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Organizational Precedents for Ownership and Management of Decentralized Renewable-Energy Systems

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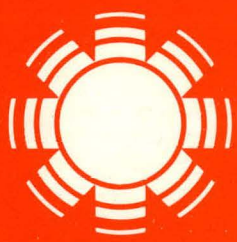

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ORGANIZATIONAL PRECEDENTS FOR OWNERSHIP AND MANAGEMENT OF DECENTRALIZED RENEWABLE-ENERGY SYSTEMS

RICHARD MEUNIER
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MARCH 1981

PREPARED UNDER TASK NO. 5634.20

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PREFACE

This report was prepared as part of the Decentralized Energy Studies Task No. 5323 by the Solar Energy Research Institute. The purpose of the report is to explore organizational possibilities for the ownership and management of decentralized renewable energy systems serving more than a single consumer. It compares the structures, operations, and previous energy programs of three existing types of organization that meet the decentralization criteria of consumer ownership and control of energy production.

The authors would like to express their appreciation for the assistance and comments rendered by Robert Odland, Alice Levine, James Ohi, Peter Pollock, and Charles Unseld of SERI; Philip Kreitner of Congress Watch; and Charles Weaver of the Rural Electrification Administration.

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Approved for

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SUMMARY

OBJECTIVE

Advocates of decentralization have suggested that renewable energy technologies, implemented in a dispersed mode, would permit energy production with numerous social and political advantages over the present centralized U.S. system for supplying electricity and natural gas. The primary benefit sought through energy decentralization is local consumer control over the policy and operations of energy supply organizations. But dispersed renewable energy systems serving more than a single consumer will still require some organizational structure for owning the energy production and distribution hardware, for allocating the costs and output of the system, and for managing day-to-day operations. The objectives of this report are to compare three existing types of organizations that meet the criteria of consumer ownership and local control, and to investigate their suitability for implementing dispersed renewable energy systems. The three are cooperatives, Rural Electric Cooperatives (RECs), and municipal utilities.

DISCUSSION

Most states currently have statutes authorizing both general purpose cooperatives and special purpose cooperatives in areas such as credit unions, agriculture, and housing. Cooperatives are typified by democratic consumer control, patronage refunds on purchases, limitations on ownership and dividends paid on share capital, and certain tax advantages on income earned by the co-op. Most states give preferential treatment in the formation and registration of cooperatives as corporate enterprises, but co-ops are otherwise regulated like other businesses. Many cooperatives have initiated energy-related tasks, particularly in areas such as firewood gathering, where capital requirements are minimal. The recently established National Consumers Cooperative Bank may help to remedy the difficulty of raising capital for co-ops, particularly in nonagricultural areas. It may assist the formation of new co-ops or expansion of existing co-ops into renewable energy activities.

The Rural Electric Cooperative model was created during the New Deal to provide rural electrification assistance. RECs currently serve about 10% of the nation's electricity customers, although most of the power distributed is purchased from federal and private suppliers. RECs are organized as cooperatives, with general policy direction set by the Board of Directors and ratified by the membership at an annual meeting. Various agencies, both governmental and private, have been established since the 1930s to assist in the financing and management of rural electrification. REC mandates are narrowly limited to providing electric power to rural areas not served by other utilities. Their primary mission in electric power has limited REC experimentation with renewable energy technologies. However, both the resource structures and energy needs of rural areas could mesh quite well with renewable technologies, and some RECs have undertaken innovative renewable energy projects.

Municipal utilities are local government agencies created to deliver specific public services. Management structures vary, but municipal utilities are directly accountable to local consumers or their elected representatives. Municipal utilities share in the powers of local governments and have the advantage of obtaining capital through tax-exempt municipal bonds. Most municipal electric utilities have undertaken conservation programs, while a few have initiated solar water and space heating programs as well as

programs for nonconventional generating technologies. The municipal solar utility (to finance, install and maintain residential solar equipment) is a relatively recent innovation that permits the local government to bear the risks and capital costs of residential solar installations.

CONCLUSIONS

The three organizational types examined in this report have undertaken renewable energy programs in the past, and all could be useful vehicles for future locally owned and controlled energy supply systems. Together, they provide a range of organizational forms that could accommodate a wide variety of regional energy resources, needs, and existing supply modes. No one organizational form is clearly superior in all circumstances, nor are the particular forms examined here the only possibilities. Organizational innovation will be necessary to adapt technical innovation to local circumstances. Federal policy makers should facilitate this process of adaptation by adjusting existing support structures to accommodate renewable energy programs by organizations that meet the decentralization criteria of consumer ownership and control.

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SECTION 1.0

INTRODUCTION

1.1 PURPOSE

As economic forces make alternative energy technologies increasingly cost-competitive, the question of the organizational means by which to implement these technologies becomes critical. When they are installed on anything larger than an individual residential unit, energy production facilities must be organized relatively formally. The exact nature of the arrangements can vary greatly, but certain organizational functions must be carried out consistently. For example, the contributions of capital and labor must be determined, the energy produced must be allocated among the owners of the facility and its clientele, a formula for sharing the risk of technology failure or accident must be devised, and rules of operation must be developed. Performance of these functions usually leads to a formal institutional structure—in the industralized countries, to some legally prescribed organization. In very small applications, such formal structures can frequently be dispensed with—for example, by informal sharing among neighbors. But when technologies involve substantial risk, expense, or potential for conflict among owners or between the owner and the state, they tend to be incorporated in formal organizational structures. In many cases, new technologies tend to be implemented by existing organizations that already possess the necessary capital and management skills.

The purpose of SERI's Decentralized Energy Studies project is to examine the concepts underlying proposals for decentralized energy production and the implications of policies designed to implement that path of energy production. Previously, most studies of future decentralized scenarios have focused on technical aspects of the transition to decentralized energy production [1]. This report, however, focuses on the organizational aspect of a decentralized energy system. Rather than surveying the entire range of institutional problems, this report addresses a more narrow topic—the existing organizational precedents that could be used for the ownership and management of small-scale, decentralized technologies.

1.2 SCOPE

There are three key questions regarding organizational forms currently available to manage community-scale energy systems:

- Are existing organizational structures, at the municipal level and below, adequate vehicles for the ownership and management of energy production systems?
- What are the relative merits and trade-offs to be considered in choosing an organizational structure with which to implement a decentralized energy system?
- Are there organizational possibilities other than the forms currently in use? Are there hybrid organizations, new variants on existing forms, or revivals of discarded forms that could be used to implement community-scale energy systems?

This report addresses those questions by surveying three ownership/management options available to communities or associations of consumers and by highlighting the critical

differences between these options [2]. This comparative study is intended to be an illustrative tool rather than an exhaustive treatise of all possible ownership/management permutations. Its purpose is not to suggest optimal choices or optimal mixes of energy supply organizations, nor will it provide an exhaustive list of potential issues. Rather, its purpose is to flag and articulate the major issues and assemble information that may be useful in analyzing these options.

For purposes of this report, decentralization will be defined operationally as localized control over energy production—decision-making performed directly by the ultimate consumers of energy, or by their representatives. Hence, a decentralized mode of energy production is defined as one in which legal ownership and policy-making authority reside in some local organizational structure that provides avenues for direct consumer input into decisions of the organization. Absolute size of the energy-producing installation or the geographical scope of the distribution system are not considered critical definitional variables. For example, large-scale systems may be operated by municipal utilities, and very broad service areas may be under direct consumer control, as in the case of rural electric co-ops. This means that relatively large, technically advanced renewable energy systems may be considered to be decentralized, as local control is the critical aspect here.

This definition precludes the two endpoints of the organizational size spectrum—individual consumer-owned systems and, on the upper end, traditional investor-owned utilities. The rationale for the upper boundary in this study is threefold. The key criterion here is direct consumer control rather than administrative decentralization or spatial dispersion of utility production facilities. Second, substantial research has already been undertaken concerning on-site utility-owned facilities or cogeneration [3]. Finally, this report is not intended to delve into the many issues surrounding investor-owned utility involvement in promoting solar energy through ownership, leasing, or financing of solar equipment. The lower boundary of our study excludes isolated systems owned by individual residential, commercial, or industrial consumers. While the problems of interfacing such systems with back-up sources cannot be overlooked, we are more concerned here with associations among two or more consumers for the production of energy which is to be distributed among the members.

Even thus narrowly defined, the spectrum of organizational forms encompassed here includes both governmental and private entities, as well as associations of individuals sharing the common goal of reducing their reliance for necessary services on distant organizations. The particular organizations selected for study here are not meant to imply exclusion of other organizational forms for which precedent is currently lacking. Indeed, the analysis may indicate the need for such new forms. In a future dependent largely upon intermittent sources of energy, multiple types of energy carriers and energy supply organizations may be required to meet reliability requirements. This might include different forms of energy supply to meet the same end-use service at different times and under different conditions (e.g., solar heat with wood-stove back-up).

The spectrum of consumer-owned organizational forms discussed here will include the following:

- Cooperatives
  - cooperatives for the production, distribution, or management of energy carriers or services other than electricity; and
  - rural electric cooperatives.

- Local Government Agencies
  - municipal utilities; and
  - public service districts organized on a neighborhood, municipal, or regional basis.

A comparative analysis of legal and institutional issues will identify the potential drawbacks and advantages of each of these organizational types. The analysis will consist of a list of critical aspects to be examined for each organizational form. These will include:

- Overview: historical summary; current U.S. usage in energy production; size and number;
- Ownership and management patterns: organizational structure; decision-making processes; client participation;
- Legal aspects: eminent domain; taxation; limits on liability; special statutory preferences or powers; competition; statutory constraints on operations;
- Finance: access to sources of capital; special benefits or cost advantages;
- Regulatory jurisdiction: federal and state regulatory agencies with jurisdiction; constraints on size, activities, or service areas; federal jurisdiction over sales of energy; other regulatory bodies (environmental, consumer protection, land use, health and safety, etc.);
- Social and political aspects: local preferences or historical patterns; relation to existing service agencies; avenues for local client participation and control; regulatory changes or implementing legislation required;
- Examples: summaries of recent experiments in the use of renewable energy technologies; and
- Conclusions: suitability for various types of renewable energy programs or technologies.

Information for this study was gathered primarily from secondary literature and archival data—from annual reports and other publications by the relevent organizations or national associations representing them. This literature was supplemented by correspondence and some interviews with representatives of the organizations. Again, time constraints and the scope of the report prevented comprehensive sampling or detailed analysis. Obviously, no overview of this type can hope to capture the rich detail or diversity of these organizational types and their activities. Our purpose was to illuminate the differences between them, realizing that these organizations are creatures of widely varying state laws and that the general inferences drawn here may not hold true for every particular case.

This report represents one step in a continuing SERI effort to depict the institutional implications of reliance on community-scale renewable energy technologies. It is intended to provide a foundation for examining the proposed transition to a national energy system based on small, relatively self-sufficient units only partially dependent on centrally managed grids for gas or electricity. It illustrates some existing organizational forms that would be utilized in this transition.

Before proceeding, however, we reiterate that our choice of organizations for comparison here does not imply exclusion of other possibilities. For example, private enterprise is a critical component of any proposed decentralized energy supply system. Various industries could be established to manufacture, install, manage, maintain, and repair dispersed renewable technologies. The consumer-owned organizations considered in this report could also function as suppliers of energy equipment or services to the general public, either on a contractual or an open-market basis. Further, new forms of organization may be conceived that combine local consumer ownership and control with business enterprise.

For example, the Community Development Corporation (CDC) is a relatively new organizational form that combines the profit motive with service to the local community. An outgrowth of the 1960s War on Poverty, the CDC was designed to stimulate business enterprise and entrepreneurial skills in deteriorating communities [4]. Many CDCs have begun operations through housing rehabilitation programs and then have expanded into other areas. CDC versatility and diversified funding sources have also led to a variety of programs related to the energy needs of the urban poor. Limitations of time and space prevent us from discussing CDCs and other forms of locally oriented private enterprise in detail here. However, these hybrid organizations could play a key role in decentralized energy supply, and, therefore, merit further study and experimentation in community energy programs.

SECTION 2.0

COOPERATIVES

2.1 OVERVIEW

Although joint efforts to achieve common goals are as old as human society, formal cooperative business enterprises are a relatively new phenomenon. The first modern cooperative, the Rochdale Equitable Pioneers Society, was a grocery store formed by a group of British weavers in 1844 as an alternative to the company store. The ground rules formulated then have since come to be known as the "Rochdale Principles": open nondiscriminatory membership; democratic control with each member limited to one vote regardless of equity contribution; limited return on share capital; and savings returned to patrons in proportion to their purchases. To these, the International Cooperative Association has added political nonpartisanship, continuing education of members, and cooperation among co-ops.

The Rochdale idea quickly spread across the Atlantic, and the first U.S. consumer co-op was organized in 1845. The American Protective Union by 1857 was operating cooperative stores in 10 states with a total volume of more than $2 million [5]. The U.S. cooperative movement expanded in size and scope during the past century, particularly in agricultural regions where joint purchasing and marketing proved extremely beneficial to farmers. The cooperative movement is thus most firmly rooted in the agrarian areas of the Upper Midwest, where the cooperative traditions of predominantly Nordic settlers merged with the needs of an agricultural economy.

The U.S. cooperative movement has had a generally cyclical history (in inverse relation to the business cycle), and in recent years has been on the upswing. After World War II, agricultural producers began merging to gain greater efficiency in serving national markets, and agricultural cooperatives began undertaking a greater range of services for farmers. Likewise, programs conducted as part of the 1960s War on Poverty began promoting the cooperative concept in urban ghettos and previously unorganized rural areas [6]. This renaissance of cooperatives likewise infiltrated the universities and upper middle classes as new solutions were sought to the problems of 20th-century America. Co-ops, both urban and rural, were created to perform a whole new range of tasks ranging from student housing to marketing of crafts. By 1977, it was estimated that U.S. co-ops had a combined membership of more than 50 million people [7]. Since most members are involved simultaneously in more than one co-op, it is estimated that about 20 million people in the United States today have direct experience with cooperatives.

Table 2-1 illustrates the size of the U.S. cooperative movement and the diversity of co-ops in both structure and purpose. This diversity prevents us from using any single definition or model of the typical cooperative [8]. The cooperative is an extremely flexible organization and can be structured in many different ways. In most cases, however, cooperatives are organized as formal entities under state corporate statutes, either with or without issuing stock to obtain capital. Nearly all states have enacted legislation for franchising cooperative associations, including specific statutes for special purpose cooperatives such as credit unions or cooperative electric or phone utilities. Nonprofit cooperatives are generally burdened by fewer formal requirements than are profit-oriented business corporations. Most cooperatives are restricted by statute with regard to membership requirements, voting rights of members, and retention of earnings or distribution of stock dividends. Despite their diversity of form, cooperatives can be categorized by function according to the following types:

Table 2-1. COOPERATIVE FACTS AND FIGURES IN THE UNITED STATES (1977)[a]

Kind of Cooperative	Number of Cooperatives	Membership	Dollar Volume
Consumer Goods	1,000	1.2 million	$477 million
Credit Unions	22,866	31.4 million	$33.9 billion savings $27.9 billion loans outstanding
Rural Electric	934 (49 generating and transmitting)	8,039,686	$2.84 billion (distributing) $947 million (generating and transmitting)
Banks for Co-ops	13	3,171	$8.9 billion
Federal Land Banks	533	467,039	$4.4 billion
Production Credit	432	331,635	$16.1 billion
Farm Market Supply and Service	7,786	6,200,000	$42.3 billion
Fishing	104	8,772	no estimate
Group Health Plans[b]	15	400,000	no estimate
Housing	2,500	500,000 families	$1 billion annually
Insurance, co-op related	2,034	7,607,497	no estimate
Memorial Societies	135	600,000	no estimate
Nursery Schools	1,700	68,000	no estimate
Student Co-ops	250	25,000	no estimate
Telephone Co-ops	238	1,013,882	$146,102,000

[a]Source: Cooperative League of the U.S.A. 1977: "Common Ground for Cooperatives." The latest figures for group health, housing, insurance, nursery schools, student, and telephone co-ops are from 1974.

[b]There are about 200 group health associations in the United States, serving 4.5 million members, but only 15 group health plans are organized as cooperatives.

- Consumer: to make bulk purchases of goods or services for the members; generally organized under the Rochdale plan of profits returned to the members through patronage dividends. A variant is the "direct charge" co-op, whereby goods are priced at cost, but the member pays a weekly or monthly service charge to cover administrative costs.
- Production: to permit association of individuals for joint ownership of capital assets used in the production of agricultural or industrial goods for sale.
- Processing/marketing: to process and/or market goods produced by individual members; usually agricultural, but also includes crafts and fisheries co-ops.
- Special purpose: to perform particular specialized tasks, generally limited by statute to those or closely related functions; includes such organizations as banks and credit unions, health, housing, insurance, telephone or electric service, memorial societies, and youth co-ops.
- Barter: to foster direct exchange of goods or services among members; the co-op may serve merely as a middleman, arranging direct exchange of goods and services, or can serve as a clearinghouse or bank in which units of labor exchange are kept on account for later barter.

Each of these types of cooperatives could be employed in the application of renewable energy technologies. Buyer clubs or consumer co-ops could facilitate a decentralized energy system where each residential unit becomes a primary producer of the energy it uses. Wholesale buying of equipment could both stabilize the market and lower the capital cost of solar technologies to the consumer. Various energy services, especially for the delivery of nonelectric energy, could be organized through production cooperatives. This would include agreements such as neighborhood heating or hot water systems, biogas systems, or solar ponds [9]. The co-op would in these cases own, maintain, and operate the system. Processing and marketing co-ops are quite common in the agricultural sector and could be applied to energy products such as wood, biogas, and alcohol fuels. Special purpose cooperatives might be utilized in the renewable energy field in numerous ways. As discussed in the following section, rural electric cooperatives present one vehicle for the application of new energy strategies in rural areas. Alternatively, new special purpose co-ops providing nonelectric or combined energy services could be created in either urban or rural settings. Finally, the barter co-op has a unique place in a decentralized energy scenario based on renewable technologies. Local functions such as wood-gathering or labor for construction or maintenance of energy-producing units could be organized on this basis (see the examples in Section 2.7). Given its versatility, the cooperative form of organization could easily be adapted to the diverse range of tasks necessary to meet U.S. energy needs through decentralized energy production.

2.2 OWNERSHIP AND MANAGEMENT

The term "cooperative" emcompasses organizations of many types. Most are similar only in that service to the members generally takes precedence over profit in the conduct of

business operations. In most cases today, cooperatives are formally franchised under state corporate laws in order to obtain the benefits of corporate entities—limited member liability, perpetual succession, and the rights to hold assets, issue indebtedness, and sue in the corporate name. Cooperatives may be formed under various types of state statutes. For example, cooperatives may be established as nonprofit corporations under special legislation; as other types of business organizations, such as partnerships; under general purpose cooperative statutes, which typically authorize cooperatives "for any lawful purpose"; and under special purpose legislation which has evolved to meet particular needs for service co-ops. Alternately, the association may decide not to incorporate at all. But this strategy has the potential drawbacks of unlimited member liability for association debts, of problems in using and holding title to assets, and of uncertain jurisdiction and venue when suing or being sued.

Most states today have enacted both general and special purpose cooperative statutes. As a matter of policy, filing fees for these types of corporations are frequently lower than for general business corporations [10]. Most state statutes impose certain structural requirements which associations must fulfill in order to qualify for the special treatment given cooperatives. These derive generally from the Rochdale plan and impose a certain national uniformity on cooperative corporations [11]. They distinguish cooperatives from regular profit-oriented business enterprises by requiring one vote per shareholder, limited returns on capital investment, limits on ownership concentration, and equal distribution of benefits [12]. Most state statutes and cooperative bylaws also provide for special meetings that can be called by members or for referenda on matters of special importance, making cooperatives in this respect more like public bodies. Although equal treatment of members is mandated in the bylaws of most cooperatives, this does not preclude imposing certain requirements for membership (so long as these do not violate other Constitutional or public policy provisions). Nor does it preclude differential treatment through business practices such as quantity discounts on purchases or quality premiums for supplier/members.

Aside from these differences, cooperative associations under most state statutes operate very much like traditional business corporations. The cooperative is considered a legal person with an identity separate from that of its members. Typically, it is governed by a Board of Directors elected at an annual meeting of the membership. (For larger cooperatives, special district meetings and/or representative practices may replace the unwieldy direct democracy). Each member possesses one vote, regardless of the size of his/her equity contribution or patronage. Nonmember patrons usually do not vote on matters of association policy, even though they may share in the earnings through patronage dividends. The Board of Directors elects or appoints officers responsible for the daily operation and management of the cooperative. Depending on the size of the operation, officers may be volunteer laymen or paid professionals. Likewise, labor may be supplied by volunteer members or by paid employees.

In the typical Rochdale plan, co-op goods or services are sold at a certain markup to both members and nonmember patrons. Once expenses are deducted, co-op earnings are divided among general reserve funds for unforeseen contingencies (whose upper size limit is generally prescribed by state law and/or the articles of incorporation), dividends returned to shareholders (also usually limited by law), and patronage refunds for all users of co-op services. A small capital contribution is generally required as a condition of membership. A portion of members' patronage refunds are generally held by the co-op as operating capital. These revolving funds are disbursed at some later date set by the Board. Funds for operations or capital expansion also may be obtained through issuance of nonvoting preferred stock, through issuing indebtedness of various types, or through

loans from private banks or public agencies. Because of the special tax incentives available to co-ops, their financial operations can become very complex, especially in the agricultural sector where the cooperative form is most highly developed. The details are beyond the scope of this report, but further discussion of certain tax and financial aspects is contained in Sections 2.3.2 and 2.4.

The size of the cooperative movement and the importance attached to co-ops by state and national legislatures have occasioned the creation of various support organizations. Through these agencies, cooperatives can obtain technical and financial assistance, as well as sharing ideas and results with other similar organizations. Much informal assistance to new co-ops is provided by other co-ops with greater resources, expertise, or experience in that particular function. Existing cooperatives have occasionally entered into formal management services agreements with new co-ops unable to perform these services themselves or unable to afford outside professional help. In addition, various associations of co-ops have been established to provide services to member organizations. There are nearly 40 statewide cooperative councils, although only two of these (Minnesota and Wisconsin) have to date included nonfarm cooperatives in their membership. Similar associations have been formed on the regional level. Various associations exist for functionally specific cooperatives [13]. On the national level, the Cooperative League of the U.S.A. (CLUSA), formed in 1916, is an association of co-ops from all functional sectors that serves its members through programs in education and training, lobbying, public relations and information dissemination, networking of co-op developments, and international representation and development. CLUSA also administers several development funds for outreach and assistance to members and new co-ops. The Consumer Cooperative Alliance (CCA), founded in 1929, performs similar functions for co-ops in the United States and Canada.

Various governmental agencies also provide support to cooperative organizations. The U.S. Department of Agriculture assists agricultural cooperatives through the Division of Cooperative Marketing and the Farmers Cooperative Service. The Rural Development Act of 1972 called for increased assistance efforts to rural communities and individuals (with the USDA as lead agency) and increased funding and programmatic responsibility to the Farmers Home Administration. Likewise, the Farm Credit System, which comprises the Federal Land Banks, Production Credit Associations, and Banks for Cooperatives, provides funding for cooperative efforts in rural areas. Similar channels for assistance to rural areas exist on the state level, including the Cooperative Extension Service—administered jointly by USDA, the state land grant universities, and state and county governments. In urban and suburban areas, agencies specifically mandated to assist cooperatives are fewer and generally newer. Most grew out of the War on Poverty and deal with minority groups and inner-city development [14].

2.3 LEGAL ASPECTS

2.3.1 General Legal Considerations

Most cooperatives are organized under state franchises closely analogous to private business corporations and are, therefore, given similar legal powers and treatment. As incorporated entities, they are empowered to hold assets, to sue and issue indebtedness in the corporate name, to hold patents and trademarks, and to act as agents of their members. They are regulated in most of the same ways and, with some exceptions, are taxed similarily. Regulation of their business practices also roughly corresponds.

The differences in treatment between private business corporations and cooperative corporations derive from two sources. First are those differences necessary to effect the democratic principles of cooperative organization—restrictions on individual ownership shares, proxy voting, and share dividends, provisions for member referenda, etc. The second class of differences arises from policy decisions since the turn of the century in both federal and state legislatures. In large measure, favorable treatment of cooperatives in the laws of most jurisdictions stems from legislative recognition of the unique role of agriculture in the U.S. economic fabric. Although the cooperative movement encompasses far more than agricultural activities, the need for special legislative preferences for cooperative enterprises was most evident in the agrarian sectors. Within the past decade, similar types of preferences and assistance have begun to be implemented for nonagricultural cooperatives. Restrictions placed on the structure or operations of cooperatives are safeguards to prevent abuse of the special legislative treatment accorded them.

Formal incorporation of cooperatives provides a shield against individual member liability for the debts of the association (beyond the amount of the members' retained share of the profits and their equity contribution to the association) [15]. The officers and directors of a corporate entity, however, assume a somewhat greater personal liability for the actions of the association [16]. Typically, directors and officers of cooperatives also are prohibited by statute or bylaws from certain types of profit-making dealings with the association or its business contacts (other than those which accrue to the director as an ordinary member).

Organization as private corporations means that cooperatives generally do not have the powers of governmental agencies. For example, cooperatives do not possess the power of eminent domain—to condemn and take private land for community use. Consequently, cooperatives formed for the purpose of producing and distributing energy from renewable technologies must obtain land for those functions through private transactions—voluntary sale, lease, or easement. The cost of acquiring land in these ways could therefore become prohibitive, or land simply could be unavailable [17].

Moreover, cooperatives do not have the governmental power of taxation to raise capital or to back their bond issues. Cooperatives usually must raise capital through private sources at commercial rates. Commercial lenders often have been reluctant to lend to cooperatives because of the perceived risk involved. As private entities, cooperatives can set conditions for membership and for transactions with members, but cannot back these with the power of governmental edict. Finally, the contracts of cooperatives are often construed quite liberally by the courts in order to further the statutory purposes of such associations, but this judicial policy has clear limits where unfairness to other parties would result.

2.3.2 Taxation

Cooperatives are generally treated like other corporations for tax purposes, although certain types of co-ops, such as mutual banks and credit unions, are governed by special provisions. Co-ops pay sales and excise taxes, property taxes on real estate, and (with some differences) income taxes on the net earnings of business operations. Preferential federal income tax treatment derives from the recognition that cooperatives must normally rely largely on their members for working capital, and often retain portions of patronage refunds for that purpose. In addition, private investment in most cooperatives is quite low because the return on share capital is usually limited to 6-8%. The very

purpose of cooperatives, particularly those organized under the Rochdale principles, is that nearly all net income be returned to the members and customers through patronage refunds.

For cooperatives not operating in rural areas, and therefore not entitled to the special exemptions available to farmers' co-ops (see below), federal tax treatment is similar to that of other private corporations. The major tax benefit available to co-ops is exclusion of patronage refunds from taxable income of the co-op on the theory that these are equivalent to discounts or other business refunds and therefore do not constitute income. Most cooperatives are required to allocate all net earnings to patronage refunds after reserve funds and prescribed dividends on share capital have been met. The Revenue Act of 1962 requires that the co-op pay tax on its net income and that the patron or member report the dollar value of his refund in the year of the rebate. The co-op is permitted to retain a portion of the patronage refund in a revolving fund as operating capital without that portion being considered income, provided it meets certain conditions [18]. For patronage refunds that don't meet these conditions, the cooperative counts the retained portion as income for that year, but may deduct that amount in the year when revolved (paid) back to the patron. Net earnings paid as share dividends are taxable to both the cooperative and the shareholder. In cases where the cooperative sells more than 85% of its goods and services for personal, family, or living use, it may apply to the IRS for exemption from accounting for the patronage refunds [19].

This summary necessarily oversimplifies extremely complex tax questions, but four other points merit passing mention here. First, farmer cooperatives for the marketing or processing of agricultural produce, or for purchase of goods related to farming, are accorded additional advantages in the treatment of cooperative income [20]. Second, another possible avenue for cooperatives is the total exemption from federal income taxation available to charitable corporations under Section 501 of the Internal Revenue Code. For energy-related cooperatives, qualification for this section would present two major hurdles. Stock dividends would not be permissible in the capital structure, and the cooperative would have to qualify as an educational, scientific, charitable, or civic organization [21]. The circumstances under which energy cooperatives could qualify are thus quite narrow. Third, cooperative housing utilizing renewable energy equipment would permit member deduction of pro rata shares of the real estate taxes and mortgage interest with all profits distributed as patronage refunds, and the co-op could thereby avoid taxable income. Finally, a qualified patronage refund not taxable to the cooperative could, if attributable to personal, family, or living uses, be excluded from the patron's income [22]. These points are raised only as matters for further exploration, and their applicability to energy-related cooperatives would require scrutiny of the IRS regulations as applied to the particular set of circumstances.

2.3.3 Competition

Competition issues might affect the operation of energy cooperatives in two ways. The first pertains to the application of various federal and state antitrust laws. Cooperative activities, particularly in marketing of commodities, typically involve exclusive dealing contracts and some form of price setting. Recognizing the importance of cooperative marketing to the agricultural sector, and the special circumstances prevailing there, federal antitrust legislation has granted limited immunity to agricultural cooperatives both in Section 6 of the Clayton Act (relating to formation of agricultural cooperatives) and in the Capper-Volstead Act of 1922 [23]. However, the immunity granted under these provisions requires strict conformance to certain conditions and does not authorize

predatory business practices, restraint of trade, or violation of other civil or criminal statutes. These exemptions could be applicable to biomass marketing co-ops or other energy cooperatives in rural areas.

The second aspect of competition arises from the operation of energy cooperatives within the service areas of other state-franchised public utilities. Potential conflict would involve issues of infringement by cooperatives on the exclusive franchises granted to existing electric and gas utilities. The traditional judicial approach to cooperatives has been that when services are provided exclusively to members on a nonprofit basis, the association is not considered a public utility [24]. In the case of very small systems providing nonelectric services, such as neighborhood heating or biogas systems, the infringement issue is unlikely to arise. However, cooperatives distributing gas or electricity could present difficult problems. The key issues would revolve around whether the co-op holds itself out to serve the public, whether its services are delivered strictly to members, and whether clear membership requirements are drawn.

2.4 FINANCE

Some types of energy co-ops would require minimal start-up and operating capital (e.g., buyers' clubs, barter co-ops, etc.). Energy production cooperatives, however, would have far greater capital requirements. Production co-ops would generally require substantial initial funding for purchase of hardware to collect and distribute energy to the members, as well as operating capital for expansion of the facilities, maintenance and replacement, back-up costs, etc. The capital needs of co-operatives have traditionally been met through three channels: membership contributions, private market transactions, and public or private assistance agencies.

The first category consists of capital provided by the members themselves: share subscriptions or member certificates taken as a condition of entering the cooperative, additional investment shares (either regular common stock or preferred, nonvoting stock), or retained earnings withheld from patronage dividends. Since there are usually limits on the amount of earnings the co-op is permitted to retain, and since there are limits on the dividends paid on co-op stock, this channel probably would not be adequate for the financing of renewable energy systems. The second customary financial channel is the open market—the sale of bonds, debentures, or preferred nonvoting stock in the co-op. Alternatively, commercial banks have provided a large portion of the capital required by U.S. cooperatives in the form of regular commercial lending. Most private bank lending to cooperatives has occurred in the agricultural sector, however, where the lenders have a certain familiarity with local farming operations and a set of procedures for dealing with farm needs. Commercial banks have been more reluctant to lend to urban cooperatives, particularly those with innovative missions or structures.

The third traditional channel for cooperative financing consists of agencies with specific missions to serve cooperatives, often at concessional terms. This would include private charitable institutions, such as the Ford and Rockefeller Foundations, as well as the outreach and development funding arms of the Cooperative League of the U.S.A [25]. Agencies in the public domain would include the Small Business Administration, the Community Services Administration, those institutions within the Department of Agriculture established to serve the needs of rural and farming regions, and the proposed Solar Bank [26]. The Rural Development Act of 1972 enlarged the mandate for assistance to rural areas by the Department of Agriculture, and increased the amount of loan funding authorized for community facilities in these areas [27]. This mandate is

administered through various agencies, including the Farmers Home Administration (FmHA), Banks for Cooperatives, Production Credit Associations, and the Federal Land Bank. The FmHA may make loans available to nonprofit corporations having significant ties to the local community when these organizations have the legal authority to borrow money, are financially sound, and are unable to obtain the funds elsewhere [28]. The willingness to fund new energy-related cooperatives and the extent of such funding under these programs are beyond the scope of this report, but these institutions are mentioned here as potential channels for financial assistance in rural areas.

Potentially the most important vehicle for cooperative financing is the National Consumers Cooperative Bank (NCCB) that began operations in late 1979. The NCCB is an independent government-chartered agency run by a board of directors initially composed of both governmental representatives and nongovernmental members. Its purpose is to compensate for commercial bank reluctance to serve cooperative ventures by providing a stable source of funding for new or existing cooperatives [29]. The NCCB has been capitalized for fiscal year 1980 at $75 million (with an additional $200 million proposed over the next four years), through repayable, interest-bearing Treasury investment. Additional funds raised through the sale of debentures on the open market are authorized up to a total of ten times paid-in capital over the first five years. Loans will be offered at market rates for groups organized as nonprofit organizations, but the criteria applied to lending will probably be somewhat less restrictive than those normally applied by commercial banks. The enabling act specifically provides that up to 35% of the NCCB's funds will be earmarked for low-income groups. Up to $75 million will be administered through the Office of Self-Help Assistance, which will provide capital investment on concessional terms to low-income co-ops that cannot meet their capital needs through regular channels. In addition, a smaller amount (authorized at $2 million per annum) will be funneled through the Office of Technical Assistance for training and technical assistance to cooperatives.

Certain provisions of the NCCB legislation are relevant to its activities in the energy field. First, only 10% of bank funding will be reserved for producer cooperatives. No loans will be made to credit unions, and a maximum 30% of lending will go to housing co-ops. Together, these provisions indicate that buying and barter co-ops are more likely recipients of NCCB loans, while co-ops for the production of energy services will not receive high priority. Regulations to be established by the bank, however, could define "consumer" to include co-ops that produce services solely for the benefit of members (not for sale to the general public). Second, this legislation clearly focuses on low-income and urban cooperatives to provide counterparts to the services available to agricultural co-ops through the various USDA agencies. The NCCB will make no loans to co-ops eligible for assistance from the FmHA or Banks for Cooperatives unless these agencies are unable to make the loans because they lack funds, or unless an agreement is reached between the NCCB and the other agency involved. Third, the NCCB is likely to employ fairly conservative criteria to loan applications at the outset. Lending will likely be skewed toward existing cooperatives with proven track records and financial soundness. This means that new energy cooperatives, particularly in highly innovative areas like district heating or wind electricity, will probably have a more difficult time meeting NCCB lending standards. "Piggybacking" on existing co-ops would be one way to overcome this initial fiscal conservatism. But this tactic could cause internal dissension over the question of equity, as all co-op members may not wish to accept new energy tasks, or may not feel they would benefit from them equally. Therefore, while the NCCB is an important addition to the cooperative movement, its impact upon energy-related cooperatives is as yet uncertain.

2.5 REGULATORY JURISDICTION

Under most state statutes, cooperatives take a corporate form and are generally subject to the same types of regulation as other business enterprises. The entire spectrum of regulation of business operations is too extensive to detail here, but would include raising capital, siting of energy production facilities, and dealings with employees and clients. Traditionally, cooperative organizations selling only to their membership have been exempted from certain state licensing requirements. These exemptions have been progressively narrowed, however, particularly as cooperatives in the agricultural sector have become larger and have engaged in more complex transactions. Still, many cooperatives are small enough to be exempted from certain state and federal regulations. For those co-ops that cannot escape regulation by virtue of size, the administrative burdens of complying with regulations could add substantial, perhaps prohibitive, costs. In addition, federal oversight of co-ops may accompany funding from federal agencies. For example, funding from federal agencies such as the FmHA would require compliance with that agency's bidding and contracting rules, and with the antidiscrimination and civil rights provisions of the 1964 Civil Rights Act.

For energy production cooperatives, the siting and operation of physical hardware could involve various regulatory agencies. Since fairly large expenditures would likely be involved, raising the capital necessary to finance these facilities could involve regulation of sales of securities. Co-op membership certificates or stock shares must be carefully drafted to meet the requirements of federal securities regulation or corresponding state laws. Likewise, energy production must conform to local zoning and land use plans, state energy facility siting laws (although these usually exempt very small facilities), state and local environmental controls, health and safety regulations, and state laws regarding the use of public highways for distribution purposes. Large co-ops distributing energy services to the public could also come under state Public Utility Commission jurisdiction or be affected by provisions of the National Energy Act of 1978. While these potential problems should not be overstated, energy production and distribution might entail significant regulatory burdens from various sources.

2.6 SOCIAL/POLITICAL ASPECTS

The cooperative form of organization appeals to many segments of American society because it echoes our frontier tradition of self-reliance. Necessary services can be provided with minimal governmental involvement, and with minimal dependence on distant service organizations. The economic advantages of cooperatives are the savings available through pooled buying or selling, the opportunity to buy into larger installations than any member could afford individually, and the minimal cost of transferring ownership equity in the organization. Additionally, a nonprofit organization whose guiding purpose is service to members is more likely to be responsive to consumer needs. The political advantages of cooperatives are similarly broad. Consumer direction of organizations providing critical social services are central elements in the decentralist vision of postindustrial American society. The question of whether energy co-ops can achieve these ideals in practice, and what other social costs and benefits they may entail, is beyond the scope of this report. Theoretically, however, cooperative principles would seem to mesh quite well with the values underlying proposals for energy decentralization.

Since its introduction during the last century, the cooperative has been a favored child in the eyes of most U.S. legislatures [30]. Agricultural cooperatives have been particularly favored, as special exemptions to various legislative requirements have been created to

fulfill the broader policy objective of maintaining a vital agricultural sector. The narrow profit margins and traditional disadvantages of farmers in the marketplace are felt to justify compensatory measures to assist the farmer. This emphasis on promoting a strong agricultural economy is reflected in the 1970 report of the White House Conference on Food, Nutrition, and Health; in the Rural Development Act of 1972; and in the strong policy mandates by the Carter Administration for USDA assistance to rural co-ops. Since the 1960s War on Poverty, cooperatives also have become increasingly common in urban, suburban, and nonfarming rural areas. Cooperatives are seen as a means to ease the inflationary squeeze on middle- and lower-income families, and as a means to provide necessary services that in recent years have become increasingly withdrawn from the control and vicinity of the ultimate consumer. However, further legislative and regulatory action may be necessary to facilitate new energy cooperatives that do not fit neatly into previous legislation based upon the Rochdale or agricultural marketing models of cooperatives.

Despite their favored status, co-ops are not without a significant range of problems. At the threshold is the process of organizing—mobilizing potential members for new co-ops or arranging the shift of existing co-ops into the energy field. The problems that can be encountered are too complex to elaborate here, but the process of defining a need, a style, and an organization for cooperative ventures could fill volumes. The first few years after organizing are generally occupied with learning procedures and fighting the inevitable crises that occur in any new organization. The failure rate for new co-ops has always been high and has usually been attributed to inefficient management, lack of capital, and interpersonal problems. Many experienced co-op organizers state that the principal problem of these years is excessive ambition—overextending the co-op in terms of size or the range of services offered.

Once adequate capital has been obtained and management has become relatively efficient, the cooperative frequently faces the issue of expansion. This involves the critical question of co-op values and of defining some optimal size for the organization in both geographical and numerical terms. Although considerations of economies of scale and service to the community may dictate some expansion, the key question is at what point size begins to erode the participatory and democratic control aspects of the cooperative. For very small groups with limited operating capital, economics will largely determine the approach to growth issues.

2.7 EXAMPLES

Because co-ops are so varied, it would be difficult to compile a comprehensive inventory of all current cooperative activities in energy. Moreover, many existing co-ops have assumed peripheral tasks related to the energy sector, such as weatherization, insulation, composting and gardening, etc. This section focuses on a few innovative experiments that are directly related to energy production or that could be copied in energy-specific cooperatives.

One of the more innovative variations on the cooperative form to be introduced in recent years is the barter cooperative, which provides a framework for direct bartering of goods or exchange of services among members. Barter co-ops may include multiple-party exchanges or even formal accounting systems (whereby labor donated on one task can be exchanged for other goods or services). In most cases, barter co-ops are an outgrowth of antipoverty and community organizing programs. The barter co-op may be organized in a variety of ways, but generally involves an initial contribution and regular service charge

to cover administrative expenses. In some cases, labor may be substituted for the monthly service charge.

The Give and Take Bartering Center of Burlington, Vermont, illustrates this type of organization. Originally established as a community barter center for an economically depressed area of northern Vermont, the Center gradually became involved in various energy-related functions. These included wood gathering for home heating, home energy audits, and insulation. Give and Take then began promoting formation of a community Energy Co-op to focus exclusively on energy services, particularly firewood gathering and splitting, but also including wood stoves, greenhouses, insulation and windmills. A full-time coordinator would supplement volunteer labor in the administration of the energy exchanges. Similar wood co-ops also operate in Eugene, Oregon (Community Energy Bank), and New Paltz, New York (Ulster County Wood for Fuel Project) [31]. The barter co-op is a particularly useful model in regions where cheap energy sources, such as wood, are readily available and require minimal capital for "sweat equity" gathering and distribution operations.

Another type of production co-op is Hoedads, Inc., of Eugene, Oregon, which contracts for forestry reclamation projects throughout the Western states for the Bureau of Land Management and the U.S. Forest Service [32]. Hoedads is composed of numerous self-governing work crews who make joint decisions about work contracts and schedules. Hoedads was originally formed in 1971 as a partnership, but was restructured into a cooperative three years later. Initially consisting of only about 30 people, membership has now leveled out at around 500 workers, approximately 300 of whom work regularly. Contracts are negotiated competitively, but each work crew makes its own hiring and work decisions, and negotiates with the contractor over work quality and payment. Democratic procedures and environmental considerations receive close attention. The $1000 membership fee can be paid outright or deducted from earnings. Leadership of the co-op rotates annually, and because work is limited by climate to certain seasons, annual meetings during the off-season are well attended and detailed.

Another recent innovation which may be applicable to the energy field is the service co-operative, an idea which is most developed in the agricultural sector. Its purpose is to provide specialized services for individual farmers or members who do not care to expend the time or make the capital investment to perform these services themselves. Economies of scale and specialization thus permit substantial savings. One example is the ServiTech Co-op, formed in 1975 by three local supply cooperatives in Kansas. Servitech performs services such as soil testing and pest management for individual members on a fixed cost-per-acre basis [33]. This type of service co-op could be applied to the management and maintenance of renewable energy technologies, such as active solar systems, biogas generators or windmills. This model would retain local control of both the energy production units and the service organizations while simultaneously capturing economies of scale in management and maintenance. It would also relieve the individual owner of these burdens while providing cheaper energy and local self-reliance.

2.8 CONCLUSIONS

Cooperatives present promising vehicles for decentralized renewable energy supply because they directly address the issues of local participation and control that have been increasingly submerged by ever more distant and incomprehensible conventional energy systems. The cooperative is an inherently egalitarian organization. It permits the local environmental costs and trade-offs of energy production to be communicated directly to

the owner/consumers. And in times of economic hardship, cooperatives provide cost savings and reduced dependence upon distant, profit-oriented organizations.

A major advantage of the corporate form is its flexibility. Most general-purpose state cooperative statutes permit great latitude in both form and function. They are usually drafted in general terms that could encompass a broad range of energy-related functions—from joint purchase to production co-ops. They permit wide discretion in both the terms for membership and the operating procedures for the co-op. Membership need not be restricted solely to individuals, but also may include corporate members or associations of co-ops banding together for particular purposes. Innovation is a keynote of the cooperative movement, as evidenced by ingenious new forms and applications established during the past decade, such as the barter co-op and the direct charge co-op.

State legislation that accords special treatment to cooperatives is also generally accompanied by rather stringent requirements in order to qualify for that favored status. Therefore, extreme care and forethought must be exercised in structuring the co-op and drafting its articles, especially to qualify new energy cooperatives under existing special-purpose co-op statutes. The requirements for special treatment frequently are geared to the traditional Rochdale model, which could serve as a brake on innovation.

The cooperative form places special burdens on its directors and managers. It requires sensitivity to fostering citizen participation, education, and responsiveness to the lay membership in what may be highly technical services. Layman-owned and operated production ventures have often experienced management and financial difficulties, and the failure rate of new co-ops has traditionally been high. Cooperatives can also become overly large, unwieldy, and unresponsive. The difficulties of co-op management reflect the dynamic tensions inherent in cooperative organizations—the issues of economies of operating scale versus maintaining close community ties, economic efficiency versus the principles of cooperation and emphasis on interpersonal relations and satisfaction, and expansion into new tasks versus continued equitable distribution of benefits. The successful cooperative almost inevitably must face the issues of growth or expansion into new task areas, which involve many of these internal tensions.

In short, the cooperative presents an exciting model for renewable energy supply. Cooperative precedents and operating experience are readily available in the United States, and could be applied to new energy uses. The co-op is not a decentralist panacea, for there are many obstacles to small, consumer-owned organizations. But the energy cooperative can start small with minimal capital, and if it fails, it therefore can fail gracefully. It embodies social values quite compatible with a decentralized energy production system.

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SECTION 3.0

RURAL ELECTRIC CO-OPS

3.1 OVERVIEW

The Rural Electric Cooperative (REC) was the principal vehicle by which electricity was brought to the agricultural and ranching regions of the Midwest and Far West. In the earlier part of the century, electrification of sparsely settled rural areas was an expensive and risky venture, and privately owned utilities were unwilling to gamble [34]. Given the reluctance of private enterprise to undertake rural electrification, groups of consumers began to band together in cooperative electric distribution enterprises as early as 1914. By the 1930s, nearly 30 small consumer-owned electric cooperatives were functioning in the United States [35].

The major thrust for rural electrification occurred during the New Deal era. It resulted largely from Franklin Roosevelt's perception of the urgent need for reversing rural emigration and the declining standards of living in rural areas relative to industrialized urban areas. By an Executive Order issued in May 1935, Roosevelt established the Rural Electrification Administration (REA), initially justifying it as an unemployment relief measure and a "yardstick" by which the performance of privately owned utilities could be measured. The REA was later made permanent by Congress in 1936. Its purpose was to provide both technical assistance and long-term, low-interest loans (35 years at 2% interest) for rural electrification projects. Although not formally barred from applying, most privately owned utilities eschewed REA loans [36]. Consequently, nearly all REA lending went to consumer cooperatives and, to a lesser degree, to public agencies (mainly Midwestern public utility districts patterned after earlier irrigation districts).

This experiment in consumer-owned, federally assisted electrification was enormously successful. In the early 1930s, about 11% of America's farms had central-station electric service; within two decades that figure had jumped to more than 90%. State, regional, and national organizations were soon formed for purposes of exchanging information; providing technical assistance; and purchasing equipment, supplies, and more recently, fuel for generating plants. A national organization, The National Rural Electric Cooperatives Association (NRECA), was formed in 1942; statewide associations of RECs now function in 38 states.

Today, more than 1000 RECs serve over 25 million customers in 46 states. Most of these are distribution agencies that purchase power from other sources. RECs own and maintain nearly 44% of the distribution lines in the United States, but currently only about 2% of the total generating capacity. Of the power distributed by RECs, 40% comes from federal sources, 33% is purchased from investor-owned utilities, and the remainder is produced by the 62 cooperatives (as of 1977) that own generating facilities. Power production by these generating cooperatives has increased annually at 13.5% during the period 1967-77. Increased REC attention to constructing their own generating capacity reflects both concern over guaranteeing future power supplies and the rapid load growth of rural systems [37]. These factors have also combined to increase REC interactions with other utilities, both investor and consumer owned, to jointly finance and operate generating plants. Consequently, although very few new distribution cooperatives have been formed in recent years, numerous umbrella agencies or "co-ops of co-ops" have been formed for generating ventures [38].

3.2 OWNERSHIP AND MANAGEMENT

The term "rural electric systems" denotes more than just cooperatives. There are organizational forms other than co-ops serving rural areas—e.g., privately owned utilities, public utility districts, state agencies—which qualify for assistance and loans from the financial institutions created to assist the process of rural electrification. However, less than 10% of REA borrowers fall into these other categories. The discussion here focuses on RECs, but in some cases the data and discussion reflect the presence of other organizational forms operating in rural areas.

REC capital assets are owned by a formal cooperative corporation created under state laws. Members of the cooperative contribute a membership fee entitling them to a connection to the distribution grid, and they pay for services purchased from the co-op. The conditions for membership are generally a written application, agreement to purchase energy from the co-op and comply with its bylaws, and payment of the membership fee. Surplus revenues above operating expenses may be distributed to the membership as patronage refunds or carried as "capital credits" based on the amount of services purchased. The membership fee and accumulated capital credits typically are returned in two ways—either through a rotating capital fund which refunds the credits in cash on a twelve- to twenty-year cycle, or to the deceased member's estate after his/her death. Because the assets are held by the cooperative, individual members are generally not liable for the debts of the co-op, but naturally stand to lose their capital credits and refunds as a result of mismanagement or legal liability for damages.

REC Boards of Directors are elected at an annual meeting of the entire membership, at which time basic policy directions for the year are also set [39]. Other special meetings may be called under certain circumstances, and in some cases the service area may be divided into administrative districts with regularly scheduled meetings. The Board of Directors usually meets immediately following the annual meeting to elect the co-op officers for the coming year. The Board meets regularly, but usually leaves day-to-day operational control and hiring of professional staff to the officers [40]. Most REC charters include provisions for removal of the officers or Board members for misconduct, and for nomination to the Board by petition of the members.

Delegates to the statewide associations of RECs are usually chosen by the Board of Directors at the annual meeting. These associations are financed by member dues and revenues from services rendered to the member co-ops. One delegate is also elected to attend the annual meeting of the National Rural Electric Co-operative Association (NRECA), which is preceded by annual meetings of the regional associations. NRECA is governed by a board composed of 46 state representatives. It performs numerous functions in the fields of training and education, technical assistance, lobbying in Washington, newsletters, information exchange, etc.

3.3 LEGAL ASPECTS

The powers that accrue to RECs derive from state law. Some state statutes antedate the creation of the Rural Electrification Administration in 1935, but most came later and were tailored to facilitate financing by the REA. This lends a certain uniformity and direction to the state statutes, but there are some differences in state legislation.

3.3.1 Eminent Domain

Under most state statutes, RECs are treated as quasi-public utilities, and are granted certain powers necessary to the operation of an electric distribution utility. These powers usually include the right of eminent domain. That is, RECs generally have the governmental power to condemn and take land, with compensation to the owner, for purposes of constructing generating facilities and transmission lines. In practice, however, land is usually obtained for these purposes through voluntary sale, lease, or easement. RECs usually are also empowered to use public ways and thoroughfares for distribution lines.

3.3.2 Taxation

RECs are not considered subdivisions or agencies of the state government, and do not have the power to raise money by taxation. As nonprofit organizations, RECs are generally exempt from state or federal income taxes, provided that no more than 15% of their sales are to nonmembers. They do pay state and local property taxes and sales taxes, which in 1977 amounted to more than $149 million for the more than 1000 RECs nationwide. REC members do not pay income tax on patronage refunds, but under certain conditions they can be subject to taxation of income from equity in the REC. Further detail on the tax treatment of REC members is beyond the scope of this report.

3.3.3 Limitations on Liability

Liability of the cooperative or its membership for debts incurred by the co-op or for damages caused by it is governed by state law. In general, REC bylaws contain provisions limiting membership liability to the amount of capital subscription in the co-op. State laws vary with regard to the liability of RECs for damages caused by their employees [41].

3.3.4 Statutory Preferences

Rural Electric Cooperatives are included in the statutory category of preferred customers for distribution of power from federally owned installations. These include the Tennessee Valley Authority, Bonneville Power Administration, and the Bureau of Reclamation [42]. Since 40% of the power distributed by RECs historically has come from federal sources that provide power cheaper than that available from privately owned utilities, these preferences have significantly lowered the cost of rural electrification. Limited potential for expanding hydroelectric capacity, however, places limits on the amounts of cheap federal power available to RECs. Spiraling demand means that self-generated power (plant wholly owned by distributing entity) and power purchased from investor-owned utilities or jointly owned plants are forming a larger proportion of the power distributed by RECs.

RECs generally also qualify for the services provided by federal and state agencies in the agricultural sector. This is particularly important in the financial sphere, as some REC programs are eligible for financing through the various components of the Farm Credit Administration and Farmers Home Administration (see Section 3.4). RECs may also act in conjunction with federal agencies in delivering other services to rural areas. For instance, Farmers Home Administration home insulation loans are being administered through some RECs, with repayments added to the monthly electric bill.

3.3.5 Competition

Organized under state statutes for rural electrification, RECs are generally granted territorial protection for their operations. This includes many states that do not regulate the RECs as electric utilities under the state Public Utility Commission. Substantial litigation involving RECs and investor-owned utilities has occurred over the years regarding disputes over service areas or expansion into new areas [43]. In most cases, these territorial disputes involve interpretation of state law and the actions of the state PUC in regulating competition [44]. Considered public utilities in many states, RECs may encounter some problems with recent judicial rulings limiting the antitrust immunity of public utilities in activities beyond the mere provision of electric power [45]. Likewise, the establishment of small energy producing organizations could create problems for RECs in terms of defending their territorial monopolies or load management strategies.

3.3.6 Statutory Constraints

Some adjustments in legislation or internal bylaws may be necessary to permit full REC utilization of renewable energy technologies. First, RECs are directed toward electrification: their empowering legislation and bylaws are oriented toward the provision of electric services. This may present some problems in incorporating renewable technologies such as solar space heating or biogas. In addition, most REC bylaws originally required that members agree, as a condition of hook-up, to purchase from the co-op "all electric energy used on the premises." This meant the disconnection of wind-electric generators that were quite prevalent during the 1930s. This provision has been changed in the Model By-Laws, and probably does not present a major impediment to residential wind-electric systems. However, other technical problems of interfacing may remain [46]. Second, in some cases state legislative adjustments have been required to permit joint action agencies for generating purposes among consumer or publicly owned utilities [47].

3.4 FINANCE

Financing patterns for RECs have become more diverse in recent years, with traditional actors adopting new roles. Historically, most of the loan capital for REC construction came directly from the Rural Electrification Administration within the Department of Agriculture. The terms of these loans were extremely favorable—35 years at 2%—so there was little incentive to go elsewhere. REA was therefore the primary source of debt capital for nearly all RECs.

The REA direct loan program funded through annual congressional appropriations was discontinued in 1973. It was replaced by legislation providing for REA-insured loans and REA guarantees of loans obtained from other lending agencies [48]. Under the latter program, REA guarantees loans to RECs by other lending agencies at terms negotiated by the lender and borrower. These are typically 35-year loans at 5%, with REA frequently holding a joint mortgage with the lender. The primary lending agency is the Federal Financing Bank within the Treasury Department, and many of the projects financed under this program involve large loans for generating plants. Between 1973 and 1978, the guaranteed loan program totaled about $8.6 billion.

Alternatively, REA issues insured loans from funds raised in private money markets and incorporated into a revolving fund for rural telephone and electrification projects. A

standard interest rate of 5% is charged for these loans, most of which are for distribution systems. A special rate of 2% is also available for borrowers in very sparsely settled areas. About 150 RECs now qualify for these hardship loans, which currently amount to about 10% of REA-insured loan disbursements. In addition, the REA Administrator can issue special 2% loans in cases of extenuating circumstances or extreme hardship, or where excessive rate increases would result from standard interest rates. Up to 1978, these insured loan programs had disbursed about $4 billion.

A major source of supplementary funding for RECs is the National Rural Utilities Cooperative Finance Corporation (CFC) which was created through NRECA and began operations in 1971. The CFC sells commercial paper to finance secured loans to NRECA members. Since 1971, nearly $950 million has been distributed in over 2300 long-term loans, and much smaller amounts have also been made available in short- and intermediate-term loans.

Another potential source of capital for rural infrastructure projects is the various programs assembled under the aegis of the Farm Credit Administration (FCA) by the Farm Credit Act of 1971. The three financial arms of the FCA are the Banks for Cooperatives, Production Credit Associations, and Federal Land Banks. The Banks for Cooperatives were originally established in 1933 to provide dependable credit for farmers' and ranchers' cooperatives. The system is organized into 12 regional banks and one central bank that provide assistance for large loans exceeding the lending limits of the regional banks. The Banks for Cooperatives are member-owned organizations that provide a variety of credit programs to aid eligible cooperatives in their marketing, production, or business services to rural areas, including rural utility services [49]. The Banks for Cooperatives presently supply a relatively small proportion of financing for rural electrification, with a cumulative total of less than 2% of financing from non-REA sources. They could, however, become a valuable source of additional capital for renewable energy projects. Their terms of reference would permit lending not only for electricity generation but also to rural co-ops engaged in providing other energy services in agricultural areas—e.g., biogas digestors and mechanical wind energy for pumping [50]. The borrower-owned Production Credit Associations were established to provide shorter-term (up to 7 years) credit to farmers, to any legal entities engaged in farm-related businesses, or to residents of small towns (less than 2500) in agricultural areas. Likewise, the Federal Land Banks and Associations were established to provide capital for farmers to purchase land. These banks are empowered to make loans for the acquisition of land by farm-related businesses, and rural consumer cooperatives could possibly use them to purchase land for energy production purposes.

Another potential source of rural credit within the Department of Agriculture is the Farmers Home Administration (FmHA). Originally created to provide loans to low-income rural families, the FmHA was expanded during the 1960s and early 1970s into a wide-ranging development agency that now channels nearly $11 billion per year into rural areas. Operating through nearly 2000 county and district offices, the FmHA provides credit to farmers, rural residents, and communities in fields ranging from community water and waste disposal to self-help housing. FmHA credit programs that might be relevant here include loans for community facilities, irrigation, rental and cooperative housing, and home ownership. The latitude built into these programs provides great flexibility to county and district officers, so that renewable energy projects could be incorporated into many FmHA programs. But, as in most decentralized organizations, implementation of national policy and willingness to innovate will vary greatly among local officials. The details of FmHA operations will not be elaborated on here, but the point is that these programs are at least theoretically available to assist in renewable energy projects in rural areas.

In addition to the agencies created especially to serve the needs of rural areas, RECs could also tap the traditional capital markets, such as the commercial lenders or bond markets. REA loans are available only for purposes specifically enumerated in the REA Act, and are generally confined to proven generating technologies. This may preclude certain types of renewable energy projects not directly related to the production of electricity, such as biogas production, district heating, etc. However, the RECs possess considerable latitute in this regard, as insulation and conservation can be justified as load management and fuel reduction techniques. Department of Energy grant funding may also be available for renewable energy experiments. Finally, REC access to less expensive capital has made them increasingly attractive partners for investor-owned utilities in jointly owned conventional generating plants serving as bulk suppliers to both urban and rural areas.

3.5 REGULATORY JURISDICTION

Regulation of RECs by state PUCs varies widely. As of 1978, only 24 states regulated RECs [51]. Four states (California, Louisiana, Minnesota, and South Dakota) have dropped regulation of RECs during recent years. The traditional rationale for minimal state regulation of RECs is twofold. First, regulation by the state PUC adds administrative and reporting burdens that can be quite onerous to small organizations. In some states, however, the burdens of regulation have been considered an acceptable trade-off for territorial protection of REC service areas against competition. Second, rate regulation is theoretically unnecessary for consumer-owned nonprofit organizations. There may be other facets of REC operations, such as discriminatory rate categories, criteria for membership, etc., that could be subject to abuses without PUC oversight, but these are felt to be minimized by the direct consumer controls built into RECs.

Federal agencies play a relatively minor role in the regulation of RECs. Jurisdiction of the Federal Energy Regulatory Commission (FERC) is limited to interstate sales of electricity, and therefore does not attach to RECs that perform only distribution functions. FERC jurisdiction theoretically would attach to generating co-ops that transmit power across state lines. But for the reasons discussed below, other federal agencies have generally left supervision and monitoring of REC operations to the Rural Electrification Administration. In the case of jointly-owned generating plants, FERC supervises only the wholesale rates paid by the REC for power purchases, and the rates charged by the investor-owned partners in the joint venture. Some further regulatory agency involvement with RECs may be imposed by the National Energy Act of 1978, but as of this writing the exact nature of that jurisdiction is unclear.

The minimal regulatory oversight of RECs exercised by FERC is largely due to the quasi-regulatory role played by the Rural Electrification Administration. As the primary funding agency for rural electrification, REA sets the criteria for eligibility by rural co-ops for its low-interest loans. These criteria relate to the availability of existing central station power, local needs, and the financial and managerial capability of the applicants. More importantly, REA's role as banker (now insurer and guarantor) gives it substantial leverage over REC operations. The REA also has jurisdiction over the rates charged by RECs that generate and transmit power for sale. The exact extent of REA regulatory authority is unclear, but it does closely monitor the operations of RECs and may exert great influence over decisions made by them.

Naturally, other regulatory agencies on both state and federal levels oversee the activities of RECs within their respective spheres of responsibility. These would include

environmental and consumer protection, occupational health and safety, labor standards, etc. In some cases, very small entities are exempted from these regulations, although many REC operations are now large enough that they do not qualify for such exemptions [52]. In the case of generating plants constructed by co-ops with REA financing, the National Environmental Policy Act of 1969 would designate the REA as lead agency in compiling the required Environmental Impact Statements.

3.6 SOCIAL/POLITICAL ASPECTS

Rural areas are unique in that many of the governmental services provided there were specifically designed to preserve the decentralized aspects and local control traditional to rural life. A primary objective of the service agencies and programs created during the New Deal era was preserving the quality and tenor of rural life. In many cases, these rural organizations are locally administered and controlled, with the local chapters electing representatives to state and national organizations. In the Production Credit Associations discussed above, only active borrowers have voting rights in the local chapters, preserving control in those with the greatest stake in the organizations. Thus, even the elaborate structures of state and national agencies built up to serve the rural areas maintain a firm foundation of grass-roots contacts. There is little direct evidence either proving or disproving that this system works up to theoretical expectations in the sense of producing greater participatory democracy or socially optimal allocation of resources. The rural organizations remain, however, the best operating model for decentralized administration of services.

Despite their appeal to advocates of decentralization, the Rural Electric Cooperatives have certain drawbacks as vehicles for implementing a decentralized energy supply system. First, the REC is an organizational form which, as currently constituted, has reached its statutory limits of growth. Very few RECs have been created during the past decade simply because there are very few areas of the country which are "not receiving central station service"—the statutory requirement for REA financing of new co-ops. In some cases, cooperatives could replace existing central station systems, but only under extremely rare circumstances wherein the existing system is unreliable and financially insecure [53].

Second, RECs were created in response to needs in rural areas and are confined to those areas. Some rural agencies require recipients of financing to meet certain criteria intended to restrict the programs to rural areas. Of the 1051 active and paid-up borrowers from REA, the overwhelming majority are located in the rural regions of Appalachia, the Upper Midwest, and the Southwest. Texas alone has 80 co-ops, or nearly 8% of the national total. The 16 states of DOE Energy Regions 5, 7, and 8 (roughly the Upper Midwest stretching from Ohio to Montana and bordered on the south by Colorado, Kansas, and Missouri) contain 509 RECs, nearly 50% of the national total [54]. The point here is that RECs are highly concentrated in rural areas and serve a relatively small portion of the national population. Although they are a potentially useful vehicle in those areas, their applicability in other areas is limited by statutory constraints on their operations and their funding sources.

Third, the RECs were created with a very narrow mission—electrification. During the past two decades, they have experienced a growth in load approximately one and one-half times greater than the electric utility industry as a whole. During this period, REC managers have focused primarily on the need for rapid growth in electric supply. Since 1973, ensuring fuel and power supplies has become more critical and more difficult [55]. This has, in turn, generally colored the REC perception of alternative energy sources, as

the paramount REC concern is electricity. Load management and peak shaving devices tend to receive the most attention, while renewable technologies are viewed mainly in terms of their potential contributions to power management. Solar water heating and space heating have therefore received less attention than conservation and insulation programs. Solar-electric technologies are generally regarded as too far down the road to merit immediate investment. Some RECs have taken a flexible and innovative approach to the changing energy situation, viewing themselves as vehicles to meet the total energy needs of rural consumers in the cheapest possible way, rather than strictly as electric suppliers. Yet attitudes toward renewable energy sources vary widely, and the majority of RECs have not moved vigorously into the promotion or installation of renewable energy devices.

3.7 EXAMPLES

Relatively few RECs have undertaken vigorous promotion of active solar technologies, but that small group of co-ops is the source of a number of innovative projects. This section presents a sampling of projects that illustrate REC uses of renewable energy to meet rural energy needs [56]. In general, RECs have emphasized conservation and passive design programs for load management rather than renewable technologies for supplementing electric generating capacity. Of those projects involving active solar technologies, the major emphasis has been on integrating supplementary solar equipment into existing electric systems. This orientation has produced various experiments with hybrid systems using electric back-up designed to provide both lower costs to the consumer and load management benefits to the REC.

The projects can be divided into four general categories. First, a number of RECs have experimented with crop dryers composed of solar collectors coupled to electric fans for air circulation and electric or gas back-up heat sources. Two South Dakota RECs (Kingsbury and East River) have cooperated with local agricultural extension agents since 1973 on solar-assisted corn dryers which have saved at least half the expected conventional fuel costs. Likewise, the National Rural Electric Cooperative Association (NRECA) has assisted two Georgia co-ops in the evaluation of experimental solar systems for drying corn and other grains. Plastic collectors inflated by electric fans provide heated air for a small temperature increment in bin-type dryers.

Second, experimental work has been undertaken on solar-assisted heat pumps. These are designed to enhance the efficiency of residential electric heating and to permit off-peak charging of thermal storage systems. The NRECA Research and Development Committee has funded demonstration of a heat pump water-storage system, and a number of RECs have participated in subsequent DOE-funded field tests of the system by 19 utilities around the country. A similar concept has been tested by the Lincoln Electric System of Nebraska and the East River Electric Power Cooperative of South Dakota.

Most REC experiments with renewable technologies for electric power generation have involved wind energy. The largest project is the $10 million MOD-1 system installed by the Department of Energy Wind Program for the Blue Ridge Electric Membership Cooperative in Boone, North Carolina. This system will eventually generate up to 2.5 MW peak capacity, and it is the first of the large-scale wind-electric machines planned by DOE. Smaller wind projects are under way in Texas (25-kW irrigation pumps) and Iowa (electricity to power residential resistance heating). Conversion of conventional fossil-fueled plants to wood-burning generation is also receiving attention. The Minnkota Power Cooperative of North Dakota has begun investigating the feasibility of using wood chips from local forests as fuel for a small generating plant. The Lea County Electric

Cooperative of Lovington, New Mexico, has recently been chosen by the Department of Energy for a photovoltaic demonstration project involving a 150-kW (peak) installation for a new shopping center.

Finally, a major REC experiment with renewable energy is the Basin Electric Cooperative's headquarters building in Bismarck, North Dakota. Basin Electric is an umbrella generating agency composed of RECs in eight states. The 67,000-square-foot showpiece building, begun in 1977, uses both passive design concepts and a supplementary active solar water heating system to meet a portion of winter heating requirements. Basin Electric has also conducted courses on energy and environment for local schools, including lectures on conservation and future sources of energy.

3.8 CONCLUSIONS

The Rural Electric Cooperatives were created to fulfill the specific function of providing electric service to sparsely settled rural areas where electrification was both costly and sorely needed. In the ensuing four decades, an organizational and legislative structure has been created to facilitate the accomplishment of the RECs' electrification mission. This framework includes state and national support agencies, financial institutions, preferences on sales by governmental generating agencies, and certain regulatory actions. The REC model was designed to implement decentralized and participatory organizations that would preserve the rural way of life. The REC structure therefore stresses the grass-roots participation and democratic control features that also underlie proposals for dispersed, renewable energy systems.

Four potential roles for RECs in renewable energy are possible. The first is the creation of new RECs using renewable technologies in their electric generating systems. The REA requirements for formation of new RECs—low population density and lack of existing central station service—eliminate all but a few extremely remote areas as candidates. Statutory and regulatory constraints thus indicate that the present REC model has nearly reached its upper limit of expansion. Very few new RECs will be formed in the near future, so that renewable energy initiatives would be better focused on existing RECs.

Second, existing RECs present certain advantages as organizational vehicles for implementing renewable energy systems. Because of their close contacts with member/consumers, the RECs are uniquely suited to diffusing new energy concepts in rural areas and to assisting customers with conservation and renewable energy projects. Moreover, the RECs have strong traditions of self-reliance, ingenuity, and grass-roots decision making that could facilitate rapid adaptation to renewable energy. Indeed, this adaptation has already begun. REA has eliminated the requirement that customers purchase all energy from the co-op, and the examples cited above indicate that innovative REC experiments in renewable energy are already under way [57].

Third, regulatory changes could permit a more active REC accommodation of renewable energy technologies. This strategy would require formal statutory enlargement of the REC mission from strictly a supplier of electric energy to an integrated energy supplier for rural areas. RECs would thereby be allowed to participate in nonelectric energy production ventures, such as biogas or bioliquid production plants using agricultural wastes. The REC could also provide services such as rural energy use studies, technical assistance in renewable technologies, and financing for customer purchases of renewable systems. Similarly, REC procedures and regulations could be altered to permit small associations formally incorporated as energy suppliers (e.g., district solar heating in

towns) to work in conjunction with RECs and to receive back-up electricity. Corresponding changes would be required in support organizations established to assist rural residents, such as the REA, Farm Credit System, and Farmers Home Administration. The rationale for this strategy is that the RECs are proven organizations that serve a significant portion of rural America, including many areas where renewable energy resources are both diverse and abundant. Federal policy and regulatory changes could greatly accelerate REC use of renewable energy technologies.

Finally, the REC model could be a pattern for new energy supply organizations. It could be applied to both urban and rural settings, and would be particularly applicable to remote locations. The REC model could also be used for organizations supplying non-electric energy services in areas presently served by electric utilities.

SECTION 4.0

MUNICIPAL UTILITIES

4.1 OVERVIEW

Traditionally, most governmental services in the United States have been delivered by local agencies. This section examines the potential for implementing renewable energy technologies owned and managed by local public agencies. State or federal agencies are omitted because they do not meet the decentralization criteria of formal accountability and control by consumers at the local level.* This section focuses rather on local entities—county agencies, public utility districts, and municipal utilities [58]. Much of the discussion centers on municipal electric utilities because of their experience and relevance to the energy field, although it should be kept in mind that other types of local agencies may also be suited to delivering renewable energy services.

This section encompasses various types of special purpose districts, which are political corporations relatively independent of other local government units, generally with limited geographical scope and specific functional purposes [59]. These units of local government have an almost infinite variety of functions, structures, and powers. Most directly relevant to the energy field are Public Utility Districts (PUDs), which were initially created for irrigation purposes and later used to distribute hydroelectric power obtained from the irrigation dams. Twelve states, mostly in the West, now have enabling legislation permitting the formation of Public Utility Districts [60]. The PUD can provide flexibility in setting boundaries on the service area and can be used to serve low-density areas too small to justify municipal incorporation. Another hybrid with potential for renewable energy applications is the special assessment district, which is usually created and controlled by an existing municipality for differential taxing purposes—viz., special property tax assessments for areas that benefit from special governmental improvements or services.

Local government agencies initially began providing energy services, particularly electricity and gas, because of the capital-intensive nature of the production and distribution equipment. Municipalities, particularly smaller cities in agrarian areas not served by investor-owned utilities, were the principal market for suppliers of electric generating equipment during the early part of the century [61]. By 1923, there were nearly 3000 municipal electric utilities in the United States. This number shrank during the 1920s because numerous utility holding companies aggressively bought out municipals. However, municipal electric utilities increased in number during the New Deal years because of general public antipathy toward the abuses perpetrated by the holding companies, more efficient diesel generating technology, and the preferential rates on power obtainable from new federal generating agencies like the Tennessee Valley Authority and Bonneville Power Administration. Today, publicly-owned electric utilities remain a critical component of U.S. energy supply. As of early 1979, there were over 2100 municipal electric utilities, as well as another 122 state, county, and PUD entities.

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*This study likewise excludes the regional federal power agencies (Tennessee Valley Authority, Bonneville Power Administration) which operate centrally managed electric generating networks covering multistate service areas. This is not meant to imply, however, that such agencies will not play a central role in the application of renewable energy technologies to the nation's energy needs.

Together, they served over 11 million electricity customers (13.5% of the national total). These utilities had a generating capacity of over 49,000 MW_e (9% of the national total) and electric operating revenues of over $6.5 billion [62]. About 900 of these municipal utilities generate all or part of their electricity, and 25 of them sell wholesale power to other distribution systems. The remainder are strictly distribution utilities, purchasing power from privately owned companies or from the various federal power suppliers. Municipal electric utilities are generally quite small and located close to the consumer. Eighty-five per cent of them serve cities of less than 15,000 population [63].

Uncertain supplies from traditional wholesalers have forced many municipal electric utilities to devote increasing attention to securing future electric power supplies. This has led to an emphasis in recent years on joint-action generating agencies to share electric capacity additions. Although the highest priority is supplying electricity, municipal utility interest in conservation and renewable sources of energy is widespread. The solar utility concept, in which solar devices are purchased, owned, and maintained in individual residences by the municipal agency, and the costs are added to the consumer's monthly electric bill, is attracting increasing attention as a device for solving the problems of the high first costs and technological risks of solar systems [64]. As with cooperatives, there are numerous models and functions through which public agencies could assist in diffusing renewable energy technologies.

4.2 OWNERSHIP AND MANAGEMENT

The fundamental features of municipal utilities are ownership by the sponsoring governmental unit and capitalization by government investment or government-backed long-term debt. Consumer control is effected through local agencies responsive either directly to the public or indirectly to their elected representatives. Operational responsibility may reside in an agency of the municipal government, in a separately chartered public corporation, or in a joint public-private venture [65].

Municipal utilities are operated much like investor-owned utilities, with a professional staff under the overall policy direction of a Board of Directors. The Board may be chosen either through appointment by elected officials or through direct elections, generally on a city-wide basis. Reform legislation deriving from the turn of the century often imposes constraints on municipal utilities that occasionally conflict with efforts to minimize costs (see Section 4.3) [66]. In many states the municipal utility is regulated solely by local officials, so that utility managers must remain sensitive to the local political environment.

It would be misleading to assume that municipal utilities operate solely within city boundaries. Some generating municipals act as power wholesalers to surrounding areas, and some directly serve customers outside the municipality. Many municipal electric utilities are quite small and dependent upon bulk suppliers whose ability to meet new power demands is diminishing. Consequently, joint ventures among municipal utilities to ensure power supplies at the lowest possible cost are becoming more commonplace. Joint action agencies seek to capture economies of scale in purchasing, to provide more integrated and reliable power, to coordinate their future expansion, and to construct generating plants. These joint ventures commonly take the form of regional agencies composed of municipal utilities and RECs, such as the Missouri Basin Municipal Power Agency. In many states, formation of joint agencies has required special enabling legislation. During the past five years, numerous states have begun to permit joint action agencies among municipal electric utilities, as well as operations outside municipal boundaries [67].

There are a number of state, regional, and national associations that provide various services to municipal utilities, such as information exchange, technical assistance, and publications. These service agencies are particularly valuable to small rural municipals which otherwise could not maintain contacts with utility developments elsewhere. At the national level, the American Public Power Association (APPA) represents more than 1400 publicly-owned utilities in 48 states and U.S. territories. In addition to disseminating information through conferences and publications, the APPA also performs lobbying, technical assistance, and public relations services for members. The APPA has become increasingly active in energy conservation activities and now maintains both a full-time Energy Conservation Representative to work with members on their programs, and an Energy Conservation Information Exchange. The APPA Matching Grant Program funds innovative research projects, such as load management, municipal wastes as fuel, and solar heating ventures. Other national associations of local government officials, such as the National Association of Counties, National League of Cities, and U.S. Conference of Mayors, have initiated energy projects in recent years.

4.3 LEGAL ASPECTS

4.3.1 General Legal Considerations

As a political subdivision of the state, the municipality is a creature of limited powers. Any activities undertaken by it must be authorized by the state legislature and contained in the city charter. In most states, authorization to operate municipal electric utilities includes a broad grant of power to acquire property for ancillary purposes, but often does not expressly include other types of energy operations, such as district heating or biogas distribution. Recent amendments to state enabling statutes, however, typically include specific references to solar, wind, or geothermal systems [68]. Some states also confer the right to purchase or condemn the property of privately owned utilities within the city's boundaries, provided compensation at fair market value is awarded to the utility. Likewise, the municipality may, depending upon the terms of the existing utility's franchise, also compete in the provision of utility services, or provide for "new services" through a municipal utility (see Section 4.3.4.).

The provision of municipal services generally subsumes other powers. For example, property may be acquired by exercise of eminent domain—the condemnation and taking of private property, with compensation, for public purposes. In some cases, recent state legislation also permits the condemnation of property outside the boundaries of the political subdivision if that land is necessary for the operation of municipal or Public Utility District generating facilities [69]. This power could facilitate development of renewable energy systems based on intermittent local resources that have unusually large land requirements. Municipalities generally enjoy immunity from suit for governmental actions, although a city operating a generating plant generally does so in its private proprietary capacity and, in the absence of specific legislation, may be held civilly liable for resulting damages [70]. Individual citizens are, of course, not personally liable for the actions of the municipality, but may be subject to higher rates to finance renewable energy experiments or pay damages incurred by the utility.

Although the municipality has substantial leeway to act for the welfare of its citizens, there are also numerous statutory constraints on public agencies. Most of these prohibitions originated around the turn of the century in response to situations of flagrant corruption in which cities were incurring debt far beyond their capacity to repay, primarily for the benefit of private corporations. First, most states severely restrict the municipality in lending its credit to private developers or undertaking projects that do not exhibit a clear public purpose. These restrictions could inhibit municipal experiments in joint public-private enterprises in renewable energy, or in ventures that benefit only a limited class of citizens. Second, in some states municipal utilities are regulated by the state Public Utility Commission (PUC). To facilitate regulation and rate-setting, state PUCs generally impose strict accounting and reporting standards on regulated utilities. These can create administrative burdens, especially for small municipal utilities. Likewise, a regulated public utility must conform to state statutes regarding nondiscriminatory service and duty to provide adequate service, and may not discontinue operations without PUC permission. Third, state and local ordinances often regulate competitive bidding in purchasing, affirmative action in hiring, and other employment conditions. In summary, the municipal utility model possesses flexibility and the powers of a governmental agency, but there are corresponding constraints on its operations.

4.3.2 Taxation

Governmental agencies are obviously exempt from local property taxes and do not pay federal or state income taxes. Interest on loans or bonds of a municipality are tax exempt to the holder. Public Utility Districts receive similar exemption from taxation. PUDs also usually possess the power of levying property taxes within their service areas in order to finance their operations. The taxing power is only infrequently used by PUDs and municipal utilities, however, as capital is generally raised through revenue bonds or retained earnings. Recent proposals for municipal solar utilities generally incorporate utility ownership of the residential solar heating devices, so the units would not be considered taxable property to the consumer.

4.3.3 Statutory Preferences

Since the New Deal era, municipal electric utilities have been the beneficiaries of statutory preferences on the sale of federally generated hydropower (see Section 3.3, supra). Although this cheap federal hydropower can no longer meet expanding demand, municipals that convert to solar energy for the majority of energy needs could still rely on historic levels of federal power for back-up purposes.

The Public Utility District, as an outgrowth of irrigation districts that followed river systems, frequently has the statutory advantage of being expressly authorized to operate across existing political boundaries. Municipalities may occasionally be split, and relatively small areas can be served by PUDs delivering particular energy services. This aspect makes the PUD model a promising vehicle for renewable energy systems serving less than entire municipalities.

4.3.4 Competition

Municipal renewable energy installations could elicit certain issues involving competition with existing state-franchised electric or gas utilities. These issues could surface in two

contexts. First, in the roughly 60 cities where both municipal and investor-owned utilities operate within the municipal boundaries, competition issues could arise where the municipal utility distributes renewable energy devices to that part of the city served by the private utility. Second, in cities served entirely by investor-owned utilities, potential conflict could derive from attempts by the municipality either to establish a solar utility or to replace the existing investor-owned utility in distributing electricity. The complex Constitutional issues involved will not be elaborated in detail here. Generally, however, the grant of a franchise to a private utility does not imply a contractual obligation to foreclose competition by the municipality [71]. In the case of renewable energy devices, particularly those that supply energy in some form other than electricity, it could be argued that the municipality is providing a "new service" that does not intrude upon the franchise granted to the private electric or gas utility. If the municipality does disenfranchise the private utility, the issues of due process and just compensation for the taking of private property must then be confronted.

Another potential competition issue derives from federal antitrust legislation. Historically, municipal utilities have been considered immune from prosecution under federal antitrust statutes because of the "state action" doctrine that these statutes were not intended to prohibit anticompetitive activities undertaken at the direction of the state. However, City of Lafayette v. Louisiana Light and Power, a recent Supreme Court case, held that this immunity for municipalities was not automatic, but would be granted only "pursuant to a policy to displace competition with regulation or monopoly public service" [72]. Further litigation will be necessary to clarify the extent of this holding. It is clear, however, that in recent years the Supreme Court has severely restricted the antitrust exemptions of public utilities, particularly when anticompetitive activities are only ancillary to their major functions or are not specifically mandated in their charters. Municipal utility purchase or sale of renewable energy devices (especially if these were mandated for residential use) might therefore be challenged under existing antitrust legislation if these activities were not supported by a specific state mandate or explicit expression of state policy.

4.4 FINANCE

Municipal utility activities may be financed through retained earnings, sales taxes, municipal bonds, loans, and federal or state grants [73]. Most recent municipal utility experiments involving renewable energy technologies have been financed by federal demonstration grants (see Section 4.7). This section, however, focuses on the municipal bond market, which will be the most likely channel for funding renewable technologies once they have moved beyond the demonstration stage.

There are two broad categories of municipal bonds, each of which subsumes numerous variants—general obligation bonds and special obligation bonds. Repayment for general obligation bonds is assured by the full faith and credit and taxing power of the issuing entity. Special obligation bonds are paid either directly by the persons who benefit from the improvement, or from the revenues of the facility built, acquired, or repaired with the bonds. Early municipal electric generating plants were financed through general obligation bonds, which carry less risk to the investor, but most recent projects have utilized revenue bonds [74].

Three general hurdles must be surmounted in issuing municipal bonds for renewable energy facilities: authorization to issue that type of bond, a public purpose for the proceeds of the issue, and qualification for tax exempt treatment of the interest payments.* The authorization hurdle requires that power to incur such debt must be expressly stated either by statute, ordinance, or constitutional provision. The public purpose requirement prohibits issues benefitting private persons or limited classes of citizens. Various judicial tests have been applied to establish public purpose, including benefits available equally throughout the location, service or commodity needed by a large number of people, direct or immediate public impact, general service to society by benefitting these individuals, and emergency status or need. Incidental benefit to private persons will not prevent the issue so long as the fundamental purpose is the general welfare. Allowable issues vary widely by state, and judicial construction of the relevant statutes on a case-by-case basis is often necessary to determine the legality of each issue. Finally, the attractiveness to investors of municipal obligations (including loans) derives from the tax-free status of the interest payments. Qualification under IRS regulations for tax-exempt treatment is therefore critical in obtaining capital.

Various types of special obligation bonds could be used to finance renewable energy facilities. These include, for example, revenue bonds, assessment bonds, industrial development bonds, and housing mortgage bonds. Revenue bonds are repaid through revenues generated by the facility, so that the beneficiaries pay for the project. Assessment bonds confer a benefit on a particular community or area, and are repaid through taxes on the enhanced value of the property benefitted. Industrial development bonds are used to construct facilities to attract private industrial enterprises and are repaid from the revenues of those enterprises. Some states limit the types of industries that may utilize industrial development bonds, and qualification for tax-free interest similarly depends upon the activity for which the issue is raised. Housing mortgage bonds are secured by a mortgage upon the facility being constructed or rehabilitated.

State statutes vary widely on the availability of bond issues for renewable energy facilities. A recent survey of five states (California, Florida, Illinois, New Mexico, and New York) explored some of these differences [75]. General obligation bonds are applicable to most types of renewable energy facilities, and could be perceived by less risky by investors for projects involving unproven technologies. Availability of assessment bonds varies not only by state but also by the type of technology to be employed. Industrial development bonds range from being highly available in New Mexico to totally unavailable in California. Of the five states reviewed, only three (California, Illinois, and New York) provide for housing mortgage bonds, and the language of these three statutes is quite dissimilar [76].

In summary, state and municipal laws vary considerably regarding municipal financing, so bond issues to finance renewable energy projects would require careful scrutiny of local statutes. Moreoever, outstanding bond issues for existing electric facilities may also impose limitations on new issues [77]. Although these statutory hurdles can present difficulties, bond financing of renewable energy facilities appears less a problem of specific barriers than one of uncertainty and attempting novel solutions. Statutory adjustments may be required in some cases, but state policy declarations encouraging conservation and new energy sources should facilitate financing of renewable energy systems as legitimate local activities under existing legislation.

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*This section does not discuss the fourth, and in many cases most critical, condition—approval by the voters.

4.5 REGULATORY JURISDICTION

Municipal utilities have been exempted from PUC regulation in many states on the theory that the direct political accountability of city officials and the absence of a profit motive remove the need for regulation. Rate setting and policy direction are therefore left to local political officials. Only 20 states today regulate the rates of municipal electric utilities, and six of these regulate only rates for sales outside the municipal boundaries [78]. This same group of states also generally regulates safety standards, voltage levels, and interconnections, and requires certificates of public convenience and necessity for municipal electric utilities. Some state securities commissions regulate sales of securities and other types of indebtedness by municipal utilities [79]. The Federal Energy Regulatory Commission (FERC) regulates interstate sales of electricity but lacks jurisdiction over generation or distribution of electricity in intrastate commerce or where the power is consumed solely by the transmitter [80]. The National Energy Act of 1978 prohibits certain electric utilities from installing or supplying residential solar heating or cooling devices, but it is unclear to what extent this prohibition affects municipal utilities and co-ops [81].

There are various other areas in which energy production organizations may be regulated by state agencies—safety standards, labor relations, environmental protection, etc. In addition, the municipal utility is subject to additional regulation because of its status as a government agency. These constraints were mentioned in Section 4.3.1, and could also include legislative sunshine laws, conflict of interest legislation, environmental protection legislation, and so on.

Finally, the question arises as to whether the introduction of renewable energy devices by municipal utilities would trigger additional regulatory jurisdiction by the state PUC or other state or federal agencies. Renewable energy technologies for generation of electricity would not effect PUC regulation of municipal utilities if only retail sales to city customers were involved. However, land-use requirements for renewable systems might trigger additional environmental regulation. A solar municipal utility selling or leasing dispersed renewable devices, such as solar water heating units, could be considered sufficiently affected with the public interest to trigger PUC regulation. Such regulation could place additional administrative or reporting burdens on the solar utility. On the other hand, PUC regulation could facilitate the creation of municipal solar utilities by providing standard procedures, rules of operation, and examples.

4.6 SOCIAL/POLITICAL ASPECTS

The case for municipal utilities as vehicles for decentralized energy supply could rests largely on the technical and economic benefits attainable. Because municipalities provide various services to their citizens, there are opportunities for multipurpose projects, such as using urban wastes for electric generation or biogas production, that could lower total municipal costs for all services. Most cities have water and public works departments that contain the skilled personnel necessary for installation and maintenance of certain types of renewable systems, especially water heating. Public agencies have consistently supplied electric power at lower costs than investor-owned utilities [82].

A municipal solar utility renting or leasing residential solar equipment, would permit a municipality to assume the burdensome first costs of the systems and the technical risks of installing and maintaining new technologies. Likewise, this tactic could remove from the residential energy consumer the risk of lowered resale value of the house. Reduced energy costs could be spread more equitably than through mechanisms like tax incentives, which tend to benefit only the middle classes who can afford the capital costs. Low-income people and renters could thereby also benefit from municipal involvement [83].

The municipal utility also has many attributes that mesh with decentralist premises of social organization. Municipal renewable energy production facilities would be proximate to the ultimate consumers, making energy supply and its costs more visible and understandable to them. Consumer control would be maintained through the local political process, and the reduced distance between clients and the service bureaucracy could facilitate direct consumer participation in policy formulation. Municipal electric utilities generally take great pride in their record of service to the community, an attitude reinforced by a continuing sense of price competition with investor-owned utilities. This orientation could foster a spirit of innovation, sensitivity to consumer needs, and a willingness to serve the total energy needs of the municipality rather than merely to provide electric power.

On the other hand, potential drawbacks of municipal utilities should also be mentioned. On the financial side, energy utilities are but one of many municipal services, and policy decisions regarding energy may be influenced by political considerations or the needs of other municipal service agencies. For example, prior to 1973 most electric utility operations were generating substantial surpluses which were used as general revenue in lieu of taxes. Loss of this profit and desire to make electric utilites self-supporting could discourage innovation by focusing attention on short-term benefits—obtaining electricity at lowest current cost through purchasing shares in conventional large-scale generating plants. Second, equity considerations may impede innovative renewable energy projects because not all customers would benefit equally, or because present customers may be unwilling to finance novel projects whose benefits would be enjoyed primarily by future customers.

Moreover, it is unclear to what extent the indirect consumer control exercised through local elections actually result in the benefits claimed by decentralization advocates (e.g., responsiveness, accountability, client satisfaction). In larger cities where many thousands of customers are served by municipal agencies, minority complaints have frequently centered around the unresponsiveness of these municipal agencies. Many of the urban decentralization conflicts of the late 1960s involved demands for control of services on a neighborhood, rather than municipal, basis. In short, some municipal utilities as now structured simply may be too large to reap the theoretical benefits of decentralization. Municipal utilities in general have claimed to suffer from uncompetitive pay scales, fragmented authority that discourages innovation or responsibility, career civil service considerations of employees, and a lack of continuity by political officials setting policy [84]. Whatever the merit of these claims, the organizational responsiveness of local government agencies is a key issue in decentralization proposals.

4.7 EXAMPLES

Municipal utility involvement in energy-related activities spans the entire spectrum from conservation to nonconventional generating technologies. Detailing those varied

activities will not be attempted here [85]. Rather, this section will outline briefly the major types of energy activities performed by local government agencies, indicating certain communities which have undertaken successful projects.

Municipal energy activities can be divided into four basic categories. First, since 1973 many governmental agencies have begun comprehensive local energy planning. These planning studies usually include inquiry into local energy use by sector, the cost of supplying energy services, and the portion of such expenditures that depart the community, and alternative energy supplies that in the future could stem this drain on community resources. In Portland, Oregon, and Carbondale, Illinois, this process began in 1978 and has produced numerous proposals for municipal actions to promote energy efficiency and to facilitate use of local renewable resources. Community participation has been an important feature of these energy planning activities, as in Franklin County and the City of Northampton, Massachusetts. Such participation assists in diffusing information on energy use, in building commitment to the new plan, and in ensuring that all segments and viewpoints within the community are represented in the planning process. Public involvement in these cases has raised citizen awareness of energy problems and induced individual conservation efforts with significant cumulative impacts on city energy consumption.

The second category, conservation, is probably the most prevalent type of municipal energy program. It is the threshold step following which some local governments have undertaken more extensive energy planning and experiments. The city of Davis, California, the first and among the most innovative U.S. cities in energy management, initially became involved in energy planning through a 1975 debate over a proposed conservation amendment to the city building code. The political controversy surrounding that ordinance made energy a prominent local issue and has since produced a number of energy initiatives. Likewise, in 1976 the Seattle, Washington, City Council rejected participation by the municipal utility in a nuclear generating venture in favor of a vigorous conservation policy and reliance on hydropower. More than 30 specific programs have since been implemented by Seattle City Light in the field of conservation and renewable energy. Similarly, nearly all municipal utilities now have conservation programs designed to reduce electricity consumption, and many cities are re-examining local building codes and energy usage by municipal facilities. From conservation it is a short step to investigating the potential benefits of renewable energy strategies to the community.

A third category of local government energy activity is operation of nonconventional technologies by municipal utilities or PUDs. Ames, Iowa, is one among a growing number of cities that have begun using garbage or agricultural residues as fuel for municipal electric generating plants [86]. Faced with increasing costs and a cut-off of natural gas supplies for its municipal generator, the city of Bridgeport, Texas, commissioned a complete switchover to solar-thermal electricity. Similarly, Clayton, New Mexico, generates a portion of its electricity from a 20-kW windmill under a DOE demonstration program. In 1977, the city of Springfield, Vermont, voted to condemn the facilities of the local privately owned utility, issuing municipal bonds for the creation of a municipal utility using nearby low-head hydropower as the supply source.

A fourth category of local government activity is the creation of a municipal agency (or special programs within the existing municipal electric utility) for the purpose of providing nonelectric energy services to the community. The first example of a "solar utility" was developed in Santa Clara, California, a city of just under 100,000 population that operates its own water and electric utilities. With federal financial assistance, in

1975 the city began installation of a solar heating and cooling system on a municipal recreation center. This was followed by a solar utility which installed solar heating units for swimming pools and has now begun experimenting with residential and commercial solar water heaters. The municipal utility owns and maintains the solar units for which the customer pays an installation fee and a monthly rental charge. The California Energy Commission and the California Municipal Utilities Assocation have jointly sponsored a series of workshops to discuss the Santa Clara experience, and a number of other California cities are currently investigating the feasibility of a similar solar utility approach [87].

4.8 CONCLUSIONS

Most municipal electric utilities today face higher costs and uncertain future power supplies [88]. Conservation and electric load management have therefore become the highest priority for municipal electric utilities. Until very recently, most municipal experiments with nonconventional technologies have been funded by the federal government [89].

Nonetheless, municipalities possess great latitude in providing for the public welfare. Municipal agencies could participate in renewable energy projects in numerous ways. Existing municipal agencies can be useful channels for distributing information on conservation and renewable energy. Cities deliver many types of services and have personnel in various agencies with skills that could be applied to local energy programs. This flexibility and breadth of experience present opportunities for innovative multipurpose projects involving new fuels for conventional electricity generating plants, new agencies delivering nonelectric energy services, or integrated systems providing multiple energy services. This potential is reinforced by the values and rhetoric that permeate municipal utilities—emphasizing the superior responsiveness to consumers and lower average costs than profit-oriented organizations.

Many municipal utilities serve fewer than 10,000 customers and are therefore quite accustomed to small systems and small-scale operations. For this reason, they are often both spatially and politically quite close to the ultimate consumers. The value of this minimal distance between consumer and service agency is recognized in federal policy encouraging local energy planning [90]. Likewise, the financial resources available to the municipality would permit public finance of the capital cost of the renewable energy systems, with the city assuming the economic risk of the new technologies [91]. Small cities with existing municipal utilities present the advantages of organizational structures already in place, as well as proximity to the ultimate consumer of the energy services. Small municipalities could therefore serve as demonstrations for the local energy planning and management techniques that would be a necessary part of a national energy decentralization strategy. Municipal generating utilities could implement nonconventional generating technologies, but the distribution utilities could also play a key role in complementary programs such as space and water heating, conservation and load management, and recycling of wastes. Municipal utilities in larger urban areas could spin off new agencies or nonprofit corporations to assist residential consumers in purchase or maintenance of renewable energy devices. The latitude enjoyed by most cities in providing public services permits a wide variety of organizational arrangements, although some federal and state regulatory adjustments may be necessary to enhance this flexibility.

For those municipalities served currently by investor-owned electric generating utilities, various renewable energy strategies are conceivable. First, new municipal agencies could be created to deliver nonelectric energy services. This could include solar water and space heating equipment, biogas, or waste recycling systems. Competition issues involving the existing franchised electric utility could present problems, although close coordination with the electric supplier would obviously be advantageous to both parties. Second, the municipality could create joint ventures for energy production with other government agencies or with private corporations in such areas as cogeneration, energy from wastes, or integrated energy systems. Finally, municipal takeover of private utility distribution equipment within the city limits has been suggested in recent years as costs of electricity have escalated. This strategy could comprise one component of an integrated community energy plan but has the drawbacks of high capital costs and controversial, difficult political dynamics. This section has obviously only scratched the surface, but the municipal energy agency is a field ripe for innovation and experimentation.

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SECTION 5.0

CONCLUSIONS

The recurring energy supply crises of recent years have prompted a fundamental re-examination of U.S. energy strategies. Spiraling petroleum prices have underscored the compelling need to reduce U.S. energy consumption habits and locate new sources of energy. Higher prices frequently elicit criticism of existing energy supply organizations. Energy shortages have reinforced many citizens' belief that they lack control over institutions delivering goods and services on which they have become dependent.

These strands converge in proposals for a decentralized U.S. energy supply system based on renewable resources. Reduced reliance on foreign energy sources implies maximum utilization of available domestic resources and firm commitments by consumers to energy conservation. To reach the former objective, it is critical to utilize fully the energy resources available in each region. To reach the latter, consumers must be aware of the methods and costs of producing energy. Renewable resources are abundant but highly varied by region, and they lessen the need for distant, centrally directed supply organizations. Because no national policy can be responsive to the infinite variety of local conditions, the importance of a "bottom-up" approach to energy planning is becoming increasingly apparent to policymakers [92]. Local energy planning theoretically produces a more open and informed policy process, because information and citizen involvement are spread throughout the society. Other presumed benefits of a locally based energy policy include shorter lead times for policy implementation and construction of hardware; smaller issues more susceptible to resolution; and empirical results that are direct, immediate, and understandable to consumers. Recent experiences with community energy planning indicate that consumer awareness of conservation practices is heightened by participation in debates over energy issues, permitting substantially reduced energy usage. A national policy of energy decentralization would attempt to capture these types of benefits, just as earlier energy policies attempted to capture the economies of scale available from centralized electrical generating plants.

For these reasons, this report has examined the potential for energy supply based on renewable resources and effected through local consumer-controlled organizations. The three models presented here—cooperatives, Rural Electric Cooperatives, and municipal utilities—are not intended to be exclusive, for new forms are continually evolving out of local energy experiments. They do, however, present a broad range of consumer ownership and control options and are basic models on which variants could be patterned to meet particular local conditions. They differ widely along many dimensions, but all have been used in previous renewable energy projects. These differences are summarized in Table 5-1.

The general-purpose cooperative is adaptable to a wide range of functions in delivery of energy services to members. It can serve very small neighborhood groups and offers the best opportunity for direct consumer participation in the service agency. Co-ops can be useful vehicles for fostering community cohesion. New sources of financing and technical assistance are becoming available for cooperative organizations in urban and suburban areas. Member-run enterprises are difficult to organize, however, and difficult to manage because of inexperienced or part-time personnel and economic inefficiency due to their small size. Expansion can be undertaken too rapidly, thereby losing the community focus and face-to-face interactions that mark small cooperative efforts.

Table 5-1. SUMMARY OF ORGANIZATIONAL ATTRIBUTES

Attributes	Co-ops	RECs	Municipal Utilities
Ownership	Consumers Through Corporate Structure		Public Agency
Management	Consumers	Professional	Professional
Eminent domain	No	Some states	Yes
Taxation Raise funds Income exempt	No Patronage refunds	No	Yes Interest
Member liability	Up to share capital and patronage refunds		Governmental immunity
Statutory preferences	Agricultural; filing and fees	Federal power	Federal power
Competition	With investor-owned utilities	State franchised	With investor-owned utilities
Statutory constraints	On voting, structure, etc.	Rural areas	Hiring, bids, etc.
Existing channels	Refunds; equity; private; NCCB	REA; federal financing bank; CFC banks for co-ops	Bonds
Regulatory agencies	Business	REA; some state PUCs	Some PUCs; FERC
Social/political aspects	Recent popularity	Electrification mission	Flexibility; local political control

The Rural Electric Cooperatives are proven energy delivery organizations with clearly defined missions and state-franchised service areas. The financial and technical support structure surrounding REC operations (legislation, funding arrangements and agencies, technical assistance agencies) is well established and effective. The REC's greatest advantages are its close contacts with consumers and tradition of innovation in rural areas. RECs are thus well suited to consumer education and information dissemination tasks and would generally inspire consumer confidence when undertaking new energy strategies. The major disadvantages of the REC form are its narrowly defined mission in electrification, the consequent focus on electric generating technologies, and the limitation of expansion because of statutory constraints on areas served by RECs.

The municipal utility model is an existing organizational structure with a well defined mission, procedures, and support structures. Local government agencies have the additional advantages of flexibility under the police power, lack of PUC regulation in most states, access to relatively cheap sources of capital, and generally high consumer confidence. The disadvantages of this form are the constraints imposed on governmental agencies and the possible intrusion of local politics in utility operations. The size of municipal utilities varies greatly, but most are located in small cities and rural areas, so that the total population served by such organizations is small. Like the REC, the municipal electric utility has a somewhat limited mission but may provide a model for new agencies devoted specifically to renewable energy technologies.

Other, more general inferences can be drawn about the organizational features of a decentralized energy supply system. First, the focus of this report on consumer controlled organizational forms does not mean to exclude private enterprise from a decentralized scenario. Centralized production facilities for natural gas and electricity would obviously be required for back-up energy and for serving large industrial or urban areas. More importantly, energy decentralization would involve dispersed energy collection and storage devices in order to tap local resources. This implies markets for the design, construction, and installation of such devices. Both standardized designs and regionally specific systems would be required. A decentralized energy scenario would also require local industries to service dispersed energy collection systems.

Second, an effective support structure is critical to the success of organizations. Society adapts over time to preferred organizational forms through legislative enabling acts, creation of financial arrangements and channels for lending, and technical assistance agencies. This process of adjustment is clearly illustrated by the sample of organizations chosen here. The older, more established forms—the RECs, municipal utilities, and agricultural cooperatives—are supported by a variety of lending institutions, governmental service agencies, and regional and national associations. For the newer forms—energy cooperatives and innovations such as the Community Development Corporation—such support agencies are relatively new. On the one hand, this means that the support agencies and experience available to assist renewable energy experiments vary by region. Rural and agricultural areas currently have more extensive support structures, but recent federal antipoverty programs now provide similar support in urban areas. On the other hand, different strategies may be necessary for adapting these organizational forms to renewable energy. For RECs and municipal utilities, the primary need is turning established organizations and support agencies from a focus on electric energy toward a broader service approach incorporating renewable sources. For energy cooperatives, the primary task is creating support structures that would induce and assist renewable energy experiments.

The federal government could play a key role in creating a support structure for decentralized energy supply. Various legislative and policy changes at the federal level could facilitate entry of local organizations into renewable energy programs. For example, the REC mission could be formally enlarged to include renewable technologies and non-electric energy supply. The National Consumer Cooperative Bank could make local energy cooperatives a priority category. Federal agencies supporting the agricultural sector could give special attention to renewable energy projects. Similarly, federal agencies operating in urban areas, such as HUD, could emphasize energy programs in their funding priorities.

Third, the growth of consumer-owned and controlled organizations in renewable energy supply may be influenced by existing franchised public utilities. For renewable energy organizations, the provision of electricity or gas could lead to competition with privately-owned electric or gas utilities. Similarly, the provision of energy services to the public could trigger legal issues regarding public utility status and state PUC jurisdiction. Classification as public utilities could add reporting and accounting burdens, as well as conditions for providing service, that could be quite onerous for small organizations. Other issues arise under federal statutes, such as the provisions in the Public Utilities Regulatory Policy Act of 1978 (PURPA: P.L. 95-617) requiring utilities to "buy back" power from small producers. As the number of organizations delivering nonconventional energy services mounts, these issues will surface more frequently and will eventually necessitate new approaches to utility regulation.

Fourth, the fundamental rationale for consumer-owned energy supply organizations is the psychological satisfactions that theoretically accrue to the consumer. These include proximity to energy production, direct access to and accountability of the service bureaucracy, consumer participation in the provision of necessary services, and face-to-face interactions. Most of these presumed satisfactions relate to the perceived responsiveness and "closeness" of the service agency. In fact, they seem more closely linked to organizational size than to formal ownership and management patterns. In other words, the psychological arguments for decentralization point toward small energy supply organizations close to the ultimate consumers.

This link to size has important implications for energy decentralization strategies. For example, consumer-owned municipal utilities and RECs serving large geographic areas and many clients may not meet this "closeness" criterion. Conversely, centralized systems could be administered through locally autonomous units (e.g., the Selective Service System, the Production Credit Association) and still provide the satisfactions of closeness.

Although size of the service agency may be critical in achieving client satisfaction, certain disadvantages also derive from small size. These include personal frictions intruding on service delivery, exclusion of disfavored groups from service, and economic inefficiency. Obviously, trade-offs must be made, and the size of the organization must conform to local circumstances and the task to be performed. The psychological rewards underlying decentralization proposals cannot be overlooked, however. Considerations of these potential benefits to individuals and society could act as filters in decisions relating to organizational size for energy supply.

Fifth, our cursory examination of the three organizational types considered in this report strongly indicates a need for further research and experimentation. Social science research is necessary to determine if the presumed psychological benefits of decentralization are attainable in the energy field. For instance, research should include such

topics as why people become involved in communitv energy organizations, what satisfactions they derive, and how convenience and cost are traded off against desire for self-reliance. Research on the institutional barriers to community-scale energy organizations is also indicated. The fundamental legal issues of competition with other public utilities, as well as the impact of state and federal regulation on renewable energy supply organizations, must be addressed [93].

Financing for demonstration projects that test the adaptability of existing organizations to renewable energy tasks should be expanded, and evaluation of social and political aspects should be an explicit part of these projects. New programs integrating system design and the social/psychological criteria for dispersed energy systems could test the applicability of decentralization to energy supply. Finally, monitoring local renewable energy experiments and exchanging information on their results are necessary to avoid repeating past mistakes and to set effective future policies.

Last, the preceding analyses indicate that the breadth and diversity of renewable energy technologies will be reflected in the organizational sphere. Since local diversity is a critical element of the decentralization concept, no single organizational form can be universally applied or expected to perform all production and distribution functions. Each of the organizations discussed in this report has particular drawbacks or legislative constraints on its operations that would limit its participation in particular renewable energy contexts. Diversity and responsiveness to local conditions therefore must be the watchwords.

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NOTES

1. Craig, Paul P. et al., Distributed Energy Systems in California's Future: Interim Report. Berkeley, CA: Lawrence Berkeley Labs (Apr. 1978).

2. Ownership is here defined as legal title—the right to use, enjoy, and transmit property-and it includes the setting of overall policy directions for use of that property. Management refers to day-to-day administration and operational control.

3. This would include the Modular Integrated Utility Systems studies undertaken by Oak Ridge National Laboratory for HUD, and various studies of Integrated Community Energy Systems funded by the Buildings and Community Systems Division of DOE.

4. For a detailed background on CDCs, see Harry Edward Berndt, New Ruler in the Ghetto: The Community Development Corporation and Urban Poverty, Growth and Change. Westport, CT: Greenwood Press (1977).

5. For a summary of the evolving Rochdale model in other Western countries, particularly Canada, see C.S. Axworthy, "Consumer Cooperatives and the Rochdale Principles Today," 15 Osgoode Hall Law Journal 137-164 (June 1977).

6. See, e.g., "Appalachian Cooperatives: Economics of the Third Kind," 11 Appalachia 3, 20-27 (Dec. 77/Jan. 78).

7. Cooperative League of the U.S.A., "Cooperative Facts and Figures." Washington, DC (Aug. 1977).

8. A cooperative is commonly defined as "an association which furnishes an economic service without entrepreneur profit and which is owned and controlled on a substantially equal basis by those for whom the association is rendering service." See Israel Packel, The Law of Cooperatives, 3rd ed. Albany, NY: Bender (1956, p. 2).

9. See, e.g., Robert W. Gilmer, "Institutional Forms and Scale Economies in Solar Ponds." Oak Ridge, TN: Institute for Energy Analysis (Aug. 1979).

10. For example, the District of Columbia Cooperative Associations Act (P.L. 642, 76th Cong.) comprehensively outlines the procedure for forming a consumer cooperative, and requires minimal filing fees for co-ops. See CLUSA, Time to Organize (Washington, DC: n.d.).

11. In some cases this orientation may inhibit innovation in cooperatives; for example, a direct charge co-op generates no net earnings to distribute as patronage refunds. See James M. Rose, "Direct Charge Cooperatives: Legal Aspects of a New Strategy in the War on Poverty," 38 George Washington Law Review 958-974 (1970).

12. For instance, the Vermont general purpose cooperative act requires one vote per shareholder; dividends on capital not to exceed 6%; reserve funds amounting to 10% of annual profit; up to 50% of paid-up capital stock, with the remainder to be distributed among the patrons; and not more than 10% of the capital stock owned by any one member. Vermont Statutes, Title 11, Section 981.

13. For example, the National Association of Housing Cooperatives is composed of over 425 co-ops and nine regional associations. Likewise, a national association of co-ops in the agricultural field, Universal Co-ops, was formed through the merger of other regional agricultural associations. Numerous regional federations of food co-ops also have been established during the past decade.

14. Various other private agencies in this field provide services relevant to cooperative formation, particularly in urban areas. These include Washington-based groups such as the Institute for Local Self-Reliance, Cooperative Forum, National Consumer Resource Center, Citizens' Energy Project, Center for Community Change, and Conference on Alternative Local-State Public Policies. Other groups too numerous to catalogue here operate at state and local levels.

15. See 18 Am. Jur. 2d 274, "Cooperative Associations," Section 14; 50 A.L.R. 3d 435, 479, Section 18a.

16. As a general rule, the director of a corporation is liable for the acts or omissions of officers and agents (other than codirectors) of the association if he/she has participated therein, has failed to exercise reasonable supervision, or has failed to exercise ordinary care in the selection and appointment of such officers or agents. See 18 Am. Jur. 2d 270, "Cooperative Associations," Section 11 et seq.

17. In some cases it is conceivable that energy cooperatives could, like the RECs discussed in Section 3.0 of this report, acquire the status of quasi-public utilities, which usually includes the power of eminent domain.

18. The refund must derive from a preexisting obligation; 20% must be paid in cash; the remainder retained by the co-op must be evidenced by certificates redeemable after 90 days; and the patron must be given notice and must accept the tax obligation of the retained portion.

19. Internal Revenue Code, Section 1385(d) (1970).

20. These benefits relate to the tax treatment of dividends on equity shares and other certificates of proprietary interest. Internal Revenue Code, Section 521 (1970). See also D. P. Alagia, Jr., "Exempt or Non-exempt Cooperatives—A Difficult Choice," 23 South Dakota Law Review 547-560 (Summer 1978).

21. See Internal Revenue Code, Sections 501(c)(3), 501(c)(4), and 501(c)(12) (1970).

22. Internal Revenue Code, Section 1385(d) (1970).

23. The Clayton Act is found at 15 U.S.C. Section 17 (1970), and the Capper-Volstead Act at 7 U.S.C. Sections 291-292 (1970). See also Eugene M. Warkich and Robert S. Brill, "Cooperatives vis-a-vis Corporations: Size, Antitrust, and Immunity," 23 South Dakota Law Review 561-583 (Summer 1978).

24. 18 Am. Jur. 261 et seq.

25. E.g., the Cooperative League Fund, which performs outreach and development tasks, Co-op Partners, and the Cooperative Foundation.

26. The Solar Bank would be established within the Department of Housing and Urban Development to provide subsidized loans to persons making conservation improvements or installing solar equipment in residential or commercial buildings. The bank would make payments to local lending institutions willing to provide below-market-rate loans or a principal reduction on loans to borrowers for solar purposes.

27. The Farmers Home Administration alone now administers nearly $1 billion in long-term, low-interest loans for rural communities. See Terrance M. Brady, "The Farmers Home Administration Community Facility Program: A Mandate for Rural Development," 23 South Dakota Law Review 585-605 (Summer 1978).

28. 7 C.F.R. Sections 1933.17(a)(2)(i) and (vi) (1978).

29. 12 U.S.C. Section 3001 et seq.

30. See, e.g., the Statement of Findings and Purpose to the National Consumer Cooperative Bank Act (12 U.S.C. Section 3001): "The Congress finds that user-owned cooperatives are a proven method for broadening ownership and control of the economic organizations, increasing the number of market participants, narrowing price spreads, raising the quality of goods and services available to their membership, and building bridges between producers and consumers, and their members and patrons."

31. Other examples of energy co-ops in the New England region are compiled by Philip Kreitner in "Co-ops Report No. 3" (29 October 1979) available through Congress Watch (133 C St. S.E., Washington, DC 20003).

32. Harvard University, Dept. of City and Regional Planning, Appropriate Technology for Community Development. Cambridge, MA: (1979), pp. 359-389.

33. See Paul O. Mohn, "Recent Cooperative Developments—Implications for the Future," 23 South Dakota Law Review 524-535 (Summer 1978).

34. In some cases, privately owned utilities actively opposed self-help efforts at rural electrification. See, for example, Marquis Child's partisan but informative The Farmer Takes a Hand. Reprint of 1952 ed. New York: DaCapo Press (1974).

35. Ibid. p. 63.

36. Recipients can include "persons, corporations, states, territories, and subdivisions and agencies thereof, municipalities, people's utility districts and cooperative nonprofit or limited dividend associations organized under the laws of any State or Territory." 7 U.S.C. Section 904 (1976).

37. For the past two decades, growth in REC loads has averaged about 9% annually. This derives from the growing electrification of farming operations, introduction of air conditioning and residential electric heating, the spread of industrial facilities to small cities, and growing emigration from large cities back to rural areas. However, figures for the past few years indicate that this growth rate has slowed substantially.

38. Developments in the joint action field are summarized annually in Public Power. See, e.g., the Sept.-Oct. 1978 issue.

39. U.S. Department of Agriculture, Rural Electrification Administration: REA Model Act Bylaws, Article III. REA Bulletin 101-5 (Apr. 1978). All further references to co-op procedures are drawn from this source. Because RECs are granted a territorial monopoly, in a designated service area, customers are generally not required to become co-op members.

40. The Board may approve, without submission to the membership, participation by the co-op in nonprofit organizations for the purpose of furthering rural electrification. The co-op may also engage in the merchandising of commodities other than electricity. (Model Act, p. 23).

41. See, e.g., Arkansas Valley Co-op Rural Electric Services v. Elkins, 141 S.W.2d 538, 200 Arkansas 813 (1941), holding a REC immune from suit for the torts of its employees in the absence of a specific statutory provision.

42. These preferences are expressed in the following acts: TVA—16 U.S.C. Section 831i; Bonneville—16 U.S.C. Section 832c; Bureau of Reclamation—43 U.S.C. Section 485h.

43. E.g., Alabama Power Company v. Alabama Electric Co-Op, Inc., 394 F.2d 672 (C.A. Al. 1968); reh. den., 397 F.2d 809; cert. den., 89 S.Ct. 488, 393 U.S. 1000, 21 L.Ed. 2d 465.

44. Cass County Electric Co-op v. Wold Properties, Inc., 249 N.W.2d 514 (N.D., 1976).

45. E.g., Cantor v. Detroit Edison, 428 U.S. 579 (1976).

46. The present Model Bylaws refer to "electricity purchased for use" which would place limits on small neighborhood systems. (Model Act Bylaws, Art. I, Section 6).

47. Koenen, Austin V., "Joint Action Legislation is Gaining," Public Power (May-June 1978) p. 44.

48. 7 U.S.C. Sections 935, 936 (1979).

49. To qualify, 70% of the people in the service area must be farmers or ranchers or provide services to them.

50. Cooperatives that function as public utilities are exempted from the requirement that 50% of the co-op's business be done with or for its members.

51. These states are Alaska, Arizona, Arkansas, Colorado, Delaware, Florida, Indiana, Iowa, Kansas, Kentucky, Maine, Maryland, Michigan, Nevada, New Hampshire, New Jersey, New Mexico, Oklahoma, Texas, Utah, Vermont, Virginia, West Virginia, and Wyoming.

52. E.g., some states exempt generating plants under 50 MW from power plant siting laws.

53. Only one such instance has occurred in recent years—on the island of Vinalhaven off the Maine coast.

54. U.S. Department of Agriculture, Rural Electrification Administration. 1977 Annual Statistical Report. REA Bulletin 1-1 (1978).

55. Ibid. p. 2. Of the total financing for REA electric borrowers in 1977 (nearly $3.6 billion from all sources), 23% was allocated to distribution facilities, and nearly 77% to generation and transmission facilities.

56. More detailed information on these projects can be obtained through the RECs themselves or through the National Rural Electric Cooperatives Association (1800 Massachusetts Ave. NW, Washington, DC 20036). See also the Solar Energy Intelligence Report (18 June 1979) p. 244.

57. Other agencies serving rural areas have also begun renewable energy programs, including the Energy and Rural Development program of the National Association of Farmworker Organizations (1329 E St. NW, Suite 1145, Washington, DC 20004), the Small Farm Energy Project (Hartington, Nebraska) funded by the Community Services Administration, and the National Center for Appropriate Technology in Butte, Montana.

58. Municipal utilities are defined by the Department of Energy Organization Act as any "city, county, irrigation district, drainage district or other political subdivision or agency of a state competent under the laws thereof to carry on the business of developing, transmitting or distributing power."

59. Juergensmeyer, John E. "Special Taxation Districts: Coming or Going?" 11 Univ. of Richmond Law Review 87-98 (Fall 1976).

60. These are Alabama, Arizona, California, Massachusetts, Nebraska, Nevada, Oregon, South Carolina, South Dakota, Tennessee, Washington, and Wisconsin. The overwhelming majority of PUDs engaged in the production and/or distribution of electric power are located in California, Nebraska, Oregon, and Washington.

61. Farris, Marvin T. and Sampson, Roy J. Public Utilities: Regulation, Ownership and Management. Boston, MA: Houghton-Mifflin (1973) pp. 270ff.

62. These figures are taken from Public Power (Jan./Feb. 1979), p. 34.

63. Ferris, Craig T. "Joint Action Partnerships: Just Good Economic Sense." The Daily Bond Buyer. Special Public Finance Supplement No. 1 (28 Oct. 1976) p. 15. In Minnesota, over 50% of the 127 municipals serve cities under 2,000 population. "Minnesota Systems Organize Five Power Agencies," Public Power (Mar./Apr. 1979) p. 24.

64. The case for municipal solar utilities is cogently stated in Southwest Energy Management, Inc., for the California Energy Commission, Multi-Family Solar Water Heating (San Diego 1978), pp. 83ff. See also Mark Braly, "Public Power—Phase III," paper presented at the International Solar Energy Society Congress, 29 May 1979, Atlanta, Georgia.

65. For the latter, see Robert Friedman, Seizing the Promise: Report of the National Conference for Public-Private Enterprises. Washington, DC: Corporation for Enterprise Development (1979).

66. Council of State Governments, The States and Electric Utility Regulation. Lexington, KY: (1977) p. 4.

67. See Public Power, Annual Joint Action Issue.

68. See, e.g., Colo. Rev. Stat. 31-15-107 (1973).

69. Oregon Rev. Stat. Chap. 261.305.

70. See 26 Am. Jur. 2d 239 (1966).

71. If the franchise expressly prohibits competition, the municipality might still challenge the validity of that contract because federal and state constitutional grants of power to abrogate a utility cannot be abrogated by a franchise. These issues are examined at greater length in Jan Laitos and Randall J. Feuerstein, Regulated Utilities and Solar Energy. Report No. SERI/TR-62-255. Golden, CO: Solar Energy Research Institute (1979) pp. 35-38.

72. The question then remains whether this exemption applies to actions merely authorized or contemplated by the state in broad enabling legislation. See "Court Hits Cities' Antitrust Exemption," Public Power (Sept./Oct. 1978) p. 50; see also, Laitos, ibid. pp. 18ff.

73. Federal programs are too numerous to catalogue here, but would include those administered by the U.S. Departments of Energy, Housing and Urban Development, and Agriculture. Likewise, the Local Energy Management Act of 1979 would provide additional funds for this type of project; see note 90 below. See also Vic Reinemer, "HUD Grants Can Help MUNIS Save Energy, Develop Alternatives," 38 Public Power 41 (Mar./Apr. 1980).

74. About 55% of municipal electric utility capital is raised through long-term debt. Council of State Governments, supra note 66, p. 5.

75. White, Sharon S., Municipal Bond Financing of Solar Energy Facilities. Report No. SERI/TR-62-191. Golden, CO: Solar Energy Research Institute (1979).

76. E.g., California permits revenue bonds for "residential rehabilitation" which is loosely construed, while New York limits loans to multiple dwellings with inadequate or unsafe heating facilities. California Health and Safety Code, Section 37916 (1973); New York Private Housing Finance Law, Section 402 (McKinney 1976).

77. Kramer, William K., and Hammer, Michael, "The Role of Municipalities in Geothermal Resource Development." 13 Land and Water Law Review 85-100 (1977).

78. Alaska regulates municipals only when competition exists between the municipal and a private utility; a recently enacted Texas statute gives the PUC appellate review power over the actions of municipals which serve only customers within city limits. Council of State Governments, supra note 66, p. 26.

79. Ibid. p. 37.

80. Federal Power Act, 16 U.S.C. Section 824(b) (1970).

81. See Laitos, supra note 71, p. 28. Amendments to this legislation have been proposed to resolve this uncertainty.

82. "Public Power Systems Provide Consumers Lower Cost Power," Public Power (Mar./Apr. 1979) pp. 18-20.

83. See note 64 supra.

84. One former utility executive has postulated a life cycle of public agencies that tends to dampen responsiveness and innovative behavior. According to Philip Sporn, public agencies initially tend to attract capable and motivated young people, who are later replaced by staff seeking employment as foundations for careers elsewhere, and finally by political hacks and career civil servants. Philip Sporn, The Social Organization of Electric Power Supply in Modern Societies. Cambridge, MA: MIT Press (1971) pp. 39ff.

85. Other organizations have undertaken this networking function. Three Washington, D.C., organizations deserve special mention in this regard. The Environmental Action Foundation has been particularly active in the field of electric utilities and municipal takeovers; the Institute for Local Self-Reliance has focused on urban energy problems; and the Citizen's Energy Project of the Center for Science in the Public Interest has performed a networking function for local alternative energy projects.

86. See, e.g., Eric Leber, "Golden Garbage," Public Power (Mar./Apr. 1980) pp. 14-17.

87. See "California Cities Considering Municipal Solar Utilities," 1 Solar Law Reporter 529-532 (Sept./Oct. 1979).

88. For example, in 1973 the Bonneville Power Administration, supplier to most of the PUDs in Washington, Oregon, and California, issued a Notice of Insufficiency that it could not meet the future load growth of its preferred customers after their present contracts begin to expire in 1983.

89. Utility funds for these experiments have generally come out of R&D or education budgets rather than power production accounts. U.S. Department of Energy, Local Government Energy Activities, Vol. II: Detailed Analyses of Twelve Cities and Counties. DOE/PE-0015-2. Springfield, VA: NTIS (1979) pp. II-53, 54.

90. Complementing earlier acts promoting state energy action, the Local Government Energy Management Act introduced by Senator Percy in 1979 would provide grants, technical assistance, and information dissemination services to promote conservation and renewable technologies. See Congressional Report, 19 April 1979.

91. There are many possible variants of the solar utility idea for diffusing residential solar equipment, some of which do not have the impact of bestowing a supplier's monopoly. For example, the municipal utility could allow the consumer to choose from among a number of approved systems, or, as proposed in Los Angeles, the utility could maintain and warrant the systems for three years and assume the responsibility for negotiating with the manufacturer regarding defects in the systems.

92. For example, a recent report by Arthur D. Little, Inc., to DOE stressed the need for dispersed systems and localized planning if the United States is to meet President Carter's 20% solar target for the year 2000. The Energy Daily (22 October 1979) p. 427.

93. Interpretation of the utility provisions contained in components of the National Energy Act of 1978 will be especially important in this regard.

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