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Impact of energy conservation on the marketing practices of the electric utility industry

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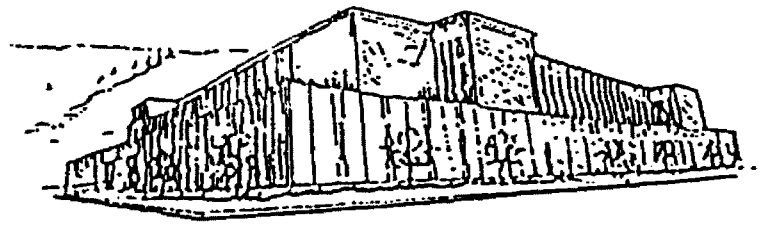

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The Impact of Energy Conservation on the Marketing Practices of the Electric Utility Industry

By

Gabriele Golissa

Diplom-Kff., Universität zu Köln, Germany, 1993

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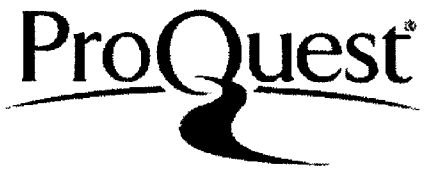

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The Impact of Energy Conservation on the Marketing Practices of the Electric Utility Industry (99 pp.)

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The operating environment of today's electric utility industry has changed dramatically within the past few years. Various regulations increased competitive pressures especially on investor-owned utilities. In addition, the industry also has to deal with environmental concerns. One of these new challenges is energy conservation. Energy conservation becomes more important due to global problems and new national regulations. The industry employs many measures to face these problems, one important tool is demand-side management (DSM). Energy efficiency or conservation programs account for the main part of DSM. They help to defer needs for new generation capacity, which becomes important because demand for electricity has almost reached the limits of today's electric generating capability.

The Northwest (Idaho, Montana, Oregon, and Washington) is a ripe territory for energy conservation, because per capita electricity consumption is well above national levels. Against this background, this thesis analyzes conservation programs of the investor-owned utilities operating in the Northwest. Examined programs address the residential, commercial, and industrial sectors. Although, non-residential programs usually address the commercial as well as the industrial sector. However, programs for the different sectors vary significantly with regard to addressed applications, employed marketing instruments, and achieved energy savings. In general, conservation programs for the residential sector are targeted to specific end-uses, whereas programs for the commercial and industrial sectors address a broader variety of end-uses. Trade ally cooperation, direct customer contact, and direct financial incentives are the marketing instruments that most conservation programs employ. Early conservation programs addressed the residential sector; commercial and industrial programs followed later. Today, the commercial and industrial sectors have become more important with regard to energy savings and account for an increasing percentage of total energy savings.

The need for energy conservation has influenced the role of marketing in the electric utility industry significantly. Conservation programs became an integral part of marketing. Utilities realized that emphasizing energy conservation enabled them to learn more about their customer's needs and to tie customer closer to their utility in times of increasing competition. However, future conservation programs will have a different emphasis than today's programs in order to become less labor- and cost-intensive and therefore allowing the utility to provide low-cost electricity services.

Acknowledgements

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Chapter I:

Introduction

A. Purpose

For a long time, the electric utility industry had an investor-owned, regulated monopoly structure. Price regulation allowed utilities to earn a reasonable profit. Together with increasing and inelastic demand, this led to a period of sustained growth for the industry. However, this stable environment was disturbed in the 1970s. In response, regulation changed and the industry had to change the old paradigms to face new ones.

In addition, the industry also has had to deal with environmental concerns. One of these new challenges is energy conservation. Energy conservation is necessary due to global problems and new national regulations. Nonetheless, utilities had difficulties in dealing with conservation programs because it was in the utilities' best interest to sell more energy in order to gain higher profits between rate cases. However, selling more energy contradicts energy conservation and utility profits were threatened. Decreases would occur within the framework of existing ratemaking procedures. Most utilities had problems integrating energy conservation into their marketing plans.

Against this background, this paper will show the impact of energy conservation on marketing in the electric utility industry. Conservation programs will be analyzed with regard to what kind of customer groups they address, which applications they emphasize, and what kind of marketing instruments they employ.

This paper does not claim to draw a total picture about energy conservation in the electric utility industry but will show how specific utilities face the challenge of energy conservation. The electric utility industry itself and conservation programs in particular, are influenced by more issues than can be addressed within the framework of this paper. Nonetheless, the paper addresses the relevant issues and provides a general presentation of the impact of energy conservation on the marketing practices of the electric utility industry.

B. Research Design

The thesis will concentrate on the Northwestern area of the United States rather than examining the whole country. The paper's focus will be on electric utilities in the area of the Northwest Power Planning Council, including Idaho, Montana, Oregon, and Washington. The Northwest is an obvious place for energy conservation because per capita electric consumption is well above national averages. The higher usage is primarily due to low prices (Marks, 1992). However, completely isolating the Northwest from national and global issues would mean to ignore important influences on the energy industry in the region. Therefore, the paper will present background information on the industry as well as on energy conservation under a broader point of view.

First, the thesis will present the history and the development of the electric utility industry in the United States. General industry characteristics will explain the specifics of the electric utility industry and will be compared with characteristics of the industry in the Northwest where differences exist.

The next step will be a closer examination of energy conservation. The thesis will present the needs for energy conservation on a global as well as on a national level. Furthermore, demand-side management as an energy conservation method will be presented.

The thesis will also look at how energy conservation has influenced marketing in the electric utility industry of the Northwest. Conservation trends in the region will be presented. In order to provide a relevant analysis of conservation programs within the framework of limited time and financial resources, the paper will concentrate on the investor-owned utilities in the region.

The paper will describe characteristics of electricity supply and demand in the Northwest as well as power planning in the region. Furthermore, characteristics of the examined investor-owned utilities will be presented. Conservation programs will receive a closer look. The paper will describe general patterns of energy conservation in the Northwest and at the investor-owned utilities first, and then it will analyze their conservation programs. Two conservation programs will be presented in more detail. Furthermore, the thesis will describe the changing role of marketing in the electric utility industry,

especially under the influence of energy conservation. Finally, findings will be summarized and conclusions presented.

Information collected for this thesis primarily comes from secondary sources. The analysis of conservation programs is based on information published by the Northwest Power Planning Council in its "Green Book" (NPPC, 1994). This book describes conservation programs in the Northwest in a standardized format and therefore allows for further analyses. However, the investor-owned utilities were asked for information about their conservation programs and further telephone interviews were conducted. This input was added wherever it could make the analysis more relevant.

Chapter II:

History and Development of the Electric Utility Industry

A. Regulatory Era

After significant electric experiments in Europe in the 1730s and practical applications in the 1800s, the first commercial electric utility in the United States was founded in 1879 in San Francisco. In its early years, the new industry was characterized by rapid technological development. By the turn of the century, about 3,000 electric utilities were operating. The industry was also characterized by vertical integration. Generation (power production), transmission (long-distance movement), and distribution (transfer to customer) of electricity were done by integrated electric utilities. (Moyer, 1993; Kamat & Silverman, 1992; Gordon, 1992). Regulation took place on the local level, many utilities were municipally-owned (Geddes, 1992; Hyman, 1994).

From the very beginning of the industry, electric utilities were formed as monopolies within the region they served because of the investment intensive nature of the business. Franchises were granted to electric utilities for given geographical areas by regulatory officials. To obtain a franchise, electric utilities had to provide service to all consumers in their territories at reasonable cost. (Energy Information Administration (EIA), 1994c). In the 1920s, the investor-owned, state-regulated monopoly structure of the industry emerged.

Though the industry wished to maintain its monopoly position, possible abuse of these monopolies was a public concern in the 1930s. Eventually, an informal public policy bargain developed, known as the social contract or

regulatory compact. It was composed of three important characteristics:

- electric utilities remained natural monopolies
- utilities agreed to price regulation (cost plus reasonable profit => "cost plus" pricing)
- utilities agreed to serve all customers upon demand

However, utilities tried to evade regulatory oversight by using complex corporate structures. By 1932, the eight largest holding companies controlled 73% of the investor-owned electric business. In order to break the power of the investor-owned utilities, the Federal Government established publicly-owned hydropower projects. (Hyman, 1994) In addition, the Public Utility Act was passed in 1935 with the Public Utility Holding Company Act (PUHCA) as its most important passage. Several holding companies had to break up and the remaining ones were forced under stronger regulatory control. Nonetheless, restructuring of the industry took until the 1960s to complete. (Gordon, 1992; EIA, 1992b)

Due to the industry's monopoly structure as well as to high and largely inelastic demand for electric services, the electric utility industry experienced a period of sustained growth. Furthermore, the economies of scale led to declining cost of electricity; prices for electricity fell steadily from 1882 to 1969 (Hyman, 1994). However, even though the customer's demand for economy

and quality of service was important, generating value for stockholders was the predominant objective, because the industry was still largely investor-owned.

B. Change to a Deregulated Market

With the Northeast Blackout of 1965, doubts grew regarding the reliability of the existing electric utility system. However, the industry's stable environment was seriously disturbed in the 1970s, when oil embargoes and economic crises led to increasing energy prices. Financial pressures made the investment in utilities unattractive and utility stock fell dramatically. (Hyman, 1994) Social and philosophical changes led to different public attitudes toward the energy industry. These developments eventually resulted in several new regulations.

The most important new regulation was the Public Utility Regulatory Policies Act (PURPA) of 1978 (Watson, 1994). It allowed non-utility generators (also called qualifying facilities (QFs)) to sell electricity generated under extremely favorable terms and was the first step towards competition in the electric industry. QFs could generate electricity without being essentially regulated, though they were only allowed to sell their electricity to utilities, not to end-consumers. (Moyer, 1993; Klebnikov, 1992; Joskow, 1982) QFs did not have transmission access and therefore sold power only to local utilities, often with the utility as owner or partner within a holding company.

The next step toward competition, the Energy Policy Act of 1992, allowed exempt wholesale generators (EWGs) to engage exclusively in the generation of electric power for sale at wholesale without being essentially regulated (Studness, 1993). EWGs have transmission access and can therefore sell to local or distant utilities, so called wholesale wheeling. (Moyer, 1993; Gee, 1993; Michaels, 1993; Watson, 1994).

Today, the discussion moves one step further to retail wheeling, which would require local utilities to allow their transmission lines to deliver power to their customers even if it was sold by a competing utility ("Competition", 1994; Bryant, 1994). Many utilities do not want mandatory transmission access usually connected with retail wheeling and prefer voluntary transmission access. (Kellerman & Furman, 1992; Bollum et al., 1992). Although competition is developing in electricity generation, transmission and distribution will remain a monopoly in the near future (EIA, 1992b).

Today's electric utility industry is not as homogeneous as it used to be. Deregulation and increasing competition draw a new picture. In addition to the classical investor-owned utility, publicly or customer-owned utilities can be found (Hirst, 1992). Though the core businesses of both types of utility are electric services, both types are different in their business goals due to different stakeholder groups. The industry is also characterized by non-utility generators, who react differently from utilities because they are essentially unregulated. In addition, regulators no longer simply agree to cost-plus pricing and closely

examine costs for inclusion in rate bases and profit levels. The stable, monopoly environment has changed. The industry is now characterized by regulatory disallowance, environmental impact, planning uncertainty and unstable national energy policies. (Collier, 1992)

C. Industry Characteristics[1]

The following section gives information about characteristics of the electric utility industry. It also emphasizes interesting differences between the industry in the Northwest and in the United States as a whole.

1. Type of Utility

The electric power industry in the United States is composed of electric utilities and non-utility generators. Electric utilities can be subdivided into:

Investor-Owned Utilities (IOUs)

They are private businesses, who's primary objective is to produce a return for investors. IOUs are granted a service monopoly in certain geographic areas

[1] If not otherwise cited, information in this paragraph refers to the year 1992 and is taken from the EIA's "Electric Power Annual 1992" (EIA, 1994c).

(franchise) and have to serve all consumers within their area on demand. They are regulated and required to charge reasonable prices. The majority provide generation, transmission, and distribution of electricity. There are 262 investor-owned utilities in the United States.

Publicly-Owned Utilities

These are nonprofit local government agencies, who serve nearby customers at cost. There are 2,017 publicly-owned electric utilities in the United States; they are especially common in Nebraska, Washington, Oregon, Arizona, and California. The majority simply distribute power.

Federal Utilities

They are primarily a producer and wholesaler of electricity, which is not generated for profit. Most of the electricity is sold to publicly-owned and cooperative electric utilities. The electricity generated is sold by federal power marketing administrations. There are 10 federal utilities in the United States.

Cooperatives

They are owned by their members and provide electricity to those members. They usually operate in rural areas with a lower concentration of consumers, which cannot be economically served by IOUs. There are 943 cooperatives in the United States.

With the described deregulations of the industry, non-utility generators (NUGs) gained importance. NUGs are permitted to sell power to public utilities at a price not higher than the price the utility would pay for own generation (Moyer, 1993; Klebnikov, 1992). NUGs can be subdivided into:

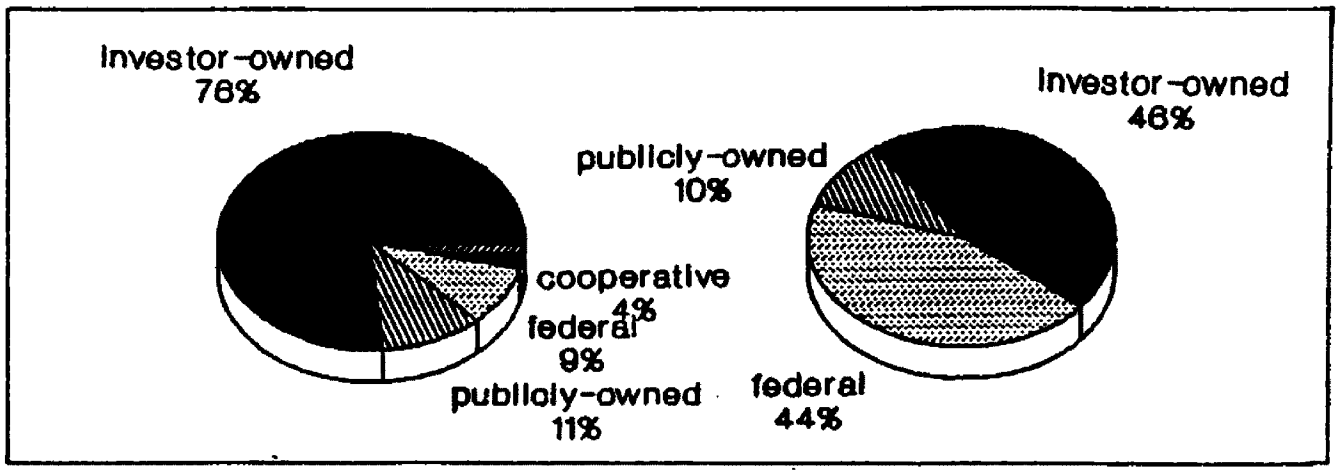
Qualifying Facilities under PURPA

These are cogenerators and small power producers, i.e. subdivision of a utility, qualifying for certain benefits under PURPA.

Other NUGs

They do not have a designated franchise area, produce electricity on wholesale, are unaffiliated with utilities, and lack significant marketing power (i.e. Independent-Power Producers, Exempt Wholesale Generators).

Generating capability of NUGs in the United States was 56,814 MW in 1992, accounting for about 8% of the total generating capability in the electric industry. Their future role will become increasingly important; they already account for about 50% of new capacity additions (Watson, 1994). However, investor-owned utilities are still the dominant factor in the industry.

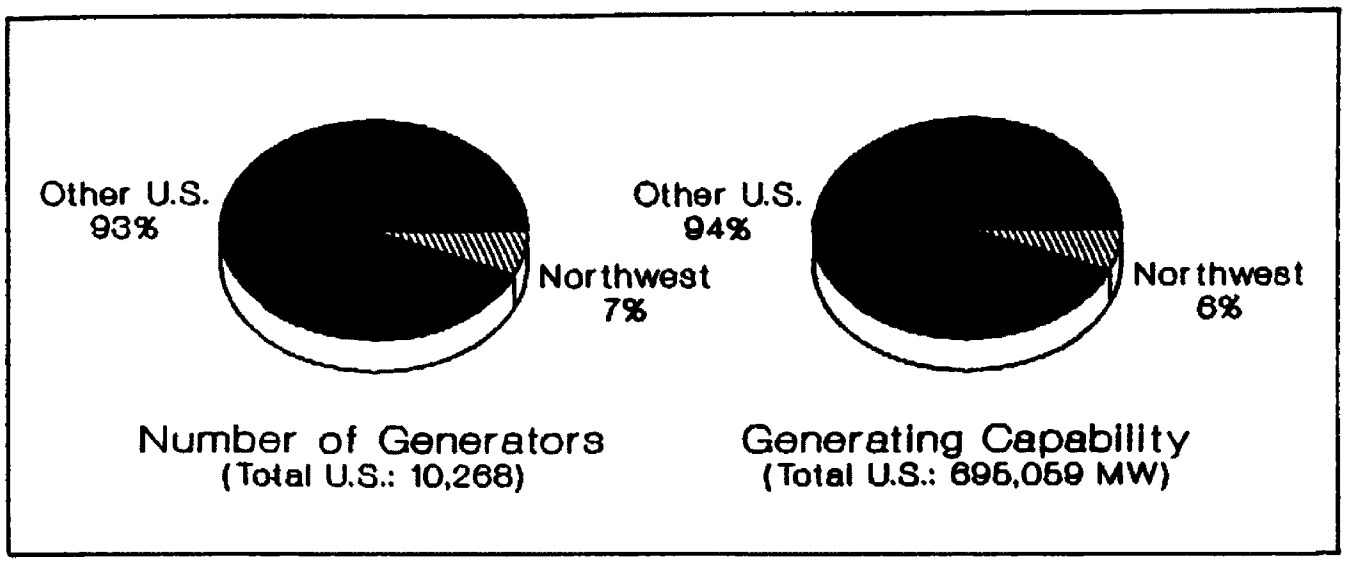


Exh. 1: **Generating Capability by Type of Utility**
(EIA, 1994c, p. 3; Bonneville Power Administration, 1994, p. 47)

In contrast to national trends, federal utilities play a much more important role in the Northwest. The Bonneville Power Administration is the region's power marketing administration.

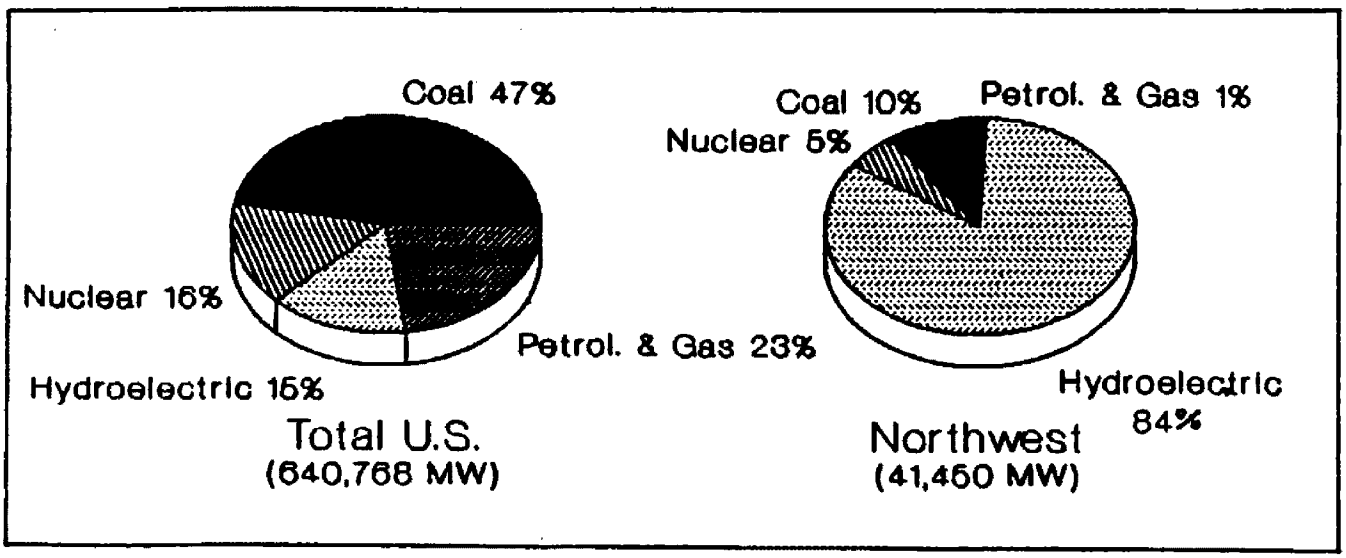
2. Electricity Generation

The Northwest accounts for just a small amount of total generating capability in the United States. However, the number of generators is relatively higher, due to a larger number of smaller generators in the Northwest.



Exh. 2: **Number of Generators and Generating Capability (EIA, 1994c, p. 24)**

A closer look at the type of generating capability shows that the major energy source for generation on a national level is coal (47%), whereas the Northwest relies heavily on Hydropower (84%).



Exh. 3: **Types of Generating Capability (EIA, 1994c, pp. 25-26)**

3. Financial Background

The electric utility industry is capital intensive and requires large amounts of fixed assets to produce revenues; total asset turnover was 0.37 in 1992. This is the main reason why the industry was a natural monopoly for a long period of time. Furthermore, the business of electric utilities was not as risky as it would have been under competitive conditions. Therefore, electric utilities could accept a higher financial risk.

However, utilities could not finance their huge capital needs from internal sources alone. They raised large sums externally, making stocks sensitive to interest rates (Grant, 1994). Rising capital cost, together with uncertain demand, led to pressure on profitability. In addition, regulators did not grant meaningful rate increases and profits dropped by 1.5% per share in 1992 (Studness, 1993).

Capital was tied up in incomplete plants and excess capacity was developed. Credit ratings decreased significantly. By 1992, just about one quarter of investor-owned utilities were still in the higher ranks of Moody's as well as Standard & Poor's ratings. Further downgrading is expected because continuing deregulation of the industry leads to increasing business risk; average credit quality will decline and mergers become more likely (Scotto, 1993).

However, the industry has learned from its financial difficulties and is reluctant to invest in new large projects. Instead, many utilities try to reduce risk by relying on non-utility producers for their new capacity needs. (Hyman, 1994)

4. Customer Sectors

The electric utility industry serves different customers. Those customers use electricity for different applications and therefore show different characteristics of demand. Customers can be divided into four main sectors:

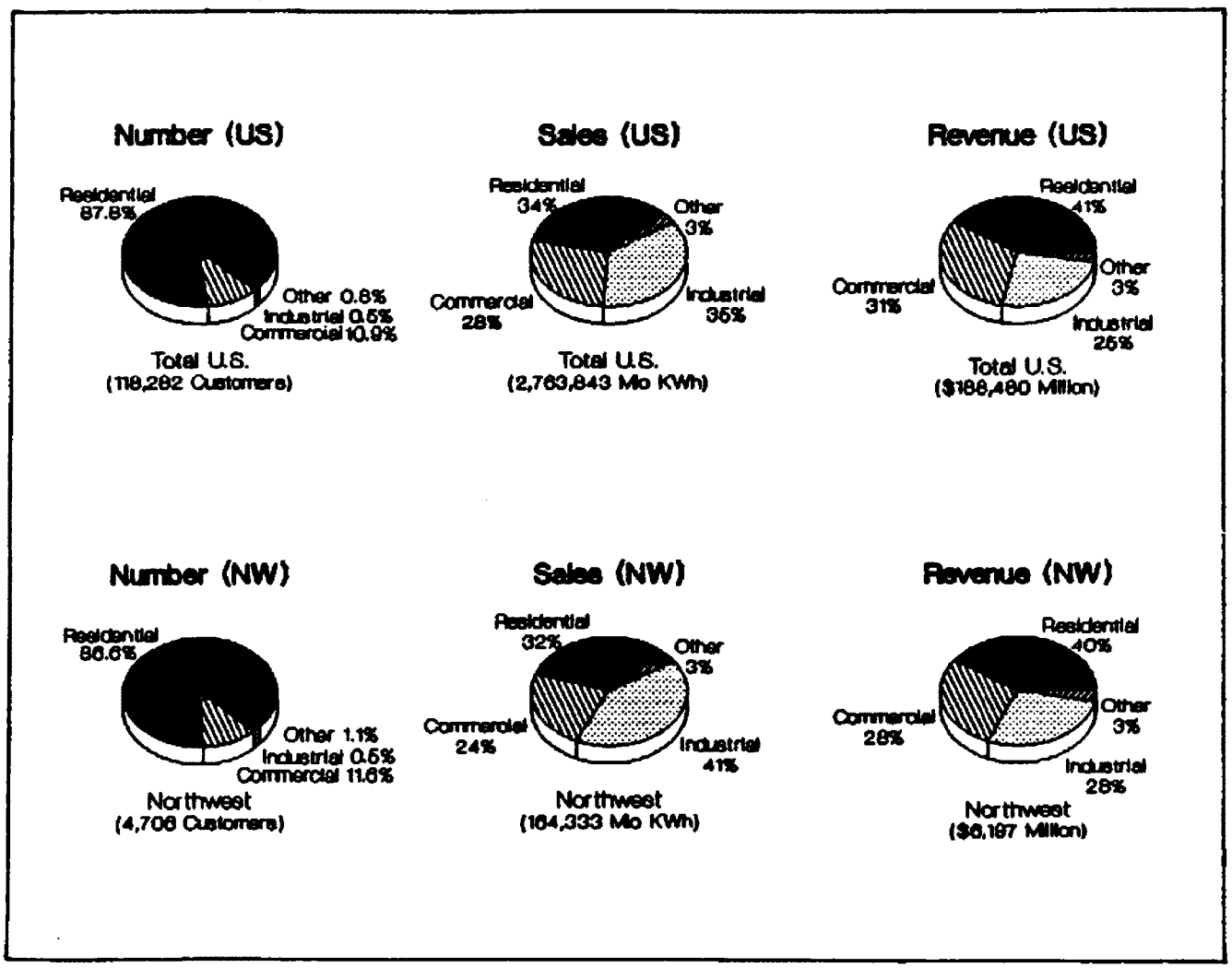
Residential Sector: Private households and apartment buildings. Energy is primarily used for space heating, water heating, air conditioning, lighting, refrigeration, cooking, and clothes drying.

Commercial Sector: Non-manufacturing business establishments, like retail stores or restaurants. In addition to this classification, utilities can classify commercial customers depending on their annual usage within a specific range. The most important end-uses are lighting, air-conditioning, and space heating.

Industrial Sector: For example manufacturing, construction, or mining. However, utilities can classify customers depending on their annual usage. The industrial sector is characterized by a wide variety of end-uses.

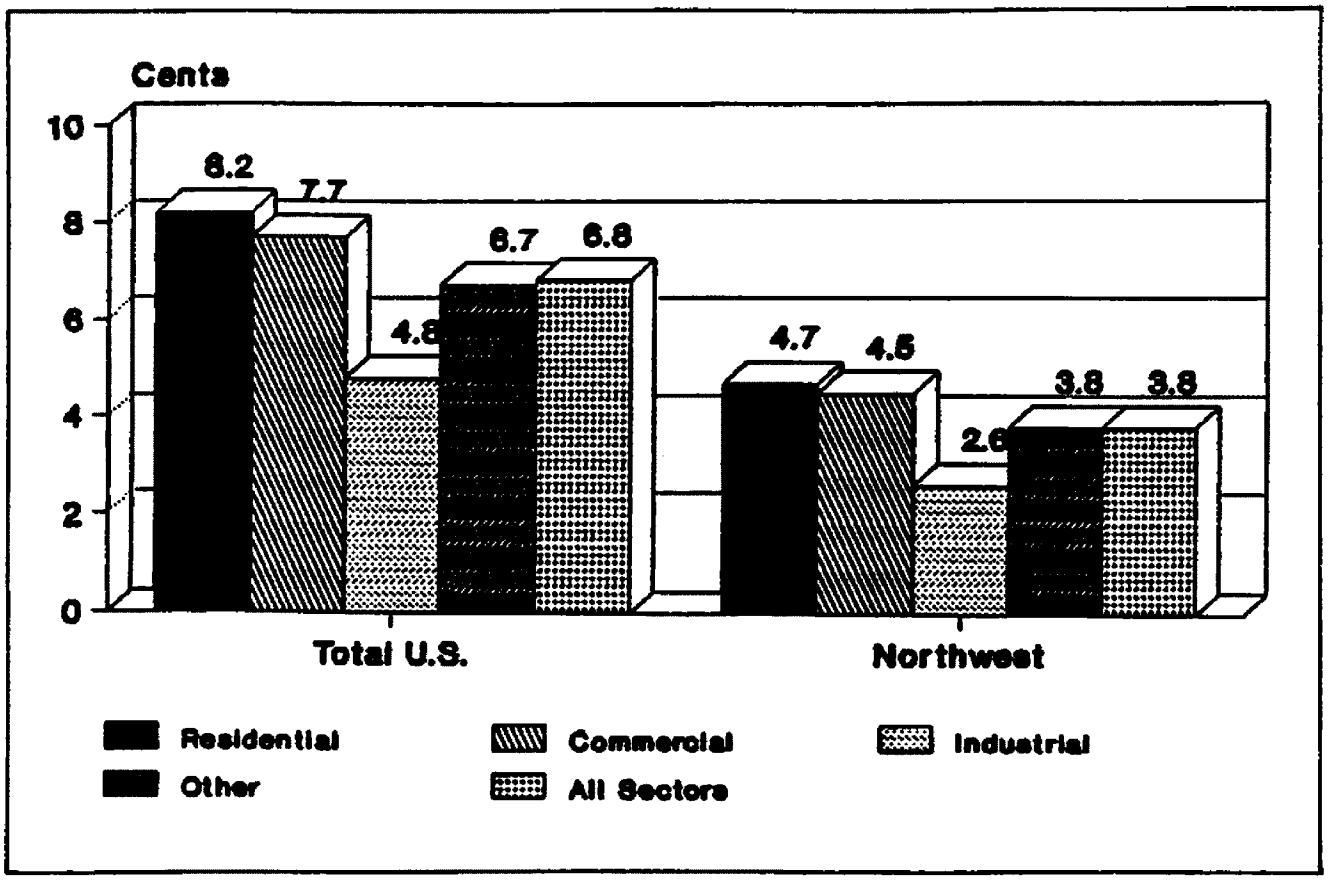
Other: Includes, for example, public street and highway lighting, or sales to railroads and railways.

The residential sector is the biggest customer sector for the industry. Although the industrial sector accounts for just a small percentage of all customers, it accounts for the biggest part of electricity sales. However, the industrial sector is not the most important source of revenue; revenues largely come from the residential sector. There are no significant differences between the Northwest and the United States as a whole with regard to customer structure.



Exh. 4: Costumer Sectors of Electric Utilities (EIA, 1994c, pp. 52-54)

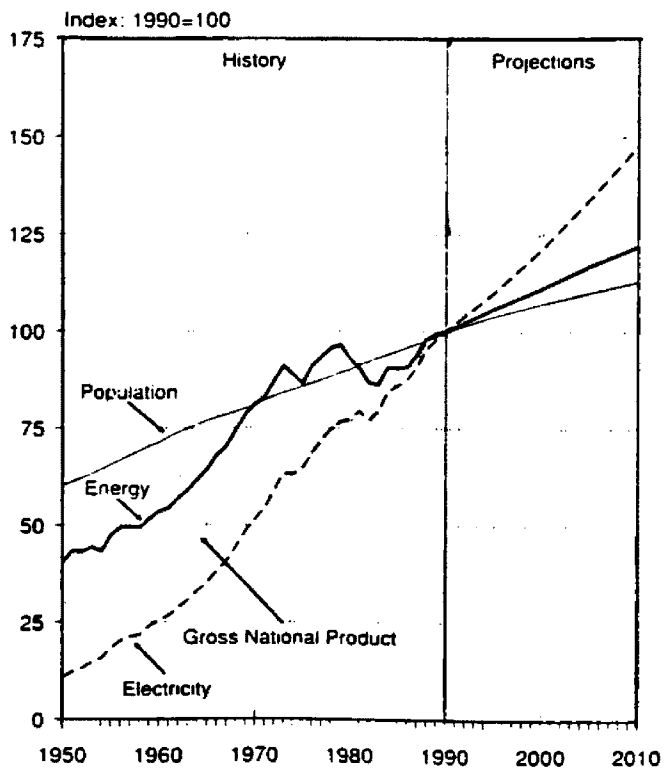
The importance of the different customer sectors as sources of revenue becomes evident with a comparison of revenues and sales. The residential sector is the most important source of revenue, the industrial sector the least important one. The reason for this trend is the different rates utilities are able to charge their different customer sectors. The Northwest shows the same pattern, though average revenues per Kilowatthour are well below national averages.



Exh. 5: **Average Revenue per Kilowatthour by Sector (EIA, 1994b, p. 55)**

5. Industry Outlook

Electricity demand is closely related to economic activity; demand for electricity increases during times of high economic activity and vice versa. Another important factor is population growth. The following exhibit shows the influence of those factors on electricity demand.

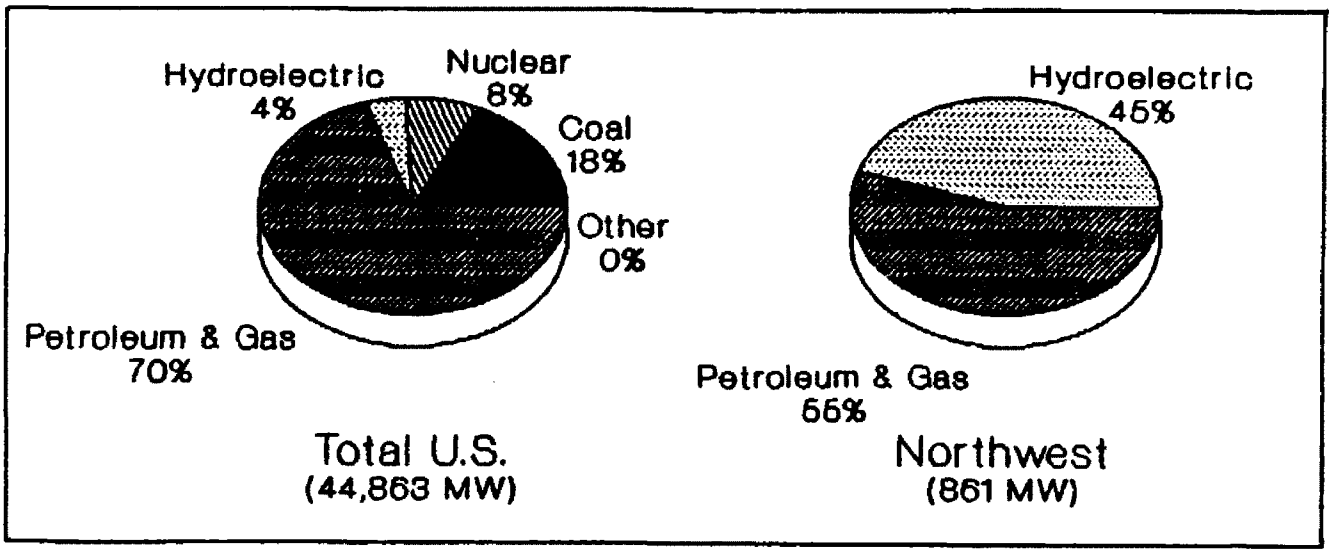


Exh. 6: **Energy, Population, and Economic Growth (1950-2010) (EIA, 1992a, p. vi)**

Within the two decades, sales of electricity are expected to grow moderately with about 2% per year. Electricity demand is expected to grow faster than the demand for other energy sources because the price for electricity will grow

slower than the price for other energy sources. The residential sector is expected to grow slower than the commercial and industrial sector.

To meet the expected growth in demand, utilities will use different resources. Existing capabilities will be utilized better. In addition, electric utilities will increasingly buy power from non-utility producers. Furthermore, some capability additions will become necessary. Again, the Northwest differs significantly from the rest of the United States with regard to capability, because Hydropower plays a much more important role. (EIA, 1994a)



Exh. 7: **Planned Capability Additions (EIA, 1994c, pp. 29-30)**

Chapter III:

Energy Conservation

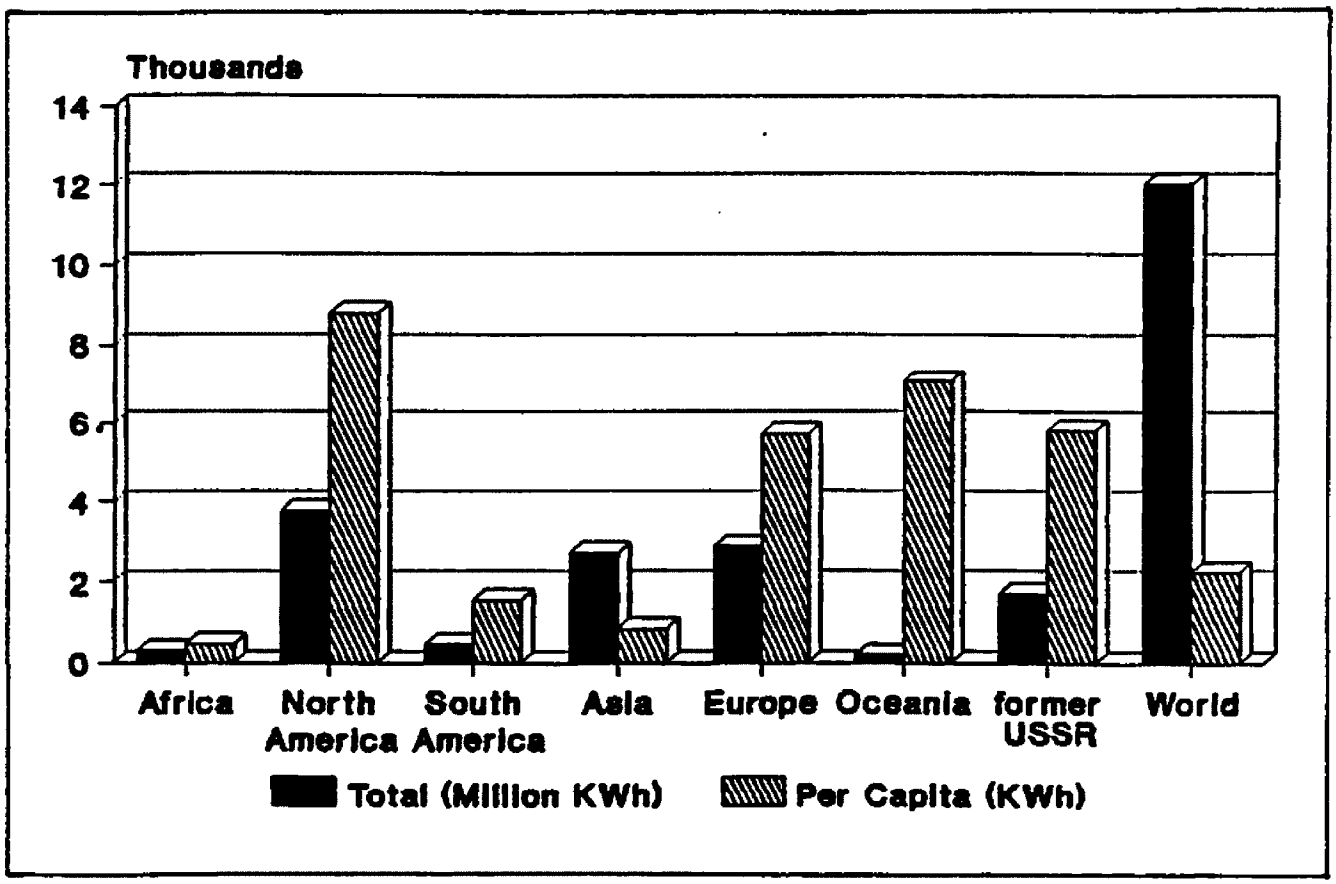
A. Needs to Conserve Energy

Environmental concerns have become an increasingly important factor in decision-making processes in the electric utility industry. They have many facets, like the nuclear power discussion, problems with transmission and distribution lines, or waste disposal to name just a few (Association of the Bar of the City of New York, 1972; Hyman, 1994). Electric utilities have to adapt to the growing public awareness regarding environmental impacts of their business and to changing regulations in this area.

1. Global Level

Within the past years, humankind realized that the resources it was using were not unlimited and furthermore that the use of these resources influenced the environment. Especially energy use patterns have long-term, global effects. One of the most dangerous ones is the greenhouse effect, global warming caused by pollution particles. Heat production, particulate production, and production of gases (especially carbon dioxide) are causes for the greenhouse effect. They also cause problems with the stratospheric ozone and acid rain. Electricity generation is a major contributor to these problems. (Devins, 1982; Burkhart, 1992; Hyman, 1994).

The urge to face the problems becomes obvious, when one looks at the fact that approximately three-quarters of the people living in developing countries still do not have electricity. Furthermore, just 25% of the global energy-related carbon dioxide emissions today come from less developed countries (Motamen-Scobie, 1993).



Exh. 8: **World Electricity Consumption versus Per Capita Electricity Consumption (United Nations, 1993, pp. 422-436)**

Developing countries contribute just a small percentage to the total energy consumption of the world and have lower per capita energy consumption

levels[2] than developed countries. Assuming economic growth in developing countries will take place, energy consumption will increase in those countries and environmental problems will grow. Therefore, the world energy balance has to change; the use of fossil fuels has to drop. Overall, energy has to become more efficient and renewable energies have to be used.

Public attitudes have also changed. Major projects which have once been associated with the blessing of economies of scale are now seen as threats to the environment and economic money pits. In addition, the public is demanding to become a larger part of the planning process. (Drouin, 1993)

2. National Level

The U.S. is the world's largest energy consumer as well as producer (EIA, 1994d) and has one of the highest per capita carbon dioxide emissions (Motamen-Scobie, 1993). Legislation has recognized the problem. Increasing environmental regulations affect the decision-making processes of electric utilities regarding utility location, design, construction, fuel use, and operation (Ringleb, 1986).

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[2] Per capita energy consumption varies significantly. Norway has the highest rate with 25,319 KWh, Cambodia the lowest rate with 8 KWh per capita. The United States have the sixth highest per capita electricity consumption. (United Nations, 1993)

The National Environmental Policy Act (NEPA) of 1969 requires environmental impact analyses. The Clean Air Amendments of 1970 and its revision of 1990 require plants to reduce their air pollution. The Clean Water Act of 1972 and its 1977 amendments require emission standards. The list of environmental regulations continues. In addition to these regulations, site approval legislation strengthened, especially in the Western United States. Decision-making processes took longer and costs of siting-projects increased. (Ringleb, 1986; U.S. Department of Commerce, National Technical Information Service (NTIS), 1991; Berg, 1992).

Environmental regulations force utilities to take environmental factors into considerations when assessing proposed utility projects ("Regulators", 1993). Building new generation sites becomes more difficult due to a "not-in-my-backyard-attitude" (Moeller, 1993). Overall, when planning a new power plant, utilities are forced by regulations to internalize externalities in their evaluation of alternatives. As a result, environmental costs can make building a new plant the unfavorable alternative. (Smock, 1992; Michaels, 1993; "Regulators", 1993; Moeller, 1993).

Energy conservation can help to reduce the need for new plants. It also reduces the reliance on foreign oil. Recognizing these impacts, the Energy Policy and Conservation Act of 1975 laid the basis for a new energy conservation culture in the United States. The emphasis of this act was residential energy conservation and several laws within this area followed. In

1976, the Energy Conservation and Production Act moved one step further by developing incentives for energy conservation for electric utilities. The National Energy Conservation Policy Act of 1978 required the development of state residential energy conservation plans. (Moeller, 1993)

Another milestone in U.S. energy policy was the National Energy Strategy of 1991. Its objective is "achieving balance among our increasing need for energy at reasonable prices, our commitment to a safer, healthier environment, our determination to maintain an economy second to none, and our goal to reduce dependence by ourselves and our friends and allies on potentially unreliable energy suppliers" (NTIS, 1991, p. 2). Greater energy efficiency and enhanced environmental quality are important means to achieve this objective. (NTIS, 1991)

Energy conservation becomes increasingly important due to environmental problems caused by electricity generation and usage patterns. Legislation has recognized this need and an increasing number of regulations influence decision-making processes of electric utilities.

B. Demand-Side Management as an Energy Conservation Method

1. Historical Overview

In the 1980s, unforeseen plant cost overruns occurred and most costs were passed on to the ratepayer. Consequently, state utility commissions mandated least-cost planning for utilities. This included mainly supply-side planning. However, due to a growing need for additional generating capacity, rising fuel as well as construction costs, and increased environmental awareness, demand-side management became popular. The combination of supply-side and demand-side planning became known as **integrated resource planning (IRP)**. IRP is a planning and operating tool helpful to shape load curves, use existing assets more efficiently, and avoid some capital expenditures and financing costs on a cost-based screening process. (Rudden, 1994) IRP allows to take the full environmental impact of new generation into consideration and helps to choose the least-cost alternative for society (Smock, 1992; Michaels, 1993; "Regulators", 1993; Moeller, 1993; Rosenzweig, 1993). The increasing importance of IRP is also due to the fact that it is an important part of the National Energy Strategy (NTIS, 1991).

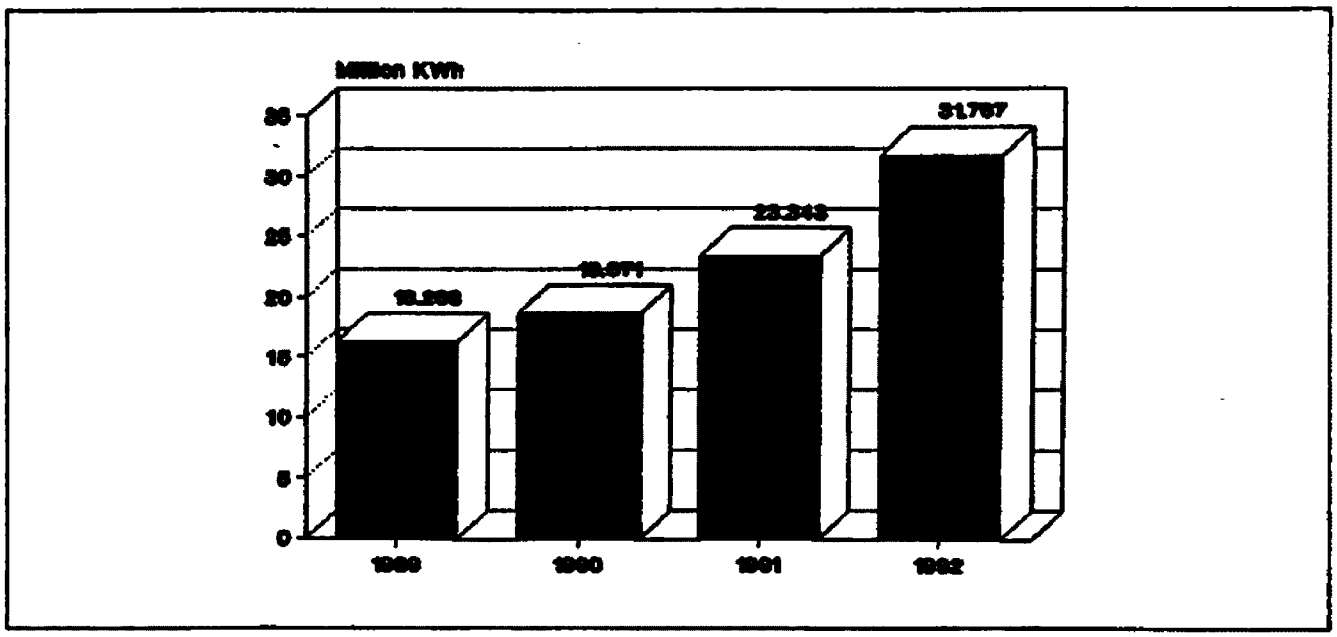
Demand-side management (DSM) programs started in the 1970s. However, utilities did not emphasize DSM because it tended to lower revenues and

earnings under existing regulations. Between rate cases, utilities could only increase their revenues by selling more electricity because rates were fixed for that period of time. (Hirst, 1994b) In the early 1980s, under regulatory pressure, more utilities participated in DSM. By the late 1980s and with the full impact of least-cost planning, DSM was fully accepted and practiced in the industry. Social concerns and regulatory pressure had encouraged DSM. However, the 1990s with changing regulations and the promise of potential profits through pursuing DSM, finally see complete engagement of utilities in DSM. (Laros & Daly, 1992)

Demand-side management becomes increasingly important because utilities have to face uneven demand for electricity (load). Furthermore, load requirements change continuously depending on factors as time of day, season of year, or characteristics of the territory served by the utility. However, utilities always have to be able to match peak load. (EIA, 1992b) Traditionally, DSM was employed to reduce this peak demand rather than to achieve overall improvements in customer energy efficiency and to avoid or delay new capacity needs. (Smock, 1992; Hirst, 1992; Moeller, 1993)

Today, DSM programs help utilities modify the growth in demand and energy use, selectively expand customer services, and improve the use of generating resources. Generally speaking, DSM programs encourage consumers to modify their pattern of electricity usage, including the timing and level of electricity demand. The overall objective of most DSM programs is to

provide cost-effective energy and capacity resources that help defer the need to build new power plants. (EIA, 1994). Utilities report DSM data to the EIA since 1989. Energy savings through DSM nearly doubled in that time period, showing the increasing importance of DSM.



Exh. 9: **Energy Savings through DSM (EIA, 1994c, p. 106)**

2. Types of DSM Programs

Utilities use different types of DSM programs, depending on organizational needs, market characteristics, strategic objectives, and system operating characteristics.

Strategic Load Growth / Electrification Programs

They increase electricity consumption during non-peak times and invent new, efficient electro-technologies. Furthermore, they reduce differences between base load and peak load.

Flexible Load Shape Programs

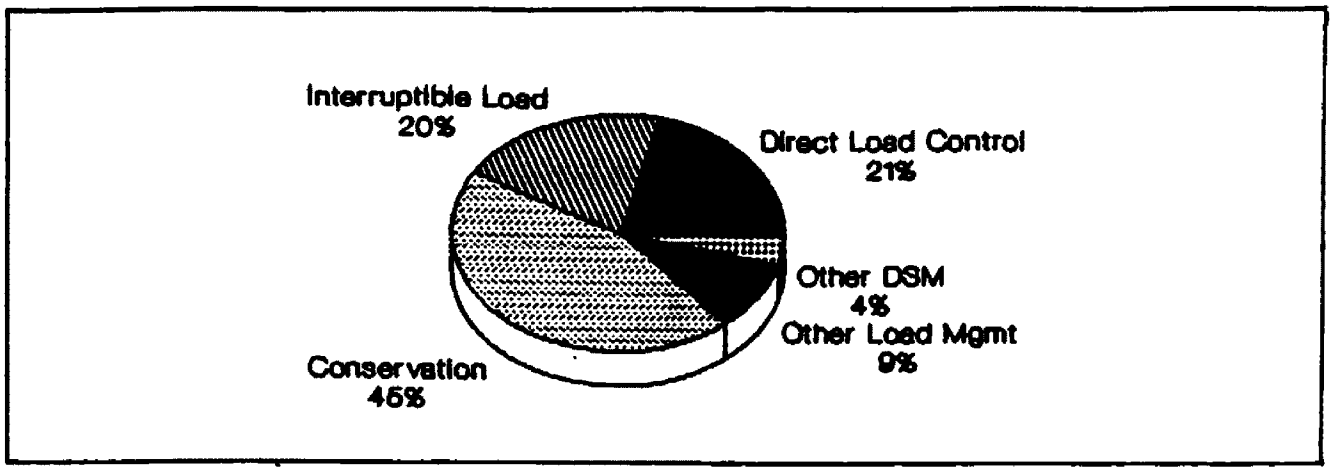
This type of program offers customers either a price signal or another incentive to modify consumption according to the changes in the utility's cost of providing the power (i.e. real time pricing).

Load Management Programs

They reduce or shift demand at certain critical times and focus on timing of electricity demand rather than on efficiency. They usually have only a minor effect on annual electricity consumption (i.e. direct load control or interruptible load).

Conservation Programs

These programs try to reduce energy demand by promoting energy efficient equipment and building design. These high-efficiency measures use less electricity to provide an equivalent or greater level of electric service. Conservation programs account for the majority of DSM programs.



Exh. 10: **Peak Load Reductions by Type of DSM Program (EIA, 1994c, p. 107)**

3. Implementation of DSM Programs

The implementation of DSM programs into a marketing plan is possible with different mechanisms (EIA, 1994c; Battelle Columbus Division & Synergic Resources Corporation, 1984; Limaye & Davis, 1986; Gellings & Chamberlin, 1992). **Advertising/Promotion** attempt to inform consumers about DSM options through such means as brochures, bill stuffers, television and radio advertisements, or workshops. Broad and specialized targeting is possible, though programs in this area tend to be expensive.

With the help of **Customer Education**, utilities try to change their customer's energy consumption patterns by general information about efficient energy use. Although a wide number of customers can be reached at low cost per customer, customer education generally has low impact.

Direct Customer Contact involves installation of energy efficiency measures in the facilities of participating consumers by the utility. Direct customer contact allows a more exact and customized analysis of alternatives, but tends to be expensive. It personalizes the customer-utility relationship, but can lead to negative reactions from trade allies. Direct customer contact involves side specific programs such as walk-throughs, energy audits, building management training programs as well as design assistance or after care.

Utilities which employ **Trade Ally Cooperation** work together with, for example, equipment producers or retailers. Rather than addressing the ultimate customer directly, the point-of-sale is addressed, which tends to be more effective. The utility does not have to bear all marketing costs, but trade ally cooperation requires coordination and the will to cooperate from all involved parties.

Utilities employing **Direct Financial Incentives** offer cash or noncash awards to encourage consumer participation in a DSM program and adoption of recommended measures, e.g. zero-/low-interest loans. Direct financial incentives usually address the costs involved with the installation of conservation measures and therefore lower existing installation barriers. However, direct incentives can be expensive and can also lead to negative reactions from ineligible customers. Regulatory agencies have to accept programs in this area.

Rate Incentives can be a powerful mean to encourage conservation, although it can create negative reactions from ineligible customers and trade allies. In addition, regulatory agencies have to accept rate incentives, such as discounts or refunds on monthly electric bills in return for consumer participation in DSM programs.

The types of programs eventually applied significantly depend on the customer sector that they address. The **residential sector** is characterized by a relative similarity of end-uses and consumption patterns, making DSM with relatively predictable outcomes possible. Because per-unit electricity consumption in the residential sector is less than in the commercial and industrial sectors, DSM in this area is usually designed to achieve high-participation rates in order to alter the load curve of the utility system significantly.

Though most electricity consumption in the **commercial sector** is for lighting, air conditioning, and space heating, the relative importance of different end-uses varies significantly across consumer types. This diversity does not allow general DSM programs and hindered utility engagement in this sector for a long time. Recently, efforts increased with activities focusing on energy-management assistance, cool storage, lighting, heat pump, and water heating improvements.

The **industrial sector** shows the widest variety of end-uses, technologies, and consumer sizes. Therefore, development of sector-wide DSM

programs was slow compared with other sectors. Traditionally, alternative rate-design approaches have been the center of focus. Today, other DSM activities try to influence the consumption patterns of industrial consumers directly. Examples are rebates and free service for thermal storage, electro-technology, and advanced motor-drive activities. (EIA, 1994c)

Chapter IV:

Utility Marketing under the Influence of Energy Conservation

A. The Northwest

The Northwest is defined within this paper as Idaho, Montana, Oregon, and Washington. After a broad comparison between national and regional trends in chapter II.C. of this paper, this chapter will take a closer look at supply as well as demand characteristics of the Northwest and will describe power planning in the region.

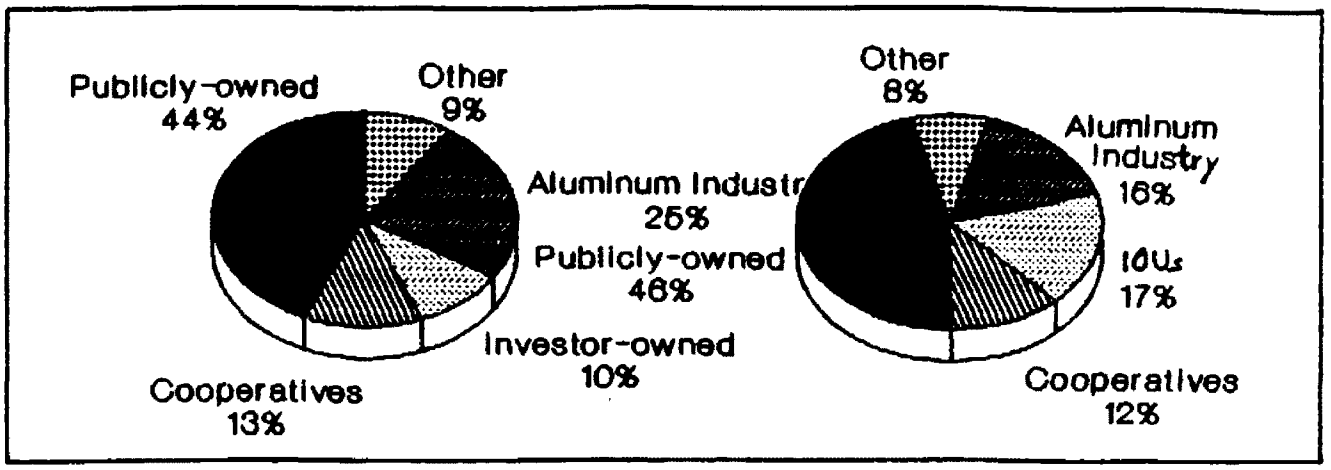
1. Characteristics of Electricity Supply

The Northwest is different from the rest of the United States in some ways. About 60% of the Northwest's energy resources come from hydropower; coal does not play an important role. Cheap hydropower is the main reason for lower electricity prices in the Northwest. Furthermore, it decreases the dependency on foreign supply of for example oil; though, it also increases the dependency on weather conditions. However, experts have indicated that hydropower resources are almost completely used, additional generation in this area is only possible to a small extent. In addition, existing hydropower generation has to deal with its impact on the environment (e.g. on endangered fish species) and therefore cannot adjust to changing electricity demands as flexibly as it could in the past. (ICF Resources Incorporated (ICF), 1994)

With the development of the Columbia River Basin by the Federal Government in the early 1930s, hydroelectric power became the major source of energy in the Northwest. The Bonneville Project Act of 1937 created a new bureau within the Department of the Interior to build transmission lines and to market the hydropower, today called the Bonneville Power Administration. Because monopoly tendencies developed in the electric utility industry during that period of time, the BPA's primary customers by law are public bodies and cooperatives. This strengthened the non-investor-owned part of the industry by providing low-cost energy. (Department of the Interior, Bonneville Power Administration (BPA), 1977; U.S. Department of Energy, 1981)

In the 1930s, voters could vote to permit their county or subdivision to set up so-called Public Utility Districts (PUDs). PUDs became an offshoot from the Bonneville Project Act, which focused the BPA's activities on publicly-owned utilities. The act therefore encouraged the formation of PUDs, which were formed primarily in Washington and Oregon. (Springer, 1976; U.S. Department of Energy, 1981)

The BPA plays a major role in the Northwest's electricity supply system; in 1993, power sold by the BPA accounted for more than 40 percent of electricity generation in the Northwest. However, Bonneville only sells power at wholesale and not at retail. Guided by its role in the Northwest, most of the BPA's electricity sales are to publicly-owned utilities, followed by the aluminum industry.



Exh. 11: **The BPA's Electric Power Sales by Customer Class (Bonneville Power Administration (BPA), 1994, pp. 48-53)**

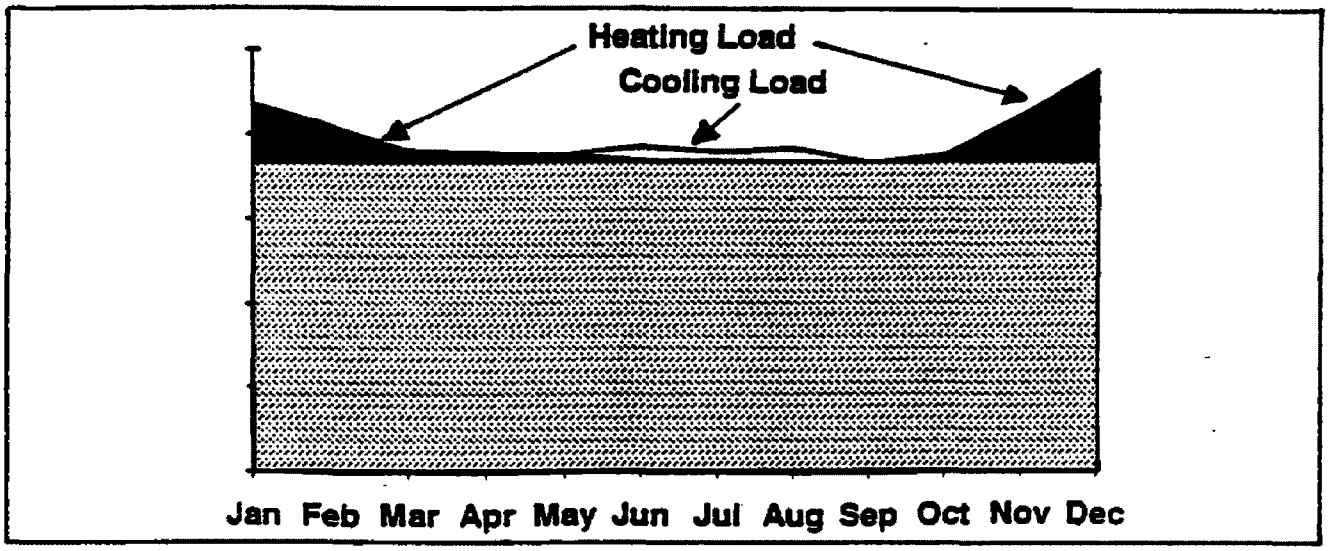
Bonneville was not created for energy generation but had power marketing and transmission responsibilities. However, recently the BPA has been directed by the Federal Government to acquire energy resources sufficient to meet the needs of its customer utilities. (BPA, 1993)

2. Characteristics of Electricity Demand[3]

In general, electricity sales are closely related to economic activity; demand for electricity increases during times of high economic activity and vice versa. In addition, weather conditions influence the demand for electricity though this

[3] If not otherwise cited, information for this section was taken from ICF Resources Incorporated's "Patterns of electric consumption in the Pacific Northwest region: A primer" (ICF, 1994)

influence is not as strong; usually, warmer weather leads to an increasing demand and vice versa. (EIA, 1992b) However, due to limited air conditioning use in the Northwest and existing weather conditions, peak demand levels are the highest during the winter months when heating purposes dominate.



Exh. 12: **Average Monthly Load Levels (ICF, 1994, p. 7)**

In the Northwest, average as well as peak demand of electricity are growing.[4] The gap between peak demand requirements and generation capacity is narrowing. Hours of peak electricity consumption usually occur in the mornings. Annual hourly peak demand occurs consistently on winter mornings. Major contributors to this trend are residential space and water heating as well as commercial office space heating end-uses.

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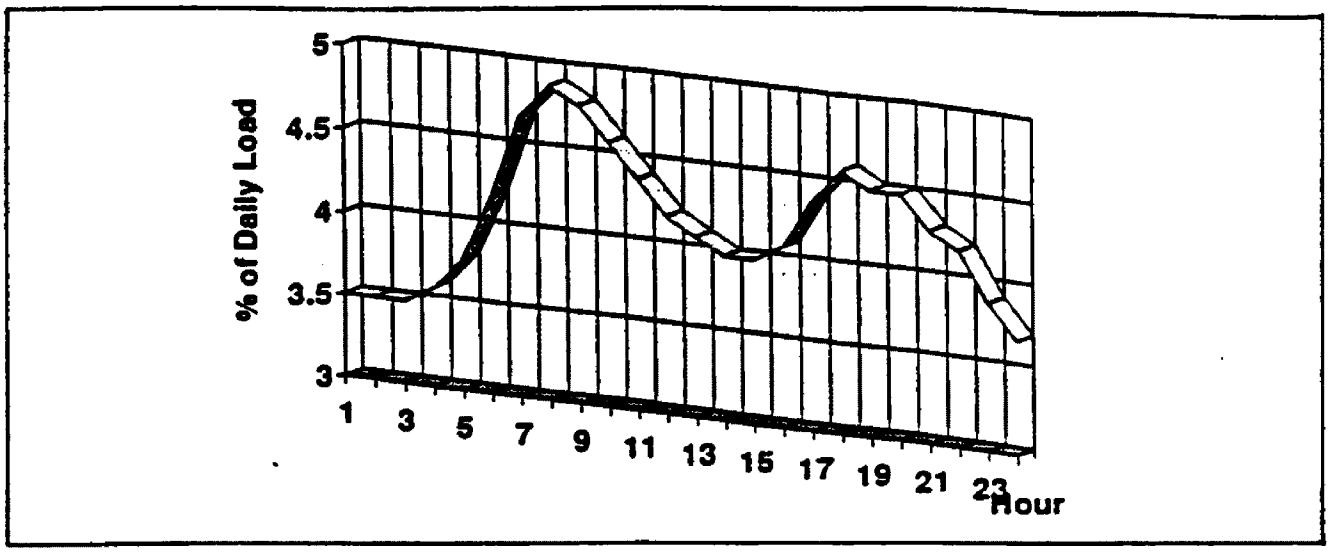
[4] Power cannot be produced in advance and stored for the moment it is needed. Therefore, an electric utility must not only be able to meet total demand for electricity throughout an extended period of time but must also be able to meet peak demand needed during a very short period of time. (Hyman, 1994; ICF, 1994)

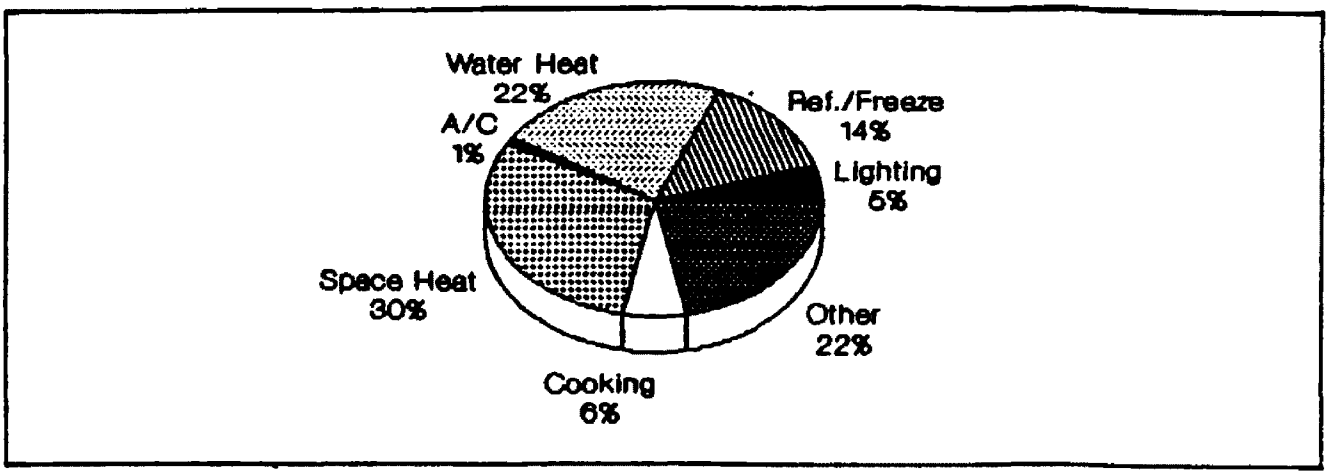


Exh. 13: **Hourly Peak Consumption (ICF, 1994, p. 12)**

The industrial and the residential sectors dominate electricity use in the Northwest. It is important to understand the characteristics of the different sectors because their relative growth can have a major impact on electric generating requirements.

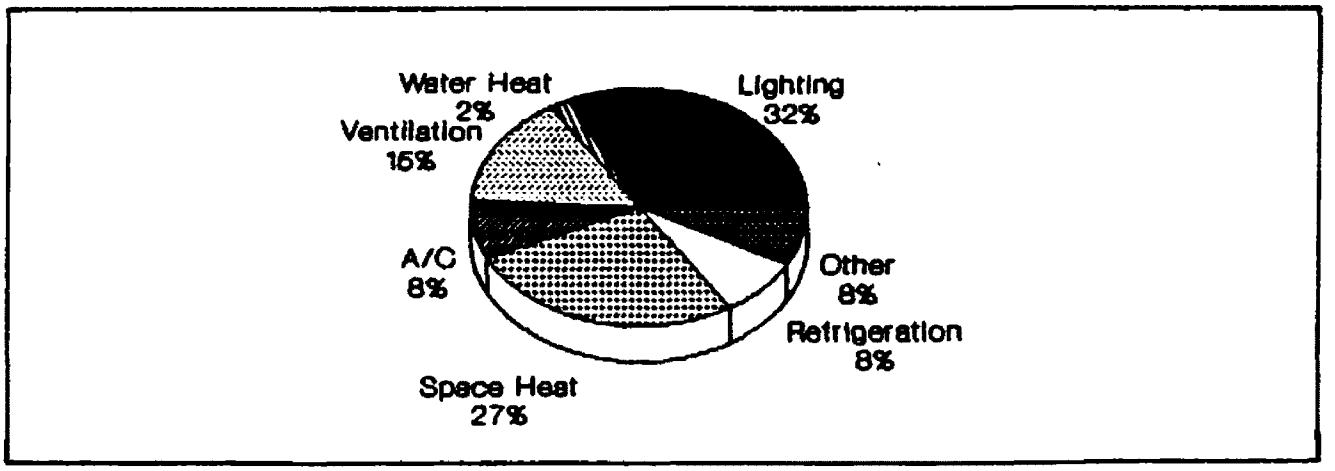
Space heating and water heating are the primary end-uses in the **residential sector**, accounting for over 50% of electricity use. Thus, in the short-run, the primary factors influencing residential electricity consumption are weather conditions and equipment efficiency. Usually, peak demand is about twice as high as the average hourly load level, with a corresponding load factor[5] of 50%.

[5] The load factor (ratio of average energy use to peak energy use) shows the difference between average and peak demand. (Hyman, 1994; ICF, 1994)



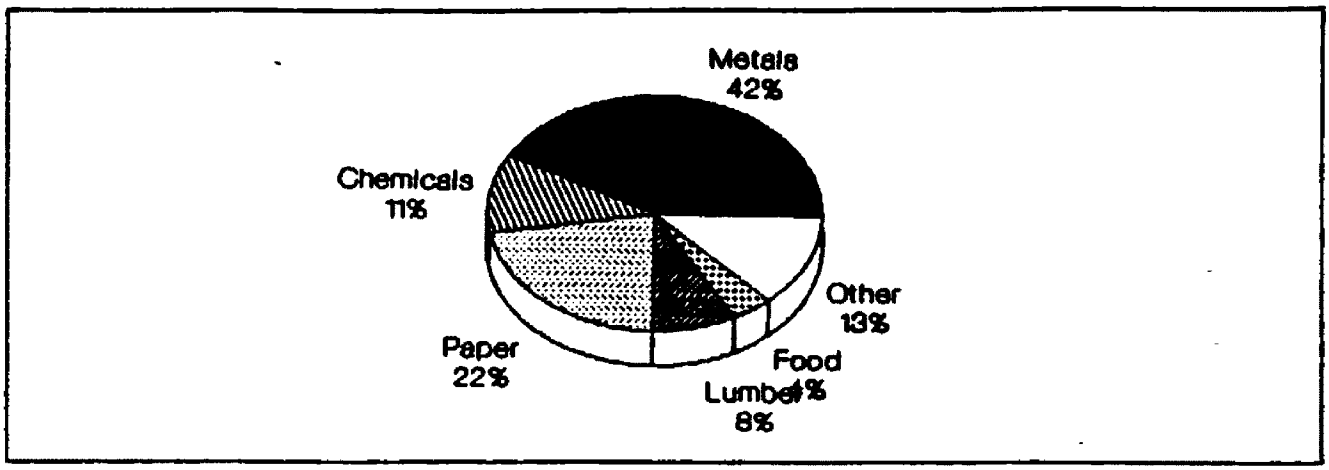
Exh. 14: **Electric End-Uses in the Residential Sector (NPPC, 1991, p. 219)**

With an average growth of 3.4%, the **commercial sector** has been the fastest growing sector in recent years. Electricity consumption is dominated by lighting, space heating, and ventilation. As peak consumption levels are typically substantially above average consumption levels, the load factor is about 70 percent.



Exh. 15: **Electric End-Uses in the Commercial Sector (NPPC, 1991, p. 224)**

The metals industry, primarily aluminum smelters, is the most important consumer in the **industrial sector** in the Northwest. Hourly electricity consumption tends to be relatively constant, because many of the largest industrial customers have around-the-clock operations. The industrial load factor is generally around 80 to 90 percent.



Exh. 16: **Composition of Industrial Electricity Use (NPPC, 1991, p. 228)**

3. Power Planning in the Northwest

With the Northwest Power Act of 1980, the Northwest Power Planning Council (NPPC) was established as the regional planning entity. The Council operates in Idaho, Montana, Oregon, and Washington. It is supposed to function as a public forum through which the Northwest's electricity needs can be secured in an economic way, and the Columbia River Basin's fish and wildlife can be protected. (NPPC, 1993)

The NPPC is directed to:

"- Develop a 20-year electrical power plan to guarantee adequate and reliable energy at the lowest cost to the Pacific Northwest.

- Produce a program to protect and rebuild fish and wildlife populations in the Columbia River Basin that have been affected by hydroelectric development.

- Conduct an extensive program to involve the public in deliberations over power planning and fish and wildlife protection." (NPPC, 1993, p. 5)

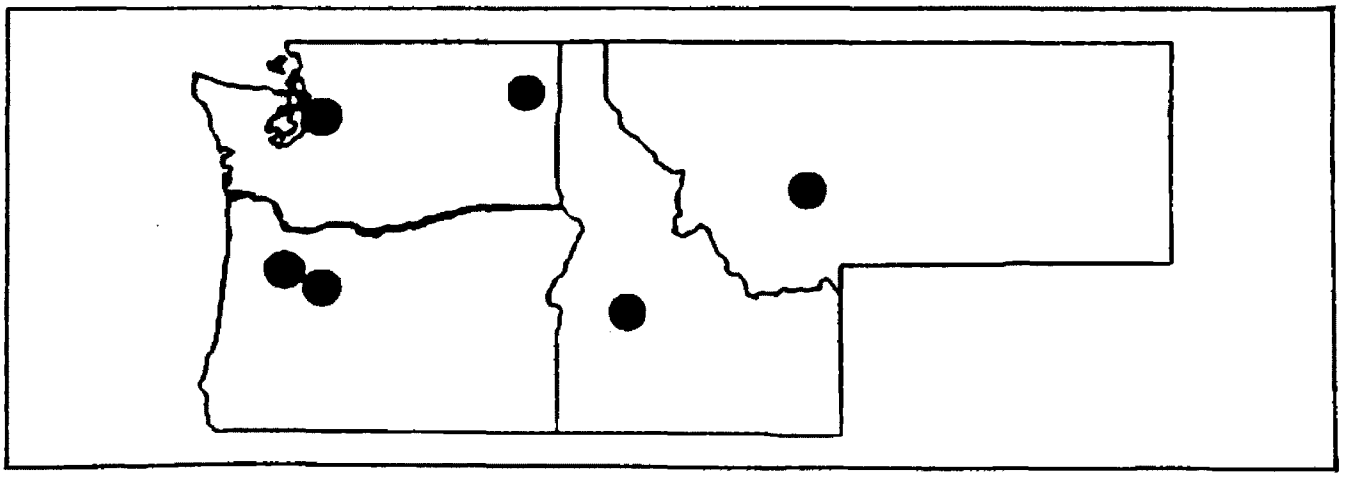
The Council forecasts demand, examines supply options, adopts a least-cost resource plan, and pays attention to regional interests through its public involvement process. Though the Northwest Power Act gives the NPPC explicit authority with regard to the BPA's acquisition of resources, on the individual utility level, the Council influences decisions more through its analysis and persuasion. (Nybo & Hammarlund, 1993)

Furthermore, the NPPC employs a conservation tracking system, called NU-Trak. This system is a computerized data base of conservation information from the Northwest's electric utilities. This information was first published in 1993 and is now released on an annual basis. NU-Trak helps to measure progress in energy conservation in relation to targets, provides information to state utility regulators, and aids in regional power planning and implementation. (NPPC, 1994)

B. Characteristics of Examined Utilities

Even though the BPA is a major factor on the energy supply side in the Northwest, it only sells electricity at wholesale. At the retail level, the investor-owned utilities are the most important players (EIA, 1994c). In addition, there are only six IOUs in the region, compared to about 75 publicly-owned utilities and approximately 80 cooperatives. In order to provide a relevant analysis of the impact of conservation programs on marketing within the framework of limited time and financial resources, the paper will concentrate on the IOUs in the region.

Six investor-owned utilities are operating in the Northwest. The following exhibit shows their headquarters. Two IOUs, Portland General Electric and Puget Power, are serving a relatively small urban area with a high population density, whereas the other IOUs are operating in larger, less populated service territories.

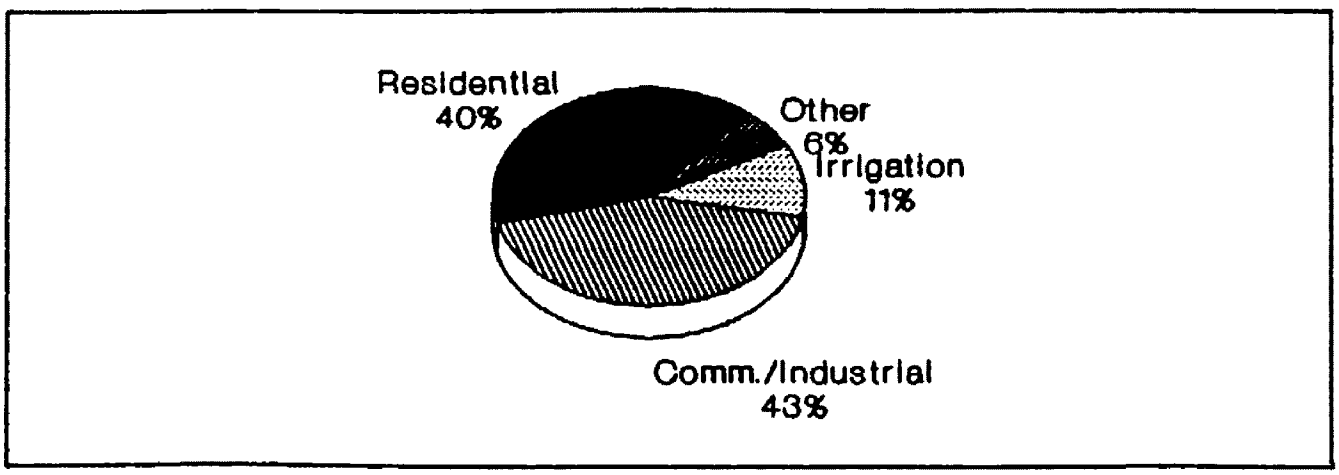


Exh. 17: Investor-Owned Utilities in the Northwest

1. Idaho Power Company

Idaho Power began operating in 1916 (Moody's, 1993); its headquarters are in Boise. Today's operations are within a 20,000-square-mile area composed of southern Idaho, eastern Oregon and northern Nevada (Debbas & Medalie, 1994) with a population of approximately 650,000 people. However, most of the company's revenues come from Idaho. (Moody's, 1993). Idaho Power is the state's only investor-owned utility, being a combined hydroelectric/thermal utility.

Due to employment growth, Idaho Power added more new residential customers to its system in 1993 than it has since the boom years of the 1970s. However, the commercial and small industrial sector accounts for the major source of revenue, closely followed by the residential sector (Idaho Power Company, 1994). The chemical and allied industries are the largest customers and account for 62% of the large industrial electricity sales (Debbas & Medalie, 1994).



Exh. 18: **Idaho Power's Sources of Revenue (Idaho Power Company, 1994, p. 19)**

Apart from general business customers, Idaho Power serves other utilities on a wholesale basis. Almost 24% of its total electricity Sales are wholesale sales. (Idaho Power Company, 1994)

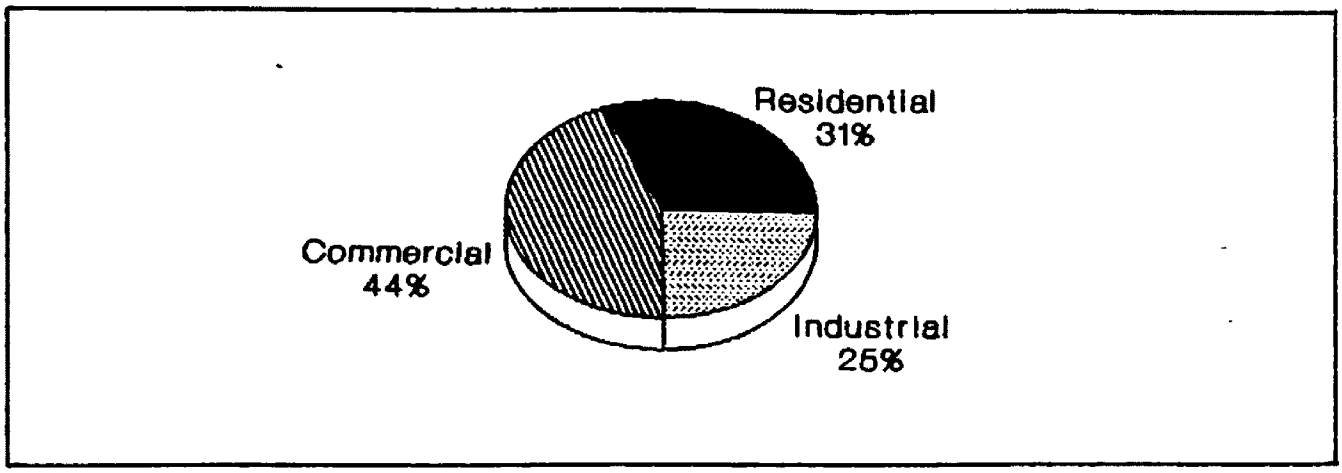
2. The Montana Power Company

Montana Power is Montana's only investor-owned utility. It is a combination utility, selling natural gas and electricity. Montana Power's headquarters are in Butte; it was incorporated in 1912. Montana Power serves a 107,600-square-mile area in Montana with a population of about 704,600. (Moody's, 1993) Energy is mainly generated with the help of hydroelectric and thermal sources, though 28% of the resource mix is purchased power (Debbas & Medalie, 1994).

Montana Power is a highly diversified company. The electric and natural gas business is conducted by the utility division, accounting for 51% of revenues. Non-utility businesses (including oil and coal as well as telecommunications) are conducted through the wholly-owned subsidiary Entech. The Independent Power Group is involved in the wholesale power business.

Wholesale sales are an important part of Montana Power's electric utility business; they account for more than 30% of the company's total electricity sales. The electric division gained 4,753 new retail customers in 1993 and has

now about 260,000 customers. It has added 15,700 new customers in the past five years with most of the expansion taking place in western Montana. Commercial and small industrial customers account for the major part of revenues, followed by residential customers. (The Montana Power Company, 1994).



Exh. 19: Montana Power's Sources of Revenue (The Montana Power Company, 1994)

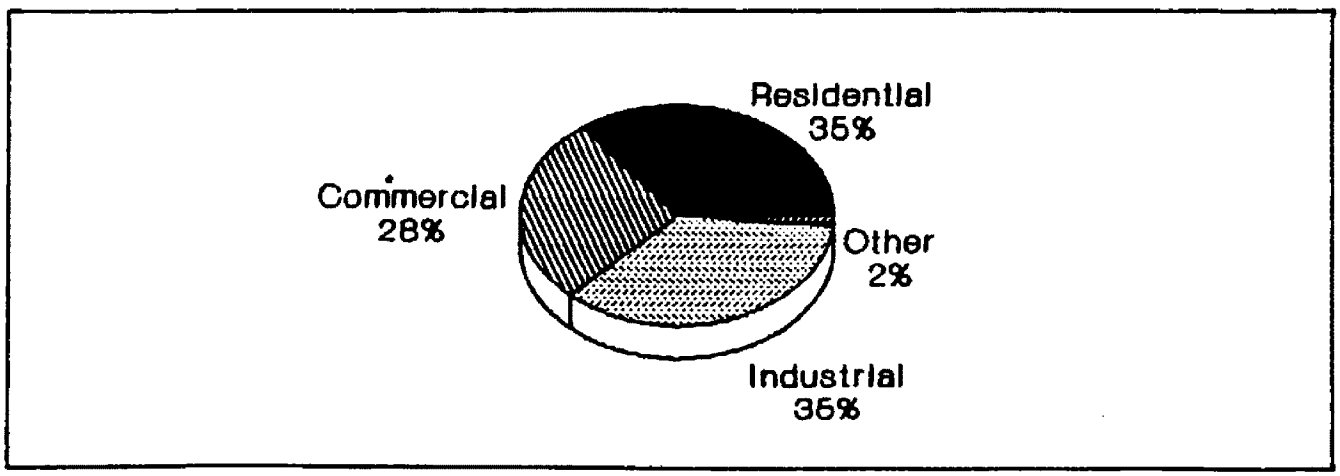
3. PacifiCorp[6]

Pacific Power and Light Company, incorporated in 1910, adopted the name PacifiCorp in 1984. In 1989, PacifiCorp and Utah Power & Light Company merged. The company conducts its retail electric utility business through two

[6] Information in this section refers to PacifiCorp as a whole. However, Pacific Power is the part of PacifiCorp that has its main service territory in Oregon and will therefore be the center of focus with regard to energy conservation.

divisions, Pacific Power and Utah Power, and its power production and sales on a wholesale basis under the name PacifiCorp. PacifiCorp is a highly diversified company, offering electricity and telecommunications as well as financial services. However, the utility division accounts for 74% of revenues. (Moody's, 1993)

The company serves Oregon as well as Utah and to a smaller extent Wyoming, Washington, California, Montana, and Idaho. It serves approximately 1.3 million retail customers in a service area of about 153,000 square miles. (Moody's, 1993) PacifiCorp is mainly a thermal utility, utilizing hydropower for just a small percentage of power sources. The company covers 16% of its power sources with purchased power. (Debbas & Medalie, 1994). PacifiCorp serves an increasing number of wholesale customers. In 1993, wholesale electricity sales accounted for more than 26% of all electricity sales. Residential and industrial customers account for the major part of the utility division's retail revenues, closely followed by commercial customers. (PacifiCorp, 1994)



Exh. 20: **PacifiCorp's Sources of Revenue (PacifiCorp, 1994, p. 28)**

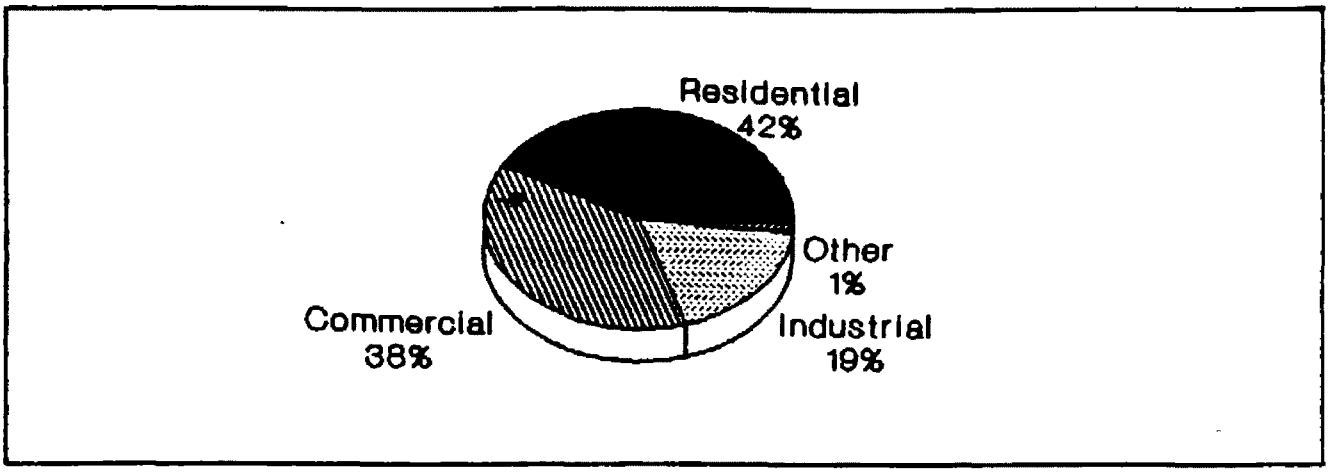
4. Portland General Electric Company

Portland General Electric Company (PGE) was incorporated in 1907 (Moody's, 1993). PGE operates in an urban area, serving over 620,000 retail customers in a 3,170-square-mile area of northwest Oregon that contains a population of 1.3 million. However, its service territory is comprised of 45% of the state's population and 60% of the state's economic base. (Portland General Corporation (PGN), 1994) PGE purchases more than half of its power. Thermal and, to a smaller extent, hydroelectric generation account for the remaining part of the resource mix. (Debbas & Medalie, 1994)

Until 1993, a significant part of PGE's generating sources was provided by the nuclear plant Trojan (16% in 1992). Trojan began service in 1976 and was permanently shut down in January of 1993 due to cracks in the tubes of the steam generator. PGE decided to retire the plant rather than to invest in replacement of the steam generation system as a least-cost decision (BPA, 1994). Power formerly provided by Trojan is being purchased until new generation will be available in 1996. PGE currently expects to purchase approximately 57% of its 1994 load requirement. (PGN, 1994)

The wholesale business plays just a minor part in PGE's electric operations. Just 8.8% of total electricity sales are on a wholesale basis. Residential customers account for the major part of retail revenues, closely followed by commercial customers. The largest industry is the paper industry

and allied products (Debbas & Medalie, 1994). However, a significantly smaller portion of revenues is derived from industrial customers, nearly one-third less than the national average. (PGN, 1994)

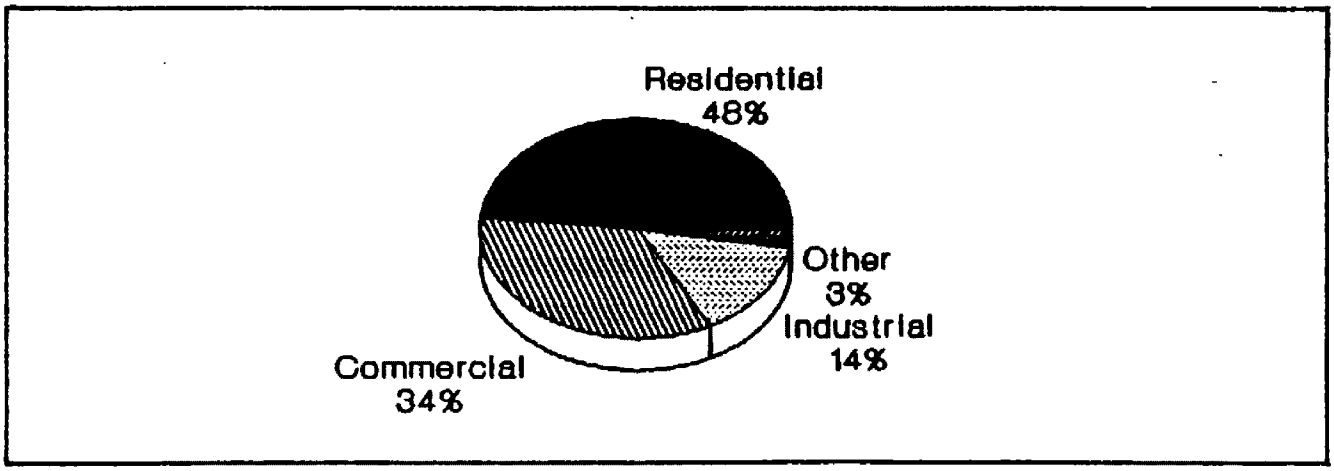


Exh. 21: PGE's Sources of Revenue (PGN, 1994, p. 48)

5. Puget Sound Power and Light Company

Puget Power is one of the two investor-owned electric utilities in Washington. It was incorporated in 1912 and has its headquarters in Bellevue (Moody's, 1993). The Company operates in an urban area, serving a 4,500-square-mile region in western Washington with an area population of 1.8 million. (Debbas & Medalie, 1994; Puget Sound Power and Light Company (Puget Power), 1994a) Puget Power generates electricity, mainly thermal, and has added more than 700 megawatt of additional resources in the past five years. However, it purchases 65% of its resource mix. (Puget Power, 1994b)

Wholesale electricity sales account just for 5.3% of all electricity sales. However, Puget Power experiences a strong customer growth, it has added 115,000 new customers to its systems in the past five years. The strongest growing sector was industrial customers with an average growth rate of 4.2% in the past five years. (Puget Power, 1994b) The residential sector represents the main source of revenues, followed by the commercial sector (Debbas & Medalie, 1994).



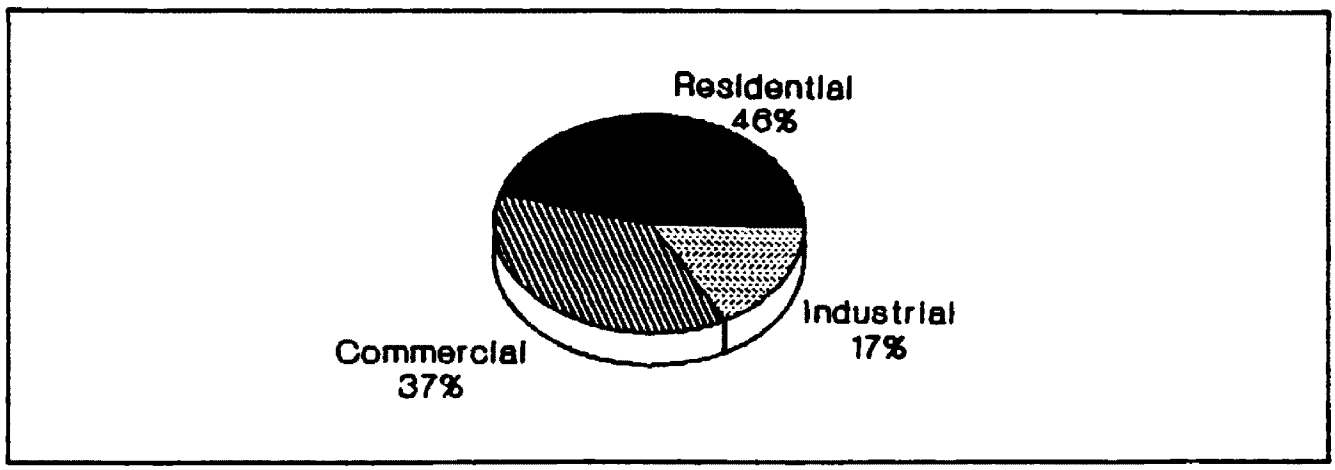
Exh. 22: **Puget Power's Sources of Revenue (Puget Power, 1994a, pp. 44)**

6. Washington Water Power Company

Washington Water Power Company (WWP) is Washington's second investor-owned utility, it was incorporated in 1889 (Moody's, 1993). However, it is a combination utility, with electricity accounting for 73% of revenues and gas for 21% (various non-utility businesses account for the remaining part). WWP

operates in eastern Washington, northern Idaho, and to a small extent in Montana. It provides electric service within a 26,000-square-mile area with a population in excess of 700,000. (Moody's, 1993). The company's main generating source is hydropower (33% of power sold), though it also has thermal generation. However, WWP purchases 42% of its power. (Debbas & Medalie, 1994)

31.3% of all electricity sales are on a wholesale basis. The wholesale business is therefore a major part of WWP's electric operations. Furthermore, Washington Water Power plans to extend its service territory and add about 9,300 new customers to its system by acquiring electric properties of PacifiCorp in northern Idaho (The Washington Water Power Company (WWP), 1994). In 1993, residential customers accounted for the major part of revenues, followed by commercial customers.



Exh. 23: WWP's Sources of Revenue (WWP, 1994, p. 22)

The following table summarizes information about the six investor-owned utilities in the Northwest.

	Idaho Power	Montana Power	PacifiCorp [2]	PGE	Puget Power	WWP
Revenue (000) [1]	$540,402	$1,075,596	$3,412,000	$2,500,000	$1,112,878	$640,599
Net Income (000) [1]	84,464	107,211	479,000	479,000	183,300	82,776
Earnings per Share [1]	2.14	1.98	1.60	1.88	2.00	1.44
Divdends [1]	$1.80	$1.58	$1.195	$1.20	$1.83	$1.24
Employees (full-time) [1]	1,654	4,089	9,475	2,618	2,609	1,438
Service Area (square miles)	20,000	97,540	153,000	3,170	4,500	26,000
Population	650,000	704,600		1,300,000	1,800,000	700,000
General Business Customer	317,772	261,601	1,305,000	621,571	716,002	263,772
Sales (Million KWh)	14,996	10,400	42,413	16,507	19,037	7,151
Retail (Million KWh)	11,406	7,100	14,949	1,599	1,064	3,258
Wholesale (Million KWh)	3,590	3,300	57,362	18,106	20,101	10,409
Average Residential Use (KWh)	14,587	8,764	10,733	12,502	12,674	13,406
Resource Mix			1% other			
hydroelectric	52%	32%	6%	12%	6%	33%
thermal	40%	40%	77%	30%	29%	25%
purchased	8%	28%	16%	58%	65%	42%
Revenues from Retail (000)	$428,658	$340,000	$1,968,800	$802,520	$1,036,875	$337,318
residential (000)	171,892	106,400	698,900	340,440	502,037	153,929
commercial (000)	[3] 184,752	[4] 150,000	543,900	303,804	356,586	126,256
industrial (000)		[4] $83,600	696,200	147,274	150,063	$57,133
other (000)	$72,014		$29,800	$11,002	$28,189	

1 Data refer to the companies as a whole, not just the utility divisions.
2 Data refer to PacifiCorp, not just the part operating in the Northwest.
3 *Idaho Power combines its commercial and industrial customers into one sector.*
4 Montana Power divides its non-residential customers into the commercial and small-industrial sector and the large industrial sector.

Table 1: **Characteristics of the Investor-Owned Utilities in the Northwest (Idaho Power Company, 1994; The Montana Power Company, 1994; PacifiCorp, 1994; PGN, 1994; Puget Power, 1994a; WWP, 1994)**

C. Characteristics of Utility Conservation Programs[7]

The Pacific Northwest Electric Power Planning and Conservation Act of 1980 defines conservation as "any reduction in electric power consumption as a result of increases in the efficiency of energy use, production, or distribution" (United States, Public Law 96-501, 1980, Sec. 3 (3)). This definition excludes programs emphasizing fuel-switching (for example from electricity to gas) or the timing of energy demand (for example interruptible power) rather than energy efficiency.

1. General Characteristics

a. The Northwest

In 1992, electric utilities in the Northwest acquired almost 100 average megawatt (aMW) of conservation energy resources, contributing to a cumulative total savings of about 650 aMW from 1978 to 1992. The NPPC's 1991 Northwest Power Plan calls for acquiring at least 1,500 aMW of conservation

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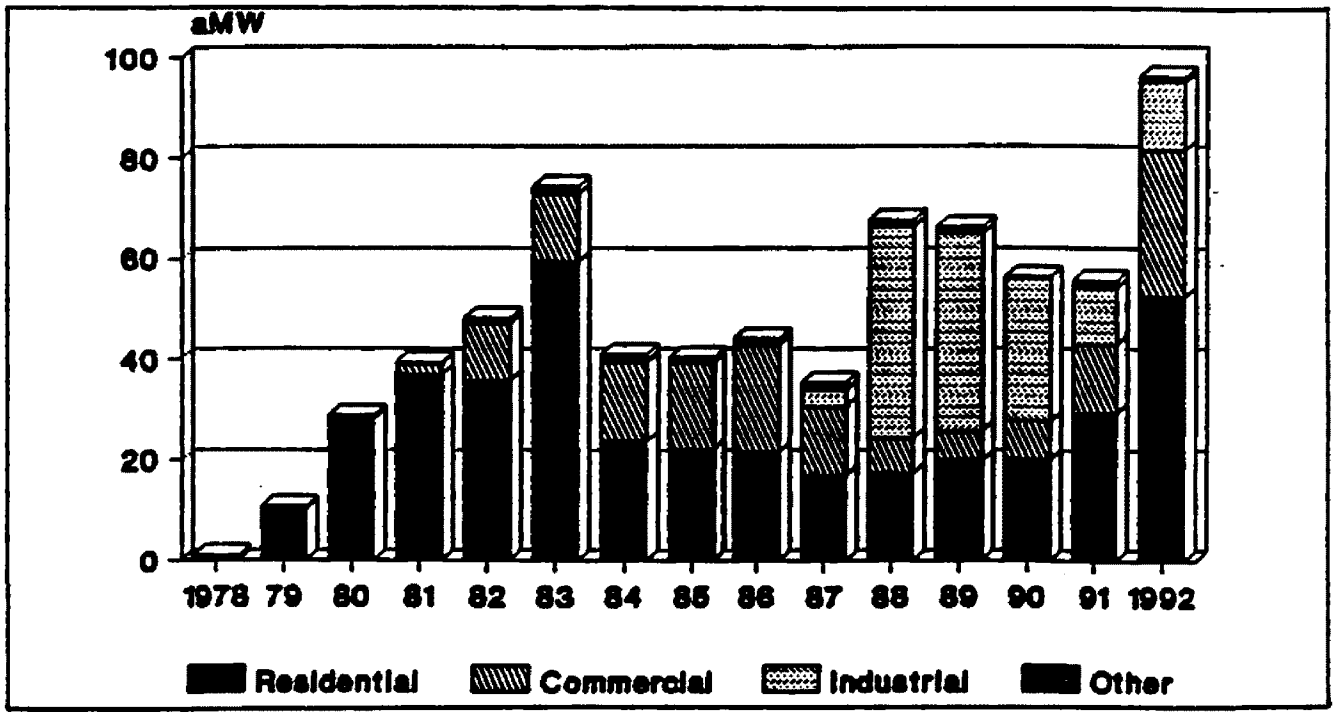
[7] The NPPC keeps track of the regions conservation efforts with the help of the Northwest Utility Conservation Tracking System (NU-Track). The regions utilities report conservation data to the NPPC and the data are published annually in the "Green Book". The analysis of conservation programs in this chapter is based on this publication. (NPPC, 1994)

resources by the end of the decade.

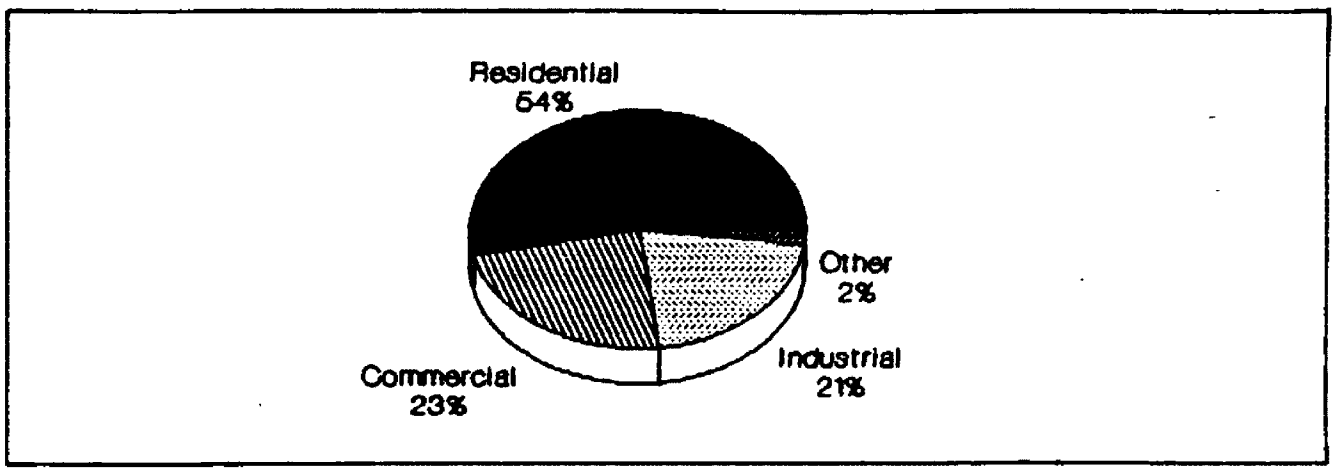
Electricity savings peaked in the early eighties due to high savings in the residential sector. However, they declined rapidly in the following years to rise again in the late 1980s/early 1990s. Electricity savings reached a new regional record in 1992. Preliminary records for 1993 indicate a new conservation record at around 150 aMW.



Exh. 24: **History of Conservation Savings in the Northwest (NPPC, 1994, p. 9)**

Residential conservation programs started as early as 1978, followed by commercial programs in the early 1979, and industrial programs in 1984. Savings in the residential sector have been the highest with 352.4 aMW, but they have been extremely volatile. The high amount of residential savings in 1992 is due to residential energy codes adopted by Washington and Oregon.

The commercial sector shows a similar trend, though savings (154.7 aMW) have been significantly below those in the residential sector. Industrial energy conservation peaked from 1988 to 1990 due to a three-year program which the BPA operated for its direct service industrial customers, acquiring about 100 aMW of conservation resources. When the effects of that program are removed, the industrial sector shows an increasing conservation trend and acquired a total of 38.7 aMW (without the BPA). (NPPC, 1994)



Exh. 25: **Breakdown of Regional Savings by Sector (1978-1992) (NPPC, 1994, p. 9)[8]**

[8] Numbers include Bonneville's direct service industrial customer program.

b. Investor-Owned Utilities in the Northwest

A closer look at the conservation history of the six IOUs in the Northwest reveals the same general trends described above. However, there are some differences.

Idaho Power Company started its industrial conservation programs as late as 1992, although they accounted for one third of all energy savings in that year.

The Montana Power Company[9] started relatively late with conservation programs, in 1980 with residential programs. Non-residential programs were added in 1987; they account for about 60% of the company's total energy savings.

PacifiCorp's residential conservation programs account for 90% of all energy savings. Conservation programs in the industrial sector account just for a small amount of total electricity savings, too small to show as aMW savings.

Portland General Electric's residential conservation programs account for 60% of all energy savings.

Though energy savings at **Puget Sound Power & Light Company** followed the same pattern as in other parts of the Northwest, variations over time were not as strong. Savings increased strongly in 1991 and 1992.

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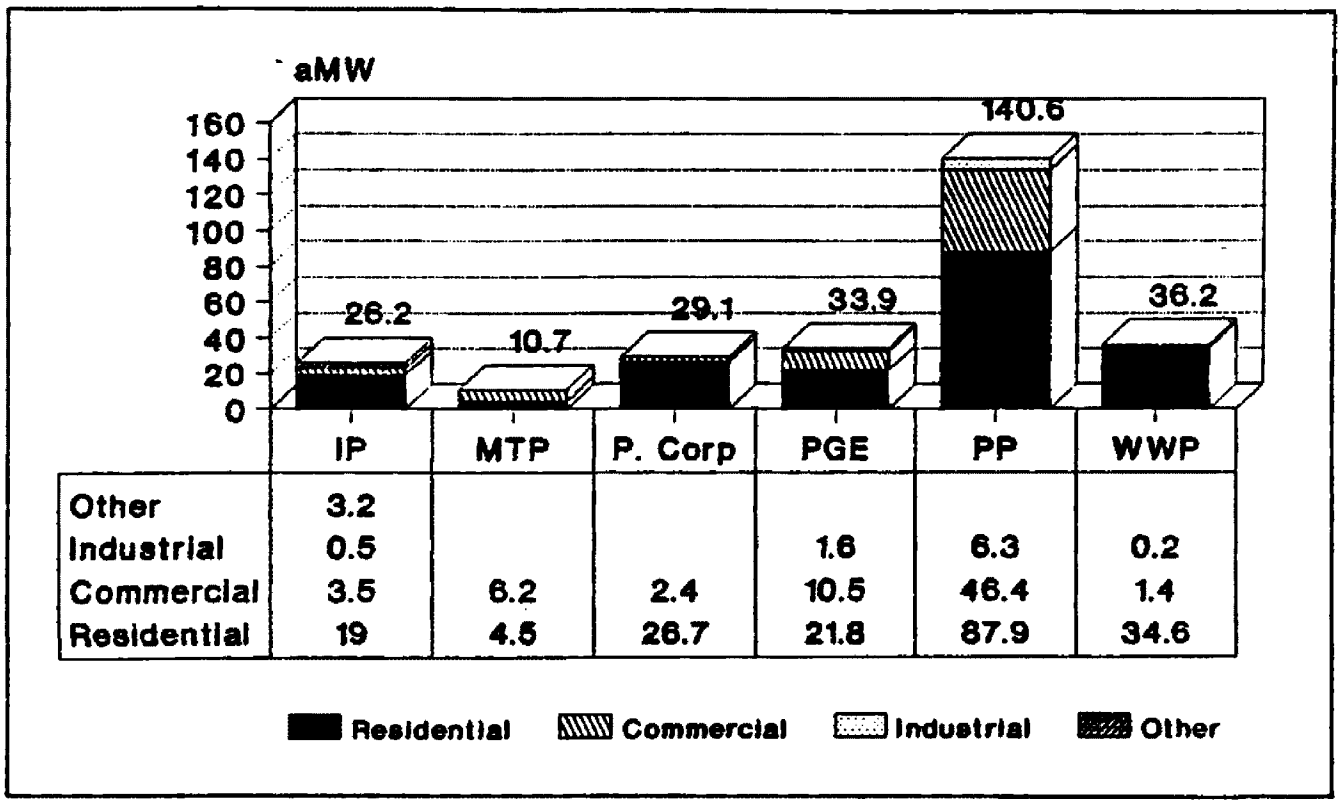
[9] Fuel-switching was a minor resource (7% of total DSM savings) for Montana Power, one of the two combination IOUs in the Northwest. (NPPC, 1994)

Commercial and residential programs were both started in 1979, with residential programs accounting for about 60% of all energy savings. Industrial programs followed in 1991 and became increasingly important.

At **Washington Water Power Company**[10], residential conservation programs account for more than 90% of total energy savings.



	IP	MTP	P. Corp	PGE	PP	WWP
Other	3.2					
Industrial	0.5			1.6	6.3	0.2
Commercial	3.5	6.2	2.4	10.5	46.4	1.4
Residential	19	4.5	26.7	21.8	87.9	34.6

Exh. 26: **1992 Investor-Owned Utilities' Savings by Sector (NPPC, 1994, pp. 21-29, 35)**

Conservation programs in relation to sales play a more important role at Puget Power and Washington Water Power. Furthermore, Puget Power is the leading investor-owned utility, with regard to energy conservation, in the Northwest.

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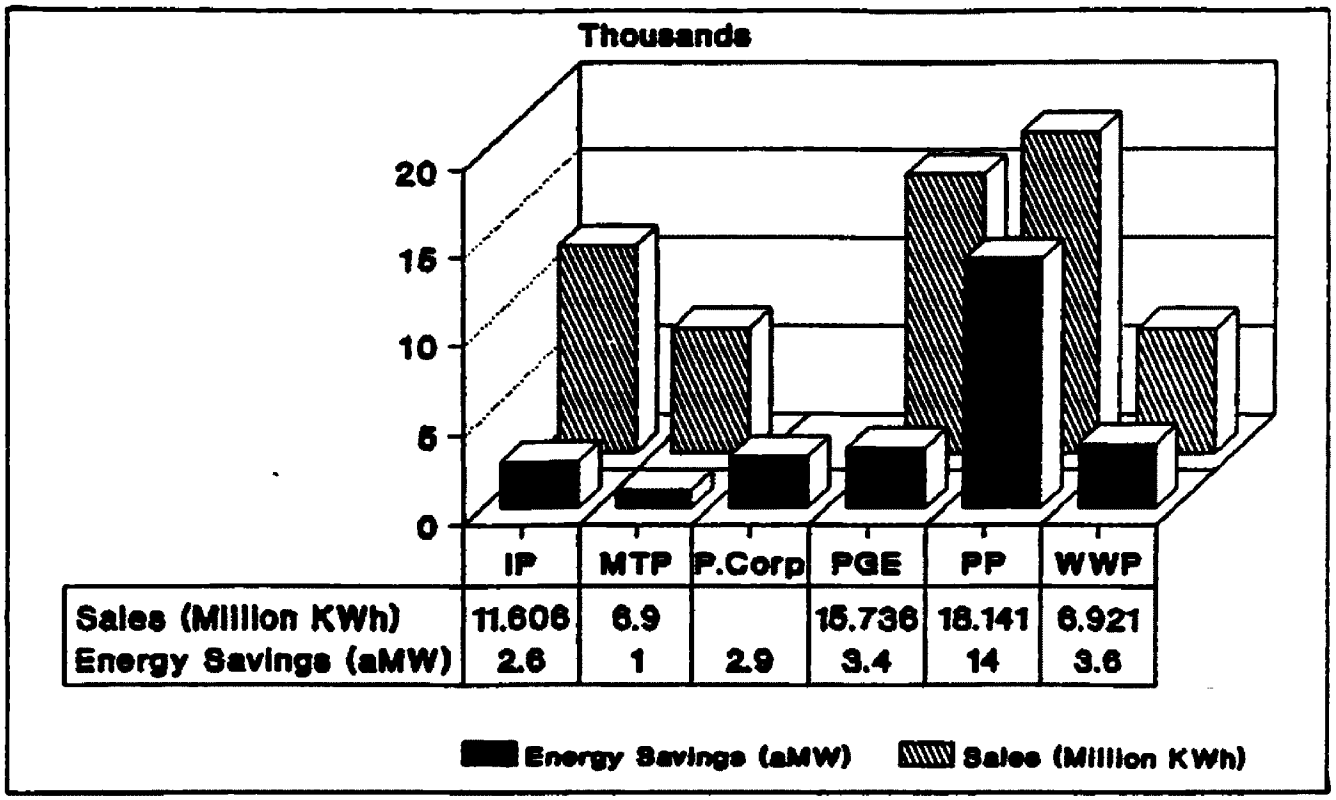
[10] Fuel-switching was a major resource (80% of total DSM savings) for WWP, the second combination IOU in the Northwest. (NPPC, 1994)



Exh. 27: 1992 Electricity Savings versus Sales[11]

2. Specific Characteristics of Conservation Programs

The Bonneville Power Administration (BPA) has a strong impact on conservation efforts in the Northwest. Not only the region's publicly-owned utilities and cooperatives, which depend on the BPA for their energy supply, but also the investor-owned utilities are influenced by Bonneville.

[11] No electricity sales for PacifiCorp are reported because numbers available refer to the whole company rather than to the part operating in the Northwest.

Utilities that employ the BPA's conservation programs for their retail customers receive reimbursements from the BPA. However, Puget Power is the only investor-owned utility in the Northwest receiving some of these reimbursements. The other IOUs rely primarily on Bonneville's promotional material. They benefit from the program's regional name recognition and from sharing program experiences as well as information among participants. (NPPC, 1994)

a. Conservation Programs in the Residential Sector

Conservation Programs in the Northwest vary significantly by sector and also within the different sectors[12]. However, certain characteristics are obvious.[13]

(1) New Construction

Especially in Washington and Oregon, state energy codes influence the implementation of conservation programs regarding residential new construction. They require electric utilities to make payments to builders of

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[12] Very few conservation programs are offered for other sectors than the residential, commercial, or industrial sector. Therefore, the following discussion will emphasize the three named sectors.

[13] Table 10 in the appendix on pages 91-92 gives additional information about the conservation programs employed by investor-owned utilities in the Northwest.

newly constructed residential buildings with electric resistance space heat and to offer design assistance. In general, conservation programs in this category address energy-efficient building practices as well as manufactured houses.

Bonneville employs the Super Good Cents (SGC) Program to encourage **energy-efficient building practices**. All investor-owned utilities, except Washington Water Power, employ a variation of the BPA's SGC program. Bonneville conducts a regional advertising campaign. Participating utilities receive promotional and technical materials as well as funds for advertising, marketing, and training. Trade ally cooperation is the main marketing instrument employed by the utilities, followed by customer incentives. End-uses that need to become more energy-efficient are heating, ventilation, and air conditioning (HVAC) as well as lighting, building envelope, refrigeration, and water heating. In the first seven years of the program, about 40,000 Northwest homes had been constructed to SGC standards. Total energy savings in 1992 were 35,067 MWh.

Residential Conservation Programs New Construction		Marketing						End–Uses						Savings
		Advertising / Promotion	Customer Education	Direct Customer Contact	Trade Ally Cooperation	Direct Financial Incentives	Rate Incentives	HVAC	Lighting	Building Envelope	Refrigeration	Water Heating	Other	MWh
Idaho Power	Good Cents Site Built					x		x		x				589
MPC	Super Good Cents Program	x		x	x	x		x		x		x		726
PacifiCorp	New Residential – Super Good Cents				x									10,148
PGE	Super Good Cents–Single Family				x	x			x	x	x		x	815
PGE	Super Good Cents–Multifamily				x	x			x	x	x	x		3,736
PGE	Multi–Family Equipment Program				x	x			x		x	x	x	1,267
Puget Power	Residential Conservation New Construction			x				x	x	x	x	x		16,975
WWP	Residential New Construction				x	x		x		x				1,111
Idaho Power	Good Cents Manufactured				x	x								985
Idaho Power	Manufactured Home Program (MAP)				x			x		x				1,644
PacifiCorp	Manufactured Housing Acquisition Program			x	x			x		x		x		4,270
PGE	Super Good Cents–Manufactured Homes				x	x				x				559
PGE	Manufactured Home Acquisition Program				x					x				1,546
WWP	Manufactured Home Acquisition				x			x		x				108
Total Savings:														43,558

Table 2: **Residential Conservation Programs in 1992 (New Construction) (NPPC, 1994)**

About 11,000 **manufactured homes** are built each year in the Northwest; about 90 percent are electrically heated, representing about 30 percent of electrically heated new homes. Idaho Power, PacifiCorp, PGE, and WWP employ variations of the BPA's Manufactured Home Program (MAP). Trade ally cooperation is the main marketing instrument of MAPs. Programs address manufacturers and provide rebates if homes are built to MAP technical specifications. All of the regions manufacturers have agreed to build according to MAP standards. Some programs also offer incentives to owners of manufactured homes. MAPs address primarily HVAC and building envelope

issues to improve energy efficiency. MAP standards save the owners of manufactured homes an average of 6,000 KWh annually. Total savings in 1992 were 8,491 MWh.

(2) Weatherization

Weatherization programs provide incentives to homeowners for installing cost-effective energy-efficiency measures in existing homes. A variety of programs is offered by all six investor-owned utilities. All IOUs also offer low-income weatherization programs and pay either the full cost or part of the costs for retrofitting existing structures. However, these programs are usually delivered by local community action agencies. Rather than relying on trade ally cooperation, utilities search for direct customer contacts, for example with the help of energy audits. Customers receive direct incentives for the installation of conservation measures. Weatherization programs also employ advertising and promotion campaigns to a great extent. Addressed end-use technologies are lighting, building envelope, water heating, and - to a smaller extent - HVAC. Weatherization programs saved 65,712 MWh of electricity in 1992.

Residential Conservation Programs Weatherization		Marketing						End-Uses						Savings
		Advertising / Promotion	Customer Education	Direct Customer Contact	Trade Ally Cooperation	Direct Financial Incentives	Rate Incentives	HVAC	Lighting	Building Envelope	Refrigeration	Water Heating	Other	MWh
Idaho Power	Oregon Weatherization			x		x								7
MPC	Energy Savings Program II			x		x		x		x		x		966
MPC	E+ Residential Audit	x	x	x				x	x	x			x	2,697
MPC	E+ Lighting – Residential	x		x		x			x					3,158
PacifiCorp	Cash Rebate and Cash Payment Programs			x		x		x	x	x		x		2,473
PacifiCorp	Zero Interest Program	x		x		x			x	x		x		641
PacifiCorp	8 1/2% Loan	x		x		x			x	x		x		148
PacifiCorp	Home Comfort	x		x		x			x	x		x		497
PacifiCorp	Home Energy Analysis	x		x					x	x		x		
PGE	Multi-Family Equipment Program				x	x			x		x	x	x	1,267
PGE	Housewarming			x		x	x			x				3,651
PGE	Single Family Energy Efficient Lighting													29
Puget Power	Residential Retrofit			x		x		x	x	x		x		39,789
Puget Power	Residential Lighting and Appliances					x			x		x			3,170
WWP	Residential Weatherization			x		x		x		x		x		870
Idaho Power	Low Income Weatherization Assistance Program		x		x									1,078
Idaho Power	Housewarming		x		x									
MPC	Free Weatherization Program		x	x				x		x		x		2,044
PacifiCorp	Low Income Direct Rebate	x		x	x			x	x	x		x		878
PGE	Low Income Weatherization			x						x				624
Puget Power	Low Income Residential Conservation			x						x				1,798
Total Savings:														65,712

Table 3: **Residential Conservation Programs in 1992 (Weatherization) (NPPC, 1994)**

(3) Appliances

All investor-owned utilities except Idaho Power also offer conservation programs regarding appliances. They are characterized by low-cost conservation measures. The majority of programs in this area addresses water heating and low-flow showerheads. Conservation measures are either done free of charge

for the customer or utilities offer customer incentives for installation of energy efficient measures. Other programs address lighting, refrigeration and HVAC. Within this area, utilities offer incentives to customers for installation of conservation measures. Appliance programs are highly efficient. In 1992, they saved 108,007 MWh of electricity.

Residential Conservation Programs Appliances		Marketing						End-Uses						Savings
		Advertising / Promotion	Customer Education	Direct Customer Contact	Trade Ally Cooperation	Direct Financial Incentives	Rate Incentives	HVAC	Lighting	Building Envelope	Refrigeration	Water Heating	Other	MWh
PacifiCorp	Hassle Free Guarantee			x								x		2,099
PGE	Water Heater Wraps			x								x		76
PGE	Hot Water					x						x		1,823
PGE	Residential Showerhead Retrofit			x								x		19,589
Puget Power	Residential Water Heating Conservation					x						x		3,248
Puget Power	Water Heater Insulation Kits			x								x		20,736
Puget Power	Energy Saving Water Heat Measures			x								x		52,773
WWP	Low Flow Shower Head/Aerator Distribution	x		x								x		3,775
Puget Power	Residential Lighting and Appliances					x			x		x			3,170
WWP	Compact Fluorescent Light Bulb Rebates					x			x					278
MPC	Ground Source Heat Pumps					x		x				x		289
MPC	Comfort Conditioning	x				x		x						152
Total Savings:														108,007

Table 4: **Residential Conservation Programs in 1992 (Appliances) (NPPC, 1994)**

b. Conservation Programs in the Commercial and Industrial Sectors

Almost all investor-owned utilities in the Northwest offer a variety of conservation programs in the commercial and industrial sectors. WWP,

however, offers only one program covering the commercial as well as the industrial sector. This program primarily addresses retrofit rather than new construction. Although the other IOUs offer more programs in this area, most programs address the commercial as well as the industrial sector. Some programs address new construction as well as retrofit. Furthermore, distinctions between different program types are not as clear as in the residential sector. Therefore, the following discussion covers commercial as well as industrial conservation programs and focuses on explaining differences where they exist.

(1) New Construction

Most new construction programs, especially in the commercial sector, follow the BPA's Energy Smart Design Program, trying to achieve or extend model conservation standards. However, not only new construction but also major remodelling is eligible for some programs. All utilities work closely together with their customers and offer either direct incentives to their customers or incentives to designers and architects, or a combination of both. They provide assistance like computer simulation models, walk-through audits, operations and maintenance, and other services. In addition to the end-uses in the residential sector, conservation programs in the commercial and industrial sectors address motor drives, industrial processes, and demand control

(Dethman & King, 1993). However, lighting is the most important end-use addressed by conservation programs in the commercial sector, closely followed by HVAC, building envelope, and water heating. In the industrial sector, motors and industrial processes in general are of increasing importance. However, most conservation programs address a broad range of end-uses, only for lighting and motors are there some specific programs. New construction conservation programs saved 97,790 MWh in 1992.

Commercial/Industrial Conservation Programs New Construction		**Marketing**						**End-Uses**									**Savings**
		Advertising / Promotion	**Customer Education**	**Direct Customer Contact**	**Trade Ally Cooperation**	**Direct Financial Incentives**	**Rate Incentives**	**HVAC**	**Lighting**	**Building Envelope**	**Refrigeration**	**Water Heating**	**Motors**	**Industrial Process**	**Demand Control**	**Other**	**MWh**
Idaho Power	**Design Excellence Award Program**			x	x			x	x	x		x			x		4,705
Idaho Power	***Partners in Industrial Efficiency***					x		x	x		x	x	x	x	x		4,568
MPC	**E+ (New) Business Partners**			x				x	x	x		x			x		294
MPC	**E+ Electric Motor Rebate Program**	x	x		x	x							x				311
MPC	**E+ Lighting Program for Comm. Buildings**	x	x	x		x			x								7,699
PacifiCorp	**Energy FinAnswer—Commercial**	x		x		x		x	x	x	x	x	x		x		7,090
PacifiCorp	**Energy FinAnswer 12,000**			x				x	x	x					x		295
PacifiCorp	***Energy FinAnswer—Industrial***			x		x		x	x	x	x	x	x		x	x	35
PGE	**Energy Smart Design—Large Commercial**			x		x											31,923
PGE	**Energy Smart Design—Small Commercial**			x		x											207
PGE	**Commercial/Industrial Energy Efficiency**			x	x	x		x	x	x	x	x	x				12,198
PGE	***Energy Smart Design—Industrial***			x		x								x			99
Puget Power	**Commercial/Industrial New Construction**			x		x		x	x	x	x	x	x		x		29,379
Total Savings:																	97,790
Bold: Conservation programs especially for the Commercial Sector																	
Italics: Conservation programs especially for the Industrial Sector																	

Table 5: **Conservation Programs in the Commercial and Industrial Sectors (New Construction) (NPPC, 1994)**

(2) Retrofit

In general, most of the characteristics of commercial and industrial new construction programs can also be found in retrofit programs. However, there are some significant differences. Trade ally cooperation is an important factor, but rather than addressing designers who work directly with the customer, utilities address manufacturers of lighting equipment or motors. Retrofit programs address a variety of electricity end-uses, but motors and lighting are major applications of conservation measures. Retrofit programs provide more energy savings than new construction programs, 155,742 MWh in 1992.

Commercial/Industrial Conservation Programs Retrofit		Marketing						End–Uses									Savings
		Advertising / Promotion	Customer Education	Direct Customer Contact	Trade Ally Cooperation	Direct Financial Incentives	Rate Incentives	HVAC	Lighting	Building Envelope	Refrigeration	Water Heating	Motors	Industrial Process	Demand Control	Other	MWh
Idaho Power	*Partners in Industrial Efficiency*					x		x	x		x	x	x	x	x		4,588
Idaho Power	Oregon Commercial Audit Program			x				x	x	x	x					x	
MPC	E+ (Retrofit) Business Partners			x				x	x	x	x	x	x	x	x	x	11,388
MPC	E+ Audits – Commercial		x	x				x	x	x	x	x	x		x		331
MPC	E+ Electric Motor Rebate Program	x	x		x	x							x				311
MPC	E+ Lighting Program for Comm. Buildings	x	x	x		x			x								7,599
MPC	Light Conversion			x					x								780
PacifiCorp	Pacific Environments	x		x		x		x	x	x	x	x	x	x	x		647
PacifiCorp	*Energy FinAnswer – Industrial*			x		x		x	x	x	x	x	x		x	x	95
PGE	Commercial Lighting/Vendor Delivered				x	x			x								8,170
PGE	*Drive Power – Motors*				x	x							x				289
PGE	*Drive Power – Adjustable Speed Drives*				x	x							x				2,592
PGE	Deferred Maintenance			x		x											920
PGE	Commercial Retrofit			x													11,959
PGE	Commercial/Industrial Energy Efficiency			x	x	x		x	x	x	x	x	x				12,196
Puget Power	Commercial/Industrial Lighting Conservation			x		x			x								20,177
Puget Power	Commercial/Industrial Energy Management			x		x		x	x	x	x		x		x		72,589
Puget Power	Premium Efficiency Motors				x	x							x				450
Puget Power	Conservation Partners			x	x			x	x	x	x	x	x		x		2,978
WWP	Commercial/Industrial Energy Efficiency			x		x		x	x	x	x	x	x		x		4,473
Total Savings:																	155,742
Bold: Conservation programs especially for the Commercial Sector																	
Italics: Conservation programs especially for the Industrial Sector																	

Table 6: Conservation Programs in the Commercial and Industrial Sectors (Retrofit) (NPPC, 1994)

D. Examples of Utility Conservation Programs

After the description of general characteristics of conservation programs in the Northwest, this section describes two energy conservation programs in more detail. Both program's are based on an energy audit, followed by a customized report of recommendations, and the offer of cash incentives to customers for installation of conservation measures. The first described program takes place in the residential sector, the second in the commercial and industrial sectors.

1. Montana Power's "E+ Residential Audit Program"[14]

The "Efficiency Plus (E+) Residential Audit Program" is a residential weatherization program. It primarily targets Montana Power's electric space heat and/or electric water heat customers. Customers get to know about the program by bill inserts, direct mail, or - to a small extent - by commercials in newspaper, TV, and radio.

Montana Power works together with an energy service company. This contractor visits the homes of participating customers and performs energy

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[14] Information about this program was taken from the NPPC's "Green Book" (NPPC, 1994), promotional material from Montana Power, and a phone conversation with Deb Young (November 2, 1994), Manager of the program at Montana Power.

audits. There is no direct charge to customers for the audit. Auditors check insulation, as well as windows, doors, foundations, and other places for heat loss/cold infiltration. They check the heating system for efficiency and thermal integrity, water heaters for heat loss, and lighting, refrigerator, as well as other energy users for possible savings. During the audit, auditors install low-cost conservation measures that immediately save electricity at no costs for the customers. Examples are low-flow showerheads, faucet aerators, pipe insulation, water heater wraps, and compact fluorescent light bulbs. In homes of Montana Power's electric space heat customers, auditors also check for air leaks with a blower door, install necessary air sealing measures, and provide an insulation analysis.

After the energy audit, participants receive a customized report with specific recommendations to improve energy efficiency in their home. This written analysis informs the customer about specific actions they can take to save energy in their homes and about how much money they can expect to save with the installation of electricity-savings measures. For the installation of recommended measures, Montana Power provides zero-percent financing for up to $2,000 and a term of 48 months. However, only about 20% of the participants of the program actually take advantage of this offer. Many customers finance the installation of conservation measures on their own.

Montana Power started the program in August of 1992. In the remaining five months of the year, 1016 customers participated in the program and 2,687

MWh of energy could be conserved. For 1994, Montana Power expects 5,000 participants. The "E+ Residential Audit Program" led to costs of $750,000 for Montana Power in 1992.

Customer Groups	Residential
End-Use Technologies	- HVAC - Lighting - Building Envelope - Water Heating - Appliances
Marketing Instruments	- Advertising/Promotion - Customer Education - Direct Customer Contact - Direct Financial Incentives
Effectiveness	Savings in 1992: 2,687 MWh

Table 7: Montana Power's "E+ Residential Audit Program"

2. Puget Power's "Commercial/Industrial Energy Management Program"[15]

The "Commercial/Industrial Energy Management Program" is a retrofit program in the commercial as well as in the industrial sector. The program has been in existence for more than 15 years and is well known among customers. Most

[15] Information about this program was taken from the NPPC's "Green Book" (NPPC, 1994) and from Puget Power's promotional material. In addition, a phone conversation with Bob Banister (October 31, 1994), Manager of the program at Puget Power, added further input to the description of the program.

customers get to know the program by word-of-mouth communication. However, Puget Power also employs a small radio advertising campaign, where case-studies about conducted audits are presented.

Puget Power uses its own staff of engineers as well as outside consultants to conduct comprehensive energy analyses for customers. Usually, Puget's own engineers conduct energy analyses in commercial buildings, whereas outside consultants perform the analysis in the industrial sector. In general, Puget Power's engineering staff performs the audit when their workload and expertise allows for it, otherwise outside consultants are hired. There is no direct charge to customers for the energy audits, they are either provided or fully funded by Puget Power. In addition, customers can conduct their own feasibility study, which is then basis for further reports of Puget Power. However, just a few customers use this opportunity. The majority relies on the knowledge of Puget Power or its consultants. However, some customers conduct their own economic analysis based on Puget Power's conservation analysis.

Conservation measures include ceiling, wall, and floor insulation, insulated windows as well as doors, duct, and pipe insulation. Analysis of heat recovery systems is included as well as of water heating systems and heat pumps. Measures also involve lighting, HVAC, and refrigeration modifications. Furthermore, energy management controls, motors (including variable speed drives), and industrial process efficiency improvements are looked at.

Following up the energy analysis is a report with proposed recommendations which is the basis for selecting the most cost-effective system modifications. The energy proposal covers estimated costs of installation as well as energy savings. It can review the energy benefits of a single measure or several in combination.

In addition to this analysis of potential energy savings, Puget Power makes grants available for the installation of energy-efficiency measures based on installed costs, estimated energy savings, and life of the measure. Most participants of the energy audit use this opportunity. Usually customers that participate in the energy audit are extremely interested in cutting their electricity bill with the help of conservation measures. Furthermore, Puget Power tries to ensure the willingness of participants to actually install conservation measure before it conducts labor- and capital-intensive energy audits.

The "Commercial/Industrial Energy Management Program" started in 1978 and saved a total of 310,798 MWh since then. In 1992, the program saved the most electricity of all conservation programs in the Northwest. In 1992, 428 Commercial Buildings and 54 Industrial Buildings received an energy management analysis. Savings totalled 39,424 MWh in the commercial sector, and 33,145 MWh in the industrial sector, contributing to overall savings of 72,569 MWh. Part of the success of the program is due to the high investment of Puget Power. In 1992, costs totalled $17,638,683; $10,806,777 in the commercial sector and $6,831,906 in the industrial sector.

Customer Groups	Commercial/Industrial
End-Use Technologies	- HVAC - Lighting - Building Envelope - Refrigeration - Water Heating - Motors - Industrial Process
Marketing Instruments	- Advertising - Direct Customer Contact - Direct Financial Incentives
Effectiveness	Savings in 1992: - Commercial: 24274 MWh - Industrial: 13166 MWh Total: 37440 MWh

Table 8: Puget Power's "Commercial/Industrial Energy Management Program"

E. The Changing Role of Marketing

For a long time, electric utilities saw marketing simply as a support for sales. Due to historical developments, utilities were focused on earning a reasonable profit for their shareholders instead of providing the kind of electrical service their customers wanted. This point of view has changed. Electric utilities began to realize that marketing can be a critical instrument to create, satisfy, and keep customers. The growing importance of marketing is primarily due to increasing competitive pressures. It is not enough anymore to provide electric services at low-costs, services have to be tailored to customer needs. ("Customers", 1993;

Murray, 1994c) Utilities also realize that electricity is more than a commodity, it is a specialized service, especially in the commercial and industrial sectors. (Murray, 1994a; Rowe et al., 1993) However, marketing still has not the importance it has in other industries. Too often, for example, market research is conducted in response to complaints of the salesforce and not as an ongoing monitoring and assessment of market trends. (Murray, 1994b) Furthermore, it is not enough to know customer needs, utilities also have to communicate and demonstrate their willingness to meet those needs (Pierobon, 1994).

A closer look at the Northwest shows that the described development is recognized by the investor-owned utilities. The following citations are from different annual reports of investor-owned utilities in the region.

> "Tomorrow's utilities must be open to new technologies and a wide array of new energy services. In the more competitive world of the future, anticipating newly evolving customer needs will be crucial to success." (Idaho Power Company, 1994, p. 8)
>
> "The key to business success is not to predict with precision what will happen five, 10, or 15 years from now; it is instead to assume that change is constant, anticipate it, and by virtue of having a "prepared mind", turn it into a competitive advantage." (PGN, 1994, p. 5)
>
> "We recognize that first and foremost we are in the business of providing excellent customer service. It is our customers who drive our business success and add value to our shareholders' investment." (WWP, 1994, p. 6)

Marketing efforts are not always aimed at increasing sales growth, they can also be aimed at increasing customer satisfaction and spending less to serve

existing customers. (Farha & Kamat, 1993) Conservation programs are a first step in this direction (Murray, 1994a). However, too often conservation programs were developed with limited customer input and did not meet customer needs in the end (Murray, 1994b). Utilities realize that conservation programs can be a competitive advantage in times of increasing competition. These programs make utilities more aware of their customers' needs and wants. With the help of energy conservation programs, utilities learn more about specific end-use technologies, about customers' fuel and equipment selection practices as well as preferences, about what it costs to serve their customers, and about pricing as well as how to organize their customer service. In short, electricity conservation programs help to tie customers closer to their utilities, an important advantage in times of increasing competition. (Stone, 1993)

Even though most investor-owned utilities in the Northwest have recognized the necessities, only a few IOUs show concrete action. **Washington Water Power** especially recognizes the need to work together with their larger customers and intends to help them to make their facilities more electricity efficient to increase customers' satisfaction with the company and its services. (WWP, 1994)

Montana Power offers its conservation programs under the common name "Efficiency Plus (E+)". Rather than confusing customers with many different conservation programs with different names, the company offers their conservation services under one roof. Montana Power realizes that offering the

customer the possibility to conserve energy and communicating that in an efficient way is more important than presenting a number of programs the average customer cannot understand.

In September 1993, **Portland General Electric** launched its Power Smart marketing program to promote the wise and efficient use of electricity. Power Smart is a comprehensive marketing communications programs providing the company with a consistent marketing platform. Power Smart helps the customers to make informed decisions and helps PGE to improve customer service and to reach energy efficiency goals. (PGN, 1994)

For quite a long time, electricity conservation programs and marketing were carried out independently, sometimes even in separate organizational units of an electric utility. Today, the majority of DSM groups are located within marketing or customer service departments. (Laros & Daly, 1992)

Montana Power, for example, restructured its Marketing Department according to this trend. In earlier years, the department assisted customers in using more electricity. However, times changed and energy conservation became an issue. The Marketing Department was renamed into the "Energy Services Department" and its major objective became to sell the wise and efficient use of energy. For Montana Power, the customer is the focal point of all actions. To meet customer needs, the Energy Services Department works closely together with two other departments, overall employing about 75 people.

The **Market Analysis and Planning Department** evaluates energy use of Montana Power's customers to determine future energy resource needs and economic development opportunities. It tracks and evaluates growth in energy use as well as the amount of conservation possible.

The **Energy Services Department** develops and implements a broad range of programs to assist customers in efficient energy use. The department also responds to customer needs regarding utility services and general information.

Relationships with large industrial customers are handled within the **Industrial Services and Economic Development** department. The department also supports economic development activities in the region. (Penberthy, 1994)

Chapter V:

Summary and Conclusions

A. Summary of Findings

The Electric Utility Industry

At the beginning of the industry in the late 19th century, electric utilities were largely municipally-owned. In the early 20th century, the investor-owned, state-regulated monopoly structure of the industry emerged. However, with the Public Utility Holding Company Act (PUHCA) of 1935, publicly-owned utilities became another player in the industry.

In the 1970s, competition began to occur. The Public Utility Regulatory Policies Act (PURPA) of 1978 allowed non-utility generators to generate electricity and to sell this electricity to local utilities on a wholesale basis. The Energy Policy Act of 1992 created exempt wholesale generators with transmission access, allowing them to sell their electricity to distant utilities as well. The next step forward, retail wheeling, is already being discussed.

Energy Conservation

Environmental concerns have an increasing influence on the electric utility industry. Electricity generation has various impacts on the environment; its exhaust, for example, contributes to the greenhouse effect. Assuming that energy consumption in the developing countries will increase in the future and will demand additional generating resources, energy conservation in the industrial countries becomes unavoidable.

Legislation has recognized these issues and several regulations address the problem area. In addition, public attitudes have changed and environmental awareness has increased. Against this background, building a new plant can become the unfavorable alternative.

The electric utility industry has recognized those new impacts and demand-side management (DSM) has become increasingly important. DSM allows utilities to delay building new generating plants. However, even though DSM programs started in the 1970s, it took until the 1990s before utilities completely engaged in DSM. Conservation programs are the major component of DSM.

The Electric Utility Industry in the Northwest

In contrast to the rest of the United States, the electric utility industry in the Northwest (Idaho, Montana, Oregon, and Washington) relies primarily on cheap hydropower generation for its electricity supply. This characteristic leads to lower rates for electricity compared to the United States average. However, revenues per Kilowatthour are also well below the national average.

Although publicly-owned utilities play a more important role in the Northwest than in other parts of the United States, investor-owned utilities still provide the major part of electricity retail sales. However, the investor-owned utilities in the Northwest differ in some ways. Montana Power and Washington Water Power are combination utilities, selling electricity as well as natural gas.

Part of their DSM efforts concentrates on fuel-switching. Furthermore, Portland General Electric and Puget Power serve a relatively small urban area with a high population density, whereas the other IOUs are operating in larger, less populated service territories. In addition, residential customers are a more important source of revenues for Puget Power, Washington Water Power, and PGE than in the electric utility industry in the Northwest as a whole.

Conservation Programs in the Northwest

Since 1978, utilities in the Northwest have employed conservation programs. However, the highest savings were reached in 1992 and preliminary data for 1993 promise a new conservation record. Conservation programs in the residential sector accounted for most electricity savings, followed by the commercial and the industrial sectors.

A closer look at conservation programs of the six investor-owned utilities in the region revealed significant differences between programs for the residential sector on the one side and the commercial as well as the industrial sector on the other side. Table 9 gives an overview about the main characteristics of the different programs.

Program Types	Marketing Instruments	Applications	Savings
Residential Sector			
– New Construction	Trade Alley Cooperation	HVAC, lighting, building envelope, refrigeration, water heating	43,558
– Weatherization	Direct Customer Contact	lighting, building envelope, water heating, HVAC	85,712
– Appliances	Direct Financial Incentives	water heating, low-flow showerheads	108,007
Commercial/Industrial Sectors			
– New Construction	Direct Financial Incentives Direct Customer Contact Trade Ally Cooperation	**lighting, HVAC, building envelope, water heating** *motor drives, industrial process*	97,790
– Retrofit	Direct Financial Incentives Direct Customer Contact Trade Ally Cooperation	**lighting** *motors*	155,742
Bold: Specifics in the Commercial Sector *Italics: Specifics in the Industrial Sector*			

Table 9: Characteristics of 1992 Conservation Programs of Investor-Owned Utilities in the Northwest

The **residential sector** receives 32% of electricity sales. Space and water heating are the dominant end-uses in this sector. Three different types of conservation programs address the residential sector.

New Construction Programs concern newly constructed buildings as well as manufactured homes. Addressed end-uses for electricity savings are HVAC, lighting, building envelope, refrigeration, and water heating. Trade alley cooperation is the main marketing instrument employed by the utilities.

Weatherization Programs address energy-efficiency measures in existing homes. They primarily address lighting, building envelope, water heating, and HVAC. Direct customer contact is the dominant marketing instrument.

Appliances Programs address primarily water heating and low-flow showerheads. Some programs also address lighting, refrigeration, and HVAC. Direct incentives to customers are the main marketing instrument.

Although just 24% of electricity sales occur to the **commercial sector**, it has been the fastest growing sector in recent years. Dominant end-uses are lighting, space heating, and ventilation. With 41% of all electricity sales taking place in the **industrial sector**, it is the dominant sector in the Northwest. However, electric end-uses vary extremely. Rather than addressing these two sectors separately, the majority of conservation programs addresses both sectors.

New Construction Programs concern lighting, HVAC, building envelope, as well as water heating in the commercial sector and motor drives as well as industrial processes in the industrial sector. However, addressed end-uses vary widely. Incentives to customers, direct customer contact, and trade alley cooperation are the dominant marketing instruments.

Retrofit Programs address lighting in the commercial sector and motors in the industrial sector, although addressed end-uses vary significantly. Incentives to customers, direct customer contact, and trade ally cooperation are the dominant marketing instruments.

The Role of Marketing in the Electric Utility industry

This role has changed significantly in the last years. Marketing changed from being a pure support function for sales to being a critical instrument to create, satisfy, and keep customers. Furthermore, conservation programs became an important part of marketing, enabling utilities to learn more about their customer's needs and to tie customers closer to their utility in times of increasing competition. However, conservation programs were carried out independently from marketing for a long time. Today, the majority is located within marketing or customer service departments.

B. Conclusions

The Northwest is known as ripe territory for conservation projects because per capita electric consumption is well above national averages, primarily due to low prices. (Marks, 1992) This paper examined the variety of conservation programs offered by the six investor-owned utilities in the region.

Customer Groups

The majority of programs are offered for the **residential sector**. This trend is due primarily to two factors. First of all, peak demand in the residential sector is significantly higher than average demand. A reduction of electricity demand with

the help of conservation programs can therefore reduce generating requirements on a large scale. Secondly, dominant end-uses for electricity in the residential sector exist. It is therefore much easier for utilities to develop standardized conservation programs and address a high number of consumers.

However, conservation programs for the **commercial as well as the industrial sector** have become more important. Utilities have recognized the large conservation potential within these sectors and have realized that by addressing a few large customers with specific programs, energy conservation is possible in an efficient way. Utilities have also realized that conservation programs have become extremely important in times of increasing competition, because they help to tie customers closer to their utility company.

Applications

Dominant end-uses for electricity in the **residential sector** are space and water heating. Conservation programs in this sector address the building envelope to make space heating more efficient. They address water heating equipment as well. Programs also address lighting, refrigeration, and HVAC because energy efficiency for these end-uses can be improved with low-cost measures.

Primary end-uses for electricity in the **commercial sector** are lighting, space heating, and ventilation. They are all addressed by conservation programs, although lighting is the end-use addressed most frequently.

The **industrial sector** is characterized by a variety of end-uses for electricity. A first categorization divides applications into motor drives, industrial processes, and demand control in addition to end-uses already known from the other sectors. At the moment, conservation programs address motor drives to a large extent. However, conservation programs in the industrial sector are just beginning to develop and will see significant changes in the next years.

Marketing Instruments

Marketing instruments employed by the investor-owned utilities in the Northwest differ with customer sectors. However, direct customer contact and direct incentives to customers play an important role in all sectors. Some conservation programs are also characterized by the use of trade ally cooperation as a marketing instrument. Other marketing instruments play just a minor role.

This implementation of conservation programs is extremely labor- and capital-intensive. Energy audit programs especially require a large investment on the utility side. This may be justified by large energy savings for some major industrial customers, but justification of those programs for residential customers becomes more and more difficult. (Eckman, 1993)

C. Trends

The future will see more conservation programs addressing equipment and system markets rather than the retail level. Programs will not address customers directly but will offer energy-efficient products. Especially for residential and small-commercial customers, energy-efficiency can be improved by offering energy-efficient equipment, such as lights, motors, or appliances. Trade ally cooperation will become more important than direct customer contacts and incentives.

For the large-commercial and industrial customers, energy-efficiency will be reached by improving energy service systems, such as complex buildings or industrial processes. This part of conservation programs remains labor- and cost-intensive, but also promises larger individual payoffs. (Hirst, 1994a; NPPC, 1993)[16]

Another important means to make conservation programs less labor- and cost-intensive is teamwork between utilities and so-called energy service companies (ESCOs). ESCOs work together with larger commercial and industrial customers in achieving more energy efficiency. Utilities often provided only incentives for the installation of conservation measures, but did not pay much

[16] Information regarding alternative approaches for energy conservation was also provided by Robert Lafferty, Manager DSM of WWP, in a phone conversation on September 27, 1994.

attention to maintenance of the equipment. ESCOs work together with the customer on a long-term basis and therefore ensure long-term savings. Utilities pay for the actual energy savings and leave risk and uncertainty to the ESCO. The importance to ESCOs will continue to grow. (Seeley, 1991)[17]

With all the non-quantifiable advantages of conservation programs, especially in times of competition, utilities still emphasize the need to be the low-cost provider of electricity. Minimizing costs of conservation programs becomes increasingly important, because there is a question of whether utilities that are concerned with short-term rate competitiveness will continue to invest in long-term conservation plans (Studness, 1993). (Hirst, 1994a; NPPC, 1993)

Even though needs for energy conservation exists, the past has shown that concrete action just takes place when legislation and regulatory frameworks encourage it. Today, increasing competition and cost-pressure begin to contradict the industry's engagement in conservation programs. However, conservation programs will continue to exist, but they will be more cost-effective, closer to customer needs, and more diverse than today's programs.

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[17] Information on ESCOs was also provided by Jan Louisse, Senior Engineer in Puget Power's Conservation Services in a phone conversation on October 31, 1994.

Appendix

Conservation Programs	Sector			Type			Marketing						Application									Savings
	Residential	Commercial	Industrial	New Construction	Weatherization / Retrofit	Appliances	Advertising / Promotion	Customer Education	Direct Customer Contact	Trade Ally Cooperation	Direct Financial Incentives	Rate Incentives	HVAC	Lighting	Building Envelope	Refrigeration	Water Heating	Motors	Industrial Process	Demand Control	Other	MWh
Idaho Power Company																						
Good Cents Site Built	x			x							x		x		x							699
Good Cents Manufactured	x			x						x	x											365
Low Income Weatherization Assistance Program	x				x			x		x												1,076
Housewarming	x				x			x		x												
Oregon Weatherization	x				x				x		x											7
Design Excellence Award Program		x	x	x					x	x			x	x	x		x			x		4,705
Partners in Industrial Efficiency			x	x							x		x	x		x	x	x	x	x		4,669
Oregon Commercial Audit Program		x			x				x				x	x	x	x					x	
Manufactured Home Program (MAF)	x			x						x			x		x							1,644
Total Savings:																						12,964
The Montana Power Company																						
Energy Savings Program II	x				x				x		x		x		x		x					965
Super Good Cents Program	x			x			x		x	x	x		x		x		x					726
Free Weatherization Program	x				x			x	x				x		x		x					2,044
Ground Source Heat Pumps	x					x					x		x				x					299
E+ (Retrofit) Business Partners		x	x		x				x				x	x	x	x	x	x	x	x	x	11,366
E+ (New) Business Partners		x	x	x					x				x	x	x		x			x		294
E+ Audits – Commercial		x			x			x	x				x	x	x	x	x			x		331
E+ Electric Motor Rebate Program		x	x	x			x	x		x	x							x				311
E+ Lighting Program for Comm. Buildings		x		x			x	x	x		x			x								7,699
Light Conversion		x			x				x					x								780
E+ Residential Audit	x				x		x	x	x				x	x	x						x	2,667
E+ Lighting – Residential	x				x		x		x		x			x								3,156
Comfort Conditioning	x					x	x				x		x									152
Total Savings:																						30,600
PacifiCorp																						
New Residential – Super Good Cents	x			x						x												10,148
Hassle Free Guarantee	x					x			x								x					2,099
Cash Rebate and Cash Payment Programs	x				x				x		x		x	x	x		x					2,473
Low Income Direct Rebate	x				x		x		x	x			x	x	x		x					678
Zero Interest Program	x				x		x		x		x			x	x		x					641
6 1/2% Loan	x				x		x		x		x			x	x		x					148
Energy FinAnswer – Commercial		x		x			x		x		x		x	x	x	x	x			x		7,090
Energy FinAnswer 12,000		x		x					x				x	x	x					x		295
Pacific Environments		x	x		x		x		x		x		x	x	x	x	x	x	x	x		647
Energy FinAnswer – Industrial			x	x					x		x		x	x	x	x	x	x		x	x	35
Manufactured Housing Acquisition Program	x			x					x	x			x		x		x					4,270
Home Comfort	x				x		x		x		x			x	x		x					437
Home Energy Analysis	x				x		x		x					x	x		x					
Total Savings:																						29,091

Conservation Programs	Sector			Type			Marketing					Application									Savings
	Residential	Commercial	Industrial	New Construction	Weatherization / Retrofit	Appliances	Advertising / Promotion	Customer Education	Direct Customer Contact	Trade Ally Cooperation	Direct Financial Incentives	Rate Incentives	HVAC	Lighting	Building Envelope	Refrigeration	Water Heating	Motors	Industrial Process	Demand Control	Other	MWh
Portland General Electric																						
Super Good Cents Single Family	x			x						x	x			x	x	x					x	615
Super Good Cents Multifamily	x			x						x	x			x	x	x	x					3,736
Super Good Cents—Manufactured Homes	x			x						x	x				x							558
Multi—Family Equipment Program	x			x	x					x	x			x		x	x				x	1,287
Low Income Weatherization	x				x				x						x							624
Housewarming	x				x				x		x	x			x							3,651
Water Heater Wraps	x					x			x								x					76
Hot Water	x					x					x						x					1,823
Residential Showerhead Retrofit	x					x			x								x					19,589
Single Family Energy Efficient Lighting	x				x																	29
Energy Smart Design—Large Commercial		x		x					x		x											91,923
Energy Smart Design—Small Commercial		x		x					x		x											207
Commercial Lighting/Vendor Delivered		x			x					x	x		x									6,170
Drive Power—Motors			x		x					x	x							x				289
Drive Power—Adjustable Speed Drives			x		x					x	x							x				2,592
Deferred Maintenance		x	x		x				x		x											620
Commercial Retrofit		x			x				x													11,859
Commercial/Industrial Energy Efficiency		x	x	x	x				x	x	x		x	x	x	x	x	x				12,196
Energy Smart Design—Industrial			x	x					x		x								x			89
Manufactured Home Acquisition Program	x			x						x			x		x							109
Total Savings:																						99,820
Puget Power & Light Company																						
Residential Retrofit	x				x				x		x		x	x	x		x					99,799
Low Income Residential Conservation	x				x				x						x							1,799
Residential Conservation New Construction	x			x					x				x	x	x	x	x					16,675
Residential Water Heating Conservation	x					x					x						x					3,249
Water Heater Insulation Kits	x					x			x								x					20,799
Energy Saving Water Heat Measures	x					x			x								x					52,779
Residential Lighting and Appliances	x				x	x					x			x		x						3,170
Commercial/Industrial Lighting Conservation		x	x		x				x		x			x								20,177
Commercial/Industrial Energy Management		x	x		x				x		x		x	x	x	x		x		x		72,569
Commercial/Industrial New Construction		x	x	x					x		x		x	x	x	x	x	x		x		29,379
Premium Efficiency Motors		x	x		x					x	x							x				450
Conservation Partners		x	x		x				x		x		x	x	x	x	x	x		x		4,479
Total Savings:																						264,497
Washington Water Power Company																						
Residential Weatherization	x				x				x		x		x		x		x					870
Low Flow Shower Head/Aerator Distribution	x					x	x		x								x					3,775
Compact Fluorescent Light Bulb Rebates	x					x					x			x								279
Residential New Construction	x			x						x	x		x		x							1,111
Manufactured Home Acquisition	x			x						x			x		x							109
Commercial/Industrial Energy Efficiency		x	x		x				x		x		x	x	x	x	x	x		x		4,479
Total Savings:																						10,815
Total Energy Savings of all Investor—Owned Utilities in the Northwest																						446,197

Table 10: Conservation Programs of Investor-Owned Utilities in the Northwest in 1992

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