984
	Less than 65,000 Btu/hr	1976	1979*
	Room Air Conditioning	1976	1979*
Heat Pumps	65,000-135,000 Btu/hr	1982	1984
	Less than 65,000 Btu/hr	1976	1979*
	Room Air Conditioning	1976	1979
Refrig/Freezer	Less than 32 cubic feet	1976	1979*
Water Heaters	Residential Size (<12 kW)	1977	1978
	Commercial size (>12 kW)	1977	1978
Gas Space Heating	Less than 175,000 Btu/hr	1977	1984*
	More than 175,000 Btu/hr	1977	1984*
	Boilers	1977	1979
	Unit Heaters	1977	1984*
	Duct Furnace Heaters	1977	1984*
Gas Pool Heaters	All	1982	1984

* For these appliances, intermediate (less stringent) standards were adopted for a date earlier than shown; "effective date" refers to the date when the final requirements took effect.

End Use Affected, Technical Method of Effecting Change

Lighting, refrigeration, heating, cooling, and water heating in new buildings and replacement units in existing stock, beginning in 1978. Improved efficiency of equipment sold for use in commercial buildings, regardless of when the building was constructed.

Description of Impact Estimates Calculations

Program savings are a function of equipment life, the total stock of appliances, the portion of the stock affected by the standards and the per unit impact (amount of reduced use due to improved efficiency) of the standards. Current estimates of the proportion of stock affected by planning area and building type are given in California Energy Demand 1984-2004, Volume II, pp. B.99 - B. 103.

Sources of Data Used

CEC Appliance Standards reports (for average equipment life and percent reductions). See Notes.

Mandatory Standard Impacts

Title: 1984 T20 Equipment Standards (Commercial)

Portion of Customers Eligible

All residential size refrigerator, freezer and all central air conditioning equipment for use in commercial buildings.

End Use Affected, Technical Method of Effecting Change

Central air conditioners 65,000 to 135,000 Btu per hour (including heat pumps). See 1984 T20 Residential Appliance Standards.

Description of Impact Estimates Calculations

Program savings are a function of equipment life, the total stock of appliances, the portion of the stock affected by the standards and the per unit impact (amount of reduced use due to improved efficiency) of the standards.

Sources of Data Used

See Notes number 4. Also CEC Appliance Standards reports (for average useful life and percent reductions).

PLANNING/SERVICE AREA: PG&E
 CLIMATE ZONE: 1
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	13.97	-18.00	-5.96	-9.00
	NGAS	14.01	-17.96		
	OIL	14.01			
RESTAURANT	ELEC	17.05	-16.96	-1.95	-13.95
	NGAS	16.97	-17.07		
	OIL	17.01			
RETAIL STORE	ELEC	4.04	-16.11	-5.94	-8.93
	NGAS	3.95	-16.03		
	OIL	3.98			
FOOD STORE	ELEC	37.01	-35.95	-19.98	-27.97
	NGAS	37.07	-35.96		
	OIL	37.02			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-26.92	-15.93	-9.98	-17.00
	NGAS	-27.03	-15.86		
	OIL	-26.93			
COLLEGE	ELEC	40.99	-12.92	-4.98	-9.00
	NGAS	41.06	-13.12		
	OIL	40.98			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	5.96	-30.00	-16.02	-8.98
	NGAS	6.00	-29.87		
	OIL	6.01			
MISCELLANEOUS	ELEC	96.95	-20.89	1.96	-8.98
	NGAS	96.99	-20.93		
	OIL	97.09			
LARGE OFFICE	ELEC	55.02	-14.91	-3.91	-8.94
	NGAS	54.99	-14.94		
	OIL	55.03			

PLANNING/SERVICE AREA: PG&E
 CLIMATE ZONE: 2
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	-37.02	-16.89	-14.01	-9.00
	NGAS	-36.96	-17.03		
	OIL	-37.01			
RESTAURANT	ELEC	-7.95	-14.96	-9.04	-13.95
	NGAS	-7.97	-14.94		
	OIL	-8.04			
RETAIL STORE	ELEC	-44.89	-14.07	-11.05	-8.93
	NGAS	-45.06	-13.94		
	OIL	-44.93			
FOOD STORE	ELEC	11.03	-30.94	-23.03	-27.97
	NGAS	11.06	-31.03		
	OIL	11.07			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-29.91	-15.93	-12.04	-17.00
	NGAS	-30.01	-15.86		
	OIL	-29.94			
COLLEGE	ELEC	14.04	-9.04	-6.01	-9.00
	NGAS	13.97	-8.92		
	OIL	13.93			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	-1.95	-25.00	-21.00	-8.98
	NGAS	-2.04	-24.94		
	OIL	-1.96			
MISCELLANEOUS	ELEC	0.00	-15.88	-7.95	-8.98
	NGAS	0.00	-15.99		
	OIL	0.00			
LARGE OFFICE	ELEC	14.95	-8.91	-5.97	-8.94
	NGAS	15.05	-8.92		
	OIL	14.30			

PLANNING/SERVICE AREA: PG&E
 CLIMATE ZONE: 3
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	-37.02	-16.89	-14.01	-9.00
	NGAS	-36.96	-17.03		
	OIL	-37.01			
RESTAURANT	ELEC	-7.95	-14.96	-9.04	-13.95
	NGAS	-7.97	-14.94		
	OIL	-8.04			
RETAIL STORE	ELEC	-44.89	-14.07	-11.05	-8.93
	NGAS	-43.06	-13.94		
	OIL	-44.93			
FOOD STORE	ELEC	11.03	-30.94	-23.03	-27.97
	NGAS	11.06	-31.03		
	OIL	11.07			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-29.91	-15.93	-12.04	-17.00
	NGAS	-30.01	-15.86		
	OIL	-29.94			
COLLEGE	ELEC	14.04	-9.04	-6.01	-9.00
	NGAS	13.97	-8.92		
	OIL	13.93			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	-1.95	-25.00	-21.00	-8.98
	NGAS	-2.04	-24.94		
	OIL	-1.96			
MISCELLANEOUS	ELEC	0.00	-15.88	-7.95	-8.98
	NGAS	0.00	-15.99		
	OIL	0.00			
LARGE OFFICE	ELEC	14.95	-8.91	-5.97	-8.94
	NGAS	15.05	-8.92		
	OIL	14.30			

PLANNING/SERVICE AREA: PG&E
 CLIMATE ZONE: 4
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	-16.06	-16.89	-9.98	-9.00
	NGAS	-15.95	-17.03		
	OIL	-16.04			
RESTAURANT	ELEC	3.03	-15.96	-5.95	-13.95
	NGAS	3.00	-15.85		
	OIL	3.03			
RETAIL STORE	ELEC	-24.89	-15.09	-8.01	-8.93
	NGAS	-24.90	-14.98		
	OIL	-25.05			
FOOD STORE	ELEC	22.07	-33.99	-21.94	-27.97
	NGAS	21.95	-33.99		
	OIL	21.98			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-27.99	-15.93	-9.98	-17.00
	NGAS	-28.02	-15.86		
	OIL	-27.94			
COLLEGE	ELEC	36.05	-12.92	-4.98	-9.00
	NGAS	36.03	-12.86		
	OIL	36.07			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	2.98	-29.00	-16.99	-8.98
	NGAS	3.00	-29.09		
	OIL	3.00			
MISCELLANEOUS	ELEC	47.93	-20.06	-2.99	-8.98
	NGAS	48.05	-20.06		
	OIL	48.03			
LARGE OFFICE	ELEC	39.95	-12.91	-4.94	-8.94
	NGAS	39.95	-13.01		
	OIL	39.95			

PLANNING/SERVICE AREA: PG&E
 CLIMATE ZONE: 5
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	-16.06	-16.89	-9.98	-9.00
	NGAS	-15.95	-17.03		
	OIL	-16.04			
RESTAURANT	ELEC	3.03	-15.96	-5.95	-13.95
	NGAS	3.00	-15.85		
	OIL	3.03			
RETAIL STORE	ELEC	-24.89	-15.09	-8.01	-8.93
	NGAS	-24.90	-14.98		
	OIL	-25.05			
FOOD STORE	ELEC	22.07	-33.99	-21.94	-27.97
	NGAS	21.95	-33.99		
	OIL	21.98			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-27.99	-15.93	-9.98	-17.00
	NGAS	-28.02	-15.86		
	OIL	-27.94			
COLLEGE	ELEC	36.05	-12.92	-4.98	-9.00
	NGAS	36.03	-12.86		
	OIL	36.07			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	2.98	-29.00	-16.99	-8.98
	NGAS	3.00	-29.09		
	OIL	3.00			
MISCELLANEOUS	ELEC	47.93	-20.06	-2.99	-8.98
	NGAS	48.05	-20.06		
	OIL	48.03			
LARGE OFFICE	ELEC	39.95	-12.91	-4.94	-8.94
	NGAS	39.95	-13.01		
	OIL	39.95			

PLANNING/SERVICE AREA: SMUD
 CLIMATE ZONE: 6
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	-37.02	-16.89	-14.01	-9.00
	NGAS	-36.96	-17.03		
	OIL	-37.01			
RESTAURANT	ELEC	-7.95	-14.96	-9.04	-13.95
	NGAS	-7.97	-14.94		
	OIL	-8.04			
RETAIL STORE	ELEC	-44.89	-14.07	-11.05	-8.93
	NGAS	-45.06	-13.94		
	OIL	-44.93			
FOOD STORE	ELEC	11.03	-30.94	-23.03	-27.97
	NGAS	11.06	-31.03		
	OIL	11.07			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-29.91	-15.93	-12.04	-17.00
	NGAS	-30.01	-15.86		
	OIL	-29.94			
COLLEGE	ELEC	14.04	-9.04	-6.01	-9.00
	NGAS	13.97	-8.92		
	OIL	13.93			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	-1.95	-25.00	-21.00	-8.98
	NGAS	-2.04	-24.94		
	OIL	-1.96			
MISCELLANEOUS	ELEC	0.00	-15.88	-7.95	-8.98
	NGAS	0.00	-15.99		
	OIL	0.00			
LARGE OFFICE	ELEC	14.95	-8.91	-5.97	-8.94
	NGAS	15.05	-8.92		
	OIL	14.30			

PLANNING/SERVICE AREA: SCE
 CLIMATE ZONE: 7
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	-35.04	-17.11	-14.01	-9.00
	NGAS	-35.02	-17.03		
	OIL	-34.97			
RESTAURANT	ELEC	-5.06	-14.96	-9.04	-13.95
	NGAS	-4.97	-14.94		
	OIL	-5.01			
RETAIL STORE	ELEC	-47.02	-14.07	-9.94	-13.95
	NGAS	-47.04	-13.94		
	OIL	-46.92			
FOOD STORE	ELEC	20.00	-30.07	-21.94	-27.97
	NGAS	20.00	-30.05		
	OIL	20.00			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-36.11	-15.93	-13.02	-17.00
	NGAS	-35.99	-15.86		
	OIL	-35.96			
COLLEGE	ELEC	14.99	-8.01	-6.01	-9.00
	NGAS	14.94	-7.87		
	OIL	15.03			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	15.02	-25.00	-20.02	-8.98
	NGAS	15.01	-24.94		
	OIL	15.01			
MISCELLANEOUS	ELEC	6.10	-15.88	-7.95	-8.98
	NGAS	6.03	-15.99		
	OIL	5.98			
LARGE OFFICE	ELEC	14.95	-8.00	-5.97	-8.94
	NGAS	15.05	-7.95		
	OIL	14.30			

PLANNING/SERVICE AREA: SCE
 CLIMATE ZONE: 8
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	52.03	-18.89	-5.96	-9.00
	NGAS	52.05	-18.89		
	OIL	51.98			
RESTAURANT	ELEC	42.05	-16.96	-1.95	-13.95
	NGAS	42.03	-17.07		
	OIL	41.96			
RETAIL STORE	ELEC	132.98	-16.88	-3.04	-13.95
	NGAS	133.00	-17.07		
	OIL	133.00			
FOOD STORE	ELEC	74.02	-32.90	-2.95	-27.97
	NGAS	73.98	-33.00		
	OIL	74.05			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-33.97	-17.03	-12.04	-17.00
	NGAS	-34.00	-16.83		
	OIL	-33.95			
COLLEGE	ELEC	70.02	-8.01	-1.03	-9.00
	NGAS	69.97	-7.87		
	OIL	69.95			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	15.02	-26.00	-11.04	-8.98
	NGAS	15.01	-16.88		
	OIL	15.01			
MISCELLANEOUS	ELEC	103.05	-16.99	1.03	-8.98
	NGAS	103.01	-16.86		
	OIL	103.08			
LARGE OFFICE	ELEC	67.03	-8.00	24.61	-8.94
	NGAS	67.06	-7.95		
	OIL	67.01			

PLANNING/SERVICE AREA: SCE
 CLIMATE ZONE: 9
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	-33.99	-16.00	-14.98	-9.00
	NGAS	-33.94	-16.10		
	OIL	-34.01			
RESTAURANT	ELEC	7.08	-15.96	-9.04	-13.95
	NGAS	7.04	-15.85		
	OIL	6.99			
RETAIL STORE	ELEC	-44.04	-13.04	-9.94	-13.95
	NGAS	-44.07	-12.89		
	OIL	-43.94			
FOOD STORE	ELEC	25.06	-27.89	-19.98	-27.97
	NGAS	25.04	-28.08		
	OIL	24.96			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-54.91	-15.93	-14.97	-17.00
	NGAS	-55.05	-15.86		
	OIL	-55.01			
COLLEGE	ELEC	22.01	-6.98	-4.98	-9.00
	NGAS	22.07	-7.09		
	OIL	21.99			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	15.02	-23.00	-21.00	-8.98
	NGAS	15.01	-22.86		
	OIL	15.01			
MISCELLANEOUS	ELEC	30.94	-15.04	-4.95	-8.98
	NGAS	31.03	-15.12		
	OIL	30.94			
LARGE OFFICE	ELEC	23.04	-6.91	-4.94	-8.94
	NGAS	22.96	-6.99		
	OIL	23.07			

PLANNING/SERVICE AREA: SCE
 CLIMATE ZONE: 10
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	0.00	-16.89	-10.95	-9.00
	NGAS	0.00	-17.03		
	OIL	0.00			
RESTAURANT	ELEC	15.03	-14.96	-8.01	-13.95
	NGAS	15.01	-14.94		
	OIL	15.03			
RETAIL STORE	ELEC	-14.04	-14.07	-8.01	-13.95
	NGAS	-14.03	-13.94		
	OIL	-13.92			
FOOD STORE	ELEC	40.00	-28.98	-19.00	-27.97
	NGAS	40.00	-29.06		
	OIL	40.00			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-33.97	-15.93	-13.02	-17.00
	NGAS	-34.00	-15.86		
	OIL	-33.95			
COLLEGE	ELEC	41.94	-8.01	-3.00	-9.00
	NGAS	42.04	-7.87		
	OIL	41.94			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	15.02	-23.00	-16.99	-8.98
	NGAS	15.01	-22.86		
	OIL	15.01			
MISCELLANEOUS	ELEC	50.98	-15.04	-2.99	-8.98
	NGAS	51.06	-15.12		
	OIL	50.94			
LARGE OFFICE	ELEC	36.03	-8.00	-3.91	-8.94
	NGAS	36.06	-7.95		
	OIL	35.95			

PLANNING/SERVICE AREA: LADWP
 CLIMATE ZONE: 11
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	52.03	-18.89	-5.96	-9.00
	NGAS	52.05	-18.89		
	OIL	51.98			
RESTAURANT	ELEC	42.05	-16.96	-1.95	-13.95
	NGAS	42.03	-17.07		
	OIL	41.96			
RETAIL STORE	ELEC	132.90	-16.80	-3.04	-13.95
	NGAS	133.00	-17.07		
	OIL	133.00			
FOOD STORE	ELEC	74.02	-32.90	-2.95	-27.97
	NGAS	73.98	-33.00		
	OIL	74.05			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-33.97	-17.03	-12.04	-17.00
	NGAS	-34.00	-16.83		
	OIL	-33.95			
COLLEGE	ELEC	70.02	-8.01	-1.03	-9.00
	NGAS	69.97	-7.87		
	OIL	69.95			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	15.02	-26.00	-11.04	-8.98
	NGAS	15.01	-16.88		
	OIL	15.01			
MISCELLANEOUS	ELEC	103.05	-16.99	1.03	-8.98
	NGAS	103.01	-16.86		
	OIL	103.08			
LARGE OFFICE	ELEC	67.03	-8.00	24.61	-8.94
	NGAS	67.06	-7.95		
	OIL	67.01			

PLANNING/SERVICE AREA: LADWP
 CLIMATE ZONE: 12
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	-33.99	-16.00	-14.98	-9.00
	NGAS	-33.94	-16.10		
	OIL	-34.01			
RESTAURANT	ELEC	7.08	-15.96	-9.04	-13.95
	NGAS	7.04	-15.85		
	OIL	6.99			
RETAIL STORE	ELEC	-44.04	-13.04	-9.94	-13.95
	NGAS	-44.07	-12.89		
	OIL	-43.94			
FOOD STORE	ELEC	25.06	-27.89	-19.98	-27.97
	NGAS	25.04	-28.08		
	OIL	24.96			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-34.91	-15.93	-14.97	-17.00
	NGAS	-35.05	-15.86		
	OIL	-35.01			
COLLEGE	ELEC	22.01	-6.98	-4.98	-9.00
	NGAS	22.07	-7.09		
	OIL	21.99			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	15.02	-23.00	-21.00	-8.98
	NGAS	15.01	-22.86		
	OIL	15.01			
MISCELLANEOUS	ELEC	30.94	-15.04	-4.95	-8.98
	NGAS	31.03	-15.12		
	OIL	30.94			
LARGE OFFICE	ELEC	23.04	-6.91	-4.94	-8.94
	NGAS	22.96	-6.99		
	OIL	23.07			

6 PLANNING/SERVICE AREA: SDG&E
 CLIMATE ZONE: 13
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	52.02	-33.41	0.98	-9.00
	NGAS	52.02	-33.93		
	OIL	51.99			
RESTAURANT	ELEC	42.03	-17.02	0.99	-13.97
	NGAS	41.96	-16.91		
	OIL	42.05			
RETAIL STORE	ELEC	132.92	-19.11	1.05	-9.02
	NGAS	132.99	-18.90		
	OIL	133.05			
FOOD STORE	ELEC	74.00	-34.07	-15.94	-28.02
	NGAS	73.94	-34.04		
	OIL	73.98			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	69.96	-18.94	-5.03	-17.00
	NGAS	69.99	-19.11		
	OIL	69.99			
COLLEGE	ELEC	20.02	-11.90	2.01	-9.00
	NGAS	19.98	-11.92		
	OIL	19.98			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	15.01	-27.05	-5.02	-8.98
	NGAS	15.02	-26.87		
	OIL	15.02			
MISCELLANEOUS	ELEC	102.94	-19.02	4.04	-8.98
	NGAS	103.01	-19.12		
	OIL	102.97			
LARGE OFFICE	ELEC	67.06	-25.58	1.95	-8.94
	NGAS	67.01	-23.33		
	OIL	67.01			

PLANNING/SERVICE AREA: OTHER
 CLIMATE ZONE: 14
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	13.97	-18.00	-5.96	-9.00
	NGAS	14.01	-17.96		
	OIL	14.01			
RESTAURANT	ELEC	17.05	-16.96	-1.95	-13.95
	NGAS	16.97	-17.07		
	OIL	17.01			
RETAIL STORE	ELEC	4.04	-16.11	-5.94	-8.93
	NGAS	3.95	-16.03		
	OIL	3.98			
FOOD STORE	ELEC	37.01	-35.95	-19.98	-27.97
	NGAS	37.07	-35.96		
	OIL	37.02			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-26.92	-15.93	-9.98	-17.00
	NGAS	-27.03	-15.86		
	OIL	-26.93			
COLLEGE	ELEC	40.99	-12.92	-4.98	-9.00
	NGAS	41.06	-13.12		
	OIL	40.98			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	5.96	-30.00	-16.02	-8.98
	NGAS	6.00	-29.87		
	OIL	6.01			
MISCELLANEOUS	ELEC	96.95	-20.89	1.96	-8.98
	NGAS	96.99	-20.93		
	OIL	97.09			
LARGE OFFICE	ELEC	55.02	-14.91	-3.91	-8.94
	NGAS	54.99	-14.94		
	OIL	55.03			

PLANNING/SERVICE AREA: OTHER
 CLIMATE ZONE: 15
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	0.00	-16.89	-10.95	-9.00
	NGAS	0.00	-17.03		
	OIL	0.00			
RESTAURANT	ELEC	15.03	-14.96	-8.01	-13.95
	NGAS	15.01	-14.94		
	OIL	15.03			
RETAIL STORE	ELEC	-14.04	-14.07	-8.01	-13.95
	NGAS	-14.03	-13.94		
	OIL	-13.92			
FOOD STORE	ELEC	40.00	-28.98	-19.00	-27.97
	NGAS	40.00	-29.06		
	OIL	40.00			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-33.97	-15.93	-13.02	-17.00
	NGAS	-34.00	-15.86		
	OIL	-33.95			
COLLEGE	ELEC	41.94	-8.01	-3.00	-9.00
	NGAS	42.04	-7.87		
	OIL	41.94			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	15.02	-23.00	-16.99	-8.98
	NGAS	15.01	-22.86		
	OIL	15.01			
MISCELLANEOUS	ELEC	50.98	-15.04	-2.99	-8.98
	NGAS	51.06	-15.12		
	OIL	50.94			
LARGE OFFICE	ELEC	36.03	-8.00	-3.91	-8.94
	NGAS	36.06	-7.95		
	OIL	35.95			

PLANNING/SERVICE AREA: BG&P
 CLIMATE ZONE: 16
 PERCENT CHANGE IN EUI FROM 2ND GENERATION TO 92 STANDARDS

BUILDING	FUEL	HEAT	COOL	VENT	INLT
SMALL OFFICE	ELEC	-33.99	-16.00	-14.98	-9.00
	NGAS	-33.94	-16.10		
	OIL	-34.01			
RESTAURANT	ELEC	7.08	-15.96	-9.04	-13.95
	NGAS	7.04	-15.85		
	OIL	6.99			
RETAIL STORE	ELEC	-44.04	-13.04	-9.94	-13.95
	NGAS	-44.07	-12.89		
	OIL	-43.94			
FOOD STORE	ELEC	25.06	-27.89	-19.98	-27.97
	NGAS	25.04	-28.08		
	OIL	24.96			
WAREHOUSE	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
SCHOOL	ELEC	-54.91	-15.93	-14.97	-17.00
	NGAS	-55.05	-15.86		
	OIL	-55.01			
COLLEGE	ELEC	22.01	-6.98	-4.98	-9.00
	NGAS	22.07	-7.09		
	OIL	21.99			
HOSPITAL	ELEC	0.00	0.00	0.00	0.00
	NGAS	0.00	0.00		
	OIL	0.00			
HOTEL/MOTEL	ELEC	15.02	-23.00	-21.00	-8.98
	NGAS	15.01	-22.86		
	OIL	15.01			
MISCELLANEOUS	ELEC	30.94	-15.04	-4.95	-8.98
	NGAS	31.03	-15.12		
	OIL	30.94			
LARGE OFFICE	ELEC	23.04	-6.91	-4.94	-8.94
	NGAS	22.96	-6.99		
	OIL	23.07			

Mandatory Standard Impacts

Title: 1992 NEPA Equipment Standards (currently drafted by Energy Commission Staff as possible revised T20 Appliance Efficiency Regulations and affecting commercial/industrial sectors).

<u>Equipment</u>	<u>Product Class</u>	<u>Adoption Date</u>	<u>Effective Date</u>
Fluorescent & Incandescent Reflector lamps		1992	Oct. 1995
Electric Motors	1 to 200 motor hp.	1992	1998 (earliest)

See the description of the effects of these standards in the residential sector.

In the commercial and assembly industry sectors, the preliminary assessment of the improved efficiency of lights and motors will require further analysis from simulation models. Staff believes that the electrical demand calculated by the process industrial models will be largely unaffected by the new regulations.

NOTES

1. Residential Sector Model

A. Program savings for residential programs quantified directly in the CEC residential forecast model are computed on an end use basis. Consumption for residential sector end uses are the product of (# of households)* (Saturation)* (Unit Energy Consumption). All three factors of estimated consumption associated with a particular end use will have an effect on total program savings; the unit energy consumption (UEC) estimates, however, is the factor most directly related to conservation program savings estimates.

In the CEC conservation program quantification approach, the base year (pre-program) UEC becomes an important determinant for aggregate savings estimates. Base year UECs are typically derived from either a statistical base (conditional demand analysis) or an engineering/heat load base.

Future year UECs are a function of the base year UEC modified to measure the impact per unit for each end use affected by the program. UECs are modified over time based on either: (1) a percent reduction estimate or (2) a change in the penetration level of conservation activities which affect the end use. Generally, appliance standards program impacts are derived from percent reduction estimates, whereas building standards and other program estimates are based on penetration level changes (See Note 1B).

The following table identifies the major end use affected by a residential conservation program, the nature (derivation basis) of the base year UEC, the reference document for base year UECs, and a reference document for the savings per unit estimation procedure:

<u>End Use</u>	<u>UEC Derivation Basis</u>	<u>Base Year UEC Reference</u>	<u>Future Year UEC Reference</u>
Refrigerators	Statistical	(1)	(4)
Freezers	Statistical	(1)	(4)
Central A/C	Heat Load (DOE 2.1)	(2) (3)	(5)
Room A/C	Statistical	(1)	(4)
Space Heaters	Heat Load (DOE 2.1)	(2) (3)	(5)
Water Heaters	Engineering	(2)	(5)
Pool Pumps	Engineering	(1)	(4)
Pool Heaters	Engineering	(1)	(4)
Gas Ranges	Statistical	(1)	(4)

- (1) Technical Documentation of the Residential Sales Forecasting Model, (CEC, October 1979).
- (2) Measurement and Evaluation of the Energy Conservation Potential in California's Residential Sector, (CEC, June 1983).
- (3) California Energy Demand, 1982-2000, Volume II ("Space Conditioning and Water Heating UECs), (CEC, August 1984).
- (4) California Appliance Standards, (CEC, September 1988).
- (5) See Note #2.

B. As indicated in Note 1A, residential UECs for space heating, central air conditioning and water heating in the CEC residential model are derived from heat load (DOE 2.1) and engineering simulations. The

procedure involves establishing energy consumption estimates with and without specific conservation activities in place. Penetration level estimates (the fraction of the stock which has adopted the conservation activity) are developed for selected years from 1970 through 2009. Increased penetration levels have the effect of reducing the UEC. Changes in the penetration levels of specific conservation activities are then attributed to a specific program or to price, depending on the year in which the change in penetration occurs and the vintage (pre-1975; 1975-1978; 1979-1983; 1983-1987; and 1987+) of the building stock.

An important feature of the space conditioning and water heating UEC computation procedures is the interaction of energy savings estimates of conservation practices (conservation activities such as thermostat setpoint schedules which reflect changes in customer behavioral patterns) and conservation measures (conservation activities such as insulation which entail the installation of conservation material or devices). Both types of activities affect end use consumption and savings estimates. By using an end use methodology which accounts for the interaction of these two types of conservation activities and by specifying explicit penetration levels for major practices and measures, it is possible to isolate the effects of each type of activity. The distinction between measures and practices becomes a major component of the approach used to attribute changes in heating and cooling end use consumption to either programs or price. See Note 1C.

- C. The residential sector model includes an explicit accounting for price-induced conservation using a price elasticity for lighting and miscellaneous end uses. No other end use has a direct price response. As mentioned in Note 1B, however, the UEC methodology for many of the end uses most affected by conservation activities (space heating and cooling and water heating) does facilitate a distinction between changes in end use consumption due to measures and those due to practices. The only conservation practice explicitly estimated in the model is the penetration of thermostat setup and setback. The penetration is estimated as:

$$\frac{(\text{Price})/(\text{1981 Price})}{(\text{Income})/(\text{1981 Income})} * \text{1981 Penetration}$$

The approach used to identify conservation program savings is to assume: (1) all changes in end use consumption due to the adoption of other conservation practices are attributable to price-induced conservation, and, (2) all reductions in end use consumption due to the implementation of conservation measures are attributable to at least one of the conservation programs in effect at the time.

The effect of this approach on program savings estimates is that changes in end use consumption due to increases or decreases in the penetration level of conservation practices are not included in the program savings estimates. Program savings estimates can be considered "net" in the sense that the price-induced changes in behavioral practices are not attributed to a program, but "gross" in the sense that the program savings estimates embodies the assumption that all measures installed can be attributed to a program. An alternative approach which would attribute a portion of the installed measures to a program would have the effect of reducing the program savings estimates but would have no effect on the baseline forecast.

2. Commercial Sector Model

- A. Savings estimates for commercial sector building and appliance standards programs are computed as a function of the relationships between a base year Energy Utilization Index (EUI), end use consumption estimate and the amount of reduced consumption (typically expressed as a percent reduction relative to the base year) associated with a particular conservation program.
- B. The CEC commercial model incorporates the effects of price-induced conservation through the use of price elasticities. Two types of price elasticities are used: (1) efficiency elasticities and (2) utilization efficiencies. Efficiency elasticities are a means of estimating the effects that price has on the efficiency of appliances due to technological improvements in the absence of efficiency improvements due to appliance standards. The efficiency elasticities used are:

-.115 (electricity) and -.185 (natural gas).

These values, which apply equally to all end uses and all building types, are those used in the original Oak Ridge National Laboratories version of the commercial buildings model. Utilization elasticities are used to estimate the effect of price changes on the utilization rate of energy-using equipment. The electricity utilization elasticity values used are as follows:

Small Office	-.132
Large Office	-.132
Restaurants	-.147
Retail	-.107
Food Stores	-.050
Warehouse	-.231
Schools	-.085
Colleges	-.085
Hospitals	-.085
Hotel	-.174
Miscellaneous	-.254

The electricity utilization elasticities are based on historical (QFER) data for the years 1977-1981. See California Energy Demand: 1982-2004, Volume II ("A Disaggregate Analysis of Electricity Demand for Commercial Sector Establishments in California"), (CEC, August 1984).

For natural gas, the utilization price elasticity used is -.15. Utilization elasticities (gas and electricity) apply equally to all end uses.

For all commercial sector programs quantified directly in the forecast, program savings estimates reported in these forms are net savings (i.e., gross savings minus savings induced by price and savings attributed to other programs in place prior to the program being analyzed).

Because of the significant reductions in energy use associated with conservation programs, the effect of alternative price elasticities and price forecasts on the demand forecast is relatively minor. The effect of the price elasticities and price forecast on estimated net conservation program savings, however, can be significant.

3. Programs Quantified Outside Models

- A. Some DSM programs' effects are quantified external to the forecast (public agency programs and utility programs). These effects are calculated from investor owned utility Annual DSM Reports to the CPUC

and information from public agencies and municipal owned utilities furnished as part of the biennial CEC Electricity Report process.

4. References to Residential and Nonresidential Appliance Standards

- A. Refrigerator and freezer performance can be measured in terms of annual energy use (kWh/year).
- B. Room air conditioner performance is normally described in terms of energy efficiency ratio (EER). The pre-standard EER is assumed to be 6.5. After November 1979, for all room air conditioners that use less than 200 volts and are not heat pumps, the standard specifies an EER at 8.7.
- C. Central air conditioner performance is also described in terms of both by EERs and seasonal energy efficiency ratios (SEER). Original standards were based on EER. For simplicity, assume SEER is 0.5 higher than EER.

<u>Type</u>	<u>Effect date</u>	<u>EER</u>	<u>SEER</u>	<u>BTU/HR Rating</u>
Central A/C	1/93			less than 65,000
-air cooled*			9.9	
-air source heat pumps			9.9	
-water source heat pumps		10.0		
Other central A/C	1/88			less than 65,000
-air cooled*			8.9	
-air source heat pumps			8.9	
-water cooled*		8.0		
-water source heat pumps		9.0		
Other central A/C	1/84			65,000 - 135,000
-air source		8.2		
-water source		9.2		
-evaporative source		9.2		
Computer Room A/C	1/88			
-air cooled		8.3		less than 65,000
-air cooled		7.7		65,000 - 135,000
-water cooled		8.1		less than 65,000
-water cooled		8.4		65,000 - 135,000

 * denotes all units except heat pumps.

Public Agency Programs Impacts

Introduction

Descriptions of the effects of California's Public Agency Programs are organized using the following format:

Title The title of the program (or in some cases, group of programs being described).

Program Scope The customer classes, building types or appliance/equipment types that are included in the program(s).

Description of Impacts Calculation The methods and assumptions used to estimate the historical impacts.

Adjustments Describes the compliance adjustment factors, useful life estimates, and degradation effects used to calculate the impacts of the program. Generally, no replacement of energy saving devices is assumed, peak impacts are assumed to be coincident with the utility system peak, and no transmission or distribution loss factors are used. Net-to-gross adjustments, useful life estimates, decay rates, peak impact estimates are described.

Public Agency Program Description

Title: State and Federal Conservation Tax Credits - Personal and Corporate

Program Scope:

State and federal legislation established the solar and conservation tax credits. The conservation tax credit began in 1981 and ended at the end of 1986.

The program provided tax incentives to owners of new or existing buildings of any type to install conservation measures. The tax credits ranged from 10 percent to 40 percent depending on the year of installation, the building type and the type of measure installed. Tax credits directly reduce the income taxes owed by a taxpayer.

Both the total measure cost and state tax credit share were reported to the Franchise Tax Board (FTB). According to this data, the portion of costs for which tax credits were taken was:

<u>Credit Type</u>	<u>Tax Credit as a % of Measure Cost</u>
Residential	25.7
Nonresidential	24.8

Affected end-uses include space heating and cooling, and water heating. Tax credits were given for installation of conservation measures which: improved the thermal performance of a building (e.g., insulation, caulking, weatherstripping); improved appliance efficiencies (e.g., water heater blankets, flue dampers, replacement air conditioners and heaters); and reduced hot water usage (e.g., low flow showerheads).

Approximate distribution of conservation measures installed were:

	<u>Personal Returns</u> <u>(Percent)</u>	<u>Corporate Returns</u> <u>(Percent)</u>
Insulation	54.0	25.0
Pool Covers	7.0	1.0
Storm Windows/Doors	7.0	7.0
Exterior Shades	1.0	0.0
Load Management	2.0	19.0
Multi-installations	20.0	39.0
Other	9.0	9.0

CONSERVATION TAX CREDIT PROGRAM
ANNUAL IMPACTS

STATEWIDE	1981	1982	1983	1984	1985	1986
RESIDENTIAL						
#CUST	239,740	229,697	191,882	138,162	138,162	24,647
\$000	52,846	61,121	49,460	40,707	40,707	31,086
INC GWH	51	59	48	39	39	30
CUM GWH	51	111	159	198	238	268
INC MW	13	15	12	10	10	8
CUM MW	13	28	40	50	59	67
CORPORATE						
#CUST	389	2,244	1,548	3,906	3,906	6,063
\$000	3,503	12,621	3,071	8,076	8,076	12,150
INC GWH	11	41	10	26	26	40
CUM GWH	11	53	63	89	116	155
INC MW	3	12	3	8	8	12
CUM MW	3	16	19	27	34	46
TOTAL						
#CUST	240,129	231,941	193,430	142,068	142,068	30,710
\$000	56,349	73,742	52,531	48,783	48,783	43,236
INC GWH	63	101	58	66	66	70
CUM GWH	63	163	221	287	353	423
INC MW	16	27	15	18	18	19
CUM MW	16	43	58	76	94	113

Description of Impact Calculations:

The table above is based on data from Franchise Tax Board. Expenditures, total costs and number of credits claimed were obtained from data collected by the Franchise Tax Board (FTB). Unfortunately, FTB's measure categories are too broad to allow energy savings estimation by measure or end-use. Fifty-four percent of all credits are claimed for some combination of wall, floor, attic, duct and pipe insulation; and 20 percent are claimed for "multi-installations." Privacy considerations prevent the FTB from releasing a sample of returns for more detailed analysis.

Given these limitations, savings are calculated from assumptions on the general class characteristics of retrofit conservation measures.

The Residential GWH was calculated by multiplying the number of dollars refunded,

shown as \$000s in the table, by the following factors: 0.0097 GWH per thousand dollars; 0.5 (discount for double counting by utility programs); and 0.2 (share of dollars that went to electric rather than gas savings). The residential MW calculation was based on a conversion of 0.25 MW/GWH.

To derive the GWH/\$k factor for the residential sector, we assumed: a 5 year simple payback; an average expenditure of \$1000; an average electrical rate of 8 cents/kwh; and a ratio of cost of measure to public expenditure of 3.88.

The GWH were calculated for the corporate sector by multiplying the number of dollars refunded, shown as \$000s in the table, by the following factors: 0.5 (discount for double counting by utility programs); 0.81 (discount for money spent on load management devices); 0.0101 GWH per thousand dollars of public dollars expended; and 0.8 (share of dollars that went to electric rather than gas savings). The corporate sector MW calculation was based on a conversion of 0.25 MW/GWH, with the dollars spent being increased by a factor of 1.19 to account for the money spent on load management devices.

In deriving the GWH per thousand dollars factor for the corporate sector, we assumed: a 5 year simple payback; an average expenditure of \$15,000; an average electrical rate of 8 cents/kwh; and a ratio of cost of measure to public expenditure of 4.04.

For the residential and corporate sectors, staff reduced the savings estimates by half because utilities probably reported these savings as part of the results of their energy audit programs.

The assumed splits of 20 percent electric/80 percent gas for residential and 80 percent electric/20 percent gas for corporate sectors are based on professional judgment.

Tax credit expenditures are available by county. Estimates by planning area are made by aggregating tax credits by county into planning areas. The distribution of tax credits by planning area are:

PG&E	48.52
LADWP	7.98
SCE	28.37
SMUD	4.71
SDG&E	4.68
BGP	1.09
Other	4.66

Adjustments:

1. No net-to-gross adjustment was made (but see above discussion on calculation of annual incremental impacts).
2. An average useful life of 24 years was assumed, which is weighted heavily by insulation, which has a useful life of up to 40 years.
3. To determine the savings extent in a given year, the original net energy savings of a program are multiplied by the factors in a matrix created by the following formula :

$$1 - \frac{.75X}{1 + e^x}$$

where e = the base of natural logarithms
 x = (years after implementation - (useful life or the period during which 50% of the original savings are lost))

4. We have made no assumptions regarding replacement.
5. Peak impacts were estimated and considered coincident with system peak.
6. No transmission or distribution loss factors are included.
7. See above discussion on calculation of annual incremental impacts for information on additional adjustments.

Public Agency Program Description

Title: State and Federal Solar Tax Credits - Personal and Corporate

Program Scope:

The solar tax credits were established by state legislation in 1976 and ended at the end of 1986. The legislature passed a new solar tax credit program in 1989 (SB227) but it only authorizes credits for construction of commercial solar powered electric generation systems and therefore is not included in this DSM program.

The programs provide tax incentives to owners of new and existing buildings to install solar (and some conservation) measures. The state tax credits ranged from 10 to 55 percent depending on the year of installation, the building type, and the type of measure installed. Tax credits directly reduce the income taxes owed by a taxpayer.

Both total measure cost and state tax credit share are reported to the Franchise Tax Board (FTB) and are available approximately 18 months after the close of the tax year. The state solar tax credit law requires that any federal solar credits and utility assistance must be subtracted from the allowable state credit percentage. In some instances, this means that the state pays only 15 percent on systems which qualified for both federal and state credits. According to FTB data, solar residential credits have averaged 22.3 percent of the total measure cost and solar nonresidential credits were 27 percent of the total measure cost.

End-uses affected include space heating, and cooling, and water heating. Installation of solar measures: replace conventional space conditioning with active and passive solar systems, replace or augment conventional domestic water heating or pool/spa/hot tub heating with solar measures, and reduce pool heat losses (pool covers).

The number and percentage of solar systems installed between 1977 and 1984 were:

	Residential # (thousands)	Residential (percent)	Corporate (percent)
Pool water heating	87.9	24	2
Domestic water	165.6	46	10
Space conditioning	16.6	5	3
Production	2.3	< 1	22
Solar Mechanical Process	2.8	< 1	20
Wind	0.8	< 1	36
Multi types	32.3	9	7
Pool covers	52.8	15	0
Total	361.1	100	100

SOLAR TAX CREDIT PROGRAM
ANNUAL IMPACTS

STATEWIDE	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
RESIDENTIAL										
#CUST	13,462	16,801	40,991	85,054	60,967	50,956	57,265	62,821	62,821	4,136
\$000	7,756	6,544	32,784	58,029	54,534	76,410	125,761	168,961	168,961	168,704
INC GWH	4	4	18	31	29	41	68	91	91	91
CUM GWH	4	8	25	57	86	127	195	287	378	469
INC MW	1	1	4	8	7	10	17	23	23	23
CUM MW	1	2	6	14	22	32	49	72	94	117
CORPORATE										
#CUST	36	51	433	1,267	2,711	2,724	1,784	3,736	3,735	3,338
\$000	87	203	789	2,882	3,254	7,705	8,530	30,133	30,133	38,804
INC GWH	0	0	0	1	1	3	4	13	13	15
CUM GWH	0	0	0	2	3	6	10	22	36	51
INC MW	0	0	0	0	0	0	0	1	1	1
CUM MW	0	0	0	0	0	0	1	1	2	3
TOTAL										
#CUST	13,498	16,852	41,424	86,321	63,678	53,680	59,049	66,557	66,556	7,474
\$000	7,843	6,747	33,573	60,911	57,788	84,115	134,291	199,094	199,094	202,508
INC GWH	4	4	18	33	31	45	72	104	104	106
CUM GWH	4	8	26	59	89	134	205	310	414	520
INC MW	1	1	4	8	7	11	17	24	24	24
CUM MW	1	2	6	14	22	32	49	73	97	120

Description of Impact Calculations:

The table above is based on data from Franchise Tax Board. The Residential GWH was calculated by multiplying the number of dollars refunded, shown as \$000s in the table, times the following factors: 0.0054 GWH per thousand dollars; 0.5 (discount for double counting from utility programs); 0.2 (share of expenditures to save electricity rather than gas). The residential MW calculation was based on a conversion of 0.25 MW/GWH.

To derive the GWH per thousand dollars factor for the residential sector, we assumed: a 10 year simple payback; an average expenditure of \$1,000; an average electrical rate of 8 cents/kwh; and a ratio of cost of measure to public expenditure of 4.32.

The GWH were calculated for the corporate sector by multiplying the number of dollars refunded, shown as \$000s in the table, by the following factors: 0.5 (discount for double counting from utility programs); 0.0046 gwh per thousand dollars; 0.233 (to remove all but direct savings); and 0.8 (share of expenditures to save electricity rather than gas). The corporate sector MW calculation was based on a conversion of 0.06 MW/GWH.

To derive the GWH per thousand dollars factor for the corporate sector, we assumed: a 10 year simple payback; an average expenditure of \$15,000; an average electric rate of 8 cents/kwh; and a ratio of cost of measure to public expenditure of 3.68.

For the residential and corporate sectors, we reduced the savings estimates by half because utilities probably reported some of these savings in their own programs. The assumed splits of 20 percent electric/80 percent gas for residential and 80 percent electric/20 percent gas for corporate sectors are based on professional judgment.

Tax credit expenditures are available by county from the Franchise Tax Board. Estimates by planning area can be made by aggregating the tax credits by county. The distribution of credits by planning area are (percent):

PG&E	50.3	SDG&E	7.5	SMUD	4.0	BGP	0.9
SCE	27.7	Other	4.1	LADWP	6.6		

Adjustments:

1. No net-to-gross adjustment was made (but see above discussion on calculation of annual incremental impacts).
2. We assume an average useful life of 15 years for residential and 20 years for corporate sector measures.
3. To determine the savings extent in a given year, the original net energy savings of a program are multiplied by the factors in a matrix created by the following formula :

$$1 - (1 - 0.75X)^e$$
 where e = the base of natural logarithms
 x = (years after implementation - (useful life or the period during which 50% of the original savings are lost))
4. We have made no assumptions regarding replacement.
5. Peak impacts were estimated and are considered coincident with system peak.
6. No transmission or distribution loss factors were used.
7. See above discussion on calculation of annual incremental impacts for information on additional adjustments.

Public Agency Program Description

Title: Miscellaneous Weatherization Retrofit (Public Agency Programs)

Program Scope:

End-uses affected for the three miscellaneous weatherization retrofit programs listed below include: space heating and cooling; water heating; installation of conservation measures which improve the thermal integrity of the building shell (insulation, weatherstripping); and other appliance measures (water heater blankets).

California Department of Economic Opportunity (DEO) Weatherization - The U.S. DOE Weatherization Assistance Program pays all costs for community-based organizations to identify, audit, retrofit and inspect low-income homes. Funds are distributed throughout the state based on climate, cost of energy, and proportion of low-income population. The maximum benefit per housing unit for low income occupants of single-family, multi-family and mobile homes, statewide is adjusted annually. It was established in 1978 by federal law (U.S. Code, Title 10, Chapter II, Part 440). Additional funds and program direction are provided by the Low Income Home Energy Assistance Program (LIHEAP) funded through the U.S. Health and Human Services (H&HS) agency. Maximum benefits under LIHEAP total \$2,000 per housing unit. California has supplemented funding through 1990 by awarding Petroleum Violations Escrow Account (PVEA) monies for this program and received almost \$3 million in 1994 from H&HS as a leveraging incentive award.

Energy Bank - This program, funded by U.S. HUD and administered by CEC, provided grants and loans subsidies to encourage the installation of conservation measures for low and moderate income owners and renters of single family and multi-family units. The incentives range from 20 to 50 percent depending on the income of the recipient and the building type. Most of the funds were awarded to utilities and local governments for distribution in their areas to eligible recipients. The average bank incentive was 40 percent of the cost of measures installed (based on expenditures from 3/84 to 8/86). Fifteen percent of match funds came from federal programs and 85 percent come from utility financing and rebates (particular Southern California Edison). The program was funded by Congress from 1982 through 1988.

Multi-family - These programs include the \$1.4 million Multi Family Weatherization Financing Program, a demonstration project begun in 1983, ended in 1988, administered by the CEC and funded by Federal PVEA funds to encourage private financing for multi-family housing energy conservation measures. Also included is the \$386,525 Apartment Energy Investment Project, a grant program to demonstrate the feasibility of developing and operating a self supporting one stop full service organization to conserve energy in the multi-family rental market. The \$75,000 Multi-family Technical Assistance Program was a grant program started in 1986 to supply technical assistance for apartment complex owners; it expired in 1987.

Description of Impact Calculations for D.E.O Weatherization:

The table below is based on data from the California DEO. We estimated energy savings at \$190,000/GWH, based on similar programs administered by utilities. This estimate was reduced by a factor of 0.5 to account for probable double counting of savings in utilities program data, and by a factor of 0.2 to account for the share of dollars that probably were spent on gas savings rather than electric savings. A factor of 0.25 MW/GWH was used to estimate the MW savings; the same conversion factor we used for the conservation tax credit program.

D.E.O. LOW-INCOME WEATHERIZATION ASSISTANCE
ANNUAL IMPACTS

YEAR	TOTAL PUBLIC \$ EXPENDED (000s)	HOUSEHOLDS PARTICIPATING	NET INC GWH	CUM GWH	NET INC MW	CUM MW
1979	2,509	4,499	1	1	0	0
1980	5,437	9,017	3	4	1	1
1981	4,630	6,287	2	7	1	2
1982	5,693	10,728	3	10	1	2
1983	8,987	15,482	5	14	1	4
1984	13,448	24,134	7	21	2	5
1985	13,001	22,614	7	28	2	7
1986	10,731	19,318	6	34	1	8
1987	2,680	3,991	1	35	0	9
1988	8,458	16,689	4	40	1	10
1989	15,805	28,053	8	48	2	12
1990	15,295	23,253	8	56	2	14
1991	13,595	26,651	7	63	2	14
1992	16,604	26,828	7	71	2	18
1993	15,110	20,232	7	74	2	19
1994	20,666	25,987	11	73	2	18

Based on DEO's allocation formulae for distributing funds by county for the program, the expenditures and number of participants were allocated to planning areas as follows:

	<u>Public Expenditures</u>	<u>Number of Participants</u>
PG&E	.50	.56
SCE	.21	.19
LADWP	.11	.09
SDG&E	.07	.07
SMUD	.04	.04
Other	.07	.05

Description of Impact Calculations for Energy Bank:

We used information provided in semi-annual reports from program participants to derive expenditures. Savings were calculated from assumptions of a 5-year simple payback on conservation measures and a 10-year simple payback on solar systems.

For the residential sector we assumed an average measure cost of \$300; an average electrical rate of 8 cents per kWh; and a ratio of the cost of measure to public expenditure of 2. For the nonresidential sector we assumed a \$16,000 average measure cost; an average rate of 8 cents per kWh; and a ratio of cost of measure to public expenditure of 5.

For the PGandE and SMUD planning areas, we assumed that 80 percent of the expenditures saved gas and 20 percent electricity.

ENERGY BANK PROGRAM
ANNUAL IMPACTS

YEAR	PUBLIC EXPEND. (\$000)	RESIDENTIAL			NON-RESIDENTIAL			
		NUMBER OF CUSTOMERS	INC GWH	CUM GWH	PUBLIC EXPEND. (\$000)	NUMBER OF CUSTOMERS	INC GWH	CUM GWH
STATEWIDE								
1984	484	1,878	2	2				
1985	1,172	5,678	4	6	45	18	1	1
1986	2,317	19,828	7	13	78	31	1	2
1987	348	1,740	0	13	87	35	1	3
1988	55	200	0	13				
PGandE								
1984	111	863	0	0				
1985	280	1,645	0	0				
1986	703	2,036	1	1	13	5	0	0
1987	228	1,201	0	1	10	4	0	0
1988	20	138	0	1				
SMUD								
1984	15	34	0	0				
1985	37	2,563	0	0				
1986	356	12,444	0	0				
1987	87	278	0	0				
1988	15	32	0	0				
SCE								
1984	358	981	2	2				
1985	856	2,812	4	6	45	18	1	1
1986	1,258	5,348	6	12	65	26	1	2
1987	33	261	0	12	77	31	1	3
1988	15	30	0					

Description of Impact Calculations for Multi-family Energy Savings

We have not included the net effects of the Multi-family Energy Savings programs because estimates of their effects are too small. We estimated that the largest of these programs, the Multi Family Weatherization Financing Program, could have provided about 1.5 GWh savings statewide in its most heavily financed year, 1983. Quantifying the conservation savings from these programs is difficult because the programs focus on providing information on how to obtain financing for energy efficiency measures instead of directly installing energy saving measures.

Adjustments to Miscellaneous Weatherization Retrofit Programs:

1. No net-to-gross adjustment was made (but see above discussions on the calculation of annual incremental impacts).
2. We assume a 15 year useful life for these measures.

3. To determine the savings extent in a given year, the original net energy savings of a program are multiplied by the factors in a matrix created by the following formula :

$$1 - \frac{1}{1 + e^{-.75X}}$$

where e = the base of natural logarithms

x = (years after implementation - (useful life or the period during which 50% of the original savings are lost))

4. We have made no assumptions regarding replacement.
5. Peak impacts were estimated to be negligible for these programs.
6. No transmission or distribution loss factors were used.
7. See the above discussion on calculation of annual incremental impacts for information on additional adjustments.

Public Agency Program Description

Title: Facilities Grants and Matching Loans Program (Schools and Hospitals)

Program Scope:

This program was designed to reduce energy use and expense in schools, colleges, or hospitals. The Energy Commission-sponsored energy efficiency projects in schools and hospitals are funded by either federal cost sharing grants or state loans. The loans are repaid from energy savings generated by the project. Information on the programs is disseminated through trade association meetings, staff workshops and general mailings from the Commission.

The grant program was established by the National Energy Conservation and Policy Act of 1978 (Public Law 95-619). The state sponsored loan program was established by the Energy Conservation Assistance Act of 1979 and is described in Sections 25410 through 25421 of the Public Resources Code.

Staff calculated savings from participating schools and hospitals that obtained grants with matching loans. Staff has not included schools and hospitals that obtained loans without grants. Little information on energy savings from the "loans only" group of participants is available, especially for the early years of this program. The "loans only" recipients represent a small fraction of the total expenditures in the program, and their energy savings are likely to be included in savings estimates from other programs such as the California Energy Extension Service's Schools Program or the CEC's Local Jurisdiction Energy Assistance Program.

<u>Measures Installed</u>	Percent of Total Measure <u>Expenditures</u>
Lighting Modifications	14
Mechanical controls (e.g. HVAC clocks)	22
HVAC Modifications	34
Energy Generation	18
Miscellaneous	12

YEAR	TOTAL PROJECT COST \$000	NUMBER GRANTS & LOANS
1979	8,045	51
1980	10,284	76
1981	14,566	81
1982	4,512	42
1983	10,172	65
1984	14,183	88
1985	6,360	44
1986	5,368	53
1987	3,904	23
1988	7,474	50
1989	3,437	19
1990	4,324	15
1991	9,057	30
1992	5,934	21
1993	5,087	n/a
1994	4,364	n/a

GRANTS AND MATCHING LOANS PROGRAM
ANNUAL INCREMENTAL IMPACTS

Energy Savings (GWh)

YEAR	BGP	LADWP	OTHER	PG&E	SCE	SDGE	SMUD	TOTAL
1979	0.36	1.94	0.36	8.65	0.43	0.42	0.90	13.06
1980	0.79	4.24	0.79	18.84	0.93	0.93	1.95	28.47
1981	0.98	2.48	0.98	16.10	3.51	3.51	1.05	28.61
1982	4.02	3.14	4.02	23.89	7.52	7.53	1.06	51.18
1983	2.07	3.11	2.07	13.54	4.03	4.03	0.50	29.35
1984	2.83	6.25	2.83	22.82	6.09	6.09	0.78	47.69
1985	0.95	2.18	0.95	8.29	2.16	2.16	0.27	16.96
1986	1.01	2.30	1.00	8.77	2.28	2.28	0.29	17.93
1987	0.91	2.06	0.91	7.94	2.08	2.08	0.26	16.24
1988	0.16	6.40	0.00	10.81	8.43	2.37	0.00	28.17
1989	0.00	1.39	0.00	4.95	9.79	0.00	0.00	16.13
1990	0.00	2.33	0.00	0.87	3.74	2.96	0.00	9.90
1991	0.00	0.00	3.60	10.46	5.63	1.36	0.00	21.05
1992	0.46	0.00	1.29	4.62	3.57	0.00	0.00	9.94
1993	0.98	0.27	0.84	2.04	4.97	0.00	0.00	9.10
1994	0.00	0.00	0.66	1.40	8.79	0.00	0.00	10.85

Peak Capacity Estimates (MW)

YEAR	BGP	LADWP	OTHER	PG&E	SCE	SDGE	SMUD	TOTAL
1979	0.07	0.39	0.07	1.73	0.09	0.08	0.18	2.61
1980	0.16	0.85	0.16	3.77	0.19	0.22	0.39	5.74
1981	0.20	0.50	0.20	3.22	0.70	0.84	0.21	5.87
1982	0.80	0.63	0.80	4.78	1.50	1.81	0.21	10.53
1983	0.41	0.62	0.41	2.71	0.81	0.97	0.10	6.03
1984	0.57	1.25	0.57	4.56	1.22	1.46	0.16	9.79
1985	0.19	0.44	0.19	1.66	0.43	0.52	0.05	3.48
1986	0.20	0.46	0.20	1.75	0.46	0.55	0.06	3.68
1987	0.18	0.41	0.18	1.59	0.42	0.50	0.05	3.33
1988	0.03	1.29	0.00	2.18	1.71	0.48	0.00	5.69
1989	0.00	0.28	0.00	0.99	1.96	0.00	0.00	3.23
1990	0.00	0.48	0.00	0.18	0.78	0.62	0.00	2.06
1991	0.00	0.00	0.08	0.18	0.28	0.00	0.00	0.54
1992	0.15	0.00	0.17	0.81	0.61	0.00	0.00	1.74
1993	0.24	0.10	0.10	6.56	0.68	0.00	0.00	7.68
1994	0.00	0.00	0.04	0.49	1.34	0.00	0.00	1.87

Description of Impact Calculations:

The electricity savings estimates have been generated from loan and grant application calculations; gas savings are not presented. The energy savings are primarily from retrofit projects. Energy savings from changes to "operating and maintenance procedures" identified in the energy and technical audit reports have not been included.

Energy savings are calculated based on total cost--not just the state's share.

Peak capacity estimates are based on proportion of MW to GWh in 1985 for each planning area.

Adjustments:

1. No net-to-gross factor was used.
2. A 12-year useful life is used.
3. To determine the savings extent in a given year, the original net energy

savings of a program are multiplied by the factors in a matrix created by the following formula :

$$1 - (1 / (1 + e^{-.75X}))$$

where e = the base of natural logarithms

x = (years after implementation - (useful life or the period during which 50% of the original savings are lost))

4. No replacement assumptions were made.
5. Peak impacts are coincident with system peak.
6. No loss factors are used.
7. There are no other adjustments.

Public Agency Program Description

Title: Streetlight Conversion

Program Scope:

The program is designed to convert streetlight equipment owned by California's 550 local governments. The program was established in 1980 and is described in Section 25412.5 and 25416 of the Public Resources Code. Section 25421 prescribes a program termination date of January 1, 1991.

The program affects the amount of energy used by streetlights by converting the existing, less efficient streetlights to a more efficient lamp type (high or low vapor pressure sodium vapor) or by rewiring.

The Energy Commission sponsored streetlight conversions are funded with loans which are repaid from savings in streetlighting utility costs attributable to the conversion. Information on the program is disseminated through trade associations meetings and general mailings from the Commission.

No loans have been made for streetlights since 1991.

STATEWIDE ANNUAL EXPENDITURES (THOUSANDS)

<u>YEAR</u>	<u>ANNUAL STREETLIGHT EXPENDITURES (THOUSANDS)</u>	<u>(CUMULATIVE) # OF LOCAL GOVERNMENTS</u>
1979	0	0
1980	4,594	10
1981	6,584	44
1982	1,464	51
1983	0	51
1984	33	53
1985	2,365	63
1986	1,514	67
1987	771	70
1988	0	70
1989	1,361	78
1990	1,002	85
1991	1,216	88
1992	0	88

STREETLIGHT CONVERSION PROGRAM
CUMULATIVE SAVINGS
(GWH)

<u>Year</u>	<u>SMUD</u>	<u>PG&E</u>	<u>SDG&E</u>	<u>SCE</u>	<u>BGP</u>	<u>LADWP</u>	<u>OTHER</u>
1979	0	0	0	0	0	0	0
1980	0	4.2	0	15.0	3.3	7.7	5.9
1981	0	13.5	3.2	24.2	3.3	17.4	8.7
1982	0	15.7	3.5	24.6	3.3	23.8	9.0
1983	0	15.7	3.5	24.6	3.3	23.8	9.0
1984	0	15.7	3.5	25.5	3.3	23.8	9.0
1985	0	16.3	3.5	27.8	3.3	27.4	9.0
1986	0	17.1	3.5	28.1	3.3	29.8	9.0
1987	0	17.1	3.8	29.5	3.3	29.8	9.0
1988	0	17.1	3.8	29.5	3.3	29.8	9.0
1989	0	19.1	3.9	29.8	3.3	30.1	9.1
1990	0.4	20.0	3.9	30.5	3.3	30.1	9.1
1991	0.4	20.9	3.9	30.5	3.3	30.1	9.1
1992	0.4	20.9	3.9	30.5	3.3	30.1	9.1
1998	0.4	20.9	3.9	30.5	3.3	30.1	9.1
2005	0.4	20.9	3.9	30.5	3.3	30.1	9.1
2011	0.4	20.9	3.9	30.5	3.3	30.1	9.1

Description of Impact Calculations:

The savings numbers have been derived from standard engineering estimates for individual lamp and ballast conversions which are contained in loan applications or actual conversions when projects have been completed.

Loan applications on file at the Energy Commission were used to estimate savings for projects not yet completed and final reports from the borrower were used for completed projects.

Adjustments:

1. No net to gross factor was used.
2. No adjustment is made for "useful life."
3. No degradation is estimated, because once conversion is made replacement of more energy efficient bulbs is no more expensive then maintaining the old system would have been.
4. Replacement is assumed to be 100 percent.
5. Peak impacts are not coincident with system peak and so are not estimated.
6. No transmission or loss factors are used.
7. No other adjustments are used.

Public Agency Program Description

Title: CEC Local Jurisdiction Energy Assistance Program

Program Scope:

The 1985 California Energy Plan, the 1986 Conservation Report, and the 1988 Conservation Report recommended that the state assist local governments in energy management and conservation activities. In 1985, 1986, and 1987 the CEC used State Energy Conservation Plan (SECP) funds and Petroleum Violation Escrow Account (PVEA) funds to provide technical assistance to local governments. In 1986 the Legislature passed SB 880 (L. Greene) which allocated \$14 million in PVEA funds to the CEC for a local jurisdiction energy assistance program. The SB 880 program is expected to continue until July 1, 1996. For administrative purposes, this program has been merged with other programs that are funded through the CEC's Energy Conservation Assistance Account.

The Commission's local jurisdiction energy assistance program has two major functions:

- (1) To provide cities and counties with direct technical assistance to identify and evaluate options for improving the efficiencies of local government energy use; and train local government staff in energy management concepts, techniques, and skills.

Typically, a local government initiates a request for technical assistance by submitting an application to the CEC's Energy Partnership Program. After reviewing an application, and evaluating the energy savings potential of the local government, the CEC may direct a state-funded contractor to provide the requested assistance at no cost to the local government. At the completion of the job, the contractor submits a report to the CEC that identifies cost-effective conservation projects which the local government may install. These contractor reports contain estimates of project costs and engineering calculations of energy savings likely to result from the expenditure of public funds.

- (2) To provide loans to local governments for the purchase and installation of energy efficient equipment in new or existing facilities.

The financial assistance portion of the Energy Partnership Program came into effect in 1989. In this program, a loan obtained by a local government for an energy project is repaid from the installed project's energy savings. Consequently, a loan application must include both anticipated project costs and expected energy savings.

Specific end-use energy conserving actions or conservation projects in these programs can be divided into four general categories: (1) operation and maintenance procedures that provide immediate no-cost, low-cost energy savings opportunities; (2) modifications of existing structures, equipment, or energy systems that generally require additional technical evaluation and design; (3) design and operation of new equipment and/or new load management technologies (i.e., energy management controls, thermal energy storage, and cogeneration); and (4) development and implementation of load management strategies (i.e., load cycling and time-of-use rates).

CEC LOCAL JURISDICTION ENERGY ASSISTANCE PROGRAM

STATEWIDE ELECTRICAL IMPACTS (1985 - 1987)

Year	\$000 Expended	Customers Participating	Incremental		Cumulative	
			GWh	MW	GWh	MW
1985	1,983.3	15	0.0	0.0	0.0	0.0
1986	1,983.3	30	0.0	0.0	0.0	0.0
1987	1,983.3	35	0.4	0.0	0.4	0.0

Description of Impact Calculations:

Once the application for assistance is approved, the CEC hires a consultant to identify feasible projects. Results of this identification process are provided to the CEC in reports, which include cost and savings estimates for each potential project identified at the site. Based on the savings tentatively identified in these reports, the impacts for the program prior to passage of SB 880 (when the program emphasized technical assistance only) are estimated by using a ratio of 0.4 MWH savings per \$1000 of public expenditures.

Savings figures from program expenditures after SB 880 (when energy assistance was emphasized) were obtained from verification of installation of projects using the engineering calculations that were incorporated in the project. Additional monitoring of the projects is underway to verify the engineering estimates. The following 3 tables provide this, most recent, assessment of the effects of the program. The table for SCE includes projects approved for Colton and Riverside; the PG&E table includes projects in and around Turlock and Tuolumne county. Because savings prior to 1990 were small (on a statewide basis) and because a more accurate accounting system on savings was in effect in 1990, savings prior to 1990 are not included in the staff assessment of impacts for the demand forecast. Note also adjustments numbered 1, 2, and 7 below.

Adjustments:

1. No net-to-gross adjustment was made; however the net savings were reduced by 50 percent due to probable double counting of savings in utility-sponsored DSM programs.
2. An 8 year useful life is assumed. Staff assumes a 2 year lag time in the implementation of projects. Therefore, the expenditures identified in the tables reflect commitments made two years prior.
3. To determine the savings extent in a given year, the original net energy savings of a program are multiplied by the factors in a matrix created by the following formula :
$$1 - \frac{.75X}{1 + e^x}$$
where e = the base of natural logarithms
 x = (years after implementation - (useful life or the period during which 50% of the original savings are lost))
4. No replacements are assumed.
5. Peak impacts were estimated and assumed to be coincident with system peak.
6. No transmission or distribution loss factor was used.
7. Because of the small total savings statewide and the high probability that some of these savings are included in utility reports on the impacts of their managed DSM programs, this program's effects prior to 1990 are not included in the Staff demand forecast.

Public Agency Program Description

Title: Farm Energy Assistance Program

Program Scope:

FEAP was established by SB 1145 in 1986. Its purpose is to help the agricultural industry and small family farms to reduce energy costs and farmers in their long term efforts to remain competitive.

The program is administered by the CEC and provides both financial and technical assistance for both direct energy consumption (energy demand) and indirect use (fossil fuel-based input). It encourages the implementation of farming practices that have energy conservation potential.

This program provides: direct technical assistance to farmers through the University of California for education and training activities; grant monies for on-farm demonstration of energy efficient agricultural technologies; and low-interest loans to purchase energy-efficient farm equipment. The program sponsors projects demonstrating energy efficient water management practices, limited-till cultivation, improved fertilization and use of nitrogen fixing cover crops, biological and integrated pest management systems, livestock management techniques, and renewable energy technologies.

Over 200 California farmers are participating in Commission sponsored grant projects.

Year	Public Dollars Expended	Total Investment	Annual Number of Customers Participating	Incremental Impacts GWh	MW
1989	1,000	1,000	100	1.20	0.25
1990	2,000	3,000	120	2.40	0.50
1991	2,000	5,000	200	2.40	0.50
1992	500	5,500	220	0.61	0.13
1993	1,000	6,500	260	1.22	0.25
1994	500	7,000	280	0.61	0.13

INCREMENTAL IMPACTS (GWH)

	1989	1990	1991	1992	1993	1994
PG&E	0.90	1.80	1.80	0.31	0.61	0.31
SCE	0.30	0.60	0.60	0.30	0.61	0.30
Total	1.20	2.40	2.40	0.61	1.22	0.61

PEAK CAPACITY (MW)

	1989	1990	1991	1992	1993	1994
PG&E	0.17	0.34	0.34	0.09	0.17	0.09
SCE	0.08	0.16	0.16	0.04	0.08	0.04
Total	0.25	0.50	0.50	0.13	0.25	0.13

Description of Impact Calculations:

Savings estimates are based on utility program experience for similar programs; ratios of 1.22 MWh per \$1000 and 0.25 MW per \$1000 were used.

Adjustments:

1. No net-to-gross factor is used.
2. Useful life is assumed to be 10 years.

3. To determine the savings extent in a given year, the original net energy savings of a program are multiplied by the factors in a matrix created by the following formula :

$$1 - (1 / (1 + e^{-.75X}))$$

where e = the base of natural logarithms

x = (years after implementation - (useful life or the period during which 50% of the original savings are lost)).

4. No replacement is assumed.
5. Peak impacts are assumed to be coincident with system peak.
6. No transmission or distribution losses are assumed.
7. No other adjustments are used.

Public Agency Program Description

Title: California Energy Extension Service Schools Program

Program Scope:

The California Energy Extension Service (CEES) administers directly or jointly with other public agencies several energy related programs: The Regional Energy Management Center for K-12 Schools (REMC); The Small Business Energy Program; The Small Business Energy Efficiency Improvement Loan Program (jointly with the California Department of Commerce); and the State Assistance Fund for Energy--California Business and Industrial Development Corporation.

The REMC is the only CEES program included in the staff forecast. The other demonstration programs are not large enough to have a significant impact on statewide energy use. Since 1981 the REMC provided energy management services to roughly 1,000 K-12 schools in California. All end-uses were affected with emphasis on low-cost lighting and HVAC equipment. The program also encouraged changes in hours of operation for HVAC equipment. The program ended in 1994.

STATEWIDE CHARACTERISTICS

<u>Year</u>	<u>CEES (\$000)s Expended</u>	<u>Number of Customers Participating</u>	<u>Incremental Impacts</u>	
			<u>GWh</u>	<u>MW</u>
1982	87.0	40	0.25	0.05
1983	88.8	80	0.26	0.05
1984	93.5	78	0.27	0.06
1985	54.0	60	2.19	0.03
1986	0.0	0	2.19	0.00
1987	74.5	152	1.86	0.04
1988	760.7	252	2.16	0.45
1989	760.7	436	2.19	0.45
1990	644.4	726	1.86	0.38
1991	748.4	1,016	2.16	0.45
1992	558.4	1,016	1.61	0.33
1993	596.1	1,560	1.72	0.35
1994	204.9	1,560	0.59	0.12

Description of Impact Calculations:

Estimates of funds expended are provided through EES from their participant-reported monthly utility billing data. Forecast savings were estimated using 0.012 GWh/\$1,000 expended and 0.0025 MW/\$1,000 expended, which were based upon approximate utility energy to expenditure ratio for energy management incentive programs. Improved estimates of energy savings from this program are due to be reported in an evaluation by EES that should be available in mid 1995.

Impacts were apportioned to the various planning areas based on the average expenditures per planning area from 1990 to 1994. This approximation yielded the following fractions for the calculation of impacts per planning area: PGE=0.72; SCE 0.11; LADWP=0.09; and SDGE=0.08.

Adjustments:

1. A net-to-gross factor of 0.8 was used to account for personnel changes in the schools that affects the operation of energy saving programs at the location. An adjustment factor of 0.5 was used to estimate the effects of double-counting program effects by utilities. Expenditures that were used to save natural gas savings were removed by multiplying the annual CEES expenditures shown in the above table by 0.6.

2. A 6-year useful life was used for all planning areas.

3. To determine the savings extent in a given year, the original net energy savings of a program are multiplied by the factors in a matrix created by the

following formula :

$$1 - (1 / (1 + e^{-.75X}))$$

where e = the base of natural logarithms

x = (years after implementation - (useful life or the period during which 50% of the original savings are lost))

4. No replacement is assumed.
5. Peak impacts are assumed to be coincident with system peak.
6. No transmission or loss factors are used.
7. No other adjustments are used.