

SAN DIEGO REGIONAL ENERGY PLAN

DECEMBER 1994

San Diego



**ASSOCIATION OF
GOVERNMENTS**

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ABSTRACT

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ABSTRACT: Energy use in the region has significant effects on the economy, environment and quality of life. The Regional Energy Plan provides a framework of specific actions needed to achieve the reliable, affordable, and environmentally sound future desired by the region.

The Plan identifies significant energy issues for the region, offers a portfolio of preferred energy resources, objectives, policies, and specific Action Plan measures for local implementation.

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CHAPTER 1
INTRODUCTION

CHAPTER 1

INTRODUCTION

Why a Regional Energy Plan?

One of the San Diego region's indispensable lifebloods is energy. It makes homes and businesses comfortable, moves people and goods, operates the machinery of industry, and powers the infrastructure that underpin the region's communities. The region spends almost \$3 billion every year for its energy supplies.

This pervasive role makes energy a key issue in the region's future. Energy choices made today will have significant effects on tomorrow's economy, environment, and quality of life generally. It is this linkage that constitutes the Regional Energy Plan (REP) purpose: using energy as a tool for improving the region's future.

This linkage has been recognized by participants in the region's growth management process, who requested preparation of the REP. These local government decision-makers are increasingly aware of their ability to improve economic and environmental conditions through energy actions. In response, the REP presents a blueprint that can lead the region to the following benefits by 2010:

- Cumulative energy cost savings of nearly \$1.5 billion.
- Creation of over 5,000 new jobs in energy efficiency services.
- Elimination of about 1/2 million tons of air pollutants.

Also importantly, the REP provides a framework for consensus-building among stakeholders on the specific actions needed to achieve the cumulative benefits illustrated in Figure 1.1.

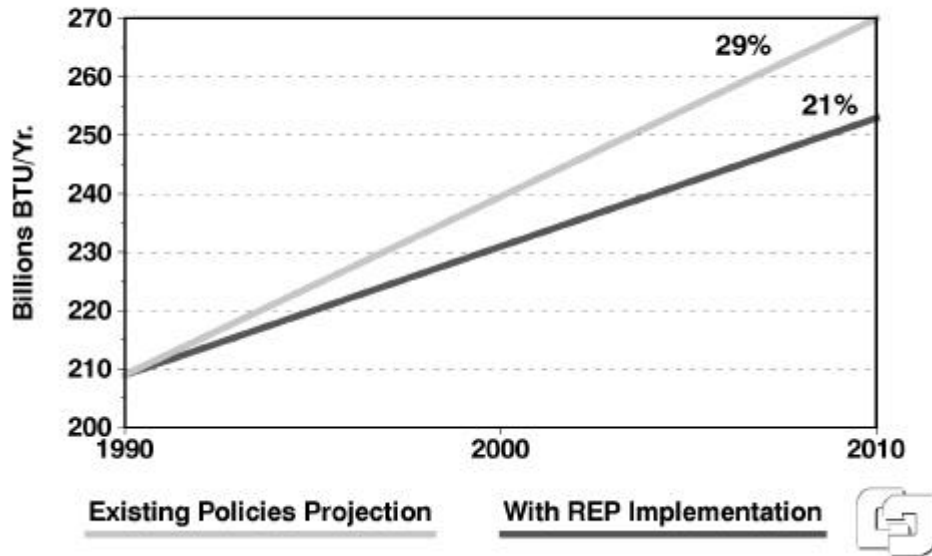
Development of the Plan

The REP has been developed by the SANDAG Board of Directors' Energy Advisory Committee. The Committee is composed of 30 members representing a cross-section of the region's energy stakeholders: local governments, consumers, suppliers, and regulators.

Figure 1.1

SAN DIEGO REGIONAL ENERGY GROWTH

SAN DIEGO REGIONAL ENERGY GROWTH



Using the year 2010 as a planning horizon, this group has assembled the REP according to a 4-step process:

1. Evaluation of trends and projection of future energy demands for the area encompassed by the eighteen cities and the County of San Diego.
2. Formulation of objectives and policies to guide the region toward the goal of an energy-efficient future.
3. Evaluation of options for meeting identified demands; and selection of a flexible "portfolio" of preferred resources for meeting those needs.
4. Design of a short-range plan of specific actions needed as first steps toward the 2010 goal.

The REP will become one of several supporting plans for the Regional Growth Management Strategy. The REP also joins a variety of utility and state government plans that affect energy demands and supplies in the region. The extensive amount of utility and state decision-making on regional energy affairs underscores the importance of an REP that advocates local needs and preferences.

CHAPTER 2
ENERGY NEEDS AND RESOURCE OPTIONS

CHAPTER 2

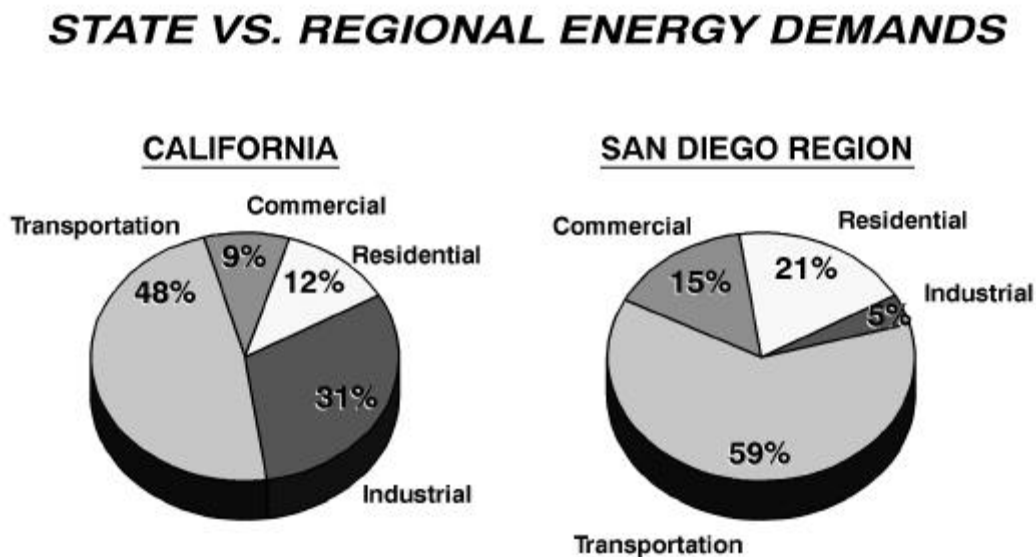
ENERGY NEEDS AND RESOURCE OPTIONS

What are the region's energy needs? How can they best be met? To answer these questions, the REP assessed current and projected energy demands, and evaluated the supply and efficiency resource options for meeting those demands. Needs have been categorized by end-use sector: transportation, residential, commercial and industrial, and public facilities and services. Resource options are also organized by these end-use sectors, and then further subdivided into efficiency improvements and specific types of fuels and supply choices.

The examination of current conditions reveals the following major regional characteristics:

- Demands are dominated by the transportation sector, which consumes over 50 percent of the region's energy annually as shown in Figure 2.1. This equates to over \$1 billion every year, most of which quickly leaves the local economy since virtually all transportation fuels are imported into the region. Transportation energy use is also the single largest source of air pollution in the region.

Figure 2.1



- The Residential, commercial and industrial sectors consume about 40% of the region's energy, but account for over \$1.5 billion in energy costs. The reason that energy costs for these sectors are higher than for transportation is that they all use substantial amounts of electricity, which costs about twice as much per unit of energy then does gasoline.
- There is enormous potential for improving the efficiency of energy use in all sectors. As shown in Figure 2.2, nearly two-thirds of the region's annual energy consumption is lost through distribution and conversion processes. In other words, of the almost \$3 billion spent annually, only about \$1 billion worth of productive end-use is achieved. This again equates to a weaker economy and degraded environment.

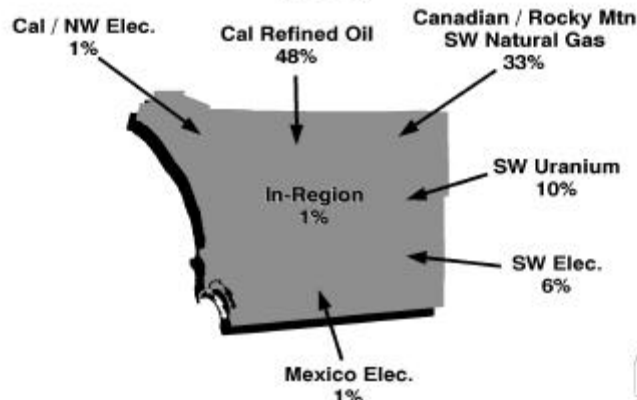
Figure 2.2

THE REGION'S ENERGY EFFICIENCY
(1990)

- In meeting its needs, the region is heavily dependent upon a relatively small mix of resources, almost all of which are imported into the region, including refined petroleum and natural gas which account for 75 percent of supplies. This reliance on outside sources, as shown in Figure 2.3, means the region's near \$3 billion annual expenditure only supports about 15,000 local energy jobs, with a majority of economic benefits going to other regions of the state and nation.

Figure 2.3

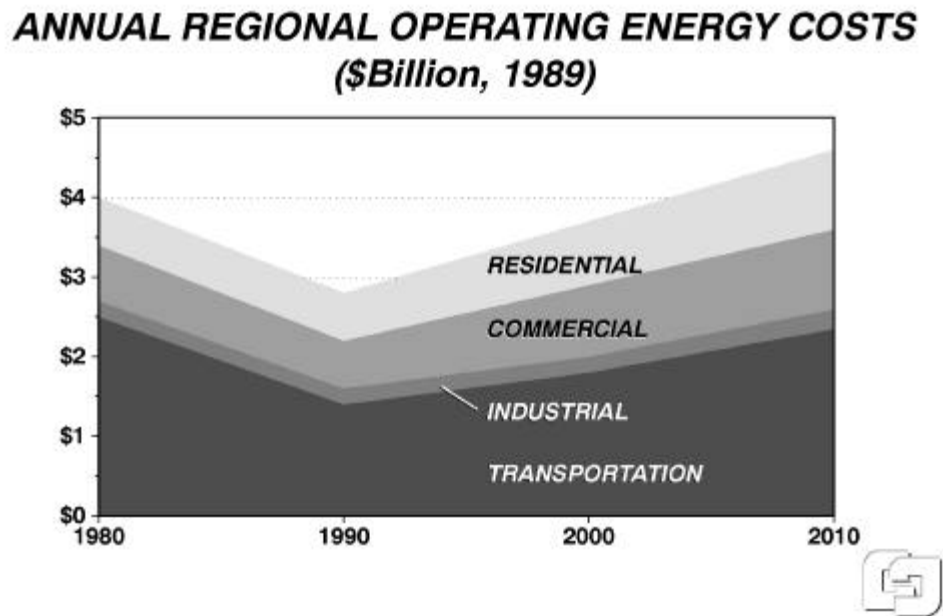
THE REGION'S ENERGY SUPPLY GEOGRAPHY
(1991)



Turning to the future, regional forecasts and trends reveal the following significant issues:

- The region's energy demands will increase approximately 30 percent by 2010, led by transportation demands that are increasing faster than population growth. Figure 2.4 illustrates the growth of energy demands in terms of potential costs to the region. The choice of which resources to use in meeting this load growth is a major decision for the region in several respects: costs to consumers and impacts on business income; jobs created to serve additional demands; and impacts that energy resources will have on the environment.

Figure 2.4



- Improvements in the efficiency of energy use should continue as a result of technological advances and public policy generally. This trend can be a foundation on which to build even greater regional economic and environmental gains through efficiency improvements.
- Public policy and legislation aimed at clean air and greater competition among energy suppliers will also create more choices in meeting future needs. Opportunities for local employment and environmental improvement will increase in parallel with alternative transportation fuels and technologies, and increased competition among energy suppliers.

Historic and projected demands for each end-use sector, and the supply options available to meet them are detailed further in Appendices A and B in Volume 2 of the REP.

CHAPTER 3
REGIONAL STRATEGY

CHAPTER 3

REGIONAL STRATEGY

Early in the REP process, the Energy Advisory Committee formulated a long-range strategy for meeting regional energy needs. The strategy includes significant issues identified during the REP process; an overall goal; and a set of objectives and policies that represent intermediate steps toward, and commitment to, goal achievement.

Significant Issues

1. Regional energy demands will increase approximately 30 percent during the planning period.
2. The region is presently dependent upon a relatively small number of supply resources, most of which are imported via a similarly small number of out-of-region sources.
3. The region has numerous efficiency and supply options for meeting future demands. Additionally, energy supplier deregulation and increased competition will expand options further.
4. The transportation sector warrants the highest priority attention due to the magnitude of its demands and effects on the region's economy and environment.
5. Within the building sector, residential buildings warrant particular attention because of their high proportion of building energy demand, and commercial buildings warrant particular attention because of large forecasted increases in their energy demands.
6. The region's relationship to Baja California also warrants particular attention because of significant linkages in demand growth, economic development, and environmental impacts.

Goal

Meet the energy needs of the San Diego region by employing resources efficiently and utilizing supplies which minimize cost, and are consistent with the environmental quality and economic prosperity objectives of the region's growth management strategy.

2010 Objective (compared to 1980 - 1990)

- A. Increase the rate of per capita energy efficiency improvement in the region.
- B. Increase the numerical diversity of the region's energy resources.
- C. Reduce the adverse environmental impacts of the region's energy use consistent with federal and state mandates.
- D. Reduce the per capita real costs of regional energy consumption.
- E. Create at least 5,000 new energy-related jobs in the region's economy.

Policies

1. Meet the energy needs of the region with a diverse portfolio of resources, preferably locally based efficiency improvements and renewable resources.
2. Consider all societal costs and benefits in the evaluation, development, and pricing of energy resources.
3. Consider the amount of local business and employment that can be increased when developing and implementing energy actions.
4. Consider the environmental performance of energy systems that can be improved when undertaking energy actions.
5. Treat transportation as the highest priority action area because of its high energy demands, significant potential for cost savings, and major environmental improvement opportunities.
6. Consider efficient energy supply, distribution, and use in all facets of land-use planning and development.
7. Implement cost-effective energy efficiency in new and existing residential and nonresidential buildings, and industrial processes.
8. Exercise local government leadership by implementing cost-effective energy efficiency in public facilities and services, and use the savings to help fund other critical public needs.
9. Develop and implement energy facility siting processes which are predictable and foster consensus among stakeholders.
10. Capitalize on trends toward an increasingly competitive energy marketplace to minimize the region's energy costs.
11. Provide ongoing support for cooperative regional energy planning and decision-making.

Energy Issues for the San Diego-Baja California Region

The region's energy relationship to Baja California warrants particular attention because of the trans-border sharing of resources, and the potential for cooperation and competition in the future due to increasing energy demands. Appendix E in Volume 2 of the REP contains a full report on the following San Diego-Baja California issues:

1. Growing energy demand, particularly in Baja California, could lead to competition between San Diego and Baja California for outside sources of energy supply, resulting in higher prices. Are there ways for the two sides of the border to coordinate planning for new supplies, and cooperate in bidding to obtain lower priced supplies?
2. Increasing cross-border traffic related to population growth and the effects of NAFTA will increase the need for coordination to deal with congestion and air pollution in the border area. Air pollution from new power generation sources could add to the problem. Can NAFTA environmental initiatives be tapped to help mitigate these problems?
3. There are cooperative energy initiatives that could be pursued directly by local and state governments on both sides of the border working together to address issues 1 and 2. Could they be accomplished by existing organizations on either side of the border?

CHAPTER 4
PREFERRED ENERGY RESOURCES

CHAPTER 4

PREFERRED ENERGY RESOURCES

Over time, the region's energy choices will be influenced by changing technologies, economics, and regulatory policies. To accommodate these dynamic conditions, the REP uses a diverse and flexible "portfolio" approach to designating preferred resources for meeting future needs.

The resource portfolio is organized in two main parts: 1) the transportation sector; and 2) the residential, commercial, industrial, and government sectors. Each of these sector groups are further sub-divided by major resource types, i.e., conventional fuels and efficiency improvements. Specific resources are then listed in descending order of preference within each resource category. The portfolio has been assembled by the Energy Advisory Committee using the following process:

1. Formulation of resource evaluation criteria, including quality of life factors from the Regional Growth Management Strategy, and energy-specific factors such as cost competitiveness, technological maturity, non-depletion of natural resources, and local availability.
2. Scoring of all available energy resources (both demand and supply-side options) according to the evaluation criteria.
3. Elimination of low-scoring resources, and ranking of remaining resources in order of their preference for use in the region. The final ranking prioritizes efficiency improvements and use of renewable resources in order to create greater resource diversity and opportunities for local economic and environmental improvements while maintaining cost-competitiveness.

Complete documentation of the Energy Advisory Committee's evaluation and scoring process is given in Appendix B of Volume 2 of the REP.

During implementation of the REP, the portfolio is intended to serve the following purposes:

- Guidance for local public agencies' energy actions.
- Advocacy of regional preferences in energy suppliers' and consumers' planning processes.

- Advocacy of regional preferences in state and federal energy policy and regulatory processes.
- Support for energy technology development that can help achieve regional economic and environmental goals.
- Evaluation of locally- proposed energy projects' consistency with the REP. The portfolio is intended to help expedite such project development.

The resource portfolio is shown in Table 4.1.

To maintain its currency and usefulness, the portfolio must be re-evaluated and updated on a regular basis to reflect the dynamic conditions cited earlier. In particular, resource costs and economic trade-offs will require frequent re-evaluation to keep up with marketplace changes.

The portfolio should be considered a starting point for guiding the evaluation and selection of specific resources and technologies. Detailed, project-specific economic and environmental trade-off analyses will still be necessary when making final decisions.

Each resource in the portfolio can include a number of specific technologies. These technologies may differ significantly in their benefit and costs to the region. An example is found in the hydro electric generation resource. This resource includes many different kinds of technologies including large scale hydro power plants at dams, micro scale power generations in urban water delivery systems and pumped storage projects.

Table 4.1

REGIONAL RESOURCE PORTFOLIO

End-Use Sector	Energy Resource Type	Preferred Resources (in descending order of preference within each type)
Transportation	Fuels/Technologies ^a	Electric (mini/special purpose) ^b Natural gas ^c Vehicle fuel efficiency improvements Methanol (M85) Hydrogen (R&D) Ethanol Propane
	Demand Management	Commute travel reduction Goods movement improvements College travel reduction Non-commute travel reduction
	Capacity Expansion	Bicycle facilities Pedestrian facilities Bus service Rail service Vanpooling Park/ride facilities HOV lanes
	System Management	Improved traffic flow
	Land-Use Coordination	Mix/density intensification Locational efficiency Parking management Efficient site design

^a Reformulated gasoline is mandated to replace conventional gasoline by 1996. Preferred fuels and technologies can further improve on the benefits provided by reformulated gasoline.

^b In the short term, electric is the preferred resource only for limited special purpose applications. In the long term, the potential for electric preference in a much wider range of transportation applications is higher.

^c Natural gas is the preferred resource for most transportation applications in the near future.

Table 4.1

REGIONAL RESOURCE PORTFOLIO

Continued

Error! Bookmark not defined.End-Use Sectors	Energy Resource Type	Preferred Resources (in descending order of preference within each type)
Residential, Commercial, Industrial, and Public Facilities	Demand-Side Management	Lighting Appliances/equipment/motors Water heating Pools/spas Space conditioning/ventilation Load management
	Direct Application Renewables	Solar Biomass Geothermal Ocean (R&D)
	Land-Use Coordination	Mix/density intensification Locational efficiency Efficient site design
	Electric Generation Fuels & Resources (regardless of location)	Wind Solar photovoltaic Geothermal Natural gas Biomass Hydro Solar thermal Ocean (R&D)
	Electric System Efficiencies & Generation Configurations	Transmission & distb. loss reduction Small in-region distributed plants Repower existing large in-region plants Large out-of-region purchases Large in-region central plants
	Direct Combustion Ther-	Natural gas

mal Fuels	Propane
Transmission Capacities	Natural gas Electricity

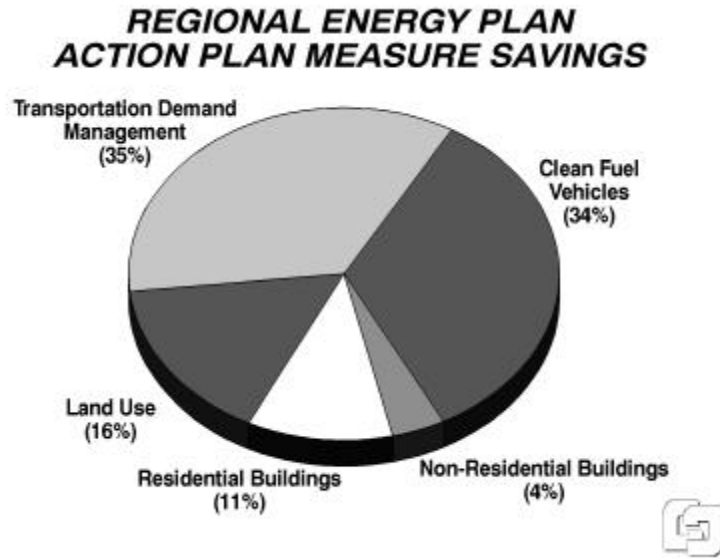
**CHAPTER 5
ACTION PLAN SUMMARY**

CHAPTER 5 ACTION PLAN SUMMARY

The REP concludes with an Action Plan that is a short-term (two year) work program for reducing energy costs, increasing energy-related local employment, and improving environmental conditions. These are high-priority steps that local governments and other stakeholders can begin taking toward the REP's long-term goal and objectives. This section summarizes the Action Plan, and a full presentation is given in Appendix C of Volume 2 of the REP.

Figure 5.1 shows the proportion of energy savings from five major Action Plan areas. Total cumulative savings through the year 2010 are estimated to be over 140 trillion BTUs, about one year's energy use for the region. Cumulative energy, dollar and air pollution savings and job creation potential for the Action Plan measures are summarized in Table 5.1 on page 30.

Figure 5.1



The SANDAG Energy Advisory Committee has evaluated a number of options for improving the region's existing capabilities for implementing the REP Action Plan. These options included: altered priorities, increased commitment of resources and new responsibilities for existing organizations; creation of a private/non-profit entity to assist existing agencies in implementation

(e.g., an Energy Resource Center); and, recruitment of private sector implementation assistance (e.g., Energy Service Companies). To date, the Committee has not concluded this evaluation. The Energy Advisory Committee will prepare a recommendation on this issue after public review and comment on the Draft REP and Action Plan measures, and SANDAG action on the Plan. This will allow for the consideration of appropriate energy policies and actions first, followed by consideration of the most appropriate implementation arrangements.

The Action Plan is organized into five implementation categories containing a total of 14 specific action areas summarized as follows:

Regional Planning Measures

These are measures to continue and improve collaborative energy planning and decision-making in the region. Actions are focused on energy-related employment and business development, and regional consensus-building on state and federal policies and regulations. Specific actions and key stakeholders include:

- Designate and pursue energy services and technology as an important employment and business development objective. Regional public and private economic and technology development organizations.
- Agreement by SDG&E (and other suppliers) to build consensus at the regional level prior to State filing of major planning and development pro-posals. The purpose of this measure is to assist more efficient and effective planning and regulatory processes. SDG&E and independent energy developers.
- Commitment by public agencies and interest groups to participate in consensus building in a timely manners that does not penalize the participating energy stakeholders. Local governments and public interest groups.

Transportation Measures

These measures support the use of alternative transportation fuels and technologies, and increased vehicle occupancy. The focus is reducing automobile and gasoline dependency consistent with the Regional Transportation Plan and Air Quality Strategy, and exercising public agency leadership in converting to alternative fuels and technologies. Specific actions include clean fuel vehicle conversions and purchases, improved vehicle maintenance, and continued implementation of transportation control measures contained in the region's Transportation Control Measure (TCM) plan. These are summarized as follows:

Public Vehicle Fleets

- Establish a regional Clean Cities/Green Fleets program to encourage use of high-efficiency, low emission vehicles. Local governments and other public agencies

- Establish public agency alternate fueling/charging stations. Local governments and other public agencies
- Convert existing vehicles to alternative fuels/technologies. Local governments and other public agencies
- Purchase new and replacement vehicles with alternative fuels/technologies where cost-effective and suitable for the intended vehicle use. Local governments and other public agencies

Private Sector Alternative Transportation Fuels and Technologies

- Establish the Clean Cities/Green Fleets program to encourage use of high-efficiency, low emission vehicles (including scrapping of older polluting vehicles). Major fleet operators.
- Identify and remove legal/regulatory barriers to alternate fueling/charging stations. Local governments.
- Establish alternative fueling/charging stations. SDG&E, independent energy developers, and major fleet operators.
- Convert existing and purchase new vehicles with alternate fuels/technologies. Major fleet operators.

Transportation Control Measures

- Implement the adopted TCM Plan.
 - Manage demand through commute travel reduction and goods movement. Local governments, and major employers.
 - Manage demand through improved goods movement. Local governments, and major employers.
 - Expand rail, bus, bicycle and pedestrian facilities capacities. Local governments and transit agencies.

Land-Use Measures

These are voluntary actions that local governments can take to accommodate growth as efficiently as possible, while supporting complementary transportation and air quality goals. The focus is to encourage transit-oriented development, along with efficient site design practices that can reduce building energy consumption. The land use measures are consistent with the policies

in the Land Use and Pedestrian Element of the 1994 Regional Transportation Plan and the Land Use Distribution Element Policies which have been proposed for addition to the Regional Growth Management Strategy.

A complete description of the analysis used to formulate these measures is given in Appendix D of Volume 2 of the REP. The PLACE³S model described in Appendix D illustrates the energy savings related to the Land Use Distribution Element Policies, as well as a more intensive version of these policies.

Auto-Independent Development

- Voluntarily amend General Plans and development codes to incorporate auto-independent policies/standards emphasizing pedestrian/bicycle/transit modes when and where appropriate. Local governments.

Efficiency Site Design

- Encourage efficient site design by sharing technical information from EPA Cool Communities technical assistance programs and other sources. Local governments.
- Voluntarily amend General Plans and development codes to incorporate efficient site design policies/standards when and where appropriate. Local governments.

Residential and Nonresidential Building Measures

These are measures that can improve the efficiency of energy use in buildings, both new construction and retrofits. Selected measures are recommended for incorporation into local building codes, and additional measures are recommended for voluntary implementation. Public agency leadership is again emphasized, in this case systematic acquisition of cost-effective efficiencies in public buildings and infrastructure.

Home Efficiency Rating and Mortgages

- Establish regional working group of interested organizations for voluntary implementation of CHEERS. Homebuilders, real estate agencies, lending institutions, and local housing officials.

Residential Building Improvements

- Evaluate several cost-effective measures for local building codes that go beyond minimum requirements of the Title 24 Energy standards. Local building officials and home builders.

- Disseminate information on voluntary efficiency upgrades benefits, and available financial incentives. Local building, housing officials, and SDG&E.

Nonresidential Building Improvements

- Evaluate several cost-effective measures for local building codes that go beyond minimum requirements of the Title 24 Energy standards. Local building officials and developers.

- Disseminate information on the benefits of voluntary upgrades. Local building officials and SDG&E.

Public Buildings and Infrastructure

- Establish/modify local government cost accounting systems to explicitly track energy expenses. Local governments.

- Identify efficiency opportunities by cost-effectiveness, and systematically implement efficiency projects. Local governments.

Energy Facility Measures

This category is concerned with the emerging field of small-scale distributed power generation, and the benefits and requirements for incorporating a wider variety of power generation technologies in small increments throughout the region, closer to consumer loads. Emphasis is placed on creating greater awareness of these technologies, removing institutional barriers, and conducting demonstrations.

Small-Scale Distributed Power Generation

- Disseminate distributed power generation information to local jurisdictions. SDG&E, CEC, and independent power producers.

- Seek opportunities to demonstrate distributed generation technologies. SDG&E, CEC, and independent power producers.

The expected results from implementing the Action Plan measures are described in Table 5.1 in terms of energy, costs, and pollution savings.

Table 5.1

ACTION PLAN MEASURE SAVINGS AND JOB SUMMARY

<u>Measures (million Btu)</u>	<u>Energy (million \$)</u>	<u>Approximate 2010 Cumulative Savings</u>			
		<u>Dollars^(a) (1994 NOx tons)</u>	<u>Pollution^(b) Potential^(c)</u>	<u>Job Creation Benefits</u>	<u>Quality of Life</u>
Transportation					
Clean vehicles	55,933,175	262	39,041	Moderate	Cleaner air and less congestion
Maintenance improvements	40,420	1	---	N/A	
Control measures	57,525,685	1,029 ^(d)	6,101	Limited	
Land-Use					
Auto-independent dev.	5,426,378	45	1,830	N/A	Cleaner air and less congestion
Efficient site design	593,781	10	73	N/A	
Residential Buildings					
Efficiency rating/mortgage energy	3,683,333	6	439	High	Reduced bills and affordable housing
Code improvements	3,665,742	31	416	High	Improved competitiveness
Voluntary improvements	10,903,145	2	1,129	High	
Nonresidential Buildings					
Code improvements	1,681,690	36	205	High	Improved competitiveness
Voluntary improvements	4,102,223	40	553	High	
Public Bldgs./Infrastructure					
Voluntary improvements improvement	<u>725,601</u>	<u>9</u>	<u>68</u>	High	Fiscal
Total savings	144,331,173^(e)	1,472	49,855		

-
- (a) Net cost savings
 - (b) Comparable reductions are expected in other criteria pollutants.
 - (c) Total job creation potential is estimated at 5,000-8,000 jobs by 2010.
 - (d) Includes direct energy savings from reduced auto use as well as indirect savings such as auto maintenance and traffic accidents.
 - (e) Equivalent to 1.2 billion gallons of gasoline.

GLOSSARY

GLOSSARY

APCD	Air Pollution Control District
BTU	British Thermal Unit. A standard measure of energy value. Gallons of gasoline, therms of natural gas, kilowatts of electricity, and other energy measurements can all be converted to BTUs for comparison
CEC	California Energy Commission
CHEERS	California Home Energy Efficiency Rating System
EPA	Environmental Protection Agency
HOV	High Occupancy Vehicle
NAFTA	North American Free Trade Agreement
PLACE ³ S	An analysis methodology designed to measure the energy impacts of alternative urban design and land use distribution strategies
R&D	Research and development
REP	Region Energy Plan
RGMS	Regional Growth Management Strategy
SDG&E	San Diego Gas and Electric Co.
Title 24	State Building Code regulations which set <i>minimum</i> energy efficiency standards for buildings and appliances