ORDINANCE NO. 8283-17

AN ORDINANCE
ADOPTING THE CITY OF URBANA
1982 COMPREHENSIVE PLAN

WHEREAS, changes in various circumstances occurring in the City of Urbana, as reflected in the introduction to the 1982 Comprehensive Plan, have indicated the need for a new study of the planning jurisdiction of the City of Urbana; and

WHEREAS, after due public notice and public hearings, the Urbana Plan Commission has recommended the adoption of the City of Urbana 1982 Comprehensive Plan.

NOW, THEREFORE, BE IT ORDAINED BY THE CITY COUNCIL OF THE CITY OF URBANA, ILLINOIS, as follows:

Section 1. The attached document, entitled "City of Urbana 1982 Comprehensive Plan," together with tables and figures included therein, attached hereto and incorporated herein by reference is hereby adopted.

Section 2. The following ordinances are hereby repealed in their entirety upon the taking effect of this ordinance:

(a) Ordinance No. 6869-18, passed July 22, 1968, entitled "Ordinance Of Adoption Of The Comprehensive Plan For The City Of Urbana, Illinois", adopting the Comprehensive Plan, Final Report (Summary Statement), November, 1967, as modified and to include Map #2.

(b) Ordinance No. 7172-95, passed April 3, 1972, entitled "An Ordinance Amending The Adopted Comprehensive Plan Of The City Of Urbana, Illinois", deleting Section 5 of Comprehensive Plan, Final Report (Summary Statement 1967) and adopts the Revision Of Section V, "Renewal Areas," Of The 1967 Comprehensive Plan Of The City Of Urbana.

(c) Ordinance No. 7374-50, passed December 17, 1973, entitled "An Ordinance Adopting The Urbana Comprehensive Plan Update," adopting the "Urbana Comprehensive Plan Update," consisting of fifty-six (56) numbered pages and a map in a pocket part as an amendment to "The Comprehensive Plan for the City of Urbana, Illinois," adopted on July 22, 1968.

(d) Ordinance No. 7475-15, passed July 1, 1974, entitled "An Ordinance Amending The Urbana Comprehensive Plan By Designating A Business District For Development And Redevelopment," amending "The Urbana Comprehensive Plan."

(e) Ordinance No. 7677-79, passed February 21, 1977, entitled "An Ordinance Amending The Official Comprehensive Plan," amending "The Official Comprehensive Plan," "The 1973 Comprehensive Plan Map Update," and "The Comprehensive Plan Map."

(f) Ordinance No. 7879-64, passed December 19, 1978, entitled "An Ordinance Amending The Urbana Comprehensive Plan By Designating A Boneyard Creed District For Development," amending "The Urbana Comprehensive Plan."

This Ordinance is hereby passed by the affirmative vote, the "ayes" and "nays" being called, of a majority of the members of the Council of the City of Urbana, Illinois, at a regular meeting of said Council on the 7th day of September, 1982.

PASSED by the City Council this 7th day of September, 1982.

Ruth S. Brookens
Ruth S. Brookens, City Clerk

APPROVED by the Mayor this 16th day of September, 1982.

Jeffrey T. Markland
Jeffrey T. Markland, Mayor

THIS IS THE ATTACHMENT WHICH IS REFERRED TO IN ORDINANCE NO. 8283-17 AND IS INCORPORATED THEREIN BY REFERENCE.

Ruth S. Brookens

Ruth S. Brookens, City Clerk

February 28, 1983

Date

8283-17

MEMORANDUM

TO: Urbana Plan Commission

FROM: Piero Faraci

DATE: September 12, 1980

SUBJECT: Energy Conservation

We have enclosed a staff paper on Energy Conservation. As you will see, the paper is preliminary and not quite complete enough to constitute a draft Background paper.

At the September 18th meeting we will discuss the question of energy conservation, present additional material and decide on the policy direction to be taken on this subject. Following this discussion and based on your policy guidance, the staff will prepare a Background paper comparable to those prepared previously.

PF:lg
enclosure

ENERGY CONSERVATION

1.0 INTRODUCTION

The rising cost of energy is threatening the life style to which we have become accostumed. These costs more than doubled in the last five years and continue to rise. The consequences are well known. First, as more of our personal income is spent for energy, fewer dollars are available for other necessities. Second, and even more important, the cost of production by the nation's energy-intensive industries is increasing as a function of energy costs with no increase in productivity. This in turn contributes to inflation, reduced consumer buying and unemployment. Alternative energy sources such as methanol, ethanol, more extensive use of coal, and nuclear power will ease the energy shortage but not the cost. With present technology, these sources are more costly to produce than petroleum, even at current prices. In addition, the actual production of some of the alternative sources require substantial amounts of energy. For example, when coal is converted to electricity, the equivalent of three B.T.U's of coal are consumed to produce one B.T.U. of energy. Even grain alcohol (ethanol) requires the equivalent of one B.T.U. of energy to produce two B.T.U.'s.

Although the energy problems may seem more global in scope that could be dealt with in Urbana through the Comprehensive Plan, there are many opportunities for reducing energy consumption. These opportunities will directly benefit the City's residents and, when combined with similar efforts in other cities, will help solve the nation's energy problem.

2.0 PROBLEMS, ISSUES AND OPPORTUNITIES

Substantial savings can be realized through energy-efficient land uses. Although total population remained relatively stable in recent years, substantial land developments can be anticipated in the future if trends continue. For example, and as illustrated in the table below, nearly one-quarter of all housing units now existing in the City of Urbana were built in the last ten years.

	No.	%
Total Units as of April 1980*	12,653	100.0
Built before 1940	4,050	32.0
Built between 1940 and 1949	1,286	10.2
Built between 1950 and 1959	1,990	15.7
Built between 1960 and 1969	2,376	18.8
Built between 1970 and 1980	2,951	23.3

*Staff estimate based on preliminary 1980 Census.

It is anticipated that comparable development will take place in the next ten years. This new development can and should be guided in consideration of energy conservation needs. Potential savings can be better understood by a brief review of consumption patterns.

The home and the automobile are the major consumers of energy. Only a few years ago, about one-third of all forms of energy including natural gas, petroleum, electricity, coal and nuclear were consumed to heat and cool our homes. Of all petroleum consumed, about one-half was used for transportation (primarily

by the private car). Moreover, only a few years ago energy consumption increased at a rate of 5 to 10 percent each year. This was when energy costs were about one-half what they are today.

As energy costs increased, a slight decline in energy consumption occurred, but nowhere near the conservation potential. Some savings were realized through more efficient automobiles and appliances, improved insulation, and through somewhat revised expectations about indoor temperature and the use of the automobile. As a result of these measures, the rate of increase in energy consumption has been reduced, and in fact may have been reversed. However, the potential for energy savings which could be realized by working in better harmony with the environment, both natural and man-made, has barely been tapped. It is estimated for example, that the heating cost for a single family home could be reduced by 50 to 70% through insulation, orientation and shading using present technology and conventional construction methods.

3.0 ENERGY EFFICIENT ARRANGEMENT OF LAND USES

In the past, abundance of both land and energy promoted low density developments and the strict separation of residential, commercial and industrial uses. This separation was justified by the belief that it would protect the quality of the residential environment, and enhance property values. In the City of Urbana, although densities have been increasing, strict separation of uses continue. Industry is concentrated to the north, residential and commercial development to the south and southeast causing

the need for substantial distances to be covered in order to go from home, to work, to shopping. Energy efficient site planning which takes advantage of both passive and active solar energy, and arrangement of compatible land uses should be promoted in new developments for the benefit of the city's residents.

3.1 Site Planning for Passive Solar Energy

In new residential developments, substantial energy savings can be realized through clustering, orientation of structures, shading and planting, and optimum form.

.1 Clustering

It is estimated that up to 14% of the energy used for heating can be saved through clustering. By clustering, structures protect one another from cold winter winds. In addition, streets and public utility lines are shortened thus realizing savings in manufacturing, construction, and long-term maintanance. When clustering is combined with high density, as much as 40% of heating costs can be saved.

.2 Orientation

Substantial reductions in energy consumption for both heating and cooling can be realized by orienting structures so as to take advantage of the wind and the sun. It is estimated that in structures facing south elongated along the east-west axis, nearly 10% of energy used for heating and cooling can be saved. This is due to the fact that in winter, the south side of a structure receive three times as much sun radiation as the east and west sides, and the north

side receive practically no radiation at all. In the summer, the south side of the structure, receives one half the radiation received in the winter, since the sun's angle is much higher. Orientation can be combined with shading as will be covered later, and with the following:

- Placement of large windows along south walls
- Use of minimum window area on the east, west and north walls.
- Placement of infrequently used rooms facing north, and frequently used rooms facing south.

.3 Shading

Trees, stratigically located in relation to the structure, can reduce heating and cooling costs. In the winter, trees oriented to the southwest will provide protection from prevailing winds, and the absence of leaves will allow the sun rays to shine through. In the summer, trees will reflect a great deal of sun light thus keeping the sun rays from heating the structure. Trees also reduce the air temperature in their surrounding environment further aiding the structure's cooling process. It should be noted however, that trees can also obstruct the sun's rays thus affecting solar collectors when active solar energy is used.

.4 Optimum Form

The optimum form is that which in the winter allows the least amount of B.T.U.'s to escape from the inside and in the summer allows the least amount of B.T.U.'s enter~~ing~~ to from the outside. With proper shade and overhang, the optimum form for our climate is that which is elongated along the east-west

axis and where the length is 1.16 times the width.

3.2 Site Planning for Active Solar Energy

All comments related to site planning for passive solar energy also apply here. The only exception is with regard to the protection of solar access. Property owners using solar collectors need to be protected from surrounding land uses' obstructions which would shade their collectors. In addition, zoning ordinances, subdivision regulations and related municipal codes, should be reviewed to insure that they do not include provisions which might create barriers to the active use of solar energy.

4.0 PROPOSED GOALS, OBJECTIVES AND POLICIES

The following goals, objectives and policy statements are based on the preceding observation and on issues related to energy which surfaced during the preparation of preceding background papers. They specifically address the implications for energy consumption related to: 1) the spatial relationship of different land uses; 2) the arrangement of structures and 3) transportation facilities. The definition of goals, objectives and policies is as follows:

A. The Goals articulate the long range aspiration of the City's residents. They are stated in terms that can promote broad area of agreement necessary to support actions and strategies required to realize these aspirations.

B. The Objectives identify the type of action that must be taken to realize the goals. Objectives are so stated as to also provide a means to measure goal attainment.

C. The Policies identify specific courses of action required

to achieve stated goals and objectives. Policies are based on the analysis of issues and a review of available alternatives.

LAND USE

Goal-To guide new developments so as to promote the most efficient use of energy.

Objective: Regulate the use of land in ways that will promote compact urban design which minimizes the demand for energy and maximizes its efficient use.

Policies: Encourage land use arrangements and densities that facilitate provision of energy efficient public transportation

-Encourage downtown redevelopment as a multi-purpose center to include a variety of compatible Land Uses as a means to reduce auto travel.

-Promote residential development in proximity to employment centers.

-Identify and promote the potential use of centralized heating and cooling facilities to serve building complexes.

ARRANGEMENT OF STRUCTURES

Goal - To encourage the efficient use of energy by both private and public users

Objective: Promote design and construction practices which effectively utilize all energy sources.

Policies: Review and where necessary revise municipal codes and ordinances to eliminate obstacles ~~in~~ to the use of active and passive solar energy.

-Provide for increased residential densities which make more efficient use of energy.

-Encourage site planning, design and construction which utilize natural lighting, reduce the effects of exposure to extreme weather conditions, and reduce the demand for artificial heating cooling and ventilation.

-Promote the use of landscaping to reduce the adverse effect of weather conditions.

Objective: Promote the efficient use of energy in the provision of community facilities and services.

Policies: Identify and implement programs to reduce energy consumption in public buildings.

-Identify and implement programs which reduce energy demands for public lighting systems but do not sacrifice public safety.

TRANSPORTATION

Goal- To improve the effectiveness of existing and future roadway and public transportation systems.

Objective: Upgrade public and private transportation systems so as to maximize the number of miles traveled for each unit of energy consumed.

Policies: Upgrade roadway surfaces and traffic controls as required to expedite vehicle movement without sacrificing public safety.

-Provide facilities and programs for maximum utilization of public transportation, car and van-pooling, bicyle and pedestrian systems.

-Provide viable alternatives to the use of the private automobile.

PUBLIC PARTICIPATION

Public participation on the update of the Comprehensive Plan consisted of a public meeting held on May 1, 1980 and of a questionnaire administered in conjunction with the public meeting (see background paper: Public Participation, June 1980, p. 11). Those responding to the questionnaire gave clear support for measures which promote energy conservation. Of the alternatives proposed in the questionnaire, means to achieve energy conservation were ranked as follows:

Better Use of Mass Transit	78%
Use of Passive Solar Energy	66%
Compact Development	53%
Improvement to bikeways and pedestrian access	50%

Clearly, Urbana residents who take an interest in community affairs support energy conservation. As shown above, highest support is for measures intended to reduce reliance on the private auto through better use of mass transit, and to reduce energy consumption for home heating through use of passive solar energy. The recommendation in this background paper on energy conservation reflect public participation's results.

CODES AND ORDINANCES

Any discussion of energy conservation would not be complete without some reference to municipal codes and ordinances. Although specific recommendations are well beyond the scope and purpose of this paper, a general discussion of the role that codes and ordinances can play

in promoting energy conservation is in order.

Zoning Ordinance

Some municipalities have made revisions to their existing zoning ordinances intended to promote energy conservation. These revisions generally deal with provisions which allow or encourage:

- Integration of different but compatible land uses such as neighborhood commercial and health facilities in residential areas.
- Mixture of different housing types
- Infill of skipped-over vacant land
- Clustering and common-wall construction

They also deal with yard and setback requirements since these regulations determine the distance between various buildings and between buildings and streets. These distances, in turn influence the orientation of the structure by determining its axis.

Of the various techniques used, the Planned Unit Development provisions of the zoning ordinances have the best potential for promoting energy efficient development provided that they are used. In recent years however, developments in or near the City of Urbana have bypassed the PUD provisions.

When used, PUD offers a number of opportunities. For example, even without specific requirements, the site plan review procedure offers the opportunity to encourage energy efficient design. More importantly, the PUD can include flexibility in the regulations which permit increased densities, reduced street lenghts and utility extensions.

Even without density increases, the flexibility of site design offered by the PUD provides opportunities for the layout of streets and for siting of buildings which make the best use of both passive and active solar energy.

Specific PUD provisions can also be used to promote energy efficiency. This begins with the "Purpose of the PUD" which in the Urbana Zoning Ordinance includes among others: "To promote an efficient use of land, to facilitate a more economic arrangement of buildings, circulation systems, land use and utilities, and the conservation of energy". (From the Urbana Zoning Ordinance p. VII - 2).

More specific provisions may allow density bonuses when: ". . . the site development incorporate features which make substantial contribution to the purpose of the PUD". Energy conservation, as stated above is one of these purposes. The criteria for the density bonuses can incorporate factor's related to clustering, orientation, shading and optimum form as discussed in section 3.1 of this report. Other specific provisions may deal with pedestrian and bicycle circulation, private streets, landscaping allowable commercial uses, clustering densities, yard and setback requirements. Actual text related to these factors from an unpublished model ordinance is enclosed in appendix B.

Subdivision Regulations

The subdivision regulation is also important in promoting implementation of energy-efficient design techniques. Street standards and layout; provisions for pedestrian and bicycle movement; landscaping and related

factors can influence energy conservation.

In regulating streets layout, standards for curves, radii, maximum grade street widths and cul-de-sacs sometimes excede the requirements of traffic volumes. When appropriate, reduction of these standards can realize energy savings. In Davis California, for example reduction of street width has been considered. The proposed new standards are as follows:

Collector streets	38'
Local street	28'
Cul-de-sacs	25'

By comparison the minimum right-of-way of any street in Urbana cannot be less than 60' according to the City's subdivision Regulations. Exceptions are provided for in the Regulations in situations where the ". . . land make such width impractical " and when a new street meets an existing street with a right-of-way less than 60'.

It should be noted however that provisions in the Plan Unit Development ordinance can offset the restrictions of the Subdivision Regulations.

APPENDIX A

Data on energy consumption for the City of Urbana are not available in published form. Consumption patterns for the Northeastern Illinois region are shown on Figures 1.1, 1.2, 1.3 and were used in the preceding text. These were chosen in preference to state or national figures because the details in which they are presented is especially useful for this analysis. Climate is usually the major variable affecting energy consumption. However, climate is comparable in the two areas. A more important difference between the two areas is the extent and type of industrialization. Note however, that the major source of energy consumed by industry is natural gas. Industry accounts for 35% of all natural gas consumed. In Urbana, industry probably consumes half that amount with commercial and residential uses accounting for 70 to 80%.

FIGURE 1.1 SOURCES AND USES OF ENERGY IN NORTHEASTERN ILLINOIS, 1974 (ESTIMATED TRILLION BTU'S)

SOURCE / SECTOR	COAL	PETRO-LEUM PRODS	NATURAL GAS	HYDRO-NUCLEAR	TOTAL PRIMARY FUELS TO SECTOR	DISTRIB-UTED ELECTRIC-ITY	TOTAL ENERGY INPUT	PERCENT-AGES
RESIDENTIAL/ COMMERCIAL		(20%) 162.70	(60%) 448.11		610.81	(61%) 109.16	719.97	33.04
INDUSTRIAL	113.97	(19%) 149.98	(35%) 256.57		520.52	(39%) 69.85	590.37	27.09
TRANSPORTATION	Added to industrial	(54%) 437.64	(2%) 12.76		450.40	1.10	451.50	20.72
ELECTRIC POWER	353.86	(7%) 53.28	(3%) 24.28	166.14	597.56	(100%) Generation 180.11	Waste Heat 417.45	19.16
OTHERS	Includes	Small	Amounts	of LPG,	Propane,	Kerosene,	etc.	
TOTAL SOURCE CONSUMPTION	467,83	(100%) 803.60	(100%) 741.72	166.14	Total 2179.29		Grand Total 2179.29	
PERCENTAGES	21.47%	36.87%	34.03%	7.62%				100%

Note: 1 trillion Btu's is equivalent to approximately 50,000 tons of coal, or 170,000 barrels of oil, or 1 billion cubic feet of gas, or 300 million kilowatt hours of electricity.

Source: Energy Consumption Patterns in the Chicago SMSA. Prepared by Energy Resources Center, University of Illinois at Chicago Circle, for the Northeastern Illinois Planning Commission, 1977.

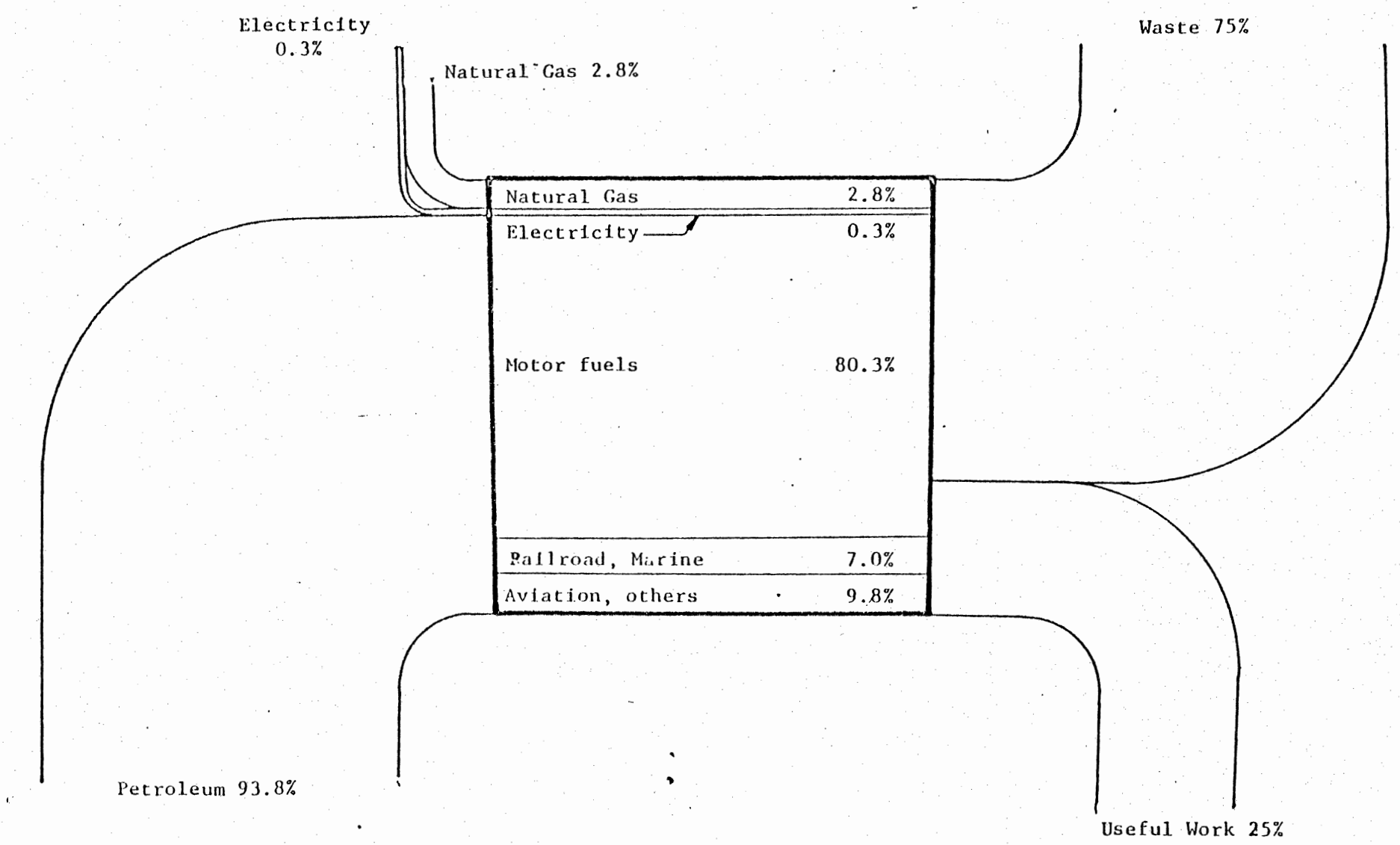


FIGURE 1.2. TRANSPORTATION SECTOR IN ILLINOIS, 1973

Total Inputs - 744 trillion BTU

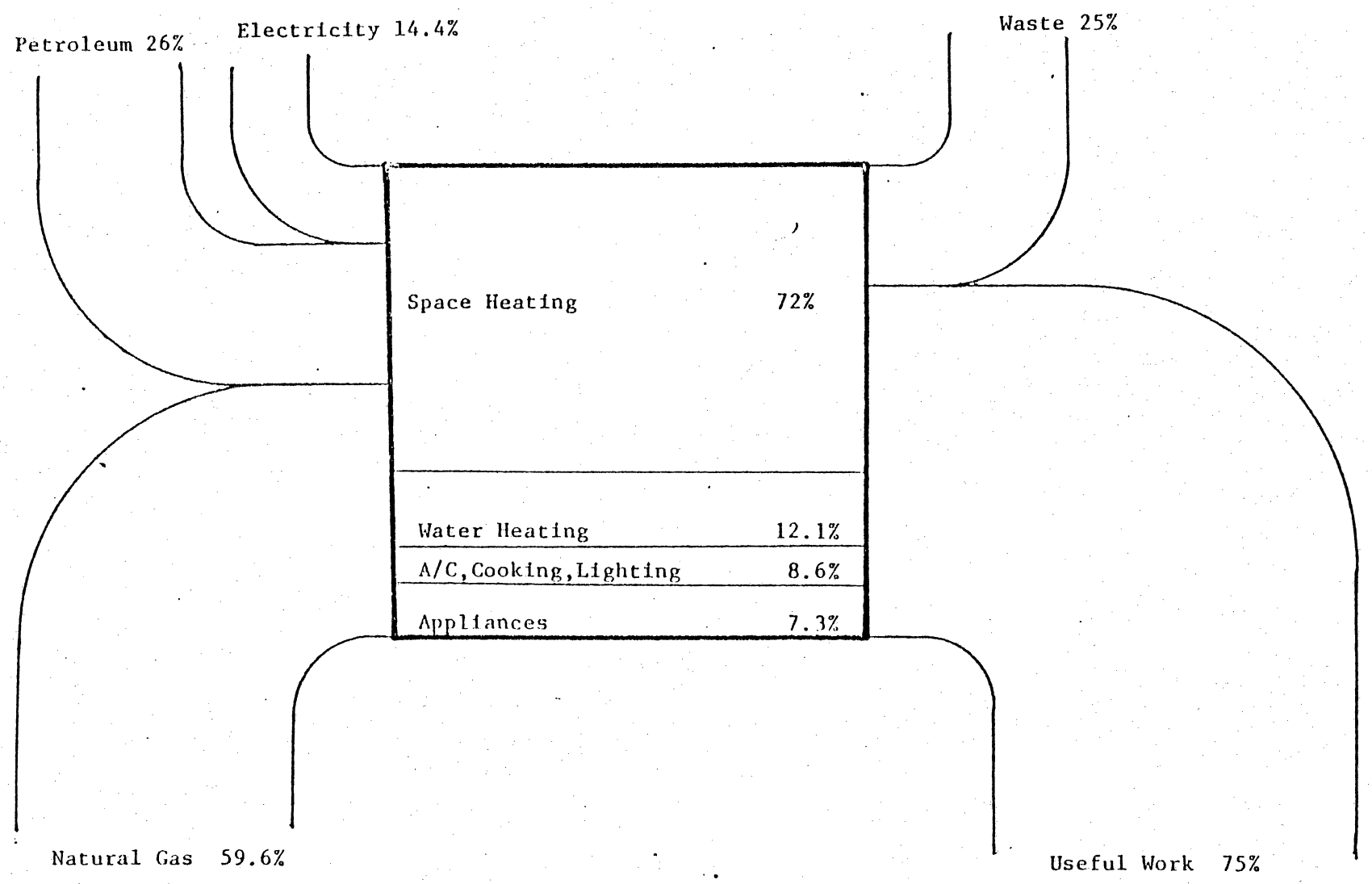


FIGURE 1.3. RESIDENTIAL - COMMERCIAL SECTOR IN ILLINOIS, 1973

Total Inputs - 1.[illegible] trillion BTU

APPENDIX B

Selected PUD provisions from an unpublished model ordinance which have implications for energy conservation have been reproduced here.

ARTICLE 2 GENERAL PROVISIONS

Section 2.1 Purpose of Planned Unit Development Regulations

2.101 To encourage innovative developments which provide efficiency and economy in the use of the land and a variety of complementary land uses in a single development.

2.102 To establish flexible standards for development which will promote creativity of design.

2.103 To establish streamlined procedures for administering the planned unit development process so as to encourage use of the process, where appropriate, and to reduce the need for large early investments in detailed design and planning.

2.104 To provide for greater flexibility in the standards pertaining to streets, sidewalks, utilities and other public services than generally apply to the conventional subdivision of land.

2.105 To reduce the cost of housing by minimizing the on-site improvements which would be required to serve each unit.

2.106 To encourage higher densities of land use on smaller amounts of land in order to preserve more land in open space and agricultural use.

2.107 To provide for the suitable location of public services, parks and conveniences within the context of an overall development.

2.108 To provide for more self-contained communities by permitting the planned provision of retail shops and personal service establishments in appropriate locations and quantities to serve the residential populations of such communities.

2.109 To encourage energy conservation by shortening lines of communication and by maximizing the use of appropriately located urban land.

Section 4.2 Permitted Uses

All uses permitted in the underlying zoning district or districts are permitted in the Planned Unit Development. Additional uses may be allowed by the (review authority) provided that they conform with a specific and precise Final Plan prepared and approved in accordance with procedural and regulatory provisions set forth in this ordinance.

4.201 Residential Uses

Single Family homes of all types, townhouses and multiple family structures shall be permitted in a Planned Unit Development. Residential uses however, must conform to density height, setback, lot size and all related standards set forth in the appropriate sections which follow.

4.202 Non-residnetial Uses

Non-residential uses not otherwise allowed in the underlying zoning district may be approved by the (review authority) provided that they are intended primarily for the service and convenience of the residents. The type of uses and their location must be such as to exercise no detremental influence on surrounding properties. In addition, they shall not endanger the public health welfare or safety, nor shall diminish or impare property values of the neighborhood in which they are located. Such uses may include:

a. Accessory Uses such as religious, educational and recreational facilities. The (review authority) or other interested parties wishing to object to the proposed accessory uses shall demonstrate beyond a reasonable doubt that these uses exceed the needs of the residents.

b. Commercial Uses including retail stores, personal service establishments and professional offices, may be allowed in the Planned Unit Development provided that the amount of area and type of facilities are based on a market analysis. In no case however, shall the gross land area excede five (5) percent of the gross Planned Unit Development area. The market analysis shall demonstrate that the amount of land proposed for commercial uses can be realistically supported primarily by the residents of the Planned Unit Development. The analysis shall include:

(1) Definition of the trade area

(2) Trade area's population and households both present and anticipated at the completion of the development

(3) Potential buying power of the prospective population

(4) Residual buying power in the trade area not otherwise served by other business areas

c. Physical Improvements. Open space areas shall be devoid of buildings and other physical structures except where required accessory to the provision of recreational opportunities as long as total imprevious surfaces constitute no more than five (5) percent of the total open space. Open space shall not include:

Proposed street rights of way,
Open parking areas and driveways for dwellings.
School sites.

d. Home Owners Association. When common open space is included in the Planned Unit Development, approval by the (review authority) shall be subject to the submission of a legal instrument establishing a Home Owners Association and detailing the manner of permanent care and maintenance of the common open space and related communally owned facilities. Such legal instrument shall be accepted only after approval of the (jurisdiction) attorney for legal form and effect, and after approval by the (review authority) for suitability of the proposed use for the open space area. The legal instrument for the Home Owners Association shall constitute a submission by the applicant of a declaration of covenants and restrictions that will govern the Association. The provisions in the legal instrument for the Home Owners Association shall include but are not limited to:

(1) Establishment of the Home Owners Association prior to the time of the sale of improved properties.

(2) Mandatory membership for each property owner and any successive owners.

(3) Permanent open space restrictions,

(4) Association's responsibility and liability for insurance, local taxes and maintenance.

(5) Establishment of property owners assessment based on a prorata share and provisions to adjust assessments to met changing needs.

(6) Safeguards including recorded convenants or dedication of development rights as required to prevent any subsequent use of open space for structures, improvements or developments not shown in the final development plan.

Section 4.3 Densities

The densities in a Planned Unit Development shall generally correspond to the densities allowed in the underlying district but need not be precisely the same. Instead, densities should reflect the district's character through complimentary building types and architectural design. Density changes may be authorized by the (review authority) when the proposed site development incorporates features which make substantial contributions

however, will the allowable increases exceed thirty (30) percent of the densities provided for in the underlying district. When more than one district is included in the Planned Unit Development site, the average densities of all combined districts will apply. The features which qualify for density increases may include, but are not limited to, those described below. For each feature, guidelines for density increases are shown in percentages. The actual densities, however, will be decided by the (review authority) based on the merits of the proposal.

a. Preservation of Natural Amenities. A maximum of five (5) percent density increase may be allowed for site design which will preserve in their natural state such natural amenities as ponds, streams, ravines, rock out croppings, wooded areas and isolated trees of special interest.

b. Landscaping. A maximum of five (5) percent density increase may be allowed for the planting and tasteful arrangement of plants on streets, lots, open space, plazas, pedestrian ways, recreational areas, and parking facilities.

c. Energy Conservation. A maximum of ten (10) percent density increase may be allowed for design and equipment features which minimize energy consumption and promote the use of solar energy. Such features include but are not limited to:

(1) Orienting buildings elongated along in east-west axis

(2) Placing larger windows along south walls and minimize window space on north, east and west walls.

(3) Shading south walls with overhangings

(4) Locating frequently used rooms on south walls and infrequently used rooms on north walls.

(5) Landscaping so as to provide shade to the south side of buildings.

(6) Using building forms where the ratio of width to length minimizes the loss of heat in the winter and the absorbtion of heat from the sun in the summer. (the optimum for this climate is estimated at 1.0 to 1.6 ratio elongated along an east-west axis).

(7) Insulating to standards suitable to this climate

(8) Providing for, or installing equipment which uses solar energy for space heating and cooling.

(9) Arranging building and landscaping so as not to interfere with solar access.

Section 4.4 Landscaping

Any area of the Planned Unit Development not used for structures or circulation elements shall be landscaped or otherwise improved. In addition, the perimeter of the Planned Development shall be treated so as to assure compatibility with surrounding uses by such means as set backs, screening, natural or artificial buffers. A landscaping plan shall be required initially followed by a detail landscaping plan once the site has been approved. The landscaping plan shall also include the procedures for protecting natural features, considering flood areas and soil limitations, and for treatment of manufactured slopes.

4.401 Protection of Natural Features

The Landscaping Plan shall include provisions for confining excavation, earth moving procedures and other changes to the landscape so as to insure preservation and prevent dispoliation of the area's character. The (review authority) shall require information concerning the means whereby trees and other natural features will be protected during construction. Excessive site clearing of top soils, trees and natural features shall be discouraged by the (review authority).

4.402 Soils and Floods

The Landscaping Plan shall include reference to the location of flood plains and soils unsuitable for urbanization. Location on flood plains shall be based on existing and available information. Soil characteristics shall be determined from published sources supplemented by site boring. Flood plain areas and areas where soil are unsuitable for urbanization shall be devoted to open space or otherwise protected through landscaping techniques.

route of vehicular access, from a public street. Sites which do not meet the above requirements for access to collector and primary streets will require a lower density than sites with good access. The number of dwelling units, number of streets to which access is available, number and spacing of access points, types of streets, and general site considerations shall be taken into account by the (review authority) in determining access requirements.

All non-residential uses including accessory uses, commercial uses and recreational uses shall have direct access to collector or primary streets especially where shared parking facilities are provided.

4.703 Pedestrian and Bicycle Circulation

A pedestrian and bicycle circulation system will be provided and, to the extent possible, provisions will be made to separate pedestrians and bicyclists from vehicular movements. This shall include as deemed necessary by the (review authority), underpasses or overpasses in the vicinity of schools, playgrounds, local shopping areas and other neighborhood uses which suggest such separation in order to promote safety.

Section 4.8 Private Streets

Private streets and drives not requiring public dedication may be permitted at the descretion of the (review authority). Such streets shall usually conform to standards otherwise applicable to streets acceptable for public dedications. Variation from such standards, however, may be permitted by the (review authority) when it can be shown thatinnovative site design warrants such deviation and when separation of vehicular and pedestrian traffic is provided.

and traffic arteries with hedges, dense planting, earth berms, changes in grade or walks. In addition, no more than fifteen (15) parking spaces shall be permitted in a continuous row without being interrupted with landscaping.

4.904 Paving and Grading.

All off-street parking and loading areas shall be paved, graded and drained so as to dispose of all surface water without erosion, flooding or other inconvenience. In addition, such areas shall be marked so as to provide for orderly and safe parking, loading and storage.

4.905 Lighting

All parking areas shall be lighted and the lighting so arranged as to be directed away from adjoining residences.

4.906 Additional Parking Requirements

When residential parking is provided only off-street, the following additional parking requirements shall apply:

a. Off-street parking shall be located in reasonable proximity but not more than two hundred (200) feet from the structures to be served.

b. In addition to the requirements of the underlying zone, fifty (50) percent additional parking spaces shall be provided.

Section 4.10 Height, Building Spacing, Setback and Lot Width.

The standards for heights, building spacing, setbacks and lot widths applicable in a Planned Unit Development shall generally correspond to the standards for the underlying zoning district but need not be precisely the same. Changes to these standards

may be authorized by the (review authority) when they are required to execute design features which make substantial constributions to the "Purpose of the Planned Unit Development Regulations." In authorizing changes, the (review authority) shall be guided by the objective of insuring that adequate light, ventilation,privacy and convenience is provided for the residents of the proposed development.

Height standards may be increased and building spacing reduced when the (review authority) determines that:

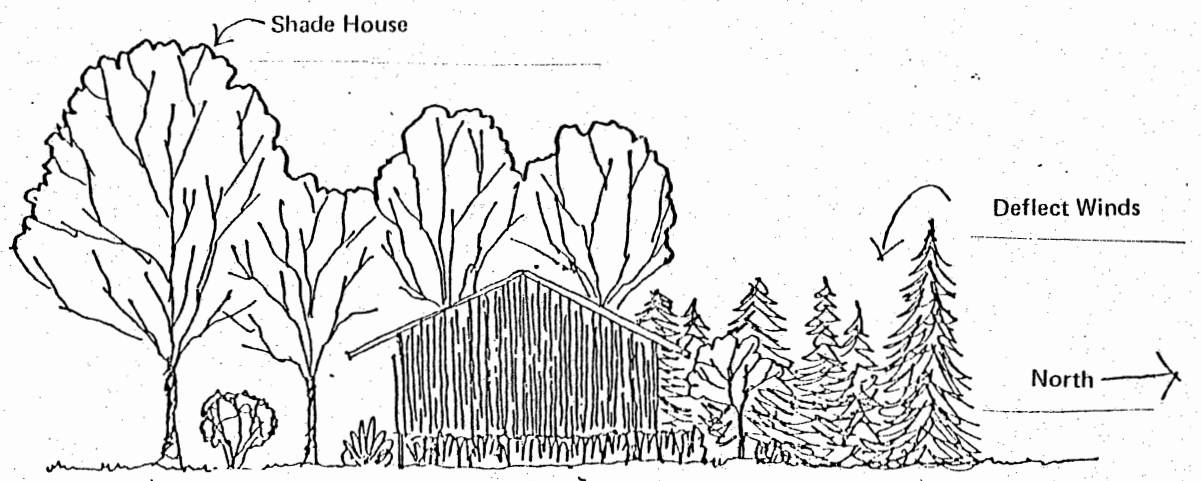
- One structure does not obstruct light, air and solar access of another structure. In no case, however, shall the height increase exceed seventy five (75) percent of the height permitted in the underlying zoning district.
- Window placement, height, or screening of windows provide adequate privacy.
- Space for service yards storage of trash, clotheslines or other utility purpose is provided in the site and building design.

Setback standards may be reduced when the (review authority) determines that adequate privacy is provided by:

- Reducing traffic flow through street layout such as cul-de-sacs
- Screening, planting or by facing the structures toward open space or pedestrian ways.
- Room layout and elevation.

Lot width may be reduced when the (review authority) determines that slopes, topography and other features require narrower or irregular lots for best design. In all cases however, the design must be such as to provide light, air and privacy especially for living spaces and for bedrooms.

ENERGY EFFICIENT LANDSCAPE DESIGN GUIDE



Example of Solar Oriented Landscape Design — Looking West

DRAFT

DEPARTMENT OF COMMERCE AND COMMUNITY AFFAIRS
OFFICE OF RESOURCE CONSERVATION
COMMUNITY ENERGY CONSERVATION PROGRAM

APPENDIX C

ENERGY EFFICIENT
LANDSCAPE DESIGN GUIDE

Prepared by:

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INTRODUCTION

Each year, thousands of homeowners install trees, shrubs and other landscape amenities aimed at beautifying their home or property. Homeowner installation of landscape plant material has historically taken a form over function approach. That is to say, beauty and visual aspects of landscaping has, until now, taken primary importance in the design of the landscape plan.

Today, with the cost of both energy and plant material being as high as they are, the function or role that the landscape plays can, and should, be tempered with a goal of energy efficiency. The use of plant material to affect energy costs involves the alteration of the climate around the building so as to reduce the resultant costs of cooling and heating. Through a carefully designed landscape, the use of furnaces, air conditioners, dehumidifiers and fans can be reduced.

The creation of an energy efficient landscape takes a thorough understanding of the housing site along with a competent knowledge of plant material and how and where energy conservation techniques would be of use.

Generally, the energy conservation techniques commonly adaptable to the Illinois landscape are based upon common sense principles. For example, I am sure each of you have noticed that on a hot summer day it is breezier and cooler in the shade of a tree and in the winter, it is less cold and windy behind the shelter of an evergreen hedge. The climate, or more appropriately described as the microclimate, around any building is affected by many factors including sun, wind, temperature, humidity, solar orientation, evaporation, precipitation and other thermal factors. These two principles provide the major basis for altering the microclimate in and around a building through landscape development. These basic concepts provide for the following energy efficient landscape design goals.

Energy Efficient Landscape Goals:

- Screen out hot summer sun
- Reduce or deflect cold winter winds
- Allow sun to assist winter heating
- Channel winds for cooling in summer

These design concepts are provided as a general guide to developing a new or retrofitting an existing landscape so as to allow for some degree of energy conservation. A word of caution is provided, as each principle is generalized and is not meant to be a firm dictate of exact site development or material locations. It must be realized that the extent to which these passive landscape energy conservation techniques are successful relates directly to the understanding of each microclimate, the land use, buildings, pavement and landscape materials surrounding the site and how each of these factors interrelate to create the site's microclimate. Further, understanding of the form, growth habits and physical growing requirement of plant material is essential. The improper placement or an inappropriate choice of plant material can cause failure in achieving an energy efficient landscape.

The following information graphically portrays the most common types of energy efficient landscape design techniques, along with a listing of various plants common to the Illinois landscape, and a plan for a "Typical Solar Landscape". Again, its use is intended only as a guide and if you have questions while you are developing your landscape plan, you should consider contacting your County Extension Agent, a local landscape architect, or a nursery and garden center. These people can usually assist you in better defining your landscape needs.

DESIGN CONCEPT

SUN

Trees and shrubs play an effective role in shading buildings and people from the direct rays of the sun. Deciduous trees, those which shed their leaves in the fall, can shade the windows, walls and roof of a house during the summer, while also allowing the winter sun to enter the house for a direct solar heating gain.

Deciduous trees should generally be located from the southeastern to the northwestern portion of the house. If located in a grove or massed pattern, the trees will provide shade and wind protection.

Studies have shown that an 8° F difference between a shaded and an unshaded wall is equal to a 30 percent increase in the insulating value for the shaded wall. An 8° F reduction is a common finding in tree and plant shading instances. Thus, the potential for cost saving is quite evident.

The following design guides reflect how to design with the sun in mind.

DESIGN PRINCIPLES

- Shade west, south and souteast windows (in that order) from 10:00 AM to 7:00 PM.
- Shade minimum of 25% of roof surface exposed to summer sun.
- Use shrubs and ground covers adjacent to building to stop sun rays reflecting onto house.
- Use climbing vines to shade walls.
- Do not place large evergreens where they will block the winter sun.

WIND

Trees and shrubs can be used to buffer a building or walk from the force of the winter wind. The winter wind usually flows through cracks in walls, around windows and doors and causes the furnace to operate longer.

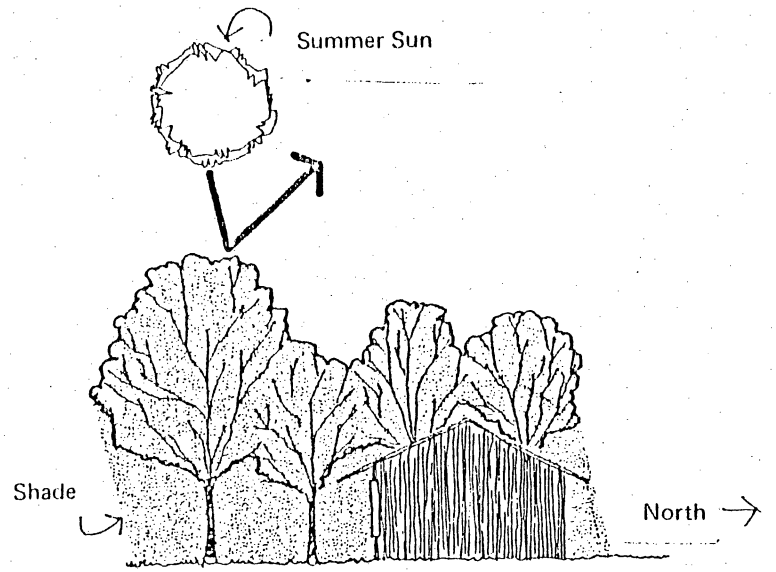
Properly located windbreaks can reduce the force of the winter wind significantly. For example, wind belocity is cut from 2 to 3 MPH for a distance of 40 feet downwind from a 20 foot tall evergreen. Some reductions can occur at a distance of from four to six times the height of the windbreak.

The following design guides reflect how to design with the winter winds in mind.

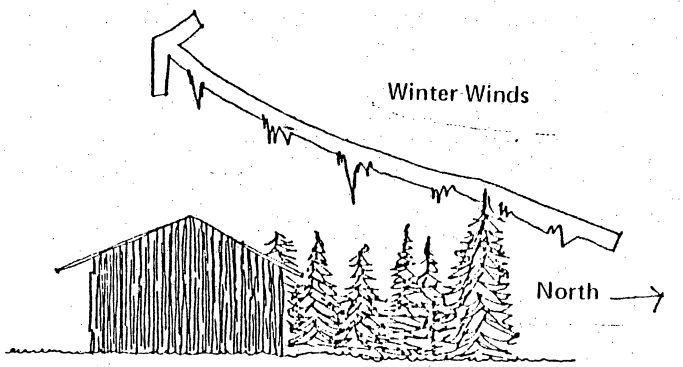
DESIGN PRINCIPLES

- Plant evergreen trees on the northwest, north and northeast.
- Plant evergreen shrubs adjacent to building to reduce wind penatration at foundation.
- Use trees which are 50-60 percent in density. (You do not want a solid screen.)
- Avoid open bottom trees. If ground level is open, plant low, heavily branched shrubs.
- Use earth berms, fences and trellises to break the wind.
- Do not block the winds - allow them to flow around and away from the house.

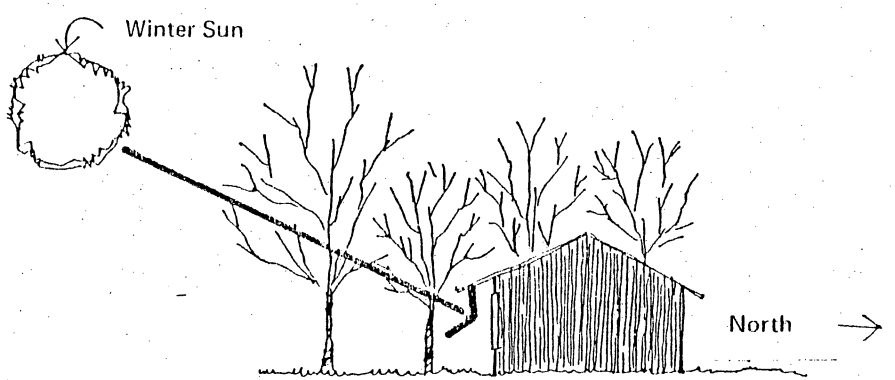
CONCEPT (cont.)



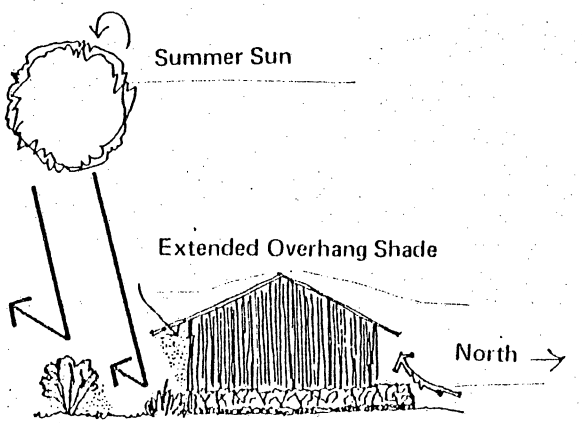
Use Deciduous Trees to Shade Windows, Walls & Roof



Use Evergreen Trees to Block Winter Winds



Deciduous Trees Allow Winter Sun into Windows



Use Shrubs to Deflect Sun and Winds from Foundation

The following plant lists will be of assistance to you in choosing the appropriate plant material for your energy conserving landscape.

TREES

Trees for Street Planting

Ash, green
Ginkgo
Hackberry
Linden, Greenspire littleleaf
Locust, Moraine
Locust, Sunburst
Locust, thornless
Maple, Columnar
Maple, Norway
Maple, Schwedler
Oak, pin

Trees for Screens and Windbreaks

Fir, Douglas
Hawthron, cockspur
Hawthron, Washington
Hemlock, Canadian
Hornbeam, European
Ironwood
Larch, European
Maple, Amur
Maple, hedge
Oak, pin
Pine, Austrian
Pine, red
Pine, Scotch
Pine, white
Poplar, Bollena
Poplar, Lombardy
Spruce, Colorado
Spruce, Norway
Spruce, white

Trees for Small Areas

Birch, river
Crab, flowering
Dogwood, Cornelian cherry
Dogwood, flowering
Dogwood, kousa
Linden, European littleleaf
Magnolia, saucer
Maple, Japanese
Redbud
Serviceberry
Yellowwood

Trees for Narrow Areas

Crab, red jade
Hawthorn, Washington
Hornbeam, Columnar
Maple, columnar Norway
Maple, columnar red
Oak, pyramidal

Trees for Shade

Ash, green
Birch, river
Buckeye, Ohio
Coffee-tree, Kentucky
Cork-tree, Amur
Ginkgo, Male
Ironwood
Linden, American
Linden, littleleaf
Linden, Redmond
Locust, Sunburst
Locust, Moraine
Locust, thornless
Maple, Norway
Maple, red
Maple, Schwedler
Maple, sugar
Oak, burr
Oak, pin
Oak, red
Oak, white
Serviceberry

Trees for Wet Soil

Ash, white
Birch, river
Buckeye, Ohio
Hackberry
Linden, American
Maple, red
Maple, silver
Oak, pin
Oak, swamp white
Sycamore
Walnut, black
Willow

SHRUBS

Shrubs for Lawn Specimen, Border, and Screen Planting

Sunny Locations - High growing

Beauty bush
Deutzia, Pride of Rochester
Dogwoods (various)
Forsythia
Highbush cranberry
Honeysuckle, tatarian
Jetbead
Lilac, Persian
Lilacs, French hybrid
Pussy Willow
Rose of Sharon
Sumac, cutleaved
Viburnum, snowball
Weigelas (various)

Sunny Locations - Medium and low growing

Almond, flowering
Barberry
Cotoneaster
Deutzia, Lemoine
Deutzia, slender
Dogwoods (various)
Hydrangea, snow hill
Kerria, Japanese
Mockorange
Privet, Regel's
Quince, flowering
Spirea, Anthony Waterer
Spirea, VanHoutte
Weigelas (various)

Shady Locations - High growing

Arrowwood
Deutzia, Pride of Rochester
Dogwoods (various)
Forsythia, Golden Bell
Highbush cranberry
Honeysuckles (various)
Mockoranges (various)
Nannyberry
Viburnum, mpaleleaf
Viburnum, snowball

Shady Locations - Medium and Low growing

Barberry, Japanese
Currant, Alpine
Honeysuckle, winter
Hydrangea, snow hill
Spirea, Anthony Waterer
Spirea, Froebelli

Shrubs for Base Planting

Sunny Locations - High Growing

Deutzia, Pride of Rochester
Dogwoods (various)
Honeywuckle, fragrant
Honeysuckle, pink
Mockorange
Pearl bush
Viburnums (various)
Weigelas (various)

Sunny Locations - Medium Growing

Beauty bush
Cotoneasters (various)
Hydrangeas (various)
Ninebark
Privet, Regel's
Spireas (various)

Sunny Locations - Low Growing

Barberry
Spirea, Anthony Waterer
Spirea, Froebelli

Shady Locations - High Growing

Arrowwood viburnum
Dogwoods (various)
Highbush cranberry
Honeysuckle, tatarian
Nannyberry viburnum
Privet, Amur
Witch-hazel

SHRUBS (Cont.)

Shady Locations - Medium Growing

Cotoneaster
Dogwoods (various)
Honeysuckle, winter
Hydrangea, snow hill
Jetbead
Privet, Regel's

Shady Locations - Low Growing

Barberry
Currant, alpine
Kerria, Japanese
Snowberry
Stephanandra, cutleaf

Shrubs for Shady Banks

Japanese barberry
Alpine currant
Arnold's dwarf forsythia
Honeysuckle (various)
Sumac (various)

Shrubs that Thrive in Dry Soils

Japanese barberry
Glossy buckthorn
Gray dogwood
Forsythia (various)
Honeysuckle (various)
Privet
Fragrant sumac
Wayfaring bush

Shrubs That Thrive in Wet Soils

Alder
Arrowwood
Dogwoods (various)
Winterberry holly
Hydrangeas (various)
Nannyberry
Spicebush
Willow

Spreading Evergreens

Tall Growing

Blue Pfitzer juniper
Hetz juniper
Savin juniper
Brown's yew
Japanese spreading yew

Medium Growing

Globe arbor-vitae
Golden Pfitzer juniper
Dwarf mugo pine
Dwarf Japanese yew

Upright Evergreens

Medium Growing

Dark Green Arbor-vitae
Pyramidal arbor-vitae
Canaert juniper
Japanese upright yew

GROUND COVERS

Ground Covers For Sunny Places

Artemisia
Barberry
Bishop's weed
Bluebell
Boxwood, Korean
Bugle
Candytuft
Cotoneaster, rock
Crown vetch
Forsythia, dwarf
Honeysuckle
Pachysandra
Phlox, creeping
Plantain-lily
Sedum
Viola

Ground Covers for Moist Soil

Forget-me-not
Lily-of-the-valley
Partridgeberry
Phlox
Plantain-lily
Sandwort, moss
Siberian tea
Wild Sweet William

Ground Covers for Dry Soil

Artemisia
Crown vetch
Phlox
Sedum
Thyme, creeping

Ground Covers for Banks

Cotoneaster
Crown vetch
Euonymus, wintercreeper
Honeysuckle

VINES AND HEDGES

Clinging Vines

Bittersweet
Clematis
Euonymus, wintercreeper
Grape Species
Hydrangea, climbing
Ivy, Boston
Ivy, English
Silver lace vine
Wisteria

Annual Vines

Balloon vine
Black-eyed Susan
Hyacinth bean
Mexican vine
Wild Balsam apple

Hedges

Formal, clipped

Barberry
Korean boxwood
Alpine currant
Winged euonymus
Canadian hemlock
Clavey's honeysuckle
Privet
Flowering quince
Dwarf viburnum
Dwarf arctic willow
Japanese yew

Informal, unclipped

Arbor-vitae
Japanese barberry
Red leaf barberry
Boxwood
Burning bush (various)
Cotoneaster (various)
Slender deutzia
Mockorange
Ninebark
Mugo pine
Flowering quince
Rose of Sharon
Viburnum (various)
Japanese yew