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I. INTRODUCTION

For at least the past 2,000 years, man has heated buildings with solar energy and designed such buildings with access to the needed sunshine.[1] The Greeks apparently built passive solar homes as early as 500 B.C. Their construction reflects an understanding of passive solar heating principles and of the necessity of providing solar access. Similarly, the Romans were knowledgeable in these principles and recognized a legal right to sunshine. A solar heating case appears in the Digest, a compilation of Roman civil law prepared under the Emperor Justinian.[2]

English common law was also concerned with sunlight. References to the doctrine of ancient lights date back at least as far as the seventeenth century.[3] The doctrine stated that if a person had the uninterrupted use of light and air through a window for twenty years, an adjoining landowner could not cause the light to be blocked. The doctrine came to the American colonies as part of the English common law. The earliest American case involving the doctrine arose in 1815. The Massachusetts Supreme Court upheld the doctrine.[4] A New York court rejected it in 1838.[5] The court said that the doctrine was "not adapted to the circumstances or existing state of things in this country" and went on to say that "[It] might do well in England . . . . but it cannot be applied to the growing cities and villages of this country without working the most mischievous consequences." In other words, the court rejected the doctrine on public policy grounds.

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1. Jordan & Perlin, *Solar Energy Use and Litigation in Ancient Times,* 1 SOLAR L. REP. 583 (1979).

2. *Id.* at 592.

3. For an early case involving the doctrine, *see* V. COKE'S REPORTS (J. Fraser ed. 1826).

4. Story v. Odin, 12 Mass. 157 (1815).

5. Parker v. Foote, 19 Wendell's Reports 309 (1838).

The New York court correctly predicted the demise of the doctrine; American courts have consistently rejected it since the middle of the nineteenth century.[6]

The leading twentieth century case concerning the doctrine is *Fontainbleu Hotel Corp. v. Forty-Five Twenty-Five, Inc.*[7] The case involved two luxury beachfront hotels in Miami Beach, the Fontainbleu and the Eden Roc. The owners of the Eden Roc sought to enjoin the construction of an addition to the Fontainbleu which would shade the Eden Roc's swimming pool after about 2 p.m. in the winter. In dismissing the argument made by the Eden Roc based on the doctrine of ancient lights, the court said:

> No American decision has been cited, and independent research has revealed none, in which it has been held that—in the absence of some *contractual or statutory* obligation—a landowner has a legal right to the free flow of light and air across the adjoining land of his neighbor. . . . If public policy demands that a landowner . . . refrain from constructing buildings upon his premises that will cast a shadow on the adjoining premises, an *amendment of [the city's] comprehensive planning and zoning ordinance,* applicable to the public as a whole, is the means by which such a purpose should be achieved. (Emphasis added)

The Florida court thus suggested that access to light and air (or solar access) could be provided through contract, statute, and zoning. All three of these methods have been used as will be discussed.

In two recent cases, plaintiffs sought to enjoin the construction of buildings which would shade collectors. In *Siu v. McCully-Citroen, Ltd.*,[8] defendants were constructing a high rise building which would shade plaintiff's solar domestic hot water heater when the building was completed. The plaintiff sued to enjoin the construction, but the court granted summary judgment to the defendant. Consequently, plaintiff's attorney never had an opportunity to argue the public policy supporting the plaintiff's case.[9] The court may have granted summary judgment in accordance with the doctrine of judicial restraint, reasoning that established property law principles should be altered by the legislature, not the judiciary. Indeed, three solar access bills

6. A more complete history of the Doctrine of Ancient Lights is given in Eisenstadt and Utton, *Solar Rights and Their Effect on Solar Heating and Cooling,* ME-66 (75) ERB 360-1 (UNM Col. Eng. 1975).

7. Fontainbleu Hotel Corp. v. Forty-Five Twenty-Five, Inc., 114 So.2d 357 (1959). Also see a discussion of this case in 34 TUL. L. REV. 599 (1960).

8. Siu v. McCully-Citroen Co. Ltd., No. 56405 (D.C. Hawaii Jan. 9, 1979). A brief description of the case can be found at 1 SOLAR L. REP. 542 (1979).

9. Personal communication with Senator John Carroll of the Hawaii Senate. Senator Carroll represented Siu in the case.

were introduced into the Hawaii Legislature shortly after this case.[10]

Prah v. Maretti[11] involved a similar situation. The circuit court of Wisconsin also granted summary judgment for the defendant. Plaintiff had asked that the court find that an implied easement for solar access existed. The court held that "to do so would be an intrusion of judicial egoism over legislative passivity,"[12] an obvious reference to judicial restraint. The plaintiff appealed the case and the U.S. Dept. of Justice has asked to appear as *amicus curiae.*[13] The Wisconsin legislature is currently studying a solar access bill.[14]

These cases show that rights to solar access currently arise only through specific legislation or contract. They also suggest that legislative bodies, rather than the courts, are most likely to resolve the solar access problem. The remainder of the paper deals with methods of creating solar access and what legislative bodies have done to date about the question of solar rights.

II. METHODS OF PROVIDING SOLAR ACCESS

There are a number of methods for creating solar access. Those that have been suggested to date include easements, restrictive covenants, subdivision ordinances, nuisance, permit systems, state statutes and zoning ordinances. Each of these will be discussed. Before proceeding, it is important to distinguish between protecting solar access for potential collector sites and for protecting access for collectors that have already been installed.[15] In general, the methods described provide one type of protection or the other.

The solar access question involves a balancing of conflicting interests. The national and local interest in utilizing solar energy requires solar access. Providing access, however, will place certain restrictions on the use which a collector owner's neighbors can make of their land. In addition, local governments are quite concerned with land use planning.[16] All of these interests require consideration in the creation of a solar access framework. For example, if a right to solar

10. The three bills introduced into the Hawaii Legislature were S. 574, S. 685, and S. 687, 10th Leg. (1979).

11. Prah v. Maretti, No. 80-CV-2399 (Cir. Ct. Waukesha Cty., Wis. 1980); *see also Court Rejects Claim of Solar Right,* 2 SOLAR L. REP. 888 (1981).

12. Prah v. Maretti, No. 80-CV-2399 (Cir. Ct. Waukesha Cty., Wis. 1980).

13. *Government Seeks to Join Solar Access Case,* 2 SOLAR L. REP. 1041 (1981).

14. *Legislature Studies Solar Access Bill,* 3 SOLAR L. REP. 12 (1981).

15. The need for this distinction is well discussed by Goble, *Siting Protection,* 2 SOLAR L. REP. 25 (1980).

16. *See, e.g.,* Hillhouse *et al, Solar Energy and Land Use in Colorado,* Envt'l. L. Inst. (April 1976), and Pollack, *The Implementation of State Solar Incentives: Land-Use Planning to Ensure Solar Rights,* SERI/TR-51-163 (Solar Energy Research Inst., March 1979).

access is given that is too broad, the burden on the collector owner's neighbors may be too great. Such a result would be politically unacceptable. Conversely, if the right is too narrow, excessive shading would diminish the collector's cost effectiveness and might slow down the penetration of solar systems into the energy market.

Methods of protecting potential solar sites must provide sufficient flexibility to anticipate potentially competing land uses. Land use plans change with time and the method used must be adaptable to those changes. Once a collector has been installed, the protection of the owner's investment and his expectation of being able to use the system for its lifetime becomes a primary consideration and the certainty of solar access becomes more important than the method's flexibility.

A. Easements

An easement is a right to use the land of another for a specific purpose. A number of purposes may cause the creation of an easement including the protection of light, air and view. Such easements give one party the right to the light and air flowing across his neighbor's airspace and striking the party's building or windows. An easement can also prevent the neighbor from blocking the party's view across the neighbor's airspace. Courts have upheld the validity of such easements.[17] Usually the easements run with the land.

Easements for solar access are similar to those for light, air and view since solar easements also involve rights in a neighbor's airspace. One state defines a solar energy easement as ". . . any easement, covenant or conditions designed to insure the passage of incident solar radiation, light, air or heat from across the real property of another."[18] Solar access easements are probably valid even in the absence of a statute since easements for light, air and view are valid without statutory support. Nevertheless, seventeen states have passed legislation specifically declaring that easements for solar access are valid and legally binding.[19] Some of these statutes allow the parties involved to stipulate whether or not a solar access easement runs with the land.[20] Many of the statutes specify how the solar easement must be described. They reflect a variety of approaches to the definition of solar access easements. As a result, a number of authorities have suggested

17. *See* Annot., 142 A.L.R. 467-88 (1943).

18. OR. REV. STAT. § 105.885 uses this definition.

19. Those states are California, Colorado, Florida, Georgia, Idaho, Illinois, Kansas, Minnesota, Montana, Nebraska, Nevada, New Jersey, New York, North Dakota, Oregon, Tennessee, Virginia, and Washington. Colorado was the first to pass such a statute in 1975.

20. *See, e.g.*, OR. REV. STAT. § 105.890(2).

methods of defining these easements.[21] The various alternatives will not be discussed here, other than to say that these airspace easements can be defined accurately and unambiguously.

The easement method for acquiring solar access entails both advantages and disadvantages. Easements afford the major advantage of providing a simple, private transaction between two parties. There are also disadvantages. Neighbors may not want to grant solar easements. Further, the party seeking the easement may need to negotiate easement rights with several neighbors. Riordan and Hiller have illustrated an urban case in which easements from five neighbors would be required to protect solar access from 9 a.m. to 3 p.m.[22] Even if the neighbors are willing, the easements will probably be sold, not given. The cost of the easements then become part of the cost of the solar system, which may already be too high. Also, easements must be acquired for each protected collector site. Consequently, a landowner probably will acquire easements only when he is ready to install a solar system, rather than for the protection of potential collector sites. Easements can also cause tax problems.[23] Thus, the easement method protects only collectors that have been installed or are about to be installed. In summary, easements should not be relied upon to provide a method for general solar access because they do not protect potential solar sites.

B. Restrictive Covenants

A restrictive covenant is a private agreement between a buyer and seller of real estate which restricts or regulates the use of real estate. The restrictions or regulations are usually included in the deed and run with the land. Restrictive covenants are the most common private controls placed on land development and use.[24]

Deeds of subdivisions commonly contain restrictive covenants. In the course of developing a subdivision, the developer may wish to place certain restrictions on land use in addition to those imposed by zoning ordinances. Examples might include restrictions on the height

21. *See* Riordan and Hiller, *Describing Solar Space in a Solar Easement*, 2 SOLAR L. REP. 299 (1980); Burke and Lemons, *Simplified Solar Easements*, 2 SOLAR L. REP. 321 (1980); Franta, *Drafting a Simpler Solar Easement*, 2 SOLAR L. REP. 341 (1980).

22. Riordan and Hiller, *supra* note 21, at 313.

23. Macht v. Dept. of Assessments of Baltimore City, 296 A.2d 162 (1972). A more detailed discussion of this case can be found in Annot., 56 A.L.R. 3d 1285 (1974). There is a question in this case as to whether the increase in property value was due to a lease of airspace or an easement for light and air. This is discussed in 33 MD. L.R. 159 (1973). The commentator there argues that the interest involved was an easement.

24. Hayes, *Solar Access Law: Protecting Access to Sunlight for Solar Energy Systems*, ENVT'L. L. INST. 111 (1979) (prepared under grant no. H-8213 G).

of radio and TV antennas or prohibitions against raising livestock. When the developer sells lots to purchasers, these restrictions usually apply to all of the lots in the subdivision. Developers often use restrictive covenants as a sales tool. The restrictions created by the covenants will help maintain certain neighborhood characteristics which the developer feels are advantageous to both the neighborhood and his sales program. The restrictions are often of an esthetic nature.

Restrictive covenants are a two-edged sword because they can be used to either inhibit or enhance the use of solar systems. They can limit both the height of buildings and the nature of the equipment placed on the roofs, thereby affecting the placement of solar collectors. The covenants can also place esthetic restrictions on buildings. Often, subdivision planners establish architectural review boards for the subdivision. They have the responsibility of approving or disapproving plans for new homes and modification of existing homes in accordance with esthetic restrictions. A number of cases have come up in which architectural review committees have disapproved of solar systems based on esthetic considerations and the party wishing to install a solar system has appealed to the courts.[25] The position that the courts usually take in these cases has been well summarized:

> Although courts may find in state or federal law (especially parts of the National Energy Act) a public policy in favor of solar energy, not many courts are likely to find in the near future that that policy is sufficiently intense or enduring to override covenants. This especially is the case since, if the legislature wanted to override covenants, it could have said so. Judicial appreciation of the solar policy, at least with respect to covenants, is likely to take more time than solar advocates would like.[26]

The author of the above quote suggests that legislation is needed to prohibit restrictive covenants from preventing solar installations.[27]

Two states have passed such legislation. California declared that all restrictive covenants, restrictions, or conditions in a deed or contract which cause an increase in the cost of solar systems are void and un-

25. *See, e.g., Arizona Court Requires Collector Approval,* 1 SOLAR L. REP. 251 (1979), where a court upheld the decision of a subdivision's architectural review board not to permit the installation of solar collectors that would obstruct a view; *Restrictive Covenant Foils Plan for Residential Solar System in Idaho,* 1 SOLAR L. REP. 543 (1979); *Solar Collectors vs. Restrictive Covenant,* 1 SOLAR L. REP. 9 (1979); *Solar Panels Unaesthetic,* 1 SOLAR L. REP. 20 (1979).

26. Wiley, *Private Land Use Controls as Barriers to Solar Development: The Need for State Legislation,* 1 SOLAR L. REP. 281 (1979).

27. *Id.* at 300.

enforceable.[28] Colorado has also legislated in this area.[29] The Colorado statute voids unreasonable covenants and similar esthetic restrictions on the use of property which effectively prohibit or restrict solar installations. It applies only to restrictions that are based solely on esthetic considerations. Thus, state legislation has begun to alleviate the negative effects of restrictive covenants on solar systems.

Restrictive covenants can encourage solar access for new subdivisions. The developer can include a restrictive covenant in the deed for each lot sold which prevents the owner of the lot from shading solar collectors placed on any other lot in the subdivision. Alternatively, the developer can specify potential collector sites on the various lots and prevent the shading of those sites by means of covenants. This method would protect both active and passive systems and prevent shading both from other buildings and from trees and shrubbery. Thus, restrictive convenants can be used to protect potential sites as well as existing solar systems.

Legal constraints do not limit application of the restrictive covenant method to new subdivisions. No law prohibits landowners in an existing neighborhood from agreeing to place restrictive convenants in each of their deeds to provide solar access for the others. Such an agreement would require unanimity among a large number of parties, as a practical matter. One party's refusal to enter into such an agreement would discourage his neighbor to the north from entering into the covenant since the northerly neighbor would not receive a right to solar access. The practical requirement of unanimity makes the likelihood of agreement small. Thus, in a practical sense, restrictive covenants are likely to be used by a single party who owns land which is then divided and sold to a number of buyers, as in the case of a subdivision.

Restrictive covenants afford a viable means of providing solar access to both existing collectors and potential sites. From that point of view, they provide an excellent method for resolving the solar access problem. They suffer from two disadvantages. First, the developer exercises his own discretion in deciding whether to impose such covenants. If he feels that providing solar access will enhance the sale of lots, he will use appropriate covenants. Providing acess will allow

28. CAL. CIV. CODE ANN. § 714. The full text of the Calif. Act can be found in 1 SOLAR L. REP. 281 (1979).

29. COLO. REV. STAT. § 24-37-107. For a short discussion of that statute, see *Colorado Voids Aesthetic Covenants Which Restrict Solar Installations,* 1 SOLAR L. REP. 547 (1979).

customers to enjoy the advantages of solar access but they will be giving up some traditional property rights. The developer's perception of the overall advantage of providing solar access will depend upon how he views this tradeoff. Second, the covenant method will only work for new subdivisions, in a practical sense. Thus, while the restrictive covenant method is a very good one, it has limited applications and cannot resolve the general problem.

C. Subdivision Statutes and Ordinances

Most states have enacted statutes which deal with land use planning and subdivision plans. These statutes generally specify the items that are to be considered in such plans. The Minnesota planning statute, for example, provides that:

> The commission shall make plans for the physical, social and economic development of its metropolitan area with the general purpose of guiding and accomplishing a coordinated and harmonious development of the area and of public facilities, improvements, and utilities. . . . Such plans *may* include, among other things, suggestions as to highways and other transportation facilities, parks and recreational facilities, *methods for protection and assuring access to direct sunlight for solar* energy systems, drainage and water supply facilities, public buildings, utilities and services, as well as suggested standards for the *subdivision of land* and for control over the construction, height, bulk, location and use of buildings and premises. The commission may adopt by resolution of a majority of its membership any such plan or portion of any plan as its official recommendation for the development of the area (Emphasis added).[30]

The Minnesota legislature has amended its original statute in order to include access to solar energy as one of the matters that a commission *may* consider. In this statute, the state has delegated the planning function to regional planning and development commissions.

Some states have enacted statutes that deal only with subdivisions. For example, the New Mexico statute requires that subdivision plans provide for sufficient water of acceptable quality, liquid and solid waste disposal, roads, terrain management (drainage) and other necessities for ensuring a well planned development.[31] The statute delegates the authority to adopt regulations concerning these matters and the power to approve subdivision plats to county commissions.[32]

30. MINN. STAT. ANN. § 473.05 (West).
31. N.M. STAT. ANN. § 47-6-9 (1978).
32. N.M. STAT. ANN. § 47-5-3 (1978).

States commonly establish land use planning schemes involving local regulation and enforcement.

Appropriate amendments to land use planning and subdivision statutes can provide solar access for new subdivisions. Such amendments would require either that solar access be considered as one of the elements of a plan (as in the Minnesota statute discussed above) or that solar access be provided for in the plan. These planning responsibilities could be delegated to county or municipal authorities. For example, the New Mexico statute gives the county commissions authority to consider all of the elements necessary for ensuring a well planned development.[33] This statute could be construed to include solar access. A statute which specifically delegates solar access planning responsibilities, however, would obviate reliance on a construction of general wording and thus provide a preferable planning scheme. A number of states have passed such statutes.[34]

Subdivision statutes and ordinances, like restrictive covenants, could protect both potential collector sites and installed solar systems. The advantages and disadvantages of providing solar access by means of subdivision statutes parallel those associated with providing access through restrictive covenants with two exceptions. First, an amendment to the subdivision statutes would take away the option to facilitate solar access from the developer and would *require* that solar access either be considered or implemented. Second, a statute would promote uniformity in the manner in which solar access is provided and would consequently facilitate administration. Thus, subdivision statutes can eliminate the developer's discretion and promote uniformity.[35]

D. Nuisance Law

There are two types of legal nuisances, private and public. An interference with the use and enjoyment of land constitutes a private nuisance. These usually involve conflicting uses of land in the same neighborhood.[36] Public nuisance consists of acts or omissions which obstruct or cause inconvenience or damage to the public in the exercise of the public's rights.[37] Examples of public nuisance include the

33. N.M. STAT. ANN. § 47-6-9 (1978).

34. *See* COLO. REV. STAT. § 32-28-106; CONN. GEN. STAT. ANN. § 8-2; ME. REV. STAT. ANN. § 30-4956; NEB. L.B. 353; 1979 OR. LAWS CH. 671.

35. A good discussion of the technical land use aspects of using subdivision regulation for solar access can be found in M. JAFFE & D. ERLEY, PROTECTING ACCESS FOR RESIDENTIAL DEVELOPMENT; A GUIDEBOOK FOR PLANNING OFFICIALS 82-98 (HUD 1979).

36. W. PROSSER, LAW OF TORTS 591 (4th ed. 1971).

37. *Id.* at 583.

maintenance of unsanitary conditions which threaten public health[38] and the generating of bad odors, smoke or dust.[39]

Nuisance law appears to encompass an almost infinite variety of conditions. One respected expert has described the confusing scope of nuisance law as follows:

> There is perhaps no more impenetrable jungle in the entire law than that which surrounds the word "nuisance." It has meant all things to all men, and has been applied indiscriminately to everything from an alarming advertisement to a cockroach baked in a pie.[40]

Nuisance comprises one of the more uncertain areas of the law. This uncertainty prevents parties from foreseeing the outcome of nuisance cases and thus creates a drawback for parties considering litigation based on nuisance.

A number of authorities have discussed the possibility of using nuisance law to prohibit the shading of solar collectors. They reason that the courts might regard such shading as an interference with the enjoyment of land or a derogation of the public's right to the promotion of energy conservation.[41] While some commentators favor using nuisance law for solar access, the majority oppose it for several reasons. These are: (1) Nuisance law is uncertain and therefore unpredictable. Often, if both parties to a dispute understand their rights, they settle the dispute without litigation. It is difficult to know what one's rights are in the area of nuisance law. (2) A lawsuit would be required in each individual case in order to prove the existence of a nuisance. The transactional costs of using this method could be excessive. (3) Nuisance law could only protect existing collectors. The shading of a potential collector site would not provide grounds for relief under nuisance law. (4) The concept of judicial restraint may

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38. *See* Ajamian v. Township of North Bergen, 246 A.2d 521 (1968).

39. Transcontinental Gas Pipe Line Corp. v. Gault, 198 F.2d 196 (1952); State v. Primeau, 422 F.2d 302 (1966); Potashnick Truck Service v. City of Sikeston, 173 S.W.2d 96 (1943); Soap Corp. of America v. Reynolds, 178 F.2d 503 (1950).

40. PROSSER, *supra* note 36, at 571.

41. A. Miller and G. Thompson, LEGAL BARRIERS TO SOLAR HEATING AND COOLING OF BUILDINGS (ERDA Rep. DSE/2528-1, March 1977); Becker, *The Common Law Sun Rights–An Obstacle to Solar Heating and Cooling?*, 3 J. CONTEMP. L. 79 (1976); Gervutz, *Obstruction of Sunlight as a Private Nuisance*, 65 CAL. L. REV. 94 (1977); S. KRAEMER, SOLAR LAW 7-8 (1978); *A Forum on Solar Access*, Proceedings of a Forum held by N.Y. St. Leg. Comm. on Energy Sys. 24 (1977); Hillhouse, *Solar Energy and Land Use in Colorado: Legal, Institutional and Policy Perspectives*, ENVT'L. L. INST. 33 (April 1976); Miller, *Legal Obstacles to Decentralized Solar Technologies*, 1 SOLAR L. REP. 595 (1979); Zillman and Deeny, *Legal Aspects of Solar Energy Development*, 1976 ARIZ. ST. L.J. 25 (1976); PERSPECTIVES IN ACCESS TO SUNLIGHT, ONTARIO MINISTRY OF ENERGY 3 (May 1978). Many of these references discuss methods of providing solar access in addition to nuisance.

work against using nuisance law. Many states and municipalities have passed legislation pertaining to solar access. A court may feel that if the legislature wanted to protect solar access, it would have passed legislation to do so. The court may therefore be reticent to apply nuisance law to the problem.

Nuisance law has at least one advantage. No legislation would be needed since the existing body of nuisance law would be used. Existing law includes cases concerned with structures and vegetation but not with solar access. Thus, if some more reliable method does not provide solar access, a plaintiff could resort to nuisance law for relief.

A statute or ordinance declaring the shading of solar collectors a nuisance would eliminate both the uncertainty and the judicial restraint problems. California has passed such a statute.[42] It is discussed later in the paper. The municipality of Kiowa, Colorado, has also passed a solar access ordinance based on nuisance law.

E. Permit Systems

Permits or licenses afford another method of providing solar access. Under a permit or license system, a person wishing to protect access for his collectors would apply to the county or municipality for a permit. After the application had been received, the county or municipality would notify all neighbors that might be affected by granting the solar access permit and conduct a hearing. Concerned parties could present any objections to granting the permit and the county or municipality would make its decision.

The grounds for denying a permit present an important consideration. The Environmental Law Institute has written a model ordinance for providing solar access by permits.[43] The grounds for denial in that document are (1) that one of the objectors has plans underway to build a structure that would shade the collectors, or (2) that granting a solar access permit would unreasonably restrict the development of presently undeveloped land. The Institute ordinance also provides for consideration of the amount of solar energy provided by the solar system. Flexibility is provided by allowing the governmental entity (county or municipality) to purchase a permit that has already been granted.[44] This flexibility facilitates changes in land use patterns which a solar access permit might otherwise impede.

The City of Cincinnati, Ohio, is considering an ordinance based on

42. Calif. State Solar Shade Control Act, Cal. Pub. Res. Code § § 25980-86.
43. *Prototype Solar Access Legislation,* ENVT'L. L. INST. 1 (Sept. 1978).
44. *Id.*

the permit method.[45] The Cincinnati ordinance follows the model ordinance but incorporates some variations. In determining whether to grant a permit (or certificate, as it is referred to in that ordinance), the hearing examiner must consider seven items. These are:

(1) (A) The location, size, height, roof angles and use of all structures which are in existence, under construction, planned or contemplated;
(B) The location, size, height, and type of all landscaping, walls, and other forms of screening which are in existence, under construction, planned, or contemplated; and
(C) The location of all vehicular and pedestrian ways which are in existence, under construction, planned, or contemplated which might obstruct the applicant's access to solar energy;
(2) (A) The thermal efficiency of the solar energy system; and
(B) The percentage of total energy which the solar energy system is expected to produce;
(3) The use to which the energy will be put;
(4) The location and orientation of the applicant's solar collector;
(5) The social utility of all obstructions under construction, planned or contemplated relative to the social utility of the applicant's solar system;
(6) The effect which the certificate might have upon the reasonably expected development or redevelopment of the affected parcels and the applicant's efforts to minimize the solar collector's impact on this development; and
(7) Any unusual hardship imposed by the certificate upon affected property owners.

The list indicates that a good deal of preparation may be required before hearings occur.

If the certificate is granted, it takes the form of an easement and is recorded as such in the county property records. Thus, the Cincinnati ordinance empowers the city to grant an easement for solar access across one landowner's airspace for the benefit of another, with no compensation to the burdened party. This might amount to a "taking" of property without compensation in violation of the Fifth Amendment of the U.S. Constitution. The taking problem will be discussed in the section on zoning later in the paper.

Two procedures in the Cincinnati ordinance provide flexibility. First, the certificate can be modified at a later date. This requires a

45. "Solar Investment Protection Ordinance" which would be Chapter 35 of the City of Cincinnati Zoning Code if adopted. *See also* Solar Rights Certificates Considered in Cincinnati, 1 SOLAR L. REP. 15 (1979).

hearing. An affected neighbor who wishes to develop his property more fully might request such a hearing. If a modification is granted and the collector is shaded as a result, the person who applied for the modification must compensate the collector owner. Second, the ordinance provides flexibility by allowing the transfer or sale of certificates. The certificate can be transferred to the party who buys the land containing the collector or to a party affected by the certificates, i.e., one of the parties that must provide solar access. If an affected neighbor wishes to develop his property in a way which would shade his neighbor's collectors, he can purchase the neighbor's solar access certificate.[46]

The complexity and high transactional costs of the permit or certificate method are its primary disadvantages. Each case involving an owner seeking a solar access permit would require a separate hearing. Such a procedure is time consuming, expensive and cumbersome. In addition, if a party to the hearing is dissatisfied with the decision, he can appeal to the local court of general jurisdiction. If he is unhappy with that court's decision, he can follow the entire appeal route. A method which clearly establishes how solar access is to be provided and then allows hearings only for those cases involving a dispute sufficient to compel legal action would not impose such heavy costs in both time and money. The permit system involves another minor disadvantage. The volume of easements contained in property records might hinder title searches by title insurance companies. Most researchers in the solar access field do not favor the permit method.

F. State Statutes Creating Solar Access

A number of states have passed laws dealing with various aspects of solar access. Those related to easements, restrictive covenants and subdivisions have already been covered. Zoning is discussed in a subsequent section. Oregon[47] and Minnesota[48] have passed legislation requiring local land use planning departments to consider solar access in their comprehensive plans, with action coming at the local level.[49] This section addresses only those state statutes that specifically create solar access. To date, only New Mexico and California have passed

46. Permit systems are also being considered by Albuquerque, N.M. and by Minneapolis. *See* City of Albuquerque, Fourth Council, Council Bill O-165 (1981) and Solar Access Permit System Proposed, 2 SOLAR L. REP. 250 (1980).

47. OR. REV. STAT. § 197.

48. MINN. STAT. ANN. § 197.

49. Pollack, *The Implementation of State Solar Incentives: Land Use Planning to Ensure Access to Solar Energy,* SOLAR ENERGY RES. INST. Rep. SERI/TR-51-163 § 4.0 (1979).

such legislation although other states have considered and are considering similar acts.[50]

1. *California*

The California State Solar Shade Control Act[51] became effective on Jan. 1, 1979. The Act deals with the shading of solar collectors by vegetation and protects solar collectors as described below:

> After Jan. 1, 1979, no person owning, or in control of a property shall allow a tree or shrub to be placed, or, if placed, to grow on such a property, subsequent to the installation of a solar collector on the property of another so as to cast a shadow greater than 10 percent of the collector absorption area upon that solar collector surface on the property of another at any one time between the hours of 10 a.m. and 2 p.m., local standard time; provided that this section shall not apply to specific trees and shrubs which at the time of installation of a solar collector or during the remainder of that annual solar cycle cast a shadow upon that solar collector. For the purposes of this chapter, the location of a solar collector is required to comply with the local building and setback regulations, and to be set back not less than five feet from the property line, and no less than 10 feet above the ground. A collector may be less than 10 feet in height, only if in addition to the five feet setback, the collector is set back three times the amount lowered.[52]

The statute applies only to vegetation planted or growing after a collector has been installed. Thus, the statute grandfathers vegetation casting a shadow on the collector at the time of installation and all vegetation in place prior to Jan. 1, 1979. The statute protects passive systems, but buildings with such systems may have a greater setback requirement than those with only active systems elevated 10 feet.

Violation of the statute is declared a public nuisance. Enforcement depends upon legal action brought by the District Attorney or the City Attorney.[53]

Conflicts can occur between systems. The statute treats these as follows:

> Any person who plans a passive or natural solar heating system or cooling system or heating and cooling system which would impact

50. *See, e.g.*, [State of] Washington Proposes Solar Rights Statute, 1 SOLAR L. REP. 24 (1979). The proposed bill was similar to the New Mexico Statute. *See also Shade Control Act Introduced in Oregon*, 1 SOLAR L. REP. 267 (1979). This bill was patterned after the California statute. Wisconsin is considering a solar access bill, *see* 3 SOLAR L. REP. 12 (1981) *supra* note 14. Wyoming is also doing so, *see Bill Would Grant Solar Access Rights*, 2 SOLAR L. REP. 903 (1981).

51. Calif. State Solar Shade Control Act, Cal. Pub. Res. Code § § 25980-86.

52. *Id.*, § 25982.

53. *Id.*, § 25983.

> on an adjacent active solar system may seek equitable relief in a court of competent jurisdiction to exempt such system from the provisions of this chapter. The court may grant such an exemption based on a finding that the passive or natural system would provide a demonstrably greater net energy savings than the active system which would be impacted.[54]

Thus, new passive systems can shade existing active systems under some conditions. The statute requires a court hearing to resolve such conflicts.

The statute provides for an interesting local option. "Any city, or for unincorporated areas, any county, may adopt, by majority vote of the governing body, an ordinance exempting their jurisdiction from the provisions of this chapter."[55] A number of localities have exercised the option.

The California statute eliminates some of the difficulties involved with using nuisance law for creating solar rights. The statute defines nuisance as a violation of the statute. An aggrieved collector owner does not have to pay legal expenses to establish a nuisance. He simply complains to the District Attorney or City Attorney. The court's exercise of judicial restraint poses no problem because the legislature has addressed the issue very specifically. The California statute, however, protects only existing installations. The grandfathering of existing vegetation negates the effectiveness of the statute in protecting potential sites.

2. *New Mexico*

The New Mexico Solar Rights Act predates the California law by about two years.[56] The New Mexico Act is also broader than the California law.

The Act begins with a set of definitions.[57] The legislature defined a solar collector as "any device or combination of devices or elements which rely upon sunshine as an energy source, and which are capable of collecting not less than twenty five thousand BTUs on a clear winter solstice day." The 25,000 BTU requirement prevents a landowner from placing a very small solar system (or a solar toy) on his property to harass his southerly neighbor.[58]

The definition of a solar collector specifically includes solar devices for space heating and cooling, domestic hot water systems, water

54. *Id.*, § 25986.
55. *Id.*, § 25985.
56. New Mexico Solar Rights Act, § § 47-3-1 through 47-3-5, N.M. STAT. ANN. (1978) [hereinafter N.M. Solar Rights Act].
57. *Id.*, § 47-3-3.
58. 25,000 BTU per day is sufficient for the hot water needs of two persons.

pumps, devices for supplying energy for commercial, industrial and agricultural processes, and for the generation of electricity. Passive systems are included since the Act states that collectors can be used for purposes in addition to the collection of solar energy. Such purposes specifically include, but are not limited to, serving as a structural support, part of a roof or wall, or a window. The Act also defines a solar right as a "right to an unobstructed line-of-sight path from a solar collector to the sun, which permits radiation from the sun to impinge directly on the solar collector."

Perhaps the most significant part of the Act states the "the right to use the natural resource of solar energy is a property right, the exercise of which is to be encouraged and regulated by the laws of this state. Such a property right shall be known as a solar right."[59]

In 1976, White analogized western (prior appropriation) water law and solar rights.[60] The analogy fails in certain aspects, e.g., sunshine is plentiful while water is scarce in the west.[61] Nevertheless, certain water law concepts apply to the solar access problem. The New Mexico statute uses these.[62] The statute mandates that should disputes concerning solar rights arise between parties, three concepts of western water law are to be used, where practicable, in resolving those disputes. The concepts are beneficial use, prior appropriation and transferability.

The concept of beneficial use encourages the efficient use of water. Under western water law, a person who wishes to use water obtains a water right from the state. The owner of the right may then use the water although ownership of water remains with the state. The owner of the water right is obligated to use the water for beneficial purposes. If he does not do so for a specified number of years, he abandons his water right and it reverts to the state. The Solar Rights Act requires that the solar energy available to a collector owner be used beneficially in order to retain the solar right. Thus, if an owner installs a collector and establishes a solar right, the collector owner must continue to use the solar energy beneficially or he risks losing his right. If the owner abandons his right for failing to use it beneficially, the right will not revert to the state but will simply terminate. The Act does not specify a time for abandonment but recognizes that solar systems may be used only seasonally. Thus, the Act states that "[i]f

59. *Supra* note 56, N.M. Solar Rights Act § 47-3-4.

60. White, *The Allocation of Sunlight: Solar Rights and the Prior Appropriation Doctrine*, 47 U. COLO. L. REV. 421 (1976).

61. *See, e.g.*, Eisenstadt, Long and Utton, *A Proposed Solar Zoning Ordinance*, 15 URB. L. ANN. 211, 213 (1978).

62. N.M. Solar Rights Act, *supra* note 56.

the amount of solar energy which a solar collector can beneficially use varies with the season of the year, then the extent of the solar right shall vary likewise." For example, a solar system used for space heating only would have a solar right only during the heating season. The beneficial use requirement relieves the neighbor's burden of providing solar access if the collector owner is not using the solar energy impinging on his collector in a beneficial manner.

The prior appropriation concept states essentially that "first in time is first in right." If an owner sites and installs his collectors in such a manner that they receive full sunshine during the part of the year in which the solar energy is beneficially used, then these collectors were the first to "appropriate" the solar energy and another party cannot subsequently shade them. The collector owner has a prior right because he appropriated the sunshine first. Conversely, if an owner installs his collectors in an area shaded by a building, vegetation, or other objects, the owner has no right to the blocked solar energy. Someone else has already appropriated it. Collectors may be placed in areas which have full solar access in summer but partial shade in winter (or vice versa). If shading occurs due to objects which were in place at the time that the collectors were installed, those objects can remain in place without violating the Act. Thus, both the New Mexico and the California statutes contain similar "grandfathering" provisions.

The Act incorporates the prior appropriation concept to protect the investment of the party who first purchased and installed a solar system. The initial investment for solar systems is high. The solar investor must have some assurance that his investment will not be rendered worthless by objects installed or grown by his neighbors after the system is in place. The prior appropriation concept supplies that assurance. The concept has successfully served the same purpose in the area of water law.

Transferability in water law allows the grant, sale, or transfer of a water right from one person to another, or from one location to another, or both. Transferability under the Solar Rights Act allows corresponding flexibility in solar rights and land use. The owner of a building with a solar system and a solar right may sell both the building and the solar right to a new owner. Alternatively, he may sell the solar right to someone else. Such a sale may be desirable under certain circumstances. For example, the owner of a lot located to the south of a solar building may wish to erect a structure which would shade the collectors. He could purchase the solar right from the building owner, erect a tall structure and legally shade the collector site. Such transactions deprive society of the advantages of operating solar sys-

tems and the consequent reduction in fossil fuel consumption, but provide flexibility in land use. The Act favors land use flexibility in this respect. If a solar right is transferred, the Act requires that the transfer be recorded in accordance with the statutes that govern real estate recording.[63]

The Act has been criticized for a number of reasons,[64] including vagueness. Vagueness affords grounds for declaring a statute unconstitutional. The statute apparently grants a solar right that is valid from sunup to sundown. A collector owner's insistence on exercising his solar right in the early morning or the late afternoon could place an undue burden on his neighbors. Critics also point to the rigidity. A properly placed solar water heater could prevent the construction of a high rise building. Nothing in the Act prevents a solar right owner from demanding an exorbitant price for right or refusing to sell. Thus, the prior appropriation concept introduces land use planning problems. While the Act specifies the use of a local permit system for solar rights, it fails to provide adequately for such a system and none has been implemented. Finally, the Act protects only existing collectors and reflects no intent to protect potential sites.[65]

The Act makes no specific provisions for enforcement. The Attorney General or the District Attorney might bring a lawsuit for violation of the Act if they determine that the violation threatened the public interest or inflicted a public harm. Arguably, conservation of fossil fuel serves the public interest and a public harm results from hindering the operation of a solar system. From a practical point of view, the Attorney General or District Attorney may perceive the harm caused by a single violation of the Act as minimal in comparison to the harm caused by other public offenses. As a result, such a case might receive a low priority. Most likely, violation of the Act will be perceived as a violation of a private property right. In that case, the party owning the solar collector would have to sue at his own expense. In summary, the burden of enforcing the Act would most likely be borne by the collector owner. No cases have arisen under the Act to date.

G. Summary

A number of methods of providing solar access have been discussed, and all pose problems. The conflict between access methods

63. The explanations of beneficial use, prior appropriation and transferability were taken from Eisenstadt, *Protecting Access to Solar Energy* (to be published in the N.M. ARCH.).

64. *See* Hillhouse & Hillhouse, *New Mexico's Solar Rights Act: A Cloud Over Solar Rights*, 1 SOLAR L. REP. 751 (1979), and SERI Memo. M. Warren to G. Morgan (Aug. 10, 1978).

65. Kerr, *New Mexico's Solar Rights Act: The Meaning of the Statute*, 1 SOLAR L. REP. 737 (1979).

and land use planning makes the possibility of arriving at a faultless method doubtful.

All of the methods discussed provided solar access only for existing collectors, with the exceptions of restrictive covenants and subdivision regulations. Those methods only apply to new developments. This state of affairs probably results from the novelty of solar technology at the time access methods were conceived. Few researchers were willing to espouse solar access methods that would complicate land use planning. Thus, only site by site protection was considered necessary. Solar is becoming more common and it is time for the next step in providing access; the protection of potential collector sites.

III. ZONING FOR SOLAR ACCESS

Zoning can provide solar access and is becoming a prevalent method for doing so. This paper discusses zoning in more detail than the other methods for this reason. Several municipalities have already enacted solar zoning ordinances and others are considering them. One commentator has stated that "[s]olar zoning is, potentially, the principal long-term tool for the general protection of solar access."[66] The solar access literature contains several model zoning ordinances intended as guides to counties and municipalities considering this type of legislation.[67] A number of commentators have discussed using zoning for solar access.[68]

The local character of zoning ordinances affords certain advantages. Solar access legislation involves two types of climates, the physical and the political. Some states experience a wide diversity in physical climate, particularly if the state covers a wide latitude range or has mountainous terrain. Microclimates are found in certain regions. Significant variations in solar insolation can exist within a state. The physical climate affects the economic viability of solar systems and climates vary between communities. Thus, the local community should determine the amount of solar access to be provided. This is also desirable from a political point of view. Some communities have a high solar awareness while others do not. Those with high awareness

66. PERSPECTIVES ON ACCESS TO SUNLIGHT, *supra* note 41, at 42.

67. Eisenstadt, Long and Utton, *supra* note 61, at 211; W. THOMAS, A. MILLER & R. ROBBINS, OVERCOMING LEGAL UNCERTAINTIES ABOUT USE OF SOLAR ENERGY SYSTEMS 48 (1978); *Prototype Solar Access Legislation,* Envt'l. L. Inst., Washington, D.C. (1978); White et al., *Santa Clara, California, Community Center, Commercial Solar Demonstration, Legal Alternatives, Implications, and Financing of Solar Heating and Cooling by a Municipal Corporation* 54, ERDA Rep. No. SAN/1083-76/1 (1976); Eistenstadt and Utton, *Access to Sunlight: A Legislative Approach,* LEGAL ASPECTS OF SOLAR ENERGY (J. Minan and W. Lawrence, eds. n.d.).

68. Eisenstadt and Utton, *Solar Rights and Their Effect on Solar Heating and Cooling,* 16 NAT. RES. J. 363, 379 (1976).

would be inclined to favor greater solar access. For example, one community might provide solar access from 8 a.m. to 4 p.m. and another from 11 a.m. to 1 p.m. A community which experiences continually overcast skies may not provide any solar access at all, based on both the physical and political climates. By placing control of solar access at the local level, these differences can be considered. In addition, the citizenry usually perceives that it exercises firmer control locally than at the state or federal levels. Recall that solar access requires the surrender of some traditional property rights.

The authority for zoning comes from the police power of the states, which deals with health, safety, welfare and morals. The states have generally delegated this power to local governments through Zoning Enabling Acts. These acts vary from state to state. In general, they specify the purposes for which the zoning power is to be used. One of the purposes frequently specified is "to provide adequate light and air."[69]

Whether "adequate light and air" includes access to solar energy is unclear. Height and setback restrictions have been the traditional means for providing light and air.[70] Some states have amended their Zoning Enabling Acts to include solar access.[71] For example, part of the Minnesota act states:

> For the purposes of promoting the public health, safety, morals and general welfare, a municipality may by ordinance regulate the location, height, bulk, number of stories, size of buildings and other structures, ... (regulate) access to direct sunlight for solar energy systems....[72]

In some cases, municipalities have enacted solar zoning ordinances although the state enabling act does not specify solar access as a purpose of zoning.[73] These municipalities are probably relying on the "adequate light and air" provisions. No litigation has been found on the matter. Amending a zoning enabling statute is not complex, however, and municipalities wishing to zone for solar access should probably lobby the state legislature for an amendment to the zoning en-

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69. Examples of zoning enabling statutes that specify adequate light and air include CONN. GEN. STAT. ANN. § 8-2; GA. CODE ANN. § 69-802; ILL. ANN. STAT. § 11-13-1 Ch. 24; MASS. GEN. LAWS ANN. Ch. 40A; N.M. STAT. ANN. § 14-20-3; N.Y. GEN. CITY LAW § § 20-24; TEX. REV. CIV. STAT. ANN. Art. 1011C.

70. 8 A.L.R. 963 (1949); 93 A.R.L. 2d 1223 (1964); 96 A.L.R. 2d 1367 (1964).

71. COLO. REV. STAT. § § 38-28-106; ME. REV. STAT. ANN. § 30-4961; NEB. L.B. 353; 1979 N.Y. LAWS Ch. 742; TENN. CODE ANN. § § 13-401, 403, 701.

72. MINN. STAT. ANN. § 462.357.

73. New Mexico is an example. Albuquerque, Taos, and Los Alamos all have zoning statutes for solar access but the state Zoning Enabling Act has not been amended.

abling statute as part of their normal lobbying activities. Such an amendment would remove any doubts. State legislatures are inclined to pass benign bills that aid solar technology.

A. Constitutional Questions

Zoning regulates the use of land. Consequently, zoning may prevent a landowner from putting his land to its highest and best use. For example, the owner of a piece of land zoned for residential use cannot construct an office building or factory on that land although he might derive a better economic return by doing so. Thus, zoning deprives the landowner of profitable options but does not compensate him. The municipality derives the benefits of an orderly, planned environment. The fact that the landowner is deprived of the highest and best economic use of his land raises questions that involve the Fifth and Fourteenth Amendments to the U.S. Constitution.

1. *Fifth Amendment Questions*

The Fifth Amendment states ". . . nor shall private property be taken for public use without just compensation." Zoning does not provide for compensation when the owner of a land parcel is denied the highest and best economic use of his land. Thus, zoning involves a tension between the exercise of the states' police power and the Fifth Amendment rights of a property owner.

An early zoning case to reach the U.S. Supreme Court was *Village of Euclid v. Ambler Realty Co.*[74] The Supreme Court upheld a general zoning regulation as a valid exercise of the police power despite a resulting 75% reduction in land value.

The Supreme Court considered the "taking" issue again in 1978 in the case of *Penn Central Transportation Co. v. City of New York.*[75] That case involved land use but not zoning. New York City passed an historic landmark ordinance which prevented the owners of designated historic buildings from destroying them or fundamentally altering their character. The City had designated Grand Central Terminal as an historic landmark. The owners wished to build a high rise building in the airspace above the terminal. The New York City Landmark Commission decided not to allow the construction because it would alter the character of the building. The owners claimed this was a "taking" of property but the Supreme Court upheld the Landmark Commission's decision. In deciding the case, the Court held that a re-

74. Village of Euclid v. Ambler Realty Co., 272 U.S. 365 (1926).
75. Penn. Central Transportation Co. v. City of New York, 438 U.S. 104 (1978).

duction in the value of property, by itself, did not establish a "taking." The Court reasoned that one had to focus on the uses which were permitted, not those which were denied.[76]

In one case, restrictions imposed by a state land use statute reduced the value of a piece of property to zero. The Supreme Court held that this was a "taking."[77]

Consideration of these concepts within the framework of a solar access ordinance yields the conclusion that the "taking" problem does not hinder the validity of solar access zoning ordinances. A small decrease in land value may result from restrictions on the use of airspace, but the land would be used for essentially the same purposes after the ordinance was passed as before. From a practical point of view, a solar access ordinance probably would not cause significant reductions in property values. Further, each landowner in the area would have a right to solar access which might tend to increase property values. Zoning for solar access is not likely to raise Fifth Amendment problems.

2. *Fourteenth Amendment Questions*

The Fourteenth Amendment prohibits the states from denying due process of law and equal protection under the law to all people within their jurisdiction. Due process requires that zoning ordinances bear a rational relationship to the health, safety, morals or general welfare of the community.[78] This should present no problem. The utilization of solar energy for heating, cooling, industrial processes and electrical generation bears a direct relationship to the health and general welfare of the community.

The zoning ordinance must not impose such arbitrary and discriminatory restrictions that it amounts to a denial of equal protection under the law.[79] The equal protection requirement mandates that people who are similarly situated must be treated the same. The meaning of "similarly situated" warrants consideration. Solar access zoning would place certain restrictions on the use of airspace in residential areas. People owning residential land are similarly situated; therefore, the restrictions must apply equally to all of them. Similarly, zoning would restrict the use of land for commercial purposes. Owners of commercial land are similarly situated. The commercial and residential owners, however, are not necessarily similarly situated. Com-

76. *Id.* at 131.
77. Penn. Coal Co. v. Mahon, 260 U.S. 393 (1922).
78. Hill, *Environmental Consideration: New Arguments for Large Lot Zoning*, 7 URB. L. ANN. 370 (1974).
79. *Id.*

mercial areas are more densely developed than the residential ones; therefore, the solar access requirements may differ. The Fourteenth Amendment permits different requirements for different areas. In other words, land may be categorized into groups for purposes of imposing zoning requirements. The members of each group must receive the same treatment, but the treatment can vary from one group to another provided there is a rational basis for the groupings.

The fact that various land parcels are not similarly situated provides some flexibility for zoning provisions. For example, providing solar access for developed downtown areas with high rise buildings may not prove desirable. An ordinance could exempt such areas from the solar access provisions. Different requirements can be established for different land uses. Also, zoning ordinances can specify different solar access requirements for developed areas and developing areas. In summary, the Fourteenth Amendment does not present a barrier to solar access zoning and permits the flexibility that is needed.

B. Prior Nonconforming Uses and Variances

Zoning ordinances frequently contain provisions for dealing with problems and conflicts that are likely to arise. Provisions for prior nonconforming uses and variances fall into this category.

When a solar access ordinance is first passed, there may be buildings and vegetation that shade both collectors and potential collector sites. These shading objects are "prior nonconforming uses" since they do not conform with the ordinance but existed prior to its passage. Almost all zoning ordinances make some provision to continue uses that lawfully existed before the ordinance was passed.[80] At the same time, nonconforming uses are expected to end eventually and the land use will then conform to the ordinance.[81] Thus, if a nonconforming building is torn down or otherwise removed, the replacement structure must conform to the ordinance. The zoning board often determines the length of time for which a prior nonconforming use will be allowed. In the case of buildings, the time must approximate the useful life of the building.

Prior nonconforming uses for solar access zoning can be divided into two groups, buildings and vegetation. Requiring that nonconforming preexisting buildings be torn down or modified would constitute a taking in violation of the Fifth Amendment. The Fifth Amendment may not apply to the vegetation. In *Miller v. Schoene*,[82]

80. D. HAGMAN, URBAN PLANNING AND LAND DEVELOPMENT CONTROL LAW § 105 (1971); *see also* references cited in *supra* note 67.

81. City of Los Angeles v. Gage, 274 P.2d 34 (1954).

82. Miller v. Schoene, 276 U.S. 272 (1976).

Virginia authorities had ordered the destruction of diseased cedar trees in accordance with the Cedar Rust Act of Virginia. Rust did not affect the cedar trees but damaged the fruit and foliage of apple trees. The cedar trees were only disease carriers. The Supreme Court held that the order was within the state's regulatory power and did not require Virginia to compensate the tree owners.

Municipal authorities could probably pass zoning ordinances requiring the removal of vegetation which shades solar collectors. Tree removal is often an emotional issue and may be a greater political problem than a legal one. There are three ways a zoning ordinance can deal with vegetation. It can: (1) grandfather all vegetation existing at the time a collector is installed (or at the time the ordinance is passed) to the vegetation's height at that time, or (2) grandfather all vegetation planned at the time that a collector is installed (or at the time the ordinance is passed) and allow the vegetation to grow to its full height, or (3) not grandfather any vegetation. The municipal authority must determine which of these options the community would accept.

Most zoning ordinances contain a provision for variances. A variance allows an exemption from the ordinance for a particular situation or use. They are granted by the zoning boards when strict enforcement of a zoning ordinance would cause undue hardship to a party. One authority has defined exactly what constitutes "undue hardship."[83] A solar access ordinance should contain provisions for both prior nonconforming uses and variances.

C. Existing Zoning Ordinances for Solar Access

A number of municipalities have already passed solar access zoning ordinances. Los Alamos, New Mexico was perhaps the first municipality to do so on Jan. 31, 1978. The ordinance provides, in part, as follows:

> a. When a solar energy collection system is installed on a lot, accessory structures or vegetation on an abutting lot shall not be located so as to block the solar collector's access to solar energy. The portion of a solar collector that is protected is that portion which:
>
> (1) is located so as not to be shaded between the hours of 10 a.m. and 3 p.m. by a hypothetical 12 foot obstruction located on the lot line; and
>
> (2) has an area not greater than one-half of the heated floor area of structure, or the largest of the structures, served.[84]

83. *See* R. ANDERSON, AMERICAN LAW OF ZONING, § 131.01 (2d ed. 1976). There is also a good deal of case law on this topic.

84. Los Alamos, N.M., Ordinance 199 (effective Jan. 31, 1978).

This ordinance protects only installed collectors, not potential sites. Section a(2) addresses the maximum size of the collector protected. The limitation is reasonable in view of Los Alamos' climate. The ordinance provides solar access from 10 a.m. to 3 p.m. and directs that a "hypothetical obstruction" or "hypothetical wall" be used to define shadow length.[85] Taos, New Mexico has passed a similar ordinance.

In 1978, San Diego County, Calif. amended its construction code ordinance to require solar hot water heaters on new structures.[86] The amendment necessitated the enactment of a solar access zoning ordinance.[87] The San Diego ordinance provides that a 100 square foot horizontal area located ten feet above grade have "an unobstructed skyview of the sun between azimuths of the sun at 45 degrees to the east and 45 degrees to the west of due south on Dec. 21st."[88]

Figure 1 shows the area protected by the San Diego ordinance. The collector site is horizontal and is positioned ten feet above grade. The cross hatched plane approximately represents a ceiling above which no development can occur. The cross hatched plane and the two vertical planes at 45 degrees define a three dimensional envelope within which development can occur. This volume is commonly called a "solar envelope" and affords one means for defining solar access. Development is not permitted to occur outside the envelope in the vertical direction (above the cross hatched plane). Thus, the San Diego ordinance protects both existing and potential sites.

Albuquerque, New Mexico passed a solar access zoning ordinance in 1980.[89] The ordinance provides access through a combination of solar envelope provisions and height and setback regulations. It protects potential sites as well as existing collectors.

Santa Clara, Calif. is considering a zoning ordinance based on solar envelopes.[90] It would apply only to new subdivisions. Los Angeles is considering an ordinance which would nullify conditions, covenants and restrictions adverse to solar access while enforcing solar easements.[91] The ordinance creates solar access by providing envelope

85. One may wonder why Dec. 21st was selected since 45 degrees is 45 degrees on any day of the year. The reason has to do with the sun's altitude angle. Access is defined on the day that the altitude is at its minimum, which is the most difficult condition for solar access. The 45 degrees specified on Dec. 21st corresponds to solar access from about 9 a.m. to 3 p.m.

86. San Diego County, Cal., Code, § 53.119(a) (1978).

87. San Diego County, Cal., Ordinance No. 5589 (New Series) (1979).

88. *Id.*

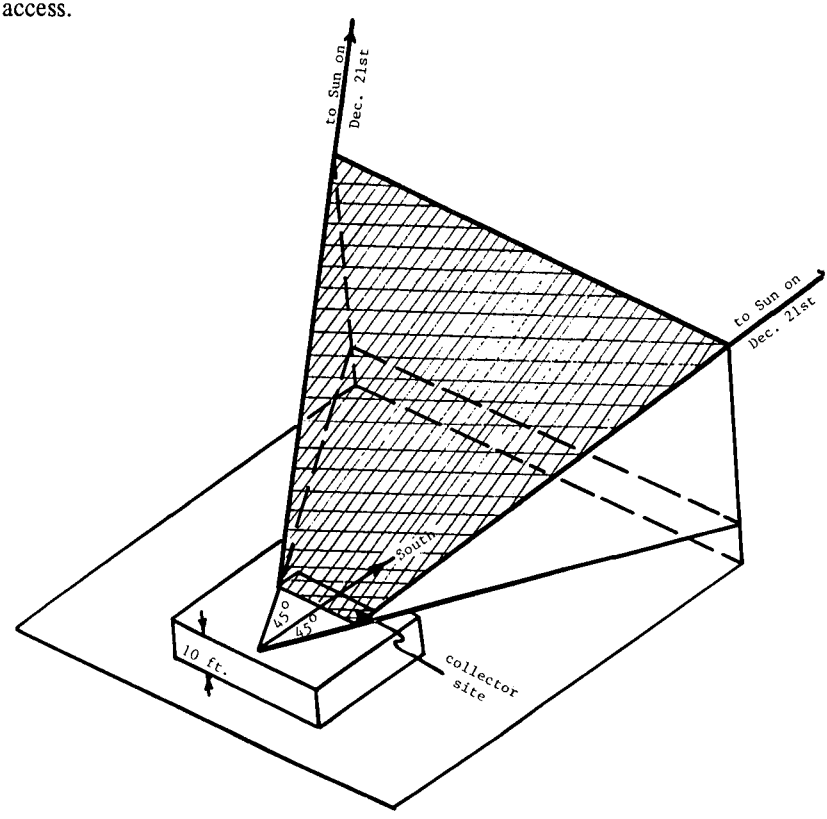
89. Albuquerque, N.M. Ordinances 032 and 033 (Fourth Council) (1980).

90. Santa Clara County, Cal., "Solar Access Ordinance for New Development" (rev. May 22, 1979).

91. Los Angeles, Cal., "Proposed Solar Access and Use Ordinance" (rev. May 16, 1979).

FIGURE 1

Graphical representation of the San Diego County zoning ordinance for solar access.



protection for reasonably placed collectors between 9 a.m. and 3 p.m. The permit ordinance being considered by Cincinnati also uses the envelope concept.[92]

Some cities have passed zoning ordinances which do not specifically define solar access but are intended to help provide for it. An ordinance passed in Port Arthur, Texas, requires streets in new subdivisions to be oriented such that 80% of the buildings can be constructed with their long axes in the east-west direction.[93] A Lincoln, Nebraska zoning ordinance allows a 20% building density bonus to subdivision developers whose community unit plans qualify.[94] Requirements for

92. Cincinnati, *supra* note 45.
93. Port Arthur, Tex., Ordinance 79-78 (Sept. 4, 1979).
94. Lincoln, Neb. City Council Res. A-66456 (Oct. 8, 1979).

qualification include maximizing solar access and submitting shading plans. Colorado Springs, Colo. passed an ordinance permitting variations from specified zoning setbacks to provide solar access under certain conditions.[95] The ordinance requires hearings before such variances are granted. The municipalities of Woodburn and Ashland, Oregon recently adopted solar access ordinances.[96] Both of these are based on height and setback provisions.

The recent activity in zoning for solar access indicates both its increasing popularity and its potential for satisfying the solar access need. Increased experience with solar zoning should accelerate the widespread acceptance of the method. The wide variety of solar zoning ordinances evidences the lack of uniformity in the specific methods used for providing access.

D. Advantages and Disadvantages

Like other methods of providing solar access, zoning involves both advantages and disadvantages. Some of the advantages are:

1. Zoning's local origin enables zoning ordinances to reflect local weather conditions and the attitudes of the citizens in the area. An ordinance's local character contributes to its acceptability.

2. The zoning mechanism provides flexibility. Areas with different types of land use can operate under different solar access requirements. Zoning permits localization on a block by block basis, allowing a high degree of flexibility.

3. Further flexibility is provided since the zoning mechanism does not permanently freeze land use patterns. If changes are required at a later date, the ordinances can be changed. The resulting lack of security also creates a disadvantage as will be discussed.

4. Zoning protects potential collector sites as well as existing collectors.

5. Zoning is a common and well understood mechanism for land use planning. While there are some technical aspects unique to solar access applications, the general zoning framework and its administrative and enforcement mechanisms are already in place.

6. Under zoning, a potential solar user would not experience any cost or delay when installing a system because of solar access problems.

7. Solar access ordinances are not difficult to draft and several models exist to aid in drafting.

8. Zoning permits spreading the burden associated with providing

95. Colorado Springs, Colo., Ordinance 14-60 (1950).

96. *Two Cities Adopt Solar Access Laws,* 3 SOLAR L. REP. 25 (1981).

solar access among a large number of people. Neither municipal nor private budgets are adversely impacted since no compensation is required for reasonable zoning restrictions.

Some of the disadvantages associated with solar zoning include the following:

1. Zoning law can be changed as land use patterns change. Changes in zoning ordinances can cause changes in solar access protection. Thus, solar zoning does not provide the degree of security that some would like to see. The protection is not perpetual, as in the case of solar easements. This lack of perpetuity was listed as an advantage above since it provides flexibility in land use planning. The ordinance can allow more security by providing that collector owners whose collectors are shaded as a result of changes in the ordinance be compensated by the party who benefits from the shadowing. Such a provision would at least provide financial security to the collector owner.

2. Municipalities (particularly smaller ones) may have difficulty with the technical aspects of solar access zoning.

3. The presence of nonconforming uses somewhat limits the effectiveness of solar zoning in developed areas. These areas present similar problems in applying other methods of providing solar access. A nonconforming use, however, does not last forever.

4. A zoning ordinance must include a provision for variances because situations in which true undue hardship exists will arise. Unfortunately, variance provisions are probably the most abused provisions in the law of zoning. The possible effects of variances on a solar collector owner can be diminished by providing that if a collector is shaded as a result of a variance, the party receiving the variance must compensate the collector owner.

IV. DEFINING THE EXTENT OF SOLAR ACCESS FOR ZONING

Defining the right to solar access in a zoning ordinance can cause problems. The previous discussion of zoning showed that the various ordinances were not uniform in their definitions of solar access. This section will briefly describe one method for aiding a municipality in determining how much solar access should be given and will also show the mathematical equivalence of the different definitions used in zoning ordinances.

A. Times of Day for Solar Access

Any reasonable solar ordinance must balance a solar system owner's need for sunshine against the resulting burden placed upon his neighbors. The solar access concept requires that neighbors give up some

traditional property rights. Thus, solar access should not be granted near sunup and sundown when shadows are long and insolation is low, but should be granted for periods during which significant amounts of insolation impinge on collectors. Specifying the times of day during which a right to solar access exists would accomplish this balance. Most of the ordinances reviewed previously specify the daily duration of solar rights either directly or by specifying sun azimuth angles on a particular day of the year.

One preliminary study[97] utilized a computer analysis to generate data which could help local zoning officials determine when solar access should be provided. That analysis considered two variables. The first was the lengths of shadows as a function of time of day and season of the year. Shadow length is a measure of the burden placed upon the neighbors of collector owners. The second variable was the amount of solar energy that a collector owner could lose when solar access was protected only during various specified times of day. This is a measure of the burden on the collector owner. The analysis was done for both flat plate collectors and tracking concentrators, at various tilt angles and different times of the year. This study did not give a single answer to the problem of determining the times of day during which solar access should exist. Rather, it provided information which local officials could use in choosing tradeoffs between burdens on the neighbors and burdens on the collector owner.

B. Mathematical Relationships Between Methods Used for Solar Access

The discussion of existing solar ordinances showed that three methods are currently in use for defining protected solar access. These are the hypothetical wall, the solar envelope, and height and setback. All of these require that appropriate times of day be specified for solar access. The solar envelope concept appears to be the most popular.[98]

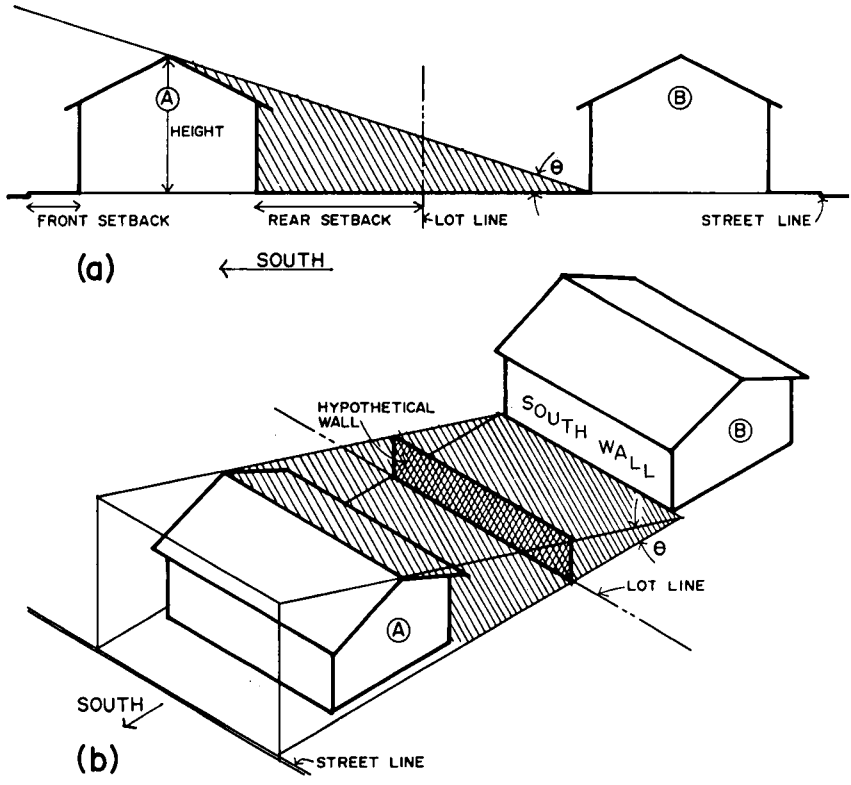
The three methods are mathematically equivalent and simply provide different mathematical descriptions of the same physical situation. Figure 2 demonstrates this equivalence. Figure 2(a) shows two houses, A and B, with house B to the north of house A. The south wall of house B is a passive solar collector and must be protected

97. M. EISENSTADT, S. LONG, and A. UTTON, A PROPOSED SOLAR ZONING ORDINANCE, N.M. Energy Inst. Rep. 76-103 (April 1978).

98. *See* R. KNOWLES and R. BERRY, SOLAR ENVELOPE CONCEPTS, Solar Energy Inst. Rep. SERI/SP/98155-1 (April, 1980); Hayes, *supra* note 24, ch. 5; and M. JAFFE and D. ERLEY, *supra* note 35.

FIGURE 2

The equivalence of the envelope, hypothetical wall, and height and setback methods for guaranteeing solar access.



down to ground level.[99] The angle θ represents the angle at which a ray of sunshine strikes a horizontal plane at the earliest (or latest) time of day for which solar access is guaranteed. An envelope can be drawn around the lot of house A, as shown in Figure 2(b). If the owner of house A does not permit any object or vegetation to penetrate the upper plane of the envelope, the south wall of house B will not be shaded. Figure 2(b) also shows a vertical plane labeled "hypothetical wall" inside the solar envelope and running along the lot line. This is the hypothetical wall used in the Los Alamos and Taos ordi-

99. Solar access protection for passive systems is generally more stringent than for active systems since access is required to approximately ground level. Thus, if reasonable protection is afforded to passive systems there should not be any large problems with solar access for roof mounted active collectors.

nances.[100] The hypothetical wall provides the same shading protection for the south wall of house B as provided by the solar envelope. Similar protection can be achieved by defining the height of house A, the rear setbacks of houses A and B, and the minimum value of the angle Θ. The relationship between these quantities is:

$$\text{Tangent } \Theta = \frac{\text{height of house A}}{\text{rear setback of house A + rear setback of house B}}$$

These alternatives raise the question of which method should be used to define solar access. Obviously, the simplest method is the best. The solar envelope is the most complex because it involves measuring angles and several imaginary planes. The hypothetical wall removes the problem of measuring angles but still involves an imaginary plane (the wall). Height and setback limitations have the advantage of being generally understood concepts and may provide the most desirable method of providing solar access. A moderately extensive mathematical analysis is needed before height and setback can be used, especially on sloping land. In more complex situations, such as developing high density areas, the solar envelope concept has some distinct advantages especially when applied on a site specific basis. Knowles' work[101] contains some innovative examples of high density development using solar envelopes.

An acceptable solar access zoning ordinance must be understood by the people whom it affects and allow them to determine when the ordinance has been violated. Residential landowners understand height and setback. In order to establish a violation of a solar envelope, a landowner must measure angles. This usually requires a transit and therefore a surveyor. Residential landowners should not have to hire surveyors to detect violations of the ordinance. Use of the height and setback method eliminates the need for complex measurements. Buildings in high density areas are usually owned by fairly sophisticated investors who would not hesitate to hire a surveyor. Their stakes are higher and the surveyor's fee becomes one of the costs of doing business. Such investors should be amenable to a more complex method of protecting solar access than a homeowner. Using the different methods in areas of differing density should not present any legal problems.

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100. Los Alamos, N.M., Ordinance 199 (effective Jan. 31, 1978).
101. R. KNOWLES, *supra* note 98.

V. CONCLUSIONS

A number of methods are presently being used to provide access to solar energy. Each involves both advantages and disadvantages. Zoning appears to be the prime candidate since it is well understood and protects potential as well as existing collector sites. In residential areas, appropriate height and setback zoning regulations can protect solar access.

The entire question of what the height and setback requirements should be can be determined mathematically. A properly written computer program would permit varying the pertinent mathematical quantities and thus permit evaluation of the burdens and benefits associated with various values of height and setback. This, in turn, would permit municipal authorities to write solar access ordinances that are compatible ith both technical and political considerations. Such a procedure would result in professionals doing the technical analysis and municipal authorities making the political decisions, with the final ordinance being in a form understandable to the lay public.