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PLANNING FOR ENERGY SUSTAINABLE FUTURES

By

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ABSTRACT

PLANNING FOR ENERGY SUSTAINABLE FUTURES

By

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Futures are the business of professional planners. Although energy planning has not been a traditional part of the planners' work, the central fact of the future in the United States is the sharp decline in the availability of cheap fossil fuels. Planners face profound new choices and complexities as they deal with the realities of the energy crisis.

Approaches to solving the energy crisis which rely on combinations of appropriate technologies, locally based and renewable, have the best chance of leading this culture toward futures which are sustainable in the long term. This thesis presents a set of reasoning and planning processes which can facilitate the use of appropriate technologies.

The Introduction sets forth the basic argument of the thesis. In Chapter II, the theoretical assumptions of future energy alternatives are discussed in the context of a model of culture. Enumeration of some relevant existing energy projects follows in Chapter III.

Anabel Dwyer

Chapter IV, a case study of Urban Options, an East Lansing group advocating appropriate technologies, reveals that energy conversions to these technologies will require political action.

In Chapter V, new processes and data, which planners will need to use in conversion to locally scaled energy technologies, are discussed.

In Chapter VI, an area of downtown East Lansing is used as an example showing planning and implementation of technical and economic conversion to appropriate technologies.

Chapter VII pursues the socio-political level of conversion to locally based technologies and summarizes changes in decision-making and implementation portions of professional planning practice.

The Conclusion finds that the depth and severity of the energy crisis and approaches reasonable and possible for long term solutions require that the planning profession alter the substance and form of its commonly practiced methodology.

ACKNOWLEDGMENTS

My thanks for encouragement and support within the School of Urban Planning go, in particular, to Professors Sanford Farness, John Mullin, Keith Honey and Carl Goldschmidt. In addition a few students pointed the way toward realization of changes advocated here. I want to thank Ron Oster for his decency and conversation.

The combination of ideas put together in this thesis came primarily from five years of discussion and organizing with David Dwyer, Linda Easley and Charles Ipcar. This is my expression of what we have done together.

That much of our academic thought is coming to fuition at Urban Options is less due to this kind of abstract work than it is to the hard, practical work of the Urban Options Staff and Board. My faith in the basic intelligence and creativity of people, their ability to deal constructively with a crisis as enormous as the energy crisis, is supported by the work of Urban Options and the enthusiasm it has generated.

In the hope of carving a possible, even an exciting future for our children, Daphne and Anthony, I have put together this thesis. And I thank David, Daphne and Anthony for their immeasurable help.

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CHAPTER I

INTRODUCTION

Major changes in the way of life in the United States will inevitably result from predicted sharp decline in availability of cheap fossil fuels. United States culture, heavily dependent on these cheap fuels, continues to increase demand for fossil fuels and precipitates the sharp decline in their availability and rise in cost. In speculated upon methods of dealing with this crisis, two alternatives have been articulated.

One alternative concentrates capital expenditures in large centralized technologies, facilities and bureaucracies. These take increasing amounts of capital simply to sustain themselves rather than producing products or results which address human needs. This is the path that Amory Lovins designates "hard" (Lovins, 1977:26). Its name includes the connotation "difficult" because it reaches a dead end in the long term (20 years or so) as it becomes caught in a "capital trap" (Lovins, 1977:60).

The other alternative, which Lovins calls the "soft" path allocates increasing amounts of capital to localized and renewable energy supply techniques with a basis in and emphasis on conservation. Techniques for supplying energy are scaled to the uses for which they are intended such as food, warmth, lighting and transportation.

In the short run (10 or 15 years), the "hard" path may give the illusion of normality in the United States. Beyond that, if not before then, shortages of basic fuels are bound to occur. Catastrophes, freezing, starvation are the inevitable kinds of results. These have already occurred in many parts of the third world and were narrowly escaped at Three Mile Island.

Conversion along the soft path is now possible on the technical and economic levels. Locally applicable, renewable energy technologies are available for conservation and supply of energy. If it is planned now, with sufficient lead time, conversion along this soft path could be orderly and creative.

The problem with conversion to soft technologies lies in the socio-political level of present U.S. culture. The soft path necessitates basic changes in the hierarchial decision-making structures that now exist in the United States. As such it represents a direct threat to those whose lives and livelihoods depend upon such structures.

Long term, planned solutions to the energy crisis then become difficult because many planners and policy makers view decision-making unilinearally and primarily in terms of their positions in the decision-making structures. Because planners are frequently locked into support of the present socio-political system, they may abrogate their responsibilities as professionals whose business is a liveable future. And except in cases where exceptionally foresighted individuals have emerged, local efforts at long term planning with decentralization and participation as essential features, are being squashed or made unnecessarily difficult by the planners themselves.

In now common planning methodology, planners have based alternative choices on implicit assumptions about the nature of culture and social systems. In earlier times, these hidden assumptions may have been commonly agreed to. But in dealing with the energy crisis, it becomes essential for planners to refine their processes and articulate basic and varying premises. Different premises will result in different kinds of data and radically different methods of implementation.

Time and money exist now for the planning profession to take an active role in working toward sustainable futures. These choices are essentially political and, paradoxically, may lessen the planners own role in broad decision-making power and broaden the base of people from which decisions are made. Planners do have responsibilities for the future. Even de facto planning for oblivion is not supportable professionally.

Many locally based groups are making significant progress toward long lasting solutions to the energy crisis. But many planners and policy makers confound such soft path solutions. When attempts at basic change are counteracted, the kinds of structural changes that need to occur in the culture become more obvious. The methods at arriving at alternatives, kinds of data and ways of implementing change in decision-making structures, are probably only speculated upon as the need to change the system arises.

Soft path solutions to the energy crisis tie together radical political advocacy of the kinds exhibited in the poor peoples, anti-war and neighborhood movements, with appropriately scaled and reliable technologies. The energy crisis deepens as it becomes a crisis, not merely of technology, but of our basic societal structure and of our ability to adapt to a different future.

Transitions, even involving major cultural change can be staged and planned. Whether they are or not in the next 20 years in the United States, depends to some degree on the vision, depth of understanding and methodology of planners themselves. It is the purpose of this thesis, by way of the line or argument outlined in this chapter, to refine the vision and techniques of planners as they begin to seek solutions to the energy crisis.

CHAPTER II

THE ENERGY CRISIS

The energy crisis became a planning problem only as a result of the oil crisis of 1973, the long gas lines and the sudden rise in prices. It was this that pressed upon the consciousnesses of Americans above the poverty line, that a fragile and transient symbiosis existed between our gluttonous way of life and the easy, cheap flow of fossil fuels.

People began to realize that an ever-increasing demand for fossil fuels cannot be met by a decreasing supply of these same fuels. Questions began to be raised: How much oil do we have left? What are we going to do after it is gone?

Projections

Projections, warning of a sudden decrease in oil supplies had been made before the crisis of 1973, particularly by M. King Hubbert (1971,1973). Projections of the remaining crude oil in the United States, for example, are based upon rates of recovery. There are basically two ways of calculating those projections. Commoner summarizes those ways as follows:

> Hubbert plots the amount of oil discovered per year for successive years, Zapp plots the amount of oil discovered per foot of exploratory well drilled for successive cumulative lengths of well drilled. In this way, Zapp's method,

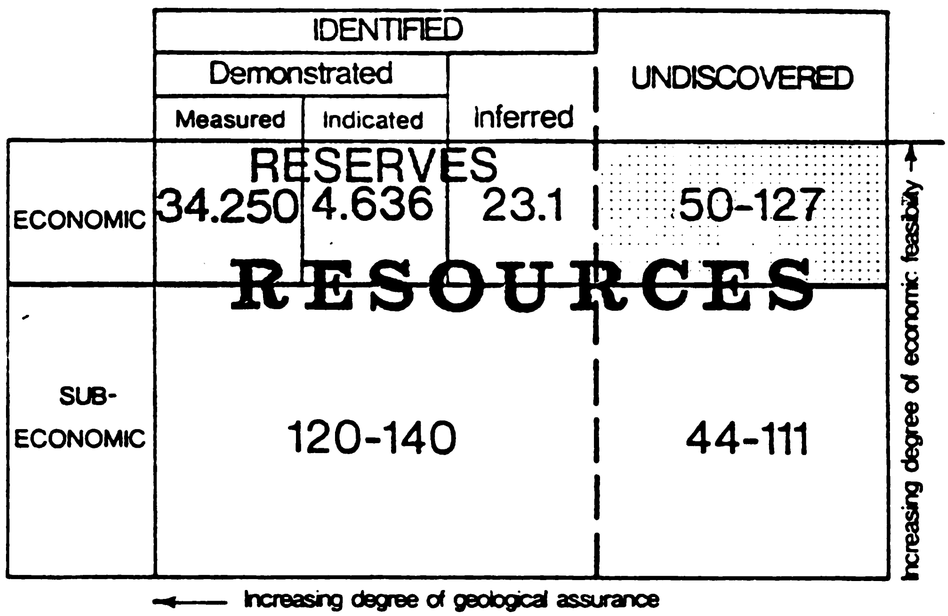
> unlike Hubbert's measures the amount of oil found for a given amount of exploratory effort (Commoner, 1976:51).

In other words, as Commoner explains, the Zapp method eliminates the economic factor, the cost of drilling and calculates on purely physical grounds the amount of oil remaining. The problem becomes one of determining how much oil, for instance there actually is under ground versus how much oil might be feasibly or economically extracted. Using these different methods, Hubbert projects a remaining 64 billion barrels from 1974 (Commoner, 1976:49) and Zapp projects 400 to 600 billion barrels of remaining oil (Commoner, 1976: 50).

In 1975, the United States Geological Survey (USGS) (Circular 725, 1979) combined these two types of projections in the following way. The USGS called "reserves" 112 billion barrels which are "identified resources known to be recoverable with current technology under present economic conditions" (USGS:1975:2). The total number of barrels of crude oil remaining in the United States is projected at 440 billion barrels (Figure 1). The lower figure, with the economic constraint defined as part of it, is comparable to the Hubbert projections. The higher figure reflecting total amounts of oil existing, whether economical to extract or not, is comparable to the Zapp figure.

Different kinds of projections are voiced in many places. Koenig (1977:160; Stoudt and Myers, 1977) gives those of Hubbert exclusively. Projections used by Dix (1977:63ff.) are based on Hubbert and the USGS:725 study portion called "Reserves."

CRUDE OIL RESOURCES OF THE UNITED STATES
(BILLION BARRELS)



Total U.S. Cumulative Oil Production 106 Billion Barrels
12/31/74

(USGS: 725,1975:21)

FIGURE 1.--Crude Oil Resources of the United States

Hayes, (1979:233ff.) summaries these and other studies and concludes similarly that United States "resources of conventional oil will be seriously depleted by the year 2000" (Hayes, 1979:234).

When Hubbert, Koenig and Dix assert projections, they assume that a given and present economic situation will "permit" the extraction of only the lower amount of oil. When Zapp and Commoner endeavor to eliminate a static economic factor in projections, they assume that there is a necessary distinction to be made between the amount of oil remaining and how difficult or expensive it may be to extract it. Drilling for oil, from now on will become more expensive, but this is an economic question and not a physical or natural fact and should be expressed as such (Commoner, 1976:57; Hayes, 1979:233).

Complexity

The confusion in these projection figures results from a lack of explicitness on the part of all those projecting about their own concepts of the whole of culture. What do these projections mean? Where does economics and technology fit into a concept of the whole? Hidden assumptions are often revealed in discussions of projections. For example, Dix says the following:

> The environmentalists have joined forces with the ultra-conservatives in blocking legislation and stopping progress in the planning and building of energy productions systems by the petroleum and electric utility corporations. A leader of the environmental movement, Barry Commoner, is engaged in totally unscientific and indefinsible claims as to the size and availability of the United States petroleum resource (Dix, 1977:7).

This kind of outrage relies on hidden assumptions. One assumption is that the energy crisis is one of supply, that is, the problem is that the supply is limited not that the demand is unrealistically high. Solutions to the crisis using the Dix assumption need to center on increasing the energy supplies, not on reducing the demand (Mobil, 1977). Another assumption, hidden in the Dix statement is that natural fact, technology and economics are all inseparable and that their present relationship as it exists in the United States today is immutable and cannot be changed. This assumption fails to distinguish cultural from natural fact.

Dix proceeds in his own discussion to quote the USGS:725 study as a reliable source of projection figures, carefully avoiding the full chart of their own projections as reproduced in Figure 1. Clearly it is not the physical projections Dix doesn't like about Commoner. What is it?

Often these arguments become hot and the content obscured. The fact that we have from 112-440 billion barrels of crude oil remaining in the United States and use about 6 billion barrels of oil equivalent per year (Figure 2) does not result in the simple conclusion that we have from 18 to 73 years left before we cease to exist.

The meaning of these figures, whether we plan it or choose it or not, is that people in the United States will have to make basic changes in their culture in the next 20 years because of the

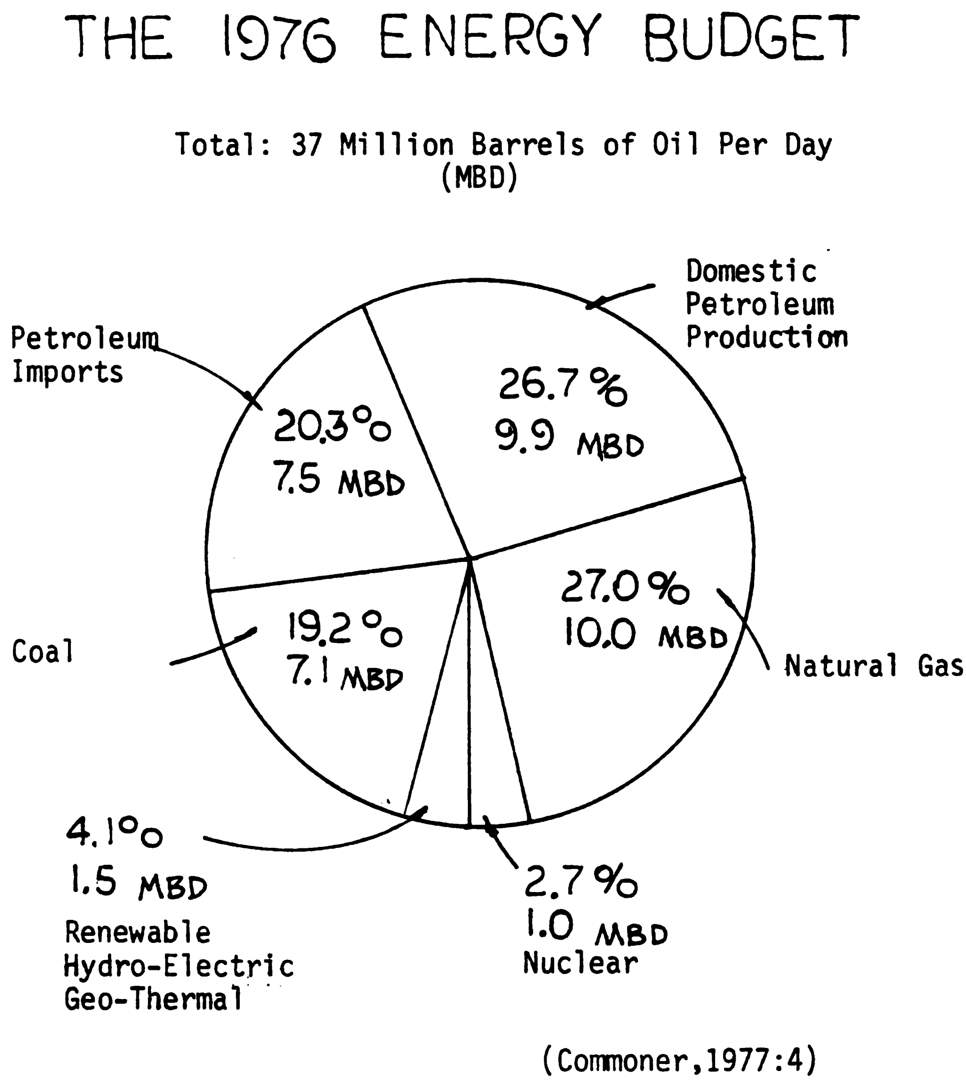


FIGURE 2.--The 1976 Energy Budget

fact that so much of our present cultural system depends upon present quantities of cheap extraction of abundant fossil fuels. Our present cultural system, including current economic expectations of rates or profit return, is structured so that corporations will remove only between 84 and 112 billion barrels of oil. At 1976 rates of consumption (Figure 2) and not including any increase in rate of consumption, that will last for about 18 years.

If more barrels of oil are extracted, they will become more expensive and at some point prohibitively expensive. But because it is possible to predict that our present consumptive way of life will change fairly soon and probably dramatically, does not mean that planning and discussion should cease while we wait for "doomsday." What it does mean is that people in general and planners in particular need to understand something about human cultures and how they operate. Then we can explore the ways in which this culture might change and the alternatives open to us.

Culture

Culture is a concept used by anthropologists to describe the system by which human beings organize their activities and relationships. As defined by Marshall Sahlins, culture is:

> a system of things, social relations and ideas, a complex mechanism by which people exist and persist . . . organized not merely to order relations but to sustain human existence (Kaplan and Manners, 1972:4).

Culture is a particularly human system of adaptation. Many different cultures exist and can be distinguished and described.

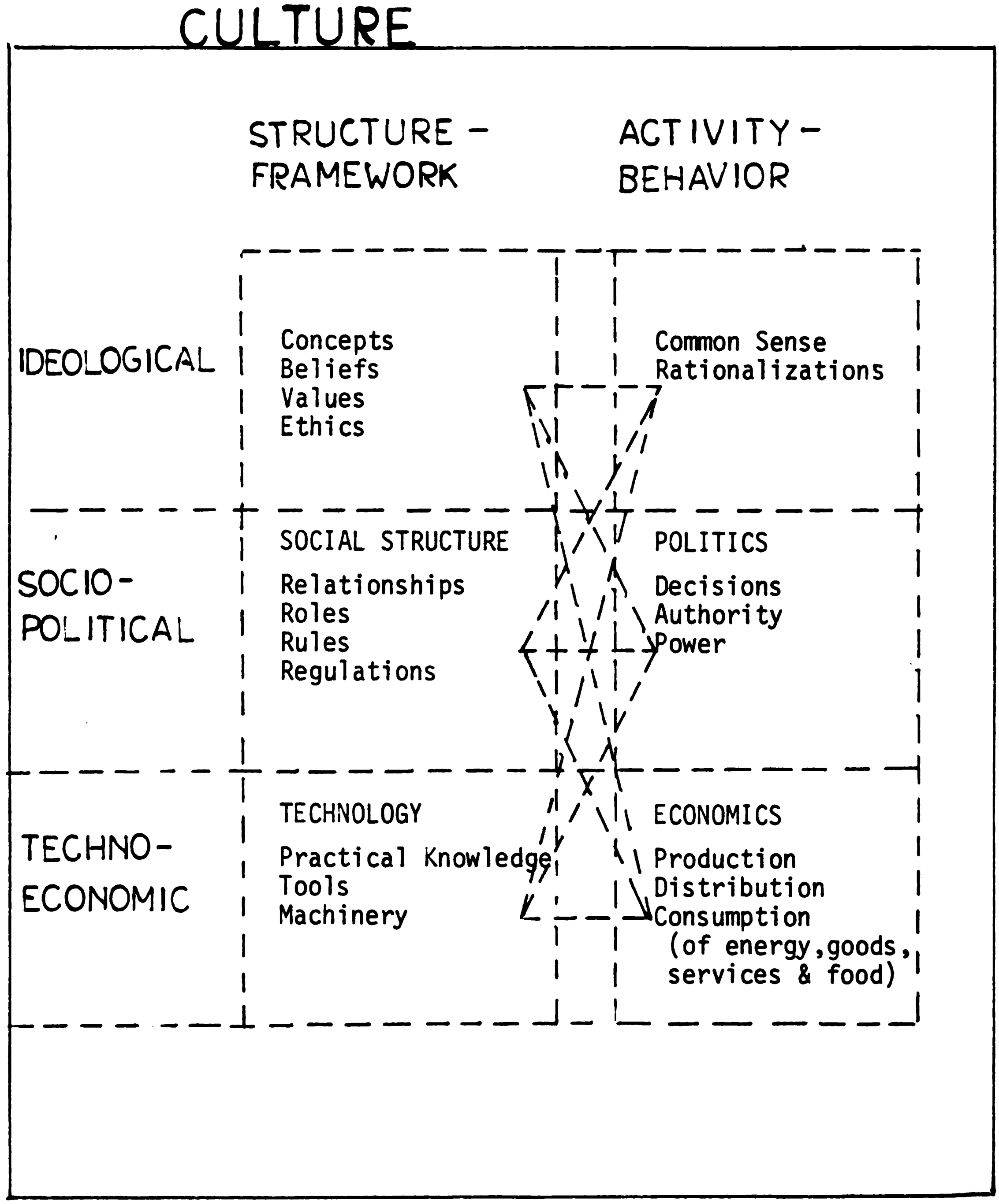
These cultures operate within the constraints of the natural system but they are entities which can be distinguished from nature in that they are learned, transmitted and changed by human beings.

Cultures in general have some common characteristics. They have structures within which people operate, these are frameworks or rules of the game. As people pursue their activities they can and do modify those structures. Anthropologists agree that all cultures consist of three general components, sometimes divided into five, the ideological, the socio-political, and the techno-economic. Definitions of these levels or components of culture are as follows:

Ideological: The ideological sybsystems of a culture consist of all its beliefs and values which related to the organization, objects and activities of the culture. In this model (Figure 3) we have found it useful to draw a distinction between ideal (structural) and real (practical) ideologies, those spoken and those practiced

Socio-political: The term social structure is used to describe the more-or-less enduring relationships among people and organizations of people in a culture. The political mode is concerned with the workings of power and authority in the process of decision making.

Techno-economic: The term techno-economics describes those structures and activities directly involved in the production, distribution and consumption of goods, energy and services. The structural aspect of this component (the means of production) includes tools, machinery of production as well as the techniques and practical knowledge (i.e., science) of production, while the mode of production refers to the actual activities of production (Dwyer, et al., 1979:13).



(Dwyer, et al., 1979:15)

FIGURE 3.--A Model of Culture

These components have been put together in the form of a model in Figure 3. This model is one way of synthesizing, for discussion, the various theories and contentions involved in studies of culture. The distinction, made in the model, between structure and activity has been traditionally drawn on the techno-economic and socio-political levels. The same kind of dichotomy is drawn in this model on the ideological level because it helps explain an ideological split that exists in present culture in the United States.[1]

Such a model is a way of clarifying areas of theoretical discussion and dispute in studies of culture. Debates in anthropological theory center around two major questions: The first is which, if any, component, or feature within a component is central in influence and importance to a given culture or to cultures in general? The second debate is whether the structure or the activity of cultures or culture is primary.

In regard to the first question, there are examples in studies of cultures where a particular component or feature within a component seems to be central to change or to the maintenance of the status quo. In the United States, on the technological

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[1]Theoretical generalizations should not, of course be made on the basis of one example but this distinction may well be a valid one on the ideological level as well as on the techno-economic and socio-political levels. In general, as Richard Adams notes: "One would think that the anthropologist with his cliam to the holistic study of man, would long since have accepted that this wholeness lies in a world that is at once symbolic and energetic" (Adams, 1978:28). It is assumed here that this dichotomy exists in present U.S. culture on the ideological level.

level, some argue the introduction of the automobile seems to have been central to the development of the present configuration of culture in the United States. Others will argue, that though the car seems central it is merely a technology which supports a deeper production and decision-making system more fundamentally characteristic of U.S. culture (Commoner, 1976:188-90; Baldwin, 1979:12).

The second question, the debate between the dominance of structure or activity in culture has to do with the importance of the status quo versus the importance of change in cultures and studies of cultures. Some students say, on the one hand that much of human behavior can be explained by the structure of a culture, that human activity is for the most part defined by these formal parameters, the structure.

Other anthropologists argue that human manipulation of change is the basic characteristic of culture. These students say that it is the study of change having to do with ongoing, explainable human activity which constitutes the importance of studies of culture (Hannerz, 1970:129-32).

For the purposes of this thesis, however, it is less important to argue about which theory may be more accurate, than it is to understand that aspects or components of cultures do not exist in vacuums. Components and features within components are interwoven in various ways with each other so that cultures can be described as wholes with various explanatory relationships existing among parts.

Because this culture, for instance has a plethora of material goods, does not mean that is consists solely of technology. Because there is a strong sense of the individual in U.S. culture does not mean that this society does not have structure. And because this society has huge and often unmanageable structures such as bureaucracies does not mean that it will not change.

In addition, there is whether implicit or explicit a concept of the whole upon which judgments about what is possible, future course of culture, and even energy projections are made (Harvey, 1973:288-96). The definition of culture and the model explained above are offered as a means of making explicit, for discussion, concepts of the whole.

Cultural Change

It is both observable and documented that cultures change through time. Some observers consider the essence of that change to be cyclical. H. T. Odum, for instance, describes processes by which cultures have accumulated and squandered energy only to overstep the bounds and tolerance of nature.

> During times when energy flows have been tapped and there are no new sources, Lotka's principle requires that those systems win that do not attempt fruitless growth but instead use all available energies in long-staying, high diversity steady-state works (Odum, 1976:8).

Odum's discussion could be interpreted as suggesting recurring loops of change through time. But cultural evolution has not been merely cyclical. It may involve cycles, but cultural evolution is, as Margaret Mead has said, "directional change" (Kaplan and Manners, 1972:49).

The rapid depletion of cheap fossil fuels will change many facets of culture in the United States. Because of the basic nature of this crisis, culture in the United States is probably not headed for a no growth end of a recurring loop. Some structural changes as well as some behavioral modifications will be required in dealing with this crisis (Rappaport, 1977:9).

In the four million or so years of human cultural evolution, major changes have occurred in "adaptive strategies" from hunting and gathering, horticulture and pastoral nomadism, agriculture and industrialism (Vivelo, 1978:212-13). With these have come various forms of economic, political and social organizations and ideologies. From some knowledge of the range of possibilities human cultures have employed in their history, we can postulate changes which might occur in the United States as this culture enters a post-industrial era.

Studies of cultural evolution raise two major questions: (1) By what mechanisms do cultures evolve? and (2) Why do some cultures adapt and change in order to improve their chances for survival and others become "dead ends"? Leslie White's original thesis concerning cultural evolution described cultures moving toward increasing concentrations of power and source of energy. Leslie White, however, changed his mind (White, 1975:176) in the kinds of ways Rappaport discusses:

> If cultural evolutionary process is necessarily linked to increase in energy flux, this suggests that a contradiction may inhere in the very process of cultural evolution itself. At the very least, its future trajectory remains very much in question (Rappaport, 1977:3).

Rappaport suggests a different principal mechanism of cultural evolution, cultures are adaptive if they maintain what he calls, "their long-term flexibility" (Rappaport, 1977:9).

Culture change comes about because of pressures from within a culture, from other cultures or from nature. These pressures can be stated in the form of "contradictions" which will resolve themselves or need resolution. In Figure 4, following, contradictions in present United States culture are stated in terms of the model shown in Figure 3.

On the techno-economic level, there is a contradiction between dependence upon fossil fuels and the rapid escalation in prices of those fuels. On the socio-political level, low-level specific decisions such as how to travel around town, which have need for flexibility especially in view of rising fuel costs, are made at high structural levels. The almost required use of the car for local travel where the car is most inappropriate, has been mandated and sustained at very high levels through such mechanisms as the highway subsidies. On the ideological level the contradiction is between justification for fulfilling the needs of corporations versus fulfilling human needs.

How we, in the United States choose to resolve these kinds of contradictions in our present cultural system, is our choice.

PRESENT U.S. CULTURE

STRUCTURE	ACTIVITY
IDEOLOGY	
Human Needs Must be Met	Corporations Needs Must be Met
Resources in Trust for all People	Consumption
Conservation	Profit
Growth in Things That Count	Growth in Things Countable
SOCIAL STRUCTURE	POLITICS
Large Centralized Bureaucracies	Most Decisions Made by a Few
Many Specialists	Responsibility, Power, and Authority Increases with Upward Moves in the Hierarchy
People Ranked According to Wealth	
TECHNOLOGY	ECONOMICS
Cheap Non-Renewable Resources are the Basis for a Plethora of Tools, Machines, and Weapons	Single Products or Crops are Produced in Large Numbers in and Distributed to a Wide Area, Often World Wide

POSSIBLE FUTURES

THE SOFT PATH

IDEOLOGY

Human Needs Must be Met
Resources for all People
"The Frog Does Not Drink up the Pond in which it Swims"
"Life, Liberty and the Pursuit of Happiness"

SOCIAL STRUCTURE	POLITICS
Decentralized Strong Neighborhood Organizations	Appropriate Decisions at Appropriate Levels
Mechanisms for Equal Distribution and Dissemination	Widespread Participation in Decision-Making
TECHNOLOGY	**ECONOMICS**
Integrated Small Scale Solar Technologies Suited to Tasks and End Use Needs Accessible	Decentralized Production
	Goods and Services Distributed Equally

THE HARD PATH

IDEOLOGY

Needs of the Corporations are Met
Profit and Consumption Equal Quality
Protection of Property

SOCIAL STRUCTURE	POLITICS
Increasingly Centralized Bureaucracies with Well Guarded Elites	All Decisions Made by a Few
	No Gradation of High to Low Level Regulators
TECHNOLOGY	**ECONOMICS**
Inaccessible Centralized Technologies such as Nuclear Power and Huge Solar Farms	Distribution to a Few
	"Energy Sector Requires Most of the Capital to Maintain Itself"

(Dwyer, et al., 1979: 28)

FIGURE 4.--Present U.S. Culture and Possible Futures

Whatever kinds of changes we make, the fact remains, that cultures do change, they do not remain static and they do not become exact replicas of other cultures. All cultures in the world are not becoming like the United States anymore than the present would revert to the 19th century were we to use energy more frugally. Certain aspects of a culture may be similar to previous aspects of that culture or imitate or emulate aspects of other cultures as they change.

United States Futures--Cultural Choices

In 1976, Amory Lovins described the two fundamental choices open now to the United States as it seeks to resolve the contradictions inherent in the present cultural system. Lovins calls these choices the "hard" and the "soft" paths and defines them as follows:

> The hard path relies on the rapid expansion of centralized high technologies to increase supplies of energy, especially in the form of electricity. The soft path combines a prompt and serious commitment to efficient use of energy, rapid development of renewable energy sources matched in scale and in energy quality to end use needs and special transitional fossil fuel technologies (Lovins, 1976:4).

In Figure 4, above, the cultural characteristics of the hard and soft paths are outlined using the same model of culture as shown in Figure 3. These characteristics are drawn from various sources explained in more detail below.

The Hard Path

The outline in Figure 4 may be sufficient to reject the hard path as a desirable or possible alternative. The characteristics of the hard path include: captial intensity, necessity for a narrow governing political elite, highly toxic waste, wastefulness and uneven distribution. It is perhaps the economic infeasibility which provides one of the most readily understood arguments.

> Our past major transitions in energy supply were smooth because we subsidized them with cheap fossil fuels. Now our new energy supplies are ten or a hundred times more capital intensive and will stay that way. If our future is generated by economic activity fueled by synthetic gas at $25 a barrel-equivalent, nuclear electricity at $60-120 a barrel equivalent and the like, and if the energy sector itself requires much of that capital just to maintain itself, will capital still be as cheap and plentiful as it is now or will we have fallen into a "capital trap"? . . . Thus, if neither the soft nor the hard path were preferable on cost or other grounds, we would still be wise to use our remaining cheap fossil fuels--sparingly--to finance a transition as nearly as possible straight to our ultimate energy-income sources. We shall not have another chance to get there (Lovins, 1977:60).

"Capital traps" includes such technologies as breeder reactors, solar satellites and fusion all of which are highly centralized, require large amounts of capital and are, because of distribution, waste and vulnerability problems, unlikely to succeed (Stobaugh and Yergin, 1979:108ff.)

On the socio-political level Lovins offers some explanation of what might be expected with these hard technologies.

> Discouraging nuclear violence and coercion requires some abrogation of civil liberties; guarding long-lived wastes against geological or social contingencies implies some form of hierarchiacal social rigidity or homogeneity to insulate the technological priesthood from social turbulence and making political decisions about nuclear hazards which are compulsory, remote from social experience, disputed unknown or unknowable may tempt governments to bypass democratic decisions in favor of an elitist technology (Lovins, 1977:55).

Some people advocate nuclear power as necessary for the future of the United States, because they feel the direction for bigger more sophisticated technologies is beyond human control. At the same time, they feel that the technologies themselves are within their control. In reality the reverse is the case. For instance, one aspect of nuclear technologies, the safe storage of 20 million kilograms of Plutonium 239 yearly for 250,000 years is beyond human control (Hayes, 1978:8).

The limits of human control were put succinctly in a New Yorker editorial reflecting on the Three Mile Island accident:

> The main thing that planners concerned with nuclear power left out of their scenarios was not the correct workings of some valve or control panel. It was the thing that no scenario can ever take into account, simple human fallibility. . . . The Faustian proposal that the experts make to us is to let them lay their fallible human hands on eternity, and it is unacceptable. . . (New Yorker, April 16, 1979:28).

Given the choice, the hard path, with characteristics as described above and as shown in Figure 4 will certainly be rejected. The resolutions it offers are short-lived at best and highly dangerous at worst.

The Soft Path

The alternative, advocacy of the soft path, requires study of the cultural details involved. It becomes easier to chart a course toward soft resolutions if specific cultural characteristics of that resolution are known. What follows in the remainder of this chapter is a description of some of the principles that localized soft path resolutions will have in common. This description is generalized and brief. A more detailed study of soft path approaches follows in Chapters III through VII.

Technologies.--Soft path technologies were described by E. F. Schumacher in 1973 as "intermediate technologies" (Schumacher, 1973: 138ff.) and are now more commonly called "appropriate technologies." The characteristics of these technologies were listed by Lovins in the following manner:

1. They rely on renewable energy flows that are always there whether we use them or not, such as sun, wind and vegetation: on energy income, not on depletable energy capital.
2. They are diverse so that energy supply is an aggregate of very many individually modest contributions, each designed for maximum effectiveness in particular circumstances.
3. They are flexible and relatively low technology--which does not mean unsophisticated, but rather easy to understand and without esoteric skills, accessible rather than arcane.
4. They are matched in scale and in geographic distribution to end-use needs, taking advantage of free distribution of most natural energy flows.
5. They are matched in quality to end-use needs (Lovins, 1977:38-9).

The end use needs such as food, light, heat or motion can be classified by the physical nature of the task to be done. In the United States today at the point of end use:

58% of the energy is required as heat, split equally between temperatures above and below the boiling point of water
38% provides mechanical motion
    31% in vehicles
    3% in pipelines
    4% in industrial electrical motors
4% requres electricity for lighting, electronics, tele communications, electrometallugy, electrochemistry, arc welding, electric motors in home appliances and railways (Lovins, 1977:39).

As will be explained in more detail later (Chapters V and VI) study of these present end uses reveals places where conservation programs could be instituted, where the energy supply is not matched in scale and quality to these needs. For example of the total energy used for electricity, about 3% is due to commercial overlighting (Lovins, 1977:39). Matching the use to the supply is a first step, which in the case of electricity can eliminate a need for construction of new expensive and dangerous electrical generating plants.

Economics.--On the economic level of culture, Burns and Borsodi offer methods of calculating a soft path system. Borsodi claimed (1947) that "more than 2/3 of the things which an average family now buys could be produced more economically at home than they could be bought factory made" (Borsodi, 1947:15). An economy centered on the household, block and neighborhood eliminates the profit, transport and overhead costs inherent in some of the retail, wholesale and manufacturing sectors of existing distribution systems (Burns, 1975:210).

Traditional, Keynesian theories of economics where exports of a region or nation are basic will be turned around in the soft path. Local or regional relative self-sufficiency will be considered most important, most basic to the health of the economy. Exports, the surplus, will be distributed as unneeded commodities and will not be considered primary (Castells, 1977; Harvey, 1973; Commoner, 1976).

As cheap capital decreases, expenditures of capital will be more closely scrutinized by people in general. Calculations of capital reallocation could begin at the household level where new allocations of savings and disposable income could be made toward applications of appropriate technologies. In addition people will begin to scrutinize allocations of public funds and increase demands for wider participation in decisions about the allocation of those funds.

Calculations of the amounts of money presently available for reallocation will be made (Chapter VI, p.108). These will clarify the nature of decisions that can be made in facilitating soft path approaches to the energy crisis.

Socio-Politics.--On the socio-political level, moves toward the soft path will require changes in the decision making systems now employed in the United States. Rappaport points out (Rappaport, 1977:19ff.) that many of the decisions which should be made at low levels of a complex system are now made via complicated bureaucratized regulation at high, inappropriate and rigidified levels. In Chapter VII various possibilities for changing the socio-political systems along a soft path are discussed.

In 1973, William Bunge devised a chart of decision making and levels of organization in the United States. In Chapter VII (p.127), the chart is matched with levels of concern and decision making necessary for the implementation of soft path technologies.

This illustrates more specifically levels of organization possible in an appropriate technologies world.

In addition to the kinds of organizations and structures possible in an appropriate technologies world, a description of the politics or actions likely in such a world needs to be made also. Such descriptions come primarily from the poor peoples movements. Alinsky (1972), Kotler, (1969) and Boggs (1974), for instance, articulate political processes which match the level and scale of application of most appropriate technologies to appropriate decision making structures.

Kotler summarizes some of the issues as follows:

> The primary aspect of political liberty is local deliberation; the central administration always contends against the people for the monopoly of deliberative control. . . . The left must decide whether it wants social change or political revolution; benign administration or political life; social engineering or political freedom; participatory democracy or local control. If it chooses the latter, radical politics will find that the middle class as well as the poor have a personal stake in revolution. This conception of revolution will free radical politics of its compassionate malaise (Kotler, 1969:162).

Ideologies.--On the ideological level, the soft path will require a choice, a clear resolution of the contradictions indicated by the Figure 4 chart. The soft path ideology will certainly contain, in part, an ethic of respect for the natural environment, from which modern United States culture can draw upon many American Indian ideologies. Concomitantly, a conservation ethic is essential to the soft path.

Lovins describes the soft path ideology in terms of personal values:

> Those values that could sustain life-styles of elegant frugality are not new. . . . Such values as thrift, simplicity, diversity, neighborliness, humility and craftsmanship. . . . Offered those choice freely and equitably many people would choose as Herman Daly puts it "growth in things that count rather than in things merely countable" (Lovins, 1976:13).

We will draw here on spoken but often not yet realized traditions which may involved further discussion of the 5th Amendment's ensuring of "life, liberty and property" as against the merits of Jefferson's declaration for "life, liberty and the pursuit of happiness."

The process of planning for sustainable futures in the United States today involves explicit necessity to move along soft path resolutions. The hard path is neither acceptable nor sustainable. In order to differentiate hard path from soft path resolutions, an articulated concept of the whole, of culture, is essential.

Using a concept of culture, it becomes possible to specify soft path resolutions in general terms. Discussion of specifics then can become easier to analyze and more systematic. With these set of premises, then, a planning process can proceed.

CHAPTER III

CONVERSION ALONG THE SOFT PATH: EXAMPLES

Levels of Cultural Impact and Concern

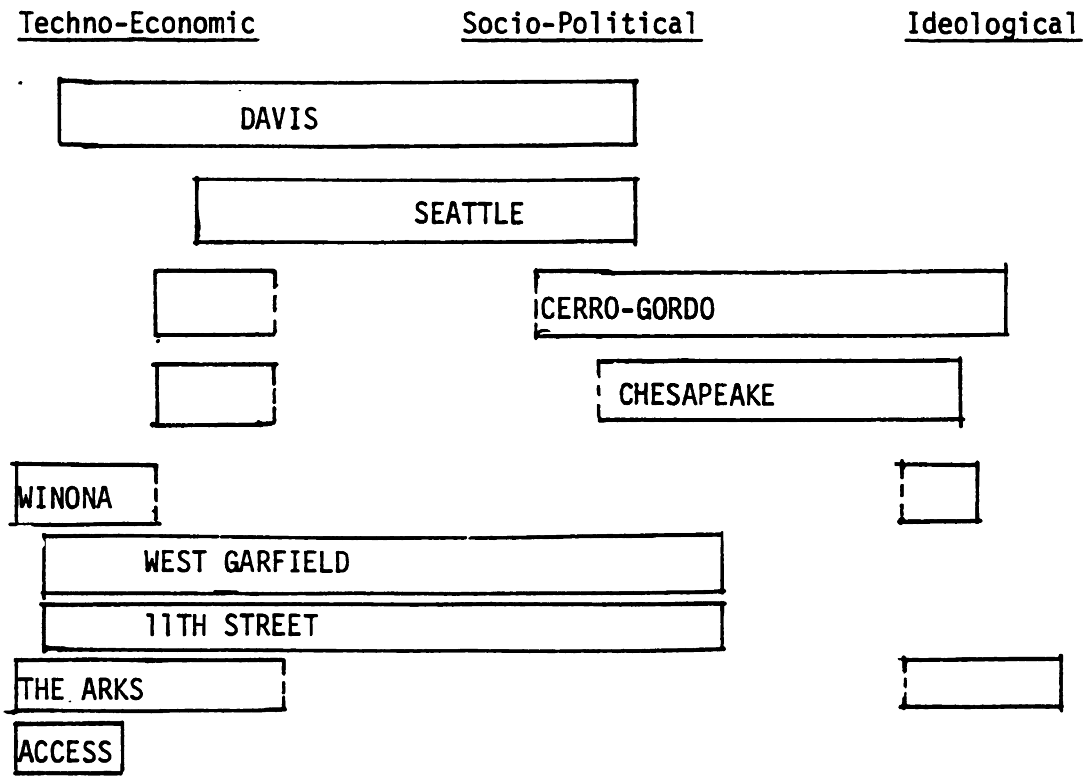
A first step in a planning process seeking to implement a soft path approach to the energy crisis is an investigation of projects and programs which attempt to come to grips with the energy crisis. Soft path solutions as advocated by cities, utilities or neighborhoods can be distinguished from hard path solutions when general cultural characteristics as outlined in Chapter II are kept in mind.

Examples of such soft path experiments, programs and projects are described in this chapter. As a group they illustrate various approaches to change along the soft path. Some projects, such as the Arks, Access, Farallones Institute are single house demonstrations. The emphasis in these projects is on technological experimentation. Other projects such as 519 E. 11th Street and West Garfield Park are integral parts of neighborhood organizations and neighborhood organizing.

Winona is an example of physical projections drawn out of the context of real life situations. The Chesapeake example involves similar academic speculation of possibilities on the socio-political and economic levels in conversion.

Cerro Gordo is a project in the tradition of 18th century utopias and is removed from the problems of conversion as it proceeds with a fresh slate toward new soft path ideas. Seattle and Davis, through local utilities and government, respectively, have initiated major changes starting from conventional political practices.

A breakdown of the project emphasis in terms of the model of culture explained in Chapter II (Figure 3) is presented below. This is not meant to establish a ranking in impact. It does illustrate the range of concern and experimentation in the cultural context illustrated by Figure 3, as well as the variety of approaches that can be taken when advocating substantial change.



These projects are classified in the diagram above according to the explicitness of their public statements. As with people who advocate the hard path, soft path advocates often assume considerably more than they state. Here these projects are tied together by their attempts to influence the course of this culture along a soft path. Looking at the areas of cultural impact of these projects helps in understanding directions and problems in concerted attempts to influence this culture toward sustainable futures.

City Projects

Davis, California.--As Mayor Black of Davis said in a February, 1978 speech in East Lansing: "We generated debate and created political controversy. This is good and positive." The success of their program is attested to by the enthusiasm of the converted opposition, the local builders (Living Systems, 1977:114).

The City's commitment is evidenced by its court challenge against Pacific Gas and Electric, which wanted to increase rates for conservation advertising. Davis had already conserved more than Pacific Gas and Electric was advocating and did not feel obligated to pay the rate increase.

The Davis process began in 1973 with a year of assessment of data and experimentation which resulted in the 1974 report (Living Systems, 1974). The Prologue stated the strong commitments on the part of the City:

> Our homes are now places of consumption. Our homes are then end result of the fattest culture on earth: while others starve, we try to figure out how to avoid cooking a Cup-O-Soup. . . .

> Our style forces us to consume: yet the more we consume, the more likely it is that if one thing goes wrong we won't be able to put it back together. If the electricity goes off we can't cook, food in the refrigerator goes bad; can't wash clothes, we are too hot or too cold, no entertainment, no lights. No man on the TV to tell us. . . (Living Systems, 1974:iv).

This first study includes breakdowns of patterns of household energy consumption in Davis, building performance, ways to improve existing buildings, proposed building standards, a chapter on neighborhood planning for energy conservation, and methods of redrawing subdivisions. As a result of this study Davis adopted a series of ordinances as revisions to the City Code.

The revisions and additions to the Code included a Housing Code revision which sets minimum performance energy conservation standards for residential construction. The Trees and Shrubs addition prescribes proper planting of trees and shrubs which were found to significantly raise and lower the ambient temperature of neighborhoods in winter and summer respectively. A biological control of pests ordinance was written.

The city nullified regulations that banned clotheslines, solar heated its own swimming pools, rewrote the setback requirements so that fences would not block the low angle of the winter sun. The home occupation ordinance "protects residential neighborhoods" but still allows for small home-based or cottage industries through home occupation definitions (The Elements, 1977:19).

Part of the neighborhood plan was to narrow the streets to lessen the amount of heat-catching asphalt. In addition, the recycling system supports itself financially while recycling glass, aluminum cans, bi-metal cans and newspapers. A strong education program facilitates various conversion experiments as well as conservation on the part of homeowners. A resale ordinance is now being written requiring certain minimum conservation standards for the resale of a house.

The city encourages the use of bicycles by a complete bike network including the requirement for bike paths in new subdivisions. "The potential of bicycle transportation cannot be realized without the necessary environmental support systems including street closings, licensing, training, bike paths and rules of the road" (The Elements, 1977:25).

As a result of these programs the city of Davis registered a net reduction of 16% in use of electricity in the four years. This level of conservation was achieved by the programs above which encouraged energy saving practices among residents of Davis.

The adoption process of the Davis Code involved considerable public education including testing, solar simulation, posters and slide shows. The ordinance and resolution drafts were reviewed with active opposition of Davis developers. After the code was written, an educational program for city staff, local builders, designers and developers presented general information about design with the climate and two approaches possible to the code itself.

The first approach required builders and designers "to state their window and floor area, roof color, show that the required percentage of windows are shaded on August 21 and how shading was calculated and compare the cumulative total heat gain and loss with the standard" (Living Systems, 1977:23).

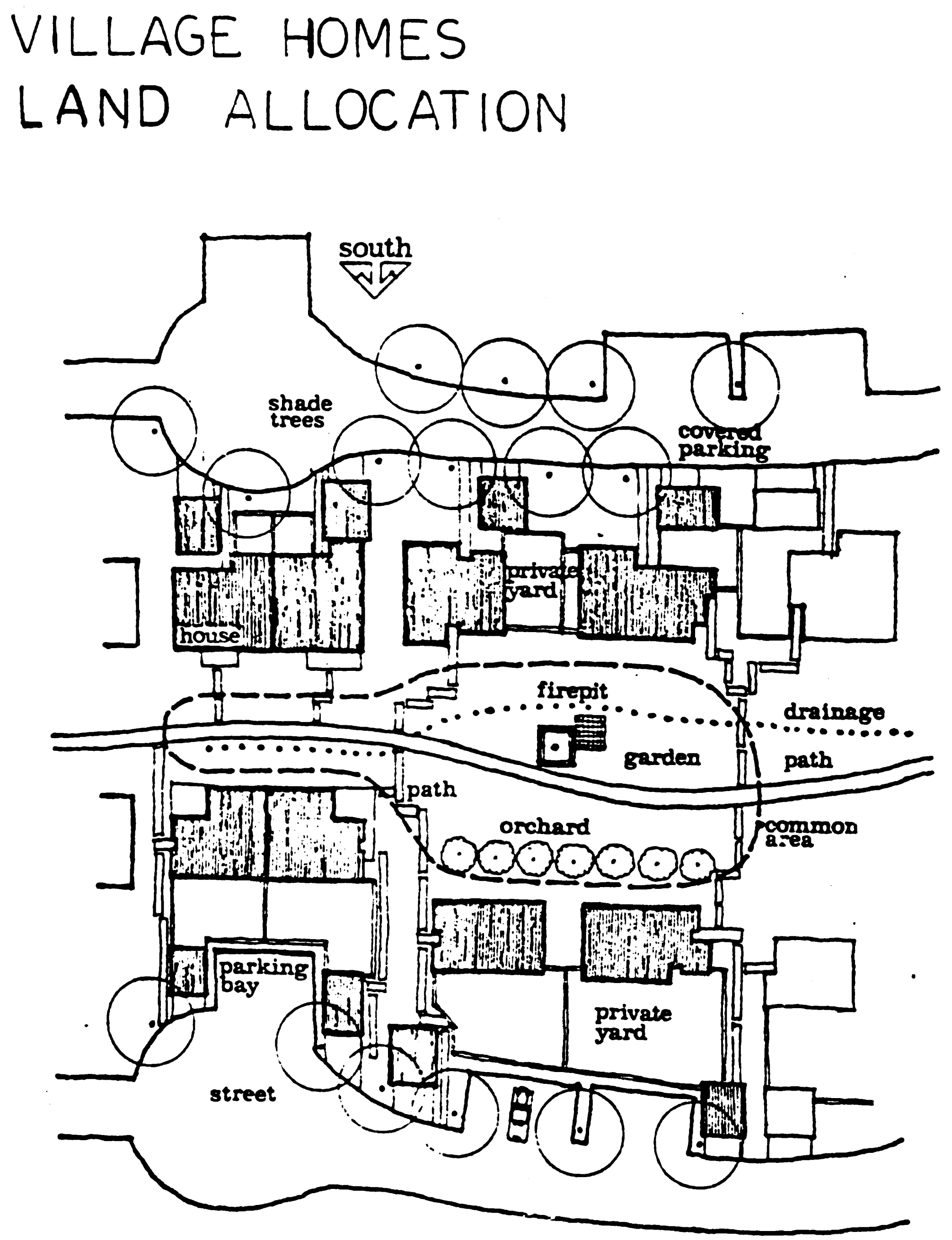
The designers using a second approach must

> calculate the heat gain and loss through the walls, roof floor and windows. They must also take into account radiant heat gain and heat loss through windows as well as conductive losses. They subtract the winter radiant heat gain through the window (which can be stored in the thermal mass of the house) from the heat loss, while the summer radiant gains through unshaded windows must be added. After the total heat gain and heat loss are computed, the designers compared the results with the standard (Living Systems, 1977:24).

Starting from the premise that considerable amount of heat can be stored or captured in the winter and that buildings can be shaded from heat in the summer, the Davis City Council has proceeded to change the form of the city. Figure 4 illustrates orientation and land allocation in Village Homes subdivision in Davis, the prototype for much of the Davis experimentation.

The Davis goal is to reduce energy consumption by 50% by 1985. Davis is a city seriously interested in conservation and change and attempts to involve as many people as possible. A recent discussion with former residents of Village Homes, the solar subdivision that lead to many of Davis' programs, indicates that not only the form but also the social fabric of the city is changing with the increased use of appropriate and solar technologies (Fridgen, 1979).

In Village Homes, for instance, cars are secondary placed behind the houses. This creates a common space in groups of 8-10



(Bainbridge,et al.,1979:16)

FIGURE 5:--Village Homes Land Allocation

homes. Decisions are made together about the use and care of those common spaces while the residents of the subdivision as a whole make decisions about general policy. One such decision restricts the size of private enclosures.

"In Village Homes, people expect to be directly involved in conservation and the workings and implications of their solarhomes. They don't expect the technology to do everything for them"(Hamrin, 1979:18).

Many of the experiments initiated by Mike and Judy Corbett in Village Homes, have been incorporated into city policy. The city government itself has jumped into, rather than opposed change with imagination and enthusiasm. "Immediate feedback, on results, peer approval, community support, public recognition of accomplishment--all contribute to achieving that most difficult task: getting people to change the way they do things" (Hamrin, 1979:33).

Seattle, Washington

The Seattle conservation study, Energy 1990, and resulting programs, began as a decision and resulted in considerable action. It differs from many conventional data gathering programs in that it began as a publically owned utility study with genuine involvement of a strong citizen committee:

> The key ingredient was a true commitment by the utility to listen to the committee, to give the committee complete freedom to all information and facts desired, to allow all activities to be conducted openly, and to allow all conclusions, recommendations and opinions to be published as part of the final report (Henault, 1978:2).

The open policy debate centered on supply by nuclear power or lessening of demand by conservation. In 1976, the Seattle City Council voted to meet the city's energy requirements through the year 1990 by conservation. The vote included code revisions, specific legislation specifying energy conservation plans, and a resolution that specifically outlined that general policies be governed by elements of resource use, conservation, sound economics, and environmental responsibility.

Seattle City Light began by studying their load characteristics in some detail. They then devised a series of programs to reduce electrical demand. Some of these programs are:

Commercial and Industrial Projects: Energy Management Seminars, Utility Training Seminars, Energy Audits, Programs for Reducing Overlighting

Residential Projects: Development of Heat Loss Standards, Energy Audit Programs, Low Income Insulation and Weatherization Projects

Education/Outreach Projects: Thermographs, Portable Exhibits, Energy Information Centers, Advertising Programs for Public Awareness, Energy Conservation Devices lemonstrations, Solar Utilization Projects

Research, Development and Demonstrations: Passive Solar Projects, Demonstrations of Hot Water Conservation and Solar Hot Water Heating Devices, Solar Utilization Projects

In-House Systems: Programs for Conservation and Maximum Efficiency in Existing Generating Facilities, Waste Heat Utilization and Co-Generation, and Load Management Programs.

In 1977, as a result of these conservati ve programs, Seattle City Light reported the following savings:

MW Savings

Commercial	40	
Industrial	12	
Residential	20	(Melcher, et al. 1979:2)

This amounted to about an 8% reduction in what the electrical requirements would have been without the conservation programs. Including considerable economic growth, the 1978 projected a savings were 56 MW. "The Megawatt saved is the difference between what is actually consumed and what would have been consumed had conservation not been practiced. Seattle City Light's goal is for a 20% reduction in their projected 1990 demand or an increase in savings of 16.4 MW annually. They are well ahead of schedule in meeting their goal"(Melcher, et al., 1979:3).

Henault attributes the success of the Seattle programs to unusually dedicated and open-minded utility officials, mayor and city council and to an effective citizens committee. As in Davis virgorous debate helped in the interest and involvement of people generally.

Cerro Gordo, Oregon

Beginning from an ideological commitment, the Cerro Gordo Community in Lane County, Oregon presently consists of about 100 families planning a new town on a 50 acre site. Eventually, they hope to have 2100 people on a 1200 acre site, of which 100 acres will be developed. From their advertising brochure comes the following:

> The startling thing about new towns is that there is hardly anything new about them. But Cerro Gordo is different. The people who hope to move in there are designing a community themselves before it is built. In essence, they are erecting a community of people not buildings. When they are able to go ahead with construction, they will have reached a consensus on what they want. In the process they will have also learned the word neighbor (Town Forum, 1977:3).

The Cerro Gordo Community assumptions include definitions of appropriate technology, community, organic agriculture, ecology, education and challenges. The Base Plan includes a description of the site, a summary of the work on transportation, utilities, land use and agriculture. Transportation will be by trolley connected to existing railroad systems at Cottage Grove, 5 miles from the site. Water, electricity and gas will be supplied on site by wells, windmills and methane in a phased process. Waste will be separated at the source and recycled.

The Land Use Map (Figure 6) indicates placement of the Village Center, Residential, Manufacturing and Open Space districts.[1] These do not look very different in form from many postulated developments.

In building the Community and the homesites, the Base Plan document says:

> During the last two years we have tried to synthesize the community concept and the site dynamics through this first draft of the base plan. . . . It is

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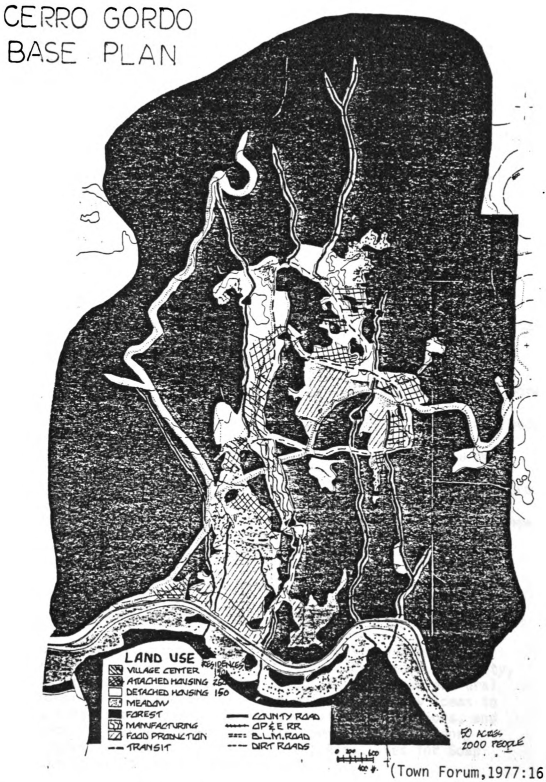
[1]Under the no clearing assumption, 150 acres maximum are located for agriculture. This amount should be compared with the 4300 acres required to support the 2150 population at the present 2 acres per person American average (Town Forum, 1977:19).



(Town Forum,1977:16)

FIGURE 6.--Cerro Gordo Base Plan

> important that all of the homes built on Cerro Gordo respect the environmental limits of the site and further the long range community plan as we build an integrated and ecosystemic community. We also want to organize a variety of environments and life-styles so that individuals and small groups can realize their personal dreams within the context of the larger supportive community. . . .
>
> Cerro Gordo isn't a commune but neither is it a land development. Cerro Gordo is a face-to-face interpersonal community the very nature of which requires its participants to examine themselves, their goals, their motivations and their expectations and work together with their future neighbors to assist one another in realizing their personal and community goals (Town Forum, 1977:23).

In the available preliminary base plan much is missing, especially a description of the workings of the community association itself which is so central to the plan's conception.

The process of conversion of this society will be far more complex than building a community of self-chosen, like-minded people in an idyllic spot. But Cerro Gordo may be emerging at a more fortuitous time in history than did its 17th century predecessors. A modern Harmony could be a living example in the building of new urban form through community decision-making.

Similar projects are going on in Soap Lake Washington where the development of a solar community is:

> conceived as an opportunity to consciously and gradually introduce a new energy-related technology into a community, taking time to consider its effect, in this case on rural community life and growth. "The goal is to allow ideas to be integrated and expanded by the values, conditions, and needs of the people who will use them," writes Gregory Higgins, Project Director. Project Associates for Soap Lake Solar Community (Bessong, 1977:15).

Paper Studies

Winona, Minnesota.--The Winona example is a paper study of a conversion of a city of 27,000 to self-sufficiency by the year 2000. Drawn by the Energy Design Studio at the University of Minnesota, it works toward "a new way of life based on decentralization, smaller more rational units of production and distribution and reliance on the natural energy flows of the biosphere" (University of Minnesota, 1975:30).

Change would fall into three phases. The first phase "limits needlessly wasted fossil fuel energy and expands household and neighborhood production by means of insulation, weatherstripping, heat pipes, backyard vegetable gardens with cold frames and composting" (University of Minnesota, 1975:31). The second phase converts to energy systems which do not require fossil fuels by using greenhouses, wind, trees as wind breaks and food supplement, raising goats, rabbits, ducks, chickens and fish and providing means of storing food (University of Minnesota, 1975:32).

The third phase "explores new social patterns" through the efficient use of solar and wind energy and the gradual shift from an energy-intensive to a labor-intensive society. In that process people will live near work in extended families. Larger groups of people will share and cooperate which will allow for economic self-sufficiency and diversity. Education, medicine and communication will remain at high levels" (University of Minnesota, 1975:35).

The city of Winona was analyzed as a whole and then with detailed studies of the CBD, a Neighborhood Example, Food Co-ops and Markets, Food and Waste Complex, Riverfront Research and Exposition Center, Winona State University, Latch Island and the Monastery. The Neighborhood example is used here as an example of the three phase conversion process proposed.

In Phase 1 some houses are joined together by a canopy system. Gardens are planted on the inner block. In Phase 2 solar collectors are added on some roofs, some houses are connected by built rather than inflatable enclosures and other houses are fenced off by surrounding walls. Superblocks are defined by street closings (Figures 7 and 8).

In Phase 3, inner blocks are developed, one as a garden cooperative, another as enclosed living-working center, a third for aquaculture, a fourth as a small shops mall. The superblock idea is fully developed, common space is used and houses are enclosed with their own private space. Transportation is by trolley down the main thorough fares (Figure 8).

Other than the fact that phase three is to be completed by the year 2000, nothing is said about the time periods involved in each phase, the way decisions are made about the content of each phase, who does the work, or how those people are trained. Even if this were a viable plan, which it might well be, it is only a physical or technological conversion.

The change in the form itself as shown below will only come about as part of a process, education and organization of people toward a system in which they not only make many more decisions but also execute them.

NEIGHBORHOOD CHANGE

(University of Minnesota,1975:59)

FIGURE 7.--Winona Neighborhood Change: Existing and Phase 1

NEIGHBORHOOD CHANGE

(University of Minnesota, 1975:60-1)

FIGURE 8.--Winona Neighborhood Change: Phases 2 and 3

Chesapeake Bay.--James Ridgeway explains processes of conversion on a regional level in a disucssion of the Chesapeake Bay region (Ridgeway, 1975:154ff.). Explaining that new energy policies with self-sufficiency as an assumed basis cannot be merely reconstructions of the past. He recounts the history of the Chesapeake Bay region:

> In the 17th century the region provided staples to England and the continent, first furs then tobacco, later wheat and cotton and during the 19th century iron ore. . . . Never in its history have the people of this region sought to lay claim to their own destiny. . . . The Chesapeake region was always a colony, first of Europe then of New York and Boston. The ships of the East India Company were exchanged for the railroads of Morgan and Rockefeller (Ridgeway, 1975:156).

Suggesting corrections of history rather than threatening retrogressions, Ridgeway outlines a process of reopening railroads and canals for the purpose of creating regional self-sufficiency. "At its most basic level that means redirecting the flow of chickens from Boston to Washington, D.C. and Baltimore, of potatoes from national markets to regional markets"(Ridgeway, 1975:159).

The kinds of systemic change advocated here requires the involvement of the people of the Chesapeake Bay area aided by a coherent and supportive regional and national policy. Specifically Ridgeway suggests "a network of democratically consituted local regional and national energy organizations" (Ridgeway, 1975:162).

Citing Davis, anti-nuclear activity and building of mass transit systems, Ridgeway envisions conversion on a regional and national level as well as on the local level. Speculation about the nature of regional and national changes that might be required in moving along soft paths, is important because some kinds of cooperation and exchange will be required at larger than local levels.

Neighborhood Projects

West Garfield Park, Chicago.--In West Garfield Park, Chicago, a neighborhood group has successfully installed and is operating a 880 square foot hydroponic greenhouse. There are 317 acres of similar available space, flat rooftops in the neighborhood (Figure 9).

The decision to construct the greenhouse resulted from the work of the Christian Action Ministry's Health Action Committee. The Committee discovered that the poor quality and expense of the locally available fruits and vegetables contributed to the low state of health of many residents (Collier, 1978).

The greenhouse now supplies annually 26,000 lbs. of fresh greens, tomatoes, cucumbers, melons and beans. They cost 30¢ less per pound than in the supermarket and have created 2 full time jobs. Discussions of the whole neighborhood economic dependence system have resulted as well as a new look at the neighborhood itself. The success of the greenhouse project has resulted in the construction of two more greenhouses and the eyeing of vacant industrial parks and more available space for other self-sufficiency projects. Figure 9 illustrates the kind of drawing and figuring that goes on in the Center for Neighborhood Technology as they postulate further change in their urban form.

WEST GARFIELD PARK

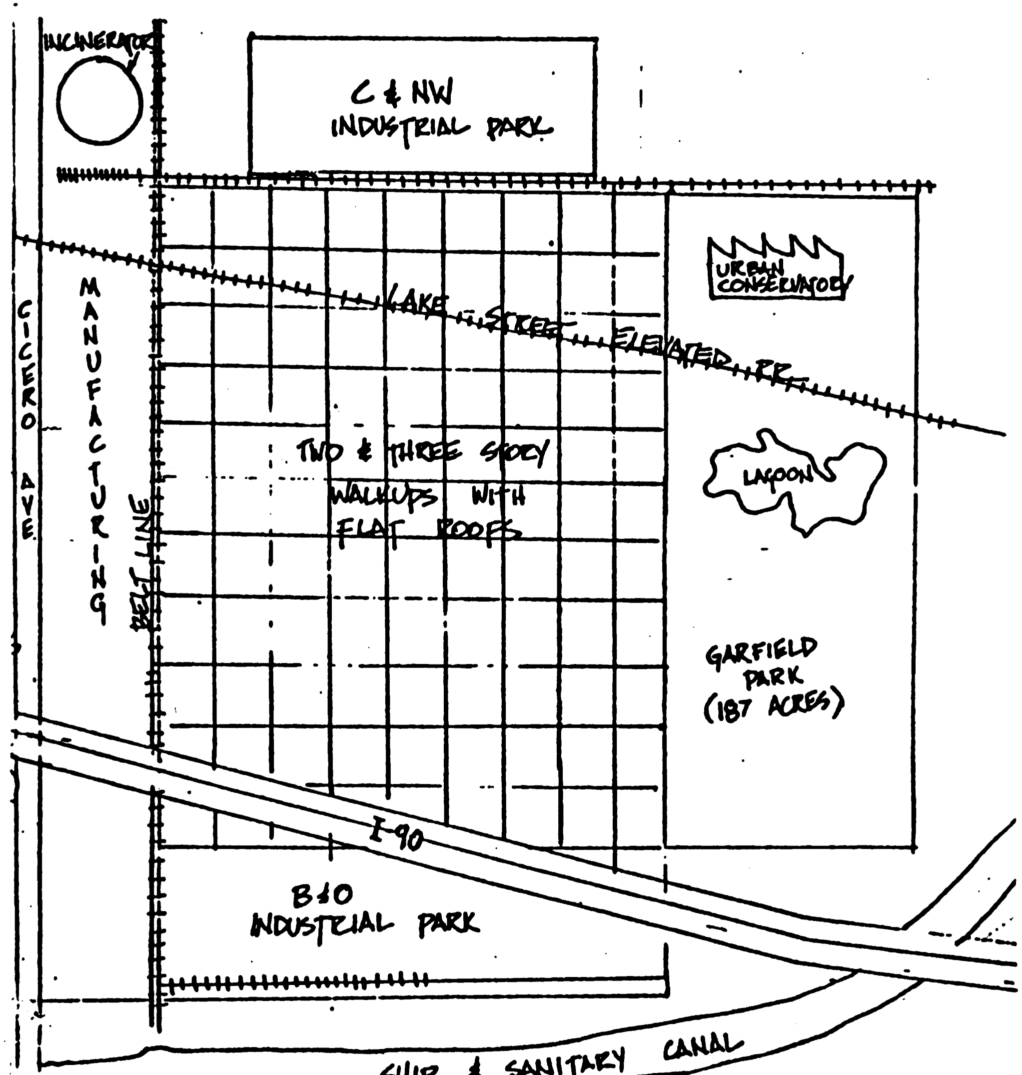
LAND USE	Acres
Park Area	187
C & NW Industrial Pk.	200
B & O Industrial Park	400
Open Space	10
Schools	60
Streets	200
Commercial	75
Vacant	20
Abandoned Residential	10
Abandoned Commercial	10

RESIDENTIAL	
Occupied	422 Acres
Flat Roofs	317 Acres
Total Dwellings	10,000
Average Units/Building	4
Total Population	40,000
Unemployed Workers	5,800
Public Aid/ Worker/Yr.	$8,500
Residential Blocks	310 Double
Average Area/ Block	1 Acre

32 Dwellings or 128 Persons/ Acre

FRUITS AND VEGETABLES

Average Family eats 624 lbs. produce/year @ 80¢/Lb. = $500
Neighborhood spends $5 Million/year



(Bernstein, 1978)

FIGURE 9.--West Garfield Park

This project arose from need as defined by a neighborhood group. A parallel example exists in New York City.

519 11th Street.--519 11th Street in lower Manhattan was, in 1975, just another abandoned 100 year old tenament. A group of residents as a "last resorts received a $177,000 mortgage from the city which they pay back by "sweat equity." At an hourly rate they gutted, insulated, added storm windows and rehabilitated the apartment building. They saved 60% of the heating bill and now own the building (Energy Task Force, 1977).

Solar collectors on the roof supply 85% of the hot water and save 20% of the heat. A windmill provides some of the electricity and on a good day runs the Consolidated Edison meter backwards.

All this was accomplished by a group of people who own the apartment building cooperatively and are now teaching the skills and the process to other neighborhood residents. A WNET interview with the participants yielded the following quotes:

> The important thing is that for the first time low income people have gotten ownership to these properties. And they gain ownership by putting in their sweat. . . . We're dealing with a new technology in our society and we're dealing with a social change issue . . . an appropriate blend of technology happening between community groups and the new survival tools of the future . . . (WNET, 1977:5).

> The important thing to remember is that we are in essence creating a local economy in a neighborhood which has traditionally been a dependent economy (Ibid., 8).

> In the whole history of urban renewal and Model Cities the government programs have done nothing to stop the deterioration. What was missing was bringing the people into it showing them how to do it, giving them an opportunity to accomplish what government money could not (Skurka and Naar, 1976:195).

Critical elements in these examples of change in urban neighborhoods include local control and ingenuity. But if conversion and savings are to occur in sufficient numbers of American neighborhoods, it would behoove those of us who use the most to act on these examples before the need is as great. Misery is obscured by success in these cases.

Single House Projects

Access.--Like the Farallones Institute in Berkeley, California, The Access house is a neighborhood conversion demonstration project being carried out in Milwaukee by the University of Wisconsin-Milwaukee School of Architecture and Urban Planning. Here a typical old frame inner city house has been converted for living and demonstration purposes to appropriate a soft technology (Schade, 1977).

It serves as a center and display of various systems. Various types of collectors are mounted on the south wall and roof for water and space heating. Shutters have been constructed and installed along with a general weatherization. A clivus multrum serves as a toilet. The garage has been converted into a greenhouse. And a sauna is made entirely of recycled materials. Except that the house is open their relationship to the surrounding neighborhood is minimal.

The Arks: Woods Hole, Massachusetts, Prince Edward Island.--
The Arks at Woods Hole and Prince Edward Island are the experimental living systems of the New Alchemy Institute. They are based on ideological principles:

> People once again had to be given control over those necessities upon which their lives depend--access to food, shelter and to an environment not poisoned by industrial wastes (Tood, 1977:x).

The Arks demonstrate with a high degree of technical sophistication, two self- sustaining bio-shelters. Principles of self-sufficiency have been substantiated by specific integrated experiments in vegetable and protein growing as well as biological controls of pests, self-sufficient shelter and self-sustaining agriculture (Baldwin, 1978; Todd, 1977).

Based on general principles of appropriate technologies as described by Schumaker (1973) and Lovins (1976,77) the New Alchemists developed specific integrated systems. For fish farming, for instance, they linked a series of ponds. In an upper pool water is filtered through crushed quahog shells, an earth filter of oxygenating plants and algae culture. The water then flows to a middle pool which continas algae, aquatic plants, and live bearing fishes or invertebrates such as Daphnia. The purified water finally goes to a lower pool where the edible fish, such as Tilapia and plants are grown under shelter of, and heated by a greenhouse. The water is recirculated for purification up to the upper pool by a windmill. This example of an appropriate, self contained and technologically sophisticated protein growing system, is indicative of the work of the New Alchemists (Todd, 1977:90-93).

The seeds of a cultural conversion along the soft path are present in the combination of all the projects outlined above as well as other summarized in Brunner (1978), (Citizens Energy Project (1979), and Ridgeway (1979). Technological and economic, social political and ideological problems, positions and on-going experiments have been discussed. In varying degrees parts of a soft path culture, then, have been adapted in various localities.

Change is being approached from all possible cultural tacks as these examples also illustrate. But whole culture change has not yet occurred in the United States in response to the energy crisis. The vast majority of policies, programs, structure, allocations of resources and modes of decision-making have not responded to the leadership exemplified in these examples and proceed along the hard path.

The process of culture change, then, a major part of the business of planners is more difficult, profound and interesting then a summation of existing examples. While those projects operate in appropriate directions they have not been adapted by the society as a whole. A more detailed examination of a specific local project will begin to illustrate the complexity of what is involved and the degree of opposition to necessary kinds of change.

CHAPTER IV

URBAN OPTIONS

In December, 1977, a small group of East Lansing, Michigan residents met to plan ways to consciously emulate some of the experimentation outlined in Chapter III. Starting from an appropriate techologies or soft path premise, the group began discussing plans for projects and programs in East Lansing.

East Lansing was chosen as an initial place of focus because it had elected a liberal City Council, it is a University town, and the School District had received a Humanities grant which in part brought the Mayor and one of the Councilmen from Davis, California for discussions of the Davis programs. Turning East Lansing into the Davis of the Midwest seemed a logical and relatively simple undertaking.

The initial Urban Options group consisted of local designers, architects, builders, University teachers and students and concerned individuals. The group formed itself into a non-profit corporation and met as the Board of Directors of that corporation once per week.

In order to effect appropriate technologies research and solutions to the energy crisis, Urban Options formulated two programs. One project was the Energy House, envisioned as an on-going drop-in demonstration center where the process of weatherization and solar retrofit could be accomplished in workshops on a typical inner city older frame structure.

Appropriate technology task forces were the second major purpose defined by Urban Options members. The task forces were to study appropriate technologies solutions to energy problems related to housing, water and waste management, transportation and urban agriculture. Their focus was to be on the city as a whole, or in blocks and neighborhoods and they were designed to make larger than single house level recommendations to the city, county and university.

Urban Options Chronology

A chronology of the activities of Urban Options is presented here to give the reader a sense of the development of the project.

1977

December:	Initial Discussions

1978

January - March:	Organization met regularly, expanded, incorporated, and defined Energy House and Task Forces as suitable projects. Began search for the most usable city-owned house.
March:	Formal request for presentation to and work session with City Council.
March 30:	City Manager's report denied the need for Urban Options (Coffman, 1978).
April 15:	Urban Options responded to City Manager's report.
June 9:	Urban Options objected to the content of the East Lansing/MSU Energy proposal to Argonne Laboratory (East Lansing, May, 1978).

June 20:	City Council passed resolution which agreed to provide Urban Options with a city-owned house for its Energy demonstration projects and to pay for the utilities on the condition that all materials needed in the retrofitting process come from some other source or were donated (East Lansing, June, 1978).
July - September:	Comprehensive Education Training Act (CETA) application submitted for four full time Urban Options staff people. Handicapper accessibility greenhouse design teams met frequently to draw plans for the Energy House.
	Task Force work clarified and National Center for Appropriate Technology (NCAT) Grant submitted.
October 12:	Report on material donations submitted to Council as basis for use of the house. Donations totalled $1,330 mostly in retorfitting equipment supplies from local hardware and lumber stores.
	Department of Energy Greenhouse grant submitted
November	Meetings take place in the Energy House
November 18:	Caulking and Weatherstripping Workshop
December 2:	Storm Windows and Shutter Workshop
December 9:	Wall Insulation Workshop
November - December:	Contract meetings with the City result in no contract.

<u>1979</u>

January:	CETA Grant comes through to hire 4 full time staff people. An Energy House Coordinator, two Task Force Coordinators and a Communications Coordinator.
	Hiring Committee formed from the Board.
February:	Four CETA staff people hired and begin official work. The Energy House is open 6 days per week 9-5.
February 17:	Home Weatherization Workshop
February 23:	Benefit at Edgewood Church

February 24:	Home Insulation Workshop
February - March:	Task Forces formed and began to meet.
March 10:	Home Energy Conservation Workshop
March 17:	Solar Window Box Heater for the Drug Education Center
March 31:	Solar Window Box Heater for Urban Options
March:	Work Session with City Council
March - April - May:	Interior Design Classes work on designs for Urban Options as a walk-in education center
	Cartography interns begin work with the Transportation and Buildings Task Forces
April - May:	Task Forces submit comments to City Master Plan Committees.
	Westherization Team began outlining the concept of a trained team which could support itself without relying on grants.
April 28:	Handicapper accessibility workshop, modified the Energy House so that it is accessible.
April:	Senators and Congressmen and Utilities representatives visit Urban Options as an alternative to their tour of the Midland nuclear plant.
	Visitors and lectures from: Village Homes, Davis; Farallones Institute, Berkeley; Sunstructures, Ann Arbor.
May 20:	Benefit in the Rathskeller with the Michigan Solar Energy Association.
May :	Urban Options receives a DOE Greenhouse Grant, Total: $10,000 (Urban Options, October, 1978).
May 26:	Urban Gardening Workshop
June:	Task Force mid-year Solar Cooker Workshop Reapplication for CETA staff continuation Reformulation of design team and large Board meeting

July and August:	Solar Greenhouse Design and Construction Workshops. A course for Participants.
July	Urban Options receives a Community Development Grant to conduct weatherization workshops in the downtown East Lansing Community Development area. A half time staff person is hired to complete that work. Total: $11,000 (Urban Options, May, 1979).
August:	Horticulturalist is hired, half time, to monitor the greenhouse as part of the DOE Grant.
	CETA Grant extended through July 1980
	City submits energy education elect grant to the Michigan Energy Administration. Urban Options is not consulted (East Lansing, August, 1979).
	Urban Options receives grant from Governor's Energy Awareness Committee to construct and display a portable solar greenhouse. Total: $1,400

Opposition

Urban Options projects were designed to broaden the kinds and quality of energy decisions made by residents and local governments. The focus of the intense activity chronicled above was to bring into the Energy House and the policy planning process as many people as possible and work with them developing skills necessary in an appropriate technologies world.

As can be seen from the history outlined above, the City of East Lansing has cooperated only minimally with Urban Options and has at various points opposed Urban Options work. It is instructive to look more closely at the nature of that opposition.

As a group of people outside the existing machinery of city government, Urban Options people trained and established themselves as experts in the increasingly important field of energy conservation and appropriate technologies. People inside the "accepted" network for decision making reacted in the ways summarized below.

In March 1978, shortly after the idea of an Urban Options project was first presented publically, the City Manager (Coffman, 1978) directed considerable staff time and money to convince council that the Urban Options projects were unnecessary and unworkable. The arguments presented by the City Manager were dispelled and City Council designated a house for Urban Options use.

In April, 1978 some Michigan State University Urban Planning school faculty and graduate students found an Argonne Laboratory Request for Proposal which asked for analysis of city wide energy use patterns in a proscribed system that Argonne Laboratory was interested in testing. Part of the proposal was designated to request citizen input into the analysis.

In response to this section of the proposal, the City staff and the MSU School of Urban Planning set up a task force made up primarily of utilities representatives (East Lansing, May, 1978). Because these utilities people were avowedly opposed to any genuine conservation or appropriate technologies programs, this feature of the proposal resulted in active opposition at City Council meetings. The grant bid to Argonne labs was unsuccessful.

In anticipation of the Argonne grant and for the purpose of rewriting the Master Plan, the city allocated funds for a number of task forces, among them an energy task force. This task force began to be an official reason why Urban Options should receive little financial support and no recognition by City officialdom.

By November 1978, when Urban Options requested contract negotiations with the city, the City Manager began a new directive, to design a parking ramp so that the Urban Options Energy House would be razed. By May, 1979 when it became obvious that the particular design eliminating the Energy House, was unreasonable and would not be accepted by Council, a group called the Urban Obervatory was suddenly formed in City Hall to advocate parking ramps. Urban Options was referred to by a City Council candidate and the chairperson of the Planning Commission as just another "energy club."

These official attempts by City Staff at discrediting and/or eliminating Urban Options were temporarily silenced when the Department of Energy awarded a grant to Urban Options to build a solar greenhouse (Urban Options, October, 1978). A proposal submitted by the City in the same grant cycle was denied.

The City Manager responded by declaring that construction of the greenhouse couldn't be approved by the City because it was designed to be built over the sidewalk. He had mistaken the railroad ties which enclosed the raised bed urban gardens for a foundation for the greenhouse.

At the same time, the City staff and the MSU School of Urban Planning were again writing a proposal designed to undermine Urban Options. This time the State Energy Administration issued a request to city governments to initiate Community Energy Education Project. This is exactly what Urban Options had done, both knowledgably and effectively. But Urban Options was neither consulted in the proposal writing not included in the advisory committee (East Lansing, August, 1979).

The Energy Consciousness Coordinator hired to carry out the proposal was an expert in the media, not energy because, in the words of one City planner on the hiring committee, "There's lots of infomation on energy these days. Anyone can read about it." People involved in energy organizing with Urban Options were not considered for the job. As a result another opportunity for forging constructive links between local energy experts and the city machinery was lost.

In general the opposition to Urban Options by the East Lansing City Government lies in two categories: personal and structural. Urban Options poses a personal threat to the individual power and professional knowledge of the City Manager and several other City staff members as Urban Options deals with authority on the crucial question of energy. This problem is compounded by the power the City Manager is used to having in swaying Council members.

The City of East Lansing has a City Manager form of government where the City Manager and staff receive salaries to carry out City Council policy. City Council members are paid very little, must hold another job in order to live and can spend relatively little time on city policy and issues. The involvement of Council is, per force, marginal.

The City Manager, in conjunction with some of the staff, has developed a system of decision making which plays Council members off against each other, as part of a means of keeping control of those decisions. The nature of solutions to the energy crisis being proposed and implemented by Urban Options requires a far more open, participatory system of decision making than the City Manager had grown accustomed to.

Urban Options is accomplishing visible and useful alternatives and responses to the energy crisis for people in the East Lansing area and it is doing so outside the presently established hierarchy for decision making. Similar structural opposition to changes in the direction of wider public participation has been noticed elsewhere (Wetmore and Dwyer, 1976; Shrobe, 1978:4). Chapter VII contains further discussion of the socio-political problems in soft path conversions.

Meaning for Soft Path Solutions to the Energy Crisis

From the kinds and intensity of opposition to Urban Options and other projects that emphasize and achieve a high level of participation, it is possible to look more clearly at the kinds of changes which will need to accompany wide conversion to appropriate technologies in the United States. Details of an alternative system of planning emerge as programs are implemented in opposition to a standard system of planning.

Success stories, such as those recounted in Chapter III may be more the exception than the rule. In Davis, success followed extraordinary persistence by Mike and Judy Corbett in their development of Village Homes (Fridgen, 1979). This project was in turn supported by a long involvement of Davis in the ecology movement. The University of California Davis, permits no cars on campus and has for a long time emphasized biological controls in its agriculture programs and education. This history led eventually to an imaginative and open program stemming in part from the City Government itself.

In the case of Seattle, a publically and hotly debated referendum, deciding in favor of a soft path approach was followed by the hiring of Peter Henault. Seattle City Light took seriously public responsibility as a city owned utility, and encouraged the extraordinary and open leadership of Henault (Henault, 1978; Ridgeway, 1979:20). Within an atmosphere of encouragement from the top, conservation and solar programs are flourishing.

Careful details and strategies in the conversion process to appropriate technologies may need to be developed only if the opposition to them is strong. The process that people in Urban Options have identified as a result of active opposition follows in Chapter V and VI.

CHAPTER V

TRANSITION IN PLANNING METHODS: PRESENT METHODS TO SOFT PATH METHODS

Energy has not been a traditional part of the professional planners preserve. Energy planning in an era of unlimited and cheap fossil fuel supply has been accomplished primarily by utility companies and the automobile industry. The utility companies planned electrical use and carved out territories among themselves for natural gas and oil delivery for space heating, water heating, cooking and industrial uses. The automobile companies have planned the transportation system in the United States using professional planners to assist them in that task.

In this era of limited and expensive energy supplies, planning practice must include active energy planning. In order to arrive at any practical and conceivable future this planning must be accomplished from a premise of conservation with plans for matching the work that needs to be done with the cheapest, safest and most energy efficient way of doing it.

Such conversion is best accomplished locally where there is knowledge of local needs, materials and skills, at single house, neighborhood and city levels. Local planners can look at energy planning as a new and basic part of their obligations. Instead of reacting to the automobile industry by constructing roads, parking ramps and land use patterns to accommodate that industry, planners are mandated by the energy crisis to look at transportation needs of their constituents and match those needs with the most appropriate means of accomplishing them.

Instead of writing codes and regulations to facilitate the use of electricity or minimize the blight of power lines, planners need to look into the appropriate uses of electricity and more energy efficient ways of delivering it. Instead of relying on old codes which waste gas and oil in buildings, planners will need to facilitate the best use of local renewable fuels in well weatherized buildings.

Planners must delve into new areas of decision-making and new areas of knowledge because of the energy crisis. One new area of knowledge and understanding is the data base from which planning proceeds. In order to determine and advocate suggested programs and priorities, end-use data must be analyzed in sufficient detail for the area under transformation or study. Analysis of end use data here is for the specific purpose of developing programs which will meet human needs, conserve energy and supply increasing amounts of needed energy through appropriate technologies. The first necessary step is for planners to argue and explain explicit assumptions, as in Chapter II. The second step is development of a data base that facilitates those aims.

Existing Data

The data sources that energy planning are based upon, become central to the kinds of programs which these planners propose. Energy data can quickly become bewildering, a maze of British Thermal Units (BTUs, see Appendix I).

In a thorough discussion of the energy data base some paths through this maze can be charted. Energy end-use data purports to show the amount of energy consumed at the point at which it is used. Varying definitions of the end point result in various kinds of data presentations.

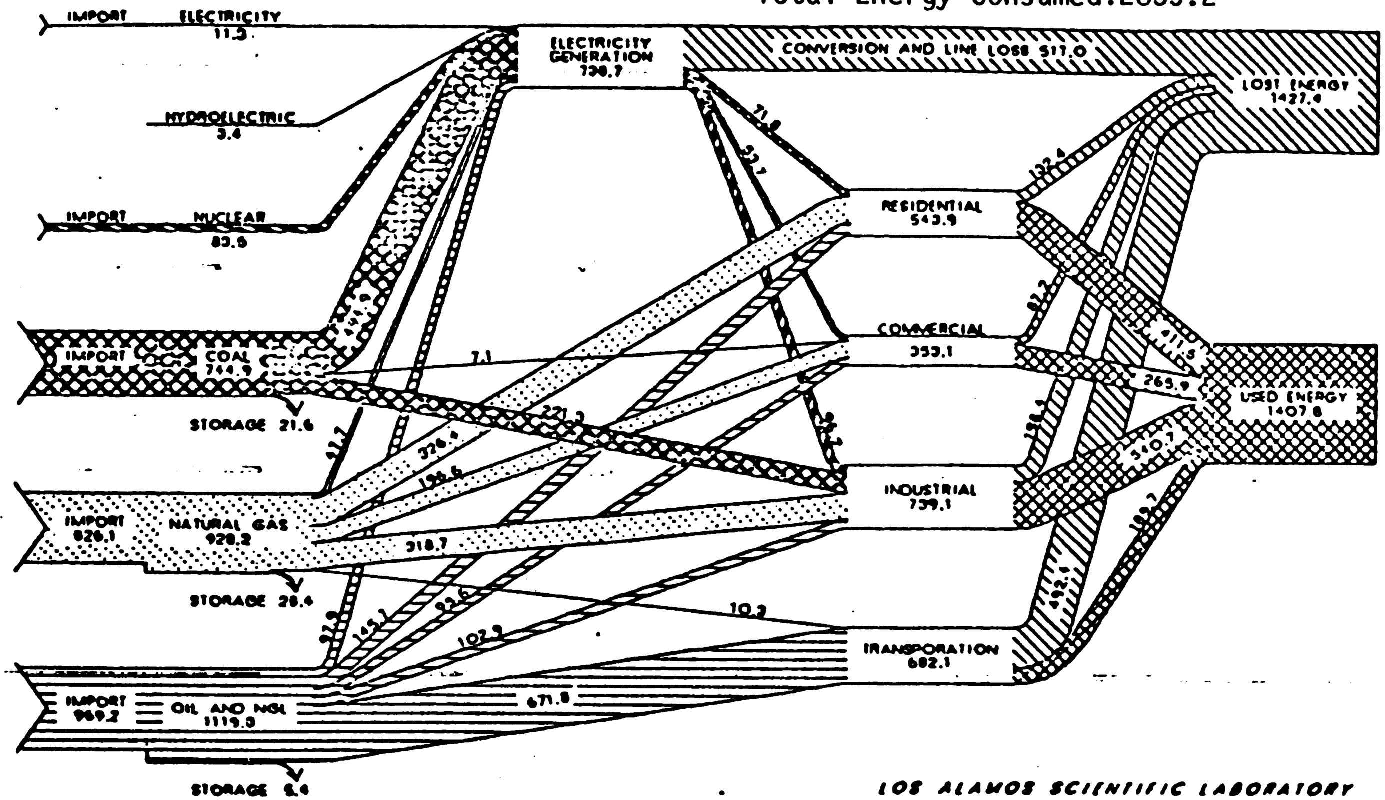
The data sequence presented below is relevant to the specific study area under discussion, East Lansing, Michigan. The data illustrate one method to understand, criticize, and arrange data so that it can be useful in making recommendations that will facilitate the use of appropriate technologies.

Part of the information that is useful for appropriate technologies planning is presented in Figure 10 below. It indicates the mismatch between what we use and how we use it. Michigan imports 95% of the energy it uses and wastes more than 50% of that energy.

Usually only the total BTU figures as presented in Figure 11 are considered relevant. But this level of data broken down only by sector and total BTUs and kinds of fuels can only suggest programs which emphasize the need for increasing supply. Programs which match kinds of supplies with the kinds of work that need

MICHIGAN: 1975

Population: 9,157,000
Units: Trillions of BTUs
Net Energy Imported: 2635.1
Total Energy Produced: 255.5
Total Energy Consumed:2835.2



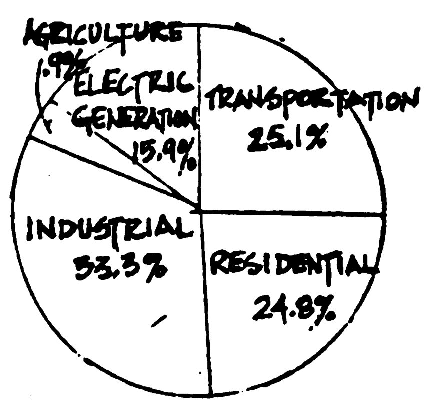
(U.S. Department of Energy,Data,1975)

FIGURE 10:--Energy Consumption Flow Chart: Michigan,1975

MICHIGAN: 1975

Units: Trillions of BTUs

	AGRICUL.	INDUST.	TRANSP.	RESID.	ELECTRIC GENERATION	TOTAL
COAL	0.0	247.9	0.0	0.0	489.4	737.3
COKE	0.0	32.7	0.0	0.0	0.0	32.7
TOT-COAL	0.0	280.6	0.0	0.0	489.4	770.0
	0.0 PCT	36.4 PCT	0.0 PCT	0.0 PCT	63.6 PCT	29.6 PCT
MO-GAS	10.7	23.3	554.3	0.0	0.0	588.3
AV-GAS	0.0	0.0	1.7	0.0	0.0	1.7
JET-FL	0.0	0.0	18.9	0.0	0.0	18.9
KERO	0.0	0.0	0.0	9.1	0.0	9.1
DIST	7.9	21.0	65.6	159.4	20.0	274.0
RESID	0.0	29.1	2.3	0.0	64.2	95.7
ASPHAL	0.0	28.1	0.0	0.0	0.0	28.1
MISC-P	.5	25.1	0.0	0.0	0.0	25.6
TOT-PETRO	19.1	126.7	642.9	168.5	84.3	1041.4
	1.8 PCT	12.2 PCT	61.7 PCT	16.2 PCT	8.1 PCT	40.0 PCT
LP-GAS	2.1	2.5	0.0	20.6	0.0	25.2
NAT-GAS	.4	287.0	11.2	385.5	39.0	723.2
OTH GAS	0.0	1.5	0.0	0.0	2.4	3.9
TOT-GAS	2.5	291.0	11.2	406.1	41.5	752.3
	.3 PCT	38.7 PCT	1.5 PCT	54.0 PCT	5.5 PCT	20.9 PCT
NUCLEAR	0.0	0.0	0.0	0.0	5.2	5.2
	0.0 PCT	0.0 PCT	0.0 PCT	0.0 PCT	100.0 PCT	.2 PCT
HYDRO	0.0	0.0	0.0	0.0	3.6	3.6
	0.0 PCT	0.0 PCT	0.0 PCT	0.0 PCT	100.0 PCT	.1 PCT
ELEC	1.2	96.4	.3	72.3	-209.7	-39.5
OTHER	0.0	71.8	0.0	0.0	0.0	71.8
	0.0 PCT	100.0 PCT	0.0 PCT	0.0 PCT	0.0 PCT	2.8 PCT
TOTAL	22.7	866.5	654.3	646.9	414.3	2604.8
	.9 PCT	33.3 PCT	25.1 PCT	24.8 PCT	15.9 PCT	100.0 PCT



(U.S. Department of Energy, 1975)

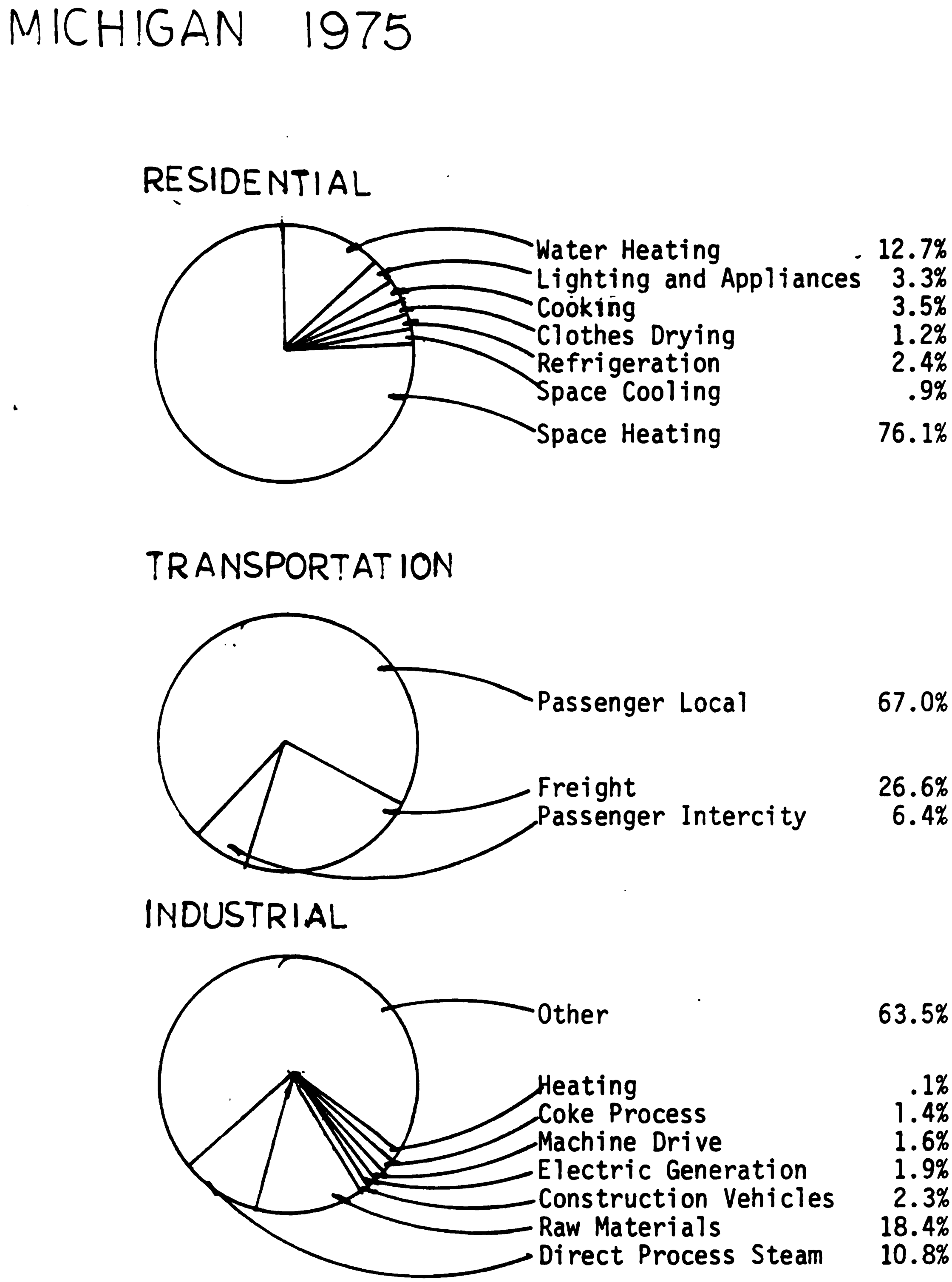
FIGURE 11:--Energy Consumption by Sector:Michigan,1975

to be accomplished can only be approached when data are analyzed further. In Figure 12, percentage of total in each sector is divided into particular kinds of uses to which people put the energy supply.

It is interesting to note that figures, as presented in Figure 12 do not include electricity generation as an end use. Rather the uses are defined in terms of the kinds of specific work to which they are now put.

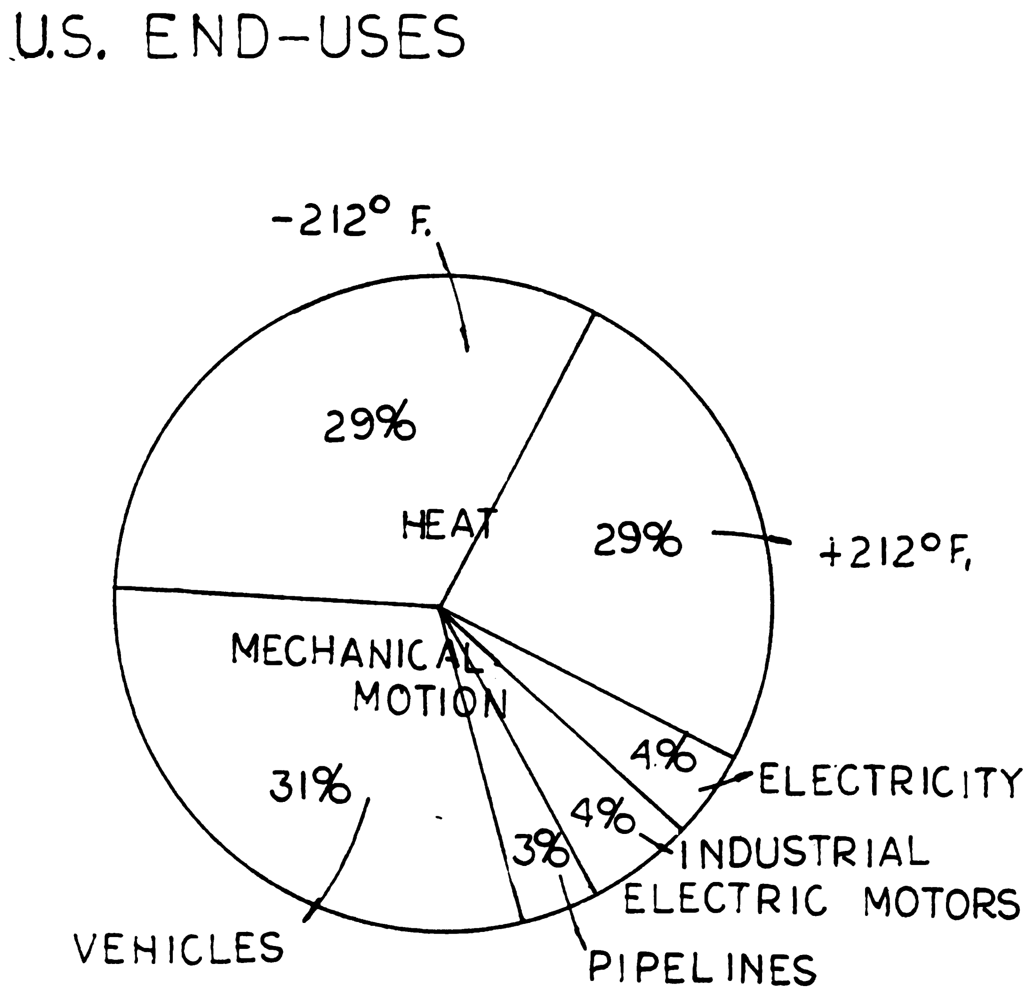
End uses can also be described in terms of the kinds or quality of energy that are needed for the work. Lovins (1976) does this as summarized in Chapter II (p.23). A pie showing this data (Figure 13) for the United States as a whole can be shown together with a chart of the end uses by sector and work as in Figure 14. Taken together a match can be made between the kinds of work that need to be done and apporpriate ways of doing that work.

If one looks at the data with an eye to appropriate technologies, the primary consideration is the match of the job that needs doing with the way the job is done. One instance, the match between energy used for the generation of electricity and the end uses which need electricity, stands out. Sixteen percent of all energy is used to generate electricity, yet only 8% of the end uses need electricity. Two problems are inherent in this mismatch. One problem is that the methods of generating electricity are not appropriate and the other is that electricity is often used inappropriately.



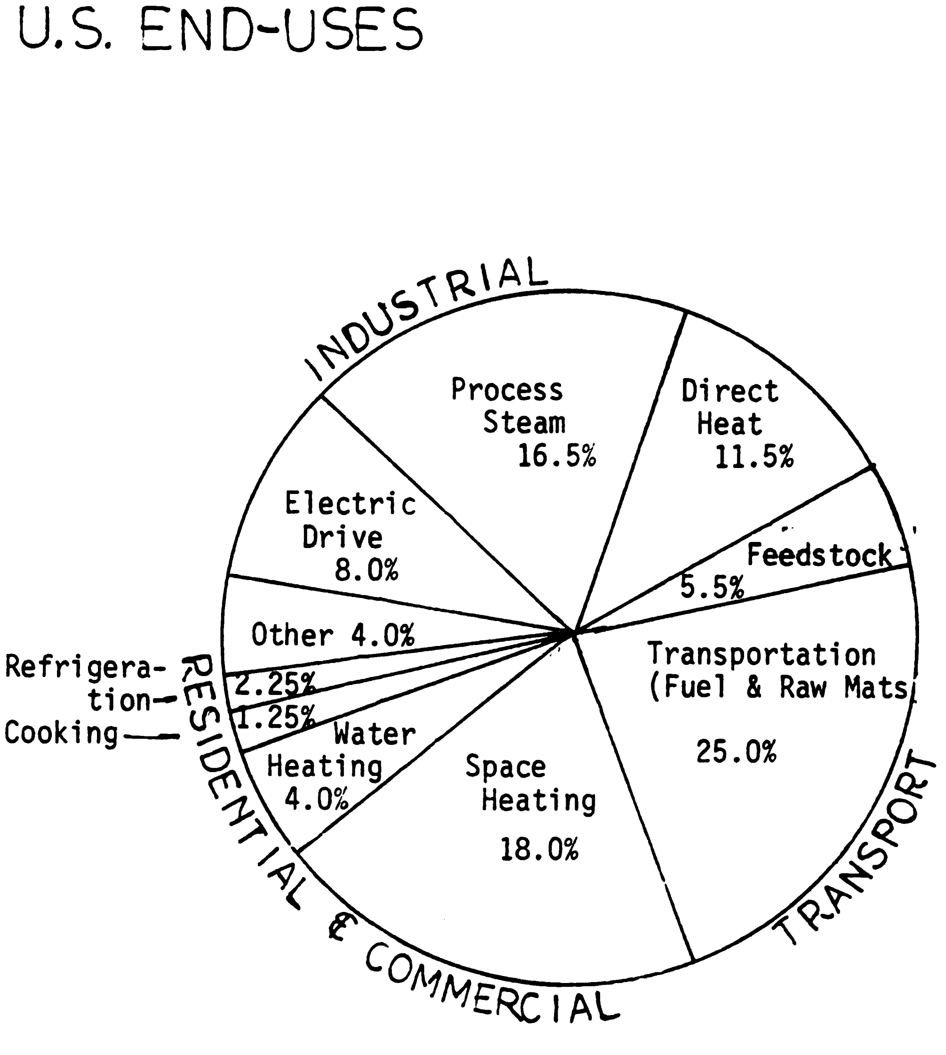
(U.S. Department of Energy, 1975)

FIGURE 12:--End Use Energy Consumption by Percentage of Sectors: Michigan 1975



(Lovins,1977:39)

FIGURE 13:-- End-Uses in the U.S. by Quality



(U.S.Department of Energy,1977:8)

FIGURE 14:--End Uses in the U.S. by Sector and Work

As Figures 10 and 11 show 72% of the amount of energy that goes into the generation of electricity is lost out the stacks or in transmission. In addition, as Lovins points out 61% of the uses to which we now put electircity, most notably space heating and commercial overlighting are in themselves inappropriate. Electrical generation and use are areas which can benefit from appropriate technologies programs.

Figure 14 also indicates that large portions of our energy needs go for transportation and space heating, to which appropriate technologies and conservation can be readily applied. These too suggest themselves for emphasis in design of appropriate technologies programs.

With implementation of appropriate technologies programs designed initially to conserve energy in the areas of electricity generation, residential space heating and local transportation, realistic reductions in Michigan 1975 end-use figures could be calculated in the way shown in Figure 15.

An initial dramatic 40% reduction as is shown in this chart (Figure 15) would provide energy planners with goals. Significant goals are sought in the design of conservation programs which "correct" the areas of greatest energy waste and mismatch. Such a "correction" is not far fetched.

> The United States can use 30 or 40 percent less energy than it does with virtually no penalty for the way Americans live--save that billions of dollars will be spared, save that the environment will be less strained, the air less polluted, to dollar under less pressure (Parisi, 1979:50).

POSSIBLE FIRST REDUCTIONS

In Trillions of BTUs

Michigan Use :1975		Possible Use With Reductions: Conservation and Appropriate Technologies
Electric Generation	624	113.4 (1/3 of Present Use)
Residential		
Space Heating	492.1	
Space Cooling	5.5	
Water Heating	82.3	
Total	579.9	290 (1/2 of Present Use)
Transportation		
Local Passenger	438.3	43.83 (1/10 of Present Use)
Total (Other Categories Included)	2604.8	

Total With Reductions (All Categories)

Electric Generation	113.4
Residential	356.9
Transportation	259.8
Industrial(no change)	866.5
Agricultural "	22.7
	1619.3

(Department of Energy,1975)

FIGURE 15:--Michigan End Uses and Possible Reductions in Use

This approach is quite different from the one which states that supplies must meet projected increases in gross demand levels. The differences in approach are reflected in the different presentations of data from Figure 11 to combinations of Figures 13 and 14.

Although rough priorities for programs can be mapped out from Figures 13 and 14 and goals set as in Figure 15, actual implementation of programs would require further refinement of the data base.

Modifications in Data Collection and Presentation

In the process of implementing and specifying energy conservation and appropriate energy programs, the necessity for new kinds of data and data collection emerges. For example, many governments of different jurisdictions use data as presented in Figure 11. The implicit assumption inherent in Figure 11 data is that any new energy program must supply the amount and kind of energy now used. It tells nothing of what should be done differently because of inherent mismatches.

A further example of the kind of data collection now used by many planners, which confuses rather than clarifies solutions to the energy crisis is the chart below drawn from a proposal by the American Institute of Planners (AIP) in their Energy the Cities testimony before Congress.

Community Energy

Energy Use Profiles (Demand)		
Energy Distribution Profiles (Supply)		
Primary Energy Profiles (Existing Tech) Supply		
Primary Energy Profiles (Alternatives) Supply		
	Institutional Factors Affecting Energy Sue	Environmental Factors Affecting Energy Use

FIGURE 16.--Matrix Proposed by A.I.P. (A.I.P., 1977)

If planners try to fill out such a chart, the work becomes unclear if not impossible. "Institution" and "environment," for instance, remain undefined and assumptions about supply and demand, "distribution" and "profiles" are certainly confusing if not confused. Alternative charts are proposed below. These start from end-use needs and work through reasonable or even present demands to various ways and stages of achieving supplies.

What is needed are data presented in an understandable and workable way. Planners can employ charts which show end uses. These would be filled out by percentage of total energy used, by total BTUs and by kinds of supply. One chart would be filled out according to known human needs as follows:

Human and Use Needs

Supply Alternatives

	Present	Transitional 5-10 yrs.	Future 15-20 yrs.
Heating/Shelter			
Food			
Water			
Light/Clothing			
Transportation			

FIGURE 17: Human End Use Needs and Supply Alternatives

Another chart could be drawn from the end uses now existing in U.S. society with assignment of BTU total and percentage of use and kind of supply changing along with methods of supply and kinds of fuels used for supply (Figure 18).

Sequence of Planning Considerations

In order to proceed away from a reliance on non-renewable or dangerous hard technologies, the kinds of data employed and what they lead to should be carefully understood. Planning methods which attempt to make appropriate technologies conversions should take into account a general sequence of considerations such as the following:

End Uses

	Supply Alternatives in BTUs, % of Total and Kind of Supply		
	Present	Transitional	Future
Transportation			
Space Heating			
Process Steam			
Direct Heat			
Electric Drive			
Feedstock			
Water Heating			
Cooking			
Refrigeration			

FIGURE 18.--Present End Uses
Transitional and Future Alternatives

1. Establish explicit assumptions about the nature of the problem and possible solutions.[1]

2. Determination of End Use Needs of people at the point of end use.

3. Conservation of Non-Renewable Resources through programs having significant effect on energy use.

4. Determine combinations of renewable, locally available energy supplies.

5. Match supplies in quality and scale to end-use needs.

6. Energy supplies and planning would be locally applied and therefore also locally managed.

7. Planning with appropriate technologies must be tailored to a specific place.

While this general sequence is important and needs emphasis it needs to be further refined. However, energy planning will not proceed with an impact upon the energy crisis unless the kind of planning sequence presented above is considered basic to and not separate from conventional planning practice and is specified to a particular place.

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[1]In this thesis solutions to the energy crisis are assumed to be most possible and workable using appropriate technologies. But assumptions are always made and should always be an explicit part of a plan.

CHAPTER VI

PLANNING CONSIDERATIONS IN CONVERSION TO APPROPRIATE TECHNOLOGIES IN DOWNTOWN EAST LANSING, MICHIGAN

The planning sequence explored in this and subsequent chapters in further depth follows from an assumption that appropriate technologies offer sustainable solutions to the energy crisis. The method proceeds with analyses of data available and needed to apply appropriate technologies to a specific geographic area. Once the data are collected the process of technological conversion can be postulated. Then the costs and savings can be studied.

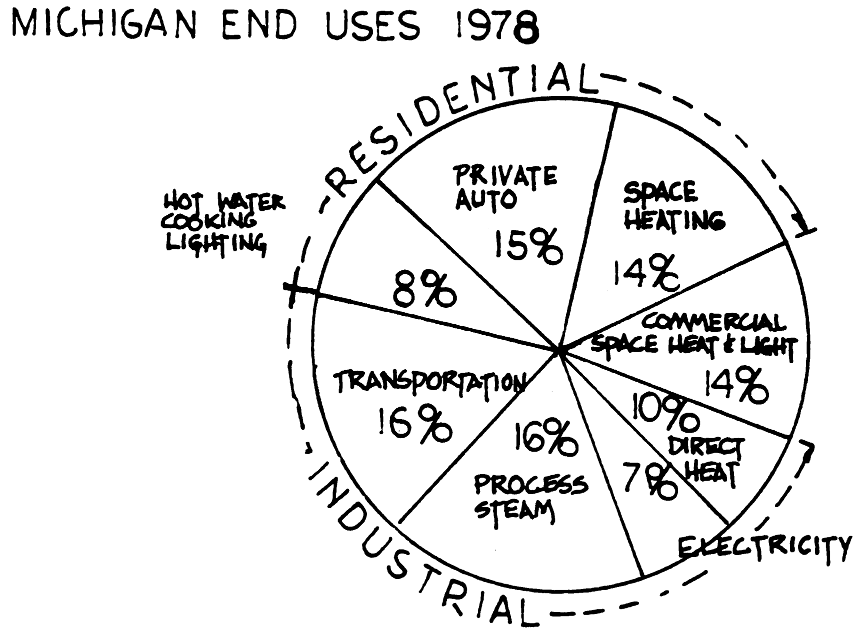
Actual implementation and conversion is a socio-political process, studied in Chapter VII. The process of conversion will be facilitated with a data base, technical conversion and costs analysis concomitant with culture change along the soft path.

Data Base

End Use Energy Needs

For purposes of transition, end use needs can be described in terms of existing uses (Figures 17 and 18). Figures 12-15 in Chapter V present a general but sufficiently accurate figures for the development priorities of soft path programs.

The Michigan equivalent to the U.S. figures (Figures 13-14) is presented below. Program direction toward significant savings in energy use can be dtermined from such general figures. In East Lansing, where no industries are directly involved priorities should be given to transportation, residential and commercial buildings, particularly space heating and electrical use.



(Michigan Energy Administration,1978)

FIGURE 19:--Michigan End Uses by Percentage

If the major purpose of the planning process proposed here is to implement appropriate technologies, then the existing data base will need further specification to the area being studied.

In many conventional planning rationales, data collection purports to have no explicit programs in mind. For instance, in reviewing the community energy history for the Argonne Proposal, mentioned in Chapter IV, the city of East Lansing synthesized the following data.

> 85% of the residence in East Lansing are heated and cooled with natural gas. The average single-family home consumes 180 mcf of gas per year and an apartment consumes 100 mcf. Applying these figures to the City's housing stock indicates that 1.3 trillion cubic feet of natural gas is consumed in the City by residential uses. The Board of Water and Light provides electricity to 9800 customers who consume 9 million kilowatt hours of electricity per year. . . . At the rate of 325,000 vehicle miles driven daily within the City and 15 miles per gallon of gasoline consumed indicates that approximately 8 million gallons of gasoline are consumed yearly with the City (at 80¢ per gallon an expenditure of $6,400,000 annually within a radius of 2 miles) (East Lansing, May, 1978:2).

No conclusions about programs, priorities or possible effective solutions to a defined crisis were proposed. As such the data remained random and meaningless at best and calculated to provide non-solutions at worst.

Summary of Relevant Existing Planning Data

Until recently energy data had not been included in planning considerations. Here the existing data are organized by general demographic, transportation, buildings and weather. Only kinds of information relevant to the problem of conversion to appropriate technologies are cited.

General Demographic Data

General demographic data relevant to a soft path conversion process include numbers, age, employment and income. Some data are available through the city, most from the United States Bureau of the Census. Of particular relevance here are the numbers of people, the proximity to the work place, and the amount of income.

Transportation Data

The census data also include numbers of cars and numbers of people who drive to work. The Michigan Department of Transporation and Tri-County Regional Planning Commission have Origin and Destination Data and vehicle count figures.

The City of East Lansing has commissioned two studies relating the traffic in downtown East Lansing. The Villican Leman Study (1978) recommends a peripheral route around the downtown area and the Burke study (1977) calls for additional parking ramps in the Central Business District. Both are based on an assumption of exclusive use of the car for transportation and on vehicle counts and projections without regard for origin, destination or distance.

In addition, another study, (Horvath, 1974) analyzes the amount of space occupied by the car in East Lansing in terms of land use and death rates.

Buildings Data

The census figures show numbers and ages of residential structures, kind of heating number of units, and value. City data include zoning, rental - ownership, comprehensive plan maps and a partially completed neighborhood housing condition survey (see Appendices A - E).

The State Energy Administration conducted a Project Conserve which audits residences and has been summarized for East Lansing (Zuidies, 1970; Harris, 1979). Utilities do not now reveal information on individual buildings, the kind of general information available is quoted above. In addition, the Tenants Resource Center has detailed rental housing information.

Weather Data

In order to tailor various forms of renewable energy supplies to a locale, information such as that presented in Appendix F should be known and is available from the United States Weather Bureau. In the case of wind availability, site specific information is necessary, just as available southern exposure of individual structures should be ascertained for solar applications.

These kind of data are available to planners and others everywhere. Cataloguing has often been a major job of planners. But planners should do more than that, they should not only create new data but organize existing data in new ways.

Modification of Existing Data

Data are presently collected in a relative haphazard way. The Census tracts, Neighborhoods and Traffic Zones are all different. (See Appendices A and B and Figures 24 and 25.) As a result drawing of consistent compilations of data for some specific purpose as is desired here becomes difficult.

A specific data recommendation for implementing appropriate technologies then would be to set the collection zones in a uniform manner. Such zones should be defined according to neighborhood for a number of reasons that become more obvious in Chapter VII as the argument progress. The main reason is that while much of the conversion of cities to appropriate technologies will need to occur on a single house level, the neighborhood is an essential organizational level for implementing appropriate technologies. It is the level where concerted action by people can occur.

Additional data will be required as outlined below. But the Neighborhood movement has already required the Census Bureau to provide census data for neighborhoods (U.S. Department of Commerce, 1975; NAN Bulletin, June/July 1978:11).

Collection of Additional Data

In order to demonstrate a study and a planning process and to indicate more specifically what kinds of additional data are needed for energy conversion, a study zone has been created for this thesis.

The study area consists of 29 downtown East Lansing blocks as indicated in Figures 20-21. For purposes of residential and commercial mix portions of Neighborhoods 9 and 10 are used (see Appendix B). For purposes of housing and income mix portions of census tracts 41 and 31.01 (Appendix A) are studied.

STUDY AREA

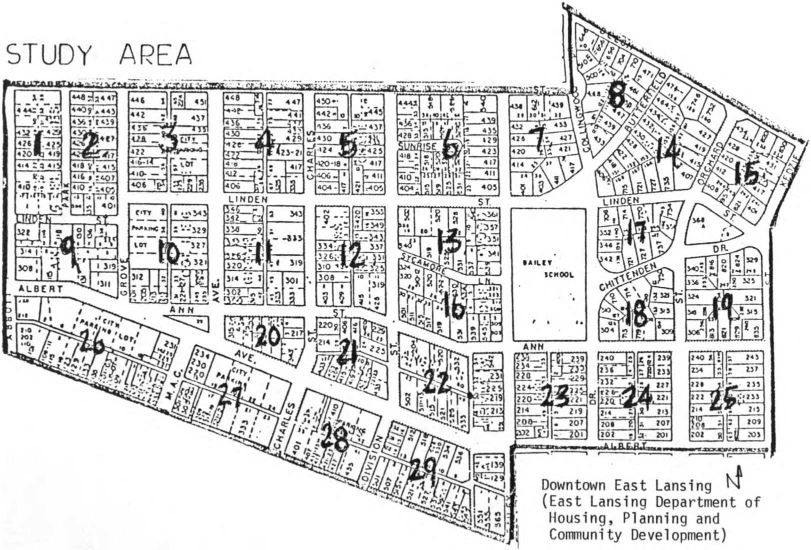


FIGURE 20:--Study Area East Lansing

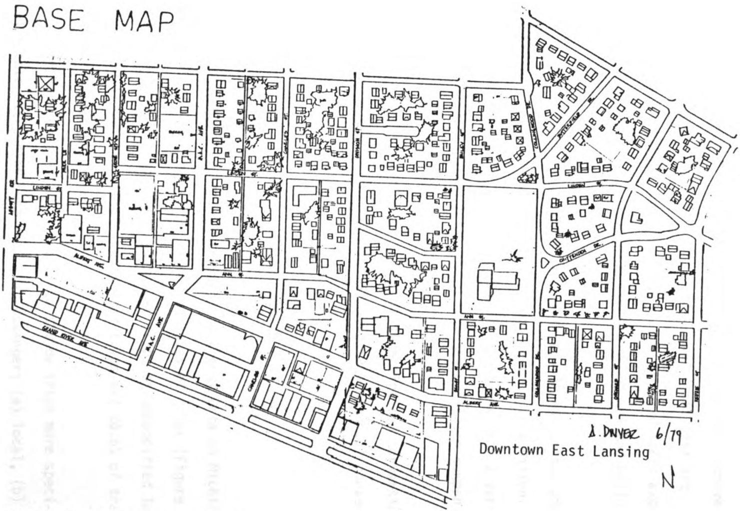


FIGURE 21:--Study Area Base Map

Specific data for this area can be generalized from the census and city data. Additional data are required for a conversion to appropriate technologies. Some needed additional data are indicated on the block chart (Figure 22) including southern exposure, collector surface, land surface and numbers of houses and buildings, numbers of cars and people.

These kinds of data should be included in the census and should be made available on a neighborhood level. In addition individual building audit data are already available from a variety of sources and additional information from the utilities companies will soon be mandated (Veenstra, 1979).

From a basic data base plans for technological conversion can begin. A sequence for dealing with the technological conversion in the study area follows.

Technological Change

Step 1: A Transportation Plan

Transportation.--The Department of Energy Data on Michigan Transportation indicates three different types of trips (Figure 12), 67% of the travel is for local passenger trips of unspecified length, 6.4% of the trips are intercity passenger trips and 26.6% of transportation is freight trips.

In East Lansing it is useful to divide trips more specifically into categories such as: (1) Passenger; (a) local, (b) to town, (c) through town; and (2) Freight. While the exact percentages of end use in each of these categories was not known, it was

SAMPLE BLOCK ANALYSIS

BLOCK #	FLAT OR SOUTH FACING ROOF AREA (Sq. Ft.)	BUILDINGS WITH UNOBSTRUCTED SOUTH FACING WALL	NUMBER OF BUILDINGS	OPEN SPACE: PARKING AND GREEN SPACE (Sq. Ft.)	NUMBER OF RESIDENTS
1	F19,250 S 1,406	All	8	P. 3,000 G 14,800	36
2	S 7,400	All	H 18	P 7,200 G 27,000	84
3	S 4,500	H 12 G All	H 16 G 7	P 32,000 G 45,000	73
4	S 2,000	H 8	H 15 G 10	G 52,000	75
5	S 3,400	H 8	H 17 G 15	G 20,000	77
6	S 4,300	H 19	H 26 G 14	G 24,000	118
7	S 2,600	All	H 13 G 12	G 20,000	42
8	Off S 2,100	None	H 14 C 7	G 10,000	44
9	F14,800	None	H 8 G 1	G 15,000	36
10	F31,800		H 3 C 5	P 39,000 G 5,600	13
11	F 2,400	H 8	H 15 G 6	G 40,500	104
12	F 4,000	H 6	H 14 A 1	G 30,000	107
13	S 150	H 12	H 14 G 8	G 15,000	54
14	S 1,500	None	H 19 G 9	G 40,000	47
15	S 2,000	All	H 12 G 9	G 15,000	38
16	S 150	All	H 16 G 8	G 16,000	75
17	S 2,700	All	H 12 G 3	G 10,000	38
18	S 1,000	All	H 12 G 5	G 15,000	41
19	S 150	All	H 16 G 9	G 22,500	49
20	S 150	H 2	H 2	P 30,000	9
21	F 5,000 S 800	H 6	H 10 C 1	G 15,000	70
22	F 7,000 S 400	H 14	H 14 A 2	G 25,000	73
23	S 2,100	H 3	H 17	G 30,000	77
24	S 2,100	H 6	H 15 G 6	G 30,000	76
25	S 4,000	H 6	H 16 G 10	G 25,000	73
26	F 72,000	CC 6	C 16 A 56	P 48,000	120
27	F[illegible],000	C 5	C 8	P 30,000	0
28	F35,[illegible]00	C 7	C88 H 1	P 20,000	4
29	F24,000 S 2,000	C 7	C 7 H 10	P 21,000	56
TOTALS	310,756	H 219 CC 25	H 351	P230,000 G591,600	1709

F: Flat Roof
S: South Facing or Sloped Roof
H: House
G: Garage
P: Parking
G: Green Space
C: Commercial
A: Apartment

Persons Per Dwelling Unit	
Single Family	
Owner Occupied	3.13
Rental	4.46
Duplex	3.33
Apartment	2.86
Group	20

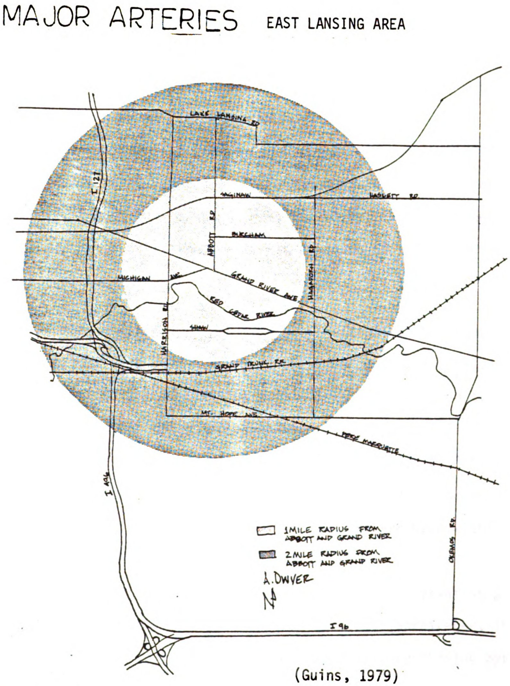
FIGURE 22:--Study Area Block Analysis

assumed that local passenger travel is a very major transportation factor in East Lansing. In part this assumption comes from local demographic data which indicate that 75% of the workforce (U.S. Census, 1970), who live in the City of East Lansing work within its borders. Most of their daily passenger trips then are within a 2 mile radius which encompasses all of the University and the City of East Lansing (see Figure 23). In addition, 70% of people in census tract 41 and 46% of the people in tract 39.02 are in schools within a 2 mile radius of their homes.

Most of the trips to the City of East Lansing are made to the University or downtown East Lansing. Many of the trips through town are to specific places or at specific times. Easterly trips through town are primarily for shopping at the major shopping center east of town. Westerly trips through town are made to the Capitol or one of the large industrial plants from settlements to the East.

As Figure 23 shows major arteries exist for all these passenger trips. Figure 23 also indicates the throughway which accommodates most intercity passenger and freight traffic.

Planners have in recent years sought solutions for all categories of trips in road going motorized vehicles that consume large amounts of cheap petroleum. But petroleum is no longer cheap nor unlimited in its availability. And in terms of capital expenditure, the car is the most expensive form of transportation (Mitchell, 1979; Living Systems, 1977:51; Clark, 1975:154).



(Guins, 1979)

FIGURE 23:--Major Arteries: East Lansing Area

In Lansing area planning agencies, transportation is defined exclusively as a problem of roads and automobiles. Solutions to perceived traffic problems are confined to further road or parking ramp construction. These are based on one kind of data, vehicle counts, projected by various methods.

In planning appropriate transportation systems, one that match the job that needs doing with the most appropriate means of doing it, a more subtle approach is necessary. Vehicle counts alone are not a sufficient basis for planning this more subtle transportation system.

More refined transporation data.--The first step taken at Urban Options in the Transportation Task Force, was to analyze the existing origin and destination data available at Tri-County Regional Planning. This had never been done because it is time consuming. Several results of the analysis compiled by John Mitchell and Peter Guins are illustrated in Figure 24 and 25. They indicate that at least 2400 round trips per day are made within a 2 mile radius of the CBD.

A half-mile is thought even by the most conservative planners to be an appropriate distance for walking, (Spreiregen, 1965: 166). Two miles is a simple distance for bicycling (Living Systems, 1977:50-60). Yet the proposed solution to the downtown parking problem is to build another parking ramp for $2.4 million to house 428 cars. Alternative plans will be proposed here for encouraging people to walk in the Central Business District by making it safe, pleasant and convenient (U.S. Department of Transportation, 1979).

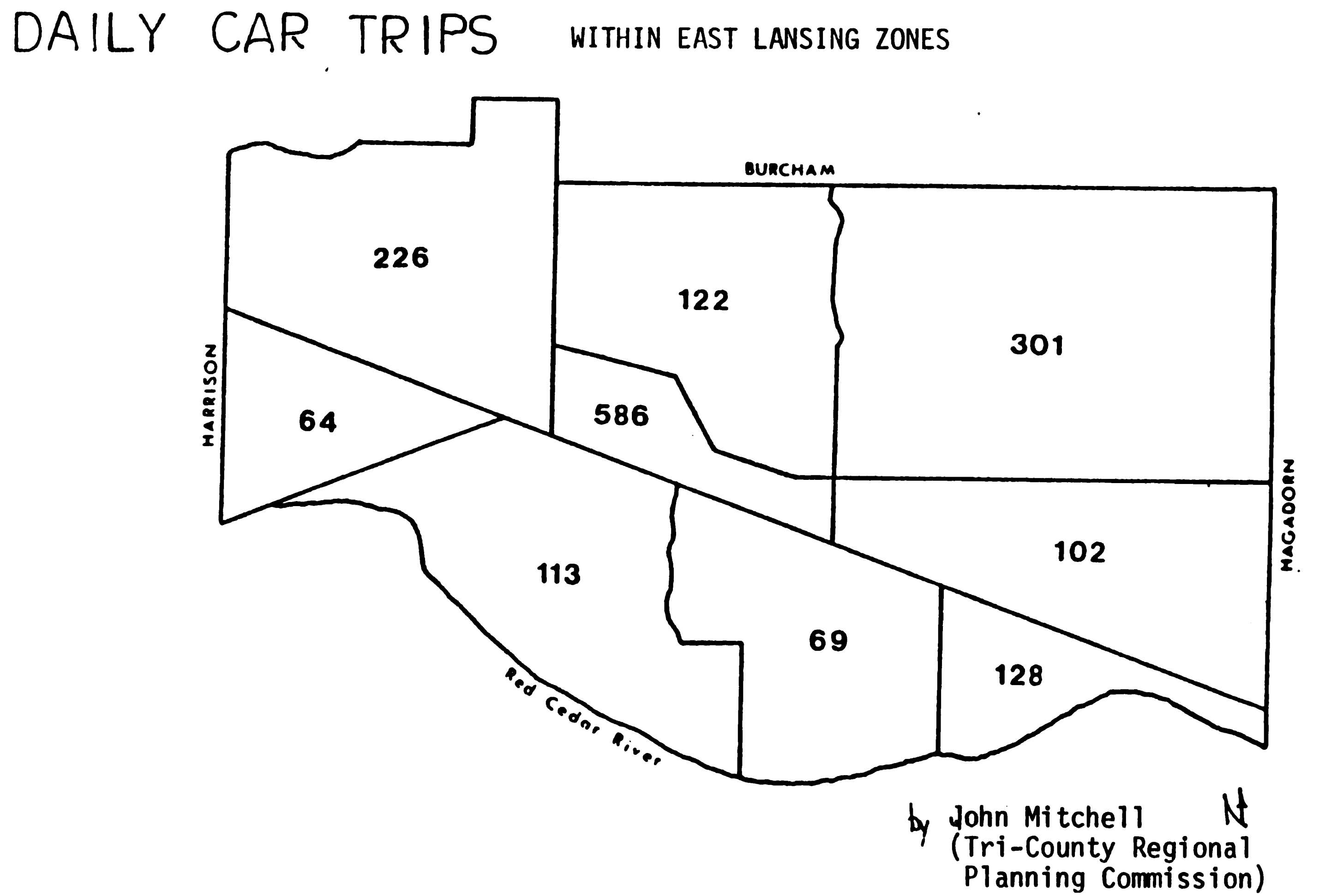


FIGURE 24:--Daily Car Trips Within Zones

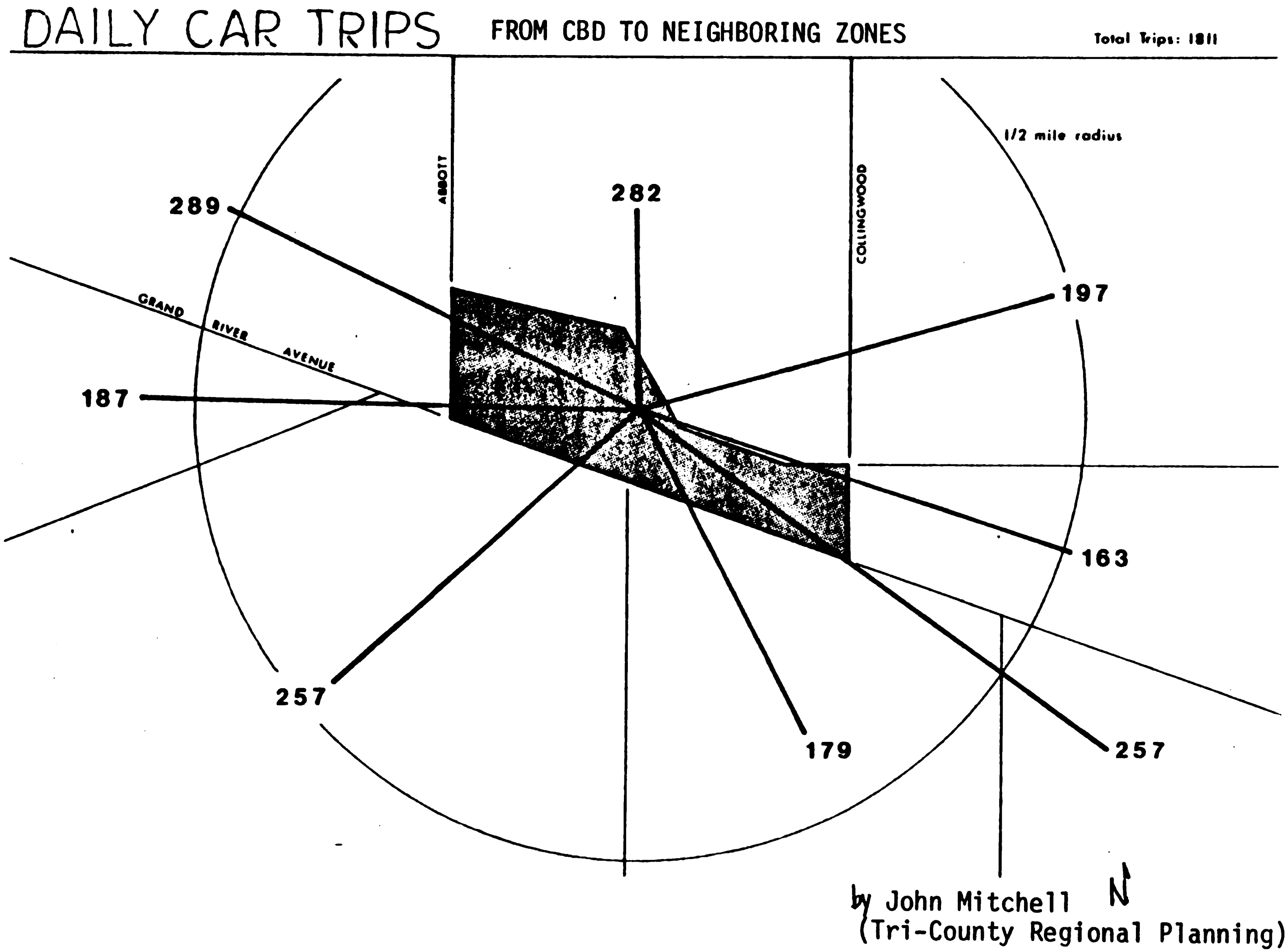


FIGURE 25:--Daily Car Trips from CBD to Neighboring Zones

The second step the Urban Options Transportation Task Force took in the data collection procedure was to study origin and destination of trips taken on a cross town artery Grand River Avenue. On the major through town artery, Grand River Avenue, the data show that 33.3% of the trips taken on that artery or 11,322 trips per day are trips within a two mile radius. Most of these are far more appropriately taken by bicycle.

The major proposal on the drawing boards for Grand River is to build a through campus highway at the cost of $35 million. According to the Urban Options Grand River study only 11.5% of the trips now taken on Grand River could possibly use the proposed cross campus route.

In addition to the 11,322 cars (33.3% of 34,000) which could be removed from Grand River by facilitating bicycling and walking, many trips on this road are taken to common destinations, Meijers to the East (4.56%) and the Capitol and Oldsmobile to the West (12.43%) and could be greatly reduced by regular buses, car pools or jitneys (Guins, 1979).

An appropriate transportation plan.--If it can be assumed that car traffic on Grand River Avenue can be cut in half by encouraging bicycle, pedestrian trips and mass transportation, alternative transportation plans can be drawn (Figure 26).

Half of present Grand River Avenue would be reserved for bikes, local buses and expanded store front pedestrian area. The major arteries, served by bus or car pool are mapped by a double

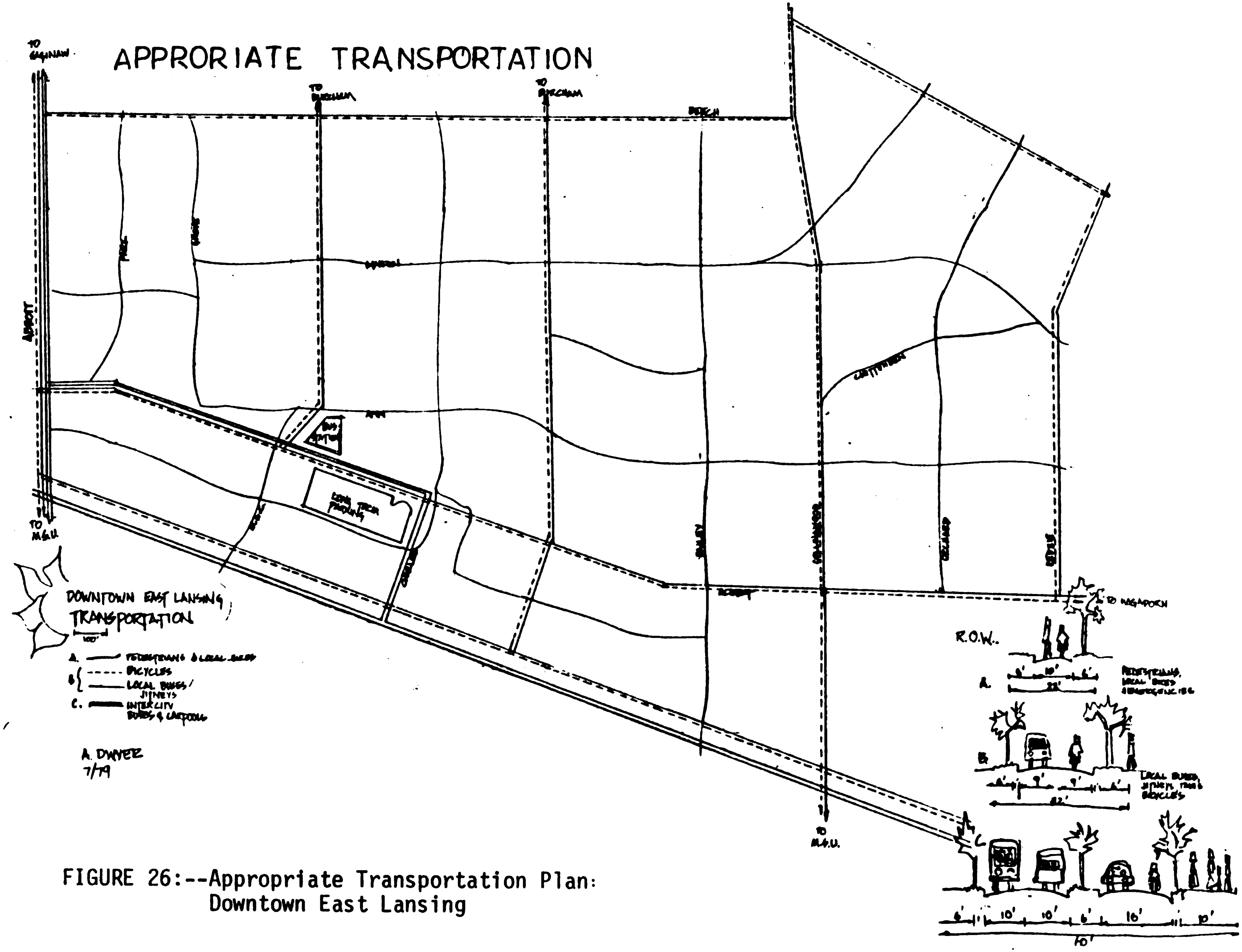


FIGURE 26:--Appropriate Transportation Plan:
Downtown East Lansing

line. These connect with the major arteries shown in Figure 23, which run across or around town. The main bicycle routes designated in dotted lines coincide with the single line mini-bus, jitney or taxi service.

Such a transportation system creates super blocks within which transportation is mainly pedestrian and bicycle. The right of way also allows for emergency access. These three different kinds of trips, intercity or through town, two mile radius and 1/2 mile radius are serviced by three different sized rights of way, 60', 30' and 26' respectively.

For much of this, perhaps all, it is possible to use existing vehicles. Cars could be commonly owned or sold to the University or city and with them a very effective short run local transport system could be devised, as has been done in many parts of the third world. This will be possible if infrastructures supporting walking and bicycling such as tree planting for shade and wind shielding are built. The amounts of money required for such programs would certainly not be larger than the amounts now normally used for road maintenance (Figure 31). In addition large amounts of land now occupied by the car in places such as this study area would be freed for productive uses.

The old and suggested ways of looking at transportation planning are illustrated in Figures 27 and 28 below. In the Existing street map, Figure 27, which is far less dramatic than the Machine Space Map illustrated in Appendix G, streets and parking are central to the plan and often unnecessarily wide.

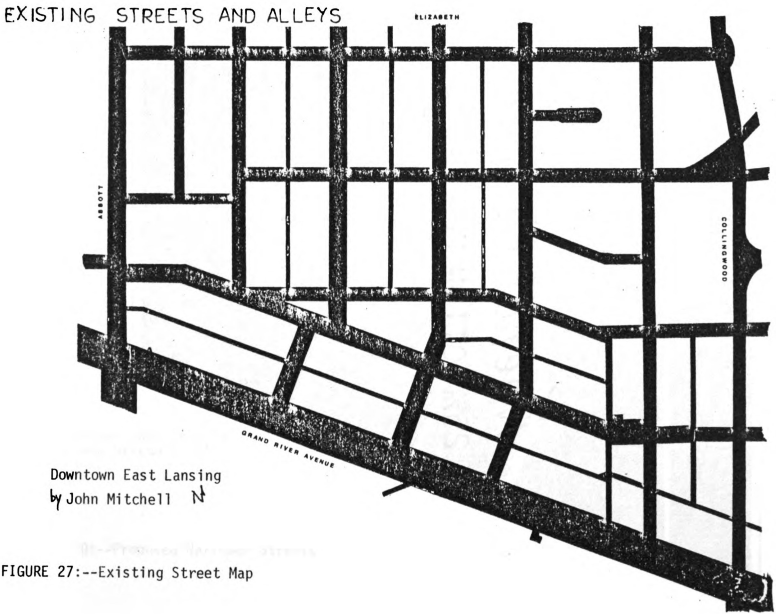
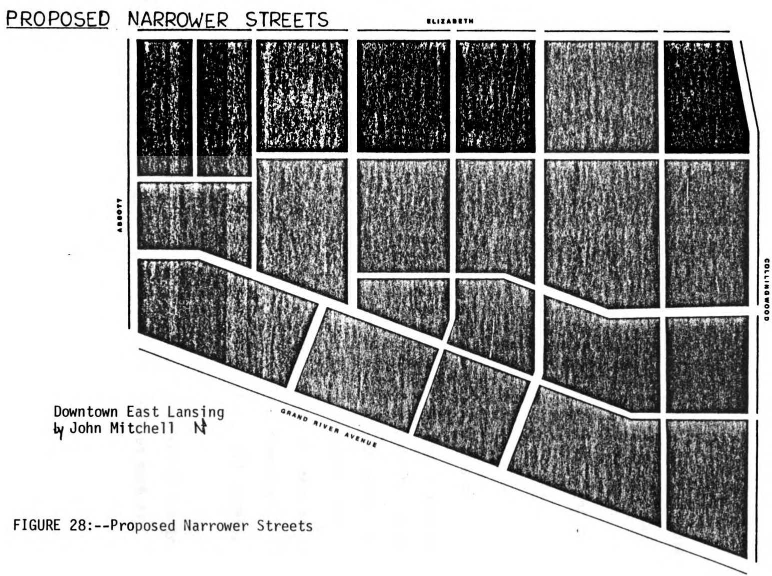


FIGURE 27:--Existing Street Map



Downtown East Lansing
by John Mitchell

FIGURE 28:--Proposed Narrower Streets

Figure 28 illustrates the suggested way of looking at the same place where streets are reduced to sizes suggested in Figure 26 and available green space is emphasized. This reversal in view is essential to appropriate technologies planning.

A planning process which emphasizes conversion to appropriate technologies should aim for significant savings. In East Lansing a transportation plan such as that outlined in Figure 26 should be coupled with plans which conserve significantly in the amount of fuel used for space heating and the production of electricity.

Step 2: A Buildings Plan

Weatherization.--About half the space heating needs now reflected in the pies (Figures 14 and 19) can be supplied by tightening the shell of buildings. This includes insulation, weatherstripping, caulking and storm windows or shutters. Insulation materials and quantities are calculated according to thermal resistance of materials (R Value) and climate. Good literature is available for calculation of proper insulation quantities and kinds (National Solar Heating and Cooling Information Center; D.O.E., 1977; Lechie, et al., 1975:77ff; Anderson, 1976).

In addition local agencies such as the Ingham County Energy Office provide free auditing services and other agencies such as Capitol Area Community Service and Urbans Options provide weatherization services or hands-on weatherization workshops for teaching or performing the task of weatherization.

The cost of full weatherization of an average house in the study area is based on calculation done by the Ingham County Energy Office on the Urban Options Energy House. Total cost for complete weatherization of that house at 135 Linden, was estimated at $1,811. Savings from such weatherization procedures for the first year are estimated at $1,623 (Appendices H and I). The pay-back period with electric heat is less than 2 years. From then on the cost of running the house actually decreases as energy prices increase. Obviously weatherization is the first step and people are making such a step (Zuiches, 1978).

In addition to basic conservation in prevention of heat loss, many devices are now available for capturing significant amounts of the sun's heat for space heating purposes. Among these are the attached solar greenhouse, the trombe wall and the solar window box.

<u>Solar greenhouse</u>.--In addition to minimizing heat loss through weatherization, heat can be captured through a number of passive solar devices that are effective in Michigan. A solar greenhouse attached to the south wall of a house acts as a passive solar collector. Without moving parts such a system not only supplies energy to the house for space heating, it also increases the living space and provides an atmosphere for growing a portion of a family's fruit and vegetable needs (Yanda, 1976; McCullugh, 1976).

Greenhouse design calculations are made according to sunshine hours per month or useful sun hours, tilt angle of the collector, amount of storage, usually in water, concrete or stone mass and insulation or shuttering system preventing heat loss.

Much work is now being done in this area. Calculations on the proposed greenhouse at the Energy House indicate that at a cost of $2,100, 27% to 40% of heat for the house could be supplied. In addition the additional 242 square footage added to the house will produce roughly 484 lbs. of fruits and vegetables per year (Urban Options, 1978).

At least 3/4 of the space heating needs can be supplied by a combination of weatherization and solar greenhouse. A due south facing wall exposed to the low angle of the winter sun is necessary for solar additions.

Trombe wall. In cases where the extra space is not available or not desired another direct gain system called a trombe wall is also available. In this a layer of glazing is added in front of and parallel to a south masonry wall. The heat which is captured by the glazing is either stored in the wall or vented directly into a building (Daniels, 1964).

The solar window box.--A smaller device called a solar window box heats air in a box that sits under a south facing window and vents the warm air by convection into a room. Such a system can easily be constructed by a home owner and can add 20%-30% of the heat to a south facing room (Mother Earth News, 1977:101).

Step 3: Electricity

Appropriate uses.--Much of the energy used for generation of electricity could be saved in two ways, by appropriate use and on- site generation. Because electricity is a specilized form of energy converted from fossil fuels or still expensive solar cells, it should be used appropriately for lighting and electric motors, for instance,and not in cases where low temperature heat is required.

Electricity should not be used, for instance, for space heating or cooling where temperatures need only reach 70 degrees. In census tracts 41 and 39.02 of which the study area under consideration here are parts, 337 houses are heated by electricity and 1444 are cooled by air conditioning units run by electricity.

Space heating can be more appropriately accomplished in ways outlined above and space cooling is more appropriately accomplished by planting and shading techniques as used in Davis (Ridgeway, 1979:50).

In addition, electric hot water heating is inappropriate, and all electric hot water heaters should now be replaced or by solar hot water heaters.

Solar hot water heating.--East Lansing is at 42°47' North Latitude. According to Stoudt and Myers (Nov. 1977:b) (Appendix I) Michigan has enough sunshine to supply about 70% of the hot water needs. This is calculated by amount used, temperature of the water and the air, insolution or the amount of solar energy available, and collector orientation.

The detailed calculations (see Appendix I) indicate that 50 square feet of collector can provide a family of four with 70% of their hot water needs. The cost of such systmes is estimated by the Ingham County Energy Office to be $1,500 - $2,000.

The United States and Michigan Solar Tax Credit acts make this opportunity financially possible. A person who makes a $2,000 investment in a solar hot water heating system, in 1980 receives a 55% refund using both federal and state tax credits. Many commercial solar hot water heaters and do-it-yourself designs are available (National Heating and Cooling Information Center, 1977).

Commercial and city lighting.--In the study area under consideration here, are a great many commercial buildings. Lovins claims that reduction in commercial overlighting alone would amount to 3% of the total energy use in the United States. Reduction in city overlighting can also account for considerable savings.

On-site generation with solar cells and wind.--In order to save on the considerable amount of fuel wasted in transmission (see Figures 10-11), on- site generation of electricity should be encouraged. While solar cells are not at the moment cost effective, with sufficient government incentive they could be (Commoner, 1979: 34-8).

In anticipation of this and in order to calculate available space for solar hot water heating, planners should begin surveying the amount of flat roof or southern sloped roof available in their areas of concern. Roof areas are not considered conventional parts of planners "open space" but should now be considered such (Figure 22).

In addition, wind systems are possible even in urban areas, as the project at 517 S. 11th Street has shown. More importantly wind and solar generation systems, point up the necessity for matching one's use to the amount of renewable supply (Energy Task Force, 1978).

Centralized fossil fuel generation facilities are now producing more than 23% more than their peak loads. Peak loads can be evened out mainly by eliminating electric airconditioning systems and the slack now available especially with concerted conservation programs such as in Davis and Seattle, can make in unnecessary to build any new centralized facilities.

In the meantime much more money should be invested in decentralized, on-site methods of electrical production matched to appropriate uses of electricity in conserved amounts.

Step 4: Integrating Suggested Technologies

When all the additions suggested above are drawn into the land use of the study area, possibilities for planning are greatly expanded. The land use is no longer dominated by the car as in Figure 27 but is opened to a range of possibilities both for housing, food growing, local production and distribution. Some possibilities for the study area are shown on Figure 29 below. This process could be staged as shown in Figure 30 which also indicates areas where labor is needed and jobs created.

Economics.--Money now available for instituting the kinds of changes proposed in Figure 29 could come from both public and private sources.

The total cost of weatherization of each house in the study area would be roughly equivalent to the Urban Options Energy House, $1,909. Such as process would save 50% of the fuel now used for space heating. With a gas heating system, the average payback of all steps in the process is 6.6 years. With electric heating the average payback is 1.3 years (see Appendices H and I).

There is no doubt that the average consumer with timed payback periods supported by various financial systems would be able to adequately weatherize and insulate his or her home.

Commercial and larger city buildings operate with far more complicated heating and cooling systems and some audit procedures or systematic mechanical fixes for increasing efficiency are now being pursued. It is probably safe to assume that most large buildings could be much improved in terms of energy performance within reasonable costs.

The amount of flat roof space and southern exposed space available in the study area, as indicated in Figure 22 shows that at least 70% of the hot water needs of the area could be met by solar hot water systems. The homeowners, renters and shop owners

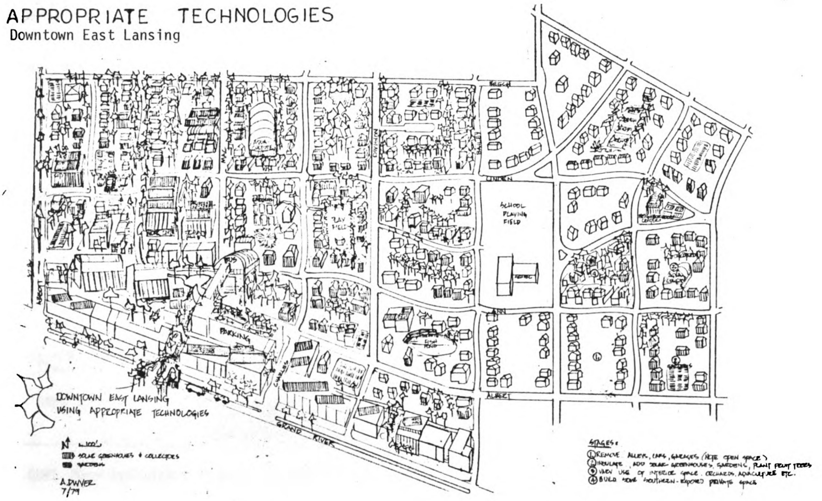


FIGURE 29:--Downtown East Lansing
Using Appropriate Technologies

SAMPLE WORK SHEET

	Tasks	BLOCK # Hours	People	Materials	$	Organization/Decisions Training
Transportation						
Step 1	Remove Garages					Teams of Workers
Step 2	Remove Alleys Size roads for bikes and pedestrians					Creation of Common Open Space
Buildings						
Step 1	Audit all buildings Weatherize all buildings					Train auditors Weatherization Training and Workshops
Step 2	Build solar green-houses, hot water heaters, window boxes					Construction Training and Workshops Maintenance
Land Use						
Step 1	Plant Gardens					Training and On-Going Work
Step 2	Build on and/or use Interior Block Open Space					Common Use of Common Space Requires Cooper-ative Decision Making

FIGURE 30:--Transition Process to Appropriate Technologies

taking advantage of the tax credit acts and the kinds of financing offered in weatherization programs could readily afford such systems (Ingham County Energy Office, 1979).

Similar arguments are true of solar greenhouses. While the cost and solar access will vary, a very large greenhouse such as the one being added to the Urban Options House for a mterials cost of $2,000 is a worthwhile investment both in terms of direct gain for space heat and growing space for a year round food supply (Todd, 1977).

Families with an average income of above $13,000, such as is the norm in the study area, invest and saves annually $1,770 (U.S. Bureau of Labor Statistics in Morrison, 1977:20). Such an amount available on an annual basis could completely weatherize a house, build a solar greenhouse and a solar hot water heater in under 4 years.

Figure 31 below indicates the amount of monies now spent or anticipated using non-renewable energy sources. While some public investments in the form of bonds would be necessary to construct such parts of the plan (Figure 29) as the overground-underground or a large bus station, these are certainly genuine alternatives to the proposed $2.4 million parking ramp and the $35 million cross campus highway.

The problems in the process of conversion to appropriate technologies and hence the planning methods which need to be employed to facilitate them, are not centered in either the

LOCAL PRIVATE AND PUBLIC FUNDS

	Conventional Expenditures	Appropriate Technologies Expenditures
PRIVATE FUNDS : Study Area		
(Study Area Population:1,709)		
Automobiles(1978) 1. (.035 x 350,000 x 28¢/mile)	$1,251,950	
Investments, Insurance & Savings (1978) 2. (11.8: x 546 x $15,000)	966,420	
Housing (1978) (24.7% x 546 x $15,000)	2,022,930	
Weatherization of 351 Houses in Study Area (351 x $2,000)		$ 702,000
Solar Greenhouses for 219 Houses in Study Area (219 x $2000)		438,000
TOTALS	$4,241,300	$ 1,140,,000

	Conventional Expenditures	Appropriate Technologies Expenditures
PUBLIC FUNDS : East Lansing (City of East Lansing 1978-79 Budget)		
Transportation		
Police	$1,248,551	
Parking Enforcement	27,431	
Sidewalk Construction	30,000	
Street Tree Planting	43,000	
Street Maintenance (Major)	104,807	
General Major Street Expense	50,000	
Traffic Control (Major)	71,450	
Street Maintenance (Local)	192,310	
General Local Street Expense	52,130	
Traffic Control (Local)	23,420	
Parking System Operating	291,755	
Additional Parking	97,745	
	$2,231,599	
Housing and Buildings		
Building Maintenance	123,371	
Building and Zoning	115,928	
Housing Rehabilitation	125,000	
Neighborhood Strategy Area	103,000	
	$ 467,349	
Education/Outreach		
Planning, Housing and C.D.	214,196	
Public Service	1,061,951	
Planning/Management Development	65,000	
Provision for Public Service	40,350	
	$ 1,381,497	
Bond Requests		
Lot 9 Ramp	$2,400,000	
Cross Campus Route	35,000,000	
CENTRAL BUSINESS DISTRICT TRANSPORTATION PLAN (CBD Report, Plan 2)		
Trees and Landscaping		90,000
Concrete Planters and Wooden Benches		27,200
Street Lighting		60,000
Paued Brick Pedestrian Area (MAC)		285,000
Overground MAC to Campus		1,000,000
TOTALS :	$41,480,445	$ 1,462,200

FIGURE 31:--Funds Available for Appropriate Technology Conversions

technology or the economics of present United States culture (Solar Lobby, 1979). Technologically and economically a high level of energy efficiency approaching self-sufficiency could be achieved within a relatively short time using appropriate technologies in ways outlined above.

These technologies are rested in fundamental principles of conservation, respect for the eco-system and self-reliance. They will result not only in a different complex of data and technology and allocation of money but also in a fundamentally different social system. Attempts to plug them into an existing social system will demonstrate their supposed failure not facilitate their use.

Many solar advocates including Denis Hayes and Amory Lovins claim that reductions on the order of 40 ot 50% in our overall energy use can be achieved "without altering our lives" (Frank, 1978). The more detailed planning processes shown here demonstrate to the contrary. Acceptance of appropriate technologies will involve partly an admission that lives in the United States will change. It is partly for this reason that these changes are in some places such as East Lansing, not occurring easily.

CHAPTER VII

THE SOCIO-POLITICAL LEVEL OF CONVERSION STRATEGIES FOR CHANGE ALONG THE SOFT PATH

Technical and economic changes postulated in Chapter VI cannot occur in a vacuum. Parallel changes in the decision-making processes and social structure will emerge in this society. This chapter explores some details of the kinds of socio-political changes essential in the process of adoption of appropriate technologies.

Appropriate or soft technologies will not simply be imposed, nor will they magically appear. The necessary changes, particularly socio-political changes, are being met with resistance. Reasons for this resistance can lead to a more refined discussion of strategies for change.

Decentralization

Calls for decentralization in social structure and decision-making processes as a necessary component of a culture based on appropriate technolgies are frequent. Some of these stem from technological necessity or end-use efficiency, others consider the solar technology a useful addition to an already urgent cry for the distribution of wealth and power in the United States.

Decentralization as a Technical Necessity

Some solar advocates use social decentralization as an offshoot of the technology. Often their definition is merely technological:

> Unlike conventional fuels, solar energy is inherently decentralized. Consequently in many situations it is most appropriate to utilize on-site facilities for the collection and storage and use of the sun's energy (Solar Lobby, 1978:212).

Other recent reports extend recommendations somewhat further:

> To provide the kind of stimulus solar needs, the federal bureaucracy itself needs to decentralize its planning and thinking. It needs to be more conscious of the role that local and state governments must play in developing a national solar policy (Citizen's Energy Project, 1978:9).

Some discussions of decentralization in piecemeal recommendations or in technological terms are meant to make the idea of solar energy more palatable. Technology is usually considered an acceptable topic of debate, discussions of ranges in wealth and power distribution are considered radical and taboo.

But recent failures in adoption of these technologies and future frustrations among those who see their obvious benefits but cannot get them implemented point to deeper analyses.

Decentralization as a Cultural Necessity

Commoner (1976:2) and Lovins (1976:55ff) give hints at a necessary package, including a total reorganization of society, with emphasis on neighborhoods and old-fashioned values. These are not new assertions but reminiscent of most of the social-reform movements of this century.

In one sense the appropriate technologies movement is the technological arm of the civil rights, human rights and neighborhood movements to mention a few. In attempting to implement small scale, decentralized solar technologies, groups will run into problems and mistakes similar to those encountered by these poor peoples movements. Soft Path advocates need to heed the failures of the black power movement or neighborhood movement and coordinate with their successes otherwise they will miss the depth of the culture changes that need to occur in order to deal with the energy crisis in the long run.

Solar advocates seek as did black power movements to "involve people in their own destiny with greater competence, skills and resources" (Riesmann and Gartner, 1970:53). In order to accomplish these ideas and policies and specific technologies emerge from groups working to implement these changes.

As Ced Currin, Chairperson of the Michigan Solar Resource Advisory Panel (1979) said, "Solar technologies are simply the kind of thing that originate from the bottom." A propos of the black power movements Riesman and Gartner concur: "The new ethos is suggesting that generating new techniques, new administrative practices, curricula from the bottom up would be more productive than the traditional "trickle down" approach (Riesman and Gartner, 1970:53).

In an article on community control and the neighborhood movement the effects of the present appropriate technologies movement are reflected as they challenge:

> the preogatives of the centralized bureaucracies to make basic policy determinations affecting local areas and represent a step in an on-going struggle to wrest power from bureaucratic and hierarchical institutions of government and industry. It attempts to redefine the democratic process by rejecting the efficacy of representative institutions such as the national and local legislative bodies to reflect popular aspirations. . . . This analysis implies the need for a generalized concept of popular control of all public institutions and the economy which can appeal not only to black and poor but also to working class and middle class people--to all who are deprived of a significant voice in the institutions which determine our lives (Arnowitz, 1970:48-51).

Two Approaches to Change

A more specific discussion of strategies possible or relevant to implementation of appropriate technologies can be approached from two directions. One is academic and to some degree abstract. It draws experience from the political reform movements, the poor peoples movements. Lessons from such an approach have to do with a basic understanding of the social forces at work in this country, a set of generalizations and admonitions.

The other approach to a discussion of strategy has to do with the practical, the lessons of on the job experience such as that garnered by Urban Options and with specific step by step plans of action tailored to a specific place and time.

Decentralization as a Logical Direction: Lessons From Political Reform Movements

In the process of challenges and debates, lessons of other decentralization movements should be learned. Power cannot be defined narrowly, objectives should not be limited to the technological sector alone, nor to garnering a larger piece of the pie, nor to developing a group of skilled conversion experts.

As people organize around appropriate technologies they need to understand a broad view and at the same time keep an eye to particulars. Inherent dangers in moves for decentralization are summarized by Riesman and Gartner as follows:

> 1. While community control is seen as a major lever for changing, redesigning and improving the human services, unfreezing the system by its demands for accountability to to the consumer and increased relevance of the service, the danger is that accountability may be achieved with no increase, or even a decrease in productivity or efficiency.
>
> 2. While community control is seen as a way of involving people in their own destiny, giving them greater resources and competency, the danger is that involvement may become socio-therapy--participation in participation or participation for its own sake . . .
>
> 3. There is a danger for localism and infighting among local cliques and competitive groups for some "piece of the action" and control of part of the "turf." The attendant danger is participation for its own sake, that is, participation without power and without economic redistribution.
>
> 4. While community control is seen as an important innovation in public administration, particularly through its concern with decentralization, the danger is that the groups involved in decentralization may have no influence on central power where the decisions on funds, resources and basic policy continue to be made . . . (Riesman and Gartner, 1970:54).

Such lessons need to be understood because, by the time the energy crisis becomes severe enough to involve the middle class, long term organizing will need to be well understood and short-cutted. Many incremental changes will need to have already occurred. Americans, in general, must be eased away from their life of dependence--a measure of self-reliance needs to be established very soon. The wrenching nature of such a major transition can be softened with adequate lead time.

Alinsky's (1972) theory of change involving only confrontation has reached its limitations in effecting broad scale change in the United States. As Pliven and Cloward document in their account of the Poor Peoples Movements of this century in the United States, disruption and protest when taken as the only strategies has always resulted in restructuring of protestors. Those involved are:

> rooted in some institutional context, who are in regular relationships with others in similar straits who are best able to redefine their travails as the fault of their rulers and not of themselves and join together in collective protest (Piven and Cloward, 1977, 19).

Unfortunately the definition of the protest has not been broad enough and protestors have been worked back into the system, without substantial change in the systemic problems which caused the protest.

> Government makes efforts to reintegrate disaffected groups and to guide them into less politically disturbing forms of behavior. It also moves to isolate them from potential supporters and by doing so diminishes the morale of the movement (Piven and Cloward, 1977, 36).

Changes in the socio-political system concomitant with appropriate technologies will include some combination of the small group, the neighborhood and the task group.

Small groups.--Kotler, Benello and Roussopoulus approach participation from the individual as he/she forms into small groups. They consider the psychology of group participation to be important, the well being of the person can be the beginning point in restructuring.

> Significant relationships are built most naturally on joint involvement in significant common purposes; to the extent that local associations no longer have this power the relationships they engender are trivial . . .
>
> For the self to develop fully out of the dialectic of the individual and the social order the possibility of reconciling individual need with social purpose must exist. . . . The value of a face-to-face group lies in its ability to nurture and integrate individual needs rather than, as in the case of bureaucratic schools and factories, reshaping the individual to meet the needs of the institution (Benello and Roussopoulus, 1971:40).

In the case of appropriate technologies conversion this becomes very important. If we are to reach beyond the depletion of fossil fuels, the participation of the individual in the conversion processes becomes essential.

If however, the decisions about kinds and combinations of conversions are made at a level well above the individual that person cannot be expected to participate in the process nor understand its workings or its meaning. Kotler explains this point in terms of the structure of neighborhood politics:

> If a man shares in the deliberative authority of public life, he will commit his own power to defend the corporate body, even though he may be in the minority on many decisions. He will defend the corporation for the sake of his own deliberative right, but he is not apt to defend it if all decisions is left to one executive or to an elected council (Kotler, 1960:85).

The two functions of groups, "prudent decisions and forceful actions" (Kotler, 1968:87) become legislative and executive functions. The questions of how these groups would be interlocked at higher levels in order to make broad scale decisions is answered by Benello and Roussopoulus:

> If groups were represented at a system of national and regional assemblies such representatives would be really delegates inasmuch as their mandate would clearly be determined by the groups they represented. Rather than pursuing politics as a system of trade-offs with each other, they would be forced to report to their respective group constituents. This follows from the fact that the locus of decisions would be in the groups themselves and not in their delegates (Benello and Roussopoulus, 1971:50).

In present energy discussions the necessity for conservation by concensus emerges as a top priority. Conservation is imperative, but processes are not established to make conservation attempts significant in terms of energy saved. People know that turning off lights or turning down the thermostat in themselves make no significant difference. At present, we have no means to establish more effective particular recommendations and people see no reason to comply with those with little or no effect.

Significant savings on energy can occur with active, individual and block level efforts as explained in Chapters IV and VI. While small groups can effectively and democratically operate, many parts of logical significant programs such as cooperative use of interior blocks or redone city wide transportation systems require cooperation between groups.

In order to maintain local control and control in a series of deliverative bodies effective checks on delegated power need to exist in the kinds and importance of the decisions made by the deliberative bodies themselves.

Kotler expands on this as follows:

> Only two principles can contain the natural tendency of unified executive power to become tyrannical through manipulation of administration: first, the equality of the people themselves and their power to make law; and second, the division of executive power in an elected council (Kotler, 1968:86).

The use of appropriate technologies, with the focus on single house and block level applications reinforces the importance of the small group.

Groups on a higher level than the block develop around essentially two different modes. One is territory, or the neighborhood, the other is the task group. In this case both are postulated to exist with appropriate technologies, the neighborhood becoming a central decision-making body, the task groups more informational and goods and service delivery oriented.

Neighborhoods.--A neighborhood is defined by Perry as:

> a self-contained area embracing all the public facilities and conditions required by the average family for its comfort and proper development within the vicinity of the dwelling (Schmandt, 1972:574).

In light of the discussion above, it is instructive to look at Schmandt's arguments for neighborhoods. He divides them into four categories: administrative, psychological, sociological and political:

> The first regards the device as a means of improving the delivery of services; the second stresses the psychic benefits which flow to the clients or consumers from its use; the third emphasizes its value in adapting policies and practices to locality differences in life styles, preferences and priorities; and the last views it as a mechanism for mobilizing power (Schmandt, 1972:576).

Since the energy efficiency of systems close to the point of delivery is now well demonstrated, the impetus toward development of neighborhood systems is given technological imperatives. Only psychological, social and political imperatives have up until now been the basis for neighborhood advocacy.

The neighborhood finally, becomes the forum for discussion of "local public issues" such as housing and job discrimination welfare rights. For this reason too a decision-making body organized in territorial terms becomes important.

In a few cases, cited in Chapter III, neighborhood organizing has related to energy concerns. West Garfield, the greenhouse project, developed from work of the Health Action Committee. The Committee formed only one active element in the Christian Action Ministry.

In lower Manhattan, another poor inner city neighborhood, neighborhood organizing resulted from occupation and conversion of 517 11th Street. "No Heat! No Rent!" was the song of success.

Ownership through sweat equity of a delapidated apartment building provided organizing momentum (Energy Task Force, 1977).

Eastown, another example, a "transitional" Grand Rapids neighborhood, formed the Eastown Community Association (E.C.S.) in 1974. Only now are they considering energy-related projects. Four years of political growth and organization have resulted in a strong long-lasting example of neighborhood organization in the United States.

The essentials of a participatory organization emerged from growth through trial and error, through argument and action. Linda Easley summarizes specifics of the structure reached to this point:

1. Specific authority should be delegated to specific individuals for specific tasks by democratic procedures.
2. All those to whom authority has been delegated should be accountable to those who selected them.
3. Distribution of authority among as many people as possible.
4. Rotation of tasks among individuals.
5. Ability, interest and responsibility should be major concerns for selection of people for tasks.
6. Diffusion of information to everyone as frequently as possible.
7. Equal access to resources needed by the group.
8. Formalized structure to resolve internal conflict has been created with development of a Planning Committee. It serves as a forum for any ideas, conflicts and dissention which may be occurring.
9. The majority of people on the staff are those who have spent many hours in volunteer work for the Association and who live in Eastown and have a long term commitment to improving the quality of life in the area.
10. The Eastown Community Association develops reciprocal relationships with residents. In exchange for services such as repair work on a resident's house, the resident volunteers a given number of hours in Association work (Easley, 1978:70-71).

The development of these principles and their use in day to day operations of the Eastown Community Association has been a major factor in keeping the ECA a grass roots, participatory and politically effective organization.

Rising energy prices, increasing unemployment may in the near future product more neighborhood movements in middle class neighborhoods. The Bailey Neighborhood Association, the neighborhood where the study area is located has a newsletter but no pressing concerns. Primarily groups in such neighborhoods are organized around the workplace or task. These task groups operate by concensus as in Urban Options or through hierarchies in City, University or other institution bureaucracy.

Frequently task groups are thought to be unworkable or inefficient if run through assembly and participation. Since such participatory systems will develop concurrently with appropriate technologies, it is important to understand how these task groups can be organized.

Task groups.--While a portion of the time of people in an appropriate technologies society will be spent in meaningful neighborhood activity, another portion of the time will be spent in task groups. Worker owner and controlled factories and work places in the United States are generally a solution to plant closedowns and abandonments. They are illustrative of task group organizations that fit with a participatory system with grass roots control.

In Puget Sound Washington Plywood Inc., a $25 million operation,

> workers elect a nine-person board of directors from among fellow workers in the plant. The board in turn, hires a general manager, who is not a shareholder in the co-op, to run the business from day to day (Zwerdling, 1978:22).

The workers, not the general manager make crucial policy decisions. Paycuts, for instance, are preferable to layoffs if times are bad. With worker control decisions that benefit the workers as well as the owners will be made.

In the Salinas Valley, the Cooperative Central ranch is now a co-op owned by its farm laborers once poorly paid migrants. The ranch, bought by

> Federally funded community organizers with a Bank of America loan . . . is a thriving model of worker democracy. The farmworkers elect a board of directors from among the membership. But most of the really important decisions are made by all the members of the co-op at their monthly meetings (Zwerdling, 1978:23).

The decisions include those about where to put their profits and how to prioritize the needs of the members.

Another example, the Consumers United Group, an insurance company with 400 workers in Washington, D.C. where

> an elaborate system of autonomous worker teams and committees of worker elected representatives . . . formulate corporate policies and make the fundamental decisions at every level (Zwerdling, 1978:21).

These decisions include those on wage levels, profit shares, workload, hiring and severance pay. The committee of executives does make decisions about marketing insurance packages and corporate investments and these people are hired by the corporate board.

Half the corporate board is elected by the workers and their control though not total is growing.

People learn to participate and prefer the process of working in a place where they have some say. This is illustrated by the examples of corporations bought by local elites when national or multinational corporations have abandoned them.

In Vermont, the South Bend Lathe, workers are part owners of a factory where shares were sold to save the factory's existence. But workers have no more say in the running of the factory than they did in the old system. The workers however, expected a change with the change in ownership and are now demanding it.

The National Center for Economic Alternatives is doing a study funded by HUD for the Lykes Corporation of Youngstown. They are recommending a worker ownership and control of a factory of 5000 employees, "not to advance socialism, but to save jobs" (Zwerdling, 1978:24).

The practicalities of survival in economic terms are linked with the energy survival issues. And the experience in worker takeovers will be invaluable to the alternative energies movement. Other examples, with documented details of worker controlled task groups exist in places such as Yugoslavia (Pateman, 1970:95ff).

National restructuring.--Chile, an example of attempted reform at the national level, provides many lessons for possible national solutions to the energy crisis in the United States.

In discussions of distributions of solar systems in the United States, the experience of Chile is revealing.

The main problem in redistribution of land and organization of peasant cooperatives in Chile was that:

> they tried to carry out a capitalist transformation and modernization of traditional farming society with some vaguely socialist elements, without altering fundamentally the structure of the society (Chanchol, 1976:357).

The solarization of United States society as it is now proceeding has similar problems. Appropriate technologies as described above in Chapter II and VI are essentially distributive and equalizing and lend themselves to participatory systems. The nature of the crisis where capital and materials are running out, lends itself to long-lasting high quality products, distributed across the board. Slogans of "Buy Solar! and Commercialize Solar" (Munson, 1979:12) reflect lack of perception about the changes that need to occur.

As utilities dream up schemes to sell people who have money short-lived hot water collectors, and make a profit besides the solar conversion business backfires: short-lived systems cannot be replaced once capital and fuels and materials are depleted sufficiently (Lovins, 1979:60). Restructuring national priorities and reallignment of regional or national governments with people in general rather than with corporations, will require imaginative inter-linkages between small groups, neighborhoods and task groups. These linkages rest their meaning and strength in the grass roots.

The sort of conversion to appropriate technologies postulated in Chapter VI is based on grass roots action, crucial decision-making on a local neighborhood level, and distribution of useful information and capital at higher levels.

Grass Roots Change Through Decentralized Energy Systems

Downtown East Lansing study area socio-political changes.--A look at the map of downtown East Lansing as shown in Figure 29 (p. 105) reveals quite a different technological system than the map of the existing system (Figure 21). Such technological changes occur only with changes in other aspects of the culture.

By drawing these maps and speculating upon those drawn for Winons (Figures 8 and 9) and by reading the statements of the other experiments such as Cerro Gordo or the New Alchemy, one is led to a kind of archeology of the future. The determination of what kinds of socio-political changes need to take place is a partly speculative process based, as in "new archeology" on knowledge of the present system and knowledge of the physical layout.

It is apparent that much of the subsistence of the people who would live in a place such as that illustrated in Figure 29, would be supplied with their own labor very near to their own residences. These include many of the food products and much of the energy supply needed for warmth and lighting.

This means that many people who now spend their time away from their homes or neighborhoods earning money to purchase fruits, vegetables, protein, heating fuel and cars, would spend at least a very much larger portion of their time than at the present tending gardens, greenhouses, fish farms, fruit trees, and walking or bicycling to nearby destinations. They would also have technical knowledge of the construction and maintenance of the weatherization process and solar systems, such as greenhouses and hot water heaters, which are part of the decentralized technology.

While some of this would be accomplished in family groups or single house groups, much of the work and organization and education would occur at a block and neighborhood level. In fact determination of the pedistrian, bike and motorized vehicle pattern and the use of the interior block space would have to be made in deliberative bodies such as those described by Kotler (1978:85).

These groups would have to be concensus oriented, cooperative in nature as the level of physical participation required in the technological systems will be much greater than exists today. In these senses, the decentralized political decision-making system takes on special and crucial importance in the implementation of these technologies.

Referring to a chart devised by William Bunge (1973), additions can now be made to those decisions described based on local control of transportation, food and heat and light supply systems. The kinds of organizing that needs to occur can be illustrated in the energy additions to Figure 32. The places Bailey Primary School, Baily Community Center and Urban Options

LEVELS

				APPROPRIATE TECHNOLOGIES Locus of Supply and/or Application				DECISION MAKING	
Hierarchical level	Population	Example functions	Example Area	Transportation	Heat	Food	Electricity	Groups	Example Functions
Nation	20,000,000	Army, national policy, regulation of external affairs, minting of monies, federal tax, elections.	U.S.	Trains Buses				Representative Assemblies	National &International Resource& Info. Distribution
Region (Huge cities)	3,200,000	Special police, special fire, metropolitan transportation (subways, expressways, airports) regional tax, overall planning, city college, adult courts, elections.	South Michigan	Buses Trains Carpools	Regional Farms: Wood & Staples			Representative Assemblies& Cooperative Task Groups	Regional Resource & Information Distribution, Transportation
District	480,000	Junior College, sewage and sanitation, health and hospitals, arterials, urban renewal, public welfare, public housing, district planning, elections.	Lansing Area	Carpools Buses Bikes					
Local area	69,000	Secondary education, water supply, local zoning (within limits), historic sites, street construction, police stations, refuse collection, elections.	East Lansing	Bike Jitney Bus				Representatives of Neighborhood Assem.	City Transport
Community	9,800	Libraries, fire stations, community identity (community naming, street signs, special marks such as a community flower), parking street lighting, adolescent courts, sidewalks, primary schools, swimming pools, children's parks, children's recreation including summer outings, elections,	Neighborhoods (see Appendix B)	Bike Walk	Neighborhood Solar, Wood, Fossil Backup	Compost	Wind, Wood, Garbage	Neighborhood Assemblies& Task Groups from Small Block Groups	Coordinate local walk & Bikeways, and Interior Block Use, Tree Planting, Backup Systems, Training in Construction & Repairs
Neighbourhood	1,400	Pre-school nurseries, day care centers, modification of local arterial traffic, pet control, beautification, alley and street clean up, extremely local zoning modification, elections.							
Block	200	Public moderation of disputes between neighbours, supervision of children from pre-school to adolescent in outdoor play, removal of junk (abandoned cars), street games for children, organizing special campaigns (charities), elections.	Blocks (see Figures 20-22)	Walk	Cooperative use of Collector Areas Conservation, Solar, Weatherization	Vegetables, Fruits, Proteins: Fish, Chickens, etc.	Conservation Photovoltaics	Small Block Groups	Interior Block Use Cooperation, Workshops, Cooperative Construction & Repair Cottage Industry
Citizen	1	Individual "good citizen" responsibilities (e.g., not littering), help children and the aged, take care of own property, and so forth (Bunge, 1973:100)							

FIGURE 32:--Levels of Decision Making

already exist for the kind of education and distribution centers that might be necessary as well as for neighborhood level deliberation.

A step by step planning process begins to take shape in ways outlined in Figure 30 (p. 106). It must be carefully coupled with the political deliberative considerations implied in the expanded Bunge chart in order to be successful. The skills needed in group political decision-making and successful interpersonal group activity are just as real and important as the technical skills which give the more tangible rationale.

Urban Options Experience

While specific paper plans as outlined above are important to keep in mind, they often remain far removed from the day to day workings of a group seeking to implement change. In part the analysis presented here encompasses as much as it does because of the experiences of Urban Options.

Urban Options encountered frequent and consistent opposition from City Government. In Davis and Seattle where the City Government and the Utility respectively, moved easily to significant work in the areas of conservation and appropriate technologies, the necessity for decentralization of the decision-making and links with other essentially decentralizing movements, is not yet central. The opposition encountered by Urban Options made it obvious that strong block and neighborhood level groups offers the major chance of success.

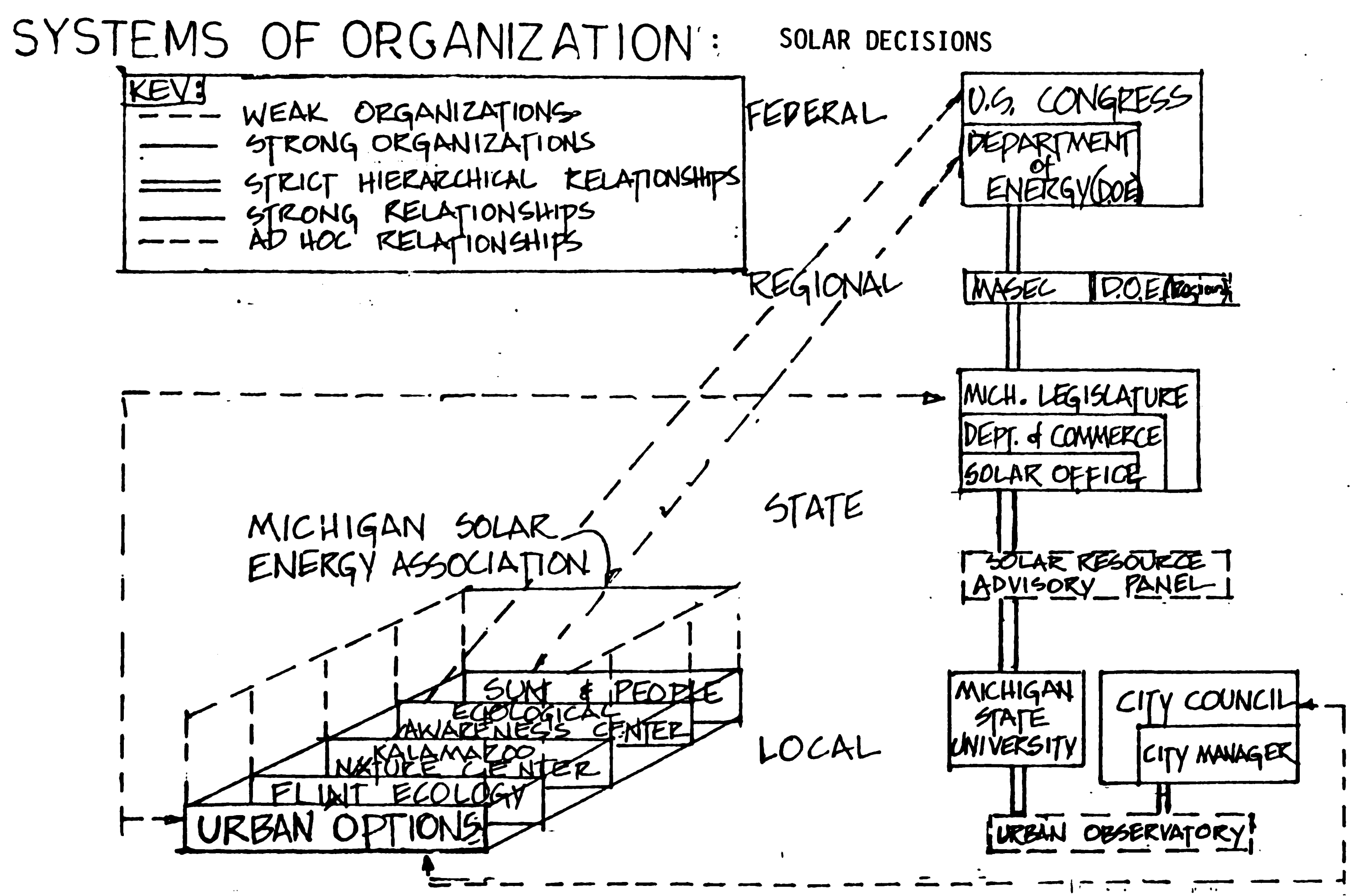
In the long run, as the experience in Village Homes in Davis and in Seattle suggest success of conservation and appropriate technologies movements rests on political decentralization and participation. The appropriate technologies movement brings to the neighborhood and political reform movements a technological leverage and legitimacy. The energy crisis itself will produce enough economic pressure on individuals and cities to require genuine participation on the neighborhood level and lower. The practical hands on nature of the appropriate technology movement provides organizing opportunities which have basis in practical and reachable experience (Hess, 1979:95ff).

> Opportunities for defiance are not created by analyses of power structure. If there is a genius in organzing it is the capacity to sense what is possible for people to do under given conditions and then help them do it (Piven and Cloward, 1977:22).

Structural Change

Not only technological change but also structural change is possible for people to reach. Illustrated in Figure 33 below are two parallel decision-making structures which now exist in the solar movements in the United States. The decision-making structure on the right is dominant today and will lead to hard path decisions whether in the name of nuclear power or solar satellites.

The other decision-making system illustrated on the left represents the emerging social system and it is part of the appropriate technologies movements. That structure is in its beginning stages in the energy movement and need only be deepened and linked



EMERGING SYSTEM
"Soft" Path Structure

PRESENT SYSTEM
"Hard" Path Structure

FIGURE 33:-- Systems of Organization: Solar Decisions

to the politically oriented groups to form a basis for a new social-structure that can deal positively with the future.

There is no doubt that such a process would be facilitated be a favorable climate on the top levels of the present structure. People in the top layers of the present decision-making structure are often not immediately threatened, though decentralization and distribution are antithetical to a strict hierarchical system. People in more middle layers of the structure such as planners and policy makers for whom practicing planners often work are immediately threatened. "What is engendered by large bureaucratic organizations that permeate our social system is an inflexibility of purpose and a vested interest in the status quo" (Benello, 1971:40). This is one major reason for the opposition to Urban Options work in the City Government of East Lansing.

Role of the Professional Planner

A New Planning Process

A new planning process emerges from the form suggested in the line of argument of this thesis. The process in this thesis has gone from explicitly argued assumptions, through study of extant examples, to kinds of data which allow for broad thinking about planning alternatives, to wide political participation of people with whom planners plan. The process can occur the other way around from the participation to explicit assumptions.

Planners from Mannhein (194) through Friedman (1978) to Grabow and Heskin (1973) have aruged in theory for some such process with political participation as a central component. But these arguments have often been taken for irrelevant academic thinking that is unnecessary or unrealistic to translate into specific planning professional practices. In fact such processes as suggested here are revealed because of the energy crisis, to be intensely practical and consistent with the wont of professional planners precisely because they can lead to success in the short as well as the long term.

To be caught in a series of failures is not only debilitating personally and professionally, in the case of the energy crisis, it could well be catastrophic. Failure to deal with the depth of the problem by accepting obsolete premises and moving along old unsuccessful paths, could put professional planning in the paradoxical position of planning for a future that is not sustainable in human terms.

A New Planner

The social and political and moral imperatives of the 60s produced only a few practicing professional planners who operated by the Needleman (1974) school and were aware of the meaning of Sherry Arnstein's (1969) typology.

The energy crisis and the ecological crisis add to these others a technical and economic imperative which make possible solutions more urgent.

In terms of planners, the most lucid present discussion of a new planner whose major focus is participation comes from the neighborhood movement. Rick Cohen's work is based on his study of the Pennsylvania Neighborhood Preservation System (PNPS). He goes well beyond Anthony Downs (1970), Sherry Arnstein (1975) the Needlemans (1974) in an understanding of the politics of the neighborhood planning process.

Cohen concludes:

> Planners must now begin to see themselves not as manipulators of resources to be allocated to target neighborhoods, but architects of new political forms which match the types of problems and neighborhoods they must face. . . . This is a different and probably difficult challenge to the conventional thinking of planners. The neighborhood unit is no longer a physical territory or a housing market, but a political entity. Neighborhood planning is a political process whose decisions have physical, economic and social implications. Planners in PNPS have been compelled to turn their conceptual world on its head, with results that may be significant advances over technical fixes of traditional neighborhood projects (Cohen, 1979:361-362).

The kinds of energy problem solutions presented in this thesis have as their foundation the neighborhood made up of strong, responsible and trained individuals doing work in their own houses and with their neighbors. As a consequence the conversion process must be in part a political process. Because this process is participatory and not directive in nature, planners who facilitate it will need different training, a different outlook than they now have. By using the kinds of planning processes suggested in this thesis we can arrive at energy solutions by beginning from where we now are.

CHAPTER VIII

CONCLUSIONS

Professional planning process and practice which has devloped in the United States needs basic revamping in response to the energy crisis. While the general sequence of that planning process which proceeds from assumptions and background to alternatives and choice, through implementation, can be argued as a logical basic system, in practice it has become pat and reactive.

The seriousness of the energy crisis mandates planners to think in creative terms about possible and sustainable futures. Frequently planners have simply reacted to isolated patterns as they unfolded. But the energy crisis reaches deeply into every aspect of culture in the United States.

In responding to this crisis planners have two choices. One response is characterized by Heilbroner:

> The planning that will emerge from the present crisis will be of a different nature. Its essential prupose will be not to remedy the various failures that capitalist growth has brought but to direct and at the bottom to protect the very possibility of that growth as long as that can be (Heilbroner, 1978:71).

The planning methods and processes that follow from this choice is one way, from implicit assumptions through implementation, initiated and carried through from the top levels of social hierarchy. It has become so narrow as to preclude any discussion of genuine alternatives.

Planners can and are responding to the energy crisis in another way, through changes in practice and methods as discussed in this thesis. This second choice involves changing the content of the planning process as it now most frequently exists in cities in the United States. It also involves changing the nature of the flow of the planning process. Instead of the planning process proceeding from often implicit assumptions, through alternatives, to implementation, planners could as is demonstrated in this thesis begin at any point.

In this thesis the beginning is, conventionally with assumptions. Unconventionally, the discussion of assumptions is explicit and reaches to the core of the present energy debate, between the "hard" and the "soft" paths. The contention in this thesis, is that if this debate proceeds with a view of the depth of the energy crisis in terms of the whole culture of the United States, the choice for solutions which planners and others will advocate is long the "soft" path. This involves not following directives as planners are too frequently trained to do, but advocacy. Such a level of discussion raises genuine alternatives. These alternatives can suggest tacks in implementation along the soft path. Some of these are summarized in view of a model of culture in Chapter III.

In Chapter IV, the conventional planning process has been reversed. The discussion of soft path planning proceeds in

Chapter IV from ongoing implementation at Urban Options. The process of implementation of appropriate technologies in the Urban Options example demonstrated that a unilineal method of planning will not be sufficient in finding positive solutions to the energy crisis.

In Chapter V the inadequacy and narrowness of the commonly used energy data base becomes very apparent as energy planning enters the concerns of local planners. If assumptions are explicit, then a sequence of planning considerations can be developed in detail and can be effectively argued from any point in the planning process.

In addition the data upon which planners and others justify their choices, can be collected for a specific and defined purpose. In the case of the argument for the appropriate technologies solutions to the energy crisis, data must be applicable to a local level and usable and controlled by people in whose houses and lives adaptation will occur.

Local planners are then thrust into a new level of responsibility and complexity. A one tiered parking ramp is no longer an alternative to a three tiered parking ramp. Rather the need for parking is discussed in the context of transportation needs of the people within a planner jurisdiction. If conservation and use of appropriate, renewable resources is a basis for planning, transporation planning becomes a complex interweaving of pedestrians, bicyclists and people and goods traveling by motorized vehicle matched in their emphasis with the needs for local and intercity passenger travel and freight carrying.

The technological planning process which can facilitate the use of appropriate technologies and the amount of money available for such conversion are new specific provinces for local planners. But the technology is learnable and interesting and the money is still available as discussed in Chapter VI.

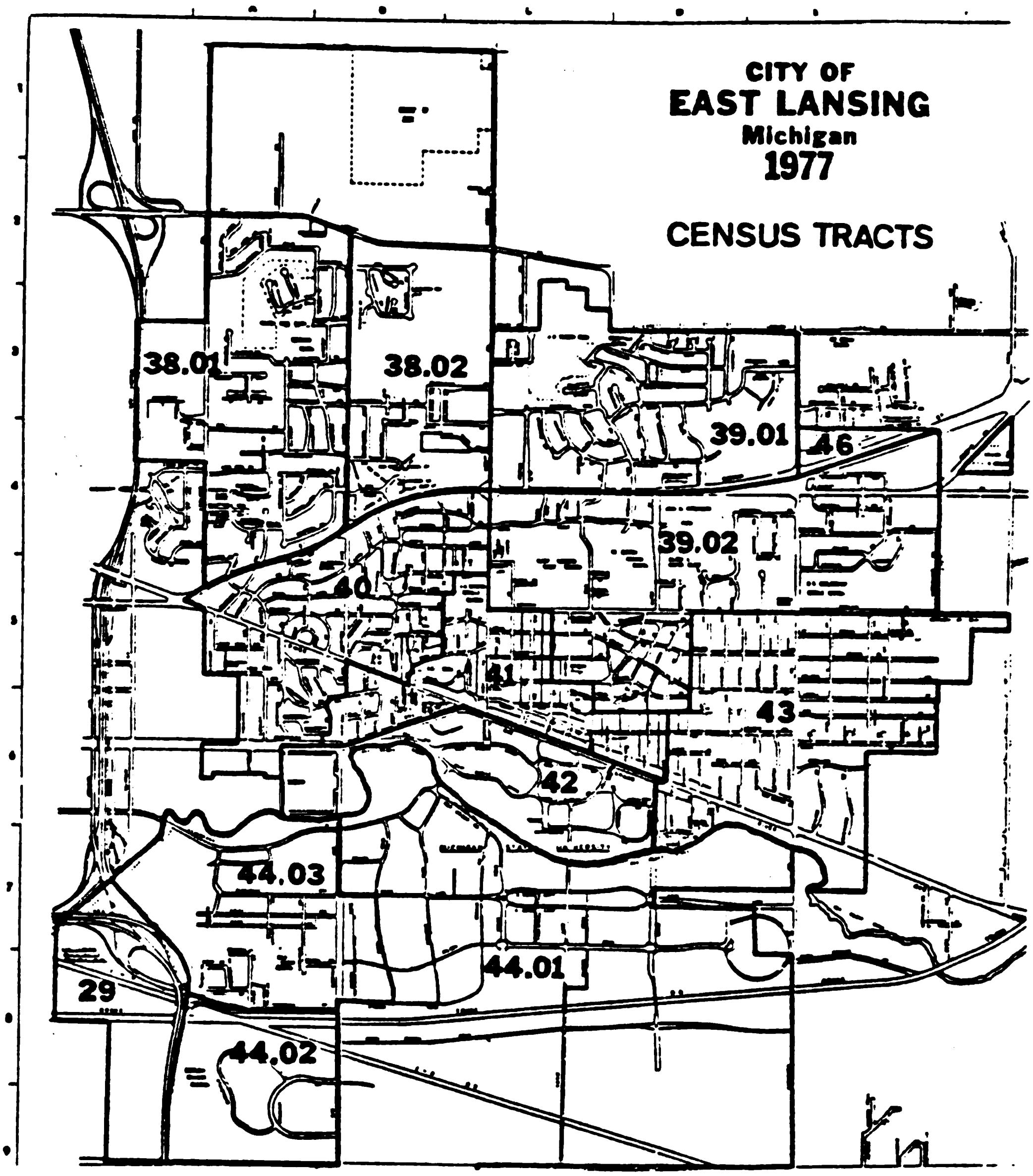
The most difficult part of the changes required of the planner in response to the energy crisis has to do with the socio-political role of the planners. As discussed in Chapter VII, the planning profession as it is practiced today puts planners squarely in a strict hierarchical decision-making system. If planners depend, professionally or personally, upon this strict hierarchy, they can become impediments to the kinds of socio-political changes which seem essential to conversion to appropriate technologies.

With explicit discussion of the root issues brought forth by the energy crisis, professional planners will become not merely querrillas in, or advocates of, an existing top down view of their professional practice where the content is narrow and reactive. Rather planners will be participants, organizers and facilitators of basic localized change with at once more subtle and in many ways more complicated data, alternatives and syntheses, and a more flexable view of the process of their professional practice.

APPENDICES

APPENDIX A

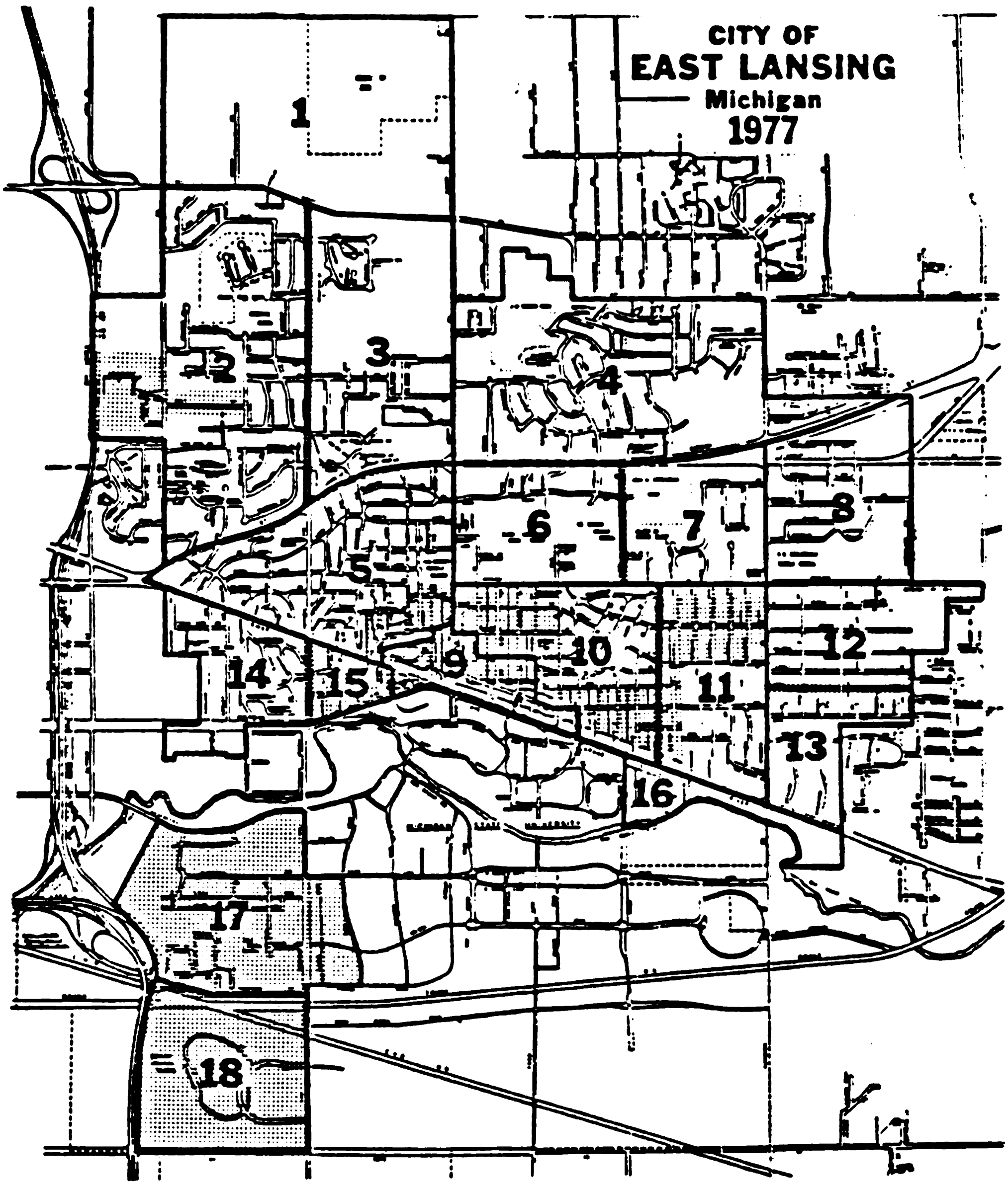
CENSUS TRACTS CITY OF EAST LANSING



(City of East Lansing, 1979)

APPENDIX B

EAST LANSING NEIGHBORHOODS



EAST LANSING NEIGHBORHOODS

1 CHANDLER
2 WEST PINECREST
3 EAST PINECREST
4 WHITEHILLS
5 GLENCAIRN
6 WEST ALTON
7 EAST ALTON
8 WALNUT HILLS
9 CITY CENTER
10 WEST BAILEY
11 EAST BAILEY
12 NORTH CAHILL
13 SOUTH CAHILL
14 WEST KENSINGTON
15 EAST KENSINGTON
16 BOGUE
17 RED CEDAR
18 SPARTAN VILLAGE

(City of East Lansing,1978)

APPENDIX C

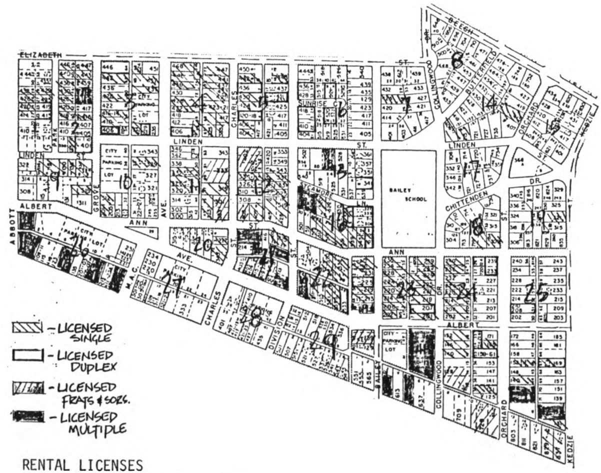
EAST LANSING ZONING

ZONING

(City of East Lansing, 1979)

APPENDIX D

STUDY AREA: RENTAL LICENSE



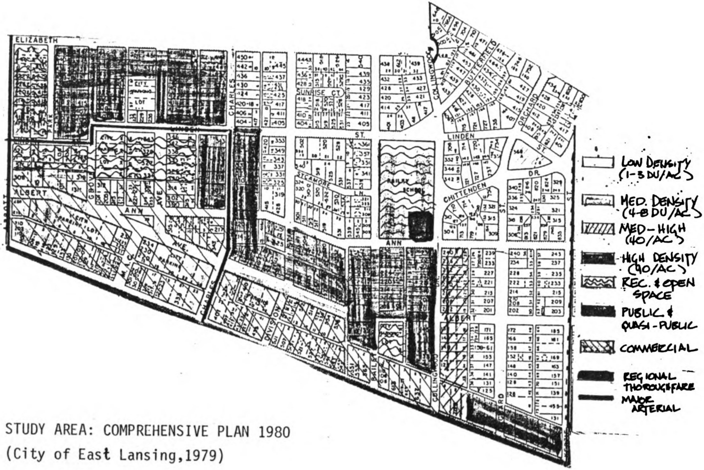
RENTAL LICENSES

(City of East Lansing, 1979)

APPENDIX E

STUDY AREA: COMPREHENSIVE

PLAN 1980



STUDY AREA: COMPREHENSIVE PLAN 1980
(City of East Lansing,1979)

APPENDIX F

SOLAR ENERGY THAT CAN BE COLLECTED

Line 7—It takes 1 BTU[1] of energy to heat 1 lb of water 1°F, and a gallon of water weighs a little over 8 lb. Therefore, the energy required to heat the water to 140°F each day would be the number of gallons per day times the temperature difference times 8.33 lb per gal.

Line 8—The hot water energy requirement each month is the amount of energy required per day times the number of days in the month.

Amount of Solar Energy That Can Be Collected (Chart 2)

Line 3—Insolation is the amount of solar energy that reaches a surface and is measured in BTUs per square foot. The insolation that strikes a solar collector depends on latitude, time of the year, and the collector orientation. Michigan ranges from about 40° to 48° north latitude (Figure 2). For all practical purposes the collector must be facing south.

[1] A British Thermal Unit (BTU) is a common unit of energy used in the United States.

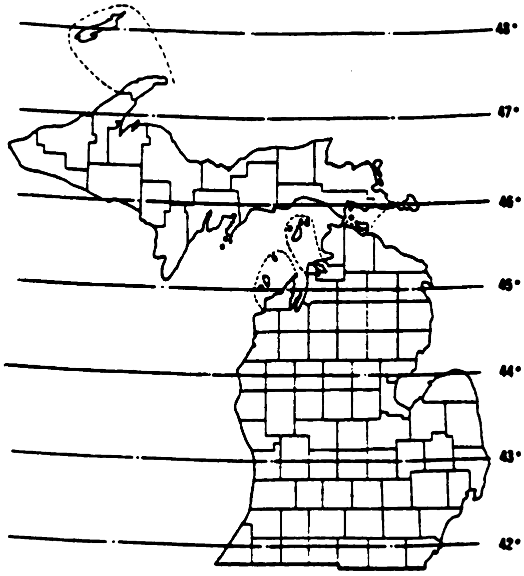


Figure 2. Michigan latitudes and counties.

CHART 2
Solar Energy That Can Be Captured per Square Foot of Collector per Month.

Line	Description	Source	Units	Data (by months)											
1	Month			Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
2	No. days per month		Days	31	28	31	30	31	30	31	31	30	31	30	31
3	Daily insolation	See discussion Table 1	BTU per ft²	1730	2100	2300	2300	2260	2210	2220	2250	2220	1970	1700	1530
4	Hours of usable sunshine per day	Table 2	Hour	9	9	9	11	11	11	11	11	9	9	9	8
5	Hourly insolation	Line 3 ÷ Line 4	BTU per ft² per hour	192	233	256	209	205	201	202	205	247	219	189	191
6	Desired water temperature	Line 4 Chart 1	°F	140	140	140	140	140	140	140	140	140	140	140	140
7	Incoming water temperature	Line 5 Chart 1	°F	54	54	54	54	54	54	54	54	54	54	54	54
8	Average collector water temperature	(Line 6 + Line 7) ÷ 2	°F	97	97	97	97	97	97	97	97	97	97	97	97
9	Average outdoor temperature	Table 3	°F	25	25	34	48	59	72	75	74	64	53	39	29
10	Loss factor	(Line 8 − Line 9) ÷ Line 5	°F-ft²-hr per BTU	0.38	0.31	0.25	0.23	0.19	0.12	0.11	0.11	0.13	0.20	0.31	0.36
11	Collector efficiency	Figure 6		0.42	0.48	0.52	0.54	0.58	0.62	0.63	0.63	0.62	0.56	0.48	0.44
12	Possible sunshine	Table 3		0.36	0.44	0.49	0.52	0.64	0.68	0.71	0.69	0.60	0.55	0.31	0.30
13	Total monthly collectable insolation per square foot	(Line 2 × Line 3 × Line 11 × Line 12) ÷ 1,000	1,000 BTU per ft² per month	8.1	12.4	18.2	19.4	26.0	28.0	30.8	30.3	24.8	18.8	7.6	6.3

(Stoudt and Myers, 1977:6)

APPENDIX G

AUTOMOBILE TERRITORY:

EAST LANSING

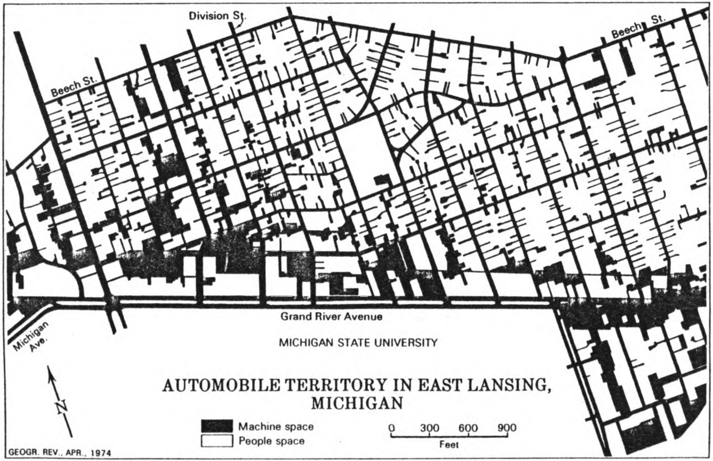


FIG. 1 – Machine space (automobile territory) in a part of East Lansing, Michigan, spring, 1970, at ground level only. Prepared from field maps with the assistance of Michael Graff, Paul Lamb, John Clark, and Malcolm Haynes.

(Horvath, 1974:170)

APPENDIX H

ENERGY HOUSE AUDIT

WITH GAS HEAT

**** IN THE BANK OR UP THE CHIMNEY ****

A COMPUTER PROGRAM TO ANALYZE
WEATHER PROOFING THE HOME

FAMILY LIVING EDUCATION
COOPERATIVE EXTENSION SERVICE
MICHIGAN STATE UNIVERSITY

*** CAULKING AND WEATHERSTRIPPING DOORS AND WINDOWS ***

1. SAVINGS FROM CAULKING DOORS AND WINDOWS ($/YR) = 5.
TOTAL INSTALLATION COST = $ 72.
PAY-BACK PERIOD (YRS) = 10.0

2. SAVINGS FROM WEATHERSTRIPPING DOORS AND WINDOWS ($/YR) = 83.
TOTAL INSTALLATION COST = $ 48.
PAY-BACK PERIOD (YRS) = 0.6

*** STORM WINDOW INSTALLATION ***

3. SAVINGS FROM STORM WINDOW INSTALLATION ($/YR) = 82.
TOTAL INSTALLATION COST = $ 396.
PAY-BACK PERIOD (YRS) = 4.2

*** ATTIC INSULATION ***

4. SAVINGS FROM INSULATING A UNFINISHED ATTIC

TOTAL INCHES	ADDED INCHES	ADDITIONAL SAVINGS($)	INSTALATION COST($)	PAYBACK PEROID YEARS
8	2.0	4.	83.	13.2
10	4.0	7.	162.	13.6
12	6.0	9.	236.	14.7
14	8.0	10.	311.	16.2

*** WALL INSULATION ***

7. SAVINGS FROM INSULATING WALLS ($/YR) = 123.
TOTAL INSTALLATION COST = $ 938.
PAY-BACK PERIOD (YRS) = 6.1
NOTE -- A CONTRACTOR WILL NEED TO DO THIS JOB

*** CRAWL SPACE, UNDER FLOORS, AND BASEMENT WALLS INSULATION ***

8. SAVINGS FROM INSULATING CRAWL SPACE ($/YR) = 10.
TOTAL INSTALLATION COST = $ 53.
PAY-BACK PERIOD (YRS) = 4.6

10. SAVINGS FROM INSULATING BASEMENT WALLS ($/YR) = 29.
TOTAL INSTALLATION COST = $ 209.
PAY-BACK PERIOD (YRS) = 6.1

ENERGY AUDIT WITH GAS HEAT: Urban Options
135 Linden

APPENDIX I

ENERGY HOUSE AUDIT

WITH ELECTRIC HEAT

*** IN THE BANK OR UP THE CHIMNEY ****

COMPUTER PROGRAM TO ANALYZE
EATHER PROOFING THE HOME

AMILY LIVING EDUCATION
OOPERATIVE EXTENSION SERVICE
ICHIGAN STATE UNIVERSITY

** CAULKING AND WEATHERSTRIPPING DOORS AND WINDOWS ***

1. SAVINGS FROM CAULKING DOORS AND WINDOWS ($/YR) = 21.
   TOTAL INSTALLATION COST = $ 72.
   PAY-BACK PERIOD (YRS) = 3.1

2. SAVINGS FROM WEATHERSTRIPPING DOORS AND WINDOWS ($/YR) = 376.
   TOTAL INSTALLATION COST = $ 48.
   PAY-BACK PERIOD (YRS) = 0.1

** STORM WINDOW INSTALLATION ***

3. SAVINGS FROM STORM WINDOW INSTALLATION ($/YR) = 370.
   TOTAL INSTALLATION COST = $ 396.
   PAY-BACK PERIOD (YRS) = 1.1

** ATTIC INSULATION ***

4. SAVINGS FROM INSULATING A UNFINISHED ATTIC

OTAL NCHES	ADDED INCHES	ADDITIONAL SAVINGS($)	INSTALATION COST($)	PAYBACK PERIOD YEARS
2	2.0	193.	39.	0.2
4	4.0	232.	72.	0.3
6	6.0	252.	105.	0.4
8	8.0	261.	138.	0.5
10	10.0	266.	171.	0.6
12	12.0	269.	204.	0.8
14	14.0	272.	237.	0.9

** WALL INSULATION ***

7. SAVINGS FROM INSULATING WALLS ($/YR) = 558.
   TOTAL INSTALLATION COST = $ 928.
   PAY-BACK PERIOD (YRS) = 1.6
   NOTE -- A CONTRACTOR WILL NEED TO DO THIS JOB

** CRAWL SPACE, UNDER FLOORS, AND BASEMENT WALLS INSULATION ***

8. SAVINGS FROM INSULATING CRAWL SPACE ($/YR) = 45.
   TOTAL INSTALLATION COST = $ 53.
   PAY-BACK PERIOD (YRS) = 1.2

10. SAVINGS FROM INSULATING BASEMENT WALLS ($/YR) = 126.
   TOTAL INSTALLATION COST = $ 208.
   PAY-BACK PERIOD (YRS) = 1.6

ENERGY AUDIT WITH ELECTRIC HEAT: Urban Options
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