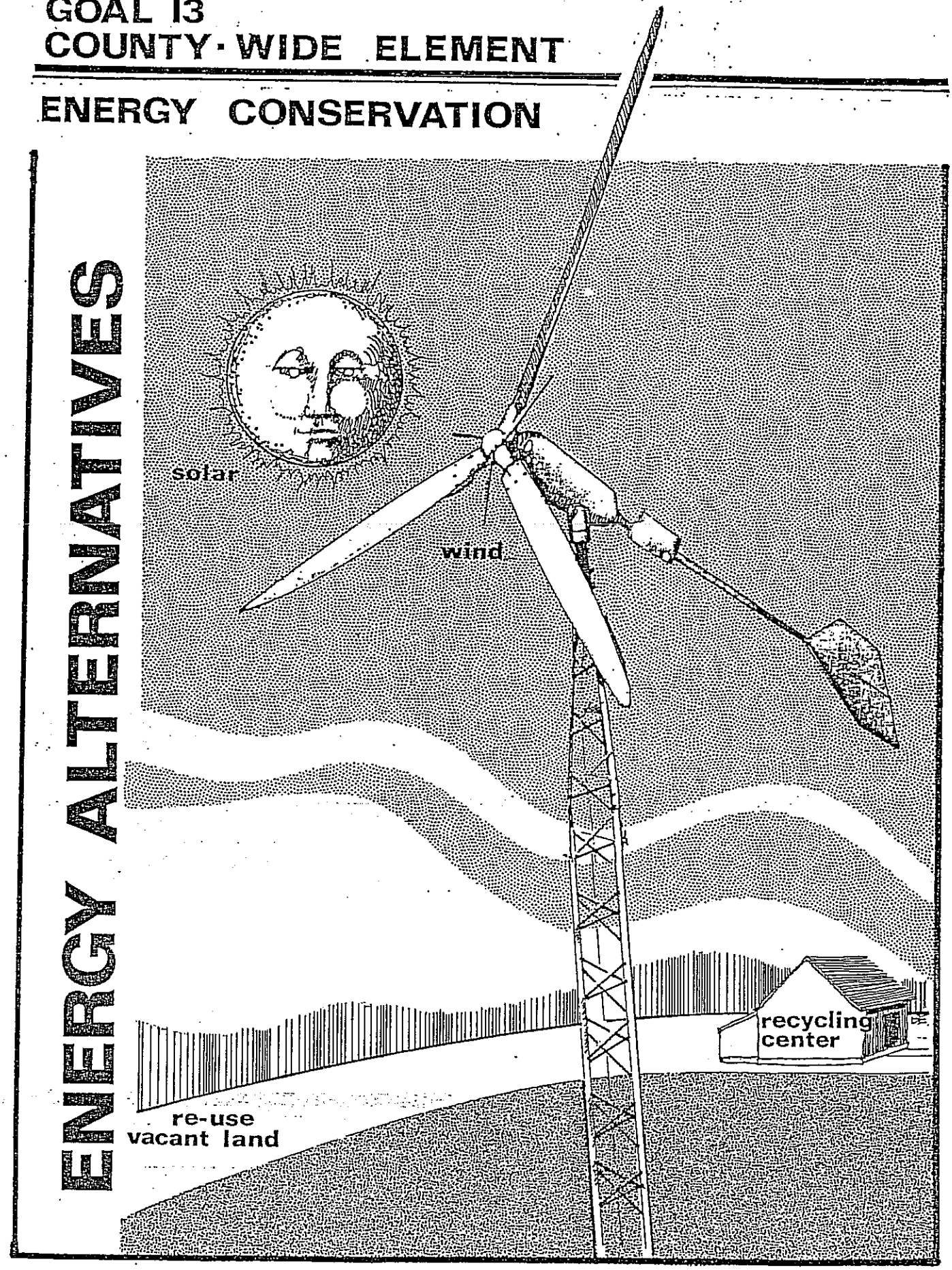
Goal 13

CLATSOP COUNTY
GOAL 13
COUNTY-WIDE ELEMENT

ENERGY CONSERVATION



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Adopted Ordinance 80-7, dated July 23, 1980

Introduction

Current patterns of consumption indicate that the world supply of conventional energy sources will diminish in the near future. The energy problem is serious. The solution to the problem involves protecting existing supplies through conservation and developing new conventional and alternative sources.

Basic Findings

At present, no energy is produced in this County. There are no dams, no known oil or gas reserves, and no nuclear power plants. More than one billion kilowatt hours of energy was imported into Clatsop County in 1978. This energy appetite is not expected to decrease in the years ahead.

Over half of the energy in this County is consumed by industry and nearly 30% by residences. The industrial sector utilizes energy as part of their production while the residential sector's primary use is for space heating. Much of this heat in the residential sector is lost through poorly insulated walls and cracks at joints between windows and doors. Recently, building codes have been modified to increase the effectiveness of buildings to resist heat loss. Under the new requirements, energy consumption in new dwellings can be reduced substantially at moderate cost. Older or existing homes present different problems. They are sometimes difficult and expensive to retrofit.

Energy savings can also be achieved through proper building site design taking advantage of local topography, vegetation, and climate. It is likely that these sites will be more valuable than others in the future.

Site designs that cluster buildings or activities can also save energy, reducing street lengths and public facilities. Another new design feature that will get serious attention in the future will be attached housing which reduces heat loss through walls, ceilings, and floors.

A consideration for the siting and construction of new buildings is the orientation of the sun for solar heating. The use of solar energy systems on homes is a new and growing trend today. To enable this growth to occur, the availability of sunlight to buildings being built now must be protected. Public officials can use their authority to assure that the application of solar technology is made possible.

Solar energy is not the only alternative to conventional sources. Other sources being developed are wind, geothermal, biomass, and tides and waves.

While scientists are making progress in the development of new energy sources, the public must make progress in conserving our existing resources. Growth must be controlled so that transportation and other costs are reduced. Metals, glass, and other resources need to be recycled. Walking, bicycling, carpooling, and mass transit opportunities should be promoted. Above all, however, the public must be educated in opportunities to conserve energy, even if it means a change in lifestyles.

Goal

To conserve energy.

Policies and Recommendations

1. The County recognizes the need for energy conservation through support of a County-wide conservation program in which the County government will play a leading role.

   a. Methods to reduce energy consumption should be explored, such as enforcing strict temperature and lighting controls in government buildings and incentive programs for carpooling, etc.

   b. New government buildings shall be energy efficient. Decisions on design and selection of equipment should not be based on the lowest initial cost alone. Operating and energy costs for a reasonable life expectancy of the building must receive equal consideration. Further, consideration should be given to the use of solar energy in heating and cooling all new government buildings.

   c. The County, cities, Extension Service and Community College should work together to establish an Energy Conservation Service with the assistance of private and public funds and expertise. This service could provide the following:

      1) Promote energy conservation through seminars, other educational programs, and information dissemination.

      2) Develop climate maps, energy efficient building standards and other guidelines for energy conservation.

      3) With the help of local utility companies, provide technical assistance to individuals desiring to retrofit their homes or buildings with improved insulation of alternative energy sources.

      4) Conduct audits with the assistance of local utility companies to identify sources of greatest energy wastes in buildings and recommend ways in which to reduce this waste.

      5) Provide technical assistance to evaluate the energy efficiency of new residential, industrial, and commercial building plans submitted for approval.

      6) Maintain information on the energy efficiency of brands and models of appliances, autos, etc.

   d. The County and cities should work together to establish a County-wide recycling operation (i.e. through a sheltered workshop program).

2. The following land use policies shall be adopted as part of the Comprehensive Plan to conserve energy and promote the use of alternative systems:

   a. Shopping, cultural, medical, educational and other public facilities shall be encouraged to cluster in urban growth boundaries so that one trip can serve several purposes and so that the possibility of public transportation will be enhanced.

   b. In new subdivisions, major or minor partitions:

      1) Should maximize the opportunity for solar orientation of windows in buildings by running streets in east-west directions, and lots on a north-south axis.

         When topographic conditions or natural features make street orientation for good solar orientation of units undesirable or difficult, lots shall be laid out so that units can be oriented to the south to the greatest extent possible. Clustering, innovative yard and setback approaches may be used in lieu of the street and lot plan if good solar orientation is achieved.

      2) Open space should be located whenever possible to buffer structures from shadows cast by other buildings.

      3) Easements for protecting solar access should be provided for every lot.

3. The County shall promote the application of renewable and alternative energy sources, by encouraging the use of total energy systems where, for example, electricity is generated and the waste heat is utilized for space heating and cooling purposes.

4. *The County shall consider energy conservation in the designation of RURAL LANDS and DEVELOPMENT lands.

*Amended 83-17, dated September 30, 1983.

GOAL 13

ENERGY CONSERVATION

By
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Department of Planning and Development

January 1980

Adopted July 23, 1980 by
Clatsop County Board of Commissioners

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INTRODUCTION

In 1850 people in the U.S. obtained as much as two thirds of their energy from human muscle power and draft animals. Wood was the main fuel for most households; the water wheel and windmills supplied power to industry.

The introduction of coal as an important source of energy marked the beginning of the Industrial Revolution and the exploitation of a resource of limited life in comparison to the wood, wind, and water power of the past. Coal primarily was used for generating steam in making iron and steel, making the steam engine the epitome of progress.

The oil industry also began to emerge just as the nation started to industrialize. First used as a medicine and fuel for lamp lights, in its first forty years a total of only one billion barrels were produced. This changed drastically when the big oil gushers were discovered in Texas and in the next year the age of the automobile and airplane was launched.

Soon thereafter the electric motor was invented and within a short period of time today's complex dependent technology emerged.

Current patterns of consumption indicate that the world supply of coal can be measured in centuries. Oil extraction is expected to reach maximum and decline around the year 2000. Maximum extraction and subsequent decline of natural gas is seen within 10 to 15 years. Fossil fuels are getting harder to find, extract, transport, and process. They are also largely affecting our environment in very negative ways. They are the largest source of pollutants in the air, a major contributor to water pollution, scar our countrysides and degrade our surface and groundwater quality with noxious wastes and dangerous gases. Electric energy also is a major contributor to losses of our fish and wildlife.

This report describes the existing energy system in the County and the potential to conserve and utilize alternatives. Conserving energy will take strong public leadership and effective conservation measures and regulations. Conservation practices will mean utilizing less energy to produce a dollar's worth of goods and services so that more energy will be left for later use by us or by future generations.

ENERGY SOURCES AND SUPPLY

HYDROELECTRIC

Currently, all electrical power in Clatsop County is supplied by the Bonneville Power Administration (B.P.A.) and is distributed, mainly, through the Pacific Power & Light Company (PP&L). Small amounts of electricity in the County are sold and distributed by the Western Oregon Electric Co-op (WOEC) and the Tillamook Public Utility District (PUD), members of the Rural Electrification Administration (REA), and the Clatskanie PUD. The Crown Zellerbach Mill at Wauna buys directly from BPA.

The primary PP&L transmission lines serving the County are 115 KV from the Longview, Washington Substation. These lines provide service to areas along the Columbia, Astoria and surrounding areas, Warrenton, Hammond and . along the coast. WOEC has 34.5 KV transmission line which serves Jewell, Elsie and the Nehalem Drainage area from the Timber Substation in Washington County. The low voltage lines of the Tillamook PUD and Clatskanie PUD serve small areas along the southern border and eastern border of the Coun respectively. The major electrical substations are located at Wauna, Clatsop, and Driscoll and smaller substations serve the Knappa-Svensen area, Warrenton, Seaside, and Cannon Beach. At present, there is no power generated within the County. There was a steam generator plant in Astoria on Youngs Bay, but it is no longer in operation.

In a Resource Survey of River Energy and Low-Head Electric Power Potential in Oregon, April 1979, at least 40 different sites in Clatsop County were identified which are presently undeveloped by dams and meet the low-head flow and power criteria of 36 cfs at least 50 percent of the time. Preliminary feasibility analysis and a screening process was used to identify relatively unconstrained reaches. Only the Lewis & Clark River from River Mile 19.0 to the headwaters was considered to warrant further investigation for a small hydroelectric power plant.

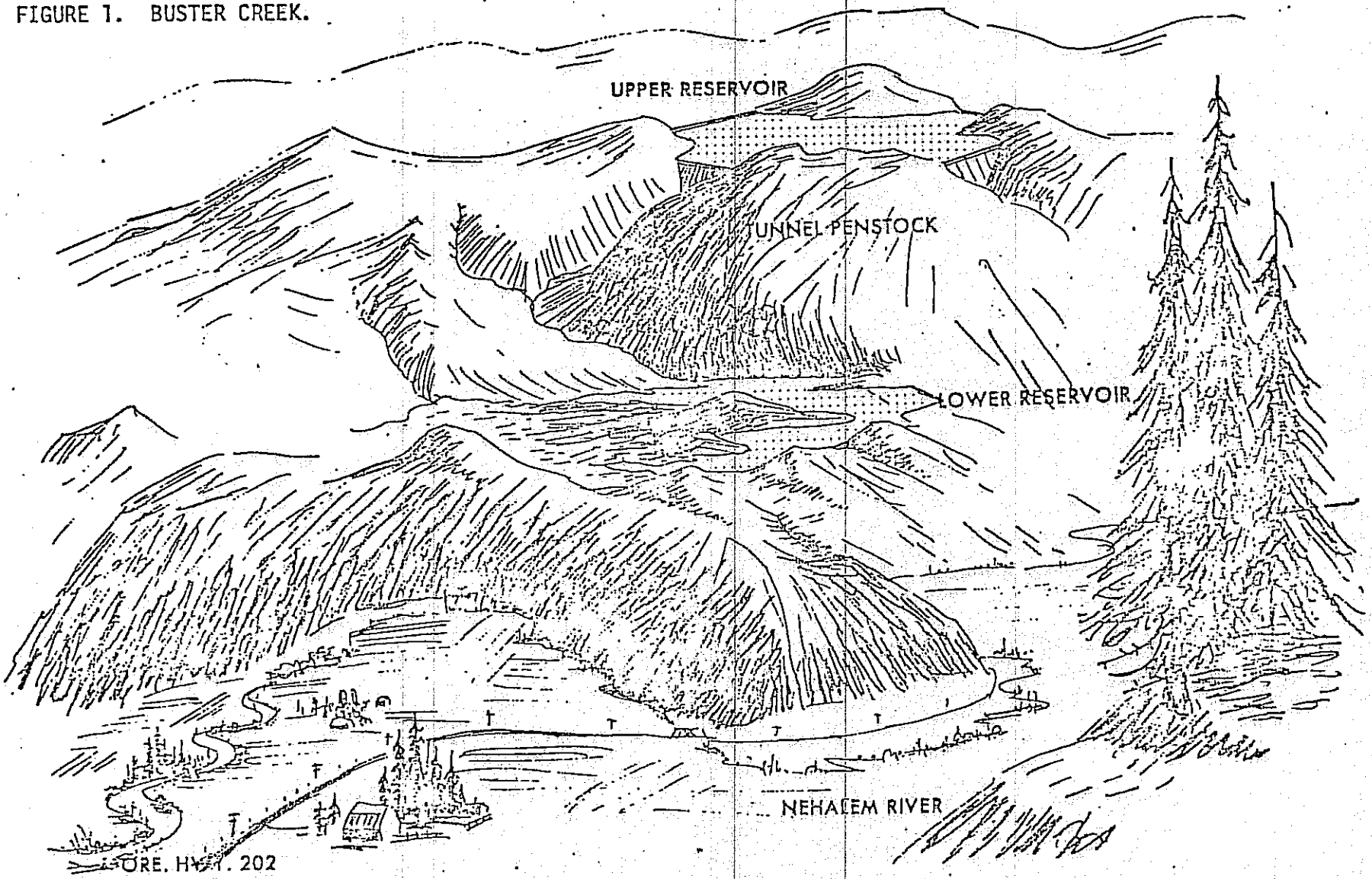
In August, 1976, the Corps of Engineers published a report for sites in Oregon that have potential for "Pumped Storage Power Plants". This type of plant is located at a higher elevation than an existing dam and reservoir. During periods of the day when electricity is needed most, water is released from the upper reservoir through electricity generating turbines to the lower reservoir. The water is later pumped back to the upper reservoir during periods of less demand and can be used over again for power generation. One of the sites that was selected is located on Buster Creek in Clatsop County. (See Figure 1 & Appendix A)*.

GAS

Natural gas has been supplied to Clatsop County by Northwest Natural Gas Company since 1965. The product is purchased from the El Paso Natural Gas Company who pipes it at 700 psi to their Deer Island Station from Canadian gas fields. A 400 psi high pressure feeder main system supplies gas to Clatsop County in pipes ranging in size from 16-inches leaving the station to 6-inches on the coast. The pipeline occupies both shared and

*A telephone conversation with the Corps of Engineers in 1979 concluded that this site, although surveyed, is now in the inactive files but has not been eliminated.

FIGURE 1. BUSTER CREEK.



Potential pumped-storage site on Nehalem River, Oregon Coastal Subregion. Example of a site located close to Portland load center: Buster Creek (592) view looking south.

exclusive rights-of-way, traversing the northern edge of the County. From a regulator just south of Astoria, service is provided to a junction on the Clatsop Plains where a pipeline is extended north to Hammond and south to Seaside. At the present time, there is no gas service to the Cannon Beach-Arch Cape area because of the difficult terrain that would be encountered. Also, there is no service to the interior areas of the County, nor are there any plans under consideration to serve those rural communities. There are no natural gas storage facilities in the County at the present time.

All industries connected to natural gas in the County have interruptible accounts which are served only when there is a surplus of gas from the domestic accounts (during the warmer summer months). During the interim periods, industry relies on the local suppliers of oil and propane. The Crown Zellerbach Pulp and Paper Mill at Wauna is the principle gas consumer in the County using over 42,000,000 therms[1] a year[2].

Columbia County has had a successful gas discovery in the area of Mist. As a result, a number of oil and gas leases have been released on land in this County that are of the same geologic formation.

There are approximately 32 tax lots for which Clatsop County has retained mineral rights but very few of the locations appear to have potential. Most of the properties lie within incorporated boundaries.

OIL

Oil products are refined in the Puget Sound area and piped here via the Olympic pipeline. Small tankers and barges deliver 34% of the total petroleum used in the state to the Ports of Portland, Astoria, and Coos Bay, with Portland receiving 70% of the tanker traffic.

According to the State of Oregon Department of Geology and Mineral Industries, the area with the most potential for discovery of petroleum or gas in Clatsop County is the Tertiary Marine area.

No significant surface seeps of oil are known to exist in Clatsop County and only traces of oil or gas have been found thus far in test drillings. (See Table I). In 1976, an oil seep was located in Olney at Watson Falls (N1/2, S14, T7N, R9W). Samples were submitted for testing. The results of the tests indicate that the oil appears to be crude oil seeping from underlying ground. However, the possibility that the oil was brought into the area was not ruled out.

COAL

Coal is a nearly pure mineral form of compressed wood and other vegetative matter containing more energy per unit of weight than either wood or charcoal. It is supplied to this state by rail and truck from Utah, Wyoming and Montana to burn in coal plants and as a heating source for some homes and boats.

[1]A therm is a unit of heat energy equivalent to 100,000 BTU's.
[2]Northwest Natural Gas Co.; interviews with representatives 1973.

Table 1. Petroleum exploration

LOCATION	WELL NAME	LOCATION AND ELEVATION	DATE	DEPTH	REMARKS
		Clatsop County, Oregon			
Astoria Shale	Oil shale?	Astoria area	1914	--	The Astoria Shale yields minute traces of oil by distillation at many locations. (Oil is found in concretionary limestone on the "Hawkins Ranch" 11 miles northwest of Astoria at Beaver River, Washington.)
Harrison, H. C.	Water well	Warrenton area; sec. 21, 8N., 10W (at Harrison Machine Shop) Elev. 25'	1910	280'	Gas blew water 10' or 15' above the top of the casing and sustained a good flame.
Lower Columbia Oil & Gas Co.	Brown No. 1	Astoria Airport - NW¼NW¼ sec. 25, 8N., 10W. Elev. 20'± Gr.	1922	4808'	Gas shows and a trace of oil reported. Bottomed in upper Eocene marine sediments.
Standard Oil Co. of Calif.	Hoagland Unit No. 1	South of Astoria, SE¼ sec. 11, 7N., 10W. 311' N. & 499' E. from S¼ corner. Elev. 72' Gr.	1955	7101'	Rotary. Several fluorescent spots on fracture surfaces of core at 5470-5465'. Bottomed in upper-middle Eocene volcanics.
		Tillamook County, Oregon			
Mohler Sand & Gravel Co.	Oil occurrence	Nehalem area. NW¼ sec. 5, 3N., 9W.	1958	--	Kerosene-like oil found in gravel bordering the Nehalem River.
Pacific Hydrocarbon Oil Co.	?	Nehalem area. Sec. 32, 3N., 10W. Elev. 35'	1910	1535'	Traces of gas reported
Portland Coal & Devel. Co.	?	Tillamook area. SW¼ sec. 10, 2S., 9W. Elev. 90'	1910	2532'	Small amount of gas. See analysis Table No. 1.
?	?	Tillamook area. Within few yards Portland Coal & Devel. Co. well	Before 1910	700'	Small amount of gas reported.
Skukum Lake	Asphalt occurrence	Approx. 6 miles southwest of Skukum Lake, 1N., 6W.	1914	--	Veinlets of asphalt found in rocks of Nestucca age.
		Continental Shelf, Oregon			
Shell Oil Co.	Ex Test 2	27 miles S.W. from mouth of Columbia R. OCS Tract 18	1965-1966	8219'	No significant shows obtained. Bottomed in Oligocene sediments (?)
Shell Oil Co.	Ex Test 1	17 miles W. from mouth of Columbia R. OCS Tract 22	1966	10,160'	No significant shows obtained. Bottomed in U Eocene sediments (?)
		Pacific County, Washington			
Richfield Oil Co.	Weyerhaeuser 1	West side of Gray's Bay SW¼ sec. 31, 10N., 8W.	1955	9110'	Hydrocarbon fluorescence at 7500' and 8300'. Mostly fine-grained marine sediments. Bottomed in U-M Eocene volcanics.
Union Oil Co.	McGowan 1	North side of Columbia R. across from Astoria	1929	4385'	Slight gas show reported. Drilled entirely in Eocene volcanics.

In the early days of Clatsop County, Captain Clark used coal as ballast for his ship, selling it as fuel when he docked in Astoria. Utilizing coal as a heating source today, however, is coupled with problems including reluctant investors, wary miners, lack of equipment and numerous environmental constraints.

The coal deposits in the County have never been significant and according to local history books were of very low grade.

WOOD

Clatsop County residents are fortunate to be near vast stretches of forest land. Wood in Clatsop County could easily provide energy for perhaps one-third to a half of the future population.

Wood heat is both aesthetically and physically pleasing to people. It's also healthy and gives people a chance to enjoy the outdoors. The wood gatherer usually picks up the scraps left after the commercial harvest or thins out alder and undergrowth from private woodlots. Cutting wood slash usually requires a permit from the landowner. These permits have been free in the past but because of the increased popularity of wood as a heating source, some property owners are requiring payment. Utilizing forest residues as residential firewood is still low cost, however, with the greatest expense coming from transportation.

It is anticipated that wood slash and mill wastes, in combination with municipal wastes, will be in demand as an energy source as well as for gasohol and wood pellets. Using forest residues in these ways is not yet a commercial reality and the technology is still being developed. In 1978, a Longview, Washington firm chose Clatsop County as one of the several potential sites for the location of a wood pellet plant.

On-site utilization of mill residues for energy production is widely practiced by the forest products industry. Residues from the lumber industry include chips, shavings, and bark. Chips are used in pulp and paper mills, shavings in particleboard mills, and the bark is either sold as "hogged" fuel or is used to generate energy at the mill site.

NUCLEAR POWER

In a Nuclear Plant Siting Study prepared by the Washington Public Power Supply System in 1975, a 400 acre site in Brownsmead was sited. This site was ranked number 9 and may be situated on an old landslide.

ALTERNATIVES

Solar

Very few homes are presently equipped to use this resource. Each system must be custom designed at the present time, making the process expensive. Solar energy development, however, is making progress in mass-produced systems.

There are two approaches to solar systems. One is the high technology system involving sophisticated hardware to capture, transport, and store heat. These are active systems. The second are passive systems which are equally sophisticated but less mechanical. No matter how complex, sophisticated, or inexpensive a solar system may be, adequate sunlight must reach the collector and be converted to heat; otherwise the entire system is useless. But even on cloudy days on the coast enough energy can be produced to make the process worthwhile. There are several homes in the County that are presently using solar heating systems as a primary or supplementary heating source.

Besides building orientation and angle, a solar system also needs sufficient space. A report by the Office of Technology Assessment of the Energy Research and Development Administration (ERDA) states that a solar system for a single family home providing 100% of space and water heating must have 440 square feet of collector area and a 1,000 gallon storage facility. However, with a back-up heating system, space requirements are much lower.

With a community solar heating system there is no concern for building site orientation or individual space requirements. The Lawrence Berkeley Laboratory has found that to provide space and water heating for 1,000 people, from 28,000 to 46,000 square feet of collector area is required. This is far less land area than if each unit was self-equipped. It is also easier and farl less costly to install, especially at the time a subdivision development is being planned. A community solar system, therefore, has many advantages:

1. retrofitting or adaption problems are avoided,
2. issue of solar rights is minimized,
3. need for solar rights zoning and setback flexibility is reduced,
4. could be applied where on-site systems are unfeasible, and
5. eliminates need for each household to provide storage.

Research is still underway to make community solar systems a reality. Some say that solar farms may be constructed in Oregon by the year 2000. Such farms have huge collectors that capture the sun's heat and use to to make steam capable of driving electrical generators.

WIND

Generating power from wind is not expected to be developed in the near future because of the lack of technology to store the power. If fully developed, it could be applied in this County, especially on the coast where it is windy much of the time.

In 1980, the University of Oregon Extensive Program will be monitoring wind speeds of two wind anemometers (wind measuring instruments) in the County. If results are favorable, the Department of Energy may offer tax credits to individual property owners who utilize wind power.

*In 1983, the Oregon Department of Energy completed a study titled "Oregon Coastal Zone Wind Data Inventory". This study summarizes locations at which reliable wind information has been collected. Six sites in Clatsop County are identified: Clatsop Spit, Columbia River Jetty, Fort Stevens, Astoria Weather Bureau, Astoria WBAB (Port of Astoria Airport), and Wickiup Ridge.

* There is no inventory information available on potential wind energy sites. clarify

Biomass

Biomass is defined as the material formed by biological processes utilizing solar energy. The majority of the biomass available in Oregon is in the form of forest products and/or agricultural products. It also consists of combustible industrial and municipal refuse.

The maximum energy available from biomass is obtained from direct combustion. Facilities that utilize biomass by combustion are currently either producing steam for heating or producing electricity by using the steam to drive turbines. Technology is also available to make alcohol by biomass fermentation and/or distillation.

Many technical and social improvements are needed to reduce air pollution problems, problems with collection and handling, and slash burning practices. If some barriers are removed, it can be expected that full utilization of the energy available through biomass could be accomplished within the next twenty years.

Tides and Waves

Enough energy might be harnessed to be important in some places, like islands, but not enough energy could be trapped to operate cities under present technology.

* Amend 84-9, dated May 23, 1984

More than one billion kilowatt hours of energy flowed in Clatsop County in 1978. This figure includes electricity, gas, and oil. Examination of Table 1. shows that more than half of the energy consumed was by the industrial sector, and the other half by residential and commercial users, with the residential usage being the largest of the two.

Industries use 92% of all the natural gas delivered to the county. The Wauna Mill is by far the largest user, being highly mechanized, requiring few people in the total operation. As a rule, the more labor intensive the industry, the more energy efficient it is.

The residential sector is the largest user of electricity and oil, accounting for 29% of the total energy consumed in the county. The largest direct use is probably space heating. As shown in Table 2., oil and electricity are the most utilized heat source in residential dwellings in the county. Table 5. shows that oil is used mostly in conventional dwellings and electricity is popular in mobile homes. Most of the conventional homes in the county are older; they once utilized wood or coal burners and later converted to oil. Only 5% of county residents use wood heat as their sole source of heat. As shown in Table 4., most of these are located in the rural unincorporated areas of the county.

Table 2.

Clatsop County Energy Consumption
1978 in KW-HRS

	Residential	Commercial	Industrial	Total
Electric	162.8×10^6	88×10^6	36.7×10^6	287.5×10^6
Natural Gas	64.2×10^6	51.9×10^6	547.2×10^6	663.3×10^6
Oil	108×10^6	74.3×10^6	12×10^6	194.3×10^6
Percent w/Total	335×10^6 29%	214.2×10^6 19%	595.9×10^6 52%	$1,145.1 \times 10^6$

Source: Telephone and Letter Surveys of August, 1979
Conversions to KW-HRS

Table 3.

Total Clatsop County Heating Fuel by Sector
(Number of Buildings)

	Oil	Gas	Electricity	Wood	Other or Unknown
Residential	5448	2290	4265	488	227
Commercial	248	166	143	69	411
Industrial	1	1	6	1	29
Public	78	15	26	6	37
	5775	2472	4440	564	704
Percent of Total	(41%)	(18%)	(32%)	(4%)	(5%)

Table 4.

Total Clatsop County Heating Fuel by Residential Sector
(Number of Housing Units)

	Oil	Gas	Electricity	Wood	Other
Conventional Single Family	5355	2211	3617	477	1
Mobile Homes	36	67	611	-	226
Multiple Family	57	12	37	11	-
	5448	2290	4265	488	227
Percent of Total	43%	18%	34%	4%	1%

Table 5.

Unincorporated County Heating Fuel by Sector
(Number of Buildings)

	Oil	Gas	Electricity	Wood	Wood or Unknown
Residential	1977	585	1864	360	180
Commercial	32	15	23	10	93
Industrial	-	-	-	-	9
Public	19	1	6	2	-
	2028	601	1893	372	282
Percent of Total	(39%)	(12%)	(37%)	(7%)	(5%)

Table 5 is an example of heating fuel usage by the residential sector of Clatsop County in 1970. It is interesting to note that use of electric heat has risen approximately 9% in eight years, while oil and gas use had declined. This clearly indicates that most of the new homes, including mobile homes, have electric heat. Use of wood heat has risen only 1%. However, wood is commonly a supplement to the main heating source, and this percentage probably does not represent existing circumstances.

TABLE 6.
SPACE HEATING FUEL BY COUNTY
(Percent of Housing Units)

County	Utility Gas	Fuel Oil Kerosene	Coal or Coke	Wood	Elec-tricity	Bottled or LP Gas	Other	None
Baker	39	43	6	2	4	4	1	--
Benton	36	21	.1	4	35	2	1	.3
Clackamas	23	40	.1	3	32	1	1	.1
Clatsop	20	48	--	3	25	2	1	--
Columbia	14	40	--	7	35	3	1	.2
Coos	2	40	.1	11	39	7	1	.15
Crook	23	41	--	7	26	2	--	--
Curry	2	10	--	25	52	10	1	.4
Deschutes	25	36	1	8	25	7	1	--
Douglas	16	34	.1	16	29	5	1	.4
Gilliam	2	69	--	--	22	6	--	.4
Grant	3	65	--	19	4	8	1	--
Harney	3	65	--	5	12	12	--	--
Hood River	9	49	2	5	30	3	2	--
Jackson	28	22	.1	11	30	8	.1	.3
Jefferson	17	34	--	6	31	11	--	--
Josephine	22	20	--	20	25	12	--	.6
Klamath	25	33	--	4	28	7	3	--
Lake	2	44	--	9	36	9	--	--
Lane	16	21	.1	6	54	1	1	.2
Lincoln	11	22	1	1	52	4	--	--
Linn	41	25	--	8	22	3	1	--
Malheur	32	45	8	2	30	2	1	.04
Morrow	--	54	1	3	30	12	--	--
Multnomah	26	51	.2	.5	20	1	1	.05
Polk	21	31	--	6	37	4	1	.2
Sherman	--	62	--	3	27	8	--	--
Tillamook	1	36	--	8	51	4	1	--
Umatilla	24	40	1	4	29	2	1	.1
Union	40	37	6	5	3	2	1	--
Wallowa	1	49	13	13	17	4	2	--
Wasco	9	29	1	2	56	3	1	--
Washington	32	32	.1	1	33	1	1	.08
Wheeler	--	49	--	31	11	6	3	--
Yamhill	18	34	--	31	36	3	1	.2
Oregon	24	38	.4	5	30	3	1	.1

Source: 1970 Census of Housing.

BUILDING DESIGN AND CONSTRUCTION

Heating represents the major demand of all energy used in residential dwellings as a result of the manner in which they are constructed.

All buildings are barriers to heat loss to some degree: retarding and reducing the flow of heat. But some types of construction resist heat loss better than others.

Recent studies show that 40 percent of all heat loss in buildings are a result of leakage through cracks or small openings at joints between walls, floors, ceilings and roofs, or around poorly fitted windows and doors. Another 43% of heat loss is through poorly insulated walls, floors, and ceilings. Unfortunately, building codes are more concerned with safety, and ignore such factors which directly affect heating and cooling losses.

TABLE 7.
Sources and Percentages of Energy Loss in House

Joints and Fittings	40.0
Glass	15.0
Doors	2.0
Exterior Walls	19.0
Slab	15.0
Ceiling	9.0
	100.0

Source: David Myhra, Westinghouse Electric Corporation, Saving Energy in Residential Sector through Planning, Figure 1.

Chapter 53 of the Uniform Building Code recognizes that insulation, used in certain quantities can increase the effectiveness of a building to resist heat loss, thereby saving energy. This chapter pertains to all hotels, motels, apartments, and other residential dwellings which are heated and/or cooled mechanically. To reduce heat loss, all ceilings must use insulation of an R-19 value, exterior walls must use R-11, basement walls (if basement is heated) must use R-45, and floors must use insulation of an R-9 value. An "R" resistence is the measurement of a material's ability to resist the passage of heat.

Oregon may even toughen the code further. Attic insulation may be increased from 6 inches to about 9 inches (changing the rating from R-19 to R-30), underfloor insulation in houses without basements from 3 1/2 inches to 6 inches (R-9 to R-19) and insulation on furnace ducts in unheated spaces from 1 inch to 3 inches. Walt Pollack, supervisor of energy conservation and resource development for the State Department of Energy says that under these new requirements, energy consumption in new dwellings would be reduced 30-40 percent and add about $800-900 to the cost of a new home.

Optimum energy efficiency can only be achieved if this effort is initiated during construction. Older or existing homes present different problems. Homeowners would rather spend money on painting or decorating (visible improvements) than to invest in some material hidden in walls and attics. Many others simply cannot afford expensive retrofitting (installation of new material into an existing building). It is expensive to insulate an existing home according to the new standards. Some homes may not ever be able to meet these standards without blowing insulation into walls, changing draperies, window locations, and adding arbors and awnings -- all very costly improvements. It is important, however, to realize that just one inch of insulation in the attic can do an effective job of reducing heat loss. Also, if more homeowners were aware of the cost benefits of weatherstripping and sealing doors and windows may be more inclined to take action.

Most retrofit programs initiated by the government promote the most obvious and least expensive methods. The weatherization programs in Clatsop County are aimed at the low-income and elderly homeowners with a maximum spending limit of $800/dwelling. Labor costs can eat up the money in a hurry so most of the retrofit programs depend on volunteer labor.

The City of Portland may resolve the issue of retrofitting. They will be applying performance standards to the sale of all homes. Before the home can be sold, it must meet certain heat loss standards. They will not be mandating these requirements for a period of five years which may give them enough time to find a workable and effective method of implementing the requirement.

The Federal Energy Administration (FEA) has a program to encourage the voluntary incorporation of energy efficiency criteria into the real estate lending process. They found that during the period of 1974-1975, 2½ percent of foreclosures of FHA-insured loans were directly attributable to rising energy costs, particularly in states where energy costs now equal mortgage payments.

The Energy Conservation and Production Act enacted by Congress in August, 1976 requires that HUD develop standards for new construction to prevent waste of energy in heating, cooling, ventilating, and heating water. Thus, a national building code with strict energy conservation measures could be operating throughout the United States in the near future. Also contained within the act is a review process to assure that buildings receiving federal financial assistance use energy efficient construction features. Another part of the act authorizes funds to make existing build-

ings more energy efficient. One of the ideas HUD is considering is a $400 grant program which can apply to the interest on a home improvement loan to finance energy conservation measures. Lenders would receive the $400, allowing individuals to deal directly with the lenders rather than HUD.

Even if a vast amount of funds were made available for weatherization and insulation upgrading, primary consideration should be given to the local climate conditions. Detailed climatic data should be collected and put on a building climate map for easy referral. Then guidelines should be developed which help builders and architects meet building perofrmance standards to achieve a desired comfort level using the lowest possible use of energy. The guidelines may include such elements as limiting glass area, shading or glazing, requiring thermal mass, or colored roofs. Unfortunately, staff expertise in the County is very limited in this field. There also may be opposition to such a code. With the limits of the County budget and the problems encountered of increasing restrictions, the likelihood of an energy conservation building code in the area ever materializing through local funds appears dim.

A new major design feature that will get serious attention in the future will be attached housing. This type of design reduces loss of heat through walls, ceilings and floors. Additional savings can be realized through the utilization of community lighting and heating systems, roads, sewage lines, and other public facilities. It is estimated that multi-family dwellings consume 30 percent less energy than the conventional detached dwelling.

The same methods prescribed for residences can also be applied to the commercial and industrial sectors. The differences are due to such things as limited building usage and the potential for overheating because of high lighting levels and dense human occupancy. There is an obvious advantage for these sectors to conserve since they may be able to reduce operating and maintenance costs. Ideally, this reduction could be passed on to the consumer.

SUBDIVISION DESIGN AND BUILDING SITING

Energy savings could be realized if building sites were designed to take advantage of topography, vegetation, and climate. It is a long-range strategy, however, aimed primarily at new dwellings. In temperate and cool regions such as Clatsop County, building sites could be located away from cold pockets, oriented towards the sun, and protected from winter winds.

To benefit most from sunlight heat, front windows on the longest side of the house where major living areas usually are located (such as living room and kitchen) should be on the south-facing walls. Strategically placed buildings among trees can also have positive effects on energy savings. Trees located on the south, southeast, or southwest of buildings, if deciduous types (shedding their leaves in winter) can absorb radiation and provide shading in summer and provide access for the sun in the winter. Earth berms or natural hills can also reduce heat loss if properly located by slowing the rate at which winter winds such heat from buildings.

Solar orientation will also be important to those persons considering a solar energy system. Solar heating systems will not work if they do not receive sufficient sun. Often lot layout or shape prevents solar orientation of buildings. Sometimes neighboring buildings or landscaping block sunlight. In England and Japan, courts have recognized property rights to the sunlight that reaches a persons property. If access is blocked then the courts could find that compensable damage has occurred. In this country, however, sunlight access is not recognized as a property right.

Solar access can be regulated by the powers of zoning, subdivision review, and comprehensive planning. If public utilities get involved they may use their power of eminent domain to create solar easements. The State of Oregon (H.B. 2036, Chapter 153 of Oregon Laws of 1975) recognized the need to protect and encourage solar utilization by authorizing the enactment of ordinances and regulations for solar energy utilization and for protecting and assuring access to incident solar energy, including height and setback restrictions.

Ordinances that in any way restrict the application of solar technology to buildings are counterproductive and should be avoided. Public officials should assure that this doesn't occur either through aesthetic treatment or outright restrictions. Indirect restrictions such as ordinances protecting the removal of trees or which specify a theme for buildings should be approached cautiously. Restrictions on street patterns and lot line angles can also hinder solar orientation.

Site designs that cluster buildings can save energy in several ways. Buildings can be sited to protect one another from winter winds; street lengths and public facilities can be shortened saving energy in paving and construction materials. Clustering can also be especially efficient when mixed land uses are contained within the same development permitting residences to border a place of employment, shopping, schools, and other community facilities.

Clustering and planned unit developments (PUDs) provide for higher densities and smaller lot sizes and allow for usable open spaces. Relaxing setback requirements for these types of designs can also allow the orientation of houses to respond to solar radiation and wind protection.

TRANSPORTATION

Transportation is a great user of non-renewable sources of energy. One way or another, changes must be made.

Motor freight traffic will probably maintain present role in moving merchandise. taken over the railroad in the past and unless rail service is improved it is unlikely that changes will be seen very readily. Railroads are more efficient users of energy and it will be important to the nation to preserve this mode of transportation. The recent abandonment of the railroad track from Warrenton to Seaside could potentially close a transportation option that could be utilized in the future.

Compact and subcompact cars will probably dominate the domestic car fleet in the near future. People will think twice before making short neighborhood trips by car, will begin carpooling to work, and will stay home more often.

Clatsop County residents will probably continue to use their cars for travel because they virtually have no choice. They only form of mass transit available is the bus service in Astoria and a small mini van service for senior citizens. As more people become aware of the scarcity of fuel there may be pressure to expand bus services to outlying areas. Unfortunately, bus services serving a wide dispersed population have been deficit operations.

Walking is a good mode of travel for short distances and bicycling for somewhat longer distances. Often their needs are ignored. It is important for the County to encourage these two modes of travel, not only for recreation but for every day travel. Many routes may serve a dual role because of their proximity to school, work, parks, etc. Although inclement weather is a problem, these modes of travel can provide energy savings for many months out of a year.

The legislative mandate for bikeways in Oregon came in the form of "the Bicycle Bill" passed by the 1971 Legislature. This bill is implemented through the appropriation of funds for bikeways to every city and county in the state. Utilizing these funds the County may be able to begin an effective bikeway system.

Another transportation consideration is the space which the street or facility occupies and the material energy used in its construction. Road rights-of way probably represent 20% of land area in cities of the County. Reducing paved street widths and lengths, therefore, can preserve valuable space and at the same time reduce the petroleum needed to produce the asphalt. Fronting most housing on cul-de-sacs and loops also has these advantages.

WASTE RECYCLING

There is some concern that the nation may soon run out of our precious metals. Fortunately, however, metals can be reused. Widespread recycling will become an everyday practice in the future; there is literally no choice. Recycling also conserves energy. For steel, aluminum, and copper, the energy consumed in production from recycled scrap is considerably less than the energy required for production from raw ores.

Recycling of metals, paper, glass, petroleum products and other non-renewable resources, would conserve oil, energy, recover valuable products and alleviate the solid waste disposal problem. The latter can be further alleviated by recovery and recycling of wood waste, municipal garbage and sewage sludge in the production of energy, as can waste heat from industry.

In Clatsop County, recycling efforts are minimal and becoming considerably more expensive because of the increased costs of transportation. The City of Cannon Beach, for instance, subsidizes a recycling depot which makes deliveries to a Portland distribution center nearly 100 miles away. A local can company collects used cans from a drop-in container at their building in Astoria; rags are recycyled and sold for maintenenace and cleaning companies via the Clatsop County Rehabilitation office; and oil can be recycyled through local distributors and gasoline service stations.

Recycling involves changes in life styles. It also requires collection, storage, sorting, transportation, etc. To a greater extent, the foremost problem in recycling is organization. Recycling has many benefits too. It can strengthen community pride, develop community leadership and cooperative skills, and enhance environmental quality.

DOMESTIC FACILITIES

Both direct and indirect energy costs can be saved by the design of utilities. The use of composting toilets can eliminate 40% of water use as can using 3½ gallon toilet tanks instead of the standard 5 gallon tank. Drainfield requirements are also reduced. Cisterns for rain water storage could be included in water systems. Storm water drainage systems can use natural drainage ways which maintain or enhance groundwater systems and at the same time reduce costs in construction of curbs, gutters, storm water pipes, manholes, etc.

EDUCATION

An important method in conserving energy is education of the public in the wise use of energy. Greater action on the part of the public could be expected if more people were aware of energy conservation techniques and their economic benefit. The local Community College offers special courses in the study of solar systems and other alternative energy sources. Community groups in the area have sponsored energy conservation fairs such as Sun Day. The Energy Fair sponsored by the Oregon State Extension office should be encouraged to become an annual affair.

APPENDIX A

BUSTER CREEK SITE

Physical Description

The site is located in the Nehalem River Basin on the west slope of the Coast Range of Oregon, a relatively rugged mountainous area with relief averaging about 2,000 feet. Both upper and lower reservoirs would require dams. The lower reservoir would be on Buster Creek and would include the lower part of Walker Creek drainage. The upper reservoir would be on the drainage divide between Buster Creek and North Fork Rock Creek. Both would be within the Clatsop State Forest in Clatsop County and would be located about 50 miles northwest of Portland, the major load center. Mean annual precipitation in the area is about 68 inches.

The lower reservoir at full pool would cover about 920 acres while the upper reservoir at full pool would cover about 250 acres. The lower reservoir site has large Douglas fir trees scattered among alder, with grassy meadows in the lowlands. The upper reservoir site is covered by mixed-age second growth Douglas fir and hemlock. The site shows no unusual geologic features which would make it infeasible and it appears stable under relatively high annual precipitation. Some 1,100 feet of generating head could be developed between the two reservoirs.

Pertinent Data

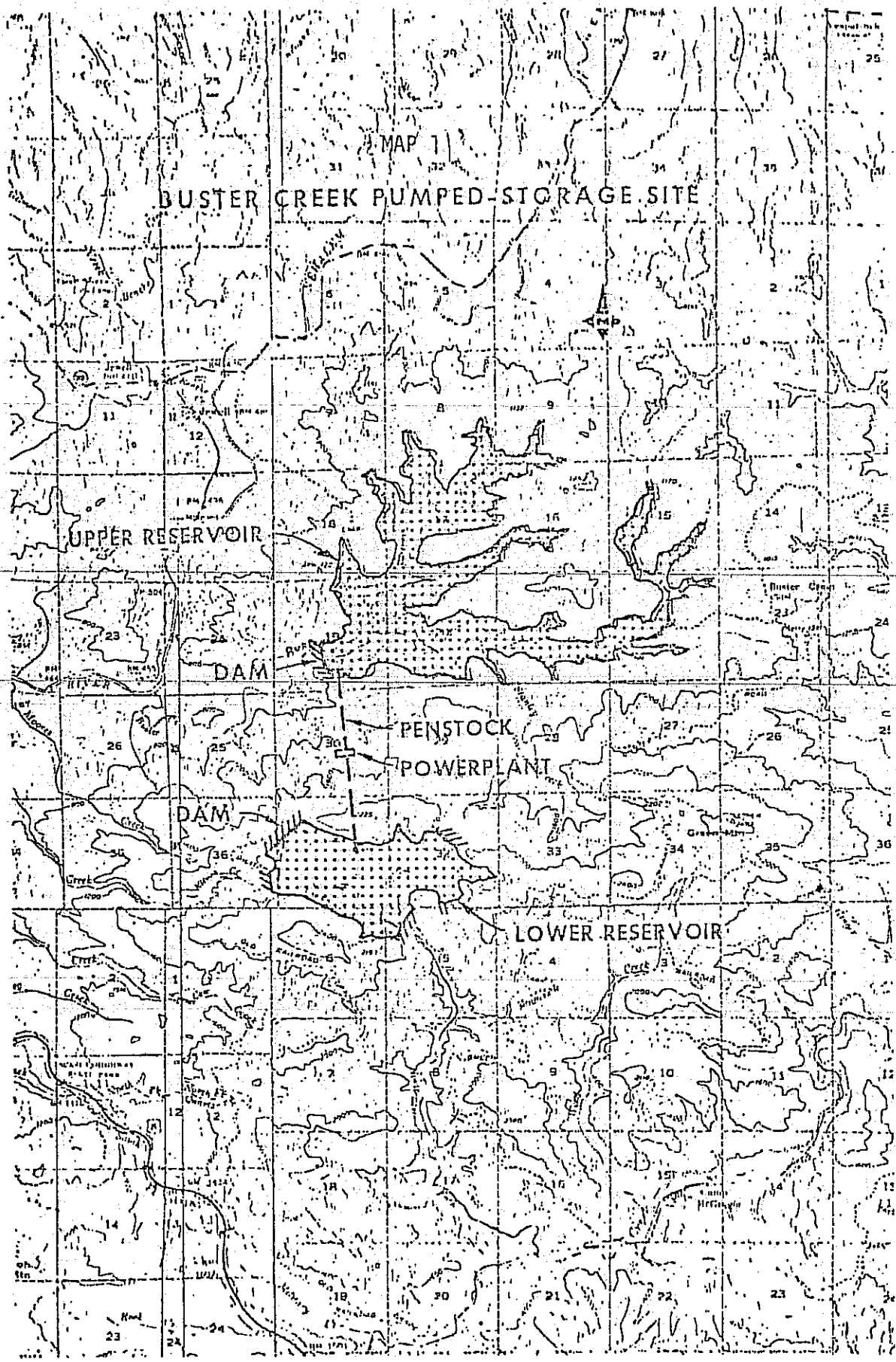
The project could develop from 1,000 to 6,000 megawatts of capacity, operating on a weekly cycle. Investment costs would be from $211 to $164 per kw.

Environmental Considerations

The area provides very good summer and winter range for Roosevelt elk and Blacktail deer, which together with many other animals, would be adversely affected by creation of reservoirs. Some fish presently spawn upstream from the lower reservoir site, and mitigation measures would be required. The site would offer some potential for recreation development, if the power operation could be minimized during the summer season.

Economics

A few non-power benefits could be developed such as recreation boating, fishing, and possibly some downstream water quality enhancement. However, peaking power would provide the main benefits. A benefit cost ratio as high as 2.8 to 1.0 could be realized.


MAP 1
BUSTER CREEK PUMPED-STORAGE SITE
UPPER RESERVOIR
DAM
PENSTOCK
POWERPLANT
DAM
LOWER RESERVOIR

BIBLIOGRAPHY

Oregon Department of Energy, Community Energy Planning, (Te-38).

Urban Mass Transportation Administration, U.S. Department of Transportation, Guidelines to Reduce Energy Consumption through Transportation Actions, May, 1974 (Te-33).

U.S. Army Corps of Engineers, North Pacific Division, Pumped Storage in the Pacific Northwest, an Inventory, January, 1976. (Tp-4a).

Yamhill County Planning Department, Energy Office, Relationships of Energy to Land Use, McMinnville, November, 1977. (Tr-16).