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DEVELOPMENT OF COTTAGE INDUSTRIES AND
APPROPRIATE TECHNOLOGIES FOR ALASKA

By Brian Rogers

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Alaska State Legislature
House of Representatives
Special Committee on the
Alaska Permanent Fund

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(FINAL REPORT)

"Appropriate technology reminds us that before we choose our tools and techniques, we must choose our dreams and values, for some technologies serve them, while others make them unobtainable."

-Tom Bender

RAIN: Journal of Appropriate
Technology

"I am convinced that non-renewable resources need not necessarily be the sole basis of the northern economy in the future. We should not place absolute faith in any model of development requiring large-scale technology. The development of the whole renewable resource sector -- including the strengthening of the native economy -- would enable native people to enter the industrial system without becoming completely dependent upon it.

"An economy based on modernization of hunting, fishing and trapping, on efficient game and fisheries management, on small-scale enterprise, and on the orderly development of gas and oil resources over a period of years -- this is no retreat into the past; rather, it is a rational program for northern development based on the ideals and aspirations of northern native peoples.

"To develop a diversified economy will take time. It will be tedious, not glamorous, work. No quick and easy fortunes will be made. There will be failures. The economy will not necessarily attract the interest of the multinational corporations. It will be regarded by many as a step backward. But the evidence I have heard has led me to the conclusion that such a program is the only one that makes sense."

-Justice Thomas R. Berger
NORTHERN FRONTIER, NORTHERN HOMELAND
The Report of the Mackenzie Valley
Pipeline Inquiry: Volume One
April 15, 1977

DEVELOPMENT OF COTTAGE INDUSTRIES AND
APPROPRIATE TECHNOLOGIES FOR ALASKA

I. INTRODUCTION TO APPROPRIATE TECHNOLOGY

- Criteria for appropriate technologies
- Research and development institutions
 - Public and governmental
 - Semi-public and universities
 - Private non-profit and for-profit

II. INTRODUCTION TO COTTAGE INDUSTRY

- Criteria for cottage industries
- Alaska opportunities for cottage industries

III. PROBLEMS OF APPROPRIATE TECHNOLOGY POLICIES

IV. RECOMMENDATIONS

- Grants and loan programs through existing institutions
- Potential new grant and loan programs
 - Alaska Enterprise Investment Fund
 - Alaska Renewable Resources Corporation
- Building design applications
- Appropriate Technology Conference
- Utility regulation
- Solar easements

V. RESOURCE MATERIALS USED IN PREPARATION OF THIS REPORT

VI. APPENDICES

- Projects funded by the National Center for Appropriate Technology
- New Alchemy Institute's "Ark"
- Proposal for an Alaska Appropriate Technology Conference
- Energy Accounting for Analysis of Alternative Energy projects
- Sample Solar Easement legislation
- Sample Solar Tax Credits legislation
- Montana Alternative Energy Research, Development and Demonstration legislation
- Analysis of Building Codes, with emphasis on rural areas
- Budget of California Office of Appropriate Technology

The concept of "appropriate technologies" has developed in response to the growing realization that not all technological development is appropriate to the changing needs of society. Some technologies may act to further the goals and ambitions of the users, while others may threaten their established way of life. No technology is value-free; each technology affects society in some way or another.

The appropriate technology movement grew in large part from the followers of Dr. E.F. Schumacher, author of "Small is Beautiful: Economics as If People Mattered." Schumacher noted that technological development, particularly in the developing nations of the Third World, did not always meet the needs of the people who used the new technologies. He called for the establishment of "intermediate technologies", technologies which were somewhat between primitive techniques and the large-scale high-technology of the industrialized world.

In 1965, Schumacher founded the Intermediate Technology Development Group (ITDG), which has since been developing small-scale and low-cost alternatives to developing countries in the areas of agriculture, building design, food, cooperatives, health, transportation, power and industry.

From Schumacher's initial concepts, the idea of appropriate technologies developed. Appropriate technology recognizes that some technologies are appropriate for regions with small populations and extensive resources, while others are appropriate for regions with limited resources and large populations. The questions "appropriate for which people?" and "appropriate for what area?" have to be asked about any new technology. But the idea of appropriate technology goes a little further. While no hard-and-fast rules can apply, the following criteria are generally accepted for appropriate technologies:

(1) The technology is small-scale; it requires a small workplace and a small number of workers to operate.

(2) The technology is low-cost (which implies that it should not depend too much on the importation of expensive materials or components or high-cost energy sources).

(3) The technology is simple; it should be relatively understandable by a user who does not have specialized training.

(4) The technology is reliant on renewable energy sources -- sun, wind or water -- rather than on fossil fuels.

(5) The technology is flexible enough to meet changing needs of its users.

In addition, appropriate technologies generally minimize the transport of goods, make expensive or unavailable financing and management services unnecessary, develop human potential rather than substituting for it, and tend toward decentralization of production, thus establishing self-sustaining local economies.

Since the establishment of ITDG in 1965, quite a number of institutions and organizations have been involved in development of intermediate and appropriate technologies. At first, many of these groups were involved in the developing nations, which were seen to have the greatest need for technological innovation on a level somewhere between the existing local technologies and those of the industrialized Western world.

Since the Arab oil embargo of 1973, however, there has been a growing realization of the need of the industrialized countries for technologies which are less dependent on rapidly-depleting fossil fuels. In addition, many people feel the need for technologies which are less costly than existing technologies, for technologies which are more personal and less bureaucratic.

Research and development of appropriate technologies and dissemination of information about these technologies is currently being undertaken by three types of institutions:

(1) Public: government agencies are directly involved with research and development.

(2) Semi-public: university research institutes and extension centers are involved with research, development, and dissemination of technological information.

(3) Private: non-profit (and occasionally for-profit) corporations and individual entrepreneurs are developing appropriate technologies.

The best U.S. example of direct involvement of government agencies is the California Office of Appropriate Technology (OAT). This office was created in 1976 by Governor Jerry Brown, who charged it with developing technologies ". . . which are less harmful to people and the environment than the technologies of the past." The OAT, which is administratively located in the Governor's Office of Planning and Research (OPR), acts as a clearinghouse for information about people and groups involved with appropriate technology throughout the state. In addition, the OAT conducts several on-going programs: training of solar technicians (with funding through CETA), demonstrating innovative ideas for conservation and self-reliance to state residents, experimenting with on-site waste water disposal and drought-tolerant gardens, and various other educational programs.

The OAT assists and advises the Governor and state agencies in developing and implementing new technologies in the areas of recycling, building design, waste disposal, transportation, agriculture, energy and energy conservation. The office is not only a source of information, but also initiates research and demonstration projects and is trying to identify and remove legal and insti

tutional barriers to decentralization, conservation, and small business and industry.

A steering committee composed of the California State Architect (who originated the idea of a state OAT), the Assistant to the Governor for Issues and Planning, and the director of OPR sets policy direction for the OAT. Funding presently comes from the Governor's discretionary account, but is expected to become a component of the state operating budget in the future. Additional funding for some projects comes from the federal government (such as the CETA solar technician training program). The office currently has a staff of five; it is intended that the office will remain an (appropriately) small one.

On the federal level, \$3 million has been allocated by the Community Services Administration (formerly OEO) to fund a National Center for Appropriate Technology (NCAT). NCAT, located in Butte, Montana, is intended to be a center for technical assistance and resources for Community Action Programs and grass roots organizations involved in research, development and demonstration of appropriate technologies. The staff of 50 will operate a research and information service, along with a library, telephone service, and appropriate technology workshops. NCAT hopes to reach low-income communities with appropriate technologies which will provide meaningful employment, will be simple to maintain, and will make the communities more self-sufficient. NCAT is currently training individuals from various rural Community Action Programs in appropriate technology, with the hope that these people will disseminate the information in their local communities.

NCAT plans several projects in Alaska, according to one staff member. Currently planned is a project for the North Slope Borough in village power plant training and operations. It is hoped that funding will be available from the Department of Energy for over \$100,000 for the project. If funding is available, people from seven villages will be trained in maintenance and operation of

village power plants. The project is currently short approximately \$70,000 for a building to house the training program. The building would be used to demonstrate fuel cell technology when the training program is completed. Other Alaska proposals currently being considered by NCAT include a village hydropower survey in Kodiak, funding of appropriate technology development for the Musk Ox Project in Unalakleet, and a possible regional newsletter on Alaskan appropriate technology development.

In 1975, Congress also allocated \$20 million to the Agency for International Development (AID) to spend on the promotion of appropriate technology in the developing countries between 1976 and 1978.

A laboratory facility for integrated food and energy production was completed in late 1976 for the Prince Edward Island provincial government in Canada. Built with federal, provincial and private funds, the facility, called "The Ark", is a "bioshelter", a home which is completely self-sufficient in energy and food production. The Ark was built for the P.E.I. government by researchers from the New Alchemy Institute, a private appropriate technology research and development institution. The Ark received \$350,000 in funding from the provincial government, and is currently being operated as a demonstration facility for P.E.I. residents.

University and university-related research and development of appropriate technologies is a rather recent phenomena. While many local appropriate technology groups originated in universities (the Technology Consultancy Centre in Ghana, the Regional Adaptive Technology Centre in the Phillipines, and the Division of Micro-projects in Eindhoven, Netherlands, are three examples of such groups), few universities have undertaken appropriate technology programs. To date, only one country -- India -- has considered giving degrees in appropriate technology.

Quite a number of universities are involved in some aspect of appropriate technology research, development, though. Many have extensive research activities which, though geared primarily towards large-scale technological development, have spinoff benefits to appropriate technology research. Several are directly involved with creation of intermediate technologies. In the U.S., this has been primarily through efforts of students who are interested in appropriate technology, rather than being a policy set by the universities themselves.

Private individuals and institutions, however, have been the prime movers in appropriate technology research, development, demonstration and information distribution activities. England's Intermediate Technology Development Group (ITDG), as mentioned earlier in this report, has been developing intermediate technologies for developing countries since its creation in 1965. ITDG also publishes the quarterly "Appropriate Technology" magazine, which details tools and processes for developing countries, and serves to transfer information about appropriate technologies between various institutions and groups.

In the United States, several appropriate technology groups have been started in recent years. Publications such as RAIN: Journal of Appropriate Technology, CoEvolution Quarterly, Alternative Sources of Energy Magazine, The Mother Earth News, and others have served as the information sources for individuals and groups throughout the country which are involved in appropriate technology research and development. A network of these individuals and groups has developed, somewhat loosely, as people exchange ideas and information and pass them on.

The New Alchemy Institute of Woods Hole, Mass., is a good example of a private group involved in appropriate technology research. The New

Alchemists have been involved with developing highly productive integrated small-scale agricultural systems and related support technologies. They have created several bioshelters, one of which was The Ark, commissioned by the Prince Edward Island provincial government, and built by researchers from New Alchemy Institute in conjunction with Solsearch Architects of Cambridge, Mass., and Souris, P.E.I.

Several excellent source books for appropriate technology have been published in the U.S. In particular, RAIN's "RAINBOOK" and the "Appropriate Technology Sourcebook" published by Volunteers In Asia, help individuals to find information needed in research and development. Many of these individual entrepreneurs, tinkerers, and inventors who are unaffiliated with any appropriate technology groups are developing the technologies which are used throughout the U.S. and the world. It is these individuals that a policy for appropriate technology must reach, yet these individuals are often least interested in getting involved with government grants, loans or other government activities. Most experimenters complain of a lack of adequate capital; yet few see a ready solution which does not take too much time away from actual research and development work.

Development of cottage industries for Alaska and development of appropriate technologies for Alaska are closely related. Since much of the technology used in Alaska is imported from the lower 48, the technology is not always suited to the special environmental situation in Alaska. Many of the potential small businesses in Alaska will be dependent on new technologies, or on existing technologies which are adapted to Alaska's climate and population.

"Cottage industry," like appropriate technology, is a term referring to a way of looking at the problems of economic development, and a size of enterprise. In any type of enterprise, there is a range in possible sizes of business. Cottage industries are production facilities which lie at the smallest-scale end of this range. As with appropriate technology, there are several other generally-accepted criteria for cottage industry.

In general, a cottage industry involves:

- (1) production of a product which is made from locally-available materials.
- (2) small units of production -- typically a home or home workshop.
- (3) a small workforce, usually an individual, family, or cooperative, where the persons performing the labor have a direct involvement in management decisions.

(4) an orientation towards fulfillment of local production needs, rather than production for export (though mail-order export of some products is necessary for some types of cottage industries).

(5) management and technical skills which are available at the local level, rather than those available only with outside training and experience.

Numerous examples of cottage industries exist in Alaska today, and the potential for expansion, particularly in rural areas, is quite large. The following list gives examples of the types of locally-available resources which could be used and the products which might be produced in local cottage industries. (It should be noted that this list is in no way comprehensive, and is intended to be illustrative only.):

	Resource available	Products
I. Food production		
-existing agricultural production	berries rose hips mushrooms	jams and jellies, syrup, wine tea, vitamin C mushrooms
-potential cultivation	vegetables herbs berries, mushrooms	local market produce herbs and teas as above

	<u>Resource available</u>	<u>Products</u>
II. Fish and shellfish	herring clams & mussels salmon	pickling, drying, smoking food and by-products terminal net fishery
III. Game and domesticated meat & by-products	reindeer and caribou goats and cows chicken & other fowl	food, fur, by-products milk, meat meat, eggs, by-products
IV. Forest products	birch spruce fir diamond willow other	flooring, furniture, syrup, firewood rough & finished lumber, logs, furniture, firewood, crafts rough & finished lumber, crafts firewood furniture, tourist-oriented crafts sawdust, slabwood, firewood
V. Minerals and rock	jade clay gold, copper building stone other stone	jewelry, carved products pottery jewelry flagstone, building construction solar collectors, saunas, etc.
VI. Recycled materials and waste	bottles cans paper organic materials	refill, glass remanufacture, crushed glass products metal recovery and re-use recycle for paper, heat from combustion, cellulose insulatio fertilizer, home compost
VII. Energy	solar wind thermal (geothermal and waste heat) biomass (wood and agri- cultural)	individual home heat, hot water, other heating needs individual and community electric generation home heat, greenhouses, etc. firewood for home heat, alcohol from grains for heat and gasoline additive
VIII. Building design	wood paper and sawdust	building materials insulation

In addition to production, cottage industries need support services, which can be cottage industries in their own right. Many small businesses are hampered by lack of management abilities and technical skills needed to deal in the modern business world. This problem is acute in the rural areas of Alaska. The opportunity exists for entrepreneurs to develop small-scale support service businesses -- from transportation and communications to management services and technical production. Some of these businesses fall within the definition of cottage industries, while others (such as boat-building for fishing, etc.) are intermediate-scale and require outside materials. In order for many cottage industries to operate, there must be adequate transportation facilities, to move the product to markets within the state. Many cottage industries require small warehouse space or machine shops to fabricate the tools necessary for the industry. Cold storage facilities for agricultural and fish products are necessary, and provide an opportunity for appropriate technological innovation to cut costs of small operations. Any program for cottage industry development will have to take these factors into account, and may thus require large-scale industrial or business development for full development of the small industries.

A recent publication by the Development Centre of the Organization for Economic Cooperation and Development (OECD), entitled "Appropriate Technology: Problems and Promises", analyzes some of the problems which have arisen in the appropriate technology programs of the developing nations. While much of this technological and industrial development is too new to evaluate in terms of effectiveness, some conclusions can be drawn.

"Problems and Promises" suggests that governments are not necessarily the most appropriate institutions to promote research and development of appropriate technologies and small-scale industries. Government impact on innovation is, however, considerable, and can in many cases be made more effective. Policies for this kind of development cannot be carried out exclusively by government, but must be a collective effort, involving as wide a number of institutions, both public and private, as possible.

One of the major roles which government can take is in testing and evaluation of new technologies and techniques, since much of the new appropriate technology is untested. Governments can also provide financial assistance to individuals and groups which are developing technologies and cottage industries, but should not attempt to run a research and development program from a centralized state agency. If a state agency like an Office of Appropriate Technology is created, it should serve primarily to disseminate information and to put people and groups in contact with one another.

Another way in which governments can help development of technology and industry is to identify and remove institutional barriers to this development. In particular, government regulations which are designed to protect the public can, in some cases, act as barriers to innovation. An example of this barrier occurs in building codes, which were originally oriented to protection of home buyers from unscrupulous builders, but now act to stifle development of building techniques which are non-conventional but appropriate to local situations.

RECOMMENDATIONS

Development of cottage industries and appropriate technologies for Alaska will have to involve a large number of institutions and programs, both public and private. Since this report is designed for legislative policymakers, however, the following recommendations are primarily oriented towards policies which can be initiated at the legislative level.

Legislative solutions, however, are only part of a policy for Alaska appropriate technology; in many respects development of technologies and industries which are appropriate to the Alaska situation will depend upon individual and group entrepreneurs rather than government action. These recommendations are designed to help entrepreneurs through funding of projects and through identification and removal of institutional barriers to innovation in Alaska.

To encourage development and implementation of technologies appropriate to Alaska will have to involve three types of activities: research and development, demonstration of technologies, and dissemination of information about the research, development and demonstration. Several existing state loan programs could potentially be involved with appropriate technologies. In addition, the proposed Alaska Enterprise Investment Fund and implementation legislation for the Alaska Renewable Resources Development Fund are potential sources for funding of appropriate technology projects.

The Alaska Enterprise Investment Fund is designed to alleviate "a shortage of investment capital for financially sound small and medium scale enterprises, particularly in rural areas of Alaska." Financial resources of the fund will be used for loans and loan guarantees for establishment and

expansion of small and medium scale businesses. The Fund will not be used for grants, however. One potential problem for small entrepreneurs is access to the investment committee, if the members of the investment committee are centrally located. For many potential entrepreneurs, the cost of preparing a proposal and presenting it to a committee which is located in an urban center may act as a barrier. This problem can be taken care of, however, if the fund managers are required to establish local offices, or to regularly travel to all areas of the state to encourage potential applicants.

The Renewable Resources Development Fund is particularly well-suited for stimulation of appropriate technology and cottage industry development when the development is associated with renewable resources. Research and development activities are particularly suited to the fund, since research activities are not always income-producing, but often lead to activities which will be income-producing. Assistance available from the renewable resources fund should include small (up to \$10,000) grants, as well as loans and loan guarantees. As with the Enterprises Fund, it is important that the small-scale entrepreneur has access to the fund. This might mean establishment of local offices, or regional funding sources for small-scale financial assistance. It might be advisable to create local subsidiaries of the fund, so that decisions made on which research and development activities are funded could be made at a local level, and thus be more responsive to local needs. It might be advisable for the legislation to specify how local subsidiary research and development groups might be formed and to provide funding for start-up and operating expenses. Grants for research, development, demonstration and information dissemination do not have to be large ones. Appended to this report is a list of grants made by the National Center for Appropriate Technology. These grants, which were all made during 1977, range from a low of \$375 to a high of \$15,458, with the majority in the \$4,000 - \$5,000 range. The appendix includes quite a

number of projects which are similar to the type needed for Alaska, in several different categories ranging from heating to housing to agriculture and fisheries.

Other existing loan programs have a part to play in appropriate technology and cottage industry development as well. Loan funds such as the Fisheries Enhancement Revolving Loan Fund, the Agriculture Revolving Loan Fund, the Small Business Development Fund, and the Alaska Housing Finance Corporation are oriented towards the same areas of economic development. Some of these loan programs, however, are primarily geared towards large scale operations, rather than small scale. In each area of economic development, there are ranges in scale of operations, and it is important that the small-scale operations are not overlooked. Some technical amendments may be necessary to several of the funds in order to provide easier access for small operators.

One area in particular where the state could have a large impact is in development of buildings and building designs which are appropriate for northern regions. Existing programs are primarily set up for people who wish to purchase housing, rather than for people who wish to build their own housing, or people who want to develop innovative building design. Most loan programs, both private and public, are available for buildings which follow conventional technologies. Modification of statutes relating to the Alaska Housing Finance Corporation could take care of this problem. Loans could be made available to owner-builders and owner-contractors who want to develop innovative building designs. One method of accomplishing this would be to provide loans for materials only, with the individual providing labor (a "sweat equity" program) or paying labor charges as part of the individual's equity in the project. Since the loan would have the materials as collateral, interest charges could be assessed at a lower rate.

A state policy for appropriate technology and cottage industry should be developed with assistance from each agency, institution or group in Alaska which is involved with research, development, demonstration and information dissemination. A conference on appropriate technology could draw together these groups and individuals in order to develop proposals for an appropriate technology policy. In addition to Alaskan individuals and institutions, several outside institutions have expressed interest in helping Alaska to develop these policies. The appropriate technology conference could involve representatives from the Intermediate Technology Development Group, Ltd., the National Center for Appropriate Technology, and the New Alchemy Institute, all of whom have indicated enthusiasm for developing the Alaska policies. A proposal for this appropriate technology conference is appended to this report.

One area of technological development where potential conflicts can occur is in electrical generation technology. In several instances in the United States, individuals who have built their own electrical generating facilities (primarily wind-powered) have run into problems with local electric companies. Two pieces of legislation which could solve these problems before they happen are in the areas of financing of alternate power generation systems and purchasing of excess energy. Since individual electric generation may compete with existing utility companies, some companies have worked to stop such development in their areas. Legislation which would allow (or require) the companies to finance individual electric generating facilities may be in order. The utility could be enabled to loan money to individuals to build these facilities, with payments on the loan going to the utility in lieu of payments for purchase of electricity. In addition, an individual with his or her own generating facility will experience times where the facility is generating more electricity than is needed by the individual. Utilities could be required to

purchase this excess electricity, with the power going into the utility's own grid. This serves two functions: it makes individual power generation more economically feasible (and income-producing), and cuts the cost to the utility of installation of additional power generation facilities. Suggested language for both types of legislation is appended to this report.

In the area of solar power, additional difficulties arise. An individual who builds a solar installation has no guarantee that someone else will not build a structure which blocks the sun from the installation. Several states have enacted legislation providing for solar easements, to guarantee that an individual has the right to all of the sun's energy which falls on his or her property, or for recording of easements granted to individuals. Appended to this report is a North Dakota law (House Bill 1069, passed in 1977) which provides for contents and procedures for recording of solar easements.

As mentioned earlier in this report, state regulations which may be well-meaning can often act as barriers to technological innovation. An on-going survey of state regulation and its effect on technology might be in order, perhaps under the auspices of the Administrative Regulation Review Committee. In addition, legislative policy-makers must take small-scale enterprise into account when designing new legislation, to ensure that the "little guy" doesn't get lost in the process.

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Correspondence

Intermediate Technology Development Group, Ltd., London
Amory Lovins, Friends of the Earth, Ltd., London
Institute for Local Self-Reliance, Washington, D.C.
Intermediate Technology, Menlo Park, California
New Alchemy Institute, Woods Hole, Mass.
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Volunteers in Asia, Inc., Stanford, California
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Stanford Research Institute, Menlo Park, California
Technical Assistance Information Clearing House, New York, New York
Office of the Science Advisor, Fisheries and the Environment, Ottawa, Ontario, Canada
United Stand, Potter Valley, California
National Center for Appropriate Technology, Butte, Montana
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ncat-funded projects

APPROPRIATE TECHNOLOGY IN FOOD PROCESSING AND DISTRIBUTIONCenter For Rural Studies
San Francisco, California

\$4,761

This grant is for the creation of a center for appropriate technology for food processing and distribution. It would include research, documentation and development of this technology, and education/training of low-income people in its application to neighborhood situations.

DEMONSTRATION WINDMILL WATER PUMPING PROJECTTrust for Public Land
San Francisco, California

\$3,037

The purpose is to construct a water pumping windmill at the Fruitvale Community Garden in Oakland, California. The windmill will be constructed and maintained by low-income residents, will provide needed water resources, demonstrate water alternatives in an area suffering major water shortages, provide low-energy alternatives to producing water, and serve as an educational tool for the local community.

RURAL COMMUNITIES HOUSING CORPORATION SOLAR LOW INCOME HOUSINGRural Communities Housing Development Corporation
Ukiah, California

\$15,458

NCAT funds will be used to equip two four-plex housing units with solar hot air systems for space heating and cooling, and to boost the hot water systems.

ENERGY CONSERVATION AND SOLAR TRAINING PROPOSALSan Luis Valley Solar Energy Association
Alamosa, Colorado

\$9,830

The project goal is to respond to individuals and organizations with information and experience in utilizing solar energy and conserving energy. Project activities include a newsletter, workshops, conferences, publicity, a solar library, slide shows, tours of solar facilities, training, and research.

ENERGY CONSERVATION RESEARCH MANUALADCO Improvement Association, Inc.
Commerce City, Colorado

\$5,000

A grant to develop a manual which will teach local weatherization program operators to conduct heat loss surveys in residential buildings has been funded.

THE DEVELOPMENT OF AN APPROPRIATE TECHNOLOGY AND COMMUNITY
LAW NETWORK

Denver Opportunity, Inc.
Denver, Colorado

\$1,500

The project will research and review the legal implications of appropriate technology, and investigate the establishment of a clearinghouse on appropriate technology and community development law. Specifically, the project will review legal parameters in the Denver area within which appropriate technology must function, establish linkages with national law schools for the purpose of sustained research and communication regarding law and appropriate technology, and investigate additional sources of funding through the National Science Foundation to establish a legal clearinghouse on Appropriate Technology and Community Development law.

SELF-CONTAINED AGRICULTURE-AQUACULTURE SYSTEM FOR LOW AND
FIXED INCOME COMMUNITIES

Action for Bridgeport Community Development, Inc.
Bridgeport, Connecticut

\$5,000

This grant will establish an agri/aqua system which will grow food for sale, provide training and employment for low-income residents, and begin a small business.

AFFORDABLE SOLAR APPLIANCES FOR THE POOR

Southwest Georgia Community Action Council, Inc. (SGCAC)
Moultrie, Georgia

\$5,000

The SGCAC has been granted funds to produce a low-cost solar powered domestic water heating system. When the system is developed, working units will be installed and tested on selected homes in seven communities served by CAA.

A PROJECT TO SAVE A RAILROAD

Business and Professional People for the Public Interest
Chicago, Illinois

\$4,900

BPI will utilize NCAT funds to support staff research costs as part of a campaign to increase ridership on the South Shore Railroad. The project will help to assure access to mass transportation to residents of Chicago and northwestern Indiana, particularly the elderly and handicapped (280 riders per day) and persons needing this transportation for employment. BPI's ridership campaign is for the purpose of convincing public authorities of the need for continuing the railroad as a viable transportation alternative.

THE GREENING OF WEST GARFIELD

Christian Action Ministry
Chicago, Illinois

\$5,000

The grantees will publish a manuscript on urban gardening, based on direct experience in developing a self-sufficient food program in the inner city.

ROOFTOP GREENHOUSE PROJECT

Chrysalis Learning Center
Chicago, Illinois

\$4,377

The purpose of this project is to construct a solar heated rooftop greenhouse at an alternative high school in Chicago. It will serve as demonstration and provide employment for students and provide vegetables for the local community.

TECHNIQUES FOR SOLAR ENERGY USE

Shawnee County Community Assistance and Action
Topeka, Kansas

\$5,000

The grant is for construction and installation of three different types of solar devices on low income houses.

DEMONSTRATION GARDENS FOR LOW-INCOME PERSONS

Kentucky River Foothills Development Council
Richmond, Kentucky

\$4,950

KRFDC proposes to initiate a demonstration site, undertaking new techniques of gardening for demonstration to low-income families and elderly persons served by the agency, including experimental planning and moisture conservation.

COMMON GROUND COUNTY FAIR

Maine Organic Farmers and Gardeners Association
Hallowell, Maine

\$4,600

The organization will conduct a fair on re-introducing agriculture into the culture in Maine.

CONCEPTUAL REVIEW OF FIELD OF APPROPRIATE TECHNOLOGY

Center for Community Economic Development
Cambridge, Massachusetts

\$8,062

The Center for Community Economic Development (CCED) will undertake a study of national dimension involving research in the areas of:

1. the relationship between appropriate technology and economic development.
2. the investment decision-making framework for evaluating the economic feasibility of selected technologies.
3. a review of community controlled projects in the broad areas of solar energy, waste recycling, and aquaculture.
4. funding and information sources for appropriate technologies in economic development.

"YOUR ENERGY EFFICIENT HOME WORKSHOP"

SCHOLARSHIPS FOR LOW-INCOME INDIVIDUALS

Alternative Sources of Energy Magazine (ASE)
Milaca, Minnesota

\$375

A grant was awarded to ASE and Milaca Department of Community Education to co-sponsor a workshop on June 25, 1977, to provide education concerning alternative energy options for area residents.

ALTERNATIVE SOURCES OF ENERGY (ASE) ENERGY CLASS

Alternative Sources of Energy Magazine
Milaca, Minnesota \$1,500

ASE is developing an energy multi-media curriculum for a class in housing and energy-related issues, at the University of Minnesota, Continuing Education Program.

DEMONSTRATION OF ENERGY CONSERVATION AND SOLAR WATER HEATING

Center for Local Self-Reliance
Minneapolis, Minnesota \$4,996

This project will involve building and installation of a flat-plate solar collector for domestic hot water heating on a 19-family cooperative apartment building in Minneapolis.

COMMUNITY CANNING PROGRAM

Forrest-Stone Area Opportunity, Inc.
Hattiesburg, Mississippi \$5,000

This program will operate a domestic cannery in the community. By operating this cannery, an attempt will be made to lessen the rising costs of food stuffs on residents in the community.

ENERGY CONSERVATION

North East Community Action Coalition
Bowling Green, Missouri \$1,615

The North East Community Action Coalition will use grant funds to retrofit a demonstration home to show energy conservation via insulation, solar energy collectors and wood stoves.

ALTERNATIVE ENERGY DEMONSTRATION PROJECT

Economic Security Corporation of the Southwest Area
Joplin, Missouri \$4,144

The Economic Security Corporation of the Southwest Area is developing a solar reliant greenhouse, which will be constructed as an attachment to the Agency's Community Center in proximity to Head Start classrooms.

WORKSHOP: "ENERGY CONSERVATION BEGINS WITH YOU: DO EVERYTHING YOU CAN, EVERYONE CAN DO SOMETHING."

Opportunities, Inc., Human Resources Development Council
Great Falls, Montana \$150

A grant was provided for rental of a conference room for the grantee's two-day workshop. The workshop addressed energy conservation concerns of the Great Falls low-income community.

ENERGY RECOVERY TECHNICIAN TRAINING

Pyramid Charitable Trust
Great Falls, Montana \$4,945

This grant will fund a training program for five low-income people in the operation of a methane digester.

FEASIBILITY STUDY ON DEVELOPMENT FOR A SMALL INSULATION
INDUSTRY IN TOMPKINS COUNTY, NEW YORK

Tompkins County Economic Opportunity Corporation
Ithaca, New York

\$4,780

The objective of this grant is to examine environmental and health impacts related to the production of cellulose and other insulation alternatives.

SUNSPACE SOLAR WORKSHOP

W.A.M.Y. Community Action, Inc.
Boone, North Carolina

\$2,700

Watson, Avery, Mitchell and Yancy counties, (North Carolina) Community Action, Inc. we funded to provide scholarships to 10 low-income people to attend a Sunspace, Inc. Workshop for two weeks at the Arthur Morgan School, Burnsville, North Carolina. The workshop involved construction of a passive solar heated dormitory, including hands-on experience with solar construction and classroom instruction during the workshop period, August 15-28, 1977. The primary emphasis of this grant is to support the development of local skilled person who can contribute to residential solar projects in the four county W.A.M.Y. area. Scholarships included costs of room, board, classrooms, training personnel, and training materials.

FUEL, FOOD, AND THE FUTURE FAIR

Quad Community Action Agency
Grand Forks, North Dakota

\$4,998

The grantee will conduct an energy fair featuring displays, forums, films and workshops.

LITTLE DIXIE SOLAR COLLECTOR

Little Dixie Community Action Agency
Hugo, Oklahoma

\$4,995

The grantee will construct a prototype solar hot water heating system on eight low-income homes.

THE MID-WILLAMETTE ENERGY INFORMATION CENTER

Linn-Benton Community College
Albany, Oregon

\$4,915

The project involves construction of a passive solar greenhouse as a teaching and demonstration for area residents. The information facility, of which the greenhouse is part, will include a library and classroom space.

MID-WILLAMETTER VALLEY GROWER'S CO-OP

Mid-Willametter Growers' Association
Blodgett, Oregon

\$4,930

Funds for this project were granted for one year for the purpose

of abling this cooperative to become self-sustaining. The Grower's Co-op was formed in 1975 to create a retail outlet for local low-income growers who otherwise have to compete with agri-business farmers in the fresh food market.

PRACTICAL TECHNOLOGY CLUB AND CURRICULUM RESEARCH

Tuscarora School District
Mercersburg, Pennsylvania \$4,900

The Tuscarora School District will use NCAT grant funds to develop prototype high school A.T. club. They will develop curricula and career training, and construct exhibits.

GREATER MISSOURI INTEGRATED RENEWABLE ENERGY ECONOMIC DEVELOPMENT PROJECT

Greater Missouri Community Development Corporation
Pierre, South Dakota \$1,500

The Greater Missouri CDC will do research on developing a small-scale farm methane digester.

BUILDING DEMONSTRATION PROJECT

Center for Maximum Potential Building Design
Austin, Texas \$1,500

A grant was awarded for a demonstration "integrated design" pavilion, including such things as solar space heating and cooling, indigenous building materials, solar water heating, and water conservation.

PASSIVE SOLAR HEATING SYSTEM FOR VERMONT

Barre Hill Craft Cooperative, Inc.
Plainfield, Vermont \$4,686

The project is to provide up to 70% of the heating requirements of the Cooperative's new shop with a passive solar heating system known as a "Solar Staircase." First developed and used in a local school cafeteria, a low-cost version has been designed and will be tested for use in low-income housing in Vermont.

WOOD-FIRED BAKERY - A MODEL FOR SMALL-SCALE ENERGY-EFFICIENT BREAD PRODUCTION IN RURAL AREAS

Upland Bakers, Inc.
Plainfield, Vermont \$4,932

Upland Bakers will operate a wood-fired bakery.

FISH FOR OUR GRANDCHILDREN (PROPOSAL TO INCREASE FISH RUN ON INDIAN RESERVATION)

Nisqually Indian Community
Yelm, Washington \$4,950

The Nisqually Indian Tribe is attempting to develop the anadromous fishery resources of the Nisqually River as a method of maintaining the cultural and economic base of the Indian community.

SUN DAY

Environmental Action Foundation \$4500
Washington, D.C.

This grant is to provide initial organizational funds for EAF to sponsor an International Sun Day in the spring of 1978. Similar to Earth Day, this event will include teach-ins, energy fairs, and demonstrations in solar power.

LOW COST HOME FOR RALEIGH COUNTY

Family Homes Cooperatives/Raleigh County Community Action Agency
Beckley, West Virginia \$1,470

NCAT funds will be used for local consulting services, to design and construct a demonstration low-cost energy-efficient home.

WOOD HEATING CONFERENCE

West Central Wisconsin Community Action Agency
Glenwood, Wisconsin \$2,280

The West Central Wisconsin CAP will conduct a conference on woodheating, which will expose low-income people to wood-heating.

TRAVELING PRODUCTION ON ENERGY AND FOOD

Friends Mime Theatre/London Theatre Workshop, Ltd.
Milwaukee, Wisconsin \$1,500

This project will develop two traveling theater productions directed to low-income communities. These will concern food production and energy conservation.

THE ROLE OF COMMUNITY DEVELOPMENT CORPORATIONS IN RURAL DEVELOPMENT IN NORTHERN WISCONSIN

Impact 7
Turtle Lake, Wisconsin \$3,500

The grantees will conduct a rural community development conference in northern Wisconsin. The purpose of this conference, to be held in April, 1973, in Wausau, is to address the organizational and institutional constraints of appropriate technology and to initiate a vigorous dialogue in the State of Wisconsin on the comparative merits of community development corporations as one of the several solutions to economic development problems.

HOT WATER DEMONSTRATION PROJECT

Center for Economic Development and Business Assistance
Tucson, Arizona \$2,570

The purpose of this grant is to construct six demonstration solar powered hot water heaters on low-income homes in Tucson. Long range plans include setting up a factory to produce the heaters.

GUIDE TO EXISTING A.T. SITES IN MASSACHUSETTS

University of Massachusetts
Amherst, Mass.

\$4336

The project goal is to develop a guide for low-income communities in Massachusetts which will list available resources and funds, current A.T. projects, low-cost designs, and evaluations of alternative energy systems. NCAT hopes to use this guide as a model which can be used in other areas of the country.

SOLAR GAS STATION

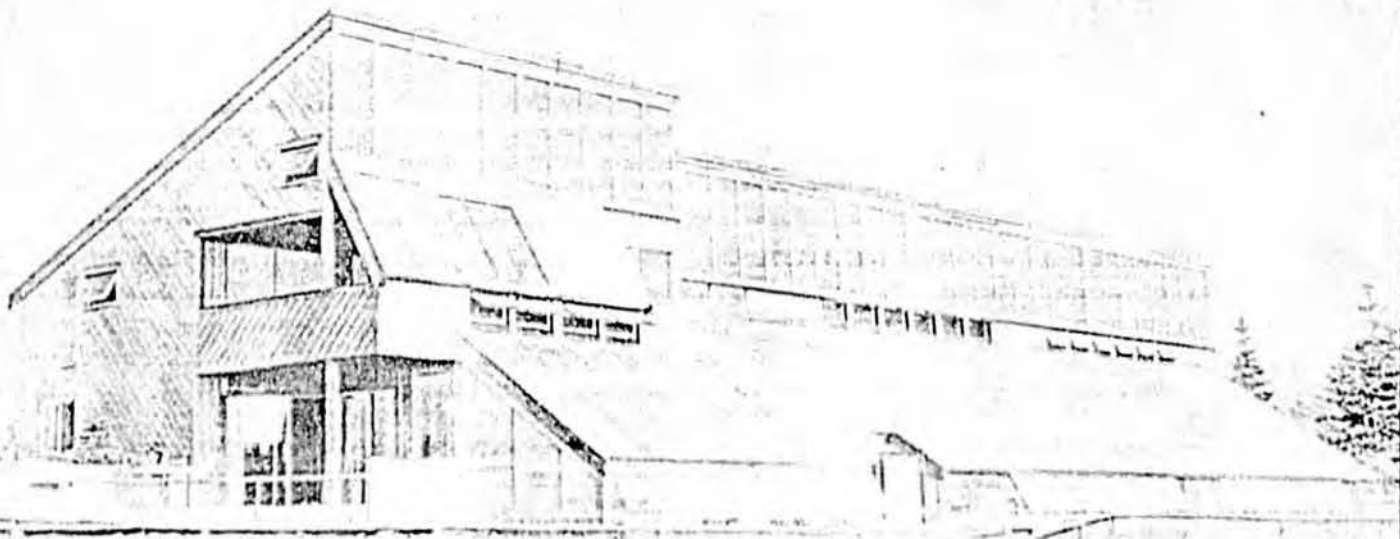
Cranston CAP
Cranston, RI

\$4995

The project will solar heat an abandoned gas station which will become the headquarters for SHINE, Inc., an economic development corporation. The project will have excellent demonstration values not only for solar heat but also for the recycling of old buildings.

The New Alchemists

The New Alchemy Institute, P.E.I. is using the Ark to explore directions for change in the way we live ... change that must come as non-renewable energy resources decline.



A bioshelter powered by the sun and the wind, the Ark is a complete life support system in which the inhabitants can raise vegetables and edible fish. More than a demonstration of technologies, the Ark is a centre for ongoing research in aquaculture, agriculture, alternative energy development and shelter design.

New Alchemy Institute P.E.I. is a private, non-profit scientific organization dedicated to research and education in renewable resource technologies.

Established in 1975, the P.E.I. Institute has affiliates in the United States and Central America, and a world-wide membership.

Construction of the Ark began in 1975, with support from the governments of Canada and Prince Edward Island, from corporations, and from private organizations and individuals.

Design was a collaborative effort of New Alchemy Institute and Solsearch Architects of P.E.I. Construction was carried out by local contractors.

The building was opened on September 21, 1976 by Prime Minister Pierre E. Trudeau and P.E.I. Premier Alex B. Campbell.

APPENDIX III.

A proposal for an Alaska Appropriate Technology Conference

Purpose: To draw together representatives of Alaska appropriate technology research and development groups and several outside appropriate technology experts in order to formulate an appropriate technology policy for Alaska.

This conference would bring together representatives of the University of Alaska research institutes, Cooperative Extensive Service, Aquaculture Corporations, regional native corporations, various state agencies, individual designers, builders, researchers, tinkerers, inventors and other entrepreneurs. Expenses for the conference would break down into three areas: coordination of the conference, travel and lodging for participants, and printed materials - publicity for the conference and publication of proceedings and recommendations. A budget for an appropriate technology conference would be approximately as follows:

(1) Coordinator to organize the conference and arrange for facilities and for publication of the final report	\$1,000
(2) Travel and lodging for 3 outside participants	\$3,000
(3) Travel and lodging for state participants (note: some of this might be available from state agency budgets)	\$2,000
(4) Advertising and publicity for conference	\$1,000
(5) Publication of proceedings and recommendations	\$1,000
TOTAL BUDGET	<u>\$8,000</u>

The conference should be held in Spring, 1977, in order to present recommendations and comment on legislation which will be before the 1977 legislature. The recommendations contained in this report should be submitted to the conference for review and refinement, in order to produce an appropriate technology policy which is representative of the whole state, rather than the author of this report.

APPENDIX IV.

December 15, 1977

TO: REPRESENTATIVE CLARK GRUENING
FROM: BRIAN ROGERS
RE: ENERGY ACCOUNTING FOR ANALYSIS OF ALTERNATIVE
ENERGY PROJECTS

One problem which policy makers face is the lack of analytical tools with which to make energy policy decisions. Many people suggest the use of traditional economic market criteria -- "let the market decide." Others believe that additional criteria should be used.

"Energy Accounting as a Policy Analysis Tool," printed for the use of the U.S. House Committee on Science and Technology last year, reviews current literature in favor and against use of energy accounting in policy analysis.

Energy accounting, or energy analysis, as it is sometimes called, is a method for tracing the flows of energy through a system. It is a relatively new analytical technique with a great potential for measurement of non-market criteria, but disagreement exists on basic assumptions, methodologies, and data estimation techniques.

This memo will summarize the arguments in favor and against energy accounting, and will discuss applications and implications for energy and technology policy, particularly as it applies to development of renewable energy sources through the Alaska Renewable Resources Corporation.

One of the major concepts in energy accounting is that of "net energy." Basically, net energy recognizes that "it takes energy to get energy." An example of this would be the enormous amount of energy being used to bring Prudhoe Bay oil to market in the United States -- in production of the materials required, in transporting them, and in building the line.

A corporate manager's objective is to maximize net income, not gross income. So too, managers of energy policy should seek to maximize net energy benefits, rather than gross energy production. Thus, while one type of project may generate larger amounts of electricity but uses more energy to build the project, another type of project which produces less electricity, but is less energy-intensive in construction, may have greater net benefits.

Another concept common to economic and energy analysis is that of discounting. Just as an economist recognizes the time value of money, and uses the discounted cash flow method (DCF) of accounting to predict net present value, an energy policy manager should recognize the time value of energy (discounted energy flow, or DEF). An example of this time value of energy

Rep. Clark Gruening
December 15, 1977

occurs in the constant decrease in net energy from petroleum production. When oil was first produced, it took very little energy to remove the oil from the ground. Now, huge amounts of energy are expended in exploring for oil, producing it, and transporting it to all parts of the world.

Every energy project is a consumer of energy until it begins production. At some point after completion, the energy project has produced as much energy as was consumed in constructing and operating it. However, the net energy produced is not worth as much as the energy consumed, since a high percentage of the net energy produced will have to be used for future energy production. (See Table I). As noted above, however, differences in basic assumptions and methodologies for DEF calculations can yield the same variations in results as are the case with DCF analyses.

Increases in energy consumption are often the result of substitutions of technology and energy for human labor. This has been particularly true in the renewable resource sector in the United States. For example, the number of people employed in agricultural production in the United States has declined sharply in the past several decades, through crop yields per acre are up. Energy consumption per unit of production, however, have increased dramatically. In addition, transportation of agricultural products has increased the amount of energy expended for agriculture. It is interesting to note that the agricultural system of China, where labor-intensive agricultural efforts combine with one unit of energy to produce 50 units of food energy, contrasts with the U.S. system, where one unit of energy is harvested for five expended (though fewer people are involved in production). An energy analysis of U.S. agriculture would note that the net benefit is actually much lower than that of China.

To some extent, energy accounting could be used to indicate answers to employment forecasts. A project which uses less net energy will, as a general rule, mean greater employment. I suspect this would be the case in the fishing industry, where higher amounts of energy and capital have, to some extent, replaced previously high levels of labor involvement. An economic analysis might point towards further use of capital- and energy-intensive fishing, while energy accounting could point towards a more labor-intensive industry.

As noted above, though, the primary use of energy accounting is in analysis of energy projects. Since the Alaska Renewable Resources Corporation will be involved with renewable energy projects, it is important that the managers have tools to analyze comparative values of various projects. I believe that energy accounting is a valuable tool for this analysis, but am unsure as to whether it should be required before fund-

Rep. Clark Gruening
December 15, 1977

ing of renewable energy projects.

Energy accounting is, as previously noted, a relatively new technique, so caution would be advisable in applying it indiscriminately. Perhaps, though, language such as "When a project involves production of energy from renewable energy sources, the applicant shall include an estimate of the amount of energy required to build the project and an estimate of the amount of energy which will be produced over the life of the project" should be included in the ARRC bill. Though this will not require that projects be producers of net energy, the trustees will have some measure of the ultimate benefits which will result.

1 A BILL for an Act to provide for solar easements, and for the
2 contents of instruments creating those easements.

3

4 BE IT ENACTED BY THE LEGISLATIVE ASSEMBLY OF THE
5 STATE OF NORTH DAKOTA:

6

7 SECTION 1. SOLAR EASEMENT - CREATION.) Any easement
8 obtained for the purpose of exposure of a solar energy device
9 to the direct rays of the sun shall be created in writing and
10 shall be subject to the same conveyancing and instrument
11 recording requirements as other easements.

12 SECTION 2. CONTENTS.) Any instrument creating a solar
13 easement shall include, but shall not be limited to, all of the
14 following:

- 15 1. The vertical and horizontal angles, expressed in
16 degrees, at which the solar easement extends over the
17 real property subject to the solar easement.
- 18 2. Any terms, conditions, or both under which the solar
19 easement is granted or will be terminated.
- 20 3. Any provisions for compensation of the owner of the
21 property benefiting from the solar easement in the
22 event of interference with the enjoyment of the solar
23 easement, or compensation of the owner of the

1 property subject to the solar easement for
2 maintaining the solar easement.

3 SECTION 3. DEFINITION.) For purposes of this Act, the
4 term "solar energy device" means the device, mechanism, or
5 apparatus designed to receive the direct rays of the sun and
6 convert those rays into heat, electrical, or other form of
7 energy for the purpose of providing heating, cooling, or
8 electrical power.

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