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Encouraging Solar Energy Development Through Federal and California Tax Incentives

By John H. Minan*  
And William H. Lawrence**

The federal government has determined that a maximum practical effort by federal, state, and local governments could result in twenty percent of the nation's energy in the year 2000 being supplied by solar power1 and has established an interim goal for the completion of 2,500,000 residential solar installations by 1985.2 California also has established a goal to complete 1,500,000 residential solar installations in the state by 1985.3 Attainment of these goals requires that solar energy4 be economically competitive

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4. "Solar energy is both direct and indirect. Direct forms create energy by the action of sunlight on solar collectors, whereas indirect forms are additional energy sources made possible by solar insolation, such as wind energy, plant biomass fuels, and ocean thermal conversions. A distinction is also made between active and passive applications. An active solar unit is primarily an engineering system that transfers collected energy by mechanical or other means from the collector to the point of use. An active solar unit usually requires an auxiliary energy source to provide power when sunlight is not available and its storage capacity is depleted. In most instances this will be provided by a public utility. A passive method is essentially architectural in nature. It utilizes solar energy through manipulation of the relationship between a structure and the outside environment." Lawrence & Minan, The Competitive Aspects of Utility Participation in Solar Development, 54 Ind. L.J. 229, 231 (1979) (footnotes omitted).
with other forms of energy. The present reality, however, is that solar energy remains stubbornly on the fringe of economic viability.

Solar tax incentive legislation is designed to improve the economics of solar use. It is premised on the principle that the initial cost of making a solar installation is the primary economic barrier to expanded solar use. Whether the national and state goals are reached naturally will depend on a variety of factors. One of the most important factors, however, is the effectiveness of tax incentives encouraging solar use.

Public support of energy development through tax incentive legislation is not new. The Department of Energy estimates the

5. The economics of using solar energy bears a direct relation to the cost of other energy resources. "A solar heating system which is more expensive than [sic] a petroleum-based alternative when oil is selling for $12 per barrel may be the preferred alternative to $20 per barrel oil, and may be much less expensive than [sic] $30 synthetic fuels, electricity from coal or uranium at the equivalent of $60 per barrel of oil, or eventual petroleum substitutes at the rate of $80 or even $90 per barrel. And despite Arizona's more favorable climate, a solar system which is competitive there against cheap natural gas may also be competitive in New England against expensive home heating oil." National Law Journal, Nov. 19, 1979, at 29, col. 1.

6. DOMESTIC POLICY REVIEW, supra note 1, at v.

7. Direct monetary assistance aimed at promoting the use of solar energy can be extended in the form of grants or through loans and loan guarantees. For example, the Solar Heating and Cooling Demonstration Act of 1974, 42 U.S.C. §§ 5501-5517 (1976), a HUD program developed to encourage the development of the solar energy industry, allows a specified amount in grants to be allocated to those states where high electric heating bills are being incurred and that have a strong interest in encouraging the use of solar energy in residences. Under the program, participating states are authorized to disburse $400 per unit to single-family homeowners and builder-developers who install HUD approved solar hot water systems. Another example may be found in the Small Business Energy Loan Act, Pub. L. No. 95-315, 92 Stat. 377 (1978) (codified at 15 U.S.C. § 636(1) (Supp. II 1978)), which empowers the Small Business Association to make loans to small businesses in energy-related fields.

8. The amount of monetary assistance derived from income tax incentives is not subject to any specific legislative limit because it depends solely upon the degree of taxpayer response. Tax "expenditures" in the form of investment credits, special depreciation deductions, deductions for special forms of consumption, or low tax rates for certain activities thus resemble spending programs that have no ceiling. CONGRESSIONAL BUDGET OFFICE, FIVE-YEAR BUDGET PROJECTIONS: FISCAL YEARS 1978-1982, SUPPLEMENTAL REPORT ON TAX EXPENDITURES 1 (1977).

9. Public support through tax incentives is only part of the support mechanism for energy development. Direct price controls also have been important. Unfortunately, however, price controls on nonrenewable sources of energy, such as oil, have had an adverse effect on the development of other energy sources. Despite the recent trend toward reducing price controls on energy supplies reflected, for example, in the Natural Gas Policy Act of 1978, Pub. L. 95-621, 92 Stat. 3350 (codified in scattered sections of 15, 42 U.S.C. (Supp. II 1978)), the current price of most nonrenewable fuels is substantially below their replace-
cost of subsidies to the nuclear power industry over the past thirty years at between $15,300,000,000 and $17,100,000,000. Oil subsidies have cost $77,200,000,000, natural gas subsidies $15,100,000,000 and coal subsidies $6,800,000,000.\textsuperscript{10} Total federal expenditures for development of energy resources since 1918 thus approximate $217,400,000,000.\textsuperscript{11} Although the absolute accuracy of these figures may be debated, it is undeniable that the producers of conventional fuels have received substantial subsidies from the federal government.

Tax incentive legislation only recently has been used to stimulate the demand for solar products. The first federal tax incentive for the development of solar energy was contained in the Energy Tax Act of 1978.\textsuperscript{12} Significant changes in tax incentive legislation subsequently were effected with enactment of the Crude Oil Windfall Profit Tax Act of 1980\textsuperscript{13} (Windfall Profit Act). State use of tax incentives to promote the use of solar products preceded the federal legislation by only a few years. Eight years ago not a single state had enacted tax incentive legislation designed to promote solar energy. Today, a majority of states have legislation offering some type of tax incentive for encouraging the use of solar products.\textsuperscript{14}
This Article analyzes the federal and California solar energy

Of the various types of state tax incentives, income tax credits have the greatest potential for promoting the use of solar energy because they produce the greatest reduction in tax liability. In contrast to income tax deductions, which merely reduce the amount of income subject to taxation, tax credits directly reduce the tax due on a dollar-for-dollar basis. This characteristic also results in an arguably more equitable form of tax relief because the same amount of savings is extended to taxpayers making identical investments, despite differences in their levels of income.

Exempting solar equipment from real property taxation is the most common approach used by the states to promote solar use. Real property tax relief is, of course, beneficial to taxpayers who have increased the value of their property by the installation of solar energy systems and to those persons who view an increase in real property taxes as a detriment offsetting future energy savings potentially provided by solar use. The primary effect of this type of relief, however, is to subsidize existing solar use rather than to promote new solar investment. The economic problem for the average taxpayer in converting his or her residence to solar energy is the high initial cost of a solar energy system. Although real property tax abatements enhance the long range economic benefits of a solar investment, they do not alleviate this critical initial burden. Therefore, despite expressing legislative support for solar energy and supplementing more substantial tax relief, real property exemptions have a relatively weak independent incentive value. Independent use of these tax incentives thus is not likely to promote significantly solar development.

A solar tax incentive also can be extended to the public in the form of either an exemption from the state's sales tax or a refund of the amount taxed. The use of an exemption involves disseminating to retailers a list of qualifying equipment not subject to the sales tax. The refund approach, however, does not require the seller to be informed of any special treatment for solar devices. Rather, the purchaser typically deals directly with the state tax commission. As a result, the consumer is likely to view the refund approach as more complicated than an exemption. The development of solar energy also may be encouraged through exemption from use taxes, which are designed to complement the sales tax, by discouraging consumers from purchasing out of state. The principal problem with use taxes lies in the difficulty of monitoring out-of-state purchases. In addition, while sales and use tax incentives lower the cost of purchasing solar equipment, their fiscal impact is limited by the amount of the state's sales or use tax. Thus, as a practical matter, they are significantly less effective for the promotion of solar energy than income tax credits.

Income tax deduction benefits require the taxpayer to itemize the deduction before the benefit can be realized. This requirement adds complexity to the income tax return and the audit process, and is also inconsistent with the general trend of encouraging individual taxpayers not to itemize deductions. For example, the Tax Reduction and Simplification Act of 1977, Pub. L. No. 95-30, 91 Stat. 126, converted the standard deduction (and the prior low income allowances) to a $3,200 “zero bracket amount” for joint returns ($2,200 for single individuals) with the Revenue Act of 1978, Pub. L. No. 95-600, tit. I, § 101(b), 92 Stat. 2769 (codified at 26 U.S.C. § 63(d) (Supp. II 1978)), increasing the zero bracket amounts to $3,400 and $2,300 respectively. Furthermore, because the value of the deduction depends on the taxpayer's tax bracket, the incentive is likely to encourage principally those in the higher tax brackets to invest in solar equipment. The higher standard deduction figures approved in recent years automatically exclude 77% of all taxpayers, almost all of whom are low and middle income persons, when the incentive is provided through special itemized personal deductions. See generally Surrey & McDaniel, The Tax Expenditure Concept: Current Developments and Emerging Issues, 20 B.C.L. Rev. 225 (1978). In addition, changes in tax rates, which may occur without consideration of their impact on the level of funding required to promote solar energy, affect the size of the public commitment. A tax
tax incentive provisions with the objective of determining whether the existing solar tax incentive legislation is best structured to encourage effective development of the use of solar energy. The Article focuses on an analysis of income tax credit legislation because tax credits are potentially the most significant form of tax incentive to promote solar use. The California solar tax credit legislation has been selected as a model for purposes of the comparative analysis between federal and state legislation for a number of reasons. First, many of the issues and much of the analysis applicable to the relationship between the federal laws and California's tax incentive legislation are fundamentally the same as a comparison between the federal provisions and the statutes of most any other individual state. Second, this methodology allows the analytical comparison to be conducted more simply and in greater depth. The comparison is further justified because the current California solar tax credit legislation offers the greatest financial benefits to users of solar products of any state solar tax incentive law. California tax incentive legislation also is sufficiently similar to the federal legislation to allow ready comparison. For example, California tax incentives, like the federal incentives, are available to both residential and business installers. In addition, the State of California has approximately one-half of the nation's solar devices; thus it is both active and preeminent in solar development. Although California gets more direct sunlight than most other parts of the nation, energy officials argue that climate need not be a limiting factor in applying the California tax experience elsewhere.


For a comparative analysis of the various state tax incentive laws, see Minan & Lawrence, supra note 14.


Federal Incentives: The National Energy Act and Crude Oil Windfall Profit Tax Act

The National Energy Act was signed into law in November, 1978. It contains five significantly different statutes: the Energy Tax Act of 1978,\(^{19}\) the National Energy Conservation Policy Act of 1978,\(^{20}\) the Public Utility Regulatory Policies Act of 1978,\(^{21}\) the Powerplant and Industrial Fuel Use Act of 1978,\(^{22}\) and the Natural Gas Policy Act of 1978.\(^{23}\) One objective of the National Energy Act is the development of renewable energy sources to ensure sustained economic growth so as to permit an orderly transition from the past era of "inexpensive" energy resources to the present period of costly nonrenewable fossil fuels.\(^{24}\) The development of renewable energy sources also serves to reduce United States dependence on foreign oil and vulnerability to interruptions in the supply of oil.\(^{25}\)

No single or unified portion of the National Energy Act concerns solar energy; references to solar energy are scattered throughout its component statutes. Title I\(^{26}\) and title III\(^{27}\) of the Energy Tax Act contain the tax incentive provisions designed to promote solar development by improving the cost effectiveness of a solar investment. The title I incentives are designed to promote the installation of qualifying solar devices in the residential sector of the economy; title III incentives are designed to promote solar energy in the business sector. Both title I and title III extend income tax credits to qualifying taxpayers to reduce the high initial cost of the solar product.

The Windfall Profit Act,\(^{28}\) in addition to imposing a tax on the production of domestic crude oil, amended the Energy Tax Act provisions affecting solar tax incentives. The changes to the federal

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solar tax credit law are contained in title II—Energy Conservation and Production Incentives, parts I^29 and II^30—of the Windfall Profit Act. Part I contains the changes affecting the residential energy credit and part II the changes in the business energy investment credit.

**Residential Energy Tax Credit**

Title I of the Energy Tax Act provides a residential energy tax credit designed to achieve the dual objectives of energy conservation and the development of alternative energy sources such as solar,^31 wind,^32 and geothermal power.^33 These fundamental objectives have not been changed by the Windfall Profit Act. The residential energy credit includes two different types of tax credits: one for home energy conservation expenditures^4 and the other for renewable source expenditures.^35 When a particular expenditure qualifies under both types of credits, it may be claimed under one or the other; taxpayers, however, cannot claim both credits for the same expenditure.^36

In authorizing tax credits for solar energy and energy conservation techniques in the home, the federal law places limitations on the extent and availability of the credits. The taxpayer must meet a number of prerequisites before being able to take the tax credit, some of which are common to both the energy conservation credit and the renewable source credit while others relate only to one of the credits.

**Principal Residence Requirement**

The primary limitation placed on both credits is that they may be claimed only for expenditures made in connection with residential property.^37 To qualify the property must be located in the United States^38 and must be used as the taxpayer’s principal resi-

32. Id. § 44C(c)(5)(A)(ii).
33. Id. § 44C(c)(5)(A)(i).
34. Id. § 44C(a)(1).
35. Id. § 44C(a)(2).
36. 44 Fed. Reg. 29923 (1979) (to be codified at 26 C.F.R. § 1.44C-3(d)).
38. Id. § 44C(c)(1)(A), (2)(A)(ii).
Owners, renters, joint occupiers, cooperative owners, and condominium owners all may qualify for either credit provided the dwelling is used as a principal residence. Whether the dwelling unit is the taxpayer’s principal residence is determined under principles similar to those relating to the Internal Revenue Code provisions and regulations applicable to the sale or exchange of a principal residence. Ownership of the dwelling is not required.

The principal residence requirement is a major limitation on the scope of the incentive under both the Energy Tax Act and the Windfall Profit Act. A much more effective incentive would be provided if the federal law were amended to define eligibility for the tax credit in terms of ownership. Defining eligibility in terms of ownership would provide a broader incentive for the installation of solar products than currently exists, and accordingly serve to promote an increased development in the use of solar energy. Renters constitute more than one-third of all households in America today. Where the landlord pays the utility bills and recovers the cost through the rent, no incentive exists to install solar energy devices. Allowing the owners of rental housing to claim a tax credit for installation of solar products could greatly increase the use of solar devices in residential property. Similarly, mobile homes and other prefabricated buildings are an important potential market for solar systems, but the producer-owners of these manufactured buildings currently have no tax incentive to equip their products with solar devices. Approximately one-third of the new residential units in this country are manufactured buildings; allowing the manufacturers of these units to claim a tax credit for the installation of solar devices could significantly increase the number of solar installations in residential units. Builder-developers, who are the initial owners, are in a key position as well for influencing the rate at which solar devices are installed in residential property.

39. Id. § 44C(c)(1)(B), (2)(A)(ii).
40. Id. § 44C(d).
41. Id. § 44C(c)(8) (making reference to I.R.C. § 1034).
42. Id. § 44C(c)(8)(A).
43. Hearings before the Subcomm. on Housing and Community Development of the Committee on Banking, Financing, and Urban Affairs, 96th Cong., 1st Sess. 333 (1979) (testimony of S. Ferrey, Staff Counsel, National Consumer Law Center).
45. For a more detailed discussion of the potential role builder-developers might play, see notes 230-36 & accompanying text infra.
46. See note 234 & accompanying text infra.
These groups, presently excluded from claiming the tax credit because of the principal residence requirement, can play a pivotal role in the introduction of solar energy in our society and should be included within the ambit of the legislation.

In making the principal residence determination, the period that a dwelling is treated as a taxpayer's principal residence includes the thirty-day period immediately preceding the date of the taxpayer's actual occupancy of the home as his or her principal residence. Thus, installations completed within this thirty-day period are eligible for the credit. The need for this special thirty-day rule is not clear. Separate provisions are applicable to renewable energy source expenditures in cases involving new construction or reconstruction, making the rule inapplicable in those situations. The special rule appears relevant only in certain atypical situations, such as a lessee installing solar equipment during the thirty-day period prior to taking possession or a homeowner improving a second home that was going to become a principal residence. Thus, as a practical matter, the thirty-day rule has little effect, yet it adds little complexity and provides desirable flexibility in a generally rigid program.

Qualifying Expenditures

Both types of residential energy credits require the taxpayer to make an expenditure before the credit is available. A taxpayer cannot, for example, obtain a credit for unpaid labor or donated materials. Similarly, if the taxpayer receives a buyer's rebate for the purchase, only the net cost to the taxpayer is treated as the expenditure. The taxpayer also must incur the expenditure obligation on or after April 20, 1977, and before January 1, 1986. The time at which the taxpayer makes the actual payment is not controlling, however, because expenditures normally are treated as made in the tax year in which the original installation of the qualifying item is completed. An exception to this general rule exists for renewable energy source expenditures made in connection with

47. I.R.C. § 44C(c)(8)(B).
49. I.R.C. § 44C(a).
50. Id. § 44C(c).
51. Id. § 44C(f) provides: "This section shall not apply to expenditures made after December 31, 1985."
52. Id. § 44C(7)(A).
new construction and reconstruction.\textsuperscript{53}

The relatively short period for which the tax credit legislation will be effective reflects the need for a rapid development of solar products as a viable energy resource. Once changes in a tax code are enacted, they frequently are difficult to repeal even after they have outlived their original purpose. A constituency is created that will promote not only the continuation of the tax benefit but also urge its expansion. Unless one takes the view that solar energy should be subsidized indefinitely, the tax incentive should be discontinued once the legislative objective has been achieved. Although the January 1, 1986, termination date may be criticized for being too early and perhaps for not being tied to the national goal of supplying twenty percent of the United States' energy needs from solar installations by the year 2000, the selected date is well conceived. As the cost of conventional fuels continues to increase because of OPEC actions, the deregulation of natural gas prices,\textsuperscript{54} and other reasons,\textsuperscript{55} solar energy will become more economically competitive; thus the need for tax incentives to stimulate most types of solar development should decrease. In addition, the 1986 termination date is far enough in the future to enable prospective claimants to learn about solar applications and decide whether they wish to install solar equipment. On the other hand, the time span of eligibility for the tax benefit is short enough to accentuate the incentive purpose of the tax law. Rather than postponing the decision indefinitely and continuing to use conventional energy resources in the interim, the interested taxpayer will have to make the solar expenditure in a relatively short but realistic period of time. The retroactive nature of the eligibility requirement, April 20, 1977, is justified by the fact that congressional intent to enact a tax incentive measure became common knowledge well before the measure actually was enacted as part of the National Energy Act. Changes affected by the Windfall Profit Act, however, are not retroactive.

\textsuperscript{53} See note 126 & accompanying text \textit{infra}.


\textsuperscript{55} For example, the Powerplant and Industrial Fuel Use Act prohibits, subject to exceptions, the use of natural gas and oil in new utilities and major fuel installations. 42 U.S.C. §§ 8311-8312 (Supp. II 1978).
Carryovers and Changes in Residence

Neither form of residential energy credit may exceed the taxpayer's liability for a particular year. Nor when the credit is greater than the tax liability is the excess refundable in cash. Excess energy credit can be carried over, however, to the following years' tax liabilities until it is exhausted or until 1988, whichever occurs first. The taxpayer thus is not penalized by the carryover provision for the size of the investment.

In addition to allowing energy tax credits to be carried over to succeeding years, the tax treatment accorded changes in principal residence also helps maximize the incentive impact of the tax benefit. The residential energy credit is available for qualifying expenditures whenever the taxpayer changes his or her principal residence. Thus, if the taxpayer takes the maximum available credit in 1980, it can be taken again in 1981 provided the taxpayer has changed his or her principal residence and the expenditures otherwise qualify.

Adjusting Basis and Recapture

A qualifying expenditure increases the taxpayer's basis in a residence. If the residence subsequently is sold by the taxpayer, the difference between the sale price and the basis generally determines the taxable gain. Apart from the special provisions under federal law for postponing or avoiding taxable gains on the sale of a taxpayer's residence, a homeowner changing residences in to-

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56. Whenever a tax credit is greater than the tax liability, the potential for a refund is created. The availability of refunds eliminates the need for carryover provisions. See, e.g., N.M. Stat. Ann. § 7-2-16(f) (1978); Wis. Stat. Ann. § 71.09 (12)(b) (West Supp. 1979).
57. I.R.C. § 44C(b)(6). The carryover provision may be a poor stimulus to taxpayers with uncertain year to year tax liability.
58. Id. § 44C(c)(8).
59. Id. § 44C(e).
60. See id. § 1001.
61. Capital gains can be deferred when (1) both houses are principal residences, (2) the purchase price of the new house is at least as much as the adjusted sales price of the old house, and (3) the new house is occupied within 18 months (before or after) the sale of the old house. Id. § 1034.
62. If the taxpayer or taxpayer's spouse were age 55 or older on the date of sale, up to $100,000 of profit on the sale of the home is exempt from capital gains tax. The home must have been the principal residence for at least three out of the five years preceding the sale, and the home must have been sold after July 26, 1978. This provision is available on only one sale in the taxpayer's lifetime. Id. § 121.
day's inflationary times generally has a taxable gain upon selling his or her former residence. Inflation tends to guarantee this result. In order to avoid giving the taxpayer both a tax credit and a reduced gain, which would result from the increase in basis, the federal law requires that any increase in basis resulting from a qualifying expenditure be reduced by the amount of the credit allowed. Depending on the sale price, this adjustment subjects a certain amount of the incentive to recapture by the government. Of course, this recapture only applies if the taxpayer has had an increase in basis attributable to the expenditure. The owner thus would not have a change in basis if the qualifying expenditure were made by a lessee using the dwelling as a principal residence.

While requiring an adjustment in basis conforms to general tax principles, it is not consistent with the policy underlying a tax incentive to promote solar use. It effectively reduces the ultimate benefit to most taxpayers by eventually taxing those who have responded to the incentive. Moreover, it complicates the purchaser's evaluation of the economic feasibility of a solar investment as well as the process of tax review and auditing. Eliminating the basis adjustment requirement would enhance the desirability of the incentive legislation and simplify the administration of the credit.

Performance and Quality Requirements

On May 23, 1979, the Department of Treasury issued a notice of proposed residential energy credit regulations prepared pursuant to the congressional directive to the Secretary of the Treasury to supplement and clarify the residential energy credit. Congress

63. Id. § 44C(e).

64. For example, if a taxpayer acquired a residence for $50,000 and spent $10,000 on capital improvements to the residence, his or her basis in the residence would be $60,000. Subsequent sale of the residence for $70,000 would result in a taxable capital gain of $10,000. If, however, the capital improvement consisted of an eligible solar installation, the taxpayer could take a tax credit under the Windfall Profit Act of $4,000 (40% times $10,000) in the taxable year. To the extent the credit is allowed, the increase in basis is reduced. Thus, the taxpayer could increase the basis in the residence by only $6,000, making his or her basis $56,000. On a subsequent sale of the residence for $70,000, the taxpayer now has a taxable gain of $14,000. Thus, to the extent the additional $4,000 gain is taxed at the taxpayer's applicable rate, the government recaptures a significant part of the benefit conferred by the tax credit, reducing the incentive correspondingly.


66. I.R.C. § 44C(c)(6)(A)(i) provides: "The Secretary shall by regulations—(i) establish the criteria which are to be used in (I) prescribing performance and quality standards under paragraphs (3), (4), and (5), or (II) specifying any item under paragraph (4)(A)(viii)
also directed the Secretary to prescribe criteria which an item must meet in order to be added to the list of qualifying equipment. Furthermore, the Secretary was directed to establish procedures for a manufacturer to follow in order to have a product treated as a qualifying expenditure item. The procedure is designed to assure both manufacturers and taxpayers that a certified item qualifies for the credit.

The Windfall Profit Act narrows the discretion of the Secretary of the Treasury to determine the performance and quality standards applicable to renewable energy source property by establishing criteria that the Secretary must consider before an item may be added to the list of qualifying equipment. The Secretary is required to determine that:

(i) there will be a reduction in oil or natural gas consumption as a result of such specification, and such reduction is sufficient to justify any resulting decrease in Federal revenues,

(ii) such specifications will not result in an increased use of any item which is known to be, or reasonably suspected to be, environmentally hazardous or a threat to public health or safety, and

(iii) available Federal subsidies do not make such specification unnecessary or inappropriate (in light of the most advantageous allocation of economic resources).

These requirements directly involve the Department of the Treasury in important national energy policy questions. The procedure’s principal advantage is that it ensures that numerous important factors will be considered in making energy policy decisions. Decisionmaking based on energy savings and cost effectiveness thus is promoted. The difficulty with this procedure lies in its practical application. Responses to any applicant’s request to specify a conservation item or renewable energy source as qualifying for the tax credit must be made within one year of the request’s


67. I.R.C. § 44C(6)(A)(i). A solar manufacturer may seek certification that the product meets the definition of renewable energy source property. In addition, the manufacturer may seek approval for the addition of the product to the Treasury’s list of renewable energy sources.

68. Id. § 44C(c)(6)(A)(ii).

69. Id. § 44C(c)(9).

70. Id. § 44C(c)(9)(A). See also id. § 44C(c)(9)(B)-(C).
These important determinations thus must be made within a relatively short period of time. Given the present structure and energy-matter expertise of the Department of the Treasury, making the required determination is difficult if not impossible.

This difficulty raises a fundamental policy question as to whether the Department of the Treasury is the appropriate governmental entity to be charged with the responsibility of preparing and issuing the regulations, supervising compliance, and determining qualifying equipment. Although the credits are directly related to taxes and the collection process, precedent exists in similar instances for placing the principal responsibility elsewhere. Inasmuch as the Department of Energy bears the primary responsibility for energy matters, certain advantages would accompany charging it with the promulgation of regulations relating to performance criteria for qualifying items of equipment. The Department of Energy's presumably greater capacity to appreciate technological distinctions that bear on the accomplishment of solar energy policies would facilitate prompt and reasoned resolution of issues which arise. In addition, more certainty would exist that the regulations reflect and are consistent with national energy policy.

"Double Dipping"

The Windfall Profit Act amends the Energy Tax Act to limit taxpayer "double dipping"—receiving both government energy grants or government subsidized financing and the residential solar income tax credit. The new Windfall Profit Act provision coordinates the residential energy credit with other government subsidies for energy related expenditures, such as loans from the new Solar

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71. Id. § 44C(c)(6)(C).
72. For example, the Department of Labor has the power in administering the Employee Retirement Income Security Act, 29 U.S.C. § 1001 (1976), to approve certain Department of Treasury rulings and regulations that substantially affect collectively bargained pension and profit sharing plans.
73. I.R.C. § 44C(c)(6)(B) directs consultation only: "Performance and quality standards regulations and other regulations shall be prescribed by the Secretary under paragraphs (3), (4), and (5) and under this paragraph only after consultation with the Secretary of Energy, the Secretary of Housing and Urban Development, and other appropriate Federal officers."
74. Id. § 44C(c)(10).
Energy and Energy Conservation Bank,\textsuperscript{76} to prevent compounding of benefits. The portion of any expenditure provided by “subsidized energy financing” is not eligible for the residential energy tax credit.\textsuperscript{77}

Unfortunately, the eligibility treatment of nontaxable grants is not as clear. The Energy Tax Act contains no specific authority on the eligibility for the residential energy tax credit of expenditures financed by nontaxable grants. Nor does the Windfall Profit Act, because the conferees assumed the law already made them ineligible.\textsuperscript{78} Support for their assumption is not evident. The conferees may have inferred that the concept of cost, which is a general prerequisite to eligibility, renders nontaxable grants ineligible. If a nontaxable grant were treated as not involving a taxpayer cost then the conferees’ assumption on the state of the law denying eligibility would be sound. The conferees’ position on ineligibility is logically appealing following the adoption of the Windfall Profit Act because the congressional rationale underlying the double dipping provision is to prevent compounding of government benefits. However, lack of specific statutory authority on the treatment of nontaxable grants is undesirable, and Congress should clarify its position.

The ineligibility aspects of the double dipping provision clearly reduce the incentive for solar expenditures that would otherwise be given to taxpayers receiving a nontaxable grant or subsidized energy financing. On a policy level, expenditures arising from subsidized energy financing or nontaxable government grants should not be eligible for a tax credit. A tax credit arguably is redundant as an incentive when the taxpayer receives some form of government subsidy and also receives a tax credit for spending the subsidy. In this context the double dipping provision prevents the compounding of solar incentives and is sound.

The Windfall Profit Act, however, also requires the expendi-


\textsuperscript{77} “Subsidized energy financing” is defined as “financing provided under a Federal, State or local program a principal purpose of which is to provide a subsidized financing for projects designed to produce or conserve energy.” I.R.C. § 44C(c)(10)(c).

ture limits on energy conservation and renewable energy source property to be reduced by the portion of the expenditures provided by the subsidized energy financing and by nontaxable government grants.\textsuperscript{79} The expenditure limits of $2,000 for energy conservation and $10,000 for renewable energy source property, rather than the amount claimed by the taxpayer, are to be reduced by the portion of the expenditure made from the government benefit.\textsuperscript{80} The adjustment is readily illustrated. Assume for example, that a homeowner spends $12,000 on a solar space heating system, $4,000 of which is supported by subsidized financing or nontaxable government grants. The $4,000 benefit would not be eligible for the credit, thus leaving only $8,000 of the total expenditure. In addition, the expenditure limit of $10,000 would be reduced by the $4,000 benefit, thus making the expenditure limit $6,000. The actual credit would be 40\% of this limit, or $2,400.

Requiring the expenditure limit to be adjusted when a purchase is subsidized by government financing or nontaxable grants is unwise as a matter of policy. Subsidized energy financing and nontaxable grants are designed to promote innovative solar applications. These applications usually need all possible incentives. When the subsidized financing or nontaxable grants do not come close to covering the cost of the solar installation, a rule allowing the full benefit without an adjustment to the expenditure limit would tend to encourage innovative solar uses. The reason for requiring a reduction in the eligibility limits for the taxpayers' own expenditure is not clear. The adjustment cuts into the economic value of the incentive where it is needed and constitutes an unwarranted penalty.

Financing solar energy devices through investor-owned public utilities is a recent development in which California has taken the lead. The California Public Utilities Commission (PUC) currently is investigating the feasibility of using alternative methods of providing low interest, long term financing for utility customers,\textsuperscript{81} an extremely significant development that is likely to be adopted in other states. The relation of utility financing programs to the "double dipping" provision is not clear. Under the Windfall Profit

\textsuperscript{79} \textit{I.R.C.} § 44C(c)(10)(B).
\textsuperscript{80} \textit{Id.} ("each dollar amount contained" in \textit{I.R.C.} § 44C(b)(1) or (2) shall be reduced).
Act, subsidized energy financing includes "financing provided under a Federal, State, or local program." The statute's language is sufficiently broad to include utility financing programs because the PUC, a governmental entity, may order the utilities to undertake such activities. This interpretation, however, would severely undermine a promising source of solar development financing. The matter should be clarified at the national level and all doubt removed so that the "double dipping" provision does not apply to these financing programs.

Home Energy Conservation

Energy conservation is the fastest and most economical way for an individual to react to higher energy costs. The current tax incentives in the area of home energy conservation are those established by the Energy Tax Act since the Windfall Profit Act made no significant changes in this area. A taxpayer is entitled to a tax credit of fifteen percent of the first $2,000 spent on qualified energy conservation measures. The maximum available credit is thus $300. Although the credit is available for expenditures made on or after April 20, 1977, and before January 1, 1986, the credit is only available for conservation measures added to homes substantially completed before April 20, 1977.

The term energy conservation measure includes expenditures for either insulation or energy conserving components. "Insulation" is any item specifically and primarily designed to reduce heat loss or gain in a dwelling or a water heater. If the function of the insulation, however, is primarily structural, decorative, or safety related, it does not qualify. "Energy-conserving components" are specified items other than insulation intended to reduce energy consumption. A partial list of qualifying components includes storm windows or doors for the exterior of a dwelling, caulking or weather stripping of exterior doors or windows, and meters dis-

82. I.R.C. § 44C(c)(10)(C).
83. Id. § 44C(b)(1).
84. Id. § 44C(c)(1)(C).
85. Id. § 44C(c)(3).
86. Id. § 44C(c)(4).
87. Id. § 44C(c)(3)(A).
89. I.R.C. § 44C(c)(4).
playing the cost of energy usage.  

A policy argument can be made that when a part of an item would be eligible, the incremental cost attributable to the energy saving feature should be eligible. The current law has not adopted this position, presumably because of difficulties in administration. A tax credit currently is allowed for an expenditure to insulate an existing hot water heater; but, if the taxpayer buys a new water heater with the insulation built into it, that portion of the purchase price reflecting the expenditure for insulation does not qualify. While this result may seem anomalous in terms of the National Energy Act’s objectives, the practical difficulties of administering a system allocating partial expenditures are manifest. In addition, as the number of products incorporating energy conserving components sold to the public increases, the need for a special incentive lessens.

In order to qualify as an eligible energy conserving measure or insulation, a product must be new, be expected to last at least three years, and meet performance and quality standards to be specified by the Secretary of the Treasury. Components purchased prior to the issuance of regulations covering these standards need not comply with them to be eligible for the credit. In addition, the item must be installed in or on the dwelling unit itself. This additional requirement limits the expenditures eligible for the credit by excluding those expenditures made for an item placed on a garage or other outbuilding detached from the dwelling.

While some taxpayers may have detached garages or other outbuildings which use energy for heating or cooling, denying eligibility to such taxpayers can be based on practical grounds. Creating an exception for such cases may not be worth the modest benefit accompanying the added complexity of administering a special provision. On the other hand, the policy of decreasing our dependence on nonrenewable energy sources is best served by broad eligibility terms. Presumably, only those persons who truly have an

90. 44 Fed. Reg. 29,927 (1979) (to be codified at 26 C.F.R. § 1.44C-2(d)).
92. Id. § 44C(c)(3)(B), (4)(B).
93. Id. § 44C(c)(3)(C), (4)(C).
94. Id. § 44C(c)(3)(D)(i), (4)(D)(i).
95. Id. § 44C(c)(3)(D)(ii), (4)(D)(ii).
96. Id. § 44C(c)(1).
established need will go to the expense of installing any sort of energy conservation measure; very few people will install an unnecessary conservation measure merely to obtain a tax credit. Although the total energy savings obtained by extending the credit may be minimal, the psychological benefit derived from the government’s display of commitment to its goal may justify any added administrative complexities.

Renewable Energy Source Property

The tax incentive primarily designed to encourage the residential installation of solar equipment is the renewable energy source expenditure credit. The credit also applies to qualifying expenditures for wind powered or geothermal property, and for additional equipment using any other energy saving form of renewable energy specified in the regulations promulgated by the Secretary of the Treasury. Under the Energy Tax Act the credit was equal to 30% of the first $2,000 of expenditures plus 20% of the next $8,000 for a maximum possible credit of $2,200. The Windfall Profit Act increased the credit to 40% of up to $10,000 of expenditures for a maximum credit of $4,000 for expenditures made after December 31, 1979.

Payback Periods

The “payback period” is the time necessary for an energy system to return the entire initial cost of the investment through fuel savings. A recent study indicates that, on the average, a five-year payback period is required before consumers will consider seriously the possible purchase of solar equipment. Because a wide variety of solar systems are on the market reflecting the differing energy demands of families and individuals, system costs vary a great deal. In 1978, the average cost of a flatplate water heater for a house in California was between $1,700 and $2,000. Assuming a

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97. Id. § 44C(c)(5)(A)(ii).
98. Id. § 44C(c)(5)(A)(i).
99. Id. § 44C(c)(5)(A)(ii).
100. Id. § 44C(b)(2) (1978).
101. Id. § 44C(b)(2).
102. ENERGY FUTURE 191 (R. Stobaugh & D. Yeagin eds. 1979) (report of the energy project at the Harvard Business School).
103. STATE OF CALIFORNIA (SOLAR CAL OFFICE), CALIFORNIA: THE SOLAR CAPITAL, HOW TO FINANCE A SOLAR ENERGY SYSTEM FOR YOUR HOME 1 (1978).
cost of $2,000 and a savings of $200 per year in reduced electric utility bills, the payback period would be ten years, absent consideration of possible tax credits. According to the above standard, the average consumer would not be motivated to purchase the system under these circumstances. With the federal tax credit of $800, the payback period for the replacement of an electric water heater is reduced to six years. While the arithmetic is more appealing, the consumer still may not find solar energy to be economically competitive. The potential savings are less for the replacement of a gas water heater, and thus the consumer is less likely to find solar energy an attractive investment.

One may easily argue the merits of this simplified method of evaluation and the specific figures used in this analysis, but the illustration nonetheless demonstrates the importance of the amount of the credit. It also strongly suggests that the current amount of the tax credit does not provide consumers with a sufficiently vigorous incentive. Accordingly, both the percentage of the credit and the ceiling for the maximum dollar amount allowed should be further increased. By thus shortening the payback period and lowering the life cycle cost, the incentive value of the tax credit will be increased.

**Tax Refunds and Carryovers**

Legislation that reduces the time lag between the expenditure and the realization of the tax benefit predictably will be more effective. One means of expediting the realization of a tax benefit is to make the credit refundable when it exceeds the taxpayer's

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104. "Solar water heating systems can be designed to supply about 60% to 80% of the annual energy required to heat water in an average residential unit. In place of an electric water heating system, this could mean a savings of as much as 4,800 kilowatt hours or $194 per year. In place of a natural gas system, this could mean a savings of 276 therms or $53 per year." PUC Case No. 10150, at 10 (September 17, 1976).

105. Id.

106. The payback method admittedly is a limited technique in calculating the desirability of making a solar investment. It does not take into account the fact that the value of money changes with time. A dollar saved today is not equal in value to a dollar saved five years from now. Similarly, it does not take into account possible alternate investments which might be available. For an alternate method of computing the economics of solar use see Consumer Reports, May 1980, at 325.

107. Life cycle costing is a method of cost analysis that considers the initial cost of the equipment plus other operating and maintenance costs estimated for the predicted life of the equipment.

108. See Minan & Lawrence, supra note 1, at 857.
income tax liability. This approach is desirable for a number of reasons. It would avoid the complexities of administering the carryover provisions and thus simplify the process for both the taxpayer and the IRS. It also would permit more people to participate in the tax incentive program. Under the current law only those taxpayers whose tax liability is sufficiently large to realize the credit are affected, precluding many lower income taxpayers from taking advantage of the legislation. Other steps also can be taken to improve the incentive’s attractiveness. Rather than forcing the taxpayer to wait until the tax return is filed, which may be many months after the actual expenditure is made, consideration should be given to making the credit available against taxes paid in the previous year by allowing the taxpayer to file an amended tax return. Because the procedure for filing amended returns already exists, this modification is not likely to add significant complexity to the tax collection process. It does, of course, complicate matters for the taxpayer, but this is not a material disadvantage because the taxpayer may elect against filing an amended return.

**Qualifying Expenditures**

To qualify for the credit, the renewable energy source property must be new, be expected to last five years, and meet performance and quality standards specified by the Secretary of the Treasury. As with home energy conservation expenditures, the property does not have to meet the standards if it was purchased prior to their publication. Eligible costs include both the equipment and the labor costs properly allocable to the onsite preparation, assembly, or original installation of the equipment.

Currently, no requirements exist that renewable energy source property be more energy efficient than comparable conventional equipment. The possibility thus exists that the credit can be claimed for expenditures on equipment using more energy than conventional equipment, a prospect that cuts across the grain of

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110. Id. § 44C(c)(5)(B).
111. Id. § 44C(c)(5)(C).
112. Id. § 44C(c)(5)(D).
113. Id. § 44C(c)(5)(D)(ii).
114. Labor costs include both direct and indirect labor costs such as some portion of the cost of construction supervisory personnel.
the premise underlying the residential tax credit. The forthcoming regulations applicable to both the residential and business credits therefore should be designed to guarantee that the credits are available only to energy saving solar systems.

Photovoltaic systems,116 which use solar energy to produce electricity directly, were not eligible for the residential credit under the Energy Tax Act. Although initially included in the proposed legislation, this class of systems was deleted by the conference committee.117 The exclusion was curious in light of the technology's tremendous potential. Furthermore, wind energy property, which includes equipment capable of generating electricity, is included as qualifying property,118 and photovoltaic systems installed by businesses qualify for the investment tax credit under title III.119 This omission was rectified by the Windfall Profit Act; renewable energy source property now includes any solar applications providing electricity.120

Photovoltaics offer the promise of revolutionizing energy production in the next decade.121 Generating power on the rooftops of residential and commercial buildings would be an important technical tour de force that would move the United States toward en-

116. “Solar photovoltaic power systems (PEPS) use semi-conductor materials to convert sunlight directly into electricity. Since the conversion is into direct current, power inverters are required to assure compatibility with alternating current. These systems offer the potential for highly reliable power in a variety of applications ranging from small, low-power instruments in remote areas to large central power stations. Modular installation allows the creation of a facility of practically any size. At present, two problems exist with this type of application: efficiency and cost. No current photovoltaic cells have achieved an efficiency greater than 13 percent. Research reported during the summer of 1978 predicts, however, efficiencies as high as 40 percent, so the efficiency problem may be solvable. Silicon-cell arrays, which are the photovoltaic front runner, can produce electricity for about $10 per watt during peak conditions. While the cost of photovoltaic generation of electricity is not presently competitive with conventional power, it has dropped tenfold in just three years. In addition, Congress recently approved the Federal Photovoltaic Utilization Act of 1978 which should provide a major boost to the photovoltaic industry. Its purpose is to establish a photovoltaic energy commercialization program for the accelerated procurement and installation of photovoltaic solar electric systems in federal facilities.” Lawrence & Minan, The Competitive Aspects of Utility Participation in Solar Development, 54 IND. L.J. 229, 232-33 (1979) (footnotes omitted).


118. I.R.C. § 44C(c)(5)(A)(ii). See also 44 Fed. Reg. 29,928 (1979) (to be codified at 26 C.F.R. § 1.44C-2(g)).


120. Id. § 44C(c)(5)(A)(i).

121. FORTUNE, Sept. 24, 1979, at 70.
ergy self-sufficiency. Before this can be accomplished, however, the cost of photovoltaic applications must be reduced substantially. Although the cost has decreased dramatically since the first modern photovoltaic cells were used to power space satellites, solar-generated electricity will not be competitive with conventionally generated electricity until the cost per peak watt is reduced to approximately fifty to seventy-five cents at present currency value.\textsuperscript{122} Several factors indicate this result is probable in the near future. As the cost of conventionally generated electricity increases, the minimum cost per peak watt necessary to become competitive will increase, thus improving the economic position of photovoltaics. Furthermore, photovoltaic equipment is included within a class of electronic devices made from semiconductors, other varieties of which have experienced rapid reductions in price as a result of technological advancements and volume production, hand calculators and electronic watches being two prominent examples. Finally, cost reductions for photovoltaics can be achieved through improvements in the manufacturing process, which currently is slow, exacting, and wasteful. Residential use of the photovoltaic technology nonetheless is some years away. Including this technology within the category of renewable energy source property is not likely to have any immediate impact on the development of the photovoltaic industry. Rather, the effective promotion of photovoltaic technology requires policies that have a more immediate impact, including federal purchases\textsuperscript{123} to reduce the cost of the present photovoltaic technology and the funding of research, development, and demonstration projects.

The renewable energy source property credit is available for existing, newly constructed, and reconstructed dwellings.\textsuperscript{124} The term “reconstruction” contemplates the destruction and replacement of most of a dwelling’s major structural components such as floors, walls, and ceilings.\textsuperscript{125} Generally, expenditures are treated as

\textsuperscript{122} One estimate places the current cost of generating solar electricity at between ten and fifteen dollars per watt generated under peak solar conditions. Id. Recent quotes for new installations are as low as three dollars per peak watt. 113 SCIENCE NEWS 8 (1978).

\textsuperscript{123} For example, the Federal Photovoltaic Utilization Act, which is part 4 of title V of the National Energy Conservation Policy Act, 42 U.S.C. §§ 8272, 8278 (Supp. II 1978), authorizes appropriations not to exceed $98,000,000 for the period beginning Oct. 1, 1978, and ending Sept. 30, 1981, for procurement and installation of photovoltaic systems for federal facilities.

\textsuperscript{124} See I.R.C. § 44C(c)(2)(A), (c)(7)(B).

\textsuperscript{125} 44 Fed. Reg. 29,928 (1979) (to be codified at 26 C.F.R. § 1.44C-3).
made when the installation is completed. For purposes of new constructions, however, expenditures are treated as made when the taxpayer begins using the dwelling as a principal residence.\textsuperscript{126} Thus, if a builder installs a solar system on a house and then sells it to the taxpayer, the expenditure can qualify even though the installation was completed prior to the taxpayer’s occupancy.

Renewable energy source property need only be installed in connection with a dwelling, rather than on it.\textsuperscript{127} Expenditures for solar collectors physically detached from the dwelling qualify provided that the system itself is used in connection with the residence. This provision is particularly desirable since rooftop deployment of solar panels will in some instances be impossible, because of considerations such as roofing materials or locations of chimneys or vents, or impractical, because of problems like shading or the slope of the roof. This requirement is distinguishable from the home energy conservation requirement that the item be installed in or on the dwelling.\textsuperscript{128}

The limitation on eligibility of parts of the system is also important. In most cases a solar system must be integrated with some type of backup system.\textsuperscript{129} The renewable energy source property credit, however, does not include costs of conventional heating or cooling systems used to provide this backup assistance.\textsuperscript{130} Nor does it include expenditures for a swimming pool used as an energy-storage medium.\textsuperscript{131} The rationale of this limitation presumably is similar to the multiple home exclusion.\textsuperscript{132} Given the possibility of local governments requiring swimming pools to use solar energy, this limitation is additionally justified as avoiding an unnecessary “incentive.”\textsuperscript{133} Under proposed IRS regulations expenditures for

\textsuperscript{126} Id.
\textsuperscript{127} I.R.C. § 44C(c)(5)(A).
\textsuperscript{128} See note 96 & accompanying text supra.
\textsuperscript{129} “[M]ost applications to date are direct solar heating and cooling systems with solar penetrations of approximately 70 to 80 percent. The remaining 20 to 30 percent of the energy required must be provided by conventional backup systems.” Bos, Solar Energy: Perspective and Prospects, 38 Proc. Am. Power Conf. 447, 449 (1976).
\textsuperscript{130} 44 Fed. Reg. 29,924 (1979) (to be codified at 26 C.F.R. § 1.44C-2).
\textsuperscript{131} I.R.C. § 44C(c)(2)(C). This provision is an important limitation for California taxpayers because many solar applications are connected to swimming pools. For California tax credit purposes, pool covers and pool heating systems accounted for 72% of the single-family installations in 1977. California Energy Commission, Staff Report, An Analysis of Tax Returns For 1977 (1979).
\textsuperscript{132} See note 43 & accompanying text supra.
\textsuperscript{133} For example, § 53.120 of the San Diego County Code provides that no permit is
storage mediums serving a dual purpose also are excluded.\textsuperscript{134}

The federal law does not include metering as an eligible cost in the landlord-tenant situation. If a separate utility meter is not available to a renting taxpayer, the lessee has no incentive to purchase a solar device. If a separate meter were available the lessee might be interested in installing solar equipment. However, the landlord has no tax incentive to install a separate meter because the principal residence requirement prevents the expenditure from qualifying for the credit. In addition, the landlord may find it just as expedient to include the cost of energy as part of the rent. Assuming that the landlord would permit the lessee to install separate metering, the economic advantage to the lessee is reduced because the cost of the meter, which can be substantial,\textsuperscript{135} is not eligible for the tax credit. Under these circumstances the lessee has less incentive to install solar devices. The dilemma is that neither party may be motivated to install solar equipment, the lessee because special metering is not eligible and the landlord because no credit at all is available.

\textit{Dual Function Approach and Passive Systems}

Proposed IRS regulations provide that only materials and components whose sole purpose is to transmit or use solar radiation are included within the term “solar energy property.”\textsuperscript{136} These regulations effectively exclude all dual function components of a dwelling regardless of whether the component serves an energy function. Expenditures for materials and components serving a significant structural function of the dwelling are not eligible for the renewable energy source property credit. Solar collectors built within the roof framing and constituting a part of the roof do not qualify under the proposed regulations because the collectors serve a dual function.\textsuperscript{137}

\textsuperscript{134} 44 Fed. Reg. 29,928 (to be codified at 26 C.F.R. § 1.44C-2).
\textsuperscript{135} A public utility may use time of use pricing for solar users. Time of use pricing requires a more sophisticated dual register meter which measures the amount of service used during two separate time intervals each day. These meters cost between $65 and $110. See generally Lawrence & Minan, Solar Energy and Public Utility Rate Regulation, 26 U.C.L.A. L. Rev. 550, 578 (1979).
\textsuperscript{136} 44 Fed. Reg. 29,928 (1979) (to be codified at 26 C.F.R. § 1.44C-2(f)).
\textsuperscript{137} Id.
Little justification can be offered for having a tax policy thwart efficient and aesthetically pleasing architectural design that may require solar collectors to be integrated into a roof.\textsuperscript{138} Such design plays an important role in achieving public acceptance of solar energy. The Windfall Profit Act corrected this deficiency, providing that “[n]o solar panels installed as a roof (or portion thereof) shall fail to be treated as renewable energy source property solely because it constitutes a structural component of the dwelling on which it is installed.”\textsuperscript{139} This change is desirable because it obviates the need to have the solar collectors or panels located on top of an existing roof. Now they may be integrated into a roof and thus made more aesthetically appealing. Moreover, this change may reduce the cost of the system by eliminating the necessity for special structural reinforcement to support the additional weight of the collectors.

In addition to affecting active solar systems, the dual purpose restriction precludes many passive systems from qualifying for the credit, except perhaps for such applications as window box heaters and thermosiphon water and space heating systems.\textsuperscript{140} Active solar systems are primarily engineering systems that transfer collected energy by mechanical means from the collector to the point of use. Passive solar systems are based on the use of conductive, convective, or radiant energy transfer. Most passive systems employ a combination of materials and components which are integrated into the structure of the residence, thus utilizing the existing structural elements,\textsuperscript{141} and therefore are ineligible for the credit. For

138. Section 714 of the California Civil Code generally invalidates covenants restricting solar energy development. \textit{Cal. Civ. Code} \textsection 714 (West Supp. 1980). However, the legislation also seeks to balance the importance of the solar policy with recognition of neighborhood aesthetic interests. This aspect of the legislation prompted one author to observe that “[w]here it is possible to reduce a system’s visual impact at a low dollar or efficiency cost, for example by placing collectors flush with the roof . . . the legislation permits such restrictions to be enforced.” Wiley, \textit{Private Land Use Controls as Barriers to Solar Development: The Need for State Legislation}, 1 Solar L. Rep. 281, 300-01 (1979). Unfortunately, this suggestion illustrates how the tax policy may sometimes interfere with the resolution of conflicts between private parties. If the collectors were flush with a roof, the taxpayer would not be entitled to any tax credit under the Energy Tax Act.

139. I.R.C. \textsection 44C(c)(2)(D).

140. Thermosiphon systems use natural convection for heat distribution. Instead of moving the heat by mechanical means, as is the case in an active system, a thermosiphon system places the space to be heated above the collector to allow natural heat distribution by convection. \textit{Sunset Books and Magazine, Solar Heating} 20 (1978).

141. For example, passive applications may use portions of a residential structure to serve as solar collectors so as to add heat to a residence. See Minan & Lawrence, \textit{supra} note
example, trombe or extra thick walls intended to operate as direct gain systems, skylights, greenhouses, and roof overhangs are not eligible as solar energy property because they serve a dual purpose.\textsuperscript{142} In short, the proposed regulations implementing the tax credit purport to include passive design, but, in fact, exclude most passive features.

The dual function limitation is undesirable. Passive systems often are more cost effective than active systems that save equivalent amounts of energy.\textsuperscript{143} Because there are no moving or mechanical parts to maintain, repair, or replace, passive systems generally are more reliable than active systems. In addition, because most passive applications cost less to install than comparable energy saving active systems, less public support in the form of tax credits is required to achieve the same energy savings. Thus more public benefit with less public support is potentially available if the dual function requirement is eliminated.

Excluding most passive systems also tends to discriminate against lower income families who cannot afford the higher priced active systems.\textsuperscript{144} An example of the participation of all income classes in a tax credit program is provided in New Mexico where the state solar tax credit is applicable to both active and passive systems.\textsuperscript{145} In 1977, the last year for which all statistics are available, 13.5\% of all claims were from low income taxpayers, with another 30.3\% from lower-middle income taxpayers. Of all claims approved, 73\% were in the low through middle income level. In 1978, 55\% of the claims received appear to be for passive systems, 29\% of which are for attached greenhouses installed primarily by low and lower-middle income taxpayers.\textsuperscript{146}

The policy question of whether to include passive systems and techniques within the scope of tax incentive legislation\textsuperscript{147} should

\textsuperscript{142} 44 Fed. Reg. 29,928 (1979) (to be codified at 26 C.F.R. § 1.44C-2(f)).

\textsuperscript{143} Minan & Lawrence, supra note 14, at 840.

\textsuperscript{144} Discrimination against low income families is also apparent in the fact that the energy credit cannot be claimed on the short-form 1040A tax return which typically is used by lower income taxpayers.

\textsuperscript{145} N.M. STAT. ANN. § 7-2-16 (Supp. 1978).

\textsuperscript{146} Letter from Larry Kehoe, Secretary, Energy and Minerals Department, State of New Mexico to Commissioner of Internal Revenue (June 20, 1979) (copy on file with the Hastings Law Journal).

\textsuperscript{147} The sun can provide a substantial part of the heating or cooling needs of almost any building. By orienting a building and its windows in accordance with the path of the
not be resolved without considering important technical factors. Comprehensive planning and coordination are essential to achieving maximum efficiency from any type of energy system. Installing active solar energy systems to regulate air temperature in structures designed for conventional systems often will result in low operating efficiency rates unless passive methods also are incorporated. Many passive systems and techniques entail merely the proper orientation of structural elements serving other purposes, so that the additional cost of their implementation in a new structure may be minimal. The cost is higher, however, when special materials or structures are required and when passive methods are used to accommodate existing structures to solar use. Including passive systems for tax incentive eligibility irrespective of whether a dual function is served will encourage the most efficient solar energy use, which in turn will enhance the economics of making a solar investment. The practical effect of excluding passive applications may be to encourage inefficient architectural design. Thus, to achieve the tax legislation's logical objective of proper and effective utilization of the entire solar resource, the dual function regulation should not be adopted.

Regulations excluding passive applications also are undesirable as a matter of policy. An argument can be made that Congress did not intend this result. The legislative history of the Energy Tax Act does provide that "expenditures for materials and components which will serve a significant structural function (e.g., extra thick walls) would not be eligible for the credit." Notwithstanding the legislative history, neither the language of the Energy Tax Act nor the Windfall Profit Act excludes all dual function items. The Energy Tax Act provides: "The term 'renewable energy source property' means property which . . . transmits or uses solar energy sun, energy savings may be realized both in heating and cooling. From a policy perspective, a major issue certain to develop is the point in the process of orientation at which the design becomes eligible for favorable solar-tax treatment. The practical difficulties of administering eligibility questions for passive designs should be considered in such a determination.

148. Recently, states have enacted laws requiring or allowing at local option consideration of solar energy potential, which includes building orientation, in land use decisions. See, e.g., CONN. GEN. STAT. ANN. §§ 8-2, 8-13d, 8-25, 8-35a (West Supp. 1980). California addresses planning and zoning concerns in its Solar Rights Act of 1978. CAL. GOV'T CODE §§ 66473.1, 66475.3 (West Supp. 1980). Subdivision design now must reflect future passive or natural heating or cooling opportunities on required maps.

... for the purpose of heating or cooling such dwelling or providing hot water ...” 150 This language, which was not changed by the Windfall Profit Act, broadly states a policy to encourage solar development. The term should be construed liberally to include as many solar system designs as accomplish objectives of the Energy Tax Act. Furthermore, the law provides: “The term ‘renewable energy source expenditure’ does not include any expenditure properly allocable to ... any ... energy storage medium which has a primary function other than the function of such storage.”151 The dual function approach thus is applied conspicuously only to equipment or items serving an energy storage function. Passive applications not serving a primary storage function should not be excluded.

The broader question is whether to exclude, as a matter of policy, expenditures for materials and components of both active and passive systems serving a “significant” structural function. At least two arguments can be made for excluding these expenditures. First, if expenditures for items serving a “significant” structural function are allowed, special lengthy and complex rules probably would be required to regulate eligibility. The Domestic Policy Review of Solar Energy explains the exclusion on the basis of the difficulty in distinguishing the cost of the “solar system” from the cost of the house.152 Second, expanding the eligibility criteria creates a substantially greater solar energy subsidy than currently is provided.

The need for lengthy and complex rules to regulate eligibility easily is exaggerated. The issue is essentially a definitional one, inherent in any developing technology. With technical assistance from the Department of Energy and from those states extending tax incentive eligibility to a broader range of passive applications, this administrative difficulty can be resolved adequately. Expanding the eligibility requirement undoubtedly would result in greater solar energy subsidies. Resolving this issue turns on the determination of spending priorities. The policies of reducing energy consumption of conventional fuels, particularly oil and natural gas, developing renewable energy sources, and promoting the efficient and cost effective use of active solar systems would be advanced by

151. Id. § 44C(c)(2)(C).
amending the current law. The failure to include structural components of passive systems, which conserve and store energy, slows the rate of passive commercialization. The problem is further compounded by the principal residence requirement because this limitation prevents homebuilders from having any incentive to construct solar homes.

**Renewable Energy Source Property and Energy Conservation Measures**

Although designed to operate independently, a relationship exists between the renewable energy source expenditure and the energy conservation expenditure. The maximum federal residential credit under the Windfall Profit Act is $4,000 for renewable energy source expenditures.\textsuperscript{153} This limit is fixed even though the taxpayer makes expenditures in excess of $10,000. However, if some of the expenditures to the solar energy system are made for insulating the piping and storage components of the system, each of which may qualify as an energy saving component,\textsuperscript{154} a combined credit of $4,300 ($4,000 for the renewable energy source expenditure plus $300 for the home energy conservation credit) may be realized on an expenditure of $12,000. Of course, the technical requirements of a home energy expenditure must be met. When a home energy conservation expenditure is part of the solar energy system, claiming it as part of the renewable energy source property credit is to the taxpayer's advantage when the total cost of the system is less than $10,000 because the option of claiming the home energy conservation credit in the future is left available. Similarly, the expenditure should be claimed as a conservation measure for retrofit installations where the total installation costs exceed $10,000.

**Business Energy Investment Credit**

Title III of the Energy Tax Act amended the regular business investment credit laws and permitted an energy investment credit for energy property acquired or constructed by businesses.\textsuperscript{155} The energy investment credit is calculated separately from the regular investment credit, but operates in tandem with it.\textsuperscript{156} Some prop-

\textsuperscript{153} I.R.C. § 44C(b)(2).
\textsuperscript{154} Id. § 44C(c)(1).
\textsuperscript{155} Id. § 48(l).
\textsuperscript{156} Id. § 48(o)(1)-(2).
sority may qualify for both credits, such as a commercial or industrial investment in a solar process heating system that is used in the manufacturing procedure.\textsuperscript{157} Even in cases where the energy property is not eligible for the regular investment credit, however, it may still qualify for the energy investment credit. Unfortunately, both types of credits suffer the inherent limitation endemic to tax credits generally. As a practical matter, the incentive is available only to entities having sufficient income and associated tax liability to be offset by the credit. Thus, price or loan guarantees or other special incentives may be necessary to afford smaller businesses the opportunity to participate in solar energy development.

\textbf{Regular Business Investment Credit}

The regular business investment credit is an incentive device intended to stimulate the purchase or modernization of certain kinds of productive assets.\textsuperscript{158} The principal types of assets eligible for this investment credit are machinery, equipment, and other tangible personal property used in a trade or business, or held for investment.\textsuperscript{159} Although the technical requirements to qualify for a regular investment tax credit are complicated, the property generally must be depreciable, have a useful life of at least three years, be tangible business personalty or certain realty other than a building and its structural components, be used as an integral part of the taxpayer’s business, and be placed in service during the tax year.\textsuperscript{160} Because the property must be used as an integral part of the manufacturing or production process, solar space heating and cooling systems generally would not qualify.\textsuperscript{161} Solar hot water, process heat, and photovoltaic systems may qualify under limited

\textsuperscript{157} Heating and cooling systems that are structural components of a building generally do not qualify for the regular investment credit. See id. §§ 38, 46. Thus, when solar devices are used for heating and cooling industrial and commercial buildings, the taxpayer will receive only a 15\% credit under the Windfall Profit Act because heating and cooling systems are ineligible under the Internal Revenue Code for the regular credit.

\textsuperscript{158} The credit permits the purchaser of productive assets to reduce federal income tax liability by a percentage of the amount spent for the assets. A business that acquires new or used depreciable property also may qualify for this investment under §§ 38 and 48(a) of the Internal Revenue Code.


\textsuperscript{160} I.R.C. § 48(a).

\textsuperscript{161} The “term section 38 property” means tangible personal property other than air conditioning or heating units. Id. § 48(a)(1).
The regular investment credit permits the purchaser to reduce federal income tax liability by a percentage of the amount spent for the assets. The credit is currently allowable up to 10% of the eligible investment\textsuperscript{162} with a maximum allowable credit equal to the lesser of the tax liability shown on the tax return or $25,000 plus 70% of the tax liability in excess of $25,000.\textsuperscript{165} The percentage of tax liability in excess of $25,000 increases to 80% for tax years ending in 1981 and to 90% for tax years ending in 1982 or thereafter.\textsuperscript{164} The actual amount of the credit also depends on the useful life of the equipment and whether it is new or used.\textsuperscript{165}

**Energy Investment Credit Requirements**

To qualify for the energy investment tax credit under the Energy Tax Act the energy property must fall within one of six separately defined categories: alternative energy property,\textsuperscript{166} solar or wind energy property,\textsuperscript{167} specially defined energy property,\textsuperscript{168} recycling equipment,\textsuperscript{169} shale oil equipment,\textsuperscript{170} or equipment for producing natural gas from geopressed brine.\textsuperscript{171} The Windfall Profit Act added three additional categories: qualified hydroelectric generating property,\textsuperscript{172} cogeneration equipment,\textsuperscript{173} and qualified inter-

\begin{itemize}
  \item \textsuperscript{162} Id. § 46(a)(2)(B).
  \item \textsuperscript{163} Id. § 46(a)(3).
  \item \textsuperscript{164} Id.
  \item \textsuperscript{165} Id. §§ 46(c), 48(c).
  \item \textsuperscript{166} Id. § 48(l)(2)(A)(i). For a definition of what constitutes alternative energy property, see id. § 48(l)(3).
  \item \textsuperscript{167} Id. § 48(l)(2)(A)(ii). Solar or wind energy property includes any equipment using solar or wind energy to heat or cool, to provide hot water for use in a structure, to generate electricity, or to provide solar process heat. Id. § 48(l)(4).
  \item \textsuperscript{168} Id. § 48(l)(2)(A)(iii). Specially defined energy property means "(A) a recuperator, (B) a heat wheel, (C) a regenerator, (D) a heat exchanger, (E) a waste heat boiler, (F) a heat pipe, (G) an automatic energy control system, (H) a turbulator, (I) a preheater, (J) a combustible gas recovery system, (K) an economizer, (L) modifications to alumina electrolytic cells, or (M) any other property of a kind specified by the Secretary by regulations, the principal purpose of which is reducing the amount of energy consumed in any existing industrial or commercial process and which is installed in connection with an existing industrial or commercial facility." Id. § 48(l)(5).
  \item \textsuperscript{169} Id. § 48(l)(2)(A)(iv).
  \item \textsuperscript{170} Id. § 48(l)(2)(A)(v).
  \item \textsuperscript{171} Id. § 48(l)(2)(A)(vi).
  \item \textsuperscript{172} Id. § 48(l)(2)(A)(vii). For a definition of qualified hydroelectric generating property, see id. § 48(l)(13).
  \item \textsuperscript{173} Id. § 48(l)(2)(A)(viii). Cogeneration equipment generally means property which is an integral part of a system which uses the same fuel to produce both qualified energy and
city buses. Passive solar systems and structural components of buildings such as walls do not qualify as energy property; this credit thus is subject to the same criticisms and analysis advanced in connection with the residential energy credit.

Solar or wind energy property must meet the performance and quality standards issued by the Secretary of the Treasury effective at the time of purchase. In addition, the solar energy property must be capable of "amortization" or "depreciation," have a useful life of at least three years as determined at the time the property is placed in service, and be new. Used property, which may qualify for the regular investment credit, does not qualify for the energy credit.

Under the Energy Tax Act, to qualify for the business credit the energy property must have been acquired and placed in service during the period October 1, 1978, through December 31, 1982. If the property was under construction (a category which also includes reconstruction and erection) before October 1, 1978, it would qualify if the construction was completed and the property placed in service after September 30, 1978. The business energy property credit expired too soon to have a large impact on the business sector. Cost-reducing solar technology improvements may take a number of years to implement and by then the credit would have expired. Photovoltaics, for example, may just begin to become cost effective in the next few years. In addition, many businesses would be hesitant or unable to commit funds for solar conversion in time to take advantage of the credit because the planning effort required for integrating solar applications may exceed the life of the credit. For these reasons, the termination date of the energy investment credit was extended by the Windfall Profit Act. The termination date now coincides with the termination of the resi-

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174. Id. § 48(b)(14). Qualified intracity buses generally include automobile buses with a seating capacity of more than 35 and which are used predominantly by the taxpayer in the business of furnishing intracity passenger transportation. Id. § 48(b)(15).
175. See notes 147-49 & accompanying text supra.
177. Id. § 48(b)(2)(A)(ix).
178. Id. § 48(b)(2)(A)(ix).
179. Id. § 48(b)(2)(B)(ii).
180. Id. § 48(b)(2)(B).
181. See DOMESTIC POLICY REVIEW, supra note 1, at 10.
dential energy credit, December 31, 1985.\textsuperscript{182}

As with the regular investment credit, the useful life of the property affects the amount of the credit. For example, the energy credit allowable under the Energy Tax Act is 10\% of the cost of the qualified investment when the energy property has a useful life of seven years or more and is installed between October 1, 1978, and December 31, 1979.\textsuperscript{183} After December 31, 1979, the Windfall Profit Tax increases the credit to 15\%.\textsuperscript{184} The Senate Finance Committee Report and the Senate floor debates on the Energy Tax Act demonstrate that the Senate had very little concrete evidence before it as to why the selected level of funding was appropriate.\textsuperscript{185} Although the credit was increased by the Windfall Profit Act, it does not come close to providing the fifty percent minimum subsidy that many solar manufacturers and government officials believe is necessary to stimulate a large, commercial market. Moreover, the Domestic Policy Review of Solar Energy recognizes the general inadequacy of the size of the credit.\textsuperscript{186} Thus, the size of the credit should be increased by amending the current law.

\textit{Refunds and Carryovers}

The energy investment credit generally is limited to the amount of the taxpayer's tax liability. Under the Energy Tax Act, the amount by which the credit for most types of energy investments exceeded the tax liability was not refundable; the excess, however, was subject to carryback or carryforward provisions.\textsuperscript{187} The Energy Tax Act contained special rules for determining the amount of the tax liability that can be offset by the nonrefundable part of the energy credit. Special rules also applied when the taxpayer took an investment credit for more than solar energy property. In the case of solar or wind energy property, the credit was refundable when the credit exceeded tax liability.\textsuperscript{188} Apart from

\begin{footnotesize}
\begin{enumerate}
\item \textsuperscript{182} I.R.C. \textsuperscript{\textsection} 46(a)(2)(C).
\item \textsuperscript{183} Id.
\item \textsuperscript{184} Id.
\item \textsuperscript{187} I.R.C. \textsuperscript{\textsection} 46(b).
\item \textsuperscript{188} Former I.R.C. \textsuperscript{\textsection} 46(a)(10)(C) (1978).
\end{enumerate}
\end{footnotesize}
the obvious fact that Congress gave solar and wind energy property expenditures a higher priority by making them refundable, the justification for making the credit for other types of energy property was not clear. Presumably the decision was based, at least in part, on the financial drain to the public fisc.

In claiming the credit available under the Energy Tax Act, the regular investment credit offsets the tax liability first. The first-in first-out rule of Internal Revenue Code section 46(a) continues to apply with respect to the stacking of credits within the limitation.189 The regular investment credit is followed by the nonrefundable portion of the energy property credit,190 and then by any refundable portion of the energy property credit.191

The following illustration demonstrates the refundability feature available under the Energy Tax Act. In June 1979, Solar-Hope Corporation purchases equipment costing $10,000 with a ten year useful life. The purchase qualifies for both the regular and the energy investment credits. Of the $10,000 total cost, $4,000 qualifies as alternative energy property and $6,000 qualifies as solar energy property. If Solar-Hope's tax liability before credits is $1,500, the credits would be taken as follows:

<table>
<thead>
<tr>
<th>1979 Tax Liability before credits</th>
<th>$1,500</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less: Regular Investment credit:</td>
<td>1,000</td>
</tr>
<tr>
<td>(10% x $10,000 cost)</td>
<td></td>
</tr>
<tr>
<td>Tax Liability remaining for nonrefundable energy credit</td>
<td>500</td>
</tr>
<tr>
<td>Less: Alternative energy credit:</td>
<td>400</td>
</tr>
<tr>
<td>(10% x $4,000 alternative energy property cost)</td>
<td></td>
</tr>
<tr>
<td>Tax Liability remaining for refundable energy credit:</td>
<td>100</td>
</tr>
<tr>
<td>Less: Solar Energy Credit:</td>
<td>600</td>
</tr>
<tr>
<td>(10% x $6,000 solar energy property cost)</td>
<td></td>
</tr>
<tr>
<td>Refund to Solar-Hope Corporation</td>
<td>$500</td>
</tr>
</tbody>
</table>

If Solar-Hope's tax liability before credits had been $500, rather than $1,500, the regular investment credit would be applied first as in the above illustration. Because the regular investment credit exceeds the tax liability, the excess of $500 plus the $400 energy credit attributable to the alternative energy property would be ei-

190. Id. § 46(a)(10)(A)(ii).
191. Id. § 46(a)(10)(A)(iii).
ther an investment credit carryback or carryover to another year’s tax liabilities. In addition, the entire $600 solar energy credit would be refunded to the corporation. The refundability of the solar energy credit is not affected by the alternative energy property carryback or carryover provisions.

The Windfall Profit Act repealed the refundability feature of energy credits for solar or wind energy property investments made after December 31, 1979. This decision is unfortunate for a number of reasons. First, it reduces both the value and the attractiveness of the incentive. The current size of the credit is not sufficient to provide the type of stimulus needed to spur the widespread commercialization of solar use in the business community. Eliminating the refundability provision weakens the incentive further. Second, an incentive designed to have a more immediate impact is likely to be more effective. The refundability feature accomplishes this objective by avoiding carryover and carryback provisions. Providing the taxpayer with the full amount of the benefit as quickly as possible is especially important during a period of economic stagnation or decline. In addition, making the credit refundable encourages a larger number of businesses to participate because the benefit is available to businesses with uncertain or no expected tax liability in a particular year. Rather than encouraging more participation, repeal of the refundability provision is likely to have the opposite effect. Finally, repeal of the refundability provision in conjunction with the lack of an adequate subsidy evinces a weakening political commitment to solar energy.

**Tax Incentives and Solar Financing**

Businesses are very large consumers of thermal energy. This energy generally is provided by nonrenewable conventional resources. The solar energy property portion of the energy investment credit is designed to encourage businesses to replace conventionally powered systems with solar energy systems. The prospects for success through use of tax incentives are tempered by considerations not present in the program for residential applications. Whether businesses will invest in solar equipment depends in a large part on the general operation of the tax system and the typi-

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cal patterns of corporate financing.

The current business tax structure creates a bias against conversions to solar energy equipment. When a business purchases energy the cost is expensed at the time of purchase. For tax purposes, the cost of energy is immediately written off against gross income. Under the current business tax rate structure, which provides a maximum tax rate of 46% for most businesses, approximately one-half of the deduction for conventional energy expenses flows through to reduce current tax liability. In contrast, a purchase of solar equipment is not expensed, but is capitalized, and because the fuel—sunlight—is free, it also is not expensed. Capital investments cannot be written off in the year of purchase; a percentage of the cost, determined according to the useful life of the equipment, is instead taken as depreciation each year. Obtaining the benefit through depreciation or amortization produces less favorable tax consequences to the business than expensing the cost of fuel.

Furthermore, in corporate financial analysis, expensing an item is viewed much differently than capitalizing it. Expenses frequently are met out of the current cash flow of a business. In contrast, although capital investments may be financed out of earned surplus, they more often are financed by borrowing. The business decision to invest in solar equipment thus will be affected by the cost of borrowing, the discounted present value of future tax savings obtained by depreciation, and the size of the tax credit.

If two generally “acceptable” investment projects are being considered, a choice between them may be made by comparing their returns. While each of these variables affect the management decision to invest, increasing the size of the credit by amending the

193. I.R.C. § 162.
194. Id. § 11(b) provides: “The amount of the tax imposed by subsection (a) shall be the sum of . . . (1) 17 percent of so much of the taxable income as does not exceed $25,000; (2) 20 percent of so much of the taxable income as exceeds $25,000 but does not exceed $50,000; (3) 30 percent of so much of the taxable income as exceeds $50,000 but does not exceed $75,000; (4) 40 percent of so much of the taxable income as exceeds $75,000 but does not exceed $100,000; plus (5) 46 percent of so much of the taxable income as exceeds $100,000.”
195. Id. § 167. Depreciation refers to a deduction under § 167; if the deduction is under some other provision of the Internal Revenue Code, such as § 162, it is referred to as amortization.
current law would enhance the solar alternative's ability to compete effectively for investment funds. Another approach, which also has not been adopted, would be to allow the increased capital cost of the solar investment, relative to a comparable investment in a conventional system, determine the size of the tax credit. The amount of the credit could be increased by the ratio of the solar investment to the conventional investment; or the credit could be determined for the conventional investment and increased dollar-for-dollar by the difference between the solar investment and the conventional investment.

Although solar development can be spurred by further increases in the size of federal tax credits, if the national solar objectives are to be achieved Congress simply does not have the luxury of tinkering with the appropriate level of subsidization. Failure to resolve this fundamental question may result in a repeat of the phenomenon reported in 1977 when, prior to the enactment of the Energy Tax Act, many prospective purchasers delayed their decision awaiting action on the proposed federal tax credit. Predictably, acquisitions of solar equipment slowed, adversely affecting the solar industry. The appropriate level of support therefore should be fixed with certainty.

California Tax Credit Legislation

"System" Tax Credits

Under California law a taxpayer may claim a solar tax credit up to a maximum of $3,000 for each "solar energy system" installed. A "solar energy system" is defined in terms of the performance of the following six specific functions: water heating, space conditioning, production of electricity, process heat, etc.
solar mechanical energy,\textsuperscript{204} and wind energy for the production of electricity or mechanical work.\textsuperscript{205} The number of functions performed rather than the number of solar devices installed determines the number of credits available. Each allowable function performed by the solar equipment is eligible for a separate tax credit.

A single solar system would qualify for six separate credits if it performed each of the functions specified. In actual practice, however, a particular solar device rarely will combine more than three functions. The two most commonly combined functions are water heating and space heating or cooling. If one solar collector, for example, is interconnected with other solar equipment to serve the functions of water heating and space heating, the taxpayer can claim a maximum state credit of $6,000 for the installation. In claiming the credit, the taxpayer could attribute the cost of the solar collector to either the water heating system or to the space heating system, or could divide the cost equally between the two systems.\textsuperscript{206} Conversely, multiple solar energy systems performing the same function are treated for tax credit purposes as a single system. Thus, if the solar system heats a pool and also provides domestic hot water heating, only one credit is available because water heating is the single function being performed.\textsuperscript{207}

The “function approach” adopted by California represents the incentive value of tax legislation at its best. As a practical matter the cost of a solar energy system increases with the number of functions it performs. The tax incentive legislation recognizes this relationship and encourages the taxpayer to consider installing solar equipment that serves multiple functions. Multiple function systems can be technically integrated using, for example, the same collectors, which furthers the important objective of efficiency. The merits of this innovative approach warrant consideration at the federal level.

While the California credit of 55\% of the eligible cost up to a maximum credit of $3,000 per function generally is applicable to all solar applications,\textsuperscript{208} if a solar system is installed in a building

\begin{footnotes}
203. Id. § 17052.5(i)(6)(A)(iv).
204. Id. § 17052.5(i)(6)(A)(v).
205. Id. § 17052.5(i)(6)(A)(vi).
206. Id. § 17052.5(i)(7).
207. Id. § 17052.5(i)(6)(A)(i).
208. Id. § 17052.5(a)(2), (h).
\end{footnotes}
other than a single family residence and the cost of the system exceeds $12,000, the combined tax credit is 25% of the cost of the system. This special 25% provision is designed to provide an extra incentive for expensive nonresidential solar applications. This additional incentive is appropriate in light of estimates as to the deficiency in the amount of federal support.210

Maximizing Energy Conservation

A solar energy system may not save the maximum energy unless it is installed in conjunction with other energy conservation measures. To promote this end, the California law specifically provides that qualifying expenditures are considered part of the solar energy system, and thus eligible for the tax credit.211 The law also provides that “energy conservation measures which shall be eligible for the tax credit when applied in conjunction with solar energy systems shall be defined by the Energy Resources Conservation and Development Commission as part of the solar energy system eligibility criteria.”212

The California law envisions the use of conservation measures and entrusts the Energy Resources Conservation and Development Commission with the responsibility for defining the measures “which shall be eligible.”213 The regulations for the California energy tax credit provide generally that “[a]ll energy conservation measures, in order to be eligible for the tax credit, shall reduce the total conventional energy requirements of the installed solar system or of its conventional backup system, and must exceed the energy conservation building standards required by law at the time of original construction of the building.”214 The regulations also establish two categories of energy conservation measures: “required”215 and “other.”216 To qualify for the state tax credit as a required measure every space conditioning system installed in a residential building must include installation of certain energy con-

209. Id. § 17052.5(a)(3).
210. See notes 185-86 & accompanying text supra.
211. CAL. REV. & TAX. CODE § 17052.5(a)(5).
212. Id.
213. Id.
214. CAL. SOLAR TAX REGS. § 2604(d) (1979).
215. Id. § 2604(d)(1).
216. Id. § 2604(d)(2).
The "other measures" category provides that energy conservation measures which shall also be eligible when installed in conjunction with solar space conditioning systems shall include but not be limited to certain identified measures.\(^{218}\)

Requiring the taxpayer to take specified conservation measures in order to meet the eligibility requirement rationally advances the tax credit energy policy because the efficiency of a solar system can be affected directly by whether certain basic conservation measures are also taken.\(^{219}\) The requirement thus protects not only the state's investment in the public funds committed to solar development, but assists in ensuring that the taxpayer gets a more efficient and effective solar system. The problem with requiring certain conservation measures as a prerequisite to obtaining the tax credit, however, is that the California statute does not explicitly provide or authorize such a requirement. Rather, it merely provides that such measures can qualify as part of the cost of the solar system, not that they must be made. Thus, the regulations on this matter may exceed the power delegated by the legislature, and thus are arguably invalid. If the legislature actually approves of the concept of required energy conservation measures, the law should be amended to reflect this position and to avoid needless uncertainty.\(^{220}\)

Ownership Requirement and Passing the Tax Credit

To qualify for the California credit, the solar device must be installed on premises located within the state and owned by the taxpayer at the time of installation.\(^{221}\) "Premises" is defined broadly in the California legislation to mean "land, buildings, or

\(^{217}\) These measures are insulation of all accessible attic spaces over conditioned rooms to a level of R-19, weatherstripping of all windows, doors, and building seams in heated rooms of a structure, and insulation of all hot water pipes or hot air ducts between the solar collector and the storage tank. Id. § 2604(d)(1).

\(^{218}\) The measures include multiple pane windows, additional insulation, glazing, and intermittent ignition devices. Id. § 2604(d)(2).

\(^{219}\) For example, failure to insulate properly all the hot water pipes between the solar collector and the storage tank dramatically reduces the efficiency of the solar system.

\(^{220}\) See, e.g., A.B. 2100 § 1(a)(5) (1980), which would include various conservation measures within the term "solar energy system."

\(^{221}\) CAL. REV. & TAX. CODE § 17052.5(a)(2) (West Supp. 1980). The credit also is available to taxpayers who partially own and partially lease a solar system from a public utility. Id. § 17052.5(a)(6).
Owners” include duly recorded holders of legal title, lessees with at least three years remaining on their lease, persons purchasing premises under a contract of sale, or persons holding shares or membership in a cooperative housing corporation, the holding being a prerequisite to the exclusive right of occupancy to the premises. Unlike the federal requirements, the state eligibility criteria are the same for both residential and business installers.

By only requiring ownership of the premises rather than primary residence, the California law gives owner-developers or owner-builders a tax incentive to install solar systems in new homes. This eligibility allowance is significant because large scale development of solar energy depends on persuading developers and builders to use the technology. They, not the purchaser of the building, are the initial purchasers of solar equipment in new constructions, and they should be given the incentive to employ the solar technology. These owners may either claim the state tax credit or pass it through to the first buyer. In order to pass through the credit, the owner-developer or owner-builder must waive irrevocably any claim to the credit. Additionally, the credit associated with one function performed by the solar equipment may be passed through to the purchaser while the credit associated with other functions is retained. Thus, on a qualifying system with two functions, $3,000 can be passed through to the purchaser and $3,000 retained by the builder-developer. However, the statutory language does not reference the pass-through of a part of the credit as to each “system,” but refers only to “the tax credit for a solar energy system,” which necessarily would be concerned with the entire tax credit as to a solar energy system. The credit for a single function thus may not be split so as to obtain a partial pass-through.

Questions of statutory construction arise when applying the “premises” requirement. If, for example, a developer installs solar devices on each home being constructed in a subdivision, the developer arguably would be entitled to only one credit because only

222. Id. § 17052.5(i)(4).
223. Id. § 17052.5(i)(3).
224. Id. § 17052.5(a)(2).
225. Id. In addition, when the credit is passed through, the purchaser must claim the credit during the taxable year in which escrow closes or legal title is acquired.
226. See note 199 & accompanying text supra.
one tract of land is being developed. Because this interpretation severely limits the availability of the credit, the preferable interpretation is that the developer is entitled to a credit for each building or site on the tract of land. This conclusion is not only reasonable but also is buttressed by the statutory provision giving the developer the right to pass the credit through to the original purchaser of the home.²²⁸ The result of this interpretation should be contrasted with the homeowner who installs a solar water heater on his or her house and a swimming pool heater on a detached garage. Because two buildings are being serviced, one might argue that two credits are available. The California 1979 Solar Energy Credit Tax Return Form, however, uses this illustration as an instance where only one credit is available since only one function, water heating, is served by the two collectors.²²⁹

A more difficult case is illustrated by an apartment owner with two separate apartments on the same lot who installs a solar water heating system on each apartment. If the one-function rule is applied on the basis of the analogy to the homeowner illustration, only one credit is available. If, however, each unit is treated separately as in the developer illustration, two credits are available. Resolution of this type of question may turn on how the buildings are treated for purposes of general taxation. If the apartments are treated as separate businesses, a stronger argument can be made for the availability of two credits. If the apartments are managed as a single business, the analogy to the homeowner and the single credit is possible. Irrespective of the resolution of this precise question, the application of the premises rule can cause uncertainty in a variety of instances. Comprehensive regulations on such matters are necessary.

To qualify for the federal renewable energy source credit, a builder-developer must use the property as a principal residence.²³⁰ Because this requirement normally will not be met, the builder-developer will not be eligible for any residential federal credit. To qualify for the federal energy investment credit, the property must be retained by the builder-developer and depreciated.²³¹ Thus, the builder-developer is not likely to be eligible for the investment

²²⁸ Id.
²²⁹ 1979 California Solar Energy Credit, FTB Form 3805L, at 3.
²³¹ Id. §§ 48(o)(2), 47.
credit either. Under California law, however, owner-developers and owner-builders may claim the state tax credit. Because the owner-developer is eligible for the full 55% state credit and the purchaser is eligible for the full federal residential credit, the combined credit that theoretically can be received by the builder-developer and the buyer for the same solar energy system may be as high as 95% (55% state and 40% federal) of the installed costs. Thus, the builder has a tax incentive to install solar equipment in new homes, and the purchaser has a tax incentive to buy a solar equipped home.

California’s pass-through provision allows the builder-developer to market a home using the availability of the credit as a selling option because part of the cost of the solar application is subsidized by the public. The extent to which builder-developers use the pass-through provision as a marketing option also will be affected by the general adjustments required to the basis of the solar energy system. The basis of any system for which a credit is allowed must either be reduced to its salvage value at the end of its useful life, or reduced by the amount of the credit, whichever results in the lesser basis. Therefore, in the event a builder claims a state tax credit for the solar energy system installed in a new residence, his or her basis in the system must be reduced which in turn adversely affects the builder-developer’s federal income tax liability when the property is sold. Some locales now require by ordinance that solar systems be installed in new residential buildings. In these instances, giving the builder-developer the option of claiming a tax incentive for complying with such ordinances ensures a greater degree of supportive cooperation for such measures.

233. If the federal home energy conservation credit also is claimed, the total credit may be greater than 95%.
234. CAL. REV. & TAX. CODE § 17052.5(c) (West Supp. 1980).
235. For example, SAN DIEGO COUNTY CODE § 53.119 (1978) requires solar water heating systems to be installed in new residential buildings constructed in all unincorporated areas not served by natural gas after October 1, 1979, and within all unincorporated areas, including those served by natural gas, after October 1, 1980. Santa Barbara Ordinance No. 3115, adopted September 17, 1979, states: “No permit shall be issued by the administrative authority for a new residential building in the unincorporated area of Santa Barbara County not being served by pipeline natural gas unless said building includes the use of a solar energy system as the primary means of heating water.”
236. This cooperation also depends on the builder-developer being able to rely on adequate equipment standards and certification procedures for installers.
By selectively apportioning the federal and state income tax credits, the builder-developer and buyer can increase the total amount of the credit applicable to the solar installation. This result is conceptually possible in other contexts as well. For example, if a tenant installs a solar energy system on premises used as his or her principal residence, the tenant may qualify for the federal renewable energy source credit. Federal law does not require the tenant to use or retain the system for any specified period of time. The tenant then should be able to sell the system to the landlord making the landlord eligible for the state tax credit since the landlord meets the state ownership requirement and has incurred the cost of the solar installation.237 The full state credit should be available because the landlord was not eligible for the federal credit because of the principal residence and original use requirements. The California statute provides that “the owner of the premises on which the solar energy system is installed may claim the tax credit for costs incurred . . . .”238 The fact that the landlord did not install the system arguably does not control state eligibility because it does not control in the analogous builder-developer and purchaser situation. If, however, the sale by the renter occurred in a taxable year later than the year of installation, the expenditure would not be eligible because the state law requires the credit to be claimed for the taxable year in which the solar system was installed.239

Warranty Requirements

Federal law requires that the solar energy system be expected to last at least five years in order to be eligible for the renewable energy resource tax incentive,240 and have a useful life of at least three years in order to qualify for the energy investment credit.241 Although the system also must meet certain performance and quality standards to be specified by the Secretary of the Treasury, warranties are not required. In contrast, California imposes substantial warranty requirements, independent of any testing program or standards, as a prerequisite to obtaining the solar tax

238. Id. § 17082.5(a)(2).
239. Id.
240. I.R.C. § 44C(c)(5)(C).
241. Id. § 48(l)(2)(C).
credit. The California regulations require written manufacturer\textsuperscript{242} and contractor\textsuperscript{243} warranties for active solar systems.\textsuperscript{244} Passive thermal systems are exempted from these warranty requirements.\textsuperscript{245}

The warranty provisions required of manufacturers and contractors have different conditions and limitations, but a number of requirements are common to both.\textsuperscript{246} The language used must

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  \item \textsuperscript{242} Manufacturers include those individuals, corporations, or other legal entities assembling, producing, or manufacturing solar systems or components. Cal. Solar Tax Regs. § 2602(e) (1979).
  \item \textsuperscript{243} Contractors are those who install the equipment or components and are properly licensed. Id. § 2602(b). See also Cal. Bus. & Prof. Code §§ 7065-7076.5 (1979).
  \item \textsuperscript{244} Cal. Solar Tax Regs. § 2601(e)(1) (1979). When a manufacturer is also the contractor two separate warranties may be given, or the warranties may be combined provided the minimum requirements of each are met.
  \item \textsuperscript{245} Id.
  \item \textsuperscript{246} Warranties must include provisions giving the buyer the option of resolving any dispute by arbitration in California according to the rules of the American Arbitration Association. Id. § 2601(e)(2)(G). It also must list a customer service representative in California by name, street address, and telephone numbers. Id. § 2601(e)(2)(H). If the manufacturer's or contractor's principal office is outside the state, the warranty must contain the name and address of a California agent designated for service of process. Id. § 2601(e)(2)(I).
  \end{itemize}

The manufacturer must warrant the solar collectors, storage units, and heat exchangers for a minimum term of three years. Id. § 2601(e)(3)(B). Pumps and controllers must be warranted for a minimum term of one year. Id. § 2601(e)(3)(B). Generally, the manufacturer's warranty begins on the date of sale. Id. § 2601(e)(3)(A). However, when the item warranted is installed by a contractor, the warranty term commences upon completion of the installation. Id. § 2601(e)(4)(B).

The manufacturer's warranty is required to include certain additional terms and conditions. The warranty must provide that the device or equipment is free from defects in material and workmanship, and from any other malfunction or failure to perform. Id. § 2601(e)(3)(C)(1). With the exception of corrosion in collectors, the warranty must provide that the manufacturer will remedy the defect (at the site if necessary) without charge and within a reasonable time if the defect occurs within the warranty term. Id. § 2601(e)(3)(C)(2). For corrosion defects in the collectors within three years of installation, the manufacturer is required to remedy the defect during the first year without charge. Id. § 2601(e)(3)(C)(3). During the remaining two years of the warranty term, the corrosion warranty must cover the cost of all parts delivered to the site which are necessary to remedy the corrosion defect, including the cost of furnishing a new collector if necessary. Id. The manufacturer's warranty may specify reasonable use conditions and procedures for installation and maintenance including specifications of incompatible components. Id. § 2601(e)(3)(C)(4). However, the warranty may not be voided or reduced by conditions that may occur in normal operation. Id. Finally, the manufacturer must reimburse the contractor for expenses incurred in remedying defects which breach the manufacturer's warranty. Id. § 2601(e)(3)(C)(5).

If defects or malfunctions occur within the warranty term, the contractor must warrant to remedy the defect without charge, within a reasonable time, and at the site if necessary. Id. § 2601(e)(4)(C)(3). The warranty also is required to provide for a free field inspection for a period of one year from the date of installation to verify failure, to establish probable
comply with the disclosure standards of the federal Magnuson-Moss Consumer Warranty Act247 and its applicable regulations,248 and with the California Song-Beverly Consumer Warranty Act.249 Additionally, it must be a “full” warranty embodying all the terms and conditions specified in the federal minimum standards for “full” warranties.250 As to the persons protected, the warranties must extend for the warranty period to the owner of the premises, including the first retail purchaser of the solar equipment and any succeeding owner of the premises.251 The manufacturer or contractor may not disclaim implied warranties beyond the duration of the express warranties and may not limit the purchaser’s right to recover consequential damages to the system occasioned by improperly functioning equipment or incidental expenses incurred by needed repairs and replacement of any damaged equipment.252 The warranty also must state that the system or components and the accompanying warranty comply with the tax credit guidelines of the California Energy Commission.253

One of the important barriers to expanded solar use is lack of consumer confidence in the quality of the product. The warranty requirements established as a prerequisite to obtaining the California tax credit have been mandated in response to recognized

cause, and to determine required corrective action. Id. § 2601(e)(4)(C)(4). In addition, the contractor must warrant that all necessary building permits have been obtained and that the contractor has complied substantially with their terms and conditions. Id. § 2601(e)(4)(C)(5). A contractor’s warranty need not apply to any equipment that is not part of the system or component installed. Id. § 2601(e)(4)(A). Taxpayers who build their own solar system do not need a contractor’s warranty in order to qualify for the state tax incentive.

247. 15 U.S.C. §§ 2301-2312 (1976). The Magnuson-Moss Consumer Warranty Act only specifies disclosure standards in the event a warranty is used. Generally, it requires the parts covered by the warranty to be identified clearly and simply, and to indicate what will be done by the warrantor in the event of a defect. All written warranties on consumer products costing more than $10 must be prominently designated as either “full” or “limited” warranties. To be labeled “full,” the warranty must satisfy minimum federal standards; any defective products must be remedied by the warrantor without charge. The implied warranties of merchantability or fitness for a particular purpose created under state law may not be disclaimed or limited. Finally, any disclaimer of consequential damages must be conspicuous. See generally Schroeder, Private Actions under the Magnuson-Moss Warranty Act, 66 CALIF. L. REV. 1 (1978).

252. Id. § 2601(e)(2)(F).
253. Id. § 2601(e)(2)(J).
problems. Poor design and inadequate installation of solar equipment have resulted in well publicized solar system failures.\textsuperscript{254} Related problems with solar equipment include increased fire hazards resulting from high temperatures in the solar collector, damage to property or person from hot water leaks, and structural damage because of the additional weight of collectors.\textsuperscript{255} Recent experience demonstrates that a significant percentage of solar systems presently in operation have been installed improperly, indicating the importance of contractor warranties.\textsuperscript{256} Therefore, for a system or component installed by a contractor in California, the contractor is required to warrant that the system, including components and connecting parts, has been installed in a proper manner and is free from defects in material or workmanship or other malfunction or failure to perform in order to qualify for the state tax credit.\textsuperscript{257}

Warranties address only indirectly many of the potential problems with solar equipment. They have given consumers relatively little protection against poorly designed solar systems and fraudulent business practices.\textsuperscript{258} A warranty is only as good as the company backing it. Because most companies only recently have entered the fledgling solar industry, the question arises as to

\begin{itemize}
\item \textsuperscript{254} See, e.g., Energy Daily, Oct. 5, 1978, at 3.
\item \textsuperscript{255} \textsc{General Accounting Office, Commercializing Solar Heating: A National Strategy Needed} 17 (1979) (report to the United States Congress by the Comptroller General).
\item \textsuperscript{256} The following observation based on site visits to installed solar units in Florida is illustrative: "In several instances the backup heating element on DHW [domestic hot water] systems was found to be providing all the hot water needs. Because the owners had a sufficient supply of hot water they assumed that the solar unit was functioning satisfactorily when, in fact, it was not. Because the domestic hot water load represents between one-fourth to one-fifth of the average residential energy load in Florida, any reductions in utility usage due to the solar system may be masked by variations in the remainder of the load." Yarosh & Litka, \textit{Solar Commercialization—The Consumer Experience}, at 13-14 (unpublished preliminary paper) (undated). San Diego Gas and Electric, in commenting on contractor performance under an experimental solar program, reported that the contractors had a tendency to not insulate all pipe runs, not install water heater blankets, and not install the solar system in accordance with specifications. Investigation by PUC into Intended Programs for the Sales, Leasing, Installation and Related Servicing of Solar Devices, at 15, OII No. 13 (June 15, 1979).
\item \textsuperscript{257} \textsc{Cal. Solar Tax Regs.} § 2601(e)(4)(C)(2) (1979). Actual installation may involve a number of skilled crafts. Solar heating and cooling systems, for example, may overlap the crafts of carpentry, plumbing, electrical, and sheet metal.
\end{itemize}
whether warranties effectively assure product quality. In addition, the use of warranties raises a fundamental policy conflict between the desire to protect consumers and promote their confidence in solar products, and the need to avoid imposing unnecessary costs that increase the price of the solar equipment and thus reduce the value of the incentive. Overly protective warranties can disproportionately affect businesses incapable or unwilling to provide the required warranties because of the uncertain risks associated with their product. This in turn can reduce innovation and ultimately undermine the objectives underlying the tax incentive initiative.

Despite these difficulties, warranties should be viewed as a desirable form of “insurance” likely to bolster general consumer confidence and protect the state’s commitment of public funds. Warranties may be especially useful in encouraging builder-developers to install solar equipment. Without mandatory warranties, they may view the increased potential liability associated with installing solar equipment as a significant barrier. With mandated warranties that reduce their financial exposure, builder-developers may find the tax incentive sufficiently attractive to promote aggressively the solar technology.

Consumer confidence in the eligibility of the solar system also is promoted through Cal Seal, a joint venture of the California Solar Energy Industries Association and the California Energy Commission providing guidance to purchasers wishing to claim the California solar tax credit. The program, which is entirely voluntary, reviews the technical information about an installed solar energy

259. In addition, some solar manufacturers have argued that warranty requirements are no more necessary for solar systems than for other durable goods. National Law Journal, Nov. 26, 1979, at 32, col. 1.

260. Many authorities contend that small firms have been the most innovative actors in new technological fields. See, e.g., Miller, Legal Obstacles to Decentralized Solar Energy Technology: Part II, 1 SOLAR L. REP. 761, 771 (1979). The first company exclusively in the solar business to go public, Solaron Corporation, is five years old and lost $750,000 on sales of $2,000,000 in 1978. FORTUNE, Sept. 24, 1979, at 68.

261. In 1979, the California Solar Energy Industry Association established an installation bonding program designed to guarantee the purchaser that the solar system is free from defects in material, workmanship, or installation. If the installing contractor is unable, unwilling, or unavailable to correct any of the covered defects, the bonding agency will assume the responsibility for seeing that the necessary repairs or modifications are made. The program, however, does not cover the manufacture of the solar system. While this program gives consumers an added level of protection, its principal limitation is that only California Solar Energy Industry Association members can subscribe to the program; therefore it operates independently of the tax credit legislation. See generally 1 SOLAR L. REP. 15 (1979).
system and determines whether or not technical requirements, promulgated by the California Energy Commission, have been met. While the Cal Seal label is not a prerequisite to receiving the state income tax credit, it is a reasonably good assurance that the system will qualify.\textsuperscript{262}

Notwithstanding the benefits of Cal Seal, because the California Energy Commission’s name appears on the certification label, several concerns have been voiced regarding the close relationship created between the public and private sector without the benefit of enabling legislation and the possibility of an improper delegation of authority.\textsuperscript{263} An additional fear is that consumers mistakenly will interpret the label as a state guarantee. Concern over potential liability of the Energy Commission in instances in which the Tax Franchise Board ultimately denies eligibility for the tax credit also has been registered.\textsuperscript{264} Yet these and other concerns should not obscure the benefit to solar development associated with the cooperation between the public and private sectors of the economy.

**Positioning of Devices**

Correct orientation of the solar energy system component collecting solar radiation is necessary to optimize the efficiency of the system. The proper orientation depends largely on the type of function performed. The regulations thus prescribe orientation and placement requirements for each function designed to ensure that energy efficiencies are achieved.\textsuperscript{265} Failure to meet those requirements will result in expenditures for the system being made ineligible for the tax credit. Although the regulations do not expressly so indicate, a space conditioning collector mounted horizontally

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\item \textsuperscript{263} The California solar tax credit legislation authorizes regulatory enactment of standards by two state agencies: “The Energy Resources Conservation and Development Commission shall, after one or more public hearings, establish guidelines and criteria for solar energy systems which shall be eligible for the credit provided by this section. Such guidelines and criteria may include, but shall not be limited to, minimum requirements for safety, reliability and durability of solar energy systems. The Franchise Tax Board shall prescribe such regulations as may be necessary to carry out the purpose of this section.” CAL. REV. & TAX. CODE § 17052.5(g) (West Supp. 1980).
\item \textsuperscript{264} See ASHWORTH, GREEN, POLLACK, ODLAND, SALTONSTALL & PERELMAN, THE IMPLEMENTATION OF STATE SOLAR INCENTIVES: A PRELIMINARY ASSESSMENT 117 (1978).
\item \textsuperscript{265} See CAL. SOLAR TAX REGS. §§ 2602(a), 2603(b), 2604(a)(2), 2605(b), 2607(b) (1979).
\end{itemize}
should qualify provided the surface receives direct solar radiation. The April 1978 regulations, which have been superseded, expressly provided that horizontal surfaces qualified; no policy reason exists to suggest an intent to change this result.

Qualifying Expenditures

All of the costs assignable to the purchase and installation of the solar energy system are eligible for the California tax credit. Eligible costs generally include the acquisition and recording of solar easements; architectural, engineering, design, and site-planning fees; site preparation and onsite fabrication charges; installation costs, including added construction or structural costs; fees for required building permits; and the costs for components such as collectors, pumps, tanks, piping, and controls, which are part of the solar system. For active thermal systems, an auxiliary backup component for water or space heating qualifies for the credit provided it is connected physically to the solar system and contributes less than one-half of the total annual energy supplied by the entire system. Expenditures for passive thermal systems, including solar glazing, solaria, and thermal ponds, are also eligible. Permitting all costs attributable to the purchase and installation of the solar energy system to be eligible for the tax credit provides the greatest incentive; the limitation that the backup system not contribute more than one-half of the annual energy supplied by the entire system ensures that the solar portion makes a substantial contribution.

Deductions, Depreciation, Refunds, and Carryover

The solar tax credit available under California law is taken in lieu of any deduction or depreciation otherwise available under state law as a result of the solar investment. This limitation has its principal impact on businesses because homeowners in Californ-
nia are not entitled to a special deduction. Making the credit in lieu of any deduction or depreciation is inconsistent with the policy underlying the special 25% provision designed to provide an additional incentive for expensive nonresidential solar applications and with estimates of the appropriate level of support.\footnote{274} Moreover, this limitation is antithetical to the federal investment energy requirement that the property be depreciated in order to receive the credit.\footnote{275} Allowing the taxpayer to claim both depreciation and the tax credit would provide not only a greater incentive, but would parallel the policy concerning depreciation under the federal law.

The state tax credit is limited in a particular tax year to the taxpayer's tax liability, with unused credit carried forward to subsequent years' tax liabilities.\footnote{276} As with the federal credits, however, the state carryover provisions can be criticized as providing a poor stimulus to taxpayers with uncertain tax liability between years.

\subsection*{Interrelationship with Federal Tax Credit}

State tax incentive legislation may establish an explicit relation with federal tax law. In California the combined effective credit for state and federal tax purposes is limited statutorily to 55\% of the system's cost by reducing the state tax credit in an amount equal to the allowed or allowable federal credit.\footnote{277} Other states have adopted different approaches, such as providing that the state tax benefits are in addition to the federal benefits\footnote{278} or are available only in lieu of any federal credit, deduction, exemption, or exclusion.\footnote{279} Other state statutes are silent on the precise relation with federal law. Presumably these states either ignored the possibility of federal action or preferred to respond retroactively, if at all, to the Energy Tax Act and the Windfall Profit Act.

A portion of what California gives to the taxpayer as an incen-
tive to install solar equipment is recovered by the federal government. In computing the federal income tax, a taxpayer who itemizes deductions may deduct state income taxes paid. When the deduction for state income taxes is reduced or eliminated because of a state tax credit, the taxpayer must pay federal income tax on the credit received. In other words, a federal tax is levied on the taxpayer's response to the state incentive. The amount of federal tax imposed on the state incentive depends on the taxpayer's tax bracket. Thus, if the taxpayer is in the 50% federal tax bracket, half the state credit will be recaptured by the federal income tax. Even though the incentive value of the state credit is somewhat undercut, however, the administrative convenience of determining the federal deduction based on the state tax paid militates against any special treatment for the solar tax credit.

The general interaction between the federal and California tax incentive laws is illustrated by the following example. Assume a residential taxpayer installs a solar hot water heating system on his or her home at a cost of $2,000 and that the cost of the system is eligible for the federal and state credits. The total allowable combined credit for California income tax purposes is $1,100 (the $2,000 cost multiplied by 55%). The allowable federal credit is $800 ($2,000 multiplied by 40%), and the state credit is $300 (the total allowable combined credit of $1,100 less the federal credit of $800). The actual state credit thus is only 15% of the cost of the installation not 55%. On more expensive solar applications the state credit supplements the federal credit at a higher rate. If the qualifying investment was $15,000, rather than $2,000, the total allowable credit would be 55% of $15,000 or $8,250. Of this total allowable combined credit only $7,000 could be taken: $4,000 as the maximum federal credit and $3,000 as the minimum state credit. The state credit for this expenditure would be 20% of the cost of the installation.

Requiring the taxpayer to take the federal credit before determining the allowable state credit seems to reflect the state policy of placing the primary responsibility for encouraging solar development on the federal government. This policy is curious because California's statewide goal of 1,500,000 installed solar applications

280. I.R.C. § 164.
281. To simplify the calculations involved, the example does not consider the federal home energy conservation credit.
by 1985 is relatively more ambitious than the federal nationwide goal of 2,500,000 solar installations by the same date.282 Moreover, California is quite some distance from realizing its laudable goal. As of April 1979, only 30,000 to 45,000 solar installations were reported to be in operation.283

Assuming all the costs claimed by the taxpayer are eligible for both the federal and state credits, the maximum California state credit for a single-function system would be realized when the cost equals or exceeds $13,273. The expenditure level that optimizes the benefit to a purchaser under California law can be determined by adding together the maximum available residential credits under state and federal law and dividing by 55%. Optimization of the federal and state credits occurs at exactly $13,273 which is $7,300 ($300 federal conservation credit, plus $4,000 federal residential energy credit, plus $3,000 state credit) divided by 55%. When the cost of the system exceeds this amount the credit per dollar expended decreases. For a two-function system the expenditure level that optimizes the federal and state credits is $18,727, which is the total credits possible of $10,300 ($6,000 state, and $4,300 federal) divided by 55%. The optimum expenditure level for systems performing additional functions is determined in a similar manner.

The optimization level is currently likely to have some impact on the pricing of solar systems. Sellers of solar systems have an incentive to ensure that the optimization level is reached in pricing the system. This motive may lead to oversizing the capacity of the installed system or overpricing it. These dangers are real because the government, not the buyer, is paying for the incremental cost through the tax credit. Because the solar industry is at the initial stage of development, competition among sellers may not be an effective mechanism to reduce or eliminate this danger. As competition increases and the solar market matures, however, the optimization level is not likely to influence significantly the price of solar equipment.

282. See notes 2-3 & accompanying text supra.

Conclusion

Proponents of any governmentally favored activity can, and frequently do, argue that the selected level of public support is insufficient. Notwithstanding the ready availability of this general complaint, such criticism can be directed appropriately at the federal tax incentives. The Domestic Policy Review of Solar Energy concluded that larger tax incentives would be required before they would have an impact on the business sector.284 This conclusion was based on an assessment of the incentives available under the Energy Tax Act. While the Windfall Profit Act increased the size of the energy investment tax credit, the change of only five percent is not likely to have an appreciable effect on solar use by businesses. The legislative history accompanying the relevant sections of the Energy Tax Act estimates a reduction in government receipts by $27,000,000 in 1978, $58,000,000 in 1979, and $186,000,000 for fiscal year 1985.285 Compared to the commitment of more than $200,000,000,000 during the last fifty years to conventional sources of energy, however, the present commitment to solar energy is negligible.

The proper level of public support should not be determined through experimentation. Widespread uncertainties as to the support level ultimately to be selected by Congress adversely affect solar development. In effect, purchasers are encouraged to postpone acquiring solar equipment until the incentives are increased, thus undermining the development of a viable solar industry. Certainly reassessment of the policy reflecting the appropriate commitment is prudent, but the process of continuing reassessment involves real dangers to the advancement of solar use.

As a practical matter, many passive systems do not qualify for tax incentives under the federal law. Admittedly, including passive systems requires the development of precise and clear regulations so that abuses do not occur and interpretative difficulties are minimized. However, the difficulty of accomplishing this task is no greater than with any other developing technology that government chooses to favor through tax incentives. Given the importance of passive systems in reducing energy consumption and their role in promoting efficient active solar systems, the current policy

of excluding passive systems serving a structural function should be rejected. The difficulty in distinguishing between the energy conserving features of a passive system and the structural function of a particular component is not sufficiently compelling to deny eligibility to passive components that are integral parts of the structure. The energy conserving feature of a passive application should be eligible for the tax credit.

The federal law is premised on the assumption that the qualifying solar system will be energy saving. This assumption may not be true for all qualifying expenditures. Regulations must address this assumption and ensure that all credits are based on system performance and energy savings. The policy to be advanced is the installation of energy saving solar systems not just solar systems.

The federal residential solar tax credit is not refundable. Thus, it provides no incentive to those taxpayers with insufficient tax liability to take advantage of the credit. Making the credit refundable would require a greater public subsidy, but it also would encourage greater public use of solar energy. In addition, it would reduce, in many instances, the time lag before the benefit is realized and eliminate the complicated provisions on carryover that some taxpayers may view as an obstacle to participating in the incentive program.

A number of aspects of the federal residential solar tax credit are unduly restrictive or underinclusive. The most important is the principal residence requirement. For reasons previously identified, the principal residence requirement should be rejected in favor of a broader incentive based on ownership. The Windfall Profit Act added the photovoltaic technology to the list of eligible property. Although one can argue that photovoltaics should be excluded from eligibility because the technology presently is not commercially feasible, the better assessment is that this is precisely the reason to include it. The sounder policy is to promote evolving solar technologies by making them eligible. The photovoltaic industry must be promoted by other governmental policies; however, tax incentive eligibility is not enough.

The energy investment credit available under the Energy Tax Act was due to expire in 1982. Terminating the incentive this soon was unwise. Businesses require more time to explore the feasibility of using solar equipment, to plan for its implementation, and actually to implement the plan. As a result, the Windfall Profit Act extended the credit through the end of 1985. This will aid compa-
nies requiring more time to assess the viability of the solar option, but the extension may not be great enough to allow serious consideration of photovoltaic options.

Most of the changes implemented by the Windfall Profit Act improved the tax incentive value of the federal law. Repeal of the refundability feature of the energy investment credit affecting solar use did not. This action was unwise. Unless changed, policymakers realistically cannot expect the business sector to promote vigorously the use of solar energy because the size of the current credit is simply insufficient. Other incentives, such as refundability, are needed.

As with many other state income tax laws, the California income tax is based structurally on the federal income tax. Given the insufficiency of the size of the federal credit, state tax incentives are an important supplement to the federal law. However, the California requirement that the federal credit be determined before computing the allowable state credit effectively places the primary responsibility for encouraging solar development on the federal government. This situation is further aggravated by the scheduled 1983 termination date of the California tax incentive law. Absent the use of other institutional mechanisms to promote solar use in California, these considerations are likely to be major obstacles in reaching the state goal of 1,500,000 solar installations by 1985.

The California law interfaces well with the federal law when all the costs of the solar investment qualify under both incentive provisions. If all costs are not eligible, however, substantial computational complexity occurs because of different eligibility requirements. Programs such as Cal Seal are important steps in managing this complexity. One important area meritng further consideration is whether the warranty requirements mandated under California law advance or undermine the goal of solar development. The alternative of adopting performance standards as the mechanism to

286. The state or local political entity, for example, may encourage solar development through subdivision ordinances. See, e.g., Cal. Gov't Code § 66473.1 (West Supp. 1980) (provides that the design of a subdivision for which a tentative map is required shall provide, to the extent feasible, for future passive or natural heating or cooling opportunities in the subdivision). Solar development also can be promoted through the public utility regulatory process. The PUC, for example, issued an interim order to designated utilities requiring them to present to the commission, within 60 days, a plan particular to each utility company and service territory for a demonstration financing program for solar water heater retrofit installations. See PUC Dec. No. 91272, OII No. 42 (January 29, 1980).
ensure energy savings and promote consumer confidence should be considered.

A final area demanding legislative consideration is the regulatory requirement that certain conservation measures be taken in order to qualify for the credit. The requirement is both rational and logical. The California statute, however, neither explicitly provides nor authorizes it. If the concept is viewed approvingly by the legislature, the law should be amended to reflect this approbation.

The prospects for expanded solar use have never been better. Federal and state tax incentive legislation alone will not induce a substantial conversion to solar energy. Other pressing and important legal issues also must be analyzed carefully before solar energy is propelled into the mainstream of our lives. Carefully conceived tax incentive legislation, however, can play a significant role in achieving this objective.288

287. The more important unresolved legal issues that affect solar development include: (1) regulation of building materials and design, (2) financing and marketing arrangements, (3) role of public utilities, (4) land-use planning, and (5) access to sunlight. These classifications are not mutually exclusive but overlap each other considerably.

288. California enacted tax legislation affecting solar development after this Article was prepared for publication. The 55% solar tax credit was extended through December 1, 1983, by A.B. 2036 (1980). In addition, two major differences in the new law provide: taxpayers with no state income taxes due will be allowed a cash refund equal to the credit, and the present 55% credit for recreational or therapeutic solar energy water systems will be reduced to 45% in 1981, 35% in 1982, and 25% in 1983. Also signed into law was A.B. 2893 (1980), which provides a 12-60 month accelerated amortization of alternate energy equipment. This deduction is in lieu of the solar tax credit available under A.B. 2036 (1980) and is designed to promote commercial, industrial, and agricultural solar uses.