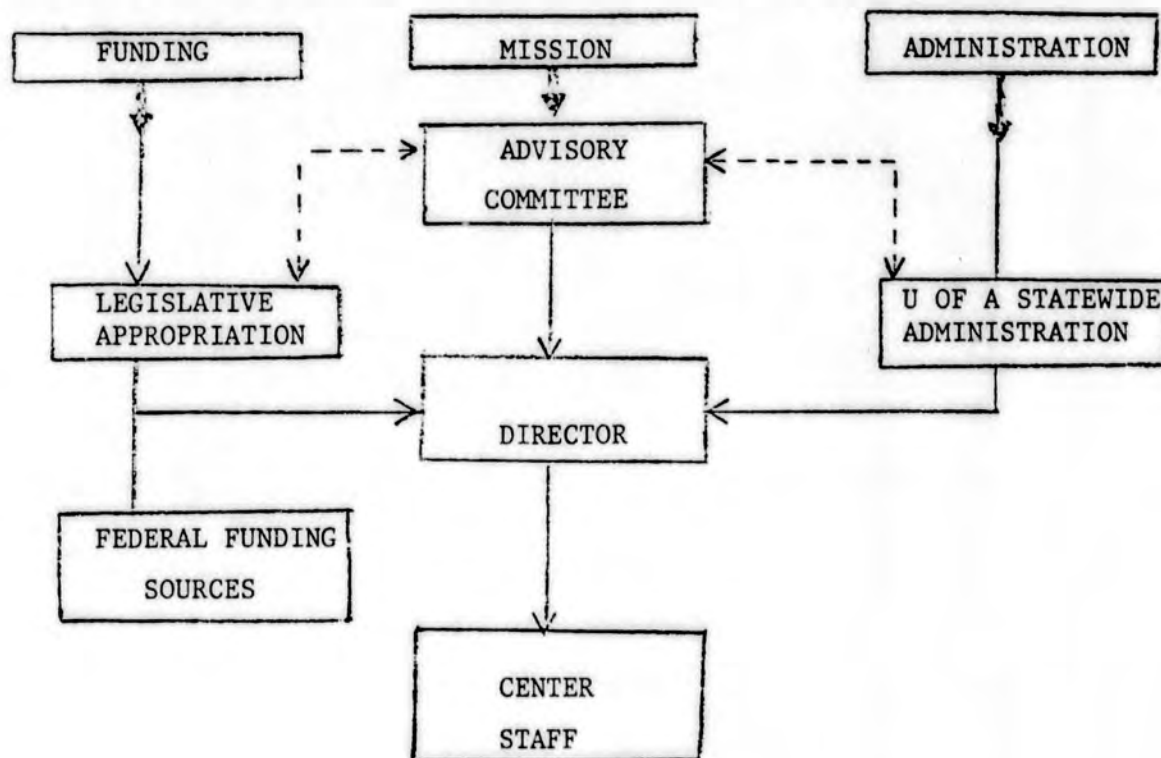


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E. ADMINISTRATION AND ORGANIZATION

The administration of the Alaska Center for Alternative Energy is modelled after the Alaska Sea Grant Program. It will serve as an interdisciplinary coordination unit to administer projects contracted to other University departments and institutes, as well as other entities within the State. The Center will not, itself, engage in projects but rather issue requests for proposals, oversee contracted projects, and carry out its education and outreach mission. An organizational chart is shown below.



The Alaska Center for Alternative Energy will fund and oversee development, demonstration, testing and research projects consistent with its mission. The Center will receive funds from State and federal sources and issue appropriate requests for proposals (RFP's) to complete the work described in those RFP's within the University of Alaska statewide system or elsewhere within Alaska. As funding permits, the Center will also entertain unsolicited proposals to do necessary demonstrations, development projects or educational projects. The funding of research work organized in a problem-solving manner, such as a task force approach, may also be accomplished through the Center.

1. DIRECTOR

A salaried Director will be employed by the University of Alaska statewide administration responsible to the President of the University. The director will be a person technically and administratively qualified to perform the following duties.

- a. Work in a leadership role to develop specific programs and projects, in cooperation with the advisory board, necessary to fulfill the mission of the Center
- b. receive proposals and establish an appropriate review process. Proposals shall be entertained from within the University of Alaska statewide system, and from appropriate entities within the State of Alaska. Appropriate entities may be further defined by legislative intent.
- c. Fund worthy proposals and administer funded projects by contract between the Center and the proposer, according to established University of Alaska financial procedures.
- d. Report annually on the progress of the Center
- e. Coordinate the activities of the Center with other energy-related programs and agencies within the State.
- f. Define the responsibilities and oversee the activities of the staff.

2. ADVISORY BOARD

A non-salaried advisory board will be appointed (see Appendix 3 for a list of suggested membership). The board will interact with the organization as follows: The committee will

- a. Assist the director in establishing specific programs consistent with the general mission of the Center.

- b. Review and critique the performance of the director and staff and report to the funding source on the conduct and performance of the Center.
- c. Assist in proposal review as appropriate.
- d. Act as a check on the power of the director in the following manner:
The authority to fund specific projects is vested in the director. However, the board may choose to exercise a veto over the director's decision to fund a specific project. The board may not override the director's decision not to fund however. Therefore, veto power to fund a project is vested in both the advisory board and the director. This negative check and balance system assures that questionable proposals and projects are unlikely to be funded.

F. FINANCIAL SUPPORT

The operating budget for the Center is considered to require an annual legislative appropriation of the order of \$150,000 for each year as a line item in the University of Alaska budget request. This administrative appropriation will include funds for:

- 1) Staff salaries, benefits, leave and overhead.
- 2) Travel and per diem for the staff and advisory board members.
- 3) Operational costs.

A second sum of money is necessary to support the funding of demonstrations, educational outreach programs, and technology development projects of the Center, as described in the detailed program descriptions included in Appendix 1. The sum of these needed project funds is of the order of \$3.7 million annually. These monies need to be made available to the Center through appropriation of general fund monies or from other State funds in the form of a capital appropriation. A one-time capital appropriation would provide for the establishment of the Center and the early period of program development. The appropriation should permit a minimum of support for five years. As the Center develops, a provision for funding beyond the initial period can be negotiated through appropriate State agencies.

It is clear that the Center as outlined in this proposal cannot function without both of these monies being made available. The availability of these funds shall in no way restrict or discourage the Center from seeking funds from federal or private sources to achieve its mandate and accomplish its mission.

The reviewer is referred to Appendix 1 for detailed outlines of the types of energy technology development programs which the Center would undertake.

APPENDIX 1

SUGGESTED PROGRAM LISTINGS

The following is a series of detailed program listings describing the possible energy technology development programs which would be undertaken by the Center. Programs are generally outlined within a five-year time frame to show the importance of continuity and building an experience base. Programs listed here are responses to solicitations for alternative energy development programs given by University staff members. Budget figures are their estimates and should not be considered binding. They were used to arrive at the annual estimated budget requirement stated in the financing section.

FUELS RESEARCH PROGRAM

(Program Years)

The objectives of the fuels-research program are to complement studies dealing with various means of energy production. The specific objectives of the fuels-research program are:

- A. To study alternative means of energy production and utilization of various energy sources.
 - 1. Basic research on the encapsulation of hydrogen and natural gas on Alaska zeolites*. (1-5)
 - 2. Research and engineering studies of the storage of hydrogen and production of oxygen by zeolites for use in fuel cells.
 - 3. Engineering studies of the behavior of zeolite-bound hydrogen and natural gas in experimental engines and vehicles. (2-5)
 - 4. Basic research and engineering studies of oxygen production over Alaska zeolites for use in coal gasification leading to hydrogen production. (2-5)
- B. To investigate possible solutions to problems associated with energy production.
 - 1. Research and engineering studies of the use of Alaska zeolites in the beneficiation of methane produced from sewage, dairy waste and sanitary landfills. (3-5)
 - 2. Research and engineering studies on the use of Alaska zeolites for the removal of SO₂ and other pollutants from stack gases of coal-fired power plants. (4-5)
 - 3. Research and engineering studies of the applications of Alaska zeolites in beneficiation of ethanol and other chemicals produced from Alaskan grains. (3-5)
- C. To investigate the use of Alaska's resources for Alaska's energy production.
 - 1. Included in items A and B.

Suggested annual funding level: \$180,000 - \$200,000

* Already begun under Department of Transportation and Public Facilities Program.

GEOTHERMAL ENERGY PROGRAM

FIVE-YEAR PLAN

(Program Years)

The objectives of a geothermal energy program are:

- A. To determine the location, extent and quality of the individual Alaskan geothermal reservoirs most suitable for near-future economic development. (1-5)
 - 1. Select sites for geological and geophysical reservoir definition studies based on recommendations of the Alaskan geothermal resources assessment map and report to be published jointly by the Geophysical Institute and the U.S. Department of Energy in early 1980. (1)
 - 2. Conduct integrated geological and geophysical reservoir definition studies of selected sites. (1-5)
 - a) This should be done as a cooperative program between the University and the Alaska Division of Geological and Geophysical Surveys.
 - b) Field studies:
 - 1) Geologic mapping
 - 2) Ground resistivity and electromagnetic surveys
 - 3) Ground and water temperature surveys
 - 4) hydrologic surveys
 - 5) Seismic surveys
 - 6) Gravity surveys
 - 7) Geochemical surveys
 - 8) Other methods as appropriate to individual sites
 - c) Analysis of data and production of reports on each site. (2-5)
 - 1) Scientific analysis and conclusions
 - 2) Analysis and conclusions written in non-technical language for use of State and local government planners and interested citizens
 - 3) Specific drilling site recommendations based on above
 - 3. Develop and test geothermal exploration techniques uniquely suited to the arctic environment.
- B. Drilling of sites to be conducted under the supervision of the State Division of Geological Surveys and the State Division of Oil and Gas. (No budget request) (2-5)

1. Funding for drilling to be by separate legislative appropriations to the State Division of Geological and Geophysical Surveys.
 - a) e.g., Pilgrim Springs geothermal drilling project in 1979
- C. Conduct engineering applications analyses of each site after such sites have been geologically and geophysically studied and drilled. (2-5)
 1. Engineering analyses to be based on actual reservoir parameters as determined by drilling and flow testing of wells.
 2. Recommend appropriate technologies and designs for local energy utilization.
 - a) Electrical generation
 - b) Direct heat utilization
- D. Economic studies of individual sites (2-5)
 1. Energy production
 2. Agricultural
 3. Marketing, etc.
- E. Interfacing with Federal, State and local agencies
 1. Ensure effective interagency communication and planning
 2. Minimize duplication of effort
- F. Outreach/Extension and Education programs (1-5)
 1. To be administered by the Outreach/Education program of the Center. (No budget requested in Geothermal Program)
 - a) To be budgeted separately

Recommended yearly funding level: \$600,000

SOLAR TECHNOLOGY PROGRAM

(Program Years)

The objectives of a solar energy program are:

- A. Determine the most economical, reliable, appropriate and durable solar technologies, and their optimum combination with energy conservation to best use solar energy for space heating in Alaska:
 - 1. test different collector types (1-5)
 - 2. set up passive solar commercial and residential applications demonstration program. *
 - 3. investigate seasonal storage solar heating technologies. (3-5)
- B. Undertake five-year plan to develop solar soil heating methodologies for Alaskan agricultural applications:
 - 1. soil heating test plots (1-3)
 - 2. solar grain drying (2-4)
- C.

- 1. Obtain for all four climatic regions of Alaska (a/south maritime, b/transition, c/interior--subarctic continental and d/the North Slope arctic) a reliable data set (1-3 years). This should include: (1-3)
 - a) global radiation
 - b) global radiation on a south slope inclined to latitude
 - c) global radiation on a south wall
 - d) direct solar radiation.

At the present all of these measurements are only carried out in Fairbanks.

- 2. Use these data sets to test existing models which derive radiation data from other meteorological parameters (e.g. the Machta model). These models are developed for lower latitudes and their applicability for high latitudes has never been tested systematically. (2-4)

* Already begun under Department of Transportation and Public Facilities Program.

3. Modify the existing models if necessary so that they apply for the Alaska climatic zones, e.g., multiple reflection and radiation for low sun angles are important. (3-5)
4. Use these modified models and the existing meteorological data of the National Weather Service (which is available for many stations in Alaska) to obtain a radiation climatology for Alaska. (3-5)
5. Make detailed measurements of the solar spectrum. Preliminary results show that in spring there is a relatively higher percentage in the shorter end of the visible spectrum than in summer when the snow has melted. However, for detailed measurements special instrumentation is necessary. Such measurements should be made for: (2-4)
 - a) different climatic zones in Alaska
 - b) under different cloud conditions and
 - c) for different seasons
- D. Photovoltaic, solar electric program (dependent upon outside research and cost evolution). (4-5)
- E. Optimize fenestration, use of windows in Alaska structures. (1-3)
- F. Develop solar energy education program (part of five-year plan). (1-5)
 1. computer simulation currency, publications updates, etc.

Recommended funding level: \$315,000

ENERGY STORAGE TECHNOLOGY PROGRAM

(Program Years)

- | | | |
|----|---|-------|
| A. | Develop a thermal energy storage test laboratory facility: | (1-2) |
| 1. | set up lab and procure facility in an existing institute | (1) |
| 2. | begin scientific investigation of storage media, options, and types of energy storage by energy type | (1-3) |
| 3. | integrate storage technologies into other energy technology investigations within the Center
i.e., batteries, mass thermal storage, compressed air storage, gas storage, hydroelectric pumped storage. | (2-5) |

HEAT PUMP DEMONSTRATION PROGRAM

FIVE-YEAR PLAN

The ground (frozen or not), a lake, a river or the sea provide heat reservoirs which may be tapped for residential or industrial space heating. Perhaps most important for Alaskan conditions, these heat reservoirs maintain a near constant temperature year-round. The heat transfer is through well-known heat-pump techniques; using data from Scandinavia, effect factors of almost 5 may be reached (e.g., heating costs that are 20% of all-electric). The heat-pump system operates automatically and should require little, if any, operational attention or service; there are no atmospheric emissions associated with its operation.

We request funds for a full-scale demonstration project. Because Alaskan soil temperatures often are close to the freezing point, a major investigation will be the response of the soil to the heat extraction.

Five-year plan:

Years

- | | | |
|----|---|-----|
| A. | Develop ground-heat pump systems suited for Alaskan conditions: | |
| 1. | Electrically driven (suburban areas) | 1-2 |
| 2. | Non-electric (bush and rural communities) | 2-3 |
| B. | Install system and monitor its operation (3 systems installed in successive years) | |
| 1. | Site selection. Installation. | 1-3 |
| 2. | Monitor system (heat delivered, power used, thermal response of ground, effects of possible frost action in the ground, reliability of system, etc.) | 1-5 |
| C. | System performance evaluation. Models aimed to aid site evaluating, estimating operating costs and minimizing installation costs. Models to be refined as actual performance data accumulate. | |
| 1. | Efficiency of heat-exchangers and heat-pump | 1-4 |
| 2. | Response of the reservoir to the extraction of heat | 1-4 |
| 3. | Optimizing ground collector size and design | |
| D. | Publication of results. Recommendations for use in various parts of Alaska. | 1-5 |

Recommended yearly funding level: \$65,000

BIOMASS REDUCTION PROGRAM

FIVE-YEAR PLAN

(Program Years)

The five-year plan will include investigations of both vegetative and animal biomass reduction technologies. The objectives will be to determine appropriate, both technologically and economically, reduction technologies for Alaskan climatic conditions. This will be accomplished through technology development as well as adaptation of available technologies.

- | | |
|--|---------|
| A. Vegetative biomass | 5 years |
| 1. Wood product conversion technologies | |
| a. Direct combustion | |
| 1) whole product | 2 years |
| 2) processed product | 4 years |
| b. Conversion to liquid fuel | |
| 1) digestive processes | 3 years |
| 2) gasification processes | 3 years |
| 2. Fibrous material conversion technologies | |
| a. Direct combustion | |
| 1) processed product | 4 years |
| b. Conversion to liquid fuel | 3 years |
| 1) digestive processes | 3 years |
| 2) gasification processes | 3 years |
| 3. Methods of residue disposal | 5 years |
| 4. Quality of fuel obtained | 3 years |
| 5. Energy ratios (energy in versus energy out) | 2 years |
| 6. Environmental impact | |
| a. Removal of products from land areas | 5 years |
| b. Deposit or removal of residues | 5 years |
| c. Air quality | 2 years |
| B. Animal biomass | |
| 1. Conversion technologies for liquid fuels | |
| a. Raw material as non-solid | 3 years |
| b. Raw material as solid | 3 years |

2.	Methods of residue disposal	5 years
3.	Quality of fuel obtained	3 years
4.	Energy ratios	2 years
5.	Environmental impact	
	a. Deposit or removal of residues	5 years
	b. Air quality	2 years
c.	Economic evaluation of alternate technologies	Begun in year 1
	1. Economies of scale	
	2. Capital investment	
	3. Cost of production	
	4. Product markets	
	5. Institutional constraints	
D.	Development/demonstration projects	Begun after completion of economic evaluation
	1. Vegetative biomass*	
	2. Animal biomass**	

* A suggested applicable area(s) are the Delta Agricultural Project or on a smaller scale, Minto.

** As above but in the proposed state dairy project at Point MacKenzie near Anchorage.

ECONOMICS PROGRAM
FIVE-YEAR PLAN

(Program Years)

- A. Comparison among alternate energy sources 5 years

Optimum alternate energy system: As well as considering the results of the economic analysis for each particular option, the studies will include: seasonal constraints, quality of fuels, energy ratios (energy in versus energy out) and appropriateness of application.

- B. Comparison among alternate and conventional energy sources 5 years

Optimum energy system: The analysis in A. above will be included as will the appropriateness of application in a specific area.

FUELWOOD PROGRAM

Assessing the Supply of Fuelwood Resources in the Fairbanks Area

(Program Years)

A five year research plan would assess the capability of forest lands in the Fairbanks area to produce fuelwood on a sustained basis.

1. At varying distances from Fairbanks, identify State and federal forest lands that could be managed for a sustained supply of fuelwood. (1)
2. Determine the various forest types on these lands and estimate the standing stock of firewood for each type. (1-2)
3. Determine the productive capacity of each forest type and from this determine the annual allowable cut for all forest types within varying distances of Fairbanks. (1-4)
4. Using cost/benefit analysis determine which forest types should be managed intensively for the continued production of fuelwood. (1-3)
5. Evaluate the environmental effects of fuelwood harvesting and burning. (4-5)
6. Develop a fuelwood management plan for State and Federal lands in the Fairbanks area. (1)
7. Investigate the implications of eliminating free use of fuelwood and charging an array of user fees. (2)
8. Develop alternative models of fuelwood harvesting and transport systems that could be used under varying conditions to minimize production costs. (1-5)

It is estimated that this research would cost approximately \$150,000 annually.

ARCTIC ENERGY PROGRAM

ALTERNATE ENERGY RESOURCES FOR ARCTIC NORTH SLOPE REGIONS OF ALASKA

John J. Kelley
Director, NARL

In the Arctic Regions, energy sources such as oil, gasoline, and gas (natural and propane) are becoming more expensive due to numerous causes. In addition, standards of living are changing in response to modernization of community life which brings with it a desire and need for new commodities in almost every sector such as transportation, housing, food, etc. Although subsistence hunting still plays an important role in remote arctic village life, new energy sources and the means and methods for the utilization of such sources must be developed to provide an alternate energy subsistence lifestyle.

Seminars have been conducted at the Naval Arctic Research Laboratory for the past two years directed to the elucidation of means and methods of development of new cost-effective energy sources for North Slope communities. These seminars were attended by NARL staff members, North Slope Borough school staff, representatives from consulting firms (in particular, Seton, Johnson, and Odell, Portland), University of Alaska staff members, and residents of the Barrow community. Although a large number of concerns were expressed, emphasis was placed on long-term benefits that could be derived through well-conceived demonstration projects. For Example:

- ° There is an abundance of coal throughout the North Slope region of Alaska. Most of it is within reasonable utilization distance of the villages. The coal which occurs near Wainwright Village on the Kuk River, for example, has been known since 1869. It is one of the best coals in the nation--low in ash and sulfur. One plan advised (A. W. Moody, Harstad Associates, Seattle) that an initial project consider a plant size of 200 kw (electrical) output. The preliminary design is suitable for expansion to 400 kw. The small coal field electric plant demonstration project would affirm a future alternate energy potential and would offer training to community participants.
- ° If the coal is used as an alternate fuel, an unusual utilization of the so-called waste products of combustion is possible. This entails the construction of double-walled greenhouse structures which would utilize the waste heat, water, products of combustion, and solid residues in an agronomic endeavor. One suggestion (AES, UofA) would be to use the CO₂ gas derived from exhaust products to promote growth of plants and the waste heat to maintain

proper temperatures in a tundra soil-growing media. Such a plan could provide a number of types of fresh vegetables and, perhaps, some fruits to the local areas at a cost comparative with or less than the same products which are currently imported.

- ° Solar energy can be harnessed with existing hardware and technology. It would not be dependent on any other outside energy source. It is, however, ineffective during that part of the year when no sunlight can be utilized. During that time, sunlight can be utilized, the energy from the sun can supplement and sometimes replace other energy sources. The use of solar energy in a demonstration project must be more than just the conversion of a standard dwelling with off-the-shelf technology. A demonstration project must, in some way, relate to a total energy architectural concept relative to regional requirements, including training.

To implement projects based on the above concepts will involve a multiyear funding program. The amount of funding needed will depend upon the extent of the project(s) and the length of time each will be allowed to continue; until 1) they are voluntarily terminated; or 2) they prove successful and are taken over by either government or commercial entities.

An estimated table of costs and milestones for anticipated greatest net return per project has been prepared (C. Hoar, Seton, Johnson, Odell) and modified for this report based on the comments of other participants:

COAL UTILIZATION--PILOT PROGRAM

<u>Task</u>	<u>Estimated Time</u>	(1979 Dollars) <u>Estimated Cost</u>
1. Research, engineering, mobilization, basic training	6 months	\$ 120,000
2. Materials/Equipment		110,000
3. Site prep, equipment erection, training	6 months	200,000
4. Materials/Equipment		150,000
5. Operation of mine site, delivery system/training	1 year	250,000
6. Materials/Equipment		100,000
7. Ancillary labor and spare parts		100,000
Total for Two-year Program		<u>\$1,030,000</u>

ARCTIC GREENHOUSE--PILOT PROGRAM

<u>Task</u>	<u>Estimated Time</u>	(1979 Dollars) <u>Estimated Cost</u>
1. Research, engineering, mobilization, training	6 months	\$ 90,000
2. Materials/Equipment		60,000
3. Site preparation, equipment, installation, training	3 months	45,000
4. Materials/Equipment		75,000
5. Operation of Greenhouse and distribution	1 year	175,000
6. Materials/Equipment		50,000
Total for Two-year Program		<u>\$500,000</u>

SOLAR ENERGY/ARCHITECTURE CONCEPT--PILOT PROGRAM

<u>Task</u>	<u>Estimated Time</u>	(1979 Dollars) <u>Estimated Cost</u>
1. Research, engineering, mobilization, equipment	6 months	\$120,000
2. Materials/Equipment		50,000
3. Site prep, erection of test structure(s), training	6 months	120,000
4. Materials/Equipment		160,000
5. Operation of Model	18 months	200,000
6. Materials/Equipment		120,000
7. Retrofit/installation and training	6 months	100,000
8. Materials/Equipment		50,000
Total for 3½-year Program		<u>\$920,000</u>

It is emphasized that these estimates could change substantially based on level-of-effort and location of the demonstration site.

Success in any endeavor of this kind must involve full participation of members of the local community. The participants are the potential managers and employees of any commercial venture that may result from the project. Training is an essential element and must be accomplished both on-the-job and in a classroom environment. Unless all who participate are adequately trained, there is little hope for the success of the projects.

WIND ENERGY PROGRAM

FIVE-YEAR OUTLINE

(Program Years)

The objectives of the wind energy program are to supply reliable wind information for Alaskan planners and to evaluate and publicize suitable wind machines (or WECS) for Alaskan use. The ultimate goal is always to establish (through cooperative programs) operational wind energy systems in communities, with emphasis on rural and small village. To achieve this, we propose to:

- A. Revise and distribute the wind atlas data in regional formats (e.g., the Regional Corporation boundaries), for all communities within those boundaries (native or otherwise). (1-3)
 1. Establish (or guide others in) further measurement stations to fill wind data gaps. (1-3)
 2. Expand the present data base and resulting reports to include machine productivity predictions (presently not part of the wind atlas). (1-2)
- B. Establish and operate a wind machine test facility (1-5)
 1. Purchase, install and test two machines (10 kW and 40 to 60 kW rated), at a hill site near Fairbanks. (1-3)
 - a) When operational, provide training for visitors from Alaskan communities; e.g., teachers and village operators. (1-5)
 - b) Invite visiting manufacturers, utility representatives, private industrialists and government agencies to use the facility (on a cooperating cost-sharing basis). (2-5)
- C. Install, in cooperation with others (recall B-2-b), machines (or clusters of machines) in communities to provide significant electric power for general use. (2-5)
- D. Test energy storage devices, developed by others (recall Solar Section above), adapted for WECS. (3-5)
- E. Prepare and distribute all results from the test facility for public use, especially in Alaska. (2-5)

Budget*

1st year	\$260,000	
2nd year	260,000	
3rd year	185,000**,†	
4th year	180,000**,†	
5th year	180,000**,†	
	<u>\$1,065,000</u>	(\$213,000/year)

* In 1979 dollars, not corrected for inflation or increase in UAF rates.

** Assumes any new WECS will be funded by manufacturer, special appropriation, or non-UA agencies.

† Assumes any WECS demonstrators outside the UAF test facility will be funded (including sub-contracts from industry, or local labor) by on-site users or special appropriations.

APPENDIX 2

HUMAN RESOURCES AVAILABLE TO THE CENTER

The following is a listing of the human resources of the University of Alaska statewide system relating to alternative energy technological expertise. The first page is a resource list, included to facilitate contacts and communication among all interested parties.

The second section is a detailed tabular listing of university staff members giving their degrees, areas of expertise, recent experience, and scientific equipment which they have at their disposal. Also included is a column to indicate how many months during the past year (1979) each staff member was funded to do alternative energy work. For the 49 people listed, a maximum possible effort of 588 man months could have been devoted to alternative energy development work. As can be tallied from the table however, only 106 man months were in fact funded.

WASTE HEAT PROGRAM

(Program Years)

Research Proposal is as follows:

- I. Develop a waste heat use research center (1-5)
 - A. Agriculture
 - 1) Set up 2 ea 40' x 100' double poly greenhouses (1-2)
 - 2) Piping of warm water from physical plant to area (1)
 - 3) Clearing 2-3 acres of ground (1)
 - 4) Install PVC pipe in soil heated plots (2)
 - 5) Compare methods of utilizing low temperature H₂O for greenhouse use (2-5)
 - 6) Evaluate types of crops and develop markets for greenhouses using low temperature H₂O (2-5)

Estimated support \$275,000/year

CENTER FOR ALTERNATIVE ENERGY

RESOURCE LIST

<u>Name</u>	<u>Affiliation</u>	<u>Telephone</u>	<u>Areas of Expertise</u>
Allan, Lee	AES-Palmer	745-3257	solar, heat flow radiation, agricultural equipment
Aspnes, John	Elec. Eng.	479-7137	passive solar, electrical
Barnhardt, Ray	CXCS	479-7143	energy education
Barsdate, Robert	IMS	479-7707	solar, wood
Behlke, Charles	Eng.	479-7330	hydropower, tidal
Benson, Carl	GI	479-7450	geothermal--calorimetry, volcanic systems
Button, Don	IMS	479-7709	microbiology kinetics
Carlson, Axel	Coop. Ext.	479-7201	energy conservation in buildings
Carlson, Bob	IWR	479-7775	hydropower
Colonell, Joe	IMS	479-7832	wind, waves, tides
Dickason, Gene	Eng./UAA	263-1859	environmental quality engineering, methane
Dinkel, Don	AES	479-7187	waste heat, geothermal & solar (agricultural applications)
Forbes, Robert	GI	206-468-2453	geothermal
Gasbarro, Tony	AES	479-7433	biomass (wood)
Goldsmith, Scott	ISER/UAA	278-4621	geothermal
Gosink, Joan	GI	479-7460	hydrodynamics, turbulence, heat transport
Harrington, John	Chem./UAA	263-1714	thermodynamics
Harrison, William	GI	479-7706	geothermal, heat flow
Hawkins, Dan	Geology	479-7809	geochemistry of hydrothermal fluids, gas sorption on zeolites
Johnson, Ron	Eng.	479-7777	thermodynamics, fluid mechanics, environmental modeling
Kane, Doug	IWR/Eng.	479-7808	water resources, fluid mechanics, hydrology
Kienle, Juergen	GI	479-7467	geothermal, volcanic systems
Leonard, Lee	DOT/UAF	479-2241	wind, solar, geothermal (engineering applications)
Lewis, Carol	AES	479-7670	production economics, biomass, waste heat
McRoy, Peter	IMS	479-7783	biomass
Merritt, Bob	Eng./GI	479-7137	solar, nuclear engineering
Metzner, Ron	GI	479-7369	stirling engine, heat pumps
Mickelson, Belle	AES	479-7631	energy education
Nelson, William	Eng./UAA	263-1859	energy conservation in buildings
Nevé, Dick	IMS	479-7977	photovoltaics, tides, current, wind
Nielsen, Hans	GI	479-7414	heat pump, thermodynamics
Osterkamp, Tom	GI	479-7543	hydroelectric, geothermal
Reeburgh, Bill	IMS	479-7830	methane
Reichardt, Paul	Chem.	479-7986	biomass
Remus, Emil	ACC/Diesel	263-1468	wind turbines, diesel & wind co-generation
Rice, Eb	Civil Eng.	479-7241	energy conservation in buildings
Royer, Tom	IMS	479-7835	currents, waves, tides
Sackinger, Bill	GI	479-7472	energy conservation in homes, wind
Sheridan, Roger	GI/Physics	479-7339	thermoelectric, photovoltaics, MHD, nuclear
Seifert, Richard	IWR	479-7987	solar, energy conservation technology
Stone, David	GI/Geology	479-7565	flywheels
Tiedemann, Jim	Mech. Eng.	479-7209	solar, heat pump
Turner, Don	GI	479-7198	geothermal
Van Cleve, Keith	AES	479-7114	production capacity of soil sites
Wise, Jim	AEIDC/UAA	279-4523	solar, wind, temperature, humidity
Wendler, Gerd	GI	479-7378	solar
Wentink, Tunis	GI	479-7607	wind, solar
Wescott, Gene	GI	479-7576	geothermal
Workman, William	AES/DOE	479-7119	energy economics
Zarling, John	Eng.	479-7209	solar, energy conservation in buildings

Staff and Facilities Available for Center for Alternative Energy

<u>Name</u>	<u>Affiliation</u> (UAF unless indicated)	<u>Degree</u>	<u>Areas of Expertise</u>	<u>Recent Experience</u>	<u>No. months funded alt. energy work in 1979</u>	<u>Equipment</u>
Aspnes, John	Elec. Eng.	PhD Elec. Eng.	Passive solar Control systems & energy systems for electrical power	Passive solar design of buildings Co-generation--waste heat scavenging	---	electrical power lab
Dickason, Gene	Eng./UAA	PhD Civil Eng.	Environmental quality engineering Resource recovery from solid waste Anerobic digestion (methane)	Methane production in waste in dumps	---	
Johnson, Ron	Engineering	PhD Fluid Mechanics	Thermodynamics Fluid mechanics Environmental modeling	Co-PI: Ice fog abatement Teaching thermodynamics Geothermal energy	---	
Merritt, Robert	Elec. Eng./ GI	MS Elec. Eng. MS Communica- tions & astro- physics	Solar Nuclear engineering	Solar panel to measure solar constants Applications of solar panel for villages	1/2	
Nelson, William	Eng./UAA	PhD Mech. Eng.	Energy conservation--heat loss	PI: Budget studies of energy loss from dwellings (1K) Heat loss through multiple pane windows	1/2	lab--low tempera- ture box heat flux measur- ing plates hot water anemom- eter
Tiedemann, Jim	Mech. Eng.	PhD Mech. Eng.	Self-powered heat pump Solar Collectors	Great Inflatable Automobile		
Zarling, John	Engineering	PhD Mech. Eng.	Active & passive solar design Energy conservation in buildings Air infiltration rates	PI: DOTPF computer modeling of passive solar structures (20K) PI: Air infiltration measurements (30K) PI: Passive freezer Grant for solar energy resources	3	solar radiation measurement

<u>Name</u>	<u>Affiliation</u> (UAF unless indicated)	<u>Degree</u>	<u>Areas of Expertise</u>	<u>Recent Experience</u>	<u>No. months funded alt. energy work in 1979</u>	<u>Equipment</u>
Carlson, Robert	IWR	PhD Civil. Eng.	Hydrology Water resources Air pollution	Hydraulic research as applied to flood control & hydropower Air pollution research		
Kane, Doug	IWR/ Civil Eng.	PhD Civil Eng.	Water resources engineering Fluid mechanics Groundwater hydraulics	Teaching & research in water resources problems--hydrological cycles	---	river & stream flow measure water quality analysis
Seifert, Richard	IWR	MS Eng. Physics	Energy conservation technology Solar energy applications Solar energy assessment	PI: Dept. of Transportation & Public Facilities- design & advise fire company on solar energy (6.6K) PI: DOTPF solar energy design manual for AK (39K) PI: Solar component of Susitna alternative study (5.5K) Taught classes in renewable energy resource assessment & history of technology & energy resources (8.8K) Solar energy resources potential assessment for state Ellerbe-IWR solar retrofit of Fbks Federal Bldg. USDOE consumer affairs advisory committee	10	solar collector radiation meter
Benson, Carl	GI	PhD Physics	Geothermal heat flow & calorimetry Volcanic geothermal systems	PI: Mt. Wrangell project (80K)	4	research lab
Forbes, Robert	GI	PhD Geology	Geological & geophysical exploration for geothermal resources	PI: Pilgrim Springs geothermal exploration project (60K) Co-PI: DOE Alaska Geothermal Assessment Project	4	
Gosink, Joan	GI	PhD Mech. Eng.	Hydrodynamics Turbulence Mass and heat transport Numerical modeling	Analysis of geothermal systems Heat transport problems in ice-bound rivers Analysis of turbulent mixing in heated water from hydroelectric plants	---	
Harrison, William	GI	PhD Nuclear Physics	Geothermal--heat mass flow processes	Studies of Pilgrim Springs, Chena Hot Springs Studies of Mt. Wrangell	---	

<u>Name</u>	<u>Affiliation</u> (UAF unless indicated)	<u>Degree</u>	<u>Areas of Expertise</u>	<u>Recent Experience</u>	<u>No. months funded alt. energy work in 1979</u>	<u>Equipment</u>
Kienle, Juergen	GI	PhD Geophysics	Geophysical prospecting for geothermal resources: seismic (active & passive) & gravity	Co-PI: Pilgrim Springs geothermal exploration project ERDA look for magma energy at Augustine volcano	5	gravimeter refraction seismograph
Metzner, Ron	GI	MS Geophysics	Stirling engines & heat pumps Fusion of water for heat storage	Literature search on stirling engines & heat pumps Calculations of heat storage in buried water tanks	---	model engines
Nielsen, Hans	GI	MS Elec. Eng. & Physics	Heat pump Thermodynamics	Investigation & demonstration of heat storage unit in ground for home	---	
Osterkamp, Tom	GI	PhD Physics	Classical & environmental physics Materials science Application of small-scale hydro- electric systems to the arctic Heat transfer	Hydroelectric--examining systems in cold regions Heat & mass transport problems in geothermal systems Geophysical exploration of geothermal systems		hydroelectric & geothermal la
Sackinger, William	GI	PhD Elec. Eng.	Small energy systems in villages Energy conservation Wind power	Energy conservation in homes Studies of wind power for remote research stations	---	electrical measurement temperature measurement
Sheridan, Roger	GI/ Physics	PhD Physics	Thermoelectric Photovoltaics Magnetohydrodynamics (MHD) power generation Nuclear power Electrostatic power generation	Engineering studies with Boeing	---	research lab
Stone, David	GI/ Geology	PhD Geophysics	Flywheels	Literature search & paper on flywheels Solar heated swimming pool	---	

<u>Name</u>	<u>Affiliation</u> (UAF unless indicated)	<u>Degree</u>	<u>Areas of Expertise</u>	<u>Recent Experience</u>	<u>No. months funded alt. energy work in 1979</u>	<u>Equipment</u>
Turner, Don	GI	PhD Geology	Geothermal energy--geological & geophysical exploration, assessment & development Geothermal project management-- interagency liason	PI: DOE geothermal resource definition project for Alaska (320K) PI: DOE AK Geothermal Assessment Project (100K) Coordinator for Energy Resources Research at GI Participant in Pilgrim Hot Springs geothermal exploration project	9	geochronology
Wendler, Gerd	GI	PhD Meteorology	Solar	PI: DOE program to measure solar radiation(200K) DOE reviewer for small technology & technical aspects Built solar collector	5	10 radiation measurement centers at GI
Wentink, Tunis	GI	PhD Physical Chemistry	Wind power Solar	PI: AK Power Admin. Bristol Bay wind power survey (5.5K) PI: BIA wind survey of Calista region (10K) PI: DOTPF users manual for wind power (10K) PI: DOE study of AK wind power & application (77K) Teaching course in energy	12	wind measurement data bank of wi characteristic in UA computer
Wescott, Gene	GI	PhD Geophysics	Geophysical exploration for geothermal resources using electrical & seismic methods	Co-PI: Pilgrim Springs geothermal explora- tion project Co-PI: DOE AK Geothermal Assessment Project Electrical resistivity	4½	resistivity & electromagnet prospecting equipment computer analys for geophysical modeling magnetometer
Allan, Lee	AES/Palmer	MS Agric. Eng.	Solar bins Agricultural equipment design Grain drying Heat flow radiation	PI: Renewable energy & solar applications-- solar grain drying bins (40K) PI: Engineering problems--buildings & machinery (18K) PI: Environmental conditions (39K)	6	AES--farms & equipment

<u>Name</u>	<u>Affiliation</u> (UAF unless indicated)	<u>Degree</u>	<u>Areas of Expertise</u>	<u>Recent Experience</u>	<u>No. months funded alt. energy work in 1979</u>	<u>Equipment</u>
Dinkel, Don	AES	PhD Horticulture & Plant Physiology	Waste heat Geothermal Solar	PI: Wainwright greenhouse production & soil heating (50K) PI: HATCH fund for waste heat (17K) AK DOE report on geothermal & wind resources Controlled environment growing for villages--diesel generator Waste heat from gas & oil lines for growing	7	greenhouse & horticultural equipment in
Gasbarro, Tony	AES	MS Land Resources	Biomass (fuel wood): availability & future problems for Fbks area	Study of fuel wood available in Fbks area	---	measure caloric values of wood & biomass (forest soils lab)
Lewis, Carol	AES	PhD Physics	Energy consumption in tillage & harvest operations & farm Use of biomass Waste heat Greenhouse & controlled environment economics	PI: Waste heat--rose production (80K) PI: Waste heat--greenhouse soil PI: Grain drying (10K) PI: Fuel wood use (10K) Co-PI: Conservation tillage (280K) Production economist--primarily agricultural applications	4	AES farm & equipment
Mickelson, Belle	AES	MS Conservation	Energy education	PI: Investigating energy alternatives for northern climates (50K) HEW community schools energy education Community workshops & energy handbook; curriculum materials, teacher workshops, & courses on a pilot basis	4½	
Van Cleve, Keith	AES	PhD Forest-Soil Relationships	Productive capacity of soil sites to grow trees	Assessment of forest production in relation to site quality	---	forest soils lab
Workman, William	AES/DOE	PhD Economics	Energy economics	Teaching energy economics	---	

<u>Name</u>	<u>Affiliation</u> (UAF unless indicated)	<u>Degree</u>	<u>Areas of Expertise</u>	<u>Recent Experience</u>	<u>No. months funded alt. energy work in 1979</u>	<u>Equipment</u>
Barsdate, Robert	IMS	PhD Geochemistry	Solar heating Wood heat	Analysis of heat budget in lakes (not for alternative energy applications)	---	
Button, Don	IMS	PhD Biochemistry	Kinetics of microbiological processes Energetics of food production	Alaska diesel tree--hydrocarbon injected into aquatic systems Energetics of conversion of nutrients into foodstuff	---	microbial bio- chemistry lab
Colonell, Joe	IMS	PhD Civil. Eng.	Wind & wave power Tidal power generation		---	
McRoy, Peter	IMS	PhD Oceanography	Biomass productivity	PI: NSF study of primary production in ocean & fresh water plants (200K)	6	
Nevé, Dick	IMS	PhD Biochemistry	Photovoltaics Tidal, current & wind	Assessment of alternate energy sources in an artificial upwelling system	---	permit to use F Island, Resurre tion Bay for aq culture
Reeburgh, Bill	IMS	PhD Chemical Oceanography	Methane	PI: Control & manufacture of methane through marine sediment. (50K) Methane in land fills	---	gas analysis la
Royer, Tom	IMS	PhD Physical Oceanography	Temperature & salinity gradients Currents, waves & tides		---	sampling to develop theor
Leonard, Lee	Dept. of Trans./UAF	BS Elec. Eng.	Wind Solar Geothermal	PI: DOE engineering & economic potential of hot springs in Alaska (41K) DOT develop solar heating for rural schools Gasohol--alternate fuels Development of experimental runway lighting for rural villages Electricity from hot springs	1½	

<u>Name</u>	<u>Affiliation</u> (UAF unless indicated)	<u>Degree</u>	<u>Areas of Expertise</u>	<u>Recent Experience</u>	<u>No. months funded alt. energy work in 1979</u>	<u>Equipment</u>
Hawkins, Dan	Geology	PhD Geochemistry	Geochemistry of hydrothermal fluids Use of minerals in beneficiation schemes Radioactive waste disposal & treatment	PI: DOT study of gas sorption on zeolites as an energy storage device Chemistry of geothermal fluids PI: AK Div. Geol. & Geophys. Surveys part of cooperative geothermal resource definition study with GI (DOE)	3	gas sorption of zeolites at low & high pressure study geothermal fluids
Harrington, John	Chemistry/ UAA	PhD Biophysical Chemistry	Thermodynamics		---	chemistry & research lab
Reichardt, Paul	Chemistry	PhD Organic Chem.	Production of energy from biomass		---	
Carlson, Axel	Coop. Ext.	MS Agricultural Engineering	Insulation Heating systems Environmental control of buildings-- design construction & maintenance Energy education	Developing publications & lectures on construction of arctic buildings	12	computer program for heating load & ventilation of buildings measurement of heat loss through walls
Barnhardt, Ray	CXCS	PhD Anthropology & Education	Rural education & self-sufficiency Energy education	PI: environmental education for small high school curricula (50K)	---	
Wise, Jim	AEIDC/ UAA	MS Meteorology	Physical measurements of applicable data--insulation, wind measurements, temperature, precipitation + derived data	PI: wind power atlas for Alaska (150K) DOE solar meteorological observation & training site Analysis of solar insulation measurements Teaching of solar & wind power Workshops on data available on alternative energy	4	measurement of radiation & wind, humidity temperature library on alternative energy

<u>Name</u>	<u>Affiliation</u> (UAF unless indicated)	<u>Degree</u>	<u>Areas of Expertise</u>	<u>Recent Experience</u>	<u>No. months funded alt. energy work in 1979</u>	<u>Equipment</u>
Goldsmith, Scott	ISER/UAA	PhD Economics	Geothermal	PI: DOE analysis of economic feasibility of geothermal demonstration project at Pilgrim Springs (20K) Economic studies of consumption patterns & demands for fuel Studies of electrical generation by tidal & geothermal	1	computer for economic & energy use data base
Remus, Emil	ACC/Diesel Technology	BA Vocational Education	Wind turbines Co-generation with diesel & wind	14 wind turbines in Alaska (private) Diesel generation using biomass waste (methane) (private)	---	engine dyno room-- diesel engine & turbines
Brown, Edward	IWR	PhD Bacteriology	Microbial ecology Inorganic chemistry Water resource management	Growth & nutrition of autotrophs (primarily phytoplankton) Arsenic chemistry Biological oceanography Teaching microbiology & water chemistry		fully equipped lab including walk-in incubators, autoclaves, scintillation counters, electronic particle counters, etc.

APPENDIX 3

SUGGESTED ADVISORY BOARD MEMBERSHIP

The following is a suggested listing of members for the advisory board to the Alaska Center for Alternative Energy.

1. One appointed representative of the University of Alaska, appointed by the President of the University.
2. A representative of the State Department of Commerce and Economic Development, Division of Energy and Power Development, appointed by the Commissioner (or Director).
3. A member of the Alaska Council on Science & Technology, nominated by that Council.
4. A representative of the concerns and interest of rural Alaska, nominated from the public, and selected by the Center's director.
5. A member of the professional/technical community, nominated by the professional/technical community in Alaska, and approved by the director of the Center.
6. A member of the State of Alaska's Department of Transportation and Public Facilities, nominated by the commissioner of that department.
7. A trustee of the Alaska Renewable Resources Corporation, or a designated representative of that corporation.

An Act creating the University of Alaska Renewable Energy Institute, and providing for an effective date.

FINDINGS + PURPOSE. The legislature finds that ~~that~~ the State of Alaska ~~cannot~~ is now receiving substantial revenues from the sale of petroleum resources to consumers in the ~~remainder~~ other United States. The legislature finds the higher costs of ~~the~~ petroleum fuels is a burden on American consumers, and recognizes Alaska's moral responsibility to help alleviate that burden. The legislature finds that research and development of ~~alternative~~ energy and energy conservation technologies will ~~fulfill~~ meet our responsibilities, ~~that~~ increase the material well-being of Alaskans and Americans, and lower energy costs to American consumers.

SEC. 1. A.S. — — — is amended by adding new sections to read:

There is created ~~within the University of Alaska~~ the Renewable Energy Institute. The Institute is a public corporation having a separate legal existence within the University of Alaska. The corporation's board of directors shall be the University of Alaska Board of Regents.

Sec. (A) Corporation created

question - public - state funding, grants awarded through G + B + A
private - no ^{direct public} legal control; ~~possibly~~ would be dependent on grants (i.e. no (independent) operating budget)
within Dept. of
independent legal existence

(B) Purposes - PRIMARY

Creation of employment opportunities through development of energy technologies

- (2) Provide economic benefit to state citizens
- (3) " effective use of state resources
- (4) Diversification of employment opportunities
- (5) Reduction in dependence on gas & employment
- (6) Reduction of state imports
- (7) Increase in state exports

(8) Promote the most efficient, technologically advanced methods of utilizing state's energy resources

(C) Funding Allocation - choices - if public - endowment

~~Board~~ Budget App

as app by leg
see ARRL
exempt

(2) Start up costs + succeeding years
budget in later years

(3) detailed planning study
report next year

(D) Bd of Directors

Governing body

7

exp. in energy technology

1 member for 1 year, 3 for 3 years, 2 for 5 years + 2 for 7 years
thereafter 7 years

app gov, and by leg / annual election of chairman

Removal - same as ARRL / 4 member quorum

Bd - no pay, per diem and travel

May employ executive director and personnel -
exempt from Alaska State Salary limits

⑤ Powers - standard for corporate

Standard - see ARRC

can receive + give \$ to ^{all} public + private entities

⑥ Duties / to achieve purposes by developing
sponsoring research + projects

in following areas including, but not limited to:

enhanced problem recovery

Coal - development ^{alternates} for rural areas + high technology applications

Hydrogen, other liquid fuels Heat Pumps

Waste Heat

Wind

Solar

Fuel Cells

Conservation ^{energy}

Small-scale Hydro

inventor and entrepreneurial support

evaluation of business plans + inventions

assist in status preparation of requests for
equity + loan assistance

⑦ Objectives

Provide 150 KW of generating capacity by year

2000, 10,000 KW (via hydrogen, small hydro)

Intenter review 200 500 600

assist 10 35 60

~~Hydrogen~~

need funding + more detailed work

⑧ Cooperation - DEPD, Council
UAK Research, etc.

Criticisms - duplication of efforts by DEPD
ARRC

Energy

Terry Gardiner

Box 6092, Ketchikan, Alaska 99901 Pouch V, Juneau, Alaska 99811

Brian —

Met with Plunkett & O'Hair from Montana. They certainly reinforce the thought that we are on to a good idea. I hope you are making this your No. 1 Priority - it will be a major plank in the Dem. program this time. I'm counting on you to handle this both policy & strategy wise. It probably should move thru the house as part of the energy package. You should work with Mike in this regard since he has most of the other energy legislation.

After talking to Plunkett the points I see are:

- (1) Put it in Fairbanks - with future outposts in other places
- (2) Make it Associated with the University but not under the control of the Board or the University.
a. close physical location may be good
- (3) It will be able to attract substantial amounts of non-state funds
- (4) It should have a base level funding of \$5 to \$10 million operation for the 1st 5 years then possibly phased down
a. startup year may be less
- (5) The goals of the Institute must be clearly spelled out
- (6) We would have to pay a maximum of \$75,000 to get a top class Institute director
a. therefore may want to keep them out of state pay scales.

Please give me a status report on how you are doing + estimated time of completion.

Sin — Terry

F 1

January 15, 1979

To: Representative Brian Rogers
From: Mark Wittow
Re: Alaska Energy Resource Development Institute

I have outlined, in rough form, some of the key features of a bill to create an Alaska Energy Resource Development Institute (AERDI). Where several options ^{are possible} ~~suggest themselves~~, I have tried to list some of the pros and cons of the choices.

A. Creation of the Institute

The Institute can be set up as either a public or private corporation, whose existence is independent of, and separate from, the state. If the corporation were public, ~~xxxx~~ its operating budget would be subject to the Exec. Budget Act. Interim grants from federal or private sources would have to approved by the Governor and Budget and Audit (usually automatic). Because the legislature passes its operating budget, AERDI would be subject to a fair amount of public scrutiny, ~~xxxxxxxxxxxxxxxxxxxxxxxx~~ The governor would have the power to veto or reduce appropriations to the Institute. All independent corporations within the structure of state gov't (~~EE~~ ARRC, AHFC, the Municipal Bond Bank Authority, etc.) are public orporations.

No precedent currently exists for a private corporation chartered and funded by the state, although one is contemplated in AGSOC. A private corporation would only have accountability to the extent that ~~xx~~ it is written ~~xxxx~~ into the initial charter. It would have great freedom of action, depending on the limitations of the initial authorization and its ability to obtain funding.

B. Purposes

primary -- to create employment opportunities through the development of energy technologies.

secondary--promote the most efficient, technologically appropriate of utilizing the state's energy resources.

~~to help bring these technologies~~

Within
Dept of
commerce?
other choices:
resources
revenue

- provide economic benefits to the state's citizens
 - ~~promote~~ promote effective use of the ~~xxx~~ state's resources.
 - promote diversification of employment opportunities
 - reduce dependence on gov't employment
 - reduce state energy imports
 - increase state energy exports
- bring technologies
to a commercial stage.*

C. Board of Directors

Seven members; at least two must have experience with energy technology; at least four must reside in the State of Alaska. When appointed, three directors would serve for three years, two for five years and two for seven years. All subsequent appointees would serve for seven years. Directors may be reappointed. Members would be appointed by the governor and confirmed by the legislature.

Chairman of Council

Board members would receive no pay, but would receive standard state travel and per diem rates. Four member quorum.

Standard removal procedures (ie, same as for ARRC).

Same conflict of interest provisions as ARRC.

Board has power to employ and executive director and personnel. Employees of AERDI would be exempt from state salary standards.

-- also, a public advisory board

D. Powers

The INstitute would have all the standard corporate powers. It would have the power to receive money from all public and private entities, and to make grants to public and private bodies.

E. Duties

To sponsor research and administer projects as necessary to achieve the primary and secondary purposes of the Institute.

To provide support for inventors, entrepreneurs and small businesses engaged in the development of energy technology.

The Institute's program shall include work in the areas of:

- enhanced petroleum recovery
- improved coal use (*inc. FBT*)
- wind power, small hydro and hydrogen

as funds are appropriated
energy conservation

The Institute's program may also include, but not be limited to, work in these areas:

- alternative liquid fuels and improved liquid fuel efficiency
- waste heat utilization, cogeneration of electricity and heat
- fuel cells --energy generation from solid wastes
- heat pumps
- other energy technologies particularly appropriate for use in rural and urban areas of Alaska and other northern territories.

F. Objectives

MERDI has suggested that specific goals be set out for the Institute. For example, AERDI could be required to have installed 200KW of capacity in the first year, 500 KW in the second etc. Other goals: number of inventor aid requests reviewed and assisted, number of small business aid requests reviewed and assisted.

G. Budget and appropriations

1. Initial funding -- endowment -- the legislature could appropriate a large lump sum (eg, 100 million) to AERDI, which could then use the sum's earnings to operate and fund programs. Additional funding would come from grants for specific projects. If the corporation is set up as a private entity, this would be a way to get it started without leaving project funding for future years up in the air.

--year by year appropriation -- AERDI could simply come in for ^{each year} money/ If it is a public corporation, it would come under the provisions of the Executive Budget Act. + *project capital funding*
--^{design}~~feasibility~~ study -- if immediate startup of the Institute is not desired, enabling legislation could be passed and a comprehensive study done to design the research institute and its programs

2. Budget process

The Institute budget should be broken down by program. The operating budget should be specified separately.. An annual audit should be done.

Unexpended and unobligated portions of appropriations should not lapse at the end of the fiscal year.

The Institute should be allowed to receive non-state funds without authorization, but not create permanent positions.

If the Institute is a public corporation, counsel advises that all appropriations, whatever their source, must have the approval of the Governor and the Budget and Audit Committee or the legislature.

The INstitute should submit program requests as capital budget items whenever possible, so that programs would be funded for the full time to completion.

H. Cooperation with the University of Alaska

Whenever possible, the Institute should contract with the Univ. of Alaska for all research activities. The Insitute shold be located as near to energy research personnel at the University as is possible. (AERDI should have the authority to open other offices, such as a financing office in Anchorage, coal research in Barrow, etc.)

I. Cooperation with state agencies

AERDI should be required to specifically work with the Alaska Council on Science and Technology and the Division of Power Development in developing its programs.

The standard clause requiring all state agencies, etc to provide information and services should be included.

J. Standard clauses on tax exemption and public access to information.

Cooperation with ARRC in financing projects of commercial potential?

*Council may shall recs
to
AERDI receive recs from Council*

POINTS FOR DISCUSSION

Opposition to a proposed energy development institute exists in some state agencies, and is based on the following arguments:

1. several agencies/^{or other public bodies}are already doing the same work that the institute would undertake. These would include the Division of POver, the Dept. of Transportation (among others); the University; the Council on Science and Technology; and the Alaska Renewable Resources Corporation. Any gaps in their work should be filled by proper direction to these bodies, and not by the establishment of a new bureaucracy.
2. an independent corporation, like the Institute, has too little public accountability, and is too hard for the legislature to control.

State agencies are not the best place to work on the type of technology development contemplated with the Institite, and their record demonstrates that. Only an independent institute can maintain the ties to the private sector and expertise inside and outside the state with the flexibility necessary to accomplish the goals contemplated for the Institute. Public acctability can be maintained in a number of ways, besides having a program under the direct control of the governor or legislature.

oddenda

Legislative findings --

The legislature finds that ~~although~~ the State of Alaska is now receiving substantial revenues from the sale of nonrenewable energy resources to consumers in the other states of our nation.

The legislature recognizes that ~~despite the fact that~~ ~~bringing~~ more efficient and advanced energy technologies to the stage of potential commercial development will result in lower energy costs to consumers, and that Alaska should use part of its energy resource revenues to help accomplish this goal.

The legislature finds that an independent institute, under the direction of state law, can best accomplish the aid to individuals and businesses necessary to develop and implement better energy technologies.

PLEASE NOTE: THE FOLLOWING PAGES WERE TREATED
AS A UNIT IN THE ORIGINAL DOCUMENT.



Alaska State Legislature House of Representatives

MEMORANDUM

POUCH V
JUNEAU, ALASKA 99811
OFFICIAL BUSINESS

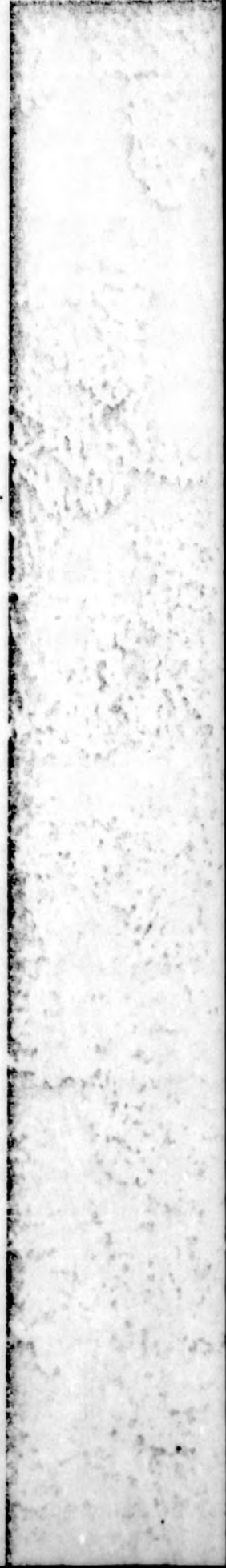
To: All House Members
From: Representative Gardiner *T.G.*
Re: Alaska Energy Center HB 687

The attached information is from the annual report of the New York State Energy Research and Development Authority. While the proposed Alaska Energy Center is not identical to NYSERDA it would be very similar in purpose and function.

Some important points are:

1. Out of a \$99 million 1979 budget \$72 million were outside funds.
2. After 5 years of operation NYSERDA, through its projects, has successfully produced beneficial technologies and jobs.

TG/mh



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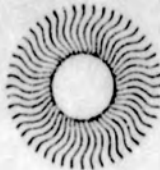
This NYSERDA Annual Report was produced by the New York State Energy Research and Development Authority, a public benefit corporation chartered by the New York State Legislature.

Additional information and copies can be obtained by writing Charles D. McKinney, Technology Transfer Director, or Judith Barton, Communications Manager, NYSERDA, Rockefeller Plaza, Albany, N.Y. 12223.

Editor
Judith Barton

Design
Envision Communications

The photographs on the front and back covers of this report symbolize the basic energy technologies NYSERDA is developing. Shown are: (from left to right) wind (photo-J. Graves), coal (photo-Dynecology, Incorporated), biomass, hydropower (photo-J. Graves), and solar (photo-J. Graves).



**New York State
Energy Research and Development Authority**
Rockefeller Plaza • Albany, New York 12223
(518) 465-6251

TO: The Honorable Hugh L. Carey
Governor of the State of New York

The Honorable John J. Marchi
Chairman of the Senate Finance Committee

The Honorable Arthur J. Kremer
Chairperson of the Assembly Ways and Means Committee

The Honorable Edward V. Regan
State Comptroller

In the fiscal year that ended March 31, 1979, NYSERDA continued development of a balanced energy research, development, and demonstration (RD&D) program geared to the present and future energy needs of New York State. NYSERDA's many accomplishments included furthering the use of indigenous and renewable resources, developing technologies to diversify the state's fuel source options, conserving energy resources, and reducing the detrimental impacts of energy use.

The state received a broad range of benefits from this energy research: the projects brought not only more jobs for New Yorkers participating in them but also the potential for a broader base of energy supplies and reduced fuel use in all geographic areas. These benefits touched all types of energy-users -- schools, hospitals, houses, apartments, businesses, and industry. In addition, the development of and participation in projects jointly funded with other organizations has provided RD&D funding totaling several times the amount of NYSERDA's budget.

Through distribution of reports and newsletters and organization of meetings, seminars, and conferences, NYSERDA's efforts have been well publicized in an attempt to speed their acceptance by the public.

I am pleased to transmit herewith the annual NYSERDA report describing our accomplishments during the fiscal year 1978-79.

Sincerely,


James L. Larocca
Chairman

JLL/dc

The New York State Energy Research and Development Authority (NYSERDA) is a public benefit corporation of the State of New York created by Chapter 864 of the Laws of 1975. Its functions and duties are set forth in Title 9 of Article 8 of the Public Authorities Law.

The purposes of NYSERDA, specifically enumerated in § 1854 of the statute, are "to develop and implement new energy technologies consistent with economic, social, and environmental objectives, and to develop and encourage energy conservation technologies."

This statement of purpose follows upon a legislative declaration that expresses the deep concern of all New Yorkers that there be an "adequate and continuous supply of safe, dependable and economical power and energy . . ." (§ 1850-a of the statute).

What NYSERDA Does

During the fiscal year 1978-79, the New York State Energy Research and Development Authority (NYSERDA) supported a broad range of technical research and demonstration projects to develop future energy supplies and to promote efficient energy use for New York State. These projects were aimed at providing alternative clean energy sources to reduce the state's dependence on increasingly expensive foreign oil and to advance conservation technologies that use present energy sources more efficiently.

Tangible results of these projects are highlighted in this annual report. In some cases, these results consist of reports that explain the economic and technical feasibility of new methods. In other cases, the results are actual operating demonstrations of equipment showing how the energy needs of homes, businesses, and institutions can be met more efficiently across the state (a residential gas-fired heat pump is shown on page 3). In all cases, NYSERDA has emphasized increased use of indigenous, renewable state resources, such as hydropower; reduction of the detrimental environmental impact of the more plentiful national sources of energy, such as coal; or conservation of expensive fuels through improved efficiency, such as waste-heat recovery.

NYSERDA's accomplishments during the year included not only concrete examples of progress, such as reports published and demonstrations in place, but also aggressive efforts to promote development of new energy sources and the adoption of conservation technologies by disseminating RD&D results directly to user groups.

Besides the direct benefits of NYSERDA's RD&D program other facets of benefit to the state include:

- NYSERDA's Saratoga Research and Development Center in Malta, which currently is undergoing studies for expansion of its facilities to foster additional R&D within the state.
- NYSERDA's emphasis on adding to the number of jobs in the state, a natural by-product of its search for clean and abundant energy sources that will help slow the escalating costs of living and doing business in New York State.
- NYSERDA's efforts to support industry in New York State, including using New York contractors and stressing growth opportunities for businesses that are able to contribute to fulfilling the state's energy needs.

The role of NYSERDA in furthering energy research, development, and demonstration projects is vital in reducing the state's energy dependency and vulnerability. As new energy technologies are perfected, the state's reliance on foreign imports will decline. The four-year-old agency already can point to numerous successes in the areas of conservation techniques, solar power, use of biomass, and methane recovery from landfills, among others. Projects now being funded and implemented by NYSERDA are an important investment in the state's energy future. The potential benefits are enormous: the state gains both the immediate economic benefit of attracting additional outside funding support and the continuing benefits of expanded energy supplies and energy savings.

An Immediate Fiscal Benefit to the State: Federal and Private RD&D Funds Attracted

NYSERDA derives its basic revenue from assessments on the intrastate sales of New York State gas and electric utilities. It also obtains income from investing retained earnings and from leasing property. It finances pollution control facilities through bond sales.

These sources provide only a portion of the funding for projects. A large part of the total research, development, and demonstration in which NYSERDA is participating is funded by private organizations and the federal government. On these projects NYSERDA acts either as prime contractor or as a co-sponsor on joint ventures.

For example, as a prime contractor for the U.S. Department of Energy, NYSERDA manages a broad range of projects, including such diverse areas as statewide testing of electric vehicles and demonstration of equipment at a hydropower site in Potsdam that produces hydrogen and oxygen from water.

Of more than 80 projects in progress for the FY 1977-78 and 1978-79 programs, 48 involve joint sponsorship and funding by other organizations. Included in this number are 23 projects with federal funding; three projects with private research funding from the Electric Power Research Institute, the Gas Research Institute, and corporations; and 13 projects with both federal and private out-of-state funding. The total amount of co-funding in the projects is summarized below:

Project Sponsors	Number of Projects	Amount of Co-Funding
Federal Agencies	23	\$41,833,000
Private Out-of-State	3	31,547,000
Joint Federal/ Private Out-of-State	13	
Private In-State	9	25,295,000
Totals	48	\$98,675,000

The total approaches \$99 million. More than \$72 million of this is from federal and private funds from outside New York State. NYSERDA's own program budget for the two fiscal years combined totaled \$16.5 million, for a ratio of outside funds to NYSERDA funds of 6-to-1.

Thus, as a result of a growing reputation for productive RD&D, NYSERDA is successfully soliciting other funding to expand the effectiveness of programs. These funds produce the immediate benefit of providing jobs for New Yorkers as well as the near and long term benefits of technology aimed specifically at the energy needs of the state. NYSERDA is a wise investment in both the present and the future.

NYSERDA's policy and direction are mapped by a 12-member board of directors. The board members are shown on this page and the following two pages.

James L. Larocca, in his capacity as state energy commissioner, serves as NYSERDA chairman. Prior to his appointment, he was deputy secretary to the governor and director of the New York State Office of Federal Affairs in Washington, D.C. (Photo A)

Frederick R. Clark, executive vice president of Key Banks Incorporated, served as chairman of the Power Authority of the State of New York and a member of the NYSERDA board until August 1, 1979. (Photo B)

John S. Dyson, former state commerce commissioner and commissioner of the Department of Agriculture and Markets, was appointed chairman of the Power Authority of the State of New York on August 1, 1979 and succeeded Mr. Clark on the NYSERDA board. (Photo C)

David J. Richardson was confirmed as a member of the NYSERDA board in June 1976. Mr. Richardson is secretary-treasurer of the Building and Construction Trades Council of Nassau and Suffolk Counties (Photo D)

Alan McGowan, a noted environmentalist, is president of the Scientists' Institute for Public Information. A former college teacher, Mr. McGowan also serves as a trustee and vice president of the Institute for Environmental Education in Cleveland, Ohio. (Photo E, left)

Robert F. Flacke was appointed commissioner of the New York State Department of Environmental Conservation in January 1979. Prior to his appointment, Mr. Flacke was chairman of the Adirondack Park Agency, a position he held since 1975. (Photo E, right)

Joanna Underwood, founder and executive director of INFORM, served as editor-in-chief and co-director of the Council on Economic Priorities. Ms. Underwood, a former magazine reporter and college teacher, has written extensively. (Photo F)

William A. Lyons is chairman of the Executive and Finance Committee of the New York State Gas and Electric Corporation. He is also a trustee of Yeshiva College and a director of the Raymond Corporation and Great American Industries. He has been a member of the NYSERDA board since August 1976. (Photo G)

Charles A. Zielinski is chairman of the New York Public Service Commission and the Department of Public Service. Mr. Zielinski, a member of the New York bar, has spent his entire professional career in the field of regulated industries. (Photo H)



A



B



C





Roy W. Bahl, Jr., was appointed to the NYSERDA board in July 1979. A renowned expert in the field of state and local public finance, Mr. Bahl is an economist and professor of economics at the Maxwell School of Citizenship and Public Affairs at Syracuse University. (Photo I)

David Sive, a partner of the law firm of Winer, Neuburger and Sive, is a director of the Environmental Law Institute and a member of the executive committee of Friends of the Earth, Incorporated. (Photo J)



Daniel G. Schuman is chairman of the board of directors of Bausch and Lomb. Mr. Schuman sits on the boards of directors of a number of domestic and international companies and organizations. (Photo K)

Elizabeth Thorndike is founder and executive director of the Center for Environmental Information. Long active in environmental affairs, Mrs. Thorndike received a special award for environmental education efforts from the U.S. Environmental Protection Agency. (Photo L)

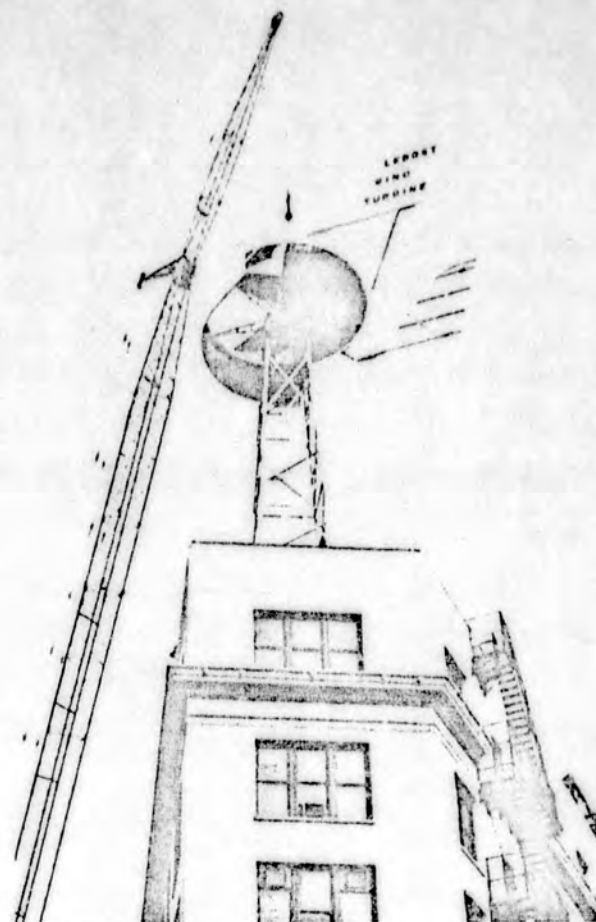


NYSERDA's research, development, and demonstration program has four goals:

- To develop the state's indigenous and renewable energy sources.
- To perfect advanced energy technologies that will increase the state's fuel diversity and reduce reliance on imported energy sources.
- To increase the efficiency in using energy resources, which includes not only conservation but also improving the management and economic efficiency of energy systems.
- To minimize detrimental environmental impacts.

Together, these goals provide the basis of an RD&D program that will contribute significantly toward improving the state's energy situation. NYSERDA generally stresses projects based on technology with potential for commercialization and implementation within five to 10 years.

During fiscal year 1978-79, work was done on numerous projects to further these aims. The following is a survey of NYSERDA's accomplishments in these areas.



New York University



New York State has only a few indigenous and renewable energy alternatives to oil and nuclear power. Nevertheless, the important potential of these resources must be tapped. They consist of hydropower, solar power, wind power, and biomass (which includes wood and natural gas from landfills). Devonian shale gas and geothermal energy are other indigenous energy resources; they are included in the section on advanced energy technologies.

Hydropower

New York State once supported hundreds of mills powered by falling water, but by 1910 coal and oil replaced water power as a leading source of energy in the state. NYSEDA has identified 1,672 New York sites that may be capable of contributing to the state's energy supply. Half of them have existing dams, many of these producing water power at an earlier time, and half do not. Together the sites could produce 3,000 megawatts of power. NYSEDA estimates that as many as 1,000 of these megawatts could be developed in the next 10 to 15 years.

To encourage development of the sites by the utilities, municipalities, and individuals that own them, NYSEDA's small hydropower demonstration program is proving that it can be done. Under the program, feasibility studies and demonstration projects are under way at some 20 of the sites (see map) in all parts of the state. Also, additional feasibility studies are being jointly sponsored, four with the U.S. Department of Energy (DOE) and one with the Appalachian Regional Commission, at sites in Albany, Essex, Otsego, Putnam, and Ulster Counties. The purpose of the demonstrations is to put into operation engineering and technical concepts and monitor the results to learn the full economic benefits.

In another cooperative project, involving DOE and the village of Potsdam, NYSEDA is supporting a pioneering method of producing hydrogen economically from water rather than

from fossil fuel. The demonstration site is a small dam that is part of the Potsdam municipal utility. All energy needed to produce the hydrogen will be generated at the site. Information gained in Potsdam could be used at similar sites across the state to produce extremely pure research-grade hydrogen for use as a chemical feed stock and in manufacturing processes. The hydrogen, used heavily in the electronics and food industry, will be available at competitive prices, and the oxygen generated in the process will be used in a water treatment plant.



Bill Pierce

As a means of providing guidance and coordination in the development of small hydropower sites in the state, NYSERDA has formed a small hydropower task force. It consists of representatives from key state agencies and the private sector that play a role in small hydropower development. In addition to NYSERDA, other agencies represented are the State Energy Office, the Power Authority of the State of New York, the Public Service Commission, the State Department of Environmental Conservation, the State Department of Transportation, the U.S. Fish and Wildlife Service, the Federal Energy Regulatory Commission, Niagara Mohawk Power Corporation, and the New York State Electric and Gas Corporation.

Solar Power

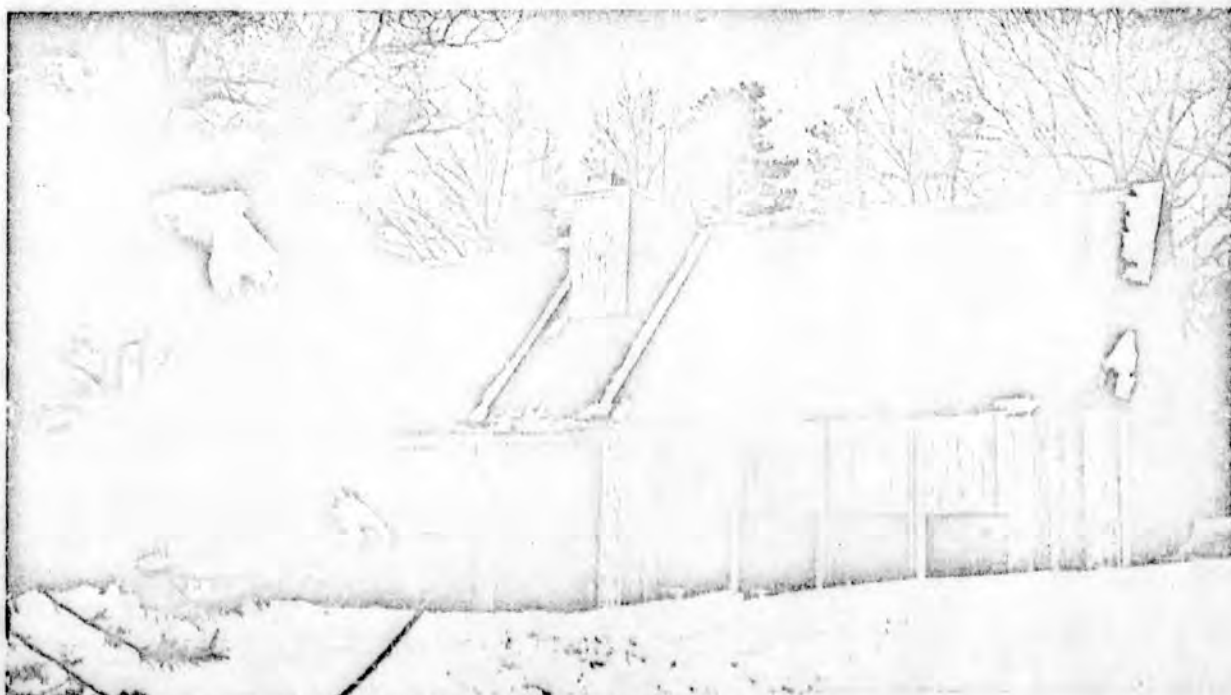
Solar energy is the basic energy form on which all life on earth relies. Much of the sun's enormous energy output, however, is unused. To capture the benefits of this extensive but diffuse energy source, NYSERDA has launched some 17 solar RD&D projects, from data collection to demonstration. To identify the state's potential, research projects include collecting information pertinent to the amount of solar energy received at different times of year at locations around the state that vary in latitude, altitude, weather, and atmospheric turbidity such as fog and smog. This information was published as an atlas that is available to the public. It can help designers of solar energy systems, builders, and interested amateurs predict the performance of active (mechanical) and passive (non-mechanical) solar hot water, space heating, and cooling systems.

One problem with using the sun's energy is that it is diffuse. It therefore must be collected, and the collectors can require extensive, unobstructed space. Increased efficiency in concentrating the sun's rays can reduce this problem. In support of research in this area, NYSERDA is sponsoring development of two different heliostats, one at Brookhaven National Laboratory on Long Island, the other at Rensselaer Polytechnic Institute.

Water heating and space heating and cooling are the usual applications of solar energy. To assess the cost-effectiveness of these solar energy technologies in New York, NYSERDA is funding 12 demonstration projects for residential, educational, and commercial buildings, largely in conjunction with other institutions (see map). These project sites include the Ballston Spa Middle School, the Butler Town Hall, the New Rochelle Public Library, the State University of New York at Albany (shown below), Ithaca College, Wagner College, an administration building of the Port Authority of New York and New Jersey on Staten Island, a fast-food restaurant in Colonie, and an apartment building and a commercial-residential building, both in New York City.

Two other projects are comparing results from equipment installed at 40 buildings in Westchester, Nassau, Suffolk, Orange, and Rockland Counties and New York City. Each project involves 20 buildings.

In a statewide effort to encourage implementation of passive solar ideas in single, two-family, and townhouse residences, NYSERDA is sponsoring a competition to design and construct housing that is traditional in style except for passive solar and conscientious energy conservation features.



Atmospheric Sciences Research Center, State University of New York at Albany

Wind

NYSERDA is working to develop innovative-design turbines that harness the wind even more efficiently than the familiar Dutch windmill. Although wind strength can vary with topography and other factors, many areas of the state may possess some wind potential.

Among the wind projects that NYSERDA is sponsoring are two demonstrations of modern wind generators, one at a rural dairy farm in Potsdam and the other at an urban site of New York University. Two additional projects involve development of unique designs, one to incorporate wind systems in existing tower-type structures and another to test vortex wind system concepts. (See map on page 8).

In addition, as a first step in determining areas in the state with high potential for wind generation, NYSERDA is sponsoring a general study to find the best areas in the state for wind power and a specific study of the wind power available at the Southtowns Sewage Treatment Plant in Hamburg. If the site has potential, a wind system for electrical generation could be installed to help power the plant.

Urban areas, in particular, are prone to gusts of wind that can be harnessed. These areas, however, also present special problems in siting wind energy systems. Another project involves studying institutional barriers to the application of wind energy conversion systems in urban settings.

Biomass

Living plants capture and store the sun's energy in a form that can be released later. Biomass resources, therefore, include both forest and agricultural crop production and also solid waste resulting from the use of organic materials by society.



Three NYSERDA projects propose to increase the amount of energy obtained from the approximately 14.3 million acres of forest land in the state, a resource with great potential. NYSERDA is compiling a dry biomass atlas for the state, which will include information on the non-depletable productivity available from a given tract of commercial timberland. Present data suggest that the equivalent of several thousand thermal megawatts are available from these forests.

Wood fuel can be cheaper than oil or natural gas in many rural areas of the state. To develop this potential, NYSERDA is investigating the possible formation of non-profit wood fuel cooperatives, using Ulster County as a model for other rural areas of the state. The cooperative could promote the use of wood as a fuel by selecting, cutting, collecting, processing, seasoning, and distributing wood for its members. The buyer would be assured of top-quality, seasoned wood at an economical price in terms of labor or money. Professionally supervised forest management services could be incorporated into the program.

In areas of the state where wood is abundant, large oil and gas based heating systems could be converted to wood burning systems. A project assessing the requirements and costs involved in converting a heating system at an educational institution will provide technological information to determine the feasibility of such a conversion. An additional dimension of the study is to determine the wood supply, economics, and market development necessary to expand the use of wood in forested regions of the state. The results will help residents of other rural areas of the state decide if wood conversion is worthwhile.

Biomass includes not only wood but also grains and organic solid wastes. A state as populous as New York is rich in municipal solid waste, sewage sludge, crop wastes, and animal wastes. All these residues, plus wood and grain, are being considered as potential sources for energy. For example, studies are considering the technology and economics of using these materials to produce alcohol, methane, and other alternative fuels. Also, shredded solid waste is being considered as a supplementary fuel in systems using oil. A study at the Arthur Kill Power Plant on Staten Island is investigating the technical and economic feasibility of conserving oil by co-firing it with shredded waste.

These projects all have potential for the statewide reduction in costs for fuel and for waste disposal.

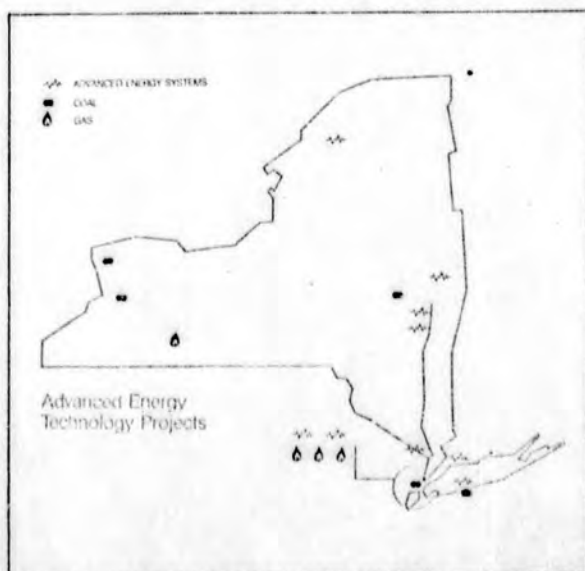
NYSERDA is emphasizing projects that could result in advanced technological systems using fuels other than foreign imported oil. Research in this area especially emphasizes expanding the use of coal, the nation's most abundant fossil energy resource, and the development of unconventional sources of methane. Of similar importance is the development of advanced technologies, such as fuel cells, which extract energy from these fuels in an environmentally acceptable way.

Coal

Although New York State has no coal resources of its own, nearby states have major deposits, and increased use of coal could greatly reduce the state's dependence on foreign oil and natural gas. Although plentiful, coal is inconvenient. Bulk coal is hard, if not impossible, to store in urban areas because of the large amount of space required. Handling and transportation also pose problems. So does pollution.

For these reasons, cities especially can benefit from NYSERDA's efforts to convert coal into a more convenient form — a liquid or gas. Liquefaction and gasification of coal have the additional economic benefits of reducing retrofit conversion costs, since much of the equipment used to burn oil or gas is still usable.

Seven NYSERDA projects are aimed at developing new, environmentally sound ways to use coal (see map). They include research into the best equipment and designs for plants using coal-oil mixtures and the best composition of that liquid, which could substitute for oil. A test in New York City demonstrated the suitability of liquefied coal as a substitute for petroleum derivatives in large boilers and determined the environmental impact of burning this liquefied form.



Other projects are aimed at developing coal systems that could produce a substitute for natural gas, a form that also is more easily handled and transported to a wide variety of users than bulk coal. Clean burning of coal is also a major problem to be solved in expanding the use of this fuel. Fluidized-bed combustion (below) represents one of the most promising technologies to achieve this. A fluidized-bed boiler operates by suspending coal and mineral particles in an upward current of air in the combustion chamber. The process could greatly reduce air pollutants and improve combustion efficiency. NYSERDA also is co-sponsoring a demonstration of regenerable flue gas desulfurization on a coal-fired boiler. This study has the potential to reduce substantially the waste produced in meeting air pollution regulations through flue gas desulfurization.



Combustion by Johns Limited

New Gas Sources

In addition to coal, other potential sources of natural gas substitutes are wood, landfills, and Devonian shale rock (see map). Gasification of wood and solid wastes with coal is one promising way of producing methane in-state. To accomplish this, researchers are investigating the optimal composition of briquettes composed of wood and coal that could be used for gasification in rural areas.

Decomposition of organic waste at landfills around the state produces methane; recovery of this gas from landfills provides an additional source of indigenous energy. Among NYSERDA's solid waste projects is one at the Fresh Kills Landfill on Staten Island, which is being studied to find the best methods of well development and extraction. It will demonstrate use of the gas to run equipment at the site.

Shale gas is a potentially large resource in the state, but the gas is in small pores in the shale formation and difficult to recover. An important effort in tapping this potential resource is at Houghton College, where a well has been bored to test a foam fracturing technique to release gas from the shale. Every 5,600 cubic feet of natural gas can replace one barrel of imported oil.

Advanced Energy Systems

NYSERDA also is sponsoring a variety of projects to find new techniques for capturing or storing energy (see map). Many of these projects are aimed at improving the efficiency of industrial processes, which too often waste considerable amounts of heat to the environment. Recovery of usable energy from this heat can conserve significant quantities of fuel.

Heat pumps are highly efficient at capturing energy for both heating and cooling. They work in a manner similar to a refrigerator, extracting heat from air that might otherwise be considered cool, from outside air in winter and from inside air in summer. NYSERDA has launched two projects to assess the potential of heat pumps for recovering industrial waste heat and is sponsoring development of a gas-fired heat pump for residences (shown below).

NYSERDA's research also recognizes that two-thirds of the heat released during a diesel engine's combustion process is not converted into electricity. Waste heat recovery systems can save a company money by reducing the amount of fuel it must buy.

A cogeneration project, at the Rockville Centre Municipal Power Plant, shows the effectiveness of a waste-heat recovery system there. That system uses the waste heat to



operate turbines that drive a generator. NYSERDA has identified 19 other potential industries where a similar waste heat recovery system could be implemented, including steel plants, petroleum refineries, paper mills, textile plants, and cement plants.

Because finding an accessible source of geothermal heat would provide a valuable indigenous substitute for expensive imported heating fuels, the geothermal potential of two areas of upstate New York is under study. The project is based on the known existence of warm water and carbonated springs in the region.

Another advanced energy technology, the fuel cell, can help conserve fuel. The concept of a fuel cell dates back to the early 18th

century, when Sir Humphrey Davy experimented with electrolysis, using an electric current to split water into hydrogen and oxygen. A fuel cell performs electrolysis in reverse: hydrogen and oxygen are combined in the process and an electric current is produced.

Current technology enables fuel cells to be powered by natural gas, light distillates, methanol, naphtha, and low-, medium-, and high-Btu gas with only slight adjustments to valves and controls. This flexibility can reduce the user's concern about fuel availability.

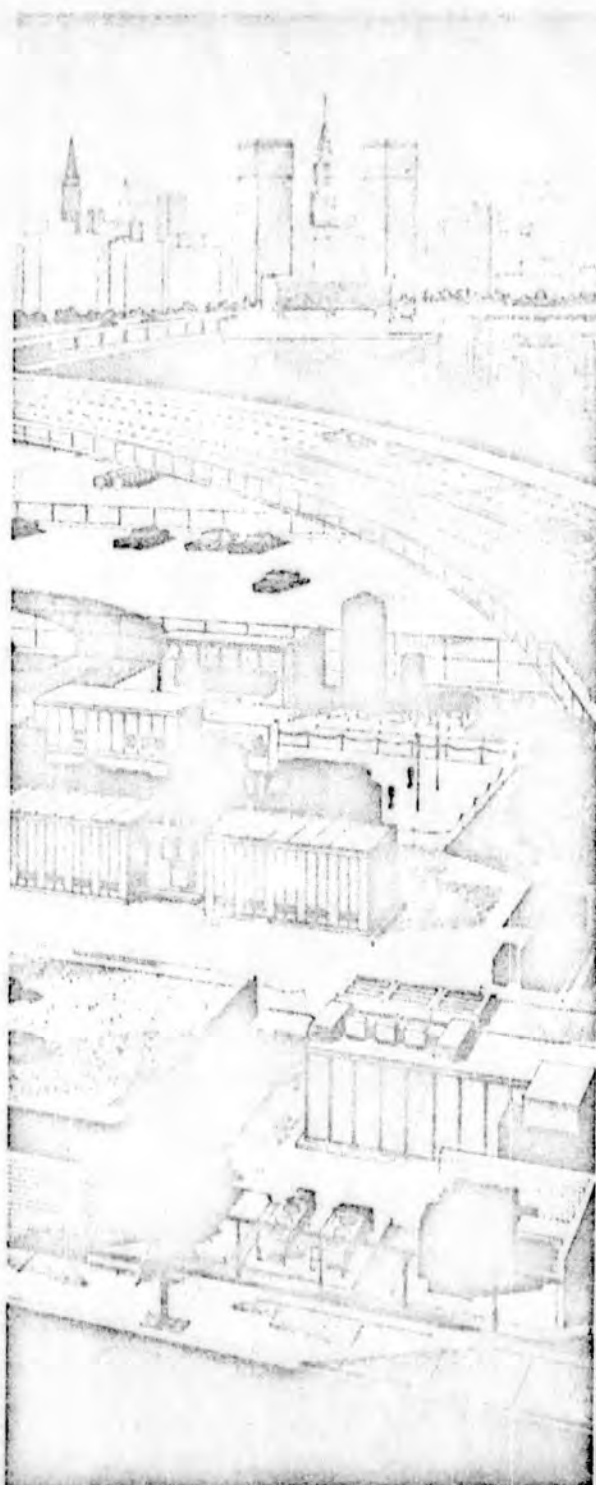
NYSERDA is co-sponsoring two fuel cell demonstration projects. One involves demonstration of a 4.8 megawatt fuel cell in New York City (left) that will work under actual operating conditions in the Consolidated Edison Company grid. The cell will be powered by light distillates and natural gas.

In a residential project involving fuel cells, NYSERDA is helping the Brooklyn Union Gas Company do site selection and evaluation in preparation for a demonstration of four 40 kilowatt fuel cells that have the potential for significant energy conservation. The fuel cells, powered by natural gas, can provide the total electrical, heating, and cooling requirements of buildings on-site.

The efficiency of this total energy system, which recaptures waste heat, is significantly greater than that obtained using utility electricity and on-site combustion of heating fuel. The fuel cell is particularly suited to an urban setting because it imposes no adverse environmental effects.

Another advanced energy technology supported by NYSERDA, development of a solid polymer electrolyzer for producing hydrogen from water, has other possible uses in addition to its planned installation at a Potsdam hydropower site. This new hydrolyzer has the potential to produce hydrogen more efficiently and cheaply from water than conventional methods do from fossil fuels. Hydrogen is used in numerous industrial processes in the state and, if inexpensive enough, could be used in the utility sector as a fuel supplement to natural gas and as a feedstock for fuel cell systems that store energy in decentralized power generating stations.

In another innovative program, NYSERDA has been chosen by the U.S. Department of Energy to test 45 vehicles powered totally or in part by electric motors. The State Office of General Services, the Port Authority of New York and New Jersey, and Westchester County by September 1980 will be provided with 15 vehicles each to be used as part of their regular fleets.



Consolidated Edison Company

Increasing Energy Efficiency

New York State will continue to use oil and natural gas from conventional sources until replacements can be found for them, and that will still be some years in the future. Therefore to extend use of these non-renewable resources, which are increasing substantially in cost, NYSERDA is sponsoring numerous projects aimed at conserving fuel (see map). These attempts to increase the efficiency with which energy resources are used also stress improving the management and economic efficiency of energy systems.

Conservation

Energy conservation projects cover a broad range of activities and energy related uses. Two major conservative targets are schools and hospitals. In cooperation with the State Energy Office (SEO) and the State Department of Education, NYSERDA developed a model energy conservation program for schools in New York State. The model program is based on energy-use data obtained on 169 elementary and secondary schools in 22 city, suburban, and rural school districts in the state (see table).

A study at Peekskill Community Hospital (right), also done in cooperation with SEO, was aimed at developing rigorous conservation measures for hospitals, which consume more energy per square foot than any other building type (see table). Another hospital conservation project, at Binghamton General Hospital, is determin-



Peekskill Community Hospital

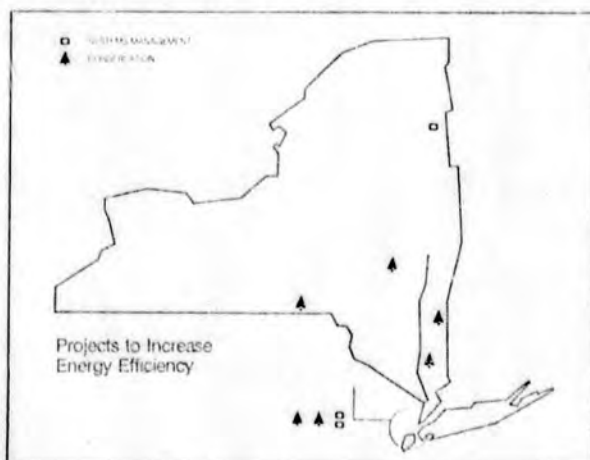
ing the feasibility of recovering hot air from flue gas for use by laundry or other equipment.

Energy conservation and heat recovery equipment is being demonstrated at a fast-food restaurant, and its performance is being carefully monitored. Other conservation projects are aimed at museums, historic buildings, greenhouses, high-rise apartments, and brownstones.

In another joint NYSERDA-SEO study, researchers are developing techniques for the aerial measurement of heat loss from buildings. The thermal radiation characteristics of various common building materials are being determined, and the analysis of thermal photographs based on these characteristics is being refined.

The Plant Science Building at the Cary Arboretum in Millbrook is being analyzed to determine the incremental value of each building system in this well designed structure.

Another project is assessing the potential use of an aquifer at JFK Airport on Long Island for storing winter cold for use during the air conditioning season.



Statewide Potential Energy Savings Through Energy Conservation

Project	Sites	Potential Energy Reduction	Potential Energy Savings	Statewide Potential Energy Reduction in %	Statewide Potential Energy Savings Annual
Hospital Energy Conservation Study	Peekskill Hospital	37%	2,424 bbls.	25-30%	3.2 mill. bbls. of oil equivalent
Model Energy Conservation Program for NYS Schools	22 School Districts	—	—	32% Elementary level 26% Secondary level	1.3 mill. bbls. of oil equivalent
Low Level Heat Recovery Applicable in NYS	19 Industries	5.9%	1.8 bbls. of oil or equivalent	31%	12.2 mill. bbls.*

*Represents 26 New York industries purchasing 54 percent of industrial fossil fuel within the state.

System Management and Economics

No energy systems are isolated, so eight NYSERDA projects are analyzing the impact of changes in one system on other systems (see map). The transportation system in the state is a prime example. A statewide survey has determined the energy use, efficiency, and environmental impact of the industrial, commercial, and private transportation sectors. Targets were identified for use in implementing conservation and environmental projects in the future.

In another systems management project, a committee of experts on state and municipal requirements bearing on energy use in buildings is working to identify items in New York City and state regulations that have an impact on energy consumption and to recommend changes where desirable.

The expanded use of ground water as a source of energy for heat pumps must take into account the environmental consequences of thermally altering ground water and the legal problems associated with withdrawing ground water or altering its temperature. A study considered these problems and projected state energy requirements and costs.

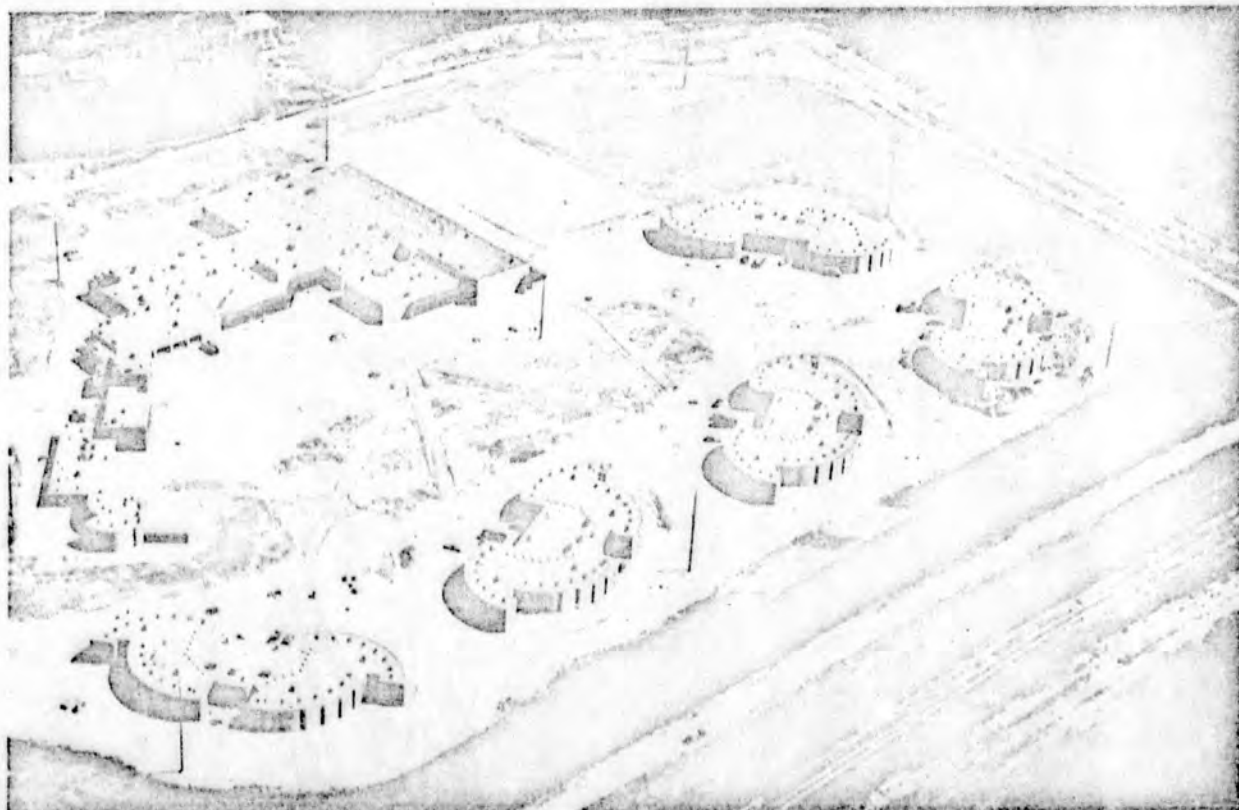
In New York City, the application of technology that will efficiently supply both electric power and hot and cold water for domestic heating and cooling will be studied. The expectation is that combined heat and power technology will supply these two services with considerably greater efficiency than can be achieved by supplying them separately.

The Olympic Village at Lake Placid (below) is the site for testing an electric load-management demonstration. The principle underlying the concept is that some portion of an electric system's energy requirements can be removed from the normal peak-load period and replaced in the low-demand period. This can reduce costs for electric customers whose bills are based on maximum simultaneous use.

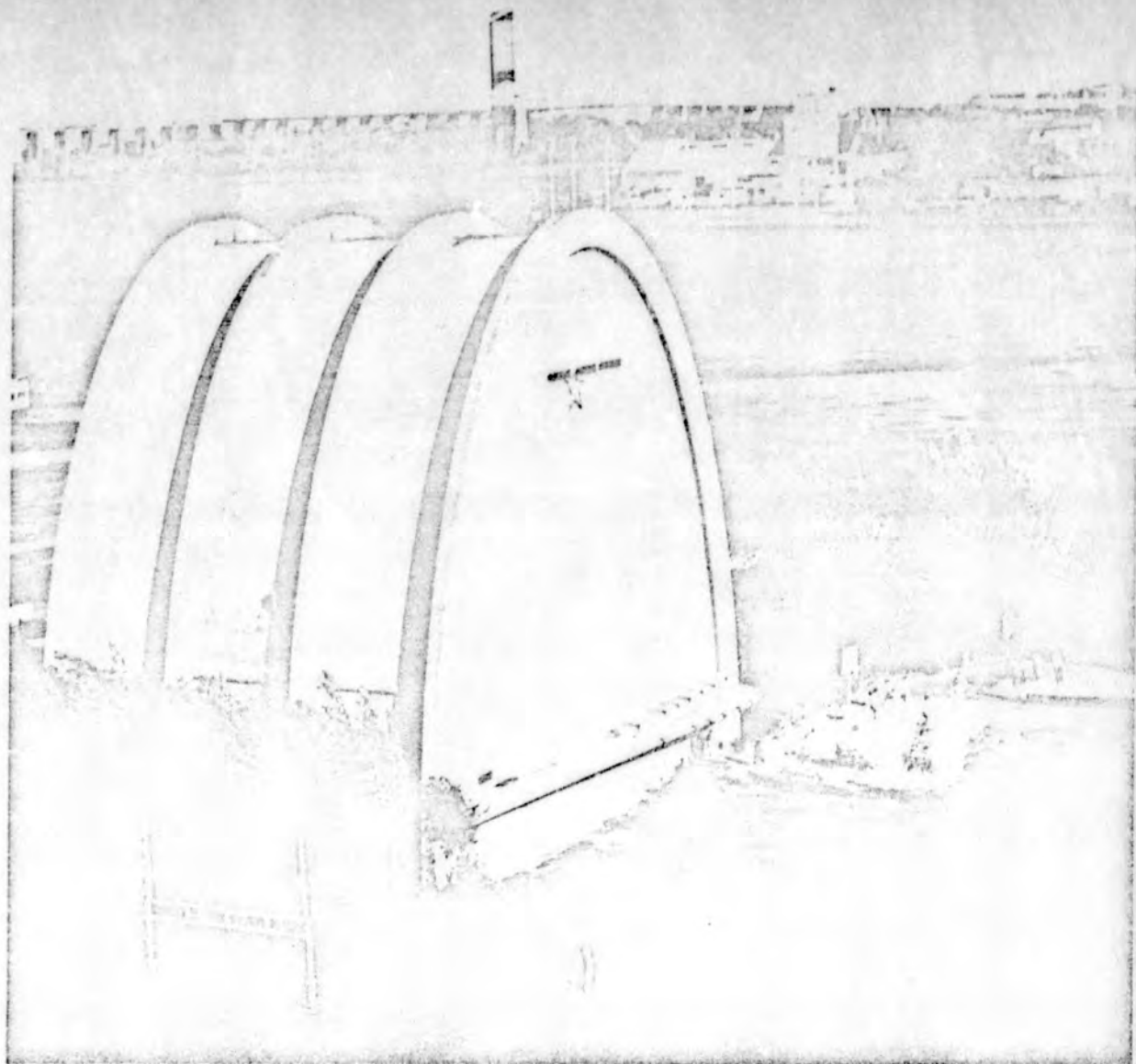
Another systems study is aimed at using the electric power generated or stored at dispersed sites by means of fuel cells, batteries, cogeneration, solar, wind, and small hydro-power. The project will determine the kinds of power processing, communication, monitoring, and safety equipment that will be necessary to incorporate these dispersed power sources most effectively into the statewide electric grid.

Two economic analyses have been launched. One has developed a draft report that estimates the total social costs of obtaining energy from the sun, water, wind, biomass, and other renewable resources in New York State. These estimates, which cover 1980 to 1995, reflect such factors as technological change and economics of production. They will help NYSERDA determine its research and development priorities and strategies.

The other project has developed a computerized model designed to simulate the least costly electrical generation plan for the state based on forecast electrical demands. The result is a tool for planners of electrical generation capacity in the state.



Lake Placid Olympic Organizing Committee



Dr. George Murphy, Chairman, Neighborhood Committee for the Asphalt Green

Integrated Community Energy Systems

The efficient use of a community's energy sources must involve both the integration of the various energy using systems and supplies and the commitment and cooperation of that community. For these reasons, NYSERDA has undertaken projects that will show how to optimize the application of various energy supply and conservation options to obtain the lowest overall costs for supplying the energy requirements of community structures. The state boasts numerous landmark buildings, many of them beautiful but unused as a result of changing community needs. In many cases these older buildings might be put to productive use if only the costs of heating and cooling their cavernous interiors could be reduced.

Innovative designs to reduce operating costs while publicizing the potential of solar and other modern technologies are being incorporated in one demonstration project in the Yorkville section of Manhattan. Residents there are cooperating in the plan to recycle one of the buildings, an architecturally striking former municipal asphalt plant (above) into an educational and recreational complex having as low fuel bills as possible. The project will enable the second building, a nearby fireboat house, to serve as an environmental and energy studies center to raise people's awareness of potential benefits from solar and wind power.

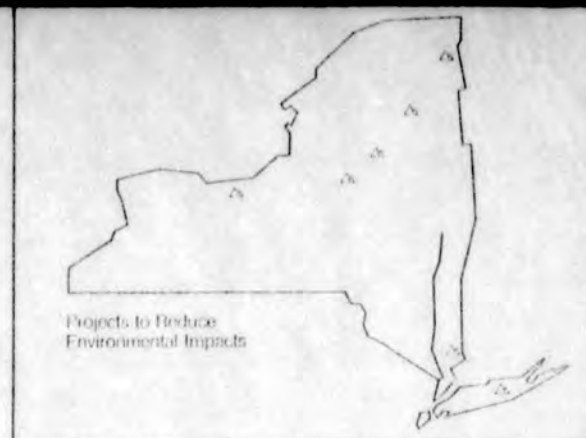
The goal of another project is to emphasize the use of local materials and resources. The public was urged to participate in the New York State segment of a federally sponsored appropriate technology small grants program. Individuals, local non-profit organizations and institutions, state and local agencies, small businesses, and one Indian tribe submitted applications.

All energy use affects the environment, although use of some fuels has a greater effect than use of others. NYSERDA is sponsoring several projects aimed at reducing the detrimental effects from energy production and conversion.

Burning Coal

Projects are under way to make the use of coal compatible with protection of the environment. The two major concerns are the effects of coal on air and on precipitation quality and the disposal of solid waste produced by combustion and by cleaning flue gas.

Evidence suggests that burning coal creates acidic residue that is carried by the winds and clouds and eventually dropped to earth. Few data are available on the residue itself and on how it affects the plants and organisms inhabiting the land and water where it falls. If coal is to become a preferred fuel, these effects, if detrimental, must be known and corrected. To increase understanding of this acid precipitation, NYSERDA has launched three coordinated projects that are studying the effects of the precipitation on lakes and land in the Adirondack region. The aim is to perfect techniques for measuring acid precipitation on-site and by remote sensing devices. The studies are being done in Herkimer County at Panther and Woods Lakes, in Hamilton County at Sagamore Lake, and in Essex County at Huntington Forest in the town of Newcomb. NYSERDA also has launched a project to study acidic cloud droplets. After calibration of the special instrumentation required, the project location will be moved to the summit of Whiteface Mountain and eventually to the three lakes in the Adirondacks where the other experiments are being conducted. (A healthy lake is shown below.)



Finding an acceptable method for disposing of coal wastes is an acute problem. Air pollution standards limit the amount of pollutants coal-burning plants may discharge into the atmosphere. Yet, although flue-gas scrubbers remove the fly ash and harmful sulfur oxides, they create a new problem by producing coal wastes equal to 30 percent or more of the volume of the coal burned, depending on the amount of sulfur the coal contained. A sizable plant burns 7,000 tons of coal a day. Estimates are that by the year 2000 the nation's coal-burning power plants will probably produce more than 100 million tons of waste a year. The disposal problem is compounded in southeastern New York State, where land is scarce and too costly for the large landfills needed to accommodate the thousands of tons of sludge and fly ash produced daily. NYSERDA is demonstrating the feasibility of forming the coal waste into blocks that can be submerged in the ocean to form reefs off Long Island. This study is assessing the possible toxic effect of the blocks on marine life; the effect appears to be minor and harmless. The reefs could have a beneficial effect, in fact, of providing habitats for fish and other organisms. (See photo next page.)



Calspan Corporation

Water Intake and Discharge

NYSERDA has developed a condenser tube simulator for use at a power plant in the lower Hudson River. The simulator will assess the causes of death of small aquatic organisms that are captured by the cooling water system of the plant.

Two projects deal with the effects of thermal discharges. In one, a report was drafted on a model for evaluating thermally induced biological effects at Indian Point; thermal resistance curves have been compiled for the eggs and larvae of four fish species. In a study at the Ginna Generating Station in Ontario, the distribution of water temperature with depth and distance from the point of discharge is being predicted.



Marine Sciences Research Center, State University of New York at Stony Brook

Money spent for research is wasted if the results of that research remain buried in a file. The goal of the technology transfer program is to bring the results of NYSERDA's research, development, and demonstration projects to potential users throughout the state. NYSERDA does this by stimulating the public to adopt proven technologies and conservation practices and by urging companies to commercialize the new technologies.

The technical and financial benefits resulting from NYSERDA's projects are advertised through the mass media and on a person-to-person basis.

Examples of recent information dissemination activities are:

Public Events

Rockville Centre: 100 persons attended dedication ceremonies and a tour of a waste-heat recovery system at the local municipal utility. Afterward, 19 industries were invited to learn how the system can benefit them.

Malta: Ground breaking ceremonies were held in the fall for expansion of the Saratoga Research and Development Center.

Staten Island: Governor Carey and state legislators representing the area attended ceremonies announcing conversion of the Wagner College Science Complex to solar energy.

Buffalo: Contract signing ceremonies marked the beginning of a coal gasification project involving Bell Aerospace Division of Textron, Incorporated.

Public Information

NYSERDA prepares and distributes information on research projects to state and national circulation technical and trade publications as well as to the general interest media. It also coordinates the release of information with the various co-sponsors of NYSERDA projects.

News releases are mailed approximately once a week to daily and weekly newspapers, radio and television stations, and selected journals.

Publication of releases frequently prompts requests for additional information from the media and from private individuals. In addition to responding to media questions, NYSERDA provides contacts with appropriate staff. Special mailings go to individuals known to be interested in certain projects. For example, the appropriate technology competition was advertised by means of mailings to selected individuals as well as through information aimed at the general public.

Reports

Reports on research are a primary communication tool in explaining the results of projects to agencies and individuals interested in specific technology. Published reports are sent to 55 key depository libraries in the state. NYSERDA files a copy of most reports with the National Technical Information Service, a branch of the U.S. Department of Commerce, which fills requests for written or microfiche copies from individuals.

In addition to the depository libraries, NYSERDA sends reports to groups it has determined are potential users of technology and to interested members of the general public. See the inside back cover for a complete list of NYSERDA reports completed during FY 1978-79.

Newsletter

Another major tool for disseminating information on agency programs is the *NYSERDA Review*. The newsletter, written in-house, describes NYSERDA projects and updates information on current developments within the agency.

Copies of the *NYSERDA Review* are mailed quarterly to all media, organizations, selected public officials, certain libraries, and about 3,000 individuals who have expressed interest in NYSERDA programs. Three issues were published in fiscal year 1978-79.

Annual Report

The report you hold is another means of disseminating information on NYSERDA programs. The previous annual report was distributed during fiscal year 1978-79 to 3,000 persons.



Saratoga Research and Development Center

NYSERDA broke ground in the fall of 1978 for expansion of its Saratoga Research and Development Center in Malta. Four companies currently rent facilities at the 455-acre tract, located 25 miles north of Albany. They are Exxon Nuclear Company, Incorporated; Mechanical Technology, Incorporated (MTI); Power Technology, Incorporated; and Wright-Malta Corporation. The initial expansion is at the MTI and Exxon test facilities.

Increasing available R&D facilities can attract and retain industrial jobs in the state and strengthen local economies. In addition, it can generate income-producing activities for NYSERDA that will help fund NYSERDA's own projects.

Since NYSERDA's predecessor bought the center from the federal government in 1964, the program there has shifted from space-vehicle testing to energy research. In order to plan the center's technical and fiscal future, NYSERDA is assessing the potential for expansion. A study has identified energy-related industries and high-technology and research-related industries that could benefit from installing research and development facilities at the center.

At the same time, another study has identified physical characteristics of the center that will affect site planning. These include site geography, location, environment, and business and personal benefits, such as the availability of highways, housing, and cultural resources in the Saratoga and Albany areas. The information gained in these two studies will allow NYSERDA to predict realistic short-term and longer-term demands for space and other requirements at the center and to choose a course of development to match its objectives.



Stephen Burke

West Valley

In 1961, New York State acquired 3,345 acres at West Valley to develop the Western New York Nuclear Services Center. Under lease with NYSERDA, Nuclear Fuel Services, Incorporated, a subsidiary of Getty Oil Company, operated a nuclear fuel reprocessing plant and waste storage facility at the site through 1972. A commercial low-level burial ground was in use until 1975. The facility has not operated commercially since then. In 1976, the company announced its intention to surrender the site to the state when the term of its lease ends in 1980.

More than 15 studies have attempted to resolve the difficult technical and financial problems associated with surrender of the site. The most recent assessment is a Congressionally mandated study, undertaken by Argonne National Laboratory for the U.S. Department of Energy (DOE), which was submitted to Congress early in 1979. Options addressed in the study range from total decontamination of the facilities to limited use of the site.

New Developments

In a letter dated June 7, 1979, DOE told Governor Hugh L. Carey that it was prepared to accept overall management responsibility for cleaning up the major problem at the West Valley site — the high-level radioactive liquid wastes. This is the first time that the federal government has acknowledged any responsibility for the problems at West Valley. This historic commitment includes implementing a program to manage the decontamination and decommissioning of all facilities used in the cleanup. The letter acknowledged that the federal government will bear a portion of the cost of the waste solidification program. Its share and those of the state and commercial operator of the site are not yet determined.

The DOE letter also said that the West Valley site will receive no further federal consideration as a potential nuclear waste storage site unless state officials are consulted first. The letter suggested that the state consider resuming burial at West Valley of low-level radioactive wastes from medical, research, industrial, and other uses.

The NYSERDA chairman is continuing to work with federal officials to narrow and resolve the differences that remain on a program for the disposition of the facilities at West Valley.

NYSERDA's policy and direction are mapped by the Board of Directors, who represent a variety of agencies and organizations having a central interest in the state's future energy course.

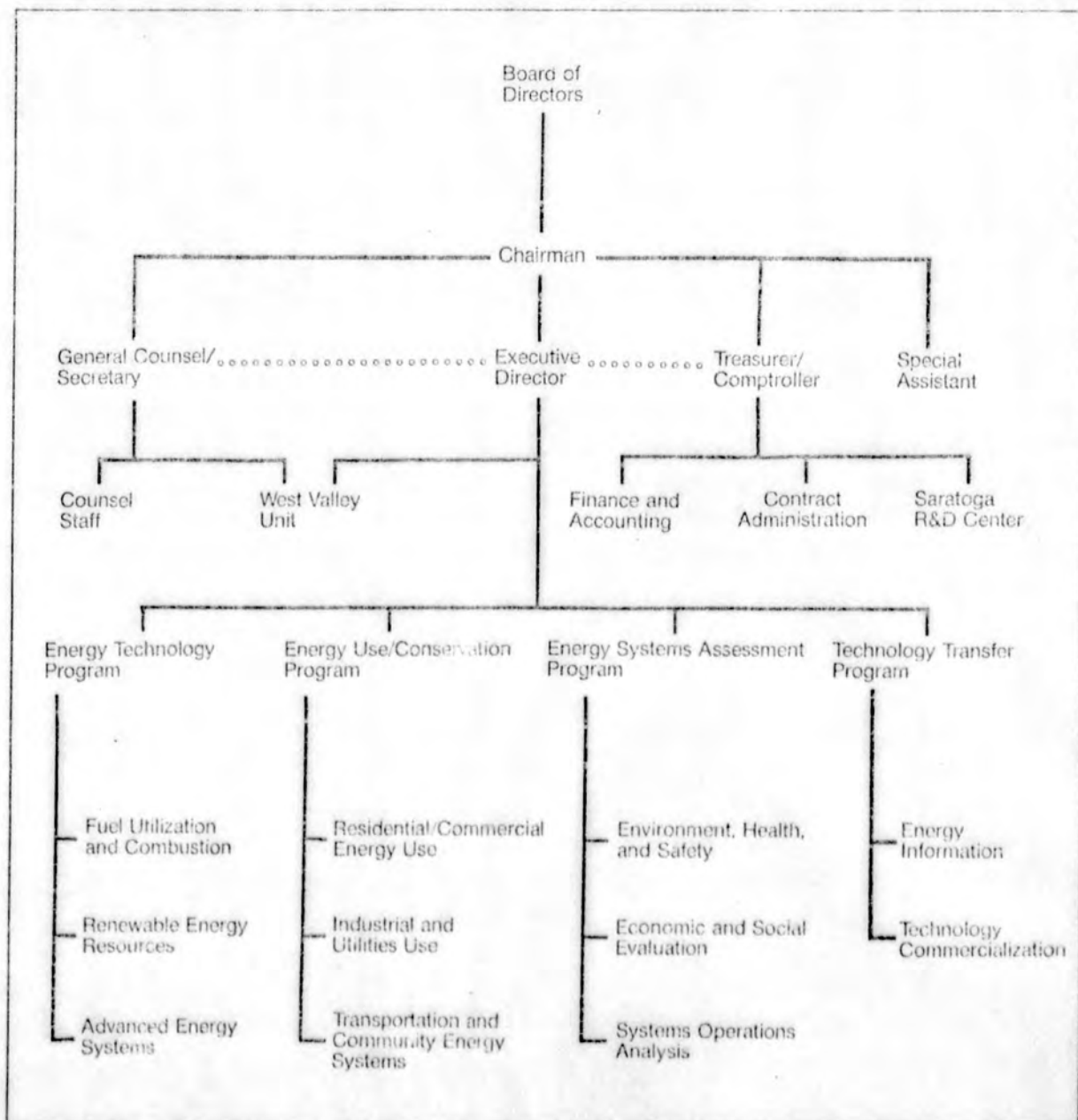
Day-to-day operations are overseen by the executive director, who is in charge of a staff with expertise in physics, mechanical, electrical, civil, and environmental engineering; energetics; geology; chemistry; economics; planning; mathematics; biology; environmental studies; and public management. This broad range of disciplines is necessary to develop and manage the variety of technical projects with which NYSERDA is involved.

NYSERDA's work force consists of 44 employees in clerical, professional, and administrative positions. Approximately 43 percent of this work force consists of people with expertise in at least one of the fields noted above. About 36 percent of the positions are clerical, and the remainder include executive, legal, and financial positions.

Affirmative Action

NYSERDA offers women, the handicapped, and members of racial and ethnic minorities an equal opportunity to secure employment. It participates in New York State's commitment (as expressed in Governor Carey's Executive Order 40) actively to recruit and retain qualified candidates from these groups.

Inquiries concerning career opportunities with NYSERDA are always welcome and should be directed to William G. Carter, Director of Affirmative Recruiting, NYSERDA, Agency Building 2, Rockefeller Plaza, Albany, NY 12223.



Geoff -

leave resource assessment functions
in DNR.

big problem - what resources do we have,
before we sell

NASA satellite program - remote sensing
tied with ALARJ

million of dollars of information for \$47,000

used for land disposal

\$1,066,000 → integrated mapping for 100 million acres

Introduced: 3/4/80
Referred: Resources

BY THE RULES COMMITTEE
BY REQUEST

1 IN THE HOUSE

2 HOUSE JOINT RESOLUTION NO. 81

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 ELEVENTH LEGISLATURE - SECOND SESSION

5 Relating to decontrol of the price of
6 oil produced from Upper Cook Inlet
7 fields.

8 BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:

9 WHEREAS oil and gas development in Upper Cook Inlet pioneered the de-
10 velopment of the oil and gas industry in Alaska, and provided information
11 which contributed substantially to the technology of deepwater drilling in
12 severe climate production areas such as the North Sea; and

13 WHEREAS production of oil from Upper Cook Inlet fields has provided
14 Alaskans and other Americans with refined petroleum products such as gasoline,
15 diesel and fuel oil; and

16 WHEREAS drilling and production costs for Cook Inlet wells are among the
17 highest in the world; and

18 WHEREAS production from Cook Inlet fields is rapidly declining; and

19 WHEREAS, though the price of most oil produced from Upper Cook Inlet
20 fields is currently controlled by the federal government at the "lower tier"
21 level, the Department of Energy has granted some Cook Inlet producers price
22 relief in recognition of higher drilling and operating costs; and

23 WHEREAS the most equitable and beneficial means of maintaining Cook
24 Inlet production would be to provide for the decontrol of Upper Cook Inlet
25 production, allowing the product to be sold at market prices;

26 BE IT RESOLVED by the Alaska State Legislature that it urges the United
27 States Congress and the Department of Energy to address the production
28 problems and higher operating costs presented by oil production in Upper Cook
29 Inlet by decontrolling the price of oil pumped from Cook Inlet fields.

1 COPIES of this resolution shall be sent to the Honorable Charles W.
2 Duncan, Jr., Secretary of Energy, and to the Honorable Ted Stevens and the
3 Honorable Mike Gravel, U. S. Senators, and the Honorable Don Young, U. S.
4 Representative, members of the Alaska delegation in Congress.

3/5 House Resources

HB 687

Alex Scala - public info, at definition

Howard Cutter - chancellor, UA, FL

"God is the source of all energy"

Man identifies, defines, harnesses & directs energy
Q - where will future energy come from?

University can
do it best
already doing it;
existing systems,
administration is
in place

Margaret Branson -

don't want Bd tied to Regent
want 14 member board (Theroff concurs)
instead have UA people on Bd.
pres of UA & two private colleges
St Jackson & APU, dir. of research for UA

(Chat - probably would
support UA energy
center)

financial, union, engineers, utility people,
life insurance exec, humanities comm -

another board as example

Elhara - conservation society, too, should be on.

Joe Geldoff - ACS

intent / want concept implemented
center should concentrate on smaller technologies
specify work for each area

Chat - what is small-scale technology?

existing technology, adopted, or new technology.

Judy Crowell - Adm. Services

Why put it with us?

neither support or oppose it?

How about Dept. Commerce?

Chat - That's why we want

Denny M^{chner} ~~Ma~~ - for UA faculty
appropriate not always small
leary of leaving at UA - because of experience

research not total purpose

ideas in use - from former hippies

Miles - CS points

concept fine; avoid duplication, have communication instead

Clarify nature of boards, composition

Primary question - jobs / prioritization of projects, discretionary funds

Sunset clause. Quantity results

pursue Every Extension service

Chat - have advisory
council, limit it to 5 members

quarterly
meetings

I know that doesn't
work to give to former hippies

PLEASE NOTE: THE PRECEDING PAGES WERE TREATED
AS A UNIT IN THE ORIGINAL DOCUMENT.

A.S. 14. is amended by adding a new section to read:

AS. 14. . ALASKA ^{Institute} ~~CENTER~~ FOR ALTERNATIVE ENERGY RESEARCH. The Alaska ~~Center~~ for Alternative Energy Research is established as a research unit (1) in the University of Alaska statewide system. The center shall, as funds are appropriated, administer research projects in alternative energy technologies, including but not limited to fuel alternatives, solar, wind, geothermal, tidal, biomass, hydroelectric, energy storage and conservation ; (2) provide a mechanism for citizen participation in determining energy technology research needs of Alaskans; (3) provide an objective review process for proposals to achieve the highest quality and performance levels possible in all technological endeavors of the center; (4) coordinate research projects with the University's educational efforts, as well as all community educational systems statewide; (5) develop and make available a data base for energy development efforts; (6) provide a research support base for the energy technology development efforts of the Alaska Energy Center established in A.S. 45.89; (7) ~~disperse funds from appropriate funding sources to accomplish (1) through (6).~~ The center shall cooperate with the Alaska Council on Science and Technology, the Division of Energy and Power Development, the Alaska Power Authority, the Department of Natural Resources, the Alaska Energy Center, and other Alaska energy agencies in determining energy research priorities.

Feb. 1, 1980

FEB 6 RECD

Representative Brian Rogers
Alaska Legislature
Pouch V
Juneau, Ak 99811

Re: Northern Technology

Dear Rep. Rogers:

Thank you for sharing a copy of enabling legislation for the Northern Technology Grants Program, an initiative I find equally intriguing.

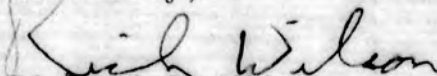
In reading the bill I am struck by a couple of things: While ARRC is presently reviewing our Fisheries Technology Awards Program proposal, Bill Spear is interested in an all-sector approach, not simply one for fishing alone. Their initial bent is also toward assisting in commercializing products which have already reached the testing stage.

Secondly, the Northern Technology Grants Program appears to be aimed at small scale technological innovation, that is projects whose cost does not exceed \$5,000 or so. I endorse the concept of working with individuals and not large organizations (and giving the inventor all patent and royalty rights as one incentive), but there may be some cases where meaningful innovation simply cannot be accomplished at under \$100,000 in grants. We cannot afford to put too many limits on the range of possible grant amounts.

A final thought: the loan program needs to be increased to provide for higher maximum loan amounts, in the range of \$200,000 over multi-year periods. Again, this does not suggest that all loans be made at the maximum level any more than grants should be made predominantly at maximum.

Speaking from the viewpoint of a potential recipient of NTGP assistance, I would close with a suggestion that there is a possible danger in that the NTGP and the program contemplated by ARRC could overlap and result in confusion to applicants. I am sure the parties are working to avoid this.

Sincerely,


Richard G. Wilson

cc: William Spear, Trustee
Alaska Renewable Resources Corporation

University of Alaska Alternative Energy Research Institute Proposal

annual operating costs -- 150,000 dollars/year (+ startup costs)

<u>Programs</u>	<u>Type</u>	<u>amount requested</u>
★ Fuels Research	basic & applied research	\$200,000
Geothermal	assessment, research, coordination	\$600,000
★ ~~Solar~~ ^{Solar} Technology	assessment, research, ~~XXXXXXXXXX~~ education, some demo	\$315,000
★ Energy Storage	test lab	—
Heat Pump	demonstration	65,000
Biomass Reduction	evaluation, demo	—
★ Economic Analysis	evaluation of alternatives	—
Fuelwood	assessment and management plan	150,000 /yr.
Arctic Coal Utilization	demonstrations	1,030,000
Arctic Greenhouse	"	500,000
Arctic Solar Architecture	"	920,000
★ Wind Energy	assessment, demo, info/educ.	1,065,000 (213,000/yr.)
Waste Heat	research center	275,000 /yr.

Alaska House of Representatives



COMMITTEE ON NATURAL RESOURCES
POUCH V • JUNEAU, ALASKA 99811

MEMORANDUM

TO: Jack Chenoweth
FROM: David Rogers *D.R.*
RE: Changes to House Bill 687
DATE: March 10, 1980

The following changes are requested:

1. Page 2, line 4 delete the words "In addition"; change "is to" to "shall"; and a : .
2. Page 2, line 6 after "for use" add the words "and conservation".
3. Page 2, line 11 delete subsection 6.
4. Page 2, lines 16 through 24 - "COMPOSITION OF BOARD OF DIRECTORS": reverse order of 1 and 2; change current subsection 1 with a requirement that two legislators be appointed jointly by the President and the Speaker.
5. Page 2, line 26 - add the words "non voting" between serve and ex officio; or something like that which clearly indicates the legislators are non voting ex officio members.
6. Page 2, Line 28 change 7 to 3; line 29 change 1 member to 3 members; change 1 member to 2 members; Page 3, line 1 change 1 member to 2 members; stop sentence after years on line 1; delete the rest of line 1 and all of line 2 and 3.
7. Page 3, line 13 change "of" to "after".
8. Page 4, line 5 add "and must have experience in the field of energy technology or development."
9. Page 4, lines 6 through 8 - require the three additional members to be nationally recognized experts in development and promotion of energy technology.

CO-CHAIRMEN

REP. ALVIN OSTERBACK (465-3715) • REP. BILL MILES (465-3779)

VICE-CHAIRMAN

REP. FRED ZHAROFF

REP. PAT CARNEY • REP. C.V. "CHAT" CHATTERTON • REP. SAM COTTEN
REP. DICK ELIASON • REP. JACK FULLER • REP. RICK HALFORD

10. Page 4, line 13 change "(a) (2)" to (a) (1).
11. Page 4, line 9 - change "five" to "four"; politicians don't count for quorums.
12. Page 4, lines 24 through 29, Page 5, lines 1 through 10 - delete (ENERGY TECHNOLOGY ADVISORY COUNCIL). Require council on Science and Technology to report to the legislature yearly with recommendations for projects to be developed by the Energy Center; amend Council statute to achieve this result.
13. Page 5, lines 11 through 14 - delete (PRINCIPAL OFFICE)
14. Page 6, Line 29 - after consult add the words "and maintain liaison" (or something like it).
15. Page 6, line 6 after conduct add "applied"; after research add the words "development and demonstration projects" and continue with the rest of the sentence.
16. Page 6, line 22 after conduct add the word "applied".
17. Page 7, line 4 add "University of Alaska and the Department of Natural Resources". Require these groups to meet with the Alaska Energy Center Board at least twice a year.
18. Page 7, line 16 and 17 - delete the words "and administration".
19. Page 7, lines 10 through 17 add a requirement that they annually report to the legislature on progress, job created, etc. In other words, they must tell us how well they have accomplished their goals and objectives. The report should accompany the budget.
20. Page 7, line 27 replace "possible" with "feasible".
21. Page 8, in definition of energy technology make sure it does not include nuclear research.
22. Page 8, Sunset the bill on July 1, 1986.
23. Retirement system problems; needs work - see Mark Wittow.

OK

BY GARDINER, ROGERS, BRANSON, ANDERSON,
BARNES, BETTISWORTH, BROWN, CARNEY,
CHATTERTON, COTTEN, ELIASON, HALFORD,
HAYES, MCKINNON, MALONE, MARTIN, MEEKINS,
METCALFE, MILES, MILLER, MOSS, MUNSON,
PARKER, PHILLIPS AND SMITH

1 IN THE HOUSE

2 HOUSE BILL NO. 687

3 IN THE LEGISLATURE OF THE STATE OF ALASKA

4 ELEVENTH LEGISLATURE - SECOND SESSION

5 A BILL

6 For an Act entitled: "An Act establishing the Alaska Energy Center; and
7 providing for an effective date."

8 BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

9 * Section 1. FINDINGS. The legislature finds that the State of Alaska is
10 currently receiving substantial revenues from the sale of nonrenewable energy
11 resources to consumers in other states of the nation. The legislature recog-
12 nizes that bringing more efficient and advanced energy technologies to the
13 stage of commercial development will result in lower energy costs to con-
14 sumers throughout the state and the nation. The legislature believes Alaska
15 has a responsibility to use part of its nonrenewable energy resource revenues
16 to help accomplish this goal. The legislature finds that an independent
17 energy resource development center under the direction of the state, can best
18 accomplish the aid to individuals and businesses necessary to develop and
19 implement advanced energy technologies. The legislature further finds that
20 the work of the center will provide significant employment benefits to the
21 citizens of the state and will stimulate the development of the state's
22 energy resources.

23 * Sec. 2. AS 45 is amended by adding a new chapter to read:

24 CHAPTER 89. ALASKA ENERGY CENTER.

25 Sec. 45.89.010. ALASKA ENERGY CENTER CREATED. There is created
26 the Alaska Energy Center. The center is a public corporation of the
27 state. It is an instrumentality of the state in the Department of
28 Administration, but has a legal existence independent of and separate
29 from the state. Exercise by the center of the powers conferred by this

promote conservation?

chapter is an essential governmental function of the state.

Sec. 45.89.020. PURPOSE. ~~The primary purpose of The center~~ *As to* create employment opportunities in the state through the development of more efficient and advanced technologies. In addition, the center ~~is to~~ *shall*

(1) promote the most efficient and appropriate technologies for use ^{and conservation} of the state's energy resources; - *intent - 90% private firms -*

(2) provide economic benefits to state citizens;

(3) promote the effective use of the state's resources;

(4) promote diversification of employment opportunities;

(5) reduce state energy imports; - *??*

(6) increase state energy and technology exports; and

(7) bring existing and new technologies to a stage of commercial feasibility. *through cooperation w/...*

Sec. 45.89.030. BOARD OF DIRECTORS. A board of directors of the center is established as its governing body.

Sec. 45.89.040. COMPOSITION OF BOARD OF DIRECTORS. (a) The board of directors consists of ¹⁵ ~~nine~~ members as follows:

(1) one state senator appointed by the president of the senate and one state representative appointed by the speaker of the house of representatives; *(2) 2 legislators without vote*

(4) seven members appointed by the governor and confirmed by a majority of the members of the legislature in joint session.

(b) The board shall elect a chairman and other necessary officers from among its members.

Sec. 45.89.050. TERM OF OFFICE. (a) The members of the board appointed from the legislature serve ex officio. *and without vote*

3 (b) The members of the board appointed by the governor serve ~~seven~~ *3* year terms and may be reappointed. Terms shall be staggered. The initial terms are *3* one member serving for one year, ~~one~~ member serving

*2 - 2 year
2 - 3 year*

drastically revise 40.

1 for two years, one member serving for three years, one member serving
2 for four years, one member serving for five years, one member serving
3 for six years, and one member serving for seven years.

4 Sec. 45.89.060. REMOVAL AND VACANCIES. (a) The governor may
5 remove from office a board member appointed by him with the consent of a
6 majority of the members of the legislature in joint session. A removal
7 by the governor shall be in writing and state the reason for removal.
8 If the legislature is not in session, the governor may suspend a member
9 of the board. After suspension, a board member may not participate in
10 board business and may not be counted for the purpose of establishing a
11 quorum. The joint session shall be held within 10 days from the date of
12 removal if the removal occurs while the legislature is in session or
13 within 30 days ^{after} ~~of~~ convening of the next regular session of the legisla-
14 ture if the legislature is not in session. If the legislature refuses
15 to consent to his removal, the board member shall be reinstated to his
16 position by the governor.

17 (b) A vacancy on the board among the members appointed under
18 AS 45.89.040(a)(2) shall be filled by appointment by the governor and
19 confirmation by a majority of members of the legislature in joint ses-
20 sion. An appointee to fill a vacancy shall hold office for the balance
21 of the term for which his predecessor on the board was appointed. If a
22 vacancy arises on the board while the legislature is not in session, the
23 governor may appoint an interim member, until the legislature has the
24 opportunity to confirm the appointment.

25 (c) A vacancy on the board among the members appointed under
26 AS 45.89.040(a)(1) shall be filled by appointment by the presiding
27 officer of the house of the legislature to which the vacating board
28 member belonged.

29 (d) A vacancy on the board does not impair the authority of a

Division - letter of intent

1 quorum of the board to exercise all the powers and perform all the
2 duties of the board.

3 Sec. 45.89.070. QUALIFICATIONS OF BOARD MEMBERS. (a) At least
4 four of the board members appointed under AS 45.89.040(a)(2) must be
5 residents of the state. *3 familiar with energy technology or development*

6 (b) At least ~~two~~ *3* of the board members appointed under AS 45.89.-
7 040(a)(2) must have ~~experience~~ *national regulatory* in the field of energy technology or de-
8 velopment.

9 Sec. 45.89.080. QUORUM. ~~Five~~ *4* members of the board constitute a
10 quorum for the transaction of business and the exercise of the powers
11 and duties of the board.

12 Sec. 45.89.090. COMPENSATION OF BOARD MEMBERS. (a) Board members
13 appointed under AS 45.89.040(a)(~~1~~) receive \$200 per day while in attend-
14 ance at meetings of the board.

15 (b) All board members may receive a per diem allowance and trans-
16 portation expenses in carrying out the duties under this chapter.

17 Sec. 45.89.100. CONFLICTS OF INTEREST. Members of the board are
18 subject to the provisions of AS 39.50.

19 Sec. 45.89.110. EMPLOYMENT OF PERSONNEL. The board shall employ
20 and determine the salary of an executive director. The executive direc-
21 tor may, with the approval of the board, select and employ additional
22 staff as necessary. The executive director and all employees of the
23 board are in the exempt service under AS 39.25.

24 Sec. 45.89.120. ENERGY TECHNOLOGY ADVISORY COUNCIL. (a) An
25 Energy Technology Advisory Council is established to advise the board on
26 desirable energy technologies.

27 (b) The members of the Energy Technology Advisory Council are:
28 (1) the executive directors of the Alaska Power Authority
29 (AS 44.56) and the Alaska Council on Science and Technology (AS 44.-

19.181 - 44.19.188);

(2) the director of the division of energy and power development of the Department of Commerce and Economic Development;

(3) a person appointed by and serving at the pleasure of the president of the University of Alaska;

(4) a member of the Board of Trustees of the Alaska Renewable Resources Corporation (AS 37.12) appointed by that board;

(5) six persons appointed by the board and representing business, energy, research, public interest, environmental, and government groups.

Sec. 45.89.130. PRINCIPAL OFFICE. The principal office of the center shall be located in Fairbanks. The board may authorize the establishment of other offices of the center in other areas of the state. Liaison with research, ARRC, DEPD, Council, APA, DNR

Sec. 45.89.140. POWERS. In carrying out the powers of the center, the board may

(1) adopt, alter, and use a corporate seal;

(2) prescribe, adopt, amend, and repeal bylaws;

(3) sue and be sued in the name of the center;

(4) enter into any agreements necessary to the exercise of

its powers and functions;

(5) accept grants from and contract with the federal government and the state or its political subdivisions and to that end comply with the provisions of federal, state, or local programs when necessary, except that it may not enter into any agreements whereby a permanent state or local government position is funded or partially funded in connection with a project;

(6) accept grants and loans from sources other than those in (5) of this section to be held and used for the purposes of the center;

private
sources