AN EVALUATION OF
UNITED STATES FEDERAL GOVERNMENT PROGRAMS
AVAILABLE TO AID SMALL BUSINESS
IN THE ENERGY AREA

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Introduction

This report discusses how effective certain United States Government programs are in meeting United States energy goals and other policy goals, and makes recommendations for better achieving such goals. Thus, such goals constitute the background of this report. Still, it is important to realize that, despite this report's assumption of agreed-upon United States policy goals of energy self-sufficiency and of the desirability of a strong small business sector, there is actually a great deal of uncertainty about and lack of clarity in ranking the goals of United States energy and small business policy. Therefore, the desirable trade-offs among possibly conflicting goals are difficult to determine.

The answers to some of the policy questions we will raise (if only by implication) will demonstrate that the policies followed obviously reflect a great many other policy considerations than solely those of economic efficiency. One can get a good deal of analytical mileage from an explicit statement of what appear to be the United States Government's and the United States political universe's nonefficiency considerations and concerns. For purposes of this report, such analysis can be useful. One could argue that it is impossible to properly evaluate any policy-related proposal or recommendation without knowing the relevant objectives, or goals, and their relative importance. However, there is at present no coherent listing of those energy-policy and small business policy objectives, let alone a statement of their relative value where they conflict, as enunciated by the Federal Government. Nor does it seem likely that such a policy will emerge soon. Therefore, the
discussion which follows—which evaluates the impact of Federal Government programs related to energy financing operations in terms of their impact upon energy policy and small business policy—has much of a "what if" quality. That is, much of the body of this report will probably sound like "If we had a coherent national energy policy, and if we had a coherent set of national energy priorities, what would be the most likely effect of the existing federal mechanisms for financing energy policy upon participation by small business?" Nonetheless, this discussion will proceed as if the United States did, in fact, have relevant energy-related and small-business-related objectives and a clear idea of the priorities when the objectives conflict.

One of the major stated commitments of the United States Government is to encourage a vibrant small business sector in the United States economy. The United States small business sector is looked upon, quite properly, as an important source of technological innovations and also as an important source of new jobs for the economy. It is no secret that as larger corporations in more mature sectors of the economy slow down their rate of growth or begin declining, additional employment opportunities and the overall economic growth leading to higher standards of living must, in part, come from the growth of presently small firms, as well as from new firms springing up.

The current energy situation in the United States has generated an additional commitment besides those commitments which are related to small business. This additional priority is to make the United States as self-sufficient in energy, both currently and for the long term, as is economically
feasible (such economic feasibility not being explicitly defined and carrying an implicit political factor of national will, as well). The two goals—energy self-sufficiency and small business development and expansion—can be made complementary by encouraging the fullest possible participation by small businesses in the energy self-sufficiency efforts of the United States.

There are several areas in which small business can effectively participate in the energy business and in energy related businesses in the United States, in order to encourage United States self-sufficiency in energy. These areas include:

a) Encouraging energy conservation through technological innovations, i.e., by inventing active devices which reduce fuel consumption by automobiles, and home heating units, and by improving all related combustion oriented equipment; by inventing and/or improving methods or machinery which would permit manufacturing those devices more quickly and cheaply; and through improving the delivery systems of energy saving devices to the ultimate user, by innovations in marketing, installing, servicing and financing such devices.

b) Encouraging fuel conservation through the manufacture of chemical substances or through the development of new technology which would improve combustion, thereby reducing fuel consumption per unit of useful energy generated by automobiles, home heating units, factories, utilities, and related businesses.
c) Devising better methods of energy conservation through passive devices, e.g., through developing better methods of insulating factories, homes, and commercial buildings (both new buildings and existing structures), as well as methods of insulating refrigerators, freezers, industrial process ovens, smelters, furnaces and similar equipment.

d) Innovating new energy producing technology, through the utilization of sources of energy which are presently not economic in a relatively economically and technologically sophisticated area like the United States, even if such sources are used in the Third World. In the case of solar energy, this could be done through creating new equipment for electricity generation, through discovering or innovating new materials for the direct generation of electricity from the sun, and through better methods of heat storage. In the case of biomass, this could be done through generating electricity or methane from biomass sources, including residential garbage (where there is a substantial additional benefit to the urban structure through the reduction of garbage removal and disposal costs and lesser environmental degradation of the cities), contaminated grain and other deteriorated foods, farm waste, forest waste, cattle waste and sewage. Related to such new technology would be the incremental improvements and innovations, no single one of which may constitute a breakthrough, yet which all together can frequently constitute a major forward step in technology and in its economic application. That is, one
seeks not only trail-blazing inventions, but also subsequent innovation which takes place through the normal process of implementing a discovery on the "hands on" operating front, a process which is ordinarily described and measured through the learning curve.

e) Assisting in the discovery and development of conventional fuel sources, where large firms may be less efficient than small business because of certain diseconomies of scale. For example, much of the innovation in secondary recovery of oil, in tertiary recovery of oil, and in the utilization of coal culm banks, has been a result of the actions of small business. Since small business' relatively more flexible structure has permitted experimentation to be conducted with relatively small outlays, small business has often made discoveries which large business was then able to utilize.

f) Through devising financing and other distribution-related innovations which permit acquisition and financing of socially desirable equipment (or other items which serve the purpose of energy conservation or energy resource conservation) by persons, families, and possibly businesses who would otherwise probably not be able to secure them. For example, small businessmen who operate in depressed areas (as well as members of religious, racial or ethnic minorities who are homeowners or tenants), are
often unable to get financing for equipment, insulation or similar energy-saving items on acceptable terms. Innovation in financing and servicing which would permit small business to finance the energy efficient equipment that these parties would otherwise find unprofitable to install could be useful. (This invention is especially useful in instances where the credit risk may be acceptable to a small businessperson directly in touch with many of the buyers of such equipment, but where a large operator would not be able to respond with sufficient rapidity and sensitivity to certain of the religious, racial or ethnic factors relating to the customer's background).

To date, there is no single coordinated analysis of all the existing programs operated by the various Federal Government entities charged with responsibility for encouraging energy innovation by small business. Because of the absence of a single coordinated data source regarding all the existing programs by Federal Governments in this area, it has not been possible to conduct the analysis which would enable policymakers to determine which programs are of substantial actual or potential importance and value for the small business sector and concomitantly for the United States economy as a whole. Nor has it been possible to make an assessment on a statistically valid basis (since none of the base data available is complete and in suitable format) of the possible counterproductive aspects of existing Federal Government programs as they relate to or impact upon energy innovation or as they relate to or impact upon energy financing for small businesses. Broadly,
there has been no adequate study done from the viewpoint of the small businessman seeking financial backing from those Federal Government programs presumably available to help him of how effective these programs actually are.

This report is intended to fill in some of the gaps in the data and to evaluate, if only on an incomplete and impressionistic basis, some of the programs. The report evaluates, inter alia, the Inventors Evaluation Program, the Small Business Administration Energy Loan Program, and the Department of Energy Appropriate Technology Program, as well as the relevant Department of Energy and similar commercialization of technology programs. Such evaluation will also point out aspects of the counterproductivity of those and other existing programs. The evaluation includes an assessment of the present requirements for a small business entrepreneur (who is usually technologically or sales oriented) to submit extensive data or more-or-less complete forms and write lengthy reports about the often-inarticulated plans for his business; and will also provide some opinions as to what may be at fault with the programs analyzed. Analysis of such faults by this report will logically lead to the recommendations and suggestions herein as to how such faults may be remedied and the programs made substantially more useful.

In the course of making these points we will often cite real-life examples suitably modified in order not to violate client confidentiality. These examples have been taken from problems that have come to our attention as an investment banking firm specializing in energy.
This report is intended to constitute a practical, empirical analysis, dealing with the real world of business, not the type of analysis which may conform to formal economic theory for policy analysis in a perfect world. Partly for that reason, this report will not cite a multitude of publications and/or studies nor will it contain a great deal of footnoting. This report is intended to constitute a base document in itself rather than secondary research based upon reading other people's base documents and other's expert testimony.

Textbook theory assumes an economically perfect Government sector with almost no non-economic (i.e., political) considerations and pressures and an almost perfect social, political and economic harmony or rationality, domestically and abroad. The theory then describes and classifies harmful imperfections of the market mechanism, including imperfections in the capital markets. Government action is usually prescribed to "solve" such imperfections as do occur, occurrences which are viewed as aberrations resulting from evil design, or at best inadvertance. In the present context of determining the adequacy and effectiveness of U.S. Government policy in encouraging the small business sector, particularly insofar as such policy involves financing technological innovation, this framework can hardly be taken as having any importance or relevance. Market imperfections resulting from incorrect risk evaluation and imperfect information are common (if not all encompassing and all inclusive) to the process of evaluating and investing in technical change. Thus, any naive application of textbook theory, which views any difference between the real world and the so-called "perfect market" as evil, simply serves to rationalize any and all
existing or contemplated Government programs in research, development, commercialization and capital markets on the grounds of "improving" an "imperfect" market. Also, it is clear that uncritical faith in the competence of Government administrators and the incompetence or injustice of markets results in prescriptions for continued Government intervention. The analysis and recommendations in this report are based upon the following approach, which is believed to have the virtue of practicality. Government intervention in the marketplace through providing aid to small business in energy is to be prescribed when imperfections in the capital markets are of demonstrable importance and result in net social losses. Government programs relating to small business and the United States' energy policy are to be evaluated based upon how well they met their stated objectives. These objectives included encouraging small business and United States energy self-sufficiency to a greater extent than the free market otherwise would encourage and at an acceptable cost (i.e., without undue waste or bureaucratic empire-building.)

The approach is based upon the empirical evidence that energy markets and capital markets are imperfect in many ways, but so are the markets for most other goods and services. The many imperfections that society chooses to ignore, in most cases, could also be ignored in the case of energy unless there are qualitative or quantitative reasons why energy and the capital markets related to it should be distinguished. Thus, the research is used to provide information on various Government programs for the supply of capital to the small business sector of the economy for the purpose of achieving energy self-sufficiency for the United States, while
the rest of the market economy provides a standard of performance for the programs and a means for evaluating the actual importance of the problems. The market system's generally good performance justifies imposing a burden of proof upon those who would modify its operations and the precise manner in which such modifications should operate. It is realized that this approach probably involves offending those people who have blind faith in the ability of Government to solve all problems, as well as those people who have blind faith in the absolute uselessness of all Government action. This report will probably offend both these quasi-religons.

It should also be realized that for our purposes we are treating derived targets stated in various Government proposals or statements, however inconsistent those statements are, as constituting ultimate objectives, rather than as being camouflage for a "hidden agenda." Many people are inclined to compare the present energy situation and the proposed synthetic fuel industry, (or energy conservation as a substitute for creating such an energy industry), to the synthetic rubber industry which was created during the Second World War. The author believes that analogy to be incorrect. The synthetic rubber industry was created to provide a wartime economy, in which various goods were rationed, including rubber, with a product that was critical to national survival. In that situation, cost was much less important than speed. On the other hand, synthetic fuels or other energy sources (including solar and bio-mass) are expected to and need to compete with other sources of energy in a market economy. Similarly, energy conservation is also expected to compete with other alternative methods of securing benefits to the consumer in a market economy. Thus, energy
production cost and conservation cost are of central importance, rather than subordinate.

Most observers of the energy industry are aware that, in general, technology poses no insurmountable barriers to the development of new energy sources nor to the development of a great deal of conservation. Indeed, some of the processes that are now being used or developed further are nothing more than some refinements of older technology. More than a century ago, before cheap crude oil was found in Pennsylvania, shale oil was commercially extracted in primitive retorts and refined in primitive refineries. In fact, the shale oil industry substantially antedates the oil industry and continued to operate until modern times. (The Scottish shale oil industry continued to function through the 1940's.) It was the existence of the refineries for shale oil that made it so easy for crude oil usage to spread. Similarly, gas works which converted coal to medium BTU gas were once commonplace in major cities. (Indeed, the regulation of the natural gas industry was originally pushed by the Massachusetts manufactured gas firms in an effort to hobble their competition from natural gas.) The technology for oil-from-coal has been around for many decades and the problem has not been that of the technology of liquefying coal but of how to do so at an economic cost. Consequently, since the technological question is answered in the United States, the major question is whether the prospective cost of most of these new forms of energy appears to be bearable. Past experience indicates that they are. Thus, the questions that arise are neither those of technology and nor even those regarding whether the U.S. economy can afford the cost, but rather those that relate to how to accomplish
the necessary steps between the theoretical development of the technology and its actual usage in the market place. Unfortunately, the existing energy programs do not accomplish that.

It is important to note here that the implicit assumption of critics of some of the existing government programs is that detailed permanent controls are the logically best approach to the energy sector of the economy. This approach is specifically rejected in this report.

We also would like to point out that the political process as relates to the supply of capital for the energy industry, particularly for the small business sector, is not entirely concerned with the cost of energy and with security of supply. The longevity and popularity of the program with respect to domestic oil price controls and entitlements is relevant to analysis of the point the author is making. Although the shape of the oil price control program has changed over time, the domestic price control program has had the general effect of holding energy prices paid by United States consumers below world energy price levels. It also consistently subsidized oil imports (through entitlements) by what amount to a tax on domestic production. The program thus subsidized energy consumption rather than conservation; reduced the United States defense security by subsidizing imports; strengthened OPEC by doing both the above; weakened incentives for domestic energy production and technological advances; and led to a variety of recurring shortages of supply and other imbalances through the various regions. Nonetheless, it has been enormously popular politically. One result of the domestic oil price control policy is that the market prices for petroleum products and for crude oil have deviated from the
levels that would be indicated by efficiency concerns or by national security concerns. Therefore, the supply of capital for the energy industry (which, in many ways would have been much more readily allocated by the free market, including the free capital market mechanisms) has become something that is increasingly allocated through the Federal funding process—either directly by subsidies or payments, or indirectly by cash benefits or by tax detriments. Thus, while this report describes a group of programs for improving participation by small business in the United States energy sector and also evaluates some of the United States Government programs which are presumably to help such energy industry participation by small business, (whether by encouraging it to participate more effectively in energy conservation or in energy production), the consequences that these programs carry and this analysis of these programs is not entirely related to every aspect of the real world. Since the real world includes a self-contradictory program which one can only hope will be straightened out over time (hopefully, over not too long a time), this is not possible.
RECOMMENDATIONS

For reasons which will be set forth at greater length in the course of this report, we will make the following recommendations. These recommendations, when implemented, are expected to materially enhance the practical usefulness of United States Government programs intended to enhance the ability of small business to contribute to United States energy self-sufficiency.

1. The staffs of the various Federal Government agencies involved should be instructed about the available programs for encouraging small business participation in the energy industry. Agency staffer's evaluation by their managers should reflect their performance in implementing such programs.—A point that we will be making throughout this report is that the stated ultimate intent of the Federal Government, which is to enhance United States energy self-sufficiency, is not being met. This failure is due to the terms of reference given by some of the Government programs and the legislation relating to them, and also because of the way that various Government agencies have interpreted their mission in respect of the financing of various small business projects which relate to the energy business. The point will also be made throughout this report that the United States government's role in energy financing for small business is being misinterpreted by some Federal Government staffers who, by unnecessarily and unduly restricting such financial aid powers, are thus defeating the Congressional
broadening of their powers to aid small business. Since Federal
Government programs do not in themselves carry any capacity for
helping small business if they are not implemented, such staffers'
self-imposed restrictions in effect sabotage Congressional intent.

2. Communication between all Federal Departments and Agencies
that may have a relationship to energy innovation programs and
energy conservation programs which may be used by small business
should be institutionalized by an inter-agency group, which could then
coordinate their efforts.—One of the great strengths of the Japanese
economy has been that the various Japanese Government agencies
that are directly or peripherally involved in a particular area can be
pulled together as formal or informal working groups in order to
focus on the problem at hand and work out a coordinated approach.
This is something which the United States Government has yet to
work through.

Currently, there are various Government programs which are
funded by the National Science Foundation, NASA, the Department of
Agriculture, and other Government agencies. These programs are not
cooordinated with the Department of Energy and Small Business Administration
energy programs. There are difficulties in having these agencies
work together in a coordinated manner with the Department of
Energy and the Small Business Administration to maximize small
business participation in these programs. An inter-agency group could
be helpful in encouraging such coordination.

In this context, it would be useful to include in the inter-agency
group not only those agencies that may be directly involved in providing aid, but also those agencies which may have the ability to foul up a program by their subsequent actions. For example, the Anti-Trust Division of the Department of Justice, the Federal Trade Commission (both of which may be involved in evaluating the accuracy or adequacy of the representations to customers of advertising, or evaluating the anti-trust aspects of energy-related joint ventures), personnel from the Department of Labor and the Treasury Department who rule upon allowing or not allowing pension plans to make various types of investments; persons from the Securities and Exchange Commission involved in capital formation problems in research and in the programs and regulations that relate to underwriting small business; might all well be involved in these joint or inter-agency task-force or groups. One of the benefits which might result from such inter-agency meeting groups would be that the relevant personnel could discover from one another what individual programs, functions, and opportunities exist and also what foul-ups exist when one agency is working at cross purposes to another. These opportunities and problems can then be put down on paper and presented to the group for evaluation. Also, to the extent that one agency finds that it is working at cross purposes with another agency because of specific legislative requirements incorporated in the terms of reference of its enabling legislation, the agency will be able to present a coherent reason for changing such legislation to more appropriately reflect national goals, and have the necessary backing
from other departments to do so. Such recommendations would be more likely to result in suitable legislation which would eliminate the legal roadblocks to a better coordinated energy program for promotion of a greater amount of small business energy innovation.

Inter-agency agreements in coordinating policies which would insure maximum cooperation and follow-up among various departments and agencies in charge of different programs could also be worked through by such a formal or informal group. To the extent that changes reflecting refinements of policy and agreements needed to be implemented by regulations (as distinguished from legislation), it might be appropriate to have representatives of the legal counsel of each of the departments or agencies involved join the group in order to ensure that the regulatory language is appropriately drawn up.

Aside from the agencies specifically involved, some input by the General Accounting Office to such inter-agency group would be helpful in order to insure that Congress is also able to monitor and assess the working effectiveness of these programs and their impact upon small business participation. Moreover, to the extent that Congress is involved, outreach measures for small business would perhaps be more readily brought to the fore and implemented.

An example of what can be done by an appropriate inter-agency group, is the recent publication of a guide to Federal assistance for small business involved in energy, recently published by McGraw-Hill. It is somewhat of a pity, however, that it has taken until 1980 before
such a guide was published since the date of the energy crisis was no later than October, 1973.

3. The Federal Government programs relating to small business in the energy industry should relate to conventional technology, as well as to conservation and alternate technology.—While the United States Government has been focusing on alternate energy technologies, it has also been discussing and analyzing aspects of the capital raising infrastructure which relates to alternate energy technology. However, the United States Government has not focused on the small business aspects of the unconventional application of the conventional technology, nor upon the application of technological improvements to the existing energy sources. For example, the development of better means of exploration, enhanced recovery methodology, better methods of coal mining, and improved means of financing existing technologies by encouraging other business people or consumers to enter into certain aspects of the energy business, are not presently part of the Government program; we believe they should be.

4. The Federal Government programs for aiding small business in the energy industry should substantially shift their focus toward funding commercialization and application rather than pure research.—The Federal Government programs do not adequately aid the commercialization—

1/There are many definitions of commercialization. For our purposes, we will define commercialization as "The private sector adoption of a technology for general use after a sufficient number of the technological and economic uncertainties have been resolved to permit the item to be used by the relevant consumer." Commercialization, defined in terms of new energy technology, whether for energy conservation or energy production, means an item's being marketed successfully to a non-subsidized user.
and ultimate application of most of the energy technological innovations that have been developed since the 1975 Oil Embargo. Failure of the Federal programs aiding small business in the energy sector to help provide funding for commercialization of existing or recently developed technology is enormously important.

Much of the justification for the supply by Government of capital for small business, especially for a small business involved in the unconventional energy sector or the energy conservation sector, is because of some of the perceived imperfections in the capital market. Some unconventional energy supply technologies are notable for their capital cost and for the lead time that is likely to be involved in plant construction and in moving the product from the proposal stage

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2/It is well known that there is a long time lag between the time that a technology is developed and demonstrated in the laboratory, until the time that it is reduced to a mechanism or substance which can be applied to practical consumer usage and which can constitute the base of an industry. Examples of this include the enormous scientific findings, developments and theories implicit in the works of Leonardo da Vinci (inter alia, the helicopter drawings) which were not applied until the Industrial Revolution hundreds of years later. Similarly, the use of punch card technology as a means of storing information and of controlling machines was originally applied to the operation of looms by Jacquard, yet the application of punch card technology to calculations, to working with numerical data and to control of metal-working machines was a product of the Twentieth Century. More recently, there are other examples of technologies that have been developed and yet which have not been applied for periods of forty or fifty years, simply because the mechanism for taking that technology and applying it did not exist. The subject of technological transfer lies beyond the ambit of this report, but we wish at least to raise the point and indicate how potentially important it is that Government policy toward energy, and Government policy towards small business finance in the energy sector, reflect such transfer potential.
to the ultimate user. While there does not exist any solid evidence or theory indicating that private capital markets are biased against large projects with long lead times, nonetheless, in this world of uncertainty skepticism about such projects is rational and investors are simply reflecting the real cost of protracted risk bearing in requiring a high rate of return on such investments. It is shown through discounted cash flow calculations that investors require a fairly high hurdle rate or target rate for the project to be considered viable.

To the extent that small business cannot even secure capital on those terms that would be socially rational overall, such capital shortage is deemed to be an imperfection in the marketplace which the Government then attempts to overcome by providing capital. To the extent that these imprecisions on the market occur because of other Government regulations, such as those which relate to pricing energy on below replacement costs or below social costs, or because of those non-energy based policies that create difficulties in selling various forms of investments to the investment public (i.e., Securities and Exchange Commission securities regulation or state "Blue-sky" laws), such subsidization may at least be looked upon as a method of overcoming the harmful effects of other regulation. (That the public might be better served by eliminating both such sets of regulation is, of course, beyond the ambit of this report.)

The Federal Government's misperception of the issues and concerns in the area of energy technology underlies much of the problem small
business has in benefitting from Government programs intended to help small business in the energy sector. That is, the Federal Government misperceives problems involved in capital formation for new-energy-technology companies or for companies which are concerned with the application of existing energy technology to existing problems. Interestingly, the misperception shown in the Government programs is the same whether the problems are those of conservation, of securing a higher amount of production from existing energy raw-material sources, or of discovering additional productive means or places where existing types of energy sources can be exploited (i.e., discovery of additional oil and gas, or discovery of additional seams of coal of such nature as can be exploited).

The Federal Government's programs relating to small business in energy deal with solving the problems of financing inventions, or financing related to research and development. In fact, however, small business firms that are involved in the energy sector which could most benefit the United States economy by aiding the energy self-sufficiency of the United States are often beyond the research and development stage, but have not yet reached any mature stage of manufacturing and/or distributing their products. Their's is the problem of the initial commercialization of their product, during which time the survival of a small business is most difficult. The government programs for funding research and development do not deal with this initial gap in financing the commercialization of the small business.
firm's product or service. To the extent that Government programs do not face up to this problem they are apt to somewhat mislead the small businessman. The typical small businessman thinks in terms of securing financing from the Government for the commercial application of his product or his invention and finds that the Government believes that once he is out of the pure research and development stage, his business is no longer worthy of Government support.

Moreover, it is in the initial commercialization period of the life-span of a firm that small businesses are generally supported by equity-investor risk capital. Investors looking at small businesses obviously look at the commercial viability of investments, i.e., the incentives for investing in them versus the possible loss from such investment. This is the area where the Department of Energy (DOE), the Small Business Administration (SBA) and the Department of Commerce have failed to jointly function effectively.

5. The staffers of the agency charged with implementing the Federal Government programs for aiding small business in the energy sector should meet regularly and reasonably often in order to resolve differences and work together, rather than at cross purposes.—Throughout this report, examples will be given of Government agencies operating at cross purposes, even where their legislative terms of reference and missions are similar (as in the case of the Department of Energy and the Small Business Administration relative to encouraging small business in the energy industry). A mechanism whereby such conflicts could
firm's product or service. To the extent that Government programs do not face up to this problem they are apt to somewhat mislead the small businessman. The typical small businessman thinks in terms of securing financing from the Government for the commercial application of his product or his invention and finds that the Government believes that once he is out of the pure research and development stage, his business is no longer worthy of Government support.

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5. The staffers of the agency charged with implementing the Federal Government programs for aiding small business in the energy sector be resolved, either administratively or by jointly requesting legislation, is strongly recommended. The United States has much to learn from Japan in this area.

6. The Small Business Administration (or other appropriate agency) should study the programs used by the European Common Market and Japan to provide government help to small business by financing energy innovations, whether such innovations are for energy conservation, energy production, or energy-systems delivery.—There is no benefit to
be served by reinventing the wheel in the United States, and there is undoubtedly a great deal the United States Government can learn from finding out what government policies other countries have tried and the success or lack of success of such policies in encouraging energy development by small business.

7. The paperwork burden that the small businessman must bear to qualify for the benefits of the programs intended to encourage small business participation in the energy sector should be reduced. — It is one thing to require documentation after a person has gotten some money from the Government under a program; it is quite another to require an enormous amount of paperwork before the small businessman knows whether he will get anything at all.

8. The Department of Energy and/or the Small Business Administration or other appropriate agency should gather and disseminate information regarding the appropriate financial and operating ratios for firms engaged in various aspects of the energy industry for which such ratios are not presently reported. — Such gathering and dissemination should involve maximum participation by firms already in the financial reporting business, with a "sunset" provision in any law or regulation promulgating such activity of the Government. Such published information would permit the financial community to start getting an initial idea as to what the appropriate ratios are, what information needs to be looked at in evaluating a potential loan to such firms and how to go about separating the good risks from the bad. Increased financing from the private sector would, to some extent, relieve the pressure
upon the public purse. It would also permit the development of the non-conventional energy industry with an increasing financial input by the small business segment of the private sector, rather than with such a high contribution from the public sector.

9. Limit or eliminated the power of agency staff (whether those of the Small Business Administration, the Department of Energy or any other agency) to impose conditions and restrictions upon the small business recipients of loans, guaranties or similar subsidies for the development of energy sources and/or energy conservation or similar innovations beyond those set forth specifically in the enabling legislation for the program, require that such conditions be included in all the literature issued by an agency describing the program and also be demanded, in writing, from the would-be borrower not later than thirty days after the initial approach to the agency.—The Government agencies apparently have an ongoing record of coming up with all sorts of demands which were not anticipated by the borrower, demands which were not raised by the Small Business Administration or other agency until just the last moment. Included in the list of such demands are:

a) Personal joint-and-several guaranties of the entire amount of the loan granted by all the entrepreneurs and their relatives, such guaranties being required in addition to the collateral demanded from the business entity which is getting the loan.

b) The requirement that all patents be transferred to the Federal Government or be licensed to the government royalty-free, and/or be
licenseable to other potential competitors at little or no cost nor fee to such actual or potential competitors of the borrower.

10. The Appropriate Technology Small Grants Program should be modified, as follows:

a) Technology should not be limited to exclusively those items which are the unconventional energy sources but could also be broadened to include that which relates to currently used energy forms, to improve upon how they are discovered, produced, or marketed by small organizations.

b) The size of business that is eligible for these grants should be defined in accordance with Small Business Administration rules so that the program could, if need be, be transferred from the Department of Energy to the Small Business Administration, if such transfer turns out to be more useful in the long run.

c) The program should be limited to individuals and small business. It should not include non-profit organizations, who apparently have the greatest experience at applying for and getting grants, but do not necessarily possess the greatest knowledge and background in coming up with ideas which are commercially viable.

d) Some mechanism is made for follow-up on those inventions or innovations which appear to have commercial merit, to help those parties that had come up with them secure further financing in order to ultimately carry out their program.

11. A program's mission should be appropriately funded and if funding is not available, the mission of the program should be modified.—
While the Government's pocket is perceived by businessmen as infinitely deep, it is not necessarily so for any one project at any particular time. One of the great problems, therefore, is that of sensible Government funding within the context of a particular technology. For example, it is ridiculous to speak of a $50,000 grant in order to start a shale oil plant where the cost per barrel per day of capacity is approximately $50,000 and a plant needs to have a capacity of at least 50,000 barrels per day, and preferably 100,000 barrels a day in order to be an economically sized project. Consequently, those Government programs set up to fund energy projects which do not particularly well relate these available funds to the total funds required for such a project, or else artificially limit the amount that is available for a particular project, are inherently self-defeating, as well as frustrating to the businessmen attempting to avail themselves of such programs.

New Small Business Investment Companies (SBICs) should be encouraged, whose major (if not sole) function would be to support the energy industry, by providing additional Governmental financing for Energy SBIC's (ESBICs).—The amount of venture capital available from existing SBICs for firms in the energy industry is generally perceived as inadequate by capital seeking small firms in the energy business. The SBIC industry has generally not been doing a great deal in the energy area, in part owing to the technical complexity of the area. The recent flexibility on the part of the Small Business Administration, in that it permitted the use of other than the corporate legal forms
for an SBIC, has been useful. For example, a Small Business Investment Company now can be not only a corporation, but also a limited partnership, with a corporate general partner. It should be noted that the extent to which the SBA has been flexible in this regard has generally not been great. It took several years before the Small Business Administration recognized that it would have to expand the legal format that was acceptable from that of the corporation to include that of limited partnership, because of the various tax and administrative aspects of dealing with Small Business Investment Companies. Based upon discussions with persons who are known to the author and who are experienced and already operating in the energy finance field, it has been found that there is a great deal of opportunity for generating additional capital for small business energy ventures through the appropriate use of various legal entities, especially if additional Government funding were provided.

13. A mechanism which would tie in the proof of commercial feasibility of projects after the DOE has provided research and development funding under the Appropriate Technology Small Grants Program would appear to be imperative.—It is acknowledged by the Department of Energy and the Small Business Administration that there is no adequate procedure presently in hand to track recipients of the Department of Energy's Appropriate Technology Small Grants Program and provide them with additional access to funds for commercialization of their work. Grants which are given for the development of inventions and
for demonstrations should be tied to a system which would provide for funding innovations that are probably commercially useful and likely to be ultimately profitable. Otherwise, the program may become a form of research boondoggle for nonprofit organizations which would simply have an additional method of acquiring funds for their use. It would also be hoped that various Government agencies that are involved in energy matters will overcome some of their previous biases and learn from the experience of the consumer and also the demonstration of the market place. The emphasis should be on learning what energy efforts, both in production and conservation, will be supported by the free market and tailoring U.S. Government policies to assist the business community, particularly the small business community, to react to the signals from the marketplace. There are unfortunately too many institutional preferences within various Government organizations for conservation over production; for windmills and solar panels vs. additional use of coal and oil; for manufacturing as opposed to retailing and finance; and for insulation as opposed to heat pumps. We expect the small business community could create good business propositions which would benefit from Government support and which the market place would ultimately support. It appears that many Government agencies unfortunately do not share this particular interest. Consequently, their programs are geared to biomass and the results are often of approximately equal value.

14. The Small Business Administration and other Federal agencies working on encouraging small business in the energy sector should
coordinate with the various state agencies and Federal agencies (including
the Federal Trade Commission) which are involved in regulating franchise
operations.—Enclosed herewith is an example of a franchise operation
relating to the energy industry, Southeastern Solar Systems, Inc.
which we neither endorse nor condemn. This firm is attempting to
raise the necessary capital for its own survival by creating franchised
distributors and in effect piggy-backing on their franchises’ capital. A
firm of this sort can run into a great many problems with various
regulatory agencies not at all concerned with regulating energy, because
of some technical defects either in its franchise operation, franchise
agreement or because it is deemed to be selling securities which are
then subject to regulation by either Federal or state regulatory authorities.
By the time a small firm has paid the legal fees necessary to comply
or to attempt to comply with the various regulatory agencies (legal
fees totaling a quarter of a million dollars are not out of the realm
of possibility), it can well find itself bankrupt. The material relating
to Southeastern Solar Systems, Inc. is in Appendix C.

15. Government loan programs or similar programs intended to
provide capital for small business in the energy sector should be
structured so as to provide the various private sector financial institutions
with exposure to these various forms of energy. In this way, the
loan officers of private sector financial institutions learn what the
important questions are and what the answers should be, and the
institutions get a "feel" for the type of entrepreneur who is likely to
be found in that industry. (There is, for example, an enormous difference
between the type of person who becomes an oil producer and the

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fellow who opens up a high technology control system manufacturing operation.) In addition, the interaction between the nonconventional energy operating sector and the private financing sector, which should ultimately be providing the financing for nonconventional energy would be broadened.

The programs should be so structured as to encourage or even require the participation of private sector financial firms in the financing of these nonconventional energy sources. Such participation could possibly be achieved through a mechanism which would have the Small Business Administration, or the Department of Energy, or other appropriate government agency provide half or more of the funds required, while most of the remaining funding would be provided by the private financial sector under some kind of guarantee. In that way, one would at least get some "hands on" experience pushed into the private financial sector which, while it would not be terribly important for the loan at hand, might be very important for getting the necessary knowhow into the private financial sector, and aid in obtaining follow-up financing. A serious problem which exists regarding the Small Business Administration 7-L program is as follows: What happens to the firms which have received these loans from the Small Business Administration and have expended them entirely in the process of establishing their business. Many of these firms now need to be concerned with securing follow-up financing. To the extent that the private financial sector, having gotten the necessary experience, was more comfortable with these firms and was willing to lend them the
necessary money, it would be easier for them to secure the necessary loans, while permitting the Federal Government to phase out of that particular business.

Since the Federal loans for this program are limited to a maximum of $350,000, it is important that a mechanism be put into place which would permit the private financial sector, which has no such ceiling on its loans, to proceed on a knowledgeable basis. One of the worst types of waste would be for the initial loans to be expended and then for the businesses involved to fail because the Federal funding limitation existed and the private sector had not yet become sufficiently knowledgeable to provide the necessary follow-up funding. In the author's opinion, providing a mechanism for private sector funding as discussed would be preferrable to setting aside a portion of the Small Business Administration's funding allocation for follow-up purposes in establishing alternative energy ventures and then ensuring that they get the financing to continue operations.

The National Bureau of Standards-Department of Energy Evaluation Program of Technologies should be modified as follows: a) Reduce the long waiting times (up to three years) for completion of the screening process. b) Recommended technologies should be followed up to determine what actually became of them, in order to see if they got the Government funding, or if the enterprise was able to secure appropriate private funding. c) Inventions which are recommended for support should be followed up with a further program whose objective would be the commercialization of the invention. The
follow-up would include those steps necessary to overcome the hurdle between the approval of an invention and its actual being brought to the final consumer of the product. d) The General Accounting Office should run a test based upon a random sample of those inventions or ideas which are turned down and/or those entrepreneurs who are turned down in order to determine if in fact the Government funding projects are operating properly. That is, if a Government aide or employee turns down a program which might be successful, there is very little penalty to him attached. If, on the other hand, he approves a program or an invention which does not work, there is a great deal of criticism and similar penalty attached. In that sort of a situation, a great deal of conservatism in administering the program, which would tend to discourage innovation, rather than a positive attitude in the program, which would encourage innovation, is the result.1/

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1/One of the well known factors in commercial history is the extent to which a change in attitude is terribly important for the success of an enterprise. Not so well realized sometimes is the extent to which such a change in attitude is important for an entire region. For example, it is well known that there was a great deal of scepticism as to whether California could continue as an acceptable, high growth area at the end of the Second World War, in view of the phase-out of the defense industry in that region. At that time, Mr. A. P. Giannini, who was the chief executive of Bank of America, explained to his executives that he would not necessarily review their files for those loans that were made. However, all files for loans that were turned down would be reviewed and a good explanation as to why a loan was turned down would be expected. The result was that a great deal more money was available to small businessmen from this bank than would otherwise have been the case, and that the California region was regalvanized. The success of California versus the success of other parts of the United States, even before the recent increases in energy costs, has been a notable factor since. From an investment banking viewpoint, it is my belief that this sort of an attitude needs to permeate the Government programs for encouraging small business in the energy industry.
17. The Appropriate Technology Grants Program should be changed in the following way:

a. The level of funding available to the final grantees should be increased at least in line with the increase in the inflation rate. Presently, the limited amount of up to $50,000.00 for promising innovative technology research and development is almost derisory.

b. The emphasis should be on actual production and commercialization or potential production and commercialization of a particular invention, rather than purely on theoretical demonstrations.

c. Grants should be awarded to profit-making organizations or to individuals who have an interest in producing or commercializing their proposal, rather than to noncommercial organizations such as the Boy Scouts. (Undoubtedly an admirable organization, but scarcely a profit-oriented one.)

18. a) The Small Business Administration Loan Program should be related to actual commercialization and production to a greater extent than it has been to date. b) The delays in processing applications should be reduced. c) The program should be administered with some degree of uniformity among the Small Business Administration offices. d) The existing bias against small business innovations needs to be revised. e) Small Business Administration personnel apparently need to be convinced that a lower degree of certainty of commercial success and ultimate payment of the loan is, to a greater extent, an acceptable risk in this program more than in other Small Business Administration programs. f) Steps should be taken to integrate this
program with the National Bureau of Standards—Department of Energy Evaluation Program and the Appropriate Technology Grants program.
g) The General Accounting Office (GAO) or some other appropriate government agency should monitor this program not only for those loans which go bad and also for those loans which are not made.
GOVERNMENT FINANCING OF SMALL BUSINESS IN THE ENERGY FIELD—THE RECORD TO DATE


Congress passed Public Law 95-316, the Small Business Energy Loan Act, in 1978. Symbolically, the Act was signed into law on July 4th of that year. The Small Business Energy Loan Program which was created by that Act was to be administered by the Small Business Administration. The Small Business Administration was directed by this law to implement an energy loan assistance program designed to provide direct loans and loan guarantees as a means for small businesses to establish or expand energy related businesses. These businesses, it was hoped, would reduce dependence upon foreign energy. The presumed intent of Small Business Administration rules and regulations relative to this law was and is to implement the Congressional intent.

The rules in providing for eligibility, credit requirements and loan terms under the program are very technical, and as will be discussed below, appear to run contrary to the intent of Congress. Such a result is somewhat surprising, since the legislation requires the Small Business Administration to consult with the Department of Energy and other appropriate Federal departments and agencies. The legislation also requires the SBA to solicit and consider comments from interested small businesses in developing the final regulations as well as in implementing the program. Despite that, the Small Business Administration took a more restrictive approach in many of its definitions than appears to be strictly necessary under the terms of the legislation and the legislative history. For example,
in defining whether a "startup" qualifying for a Small Business Administration energy-related loan should be defined as a business that has been in operation for less than two years or one that has been fully in operation for less than two years, the Small Business Administration decided that the "in operation" definition would be more restrictive. Therefore, it limited its definition to a company that had been either in existence or in operation rather than one that had been fully operational. The effect was to narrow the number of firms that were eligible for such energy-related loan financing.

The Small Business Administration acted similarly in laying out other criteria for loan eligibility. The Small Business Administration limited the amount of money that could be used for working capital needs to 25% of the amount borrowed, and limited the loan amount that could be used for working capital needs plus research and development needs to 30% of the sum borrowed. It does not appear that under the language of the law either of such restrictions was necessary. Again the question arises as to why the Small Business Administration, as an agency which should be working to permit the broadest possible use of its program in order to encourage energy independence, opted for such restrictions on the investments. It is particularly questionable as to whether this sort of restrictive measure was a sensible requirement to set for energy loan eligibility.

The Small Business Administration is required, in its evaluation of loan requests, to have reasonable assurance of loan repayment. In seeking to meet the requirement for reasonable assurance of loan repayment, the Small Business Administration already considers the following factors: adequacy of the borrower's net worth, other available equity funds, the borrower's
past earnings, the probability of the borrower's attaining projected earnings, the probability of product acceptance in the marketplace (whether shown by projections, market surveys or other means), the technical competence of the borrower's personnel and/or consultants and/or other persons who are making the proposal, the experience of such personnel and/or persons, demonstrable projections of costs, and revenue estimates. Consequently, it appears to be nonsensical for the Small Business Administration to require such specific numerical criteria as the 25% and 30% criteria above related to the use of the funds where such restriction is not mandated by law. Indeed, provided that the loan is, in fact, made for an energy-related project and the loan payments can be met by the borrower, such restrictions are useless at best, and defeat the purpose of the energy loan program. From an investment banking standpoint, we have found that any attempt to set this sort of numerical criteria is generally inappropriate, and, to the extent that it forces a firm to follow a non-optimal pattern for its operation, is counterproductive and increases the risk of failure.

It appears that the Small Business Administration has adopted such criteria partly because, as will be discussed at a later point in this report, the Small Business Administration did not care for this special energy-related loan program and ignored its liberalized lending criteria. Thus, in its comments to its regulations in respect of the Small Business Energy Loan Program, the Small Business Administration made the point that energy loans would be made to parties who would still meet the "reasonable assurance of repayment ability" test. The Small Business Administration specifically rejected the suggestion that energy loans be made only to
those who would be unable to qualify under the usual Small Business Administration guidelines for loans to a non-energy related business, although the Small Business Administration did acknowledge that a greater risk might be associated with energy loans than with the ordinary run of Small Business Administration loans. The Small Business Administration also acknowledged that technical factors should be incorporated into the credit decision. Thus, in its comments and its regulations, the Small Business Administration has taken a position contrary to that which the legislative history of the Small Business Energy Loan Act requires. The Small Business Administration's position apparently is that every applicant for SBA funding be given equal treatment under the laws. This includes an equal requirement of reasonable assurance of loan repayment ability in every case, despite the specific language of the Small Business Energy Loan Act which was intended to ease the requirements for the intended beneficiaries of the Energy Loan Program and not put such loans under the same restriction as all other types of small business loans.

The Small Business Administration also found another way to render the Energy Loan Program effectively inoperative. The Small Business Administration required applicants for loans under the Energy Loan Program to document projected energy savings and required loan recipients to document actual energy savings. The need to document any such savings in advance of the receipt of the loan funds from the Small Business Administration, where the funds are being borrowed specifically in order to implement some of these energy saving programs and energy innovations, is a typical
bureaucratic sort of "Catch 22" situation, which renders the program inherently
unworkable and entirely ineffective in providing funds to the small business
sector of the economy.

There is some suspicion on the part of bureaucracy watchers that
part of the reason why the Small Business Administration was so dilatory
in making loans, providing guaranties or pressing for increased funding
under the Special Energy Loan Program was precisely because the paperwork
burden was reduced. Consequently, the opportunity for bureaucratic position-
enhancement was concommitantly reduced. A more probable (and less
Machiavellian) reason is that since the energy loan program did not require
such a high degree of collateralization as other Small Business Administration
loans, Small Business Administration personnel were in terra incognita
(unknown territory). Since they did not know precisely how to proceed,
they simply did not go forward with the program. (In the absence of
precise instructions, the bureaucrat is in a difficult position. If he errs
and does something wrong he can lose his job; if he is correct in his judgment,
his salary is still set by Civil Service and rules. The risk-reward ratio
favors "playing-it-safe" at almost all times.)

A further troublesome aspect of the attempt by Small Business Administration
personnel to apply the more usual and stringent bureaucratic criteria to
loans made under the energy program was that they attempted to dictate
the use of the loan funds to an excessive degree, adding to the frustration
of the small business entrepreneurs. The position of many of the personnel
at the Small Business Administration is along the lines of "it is not their
job" to evaluate the energy initiatives of the administration. In addition,
it is not the job of the Small Business Administration to administer energy loans differently because of the administration's desire to push the energy independence of the United States. Rather, their concern is that whatever is done be done in such manner as to cause them the least amount of possible criticism or grief.

From a bureaucrat's viewpoint, while failure of a program to be administered in an aggressive manner is going to cost the bureaucrat or that agency generalized criticism, it does not directly affect that bureaucrat. Approval of a single semi-fraudulent or fraudulent loan which later surfaces, coupled with the fact that the blame for the loan can be fixed to that specific bureaucrat, can be absolutely destructive of that bureaucrat's career. Thus, the degree of energy applied by a Small Business Administration bureaucrat to an innovative loan program or loan guaranty program which would require less paper work, would permit a lesser degree of collateralization, and which would not require nor permit as high a degree of control of loan funds as other loan programs, is not going to be unduly large. Interestingly, part of the approach apparently used by Small Business Administration personnel who did not care for the Special Energy Loan Program was to approve loans and then to fail to send out the check with which the approved loan would be funded, thus sabotaging the program.

The Government agencies also apparently have an ongoing record of coming up with all sorts of demands which were not anticipated by the borrower and which were in fact not raised by the Small Business Administration or other agency until just the last moment. Included in the list of such demands are:

1. Personal joint-and-several guaranties of the entire amount of the
loan granted by all the entrepreneurs and their relatives, such
guaranties being required in addition to the collateral demanded
from the business entity which is getting the loan.

2. The requirement that all patents be transferred to the Federal
Government, be licensed to the government royalty-free and/or
be licenseable to other potential competitors at little or no cost
nor fee to such actual or potential competitors of the borrower.
Such requirements, it should be noted, are not imposed by law
nor legislative policy. They constitute instances and examples
of bureaucratic action run amok and effectively defeating the
Congressional interest of the enabling legislation.

The point of the above examples and discussions is that the Government
agencies, rather than the Congress, make it difficult to secure the Congressionally
mandated guaranties and loans to begin with. The personnel of the agencies
also require an entrepreneur to expend a great deal more time and effort
to get the loans through government channels than through the ordinary
borrowing channels at a bank or similar financial organization. These
personnel, also raise the cost of the borrowing by waiting until almost the
last minute to spring a list of additional demands on the would-be borrower.
By that time, the would-be borrower or energy entrepreneur has very little
alternative financing possibilities that he can work on because the initial
working capital may be gone. The bad name that the Government agencies
have earned in this regard has been a discouraging factor to people who
might otherwise look to them for help in getting loan financing and other
aid from the Government.
A portion of the problem which small business has in benefiting from the Small Business Energy Loan Program is the result of the statutory definition of what constitutes permissible types of energy projects which qualify for such financial aid. The definition was limited to firms developing, manufacturing or distributing (a) solar energy equipment, photovoltaic cells and solar-energy-related equipment; (b) conservation equipment (including conservation equipment which affects systems which use fossil fuels); (c) equipment for the primary production of energy from wood, biological waste, grain or other biomass; (d) equipment the primary purpose of which is industrial co-generation of heat; (e) hydroelectric equipment; and (f) wind energy conversion equipment; are eligible, as are firms providing engineering, architectural, or other services necessary or appropriate to aid in using any of the above items. However, energy-related innovations which would have an impact upon other fuels are apparently not eligible. Thus, the Small Business Energy Loan Program does not enhance the availability of funds for small businesses innovating in (a) cleaning up oil spills or other energy-source pollution; (b) providing technological innovation for the better usage of coal mining equipment in order to open up new seams or permit the mining of narrow seams, sloping seams or other types of coal seams from which energy can presently not be economically secured; (c) implementing or devising new technology for finding oil and gas, (d) improving technology relating to utilization of steam from natural springs or geysers or similar geothermal energy sources, and (e) securing natural gas from geopressured zones. To an observer, it appears that the
program avoids providing funding for those aspects of the energy business of greatest potential interest to the small businessman.

The typical small businessman is ordinarily interested in expending time and effort in areas which have the following characteristics: (a) similarity to the present technology but somewhat farther along the path of innovation; (b) some kind of infrastructure already in place so that one is dealing with fewer "unknown unknowns;" (c) has a cadre of experienced practitioners available to be employed in the business (often the personnel who used to be with some of the larger companies in the energy business) and (d) already has some small business participants. Operations and businesses which relate to coal, oil and gas finding, production and transportation most closely possess the enumerated desirable characteristics. From the viewpoint of a small businessman or of an investor who provided capital for a small business venture, it appears that the Small Business Energy Loan Act was so set up as to provide funding for those projects that had the most chic in the eyes of "soft-energy" advocates and other nonpractitioners of business. However, it was geared and designed to provide almost no funding for those businesses from which the small businessman could realistically expect to benefit.

Interestingly, the Small Business Energy Loan Program did not provide for very much financing of innovations in the system of delivery to the consumer of certain types of energy-related goods and services. For example, assume a small businessman invents and manufactures a new type of solar energy equipment which is long-lasting, low-maintenance, aesthetically attractive and can save the homeowner about $1,000 a year in energy
costs. Assume further that the sales price of such equipment needs to be about $5,000—per unit. Obviously, not many homeowners are in a position to spend $5,000 without borrowing the money. If the only financing they can secure is a three-year self amortizing loan calling for monthly payments of $260; the homeowner's interest in such equipment will be slight.

If such equipment can be financed over fifteen years as a long-lived home improvement, with monthly payments of $60 per month, homeowners would probably be very interested. Thus, financing is an important part of any system concerned with the delivery of an energy-related good or service to the consumer who will benefit from it. Regrettably, the Small Business Energy Loan Program apparently does not provide for innovative financing mechanisms or firms as approved beneficiaries of loan financing under the Act. That is, firms providing innovative energy financing (for example, a company that would specialize in making solar equipment loans to homeowners) are not at all provided for in this Small Business Energy Loan Program, neither in the loan portion nor in the loan-guarantee portion.

Many service innovations and financial innovations are necessary in order to get the innovated equipment into the hands of the people who will use it. If the innovative equipment is not used, it is obvious that the energy savings which the entire program is expected and supposed to promote are not likely to be secured. Thus, the lack of basic financial and service innovation can defeat the entire program. The need for such financial innovation will grow even more if the Small Business Administration is successful in encouraging small business to innovate in the energy area.

To the extent that the Small Business Administration programs result
in small businesses being the energy innovators rather than large businesses, the need for financial innovation to serve the actual or potential customers of such business becomes even more important. Large businesses generally have the capacity, either through existing captive finance operations or through finance operations which they can set up, to provide consumer financing for the equipment which they have innovated and are manufacturing and selling. However, the manufacturer of energy conservation-related items who is also engaged in producing new equipment not only has the problems associated with getting his product manufactured and sold, but also of financing the consumer who wants to buy his equipment. The equation that faces the small businessman is stark: No financing=No sales. To the extent that the Small Business Energy Loan Program does not provide for such financial innovation, it is still less effective than it could and should be.

Congressional sponsors of the Act intended it to create a pool of capital available to take relatively high risks for the benefit of companies which were engaged in distributing and/or marketing such items. The Act directed the Small Business Administration to establish a program which would provide direct loans and loan guarantees to companies which qualified under the terms of the Act. Small Business Administration field personnel apparently did not particularly care for the program; consequently, Small Business Administration policy-makers were not interested in vigorously administering it. According to published reports and according to people within the agency who were somewhat upset at this sort of development, Small Business Administration personnel apparently discouraged loan applications
from potentially qualified borrowers. It is understood and has been mentioned several times in print that even several months after the loan program was supposed to have been implemented, some Small Business Administration Field Office personnel were telling applicants that the program did not exist at all.

 Apparently many of the persons in various agencies and departments involved in the energy-related funding program for small business, including the Small Business Administration, the Department of Energy, the Office of Management and Budget, and the U. S. Congress, were at odds with each other over how the program should be run. In fact, there was debate as to whether this particular program should exist at all. The Small Business Administration had told Congress, even before the bill had left committee, that there was no adequate way to evaluate energy loan applications. The reason was that the Small Business Administration did not have the personnel with specific energy background who would be in a position to evaluate the quality of the business proposals presented to the Small Business Administration, since the personnel lacked the necessary specific energy background. Logically, therefore, the program might have been given to the Department of Energy to administer, as many of its personnel had such background. However, the Department of Energy already had a relatively poor reputation with the small business community for its methodology of dealing with small business. This included some personnel who apparently did not care for the relatively small sums involved in small business-related programs and for the types of people who were and are involved in small businesses related to energy. Consequently, the program was put into the Small
Business Administration, whose personnel were perceived as more smallbusiness oriented.

The Small Business Administration, however, had its own problems with the program. The Small Business Administration maintains that the program provided no particular guidelines for evaluating applications, neither as to how applications were to be judged nor as to the criteria for setting priorities between applications, which made the administrator's job even more difficult. Also, Small Business Administration personnel attempting to secure aid from the Department of Energy in getting such loan evaluation measurement techniques in place in order to carry out the Congressional mandate found that Department of Energy personnel were not particularly helpful to them. Department of Energy personnel obviously had other duties assigned to them, which they were told commanded higher priority than working together with the Small Business Administration on such agency-related energy loans. The Department of Energy, when questioned about this matter, has generally maintained that it has not been given sufficient manpower and other resources to help the Small Business Administration run such programs.

Part of the problem which the Small Business Administration (and indirectly, the Department of Energy) had in trying to implement the program was caused by the fact that the criteria for evaluation of loan applications were not clearly set forth. Therefore, the Small Business Administration did not know exactly what weight it should put upon the fact that many of the loan applications it received were made by companies that had already been receiving aid from the Department of Energy. That
is, in theory, the fact that a firm was receiving financial assistance from the Department of Energy should have given the Small Business Administration some idea as to the competence of various applicants, added to the credibility of their applications for additional help from the Small Business Administration and added to the credibility of their appended business plans. However, in practice, Small Business Administration personnel had not been instructed as to how much weight to give to this criteria and whether such aid from the Department of Energy to an applicant was a negative rather than a positive. These doubts were based on grounds that companies applying for aid from the Small Business Administration were already being taken care of by another branch of government, the Department of Energy.

The Small Business Administration also found another difficulty in implementing the program. The Congress had originally authorized $75 million for the program but had appropriated only $5 million for direct loans and $1 million for loan guaranties for the first year of the program. The result was that the Small Business Administration used up the money appropriated almost immediately and then, in order to avoid exceeding the permitted and budgeted sums, discouraged other borrowing and guaranties under the program. The transfer of funds from other Small Business Administration lending activities to fill the void in energy-related funding was a possibility. However, there are many claimants for funds available to the Small Business Administration under various special programs and, accordingly, there are limits as to the amount of transfers of funds between loan programs that
may be done.

The consequence was that the Small Business Administration personnel discouraged the use of the program and side-tracked suggestions that otherwise would have promoted the program. Small Business Administration bureaucrats also tried to send applicants for energy program loans into SBA's general loan program, where the loan criteria were much more readily understood and where Small Business Administration personnel already had a record of bureaucratic precedents governing how these funds were supposed to be administered. Those applicants for energy loans who were not deterred by the Small Business Administration's initial unhelpfulness in making their applications still were subjected to the more stringent paperwork and collateral demands for the SBA general loan program, owing to such bureaucratic obduracy. That is, despite the Congressional instructions, which had insisted that the Small Business Administration should (1) recognize and accept the higher risk nature of the energy loans and (2) not require the same level of collateralization and detailed paperwork from applicants under the program as from those applying under the SBA general loan program, the Small Business Administration staff applied much more stringent criteria and rules, to the detriment of small businessmen wishing to participate in the energy sector of U.S. business.

It should not be thought that nothing was accomplished by the Small Business Energy Act. As noted, the Small Business Administration's Energy Loan Program, which was approved on July 4th, 1978, was originally authorized for $75 million. Implementation of the program started in January, 1979, with an original appropriation of $5 million for direct loans and $1 million
for loan guaranties. These funds were exhausted by April 1979, and the Office of Management and Budget allowed the Small Business Administration to reprogram $7 million in direct loan funds and $5 million in guaranty authority to the Small Business Energy Program after the Small Business Administration's request for reprogram was approved. Subsequently, some additional energy-related loans were made through the so-called regular program. The fiscal year 1980 appropriation request made by the Small Business Administration was for $15 million in direct loan funds and $30 million for guaranties. The Small Business Administration indicated that these levels could probably be considered adequate to meet projected loan demands.

The Small Business Administration stated that as of August 31, 1979, it made a total of one hundred twenty-three energy loans of a total amount of $16.2 million. This figure includes both the direct and guaranteed loans under the Energy Loan Program as well as other energy loans that were made under other parts of the Small Business Administration's program. (It is worth pointing out that the loans that were made under the Small Business Administration's usual program rather than under the Special Energy program were made subject to more stringent requirements. It appears that the Small Business Administration was in effect circumventing Congressional intent by making the loans under the more stringent rather than the less stringent program as noted previously.) The Small Business Administration's statement also noted that 46% of these hundred twenty-three loans for energy went to firms that were manufacturers, 22% went to construction firms, 11% to wholesalers, 10% to retailers, 8% to service firms and 3% to mining firms. Based upon the author's knowledge of the
capital requirements in the energy business, the dollar amount going to mining (which presumably includes oil exploration, as well as coal operations) is pitifully small. Also, if one divides the total funds made available, that is to say, $16.2 million, by a hundred twenty-three energy loans, the average amount per loan appears to be less than $100,000. In the context of the enormous capital requirements for most substantial projects in the energy business, these amounts are miniscule.

The Small Business Administration states that an informal telephone survey of about fifty firms that received a direct loan from the SBA under the Special Energy Loan Program was conducted in order to provide the Small Business Administration with a preliminary assessment of the effectiveness of the Energy Loan Program. The study was conducted by Dan Gibbon, a summer Research Assistant, at the American University Center for Technology Administration in Washington, D.C. This study, which is entitled "An Evaluation of the Small Business Energy Loan Program by F. Y. '79 Loan Recipients" is dated as of August 1, 1979. It consisted of a survey of the 48 firms receiving loans under the first phase of the Small Business Administration Energy Loan Program, of whom 35 were surveyed (i.e., 73% of the total). No format was strictly adhered to in the questions and more emphasis was placed on getting a general impression than specific information. Since the size of the total universe was relatively small and since the size of the sample, although not certain to do so, would indicate a general lack of bias, this appears to be as good a methodology as any for coming up with an evaluation of the program from the viewpoint of the successful recipients of loans. It should be noted that if the purpose of the survey is to evaluate
the program from the viewpoint of energy-related small businesses, the study lacks validity since statistically this sort of sample is, to say the least, biased, as it only includes those firms that received funding and excludes those firms that did not get funding. Thus, the firms that are most likely to be dissatisfied with the Energy Loan Program and to consider it inadequate, badly administered, or generally lacking in effectiveness are excluded from the sample by definition.

The results of the survey indicated that the loans had ranged in size from $10,000 to the statutory ceiling of $350,000; thus, the size of the average loan was $115,000, which is somewhat greater in size than the average for the loans made by the program as a whole. The Small Business Administration stated that the informal survey showed that the largest users of the Energy Loan Program were concentrated in two industries, with 35% of the loans being made to firms involved in the solar energy industry and another 35% of the loans being made to firms manufacturing and retailing insulating material, including cellulose, thermal windows and shutters, and roofing. Most of the remaining funds went to firms involved in wood stoves, heat transfer equipment and energy management systems.

From reading the text of the study, it appears that of thirty-five firms sampled, nineteen (or over half) were primarily engaged in the solar business (which includes wood stove manufacturers and retailers, according to the perceptions of the author of that report; this author does not share that view); nine of them were involved in manufacturing, installing or retailing insulation; four were involved in energy management operations and three in other energy related activities. Thus, the loan program, even
under the most charitable interpretation, has not been successful in finding
borrowers engaged in hydro-electric power, biomass-source energy, wind
energy, and cogeneration. Moreover, the program has clearly done almost
nothing in other energy areas such as coal production and oil production,
which lie outside its ambit, nor in the delivery systems which induce or
make possible for the consumer to afford to purchase and use various
energy conserving equipment.

It was interesting that out of the thirty five firms which were surveyed,
sixteen, who believed that they were speaking to a person from the Small
Business Administration, gave the Small Business Administration unqualified
praise on its handling of the loan program. It is perhaps more significant
that nine expressed only qualified enthusiasm and eight had primarily negative
feelings toward the Small Business Administration. This means that about
a quarter of the persons surveyed, all of whom had received funds from
the Small Business Administration Program, had negative feelings toward
the agency. Apparently, they felt so strongly that they were willing to
express these feelings even to a person from the Small Business Administration,
despite the risk of complaining (which risk may only have existed in the
mind of the person voicing the complaint but which nonetheless were quite
real from his viewpoint, even if in reality the Small Business Administration
staff would not have sought revenge against the critic). In addition, they
were willing to state that they found substantial difficulty when dealing
with the Small Business Administration. The complaints most often voiced
in respect of the program were:

1. Too much paperwork (an ongoing problem in dealing with any
Government agency, especially one which handles money, and which therefore has to be very careful that none of its actions be criticized as having been tainted with fraud).

2. That the Small Business Administration directed the use of the loan funds to an excessive degree (i.e., beyond the degree of control that is necessary in order to be reasonably certain that the funds advanced would be repaid).

3. That the regional offices of the Small Business Administration seemed to be unaware of the existence of the Small Business Energy Loan Program and consequently were entirely unhelpful in regard of helping the would-be borrowers.

It was surprising to this author that the average waiting time of five months for a loan was not deemed excessive by the loan recipients. One can think of relatively few banks or other commercial lending institutions which have such a long waiting period between the time that they receive a loan application and the time that the loan application would finally be acted upon, approved and the funds disbursed. Moreover, in the case of a loan from a bank, a would-be borrower can speak to a loan officer and very quickly (usually within a day or to) get an idea as to whether a particular loan would fit that bank's appetite at that particular time, and on what terms and at what rate.

Obviously, the long waiting time for a Small Business Administration loan can in itself be a major problem for a businessman, in that if the wait is too long he may very well have gone out of business before getting the loan. When a businessman needs to add the waiting period to the time
that initially had to be expended in chatting with Small Business Administration personnel in order to track down which person would be responsible for a particular entrepreneur and his informal requirements for documentation of that loan, the implicit cost of such loan and the waiting period increase greatly.

The views of those businessmen who received the Small Business Administration loans, insofar as they state that the program was a good idea, and should be continued are in line with those of almost any other beneficiary of a public program—namely, that it is a good thing and that he ought to continue keeping his trotters in the trough. However, that does not mean that from the viewpoint of the taxpayer, the program is particularly well thought out, well administered, or incapable of very substantial improvement. Indeed, the comment which many of the beneficiaries of the program expressed—that their loan had made the difference between life and death for the firm, i.e., that it had enabled them to get on their feet, is perhaps accurate for those firms that received the loans. It would also be interesting (in fact, it might be even more interesting) to find out how many firms found that the time wasted in trying to secure the benefits of this program or of other United States Government programs had resulted in the death of the firm, because that firm could not secure the promised help that they had relied upon, and therefore, the firm had dissipated resources that might have been better expended elsewhere.

In this context, it is interesting to note that when the question was asked about the interaction of these small business entrepreneurs with the
Department of Energy and other Federal agencies, five of the firms reported that they had what they considered to be basically a negative experience. Many of the firms, which had never had any interaction with Federal Government agencies before, expressed a general wariness of ever becoming involved with such agencies again. Such reluctance was based primarily on what these small businessmen had heard from colleagues who were also small businessmen, i.e., that the returns one might expect from securing benefits under a Federal Government energy-related program were not worth the time and money invested. This negativism towards U.S. Government programs related to financing energy continues to be the feeling one hears expressed in the business community. This is especially true of those persons who are not financially sophisticated, are not used to dealing with Government bureaucracies, are not used to providing voluminous written data in order to justify what appears to them as self-evident and eminently reasonable, and who are not used to working with the political sector of the economy and working with political appointees in order to secure what they need from bureaucrats.

A very interesting fact that turns up in the course of examining the write-up of individual contracts with individual firms is that many of the parties who received Small Business Administration loans were persons who already had experience in working with SBA personnel, had possibly secured other Small Business Administration loans or participated in other SBA programs, or had worked with other Government agencies. Consequently, they were quite knowledgeable as to what "stroking" needed to be done to secure the proper results from Federal bureaucrats. That is, one of the
problems with using a survey that takes its sample only from those persons who had secured financing from the Government is that one is dealing with a very stratified and probably a very unrepresentative sample of the affected population.

One related aspect is that the sponsorship and help of the local Chamber of Commerce, of the local office of a national accounting firm, or of people who are on contract at the Office of Management and Budget (OMB) resulted in many of these successful parties getting the information that they needed in order to secure their Small Business Administration loan. In the absence of special knowledge and access, however, the small businessman approaching the Government for funding for an energy-related project had great difficulties.

The Small Business Administration also noted that even recipients of the loans complained of having to do too much paper work when applying for the Energy Loans, and also complained that it took too long for the loans to be made. The Small Business Administration noted that the delivery system for energy loans was inadequate because the personnel involved generally did not have the necessary technical or engineering expertise to assess such loans. It suggested either creating regional or centralized offices which could include the personnel who had the necessary technical and administrative capability to administer such loan programs.

An interesting aspect of the survey was that only one company stated that it was actively involved in research and development work, although twenty-five to thirty-five firms said that they would be interested in obtaining grant money from Federal agencies with which to conduct research and
development. (It is the perception of the author of the report cited that most small businesses are perfectly willing to accept grants from the Federal Government for any one of a wide variety of research and development programs. They believe that they will be able to take an aspect of their ongoing business or an activity related to their area of interest, appropriately label the activities that they would in any event wish to conduct, and then proceed to call it research and development. It should not, however, be imagined that a passion for research and development has suddenly overcome the small businessmen of America.) The responses and the survey indicated that (in keeping with our perception of most small business energy firms as being relatively undercapitalized) the Energy Program Loan money was used primarily for working capital, including inventory, and for purchasing new equipment.

Some of the firms surveyed had actually used the money to set up shop and go into business. These firms had found that they had been refused loans by banks which they had approached primarily because of these firm's involvement in a new energy field. The banks viewed these firms as being involved in an industry without a financial "track record" and therefore, these firms represented an unacceptable risk in the eyes of the banking community. That is, the firms generally found that the problem they had in dealing with the banks was not the energy companies' lack of sufficient collateral. Rather, it was that the banks, because of a lack of experience with the industry and with its characteristics, were unwilling to make loans. Since there were no accepted ratios or norms for the industry on the basis of which the bank could evaluate whether a firm could be
deemed successful or unsuccessful, determine when a borrowing firm was getting into trouble, evaluate whether management was good or bad in terms of rate of return on sales, or use any of the ratios that are commonly used by a bank, loans were not granted.

The above point regarding the banking community's reluctance to make loans to an industry it does not understand is really of great importance from the viewpoint of establishing appropriate policies and mechanisms to get more capital to small businesses engaged in energy innovation in the United States. Most financial people understand that an appropriate current ratio for a clothing retailer, or even for a retail firm in the petroleum marketing industry, is quite different from an appropriate ratio for a firm which is a petroleum refiner or for a firm which is in the petroleum exploration and producing business. However, for each sector of the oil industry, there do exist some commonly accepted rules of thumb, as well as a good amount of "feel" by the bankers or other financial people in respect of that industry.

In addition, where there is an established industry, bankers are able to go to their existing clientele or to other persons who are knowledgeable in the industry and ask them whether a prospective borrower has a good, bad or indifferent reputation. Thus, a banker can make the initial evaluation of the character and competence of a businessman fairly rapidly and with high probability of being right. The information thus permits the financier to make loans to firms in traditional areas of the energy industry with the confidence that he will be proven correct in the overwhelming majority of
Moreover, the financier can also determine whether a firm engaged in a traditional aspect of the energy industry which is deviating from the norm in one or more of the ratios is in fact a well run firm whose books may be somewhat different owing to accounting differences; a firm reflecting very rapid growth; a firm undergoing a change in management policy; or a firm going through any one of the other sources of change, and to charge what appears to be an appropriate risk premium for such variance. It is understood that while Exxon may be able to borrow at the prime rate or at the commercial paper rate (when such rate is lower than prime), a Southland Royalty Corporation will not secure so high a rating and therefore not so low an interest rate as Exxon. An independent producer who has a net worth of one million dollars or less will have an even higher interest rate to pay. He may also have more restrictions placed upon certain of his operations and his ability to withdraw funds from the business. However, in all these situations, the bank is operating within well-known, well-set parameters for the industry and can evaluate the loan application accordingly. In dealing with a brand new aspect of the energy industry, however, the financial institutions are not able to work. Accordingly, it would appear that one of the most useful things that could be done by the U.S. Department of Energy, by the Small Business Administration, or by another appropriate agency, would be to gather and disseminate the information as to what the appropriate financial and operating ratios are for various aspects of the nonconventional energy industry, including solar power, biomass, and similar new aspects of the industry. Such published information would permit the
financial community to start getting an initial idea as to what the appropriate ratios are, what needs to be looked at in evaluating a potential loan to such firms, and how to go about separating the good risks from the bad. Increased financing from the private sector would also, to some extent, relieve the pressure upon the public purse. It would also permit the development of the nonconventional energy industry with an increasing financial input by the small business segment of the private sector rather than with such a high contribution from the public sector.
The Federal Non-nuclear Energy Research and Development Act—
Solutions Searching for Problems.

The Federal Non-nuclear Energy Research and Development Act of 1974 (Public Law 93-577) established a national program for research and development of all beneficial energy sources and energy utilization technologies, exclusive of nuclear energy. In theory, the Act was initiated to provide assistance to inventors and encourage them to develop promising inventions which would reduce the energy dependence of the United States.

The program is conducted by DOE's Energy and Research Development Administration (ERDA). To encourage innovation in developing such non-nuclear energy technology, the Act also directed the U.S. Department of Commerce' National Bureau of Standards to evaluate all promising energy related inventions, especially those submitted by individual inventors and small companies. The evaluation is conducted in order to determine the probable ability of various inventions to meet United States energy goals. The businessman would submit his invention for evaluation in order to obtain direct grants from the Department of Energy's ERDA for the development of energy inventions and innovations. In order to proceed with this program, the National Bureau of Standards (NBS) established an Office of Energy-Related Innovations (OERI). The inherent managerial difficulties of having an energy-related program notionally funded by one U.S. Government Department while the energy-related technology is evaluated by another Department, are fairly obvious. Many difficulties have arisen simply because of the problems of coordinating two different Departments and their separate
divisions. These will be discussed subsequently. Other problems arose because each of the Departments has its own goals, objectives and terms of reference (whether set forth in its enabling legislation or in the bureaucratically perceived mission and received wisdom governing each agency's actual operations).

The purpose of the Energy Related Invention Evaluation Program was to insure that all promising energy-related inventions received a thorough and objective review. If the evaluation showed that an invention had significant promise for either saving or producing energy, ERDA was to consider providing financial and technical help to the inventor in order to develop the invention. However, NBS approval of an invention or innovation as being technologically useful or otherwise meeting certain criteria does not necessarily mean that such a project will be funded by ERDA.

The program was designed fairly broadly, so that anything qualifying as an invention or idea for a new device, material, process or procedure, whether it was patented or even patentable, was grist for the National Bureau of Standards' mill. No devices, models or materials needed to be submitted to the National Bureau of Standards unless they were specifically requested during an evaluation. Submission of drawings was encouraged and (again, by way of making the operation easier for a small firm) they need not be done professionally. Once the invention and the related disclosure was reviewed and determined to be acceptable because the item described was energy-related, did not deal with the production or use of nuclear power, had no obvious technical flaws, and was described so that the description was reasonably clear and complete, the invention was given to at least two
technically qualified evaluators, whether within or outside the Government, to undergo first stage evaluation. These evaluators were requested to provide a recommendation for or against Government support of the invention and a one page technical opinion. The first stage evaluation decided whether the invention was technically valid and sufficiently promising to warrant a substantial evaluation effort. Such evaluation was expected to take a relatively short time and the parties involved were to be notified of the conclusions in writing.

The invention that did appear to warrant further evaluation effort then entered the second stage evaluation, in which an in depth analysis of the invention was conducted, and a report written to serve as the basis for recommendation by the National Bureau of Standards to ERDA. Such a report would include the conclusion, if appropriate, that the proposal be recommended to ERDA for Government support, the extent of which and the nature of which were to be determined by ERDA and not by the National Bureau of Standards. A National Bureau of Standards decision not to make a favorable recommendation to ERDA would mean that the invention lacked sufficient potential to warrant the support of the Federal Government and would generally taint any hope of getting any further funding by ERDA. However, NBS approval did not and does not mean that there would be any funding for the invention by ERDA.

It is fairly obvious that this multi-stage type of an operation, if it is not pursued with great diligence, can be enormously time consuming for any small business which is seeking funding. Every stage provides the opportunity for the evaluator to ask for further information, data, and
clarification. Meanwhile, the small businessman who is involved can be losing a great deal of time which might otherwise be devoted to his business. On the other hand, the small businessman might be running out of actual funds. Ordinarily, small businessmen, especially those who are funding an innovation or invention, are using their personal funds or those of their family in order to pay their living expenses until the business gets underway. The longer the time an evaluation takes, the less the likelihood that the small businessman will be able to survive this initial period.

Available data indicates that even though the Federal Non-Nuclear Energy Research and Development Act of 1974 (Public Law #93-577) was intended to establish a comprehensive national program for research and development for all potentionally beneficial energy sources and utilization technologies, the program has been applied with very little imagination and even fewer results. The law refers specifically to direct grants as a form of assistance which may be provided by the Energy Research and Development Agency under the Act. Moreover, the authority of ERDA to provide assistance to energy related research and development is, at least in theory, very broad and includes grants, contracts, loans, and other species of financial awards. In fact, ERDA was given very wide discretion concerning the form of assistance it could provide. Nonetheless, the type or form of assistance that have been provided to date have almost uniformly been grants.

The impact of or the potential benefits from a viable invention, or the costs required to establish such an invention in the marketplace appear to have received little consideration in the grant evaluation process which
determines the extent and form of the funding. The importance of coordinating the NBS and ERDA efforts with those of other Government Departments in order to provide some measure of credibility to the invention which the NBS or ERDA may have approved has also apparently been overlooked.

The actual Government actions and application to make the program work have been lacking in further respects, as well. For example, the Government theoretically is required to respect the rights of the inventor, under the terms of this program. The Government procedure for handling invention disclosures were theoretically established to safeguard the proprietary rights of the inventor. Disclosures of confidential data were to be kept under strict control, with access restricted to personnel of the Office of Energy-Related Inventions and to those persons selected by the OERI to assist in evaluations of the disclosures. All OERI personnel and other Government evaluators were required to sign statements that advised them of the procedures and of the Law (18 U.S.C. 1905) providing for criminal penalties which may be imposed upon Government employees for unauthorized release of confidential information, including trade secrets. Consequently, there have been few scandals regarding the release or disclosure of trade secrets to private firms or to people who might have "paid off" Government personnel in order to receive them.

The problem for the inventor has been another one. In their zealouslyness to ensure that the Government received some return upon its investment, evaluation personnel have often inserted a condition into the funding application which provided that the Government would receive royalty free use of the
patent, and occasionally (presumably in order to avoid any anti-trust problems for the inventor) the evaluators have insisted upon imposing a free licensing requirement or an open licensing requirement upon the inventor. Consequently, the proprietary interests of the inventor have, in fact, not been respected. The inventor, frequently an underfinanced small businessman who is borrowing money from family and friends to pay for the "bare necessities of life" while his invention is being processed, is brought under considerable financial pressure to give in to this of blackmail by overzealous Government employees.

The point we are making is that some of the special provisions established by OERI in order to maintain security, such as those requiring adherence to secrecy provisions, those which provide safeguards against Government or contractor personnel participation in an evaluation where there is or may be a conflict of interest, etc., overlook the conflicts which arise because personnel often have conflicting philosophical objectives from those of the inventors. The inventors want to get rich from their invention; OERI personnel sometimes act as if they believe that an invention is something that ought to be freely licensed to the public or to the Government. Whether this is because the OERI staff is not pro free enterprise, or because OREI personnel fail to view the U.S. Government as itself a party which has certain inherent conflicts in wishing to have an invention available for its use or a zero fee basis, is irrelevant from a practical basis. The results are the same.

The Government personnel involved generally do give some excuse or cover when demanding such licenses. One such cover is that the Government
has many of its personnel and contractors working on research and development of all types and the thrust of a disclosure may already be known to employees or their contractors or may become known to them through independent effort. Therefore, the Government states, that the acceptance of a disclosure by OERI personnel will not place any restriction upon the right of the Government to use information that it has developed or which it could reasonably (in its opinion) anticipate developing without this disclosure. This leaves the innovator (that is, the person who has applied a reasonably well known item to some new use or function) in the worst of all worlds. He has given over his knowledge, his innovation (which falls into the category of trade knowledge or a trade secret), to a party that will not honor his request for confidentiality.

One might also question why the Government took the position that a disclosure, once submitted to the Office of Energy-Related Inventions, will not be returned. It would seem that if the government did not intend to abuse any patent, information or new technology submitted to it by an inventor, the Government would be willing to return the information once the evaluation was completed or when the inventor decided that he no longer wanted to go through the hassle of trying to get Government aid. Under the program as it stands, once an inventor makes a disclosure to the Government, he cannot retrieve the information which he has submitted to the Government. This holds true whether the inventor decided that he could obtain adequate funding elsewhere or whether he decided that applying for funding was not worth the hassle. In effect, he cannot prevent the
Government from revealing such information to others in the course of the evaluation of other processes nor prevent the Government from using it in its own operations.

One may also question the Office of Energy-Related Inventions on another point. The U.S. Department of Commerce National Bureau of Standards, in the instructions for the form related to request for evaluation of an energy-related invention, state as follows, "The principal objective of the OERI effort is to assist Department of Energy in identifying inventions that are ready to be moved into the private sector when they require business management assistance, or inventions that require further research and development...in order to bring them to the point where they can compete with other Department of Energy projects for Program Research & Development funds."

The question arises as to where and how the Government proposes to provide business management assistance to businessmen. The Department of Energy and the other Government entities in the program, are notionally devoted to securing funding for certain types of inventions. It does not appear, however, that the DOE, the NBS or the other Government agencies involved are geared to providing management assistance for the firms seeking to obtain funding under these programs. It is understood that the Small Business Administration does provide such management assistance and that various private entities also provide such services, including specially financed Small Business Investment Companies. However, it does not appear that there is any office or group within the Department of Energy
or within the National Bureau of Standards that is geared to providing such assistance. It is worth ascertaining why and what management assistance is referred to in the National Bureau of Standards form for bringing an invention to the attention of the Department of Energy.

It is interesting to note that although the program refers to coordination of the Department of Energy and the National Bureau of Standards, one of the purposes of this interaction, according to instructions on page 3 of the form, is "The Small Business Administration suggests that one request evaluation from National Bureau of Standards in connection with a loan application." It is to be hoped that such coordination and the need for it is made explicit not only to the National Bureau of Standards and the parties connected with it but also to the U.S. Government officials at the Small Business Administration, who apparently are not aware that they are supposed to coordinate anything with the National Bureau of Standards.

In terms of the practical results of such an ineptly coordinated program, as of August, 1979, approximately 11,000 ideas had been brought to the Department of Energy for technology evaluation at the National Bureau of Standards. Of these 11,000 inventions, upon which the Government has been spending an annual $2 million over a five year period to subsidize small inventors who may have especially innovative energy-saving ideas, about 111, or 1.3%, have been recommended for Federal funding. Of the 111, five have made it to the marketplace. One of the systems was that for reheating scrap steel, which is expected to save steel companies millions of dollars in electricity. Nevertheless, most of the dollars for the program were expended on the bureaucrats necessary to administer this program,
rather than for helping the inventors.—This is rather like special programs that help the poverty worker, but not the poor person. The Government program indicates that most of the ideas have come in from California. Interestingly, however, the state with just about the fewest ideas, New Hampshire, has found that approximately 9% of its proposals have been acceptable to the program, while in the case of California the percentage runs far less. New York State has had 13 out of 749 proposals recommended for funding, which is more than for any other state, perhaps indicating that New York is somewhat more financially oriented.

One indication of how relatively useless the program is and why, is that the program is only permitted to finance something new, even though the invention might well be competitive in the marketplace despite its not being entirely new, and might, at a further state of its development, provide benefits and innovation advantages which are new. For example, if an automobile gets gas mileage as good as that of a Diesel Rabbit, it would not be good enough to get funding under the program, as the Diesel Rabbit already exists. The fact that the new automobile might be less costly than the Rabbit, would be roomier than the Rabbit, or have other characteristics that would make it more marketable or useful than the Rabbit, would not enter into this evaluation. If the Department of Energy does reject an invention idea because it is not new but it might be competitive, one would expect that the Department of Energy might help get the inventor a hearing and a loan from the Small Business Administration. However, the Small Business Administration is another bureaucracy, has its own rules and
requirements for funding, and apparently has no formal coordinating mechanisms with the Department of Energy.

The success ratio of 111 inventions recommended or accepted for funding out of 11,000 ideas over a period of five years does not seem like a terribly high success ratio. The question that could well be asked is whether this entire program is worth the candle. Indeed, to the extent that the program has been geared away from the small businessman/private sector, and has been geared to either the lone inventor or the non-profit institution, it has really served more as a boondoggle than as a forum for discovering innovations that have provided any significant amount of energy savings. It is also useful to bear in mind that while much of the sound and fury going on in respect of energy has stressed so-called soft energy options (such as biomass, solar, etc.), the practical results have to date been minimal. The extent to which the funding might more appropriately be expended in other areas geared more to the economic opportunities (and therefore to the small businessman) to both save energy and to provide a product which could be useful, is worth analyzing. To date, funds expended on such energy forms have had a yield which is very close to zero relative to the amount of funding, time, effort and publicity that has been poured into them. It would appear to be more appropriate to describe these programs more as a form of media hype than anything else.

was presumably decided within the Department of Energy on the basis of individual merit and need. The Department of Energy stated that 92 inventions had been recommended to DOE, and it had already awarded 34 grants or contracts, 27 of which were awarded during fiscal year 1978. The total awards to the December 31, 1978 date therefore amounted to $2,347,800, of which $1,790,350 had been awarded during fiscal year 1978. In addition, two inventors were provided with business or technical assistance. It would seem that the average amount awarded under these contracts was substantially less than $100,000 in each of these periods. Moreover, of the 92 recommendations made by the National Bureau of Standards, the Department of Energy had decided that there was no basis for supporting 8, that 41 had been accepted for support, and 43 were still under review. The largest amount awarded under this program in the December 31, 1978 report was $193,000. The average award, however, ran something closer to about $25 thousand to $30 thousand.

It is worthwhile to focus on a portion of the report, in which an attempt has been made to determine how quickly the suggestions made or the inventions received for evaluation by the National Bureau of Standards were evaluated by the National Bureau of Standards and acted upon by the Department of Energy. For example, in every report there is an item called significant dates, including the date that Form 1019 was received by the National Bureau of Standards and the date that the NBS recommendation was received by the Department of Energy. Generally, these indicate that it takes approximately six to seven months between the time Form 1019 is
received by NBS and the time the National Bureau of Standards recommendation is received by Department of Energy. Between the date that the form is received by the National Bureau of Standards and the procurement initiated, the elapsed time period has sometimes been about 3 years, which is a fairly long time for a business to be running without any sort of financing from the Government program that presumably is intended to provide early-stage financing for such inventions.

Also, it is worth noting that the date that a form is officially received by the National Bureau of Standards is not necessarily the date on which the inventor first contacted the National Bureau of Standards, spoke to the people of NBS about how best to submit his form, had his various drafts critiqued, withdrew them, added additional material, and finally made the official submission to the National Bureau of Standards. Consequently, it appears that there is at least some doubt as to whether this program is as effective as it should be, if only owing to the relative slowness with which it is being implemented. Such slowness is not so much the period between the date that Form 1019 is received by the National Bureau of Standards, and the National Bureau of Standards makes its recommendation to the Department of Energy but rather the length of the period between the time that the NBS recommendation is received by DOE and the time that the Department moves forward with the procurement or funding process. That is, the program compounds delays rather than reducing them. Since the procedure which is intended to provide guidance to other agencies of the Government who would provide the financing of worthwhile inventions can take two years or longer, followed by yet another evaluation by the
funding agency, the program does compound delays. Furthermore, owing to the types of techniques and the almost lackadaisical attitude taken toward evaluating inventions in a timely fashion, (as distinguished from evaluating them so thoroughly that not the least bit of criticism could be leveled against the thoroughness of the process and the paperwork trail it left) only two percent (2%) of the evaluation requests received by the agency can even be expected to be recommended for assistance. Since most businesses go bankrupt in the first and second year of their existence, only the exceptionally well financed business—the one that basically did not need that much help to begin with—could afford so long a period of evaluation in order to get Government's financing. This is the classic case of a Government program which is administered so as to provide help to those who least need it.
The Appropriate Technology Grant Program—
A Haven For Non-Profit Institutions But Not For Small Business

The Office of Appropriate Technology was established under the direction of the Assistant Secretary for Conservation and Solar Applications. Its purpose was to encourage development and demonstration of energy-related systems appropriate to promoting energy conservation, promoting the use of non-commercial energy sources, and seeking out the talents of individuals and small business, as well as major organizations and institutions.

Obviously, this sort of description is pretty much a catch-all. In view of the small size of the individual grants, it is reasonably likely that major organizations and institutions are unlikely to get too involved in this program, except insofar as they are already doing something for which any additional funding might be welcome, or a particular individual in one of these organizations is involved in and working on such technology and would seek such funding in order to justify what almost amounts to a pet individual budget item. Even though the description of the program does refer to small business, the DOE Appropriate Energy Program was only slated to expose some of the small scale energy related technologies appropriate to local needs. The fact that an innovation by a small business may, in fact, result in some fairly large scale energy related technologies at some point and that most of today's "big business" started off as small businesses at some point in time is not fully thought through in the program.

A list of those entities which are eligible for this program includes the following: individuals; local non-profit organizations and institutions;
state and local agencies; Indian tribes, and (almost as an after-thought) small business. The types of projects to be supported by these grants include concept development (that is, developing an idea or finding a new concept or new way of using an old procedure); and product development (which is the practical application of a specific useful product exclusive of manufacturing and production engineering). As part of product development a demonstration of the technique under operating conditions showed that the technique is technologically, economically and environmentally feasible is required. However, the economic feasibility of the product is not that extensively discussed in all literature describing this program.

To the extent that the grants for concept development were limited to $10,000 or less, and those for project development demonstration were limited to $50,000, the program is naive. In any useful project involving energy, which is a fairly large scale industry involving some very large and important economies of scale both in use and in generation, the sums were scarcely adequate.

The system is also clearly not small business oriented in its definition of energy-related appropriate technology. This included the following: solar technologies, use of wood or wood waste, wind systems, geothermal systems, aquacultural systems, solar storage systems, waste heat recovery system, energy conservation, methane production from organic wastes, and small hydroelectric systems. Items such as better means of oil and gas production, less wasted production, better means of discovery of oil and gas, better utilization of coal, reduction in effluent problems from the use of coal, were not encouraged. This listing of what was deemed to be appropriate
technology for the Department of Energy to fund and the pitifully inadequate
scale of such funding in which no one would be given enough money to
really develop any idea successfully, show that the program constitutes
waste. The policies adopted almost guarantee that once a small
businessman has spent a great deal of time and effort to get funding under
the program, he will not be able to come up with anything terribly useful
to encourage the small business sector of the economy.

It is worth noting that the Department of Energy described its operations
and its "successes" under the program in a letter dated July 5th, 1979.
That letter stated that the 1979 Midwest Appropriate Technology Grant
Program resulted in 63 grants being made in the six state area covered by
the Midwest Appropriate Technology Grant Program and the average grant
was $20,600.00. However, it is worth noting that

a) There were 1,200 applicants and 63 grantees.

b) The amount of cash that was actually appropriated for some of
the items went for energy program aspects that might be socially
interesting or might meet the implicit requirements that
constitute "soft" energy technology, but was not the type of
technology which would be of interest to small business and
from which small business could benefit.

c) A fair number of the grants were made to the non-profit sector
of the economy, rather than to the small business sector. For
the purpose of illustrating this point, we are including an analysis
of the items listed by the Midwest office of the Department of
Energy in the letter of July 5, 1979 above, describing the results of the 1979 Midwest Appropriate Technology Grant Program. Here are some of the 63 grants that were made to universities, Boy Scout groups and similar non-profit institutions.

1. To the University of Wisconsin, $6,324 for reduction of energy waste by improved fireplace design.

2. To the La Crosse, Wisconsin YW/YMCA for $23,125 for a heat recovery loop system.

3. The city of San Prairie, Wisconsin received $50,000 for water pollution control facilities.

4. The Tri-County High School of Plainfield, Wisconsin received $1,270 for a wind-powered electric generator.

5. The Hayward Community Schools received $1,696 for a solar water heating demonstration.

6. The Phillips High School in Phillips, Wisconsin received $6,000 for "the wind, wood, and solar group wind electric demonstration experimentation project" (which scarcely appears to be small business).

7. The St. Cloud Unitarian Fellowship of St. Cloud, Minnesota received $17,933 for a solar assisted dual heat pump.

8. The Lake Agassiz Council of Camp Fire Girls received $3,308 for primary solar heat system for their winter camp.

9. The University of Toledo received $29,288 for performance improvement of a solar heating system using an off-peak...
10. Green County Communication Action Council received $16,428 for a solar technician's training project.

11. Xavier University of Cincinnati, Ohio received $9,910 for a demonstration of feasibility study of a residential wind electric generating system.

12. The Dwyer Mercer County District Library received $35,544 (incidentally, this was one of the largest grants made) for parts of a solar ceiling tile system for a library.

13. The Southern Illinois University in Carbondale received $23,815 for a long term solar heat storage system in an underground water cistern retrofitted with thermal insulation.

14. The University of Illinois in Urbana received $48,000 for surface heating greenhouses with heated wastewater.

15. The City of Evanston, Illinois received $26,942.50 for a demonstration of an arch-type wind turbine generator for use in an urban environment.

16. The Metropolitan Sanitary District in Greater Chicago, Illinois, received $50,000 for digester gas utilization at WSW Sewage Plant.

17. Illinois Community College of East Peoria, received $49,787 for alternate home application and demonstration of a sod roof, south facing glass, composting toilet, greenhouse, aerogenerator laboratory house.
18. The Minnesota Intermediate Technological Development Group received $17,784 for demonstration of wind electric power co-generation to establish rates for the rule producer.

19. The Purdue Research Foundation received $10,000 for a solar cell utilizing photochemical generation of electricity.

20. In Indiana, the View Research Foundation received $10,000 for a solar cell utilizing photochemical generation of electricity.

21. The Michigan Technological University received $39,210 for a project on insulation from local basaltic stamp sand left over from mining operations.

22. The Environmental Research Institute of Michigan received $49,585 for a demonstration of an advanced solar garden with water ceiling.

23. The Upland Hills Ecological Awareness Center received $11,500 for the Upland Hills Ecological Awareness Center's Solar and Wind System Demonstration Program.

24. Grand Valley State College received $48,700 for a small sewage lagoon enhancement project.

25. Dairy County Board of Commissioners of Michigan received $15,467 for a model for wastewood use and resources renewal for woodchip industry, firewood retailers, and woodlot owners.

26. Sawgatuck Township Park and Recreation received $18,371 for solar heating Panel Parks and Recreation Building.

27. Urban Options Cooperative received $9,945 for the Urban
28. The University of Minnesota received $9,691 for energy from windpower oscillators.

29. The Campy Area Vocational Tech Institute of Campy, Minnesota received $50,000 for a study on enzymatic conversion of renewal biomass alcohol fuels.

While quite adequate funding appears to be available for the non-profit projects, the small businessman in the energy sector has great difficulty in getting anybody in Government to listen to his project or to express anything else but the most discouraging comments. The bureaucrats excuse themselves on the grounds that if anything is done to discourage an invention, there is no real social loss since a good invention will be found out in any case. However, the Government employees are not going to put themselves out in any way to examine anything which possibly could contradict their previous assumptions.

The Appropriate Technology Grant Program is a program which was theoretically set up in order to permit small business to benefit from Federal Government grants by enabling the small business community to enhance its position while helping the United States become more energy self-sufficient (either by generating additional energy from U. S. sources or by more efficiently utilizing energy). Yet, in fact, this program has by and large been taken over by non-profit institutions accustomed to writing applications for grants. This would strike most observers as a misapplication of the funds allocated for these particular programs, at least insofar as the Committee records indicate what the intent of Congress truly was.
This same pattern of almost complete domination of the Appropriate Energy Technology Program by non-profit organizations (whether they are small, local, non-profit organizations or local agencies of government) is also the case in Arizona, American Samoa, Guam Trust Territories and other areas from which the data was available.

The Appropriate Technology Grant Program gets many of its candidates for such small grants from the Source Selection Board for an area. The Board is responsible for selecting award winners after technical and peer reviews. The Source Selection Board must integrate the technical viability of the proposal with the State and Federal interest in the proposal. State officials have been concerned that the process of final proposal selection was generally unclear. They also wanted to make sure that the state would have a representative advisor to the Source Selection Board. In addition, the Program Manager is generally not a member of the Source Selection Board. Consequently, the degree of control that the source selection board has over the Product Manager in carrying out his mandate is limited.

At present, technical and peer reviews are somewhat separate functions. The technical review theoretically determines that the proposal is physically workable. The peer review determines that the proposal is desirable from the social viewpoint. It would appear that at no point is there any determination made that the project is intended (at least in part), to provide some benefit to the small business community; that the project is supposed to be economically viable, as well as technically viable; and that the project should have the potential for improving employment or anything else of that nature. The
Appropriate Technology bureaucratic community has generally interacted with the Small Grants Program which, in part, has an objective that of lessening the support and interest of the Appropriate Technology bureaucratic community. The community is still, in effect, engaged in an almost circular species of analysis, in that the Appropriate Technology Group determines what is appropriate for the Small Grants Program and then proceeds to evaluate how good its initial judgement was.

In none of the material reviewed, especially that coming from nonprofit agencies and state and local governmental agencies, is there any indication that the the funding had been appropriately utilized. That is not to say that the funds have been stolen or misappropriated. Rather, it is that formulas notionally have been established for allocating Federal dollars to the various regions. In addition, a budget has been established for the total program. There appears to be very little evidence that the Appropriate Technology Small Grants Programs (ATSGP) are reviewed to determine their economic viability, i.e., that in fact a dollar's worth of benefits was received for each dollar expended. Nor is there any way of monitoring the results of any particular grantee as he goes along or even when a project for which a grant was received has been completed.

To the extent that an objective of the Small Grants Program is to fund programs which will have applicability to local energy problems and will be commercially viable, the result of awarding a substantial portion of the funds to awardees who have no experience running a business or taking a successful idea and marketing it is to make the program self defeating. Certainly, one would not expect a nonprofit institution to necessarily
run a commercially profitable program. That is not part of its obligation or its stock in trade. In addition, very little thought has been given to disseminating the results of the awardees efforts. For example, there has been very little thought given to the extent to which the Regional Manager should, assuming that an awardee comes in with a technically successful project, assist the awardee with additional other help in commercializing the successful project.

In addition, there is no guideline or directive as to what role is appropriate for the Regional Manager or for anyone connected with the Appropriate Technology Small Grants Program in disseminating the results of the awardees efforts, whether they are successful or not. Also, there is apparently no scorecard and no given priority ranking whereby a manager who is involved in implementing the Appropriate Technology Small Grants Program can determine what priority should be given to any of the various goals that he is expected to meet—of which commercial applicability is presumably one. Encouraging the small business community is appropriately another. Lastly, the extent to which the Regional, State or Local Managers representing local or State Government are to be advised and aided in bringing any technology or funding needs to the attention of the various state and local boards involved in funding small business (especially that which is technologically based) has not been worked out. At what point is Federal action appropriate, at what point is Federal, State and Local Government action appropriate, and at what point should either or both of them be getting out of the way of private industry, are all questions that have not been answered.
To the extent that all these uncertainties exist, the small businessman who is involved in the program is not at all sure:

a) If he is going to get funding, because he really doesn't know what the funding criteria are;

b) What the benefits to him will be if a program he is interested in is deemed to be an appropriate technology;

c) What the rewards to him will be from successfully developing a program commercially; nor

d) How to go about getting advice on how to commercially develop an invention or innovation (something of great importance to most of the parties receiving such grants, who are generally technologically oriented rather than commercially oriented).

The results noted above are to be expected given the parameters of the Appropriate Technology Small Grants Program, as set forth in the brochure issued by the Department of Energy for the Appropriate Technology Small Grants Program for Region three (see Appendix D). It shows that the program is almost a species of catchall.

Perhaps somewhat typical of the nonsensical approach which is applied is contained in a written justification provided by the DOE bureaucracy in asking for an increased funding level for the Appropriate Energy Technology Small Grants Program. The information on the sheet points out that the program is the only Federal Grants Program available directly to individual inventors and innovators with "Yankee ingenuity" in the field of energy. The program goes on to state that it encourages individuals in community energy awareness and self-reliance and the program enhances public knowledge
in wise use of the environment, energy conservation and renewable
resources. It is difficult to believe that a project which produces as
skimpy results as this project has produces in terms of actual commercially
viable projects could have accomplished all these ends. Since these claims
are very difficult to document, perhaps they may serve the purpose of
someone who wishes to make a statement that can in no way be contradicted.
The economic viability of such projects, the number of small businesses
that they generated, the commercial success of those small businesses
based upon these projects, are all factors which have not been evaluated
oreven discussed in this effusion by the Department of Energy.

Interestingly enough, the Department of Energy immediately starts off
its program—the Appropriate Technology Small Grants Program (see the
Department of Energy regulations Title 10, Chapter 2, Department of
Lines issued in the Federal Register, Volume 43 #153 Tuesday, October 8,
1978) by defining small business in order to determine which small businesses
can be appropriately recruited for this program. This definition of small
business is different from the Small Business Administration definition.
Thus, it guarantees that the data regarding small business which is
generated by the Small Business Administration or other agencies will not
be comparable to the Department of Energy data. It also means that
Small Business Administration personnel seeking to help a small businessman
in the energy area will find it difficult to do so because of the different
qualifications the Department of Energy. Such working at cross purposes,
even in the initial stages, is an unfortunate policy to be followed.
The above discussion is not to say that the program is inherently useless or cannot be salvaged in any way. Rather, it is to point out that if the objective is to encourage technological advancement in such manner as would be helpful to small business, it will have been useful if:

a) Technology is not limited exclusively to those items which are, the unconventional energy sources but could also be broadened to include that which relates to currently used energy forms, to improve upon how they are discovered, produced, or marketed by small organizations.

b) The size of business that is eligible for these grants should be defined in accordance with Small Business Administration Rules so that the program could be transferred from the Department of Energy to the Small Business Administration, if that turns out to be more useful in the long run.

c) The program should be limited to individuals and small business rather than also including nonprofit organizations, who apparently have the greatest experience at applying for and getting grants but not necessarily the greatest knowledge and background in coming up with ideas which are commercially viable.

d) Some mechanism is made for follow-up on those inventions or innovations which appear to have commercial merit, to help those parties that had come up with them secure further financing in order to ultimately carry out their program.
The Federal Loan Guarantee Program—
Good Legislation Helps

The Department of Energy has for more than four years been unable to issue a loan guarantee to a small coal operator to open an underground low sulfur mine. The Department of Energy's program has been hampered both by funding problems and bureaucratic snarls. The Congress has a $750 million Federal Loan Guarantee Program which was passed in 1975. For two years, no funds were released for the program, which was designed exclusively to promote the development of low sulfur underground coal reserves. The regulations for this program, first released during 1979, took more than two years to write both because of staff shortages and (apparently) deliberate bureaucratic delays. Also, the enabling legislation was much too restrictive to permit its applicability to most situations of interest to small business.

At the time the program was set up, the Department of Energy had predicted that under this program there would be fifty loan applications a year. In fact, only twelve operators have to date requested help. Requirements that applicants have long term contracts secured in advance from responsible purchasers, and have coal with a sulfur content of no more than 0.6% are stated to be the major drawbacks to the program. It is known that one cannot write a long term contract for coal at a time when there is a relative surplus of coal. And yet, that is what the program requires. Also, the type of coal which is acceptable under the program makes up only 5% or 6% of the total amount of all underground reserves, with most of such coal being held by larger companies that are generally in the steel
business or that are the captives of steel operators.

The program was theoretically designed for small operators, defined as those who had previously produced less than either 1 million tons per year or 300 thousand barrels per day of oil, or who had an operation which was less than $50 million in size, or who did not own an oil refinery. Also, there was a whole series of rules as to cross holdings, common ownership, etc., which tended to restrict eligibility even further. The funds, which could either go to a new mine or for the expansion or reopening of an existing mine, were held to a maximum of $30 million per applicant and were not to be lent for a period of longer than thirty years.

During 1978 Congress expanded the original 1975 bill to include coal preparation plants which would process low sulfur coal in the guarantee program. However, the other restrictions still applied. The fact that no loan guarantee has been issued to date, and that the loan guarantee which is stated to be the closest one to being completed is only for $2 million, indicates the type of problem that this sort of program runs into. Legislation has just been introduced to eliminate the requirement for an applicant to have a long term contract (most applicants having a long term contract would not need this sort of government financing in any case) and to permit loan guarantees for development of coal with a sulfur content as high as the level allowed by individual states under their air pollution laws, rather than the artificially low 0.6% requirement of the initial program.

This type of program and its relatively miniscule (in fact almost non-existent) results is a consequence of both the failure of Congress to draft the appropriate legislation and the failure of the Department of Energy
and other related departments to understand that, from the viewpoint of small business, legislation which is so restrictive is entirely useless. The stalling on the part of the Department of Energy coupled with other bureaucratic delays are not to the credit of the departments involved. In fact, it took nearly four years for the agencies to discover that the legislation was almost inherently unworkable. Ordinarily, a department which cares about getting legislation implemented would point out the lacks and failures of the proposed legislation, and its inability to function adequately under it. The department would propose amendments to the legislation which would permit such legislation to be worked out in a sensible manner.
THE CURRENT SITUATION—
Investment Funding Consequences of Perceptions of
Government Energy Policy and Small Business Policy

As an investment banking firm, we are aware that the investment community—whether it is the stockbroker, the investment banker, the individual investor, or the institutional investor—generally looks upon any new technology, whether it is related to energy or to any other sector, as basically part of a technology-small-business-investment market. Consequently, many investors are in principle not interested in investing in such firms because they only wish to invest in existing established firms, or are generally risk-averse to the area of technology or innovation. Obviously, in the absence of substantial incentives, whether by way of tax benefits or by way of Government subsidization, these investors will not be interested in investing in energy-related small business. There is also an investor universe which is, in principle, interested in small business investments, if the risk-reward ratio is perceived as attractive. Government policy, as defined by legislation or regulatory policy, which increases or decreases the investment risk, will have an important effect upon such investors.

Because of the Federal Government's interest in energy, and the Government policies which have evidenced themselves in matters like the Small Refiner Bias program, the Entitlements program, the Small Business Set-asides, the imposition of price controls on petroleum and on natural gas, the imposition of severe environmental restrictions on coal mining and coal burning, the almost complete destruction of the nuclear industry in
the United States by Government fiat, and similar matters, including most recently the Windfall Profits Tax, the investor in energy technology generally believes that he is dealing in an area where the technological risk is enormously compounded by political risk. To the extent that he perceives the political and technological risk he is expecting to bear is not adequately rewarded, the investor is obviously going to be reluctant to provide capital to an energy-related small business. It is necessarily a function of this report, which is intended to deal with Federal Government programs as they affect small business and energy, to point out such a problem. To the extent that small business has to look outside its own internally-generated cash flow stream in order to secure the funds for the energy-related projects it wished to undertake, it must look to outside investors. Government policies which make such outside investment more difficult to secure (because of the effect of such policies on investor perceptions) are likely to have some impact on the Government programs related to financing energy-related projects undertaken by small business.

For the sake of completeness we are discussing here some of the factors which affect investor willingness to provide capital to a firm, a project or any other investment opportunity, as observed by the author of this report (both as an investment banker and also as an advisor to substantial U.S. and foreign investors). The capital gains provision of the Tax Code, and the over-all tax structure are quite important, particularly to individual investors who are not tax exempt, and to foreign investors, who are covered by tax treaties. To the extent that the capital gains provisions were perceived for many years as penalizing the investor—in that losses were only of limited deductibility while reported capital gains were taxed at an
effective rate of 55% or 60% because of the effect of state and local
taxes—the investor was hardly interested in almost all such investments.

The effect of such taxes was worsened by the concurrent decline in
the number of firms within the investment banking community in the 1968-
1978 period. This decline also had the effect of reducing the number of
firms available to under-write or otherwise market stock issues of smaller
firms, thus reducing the liquidity of capital invested in small business firms
by non-controlling shareholders. Liquidity is important in encouraging
investment by non-controlling shareholders because that type of investor is
interested in knowing not only the terms on the basis of which he can get
in but also that he can sell all or part of his investment within some
acceptable time frame and thereby realize all or part of his profits.
Realization of profits has the effect of proving or disproving the profitability
of the investment and the efficacy of the strategy and tactics employed in
making such investment. Such realization is also a way of freeing up
capital to be used by the investor to enter into new investments. Very
few investors are interested in permanent lockups of their capital. To the
extent that the change in the rules relating to brokerage commissions and
required unbundling of services by the investment community reduced the
number of firms, especially smaller and regional firms, there was the
reduced probability that the investor could sell all or part of his investment
in smaller firms, except by almost fortuitous "windows" occurring as a
result of the popularity of a particular type of issue at a particular time.
From the viewpoint of the investor, this reduced liquidity in turn reduces
the desirability of small business investments. The effect was (and to

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some extent still is) to reduce the flow of private capital to small business in the energy sector of the United States economy.

The lawsuits successfully brought against investment managers who engage in the purchase of smaller, riskier and thus more speculative issues are particularly important in the case of pension plan portfolio managers, whose legal liability has been expanded by the 1974 Employee Retirement Income Security Act (ERISA). The U. S. Government has recently treated the investors to the spectacle of one sector of the Government pushing for increased investment in small business—especially energy related small business—while another sector, the Department of Labor, had stated that investment in such small business securities issues would be treated not on a total package basis but rather on a security by security basis. For example, assume that an investment manager were successful in eight out of ten of his investments in small businesses in the energy sector but loses money on two of them, while securing an overall above-average rate-of-return performance on the "package" of all ten such investments. Under the Department of Labor ruling, that investment manager could be sued for losses sustained on the two investments that are unsuccessful. However, he would not be able to even offset against such loss the gains secured on the eight investments in order to demonstrate that, on the whole, his actions were prudent. The failure on the part of the left hand to know what the right hand is doing and their working at cross purposes in this area would be laughable if it were not so tragic in its consequences. (Although the ruling has apparently been reversed, for several months it served to "chill" such investments by pension funds.)
In the context of the discussion of the inadvertent effects of Securities and Exchange Commission (SEC) policy upon the ability of small business to raise capital for energy innovation (whether by way of energy conservation or by way of production of energy from unconventional sources), it is useful to note that the SEC has displayed some understanding of the need for greater sensitivity to small business issues. The SEC has stated that it is establishing an Office of Small Business Policy, and that it would also undertake a joint project with the Department of Commerce to institutionalize a system for monitoring the impact of Commission rules upon the ability of small businesses to raise capital. This new joint project with the Small Business Administration expands the Commission's focus on the capital-raising ability of small businesses in general, and thus should also prove useful for the efforts of the Federal Government to encourage small business in the energy sector. It also can serve as a prototype of the sort of joint operation between various sectors of the U.S. Government (intra-Government, inter-agency facilities), in order to help small business achieve a greater degree of success and access to government financing. If nothing else, it will hopefully provide a mechanism where the left hand does not take away more than the right hand is giving.

The Federal Government's delay and indecision on some energy issues, and its putting certain types of alternative energy technologies to death for purely political reasons (as it has done in the case of nuclear and as it is apparently doing to a fair extent in respect of coal) is again a reason why investors are not eager to risk their capital on technologically innovative small business in the energy field. Moreover, government programs that do
not recognize the risk-inventor's expectation of an adequate return (as the Department of Energy's rules on refinery investment fail to do) have a chilling effect on all investment in a field regulated by that Government department. Unless a Government program guarantees the investor not only that he will get his money back but also that he will be given the opportunity to make an adequate rate of return, the investor will decide that it is not worthwhile making the investment at all. After all, if the investor just wants to get his money back, he can keep his money in his pocket. Without the perception on the part of the investor that he will secure an adequate rate of return to pay for the risk, time and efforts expended in investing in small businesses innovating in such technologies as would be appropriate for energy conservation and alternative energy sources, the investor will not bite.

The perception on the part of many investors was and remains that the Department of Energy is continuously tinkering with a rather intricate piece of machinery, having several fixed ideas and goals in mind, most of which have very little to do with securing any positive return for the investor. It was and remains the investor's perception that the United States has no special energy policy. Rather, the perception is that the United States had and has a variety of policies regarding the environment, small business, big business, anti-trust, minority employment, defense and the United States balance of payments, and that somehow or other, from amongst all pressures and actions such other policies generate, an energy policy of sorts is cobbled together. It was not that energy policy had been thought through and then its implications for various policies worked
out; rather, other policies were worked out. If energy policy fits the
decisions made, that was fine and if not, that was just too bad. Investors
are not excited by the positive implications of such policy, and will not
make long term, risky investments in the non-marketable small business
securities of firms innovating in energy until such policy is changed or
perceived to be changing.

The paperwork burden.—Much of small business' disaffection with Federal
Government programs ostensibly designed for the benefit of small business
has been a consequence of the paperwork burdens that most Government
programs impose. Small business has the sense of being overwhelmed by
paperwork which is unpredictable in quantity; aimless, in that no visible
purpose is served by it; and lacking apparent touch with reality. Paperwork
is where the psychological crunch on the small business entrepreneur is the
greatest. He (or she) has the feeling that, having filled out a variety of
Government forms in order to qualify for a particular program, he does
not know where he stands. Will he get his money or will he get more
paperwork from the Government.

Why paperwork is a particular problem for a small business is often
what the Government program manager (often without great fondness referred
to as a bureaucrat) does not appear to understand terribly well. The small
businessman must wrestle with a fairly complicated situation to begin with.
The manager of a small business is required to deal with a variety of
factors which in a larger business are often dealt with by specialists. The
same person in small business may be required to be a factory manager,
shipping expert, expediter, labor negotiator, and otherwise maintain the
operations of the business. A big business has (at great cost) a staff of paperwork specialists, who relieve operating management of much of the burden. Thus, at the same time that a small businessman is trying to get some money for a particular program or innovation from the Government, he is hit with a multi-page form. This firm usually arrives just at the time when he is wrestling with a more-than-sufficient number of other problems. If this form hits the desk of the businessman just when he thought he had already finished meeting the paperwork obligations which were imposed upon him by the program for which he wanted to qualify, the reaction is likely to be that the whole program and financing are just not worth it.

Unfortunately, much of the information on this paperwork problem will have to be based upon anecdotal data, which is statistically difficult to validate and often constitutes a partial view (rather than the total view one would prefer to have). Nonetheless, since the data does not lend itself to many other measures, we will both point out the overall difficulties and anecdotally refer to some of the problems which have occurred in respect of particular programs.

It should be clearly understood that this criticism is related to a relatively small portion (about 25%) of the Government-related reporting requirements, i.e., those which are involved in the application for various Government programs. We know that many reports submitted by business to Government do not directly affect small business, since those reports which are related to control processes are often not imposed on small businesses (which are outside the control process by legal exemption).
Nonetheless, a survey done by the Small Business Administration has demonstrated that bureaucratic estimates of the time burden that a form will impose are significantly lower than those actually reported by small business firms who have actually filled out those forms about 79% of the time (that is, about 4/5 of the time).

Much of the burden apparently arise because Government's information demands on small business are basically heavier than they need to be. That is, government program managers or bureaucrats are still not working hard enough or effectively enough to reduce such information demands to the level where the cost/benefit ratio is sensible. In part, such burden reflects the viewpoint of many Government bureaucrats that the requirements and needs of small business are a large sized pain in the neck. That is, many bureaucrats are much more comfortable dealing with their counterpart specialists in larger organizations, and view the problems of small business as a form of special pleading which really does not quite deserve their concern, or as an attempt by small business to secure unwarranted benefits and rip off the taxpayer. In such cases, the normal bureaucratic fear of change and desire to have full files is comingled with a righteous indignation at what is perceived as an effort to cheat the taxpayer.

There is, as is well known, a round robin of reciprocal recrimination about paperwork between regulatory zealots and entrepreneurial zealots. When small business speaks about paperwork burdens, it is often a disguised way of opposing regulation. On the other hand, regulators frequently assume that the criticism by small business of some of their forms and reporting requirements simply constitutes a cover for an attack on regulation.
Much of the problem relating to the various reports and forms that need to be filed by a small business in order to qualify for the various potential Government programs in energy innovation are along the following lines:

1. There are too many of these reports.

2. These reports and forms are unnecessary and frequently duplicative. They contain the need for the same information somewhat rearranged or in a slightly different form to meet a particular bureaucratic requirement when the bureaucrats could just as well have secured the data themselves from another form that is already in their hands. Thus, from the businessman's viewpoint, a program where such forms are unnecessarily time consuming, confusing and unclear, and therefore require a great deal of his scarce time is, in effect, the same as an out-of-pocket cost equal to the value of his managerial labor. He cannot afford to spend too much.

3. Some forms also cannot be completed without professional help from accountants, lawyers, consultants, or similar people. This converts an implicit cost, which a businessman might consider to be difficult but tolerable (since it would mean that he would be using some of his own time or some internal time which in some ways is not fully costed by him) to a straight out-of-pocket payment for accountants, lawyers, consultants or similar people. Thus, a man may find that in order to get a government loan for $100,000, he has to spend $10,000 to $20,00 as a pure
speculation for legal and similar fees in order to get the forms filled out in such manner as would be acceptable to the Government. If the person believes that his chances of getting the money are not very good, he's not even going to bother applying for the program.

4. To the extent that the Government agencies' reporting deadlines conflict with other business activities, the entrepreneurial cost becomes even greater and thus the desirability of even applying for such programs diminishes.

The major source of the problems of small business in the area of attempting to secure appropriate benefits from Federal Government programs intended for the benefit of the small businessman active in energy innovation is the decentralized nature of the reporting requirements among many of the Government agencies concerned with energy. Each agency has the right to require its own information and its own particular format of it. No agency is required to accept information from another agency and to merely add to it its own particular need. Furthermore, no agency is required to share its information. Each agency has the right to issue its own forms and to make its own demands for information and the power to enforce all these rights. Thus, the root cause of the difficulties that small business has in getting appropriate financing from the Government initially begins with a lack of coordination and sharing of the information already in Government hands in respect of that small business entity seeking to obtain any sort of help from the government.
For example, the Small Business Administration has ascertained that a small coal mine operator is responsible for nearly forty separate reporting requirements, many involving detailed and comprehensive reports. In addition, further requirements are imposed upon the small coal mine operator to keep detailed records for inspection at the mine site. These reporting requirements are spread over twelve separate Federal Agencies, with no exemption as to information which is duplicative of information filed elsewhere. A small mine operator applying for Federal help cannot simply refer to the information already on file with these various agencies. Rather, he must proceed to pull it all together on a yet another form, (which is subject to being modified or otherwise adjusted further at bureaucratic whim), and then submit this data as part of his request for a benefit from the Government. If the Government were required to simply obtain all the data that is already in its file (except for census and IRS data) and use that and could only ask for additional data as needed, rather than the present system, the paperwork burden upon the small businessman seeking to benefit from a Government program for small business in energy would be substantially reduced. At the same time, the small businessman would be much more likely to apply for such benefits and use the program. To the extent that an entrepreneur perceives that he will have to spend a great deal of time in (from his viewpoint) a relatively useless manner—i.e., in filling out Government forms—he will be less willing to enter into a new energy related business, or to secure funding from a Government agency. Paperwork serves as a barrier to entry of new small firms into the industry and a barrier to the use of a Government program ostensibly intended to benefit small business.
The "Not Invented Here" Syndrome.—A further aspect of Government ineffectiveness in utilizing small business efforts and expertise in aiding U.S. energy self-sufficiency has been the relative inability of the United States to use many of the foreign developments that appear to be entirely appropriate for the United States. For example, Hans Gazda, President of the International Research Establishment of Vienna Company, Consulting Engineers, has developed a new uranium-enrichment technique called the Haga Process. (This example is neither an endorsement of nor an attack upon the person nor process. Rather, it is utilized here purely as an example.) The Haga process, which uses centrifugal force in the separation process, differs in concept from the gas centrifuge enrichment facilities which are now in use in Europe. Among the technical and economic advantages claimed for the Haga process over the recently developed gas centrifuge and the older gaseous-diffusion enrichment technique (which is used by the United States Government in its uranium operation) is the ability to use a natural uranium to secure reactor-fuel grade (a mixture containing about 3% of U235 instead of the 0.7% ordinarily found in nature) using only one pass of the hexafluoride gas (UF₆) through the equipment. The Haga Process requires only one pass through the apparatus. In contrast, the gaseous-diffusion process used in the United States can require up to 2,500 stages to enrich the hexafluoride gas to the necessary richness, and the gas centrifuge process used in Europe currently requires something in the order of 30 steps.

The Haga Process, because of its nature, requires relatively small amounts of electricity, in part because it only requires one step and in
part because of the fairly slow speed of the rotating portion of the Haga centrifuge apparatus compared with that in the more standard gas centrifuge. The economic feasibility studies performed for Gazda by a physicist from the New York Institute of Technology, Paul Koch, indicated that electrical power consumption of the Haga Process was about 30 kilowatt hour per kilogram of separative work units. This compares with 3,000 kilowatt hours per kilogram of separative work units for operating the current U.S. gaseous-diffusion apparatus, and with 300 for the gas centrifuge used in Europe. The Haga type enrichment plan also requires substantially less lead time to put it into operation and also has a substantially lower capital cost in the conventional enrichment units. A Haga plant can notionally be built in one year, compared with three or more years for the other types of processing plants.

The Haga Process also is defense reliable, in that it could be of a relatively modest size and still operate economically. Gaseous-diffusion plants, by contrast, require a capacity of 9,000 tons a year to be economical, versus 100 ton a year for a Haga plant. The ability to scatter plants coming up with a relatively low degree of enrichment (that is, a plant which turns out a uranium enriched adequately for power generation but still substantially less than the degree of enrichment required for armaments), is particularly important. By scattering such plants about, the United States would be far less vulnerable to the power supply disruptions which would and could ensue from either a natural disaster or from war.

The point is not whether the Haga process is or is not the best in the world. What is of particular importance is that the Department of
Energy has been conducting a feasibility study of the Haga Process and has so far declined to comment on the merits of the Haga Process, although the study has been under way for more than a year. Also, it is a study that was not done at the request of the inventor, because the inventor indicated that he had not approached the Department of Energy since he was not interested in United States Government business.

The inventor indicated that it would cost about $6 million in order to build a prototype pilot plant which could produce 50 tons a year of enriched uranium. Because of the difficulties in working with the U.S. Department of Energy and getting its process approved commercially, the first country which the inventors working with this process approached was West Germany. The government there declared the Haga Process in the national interest, which immediately entitled the Gazda firm to investment tax write-offs and reduction in income taxes. Japan and Australia have also indicated their interest in the process. What is also interesting and remarkable is that the Department of Energy in the United States and other U.S. Government entities are either unwilling or unable to use extensively the results of the experimentation and laboratory work by other sophisticated countries—West Germany and Austria would certainly qualify as such. Instead, the U.S Department of Energy insists upon reinventing the wheel in such manner as to waste the time of the various inventors and businessmen who are involved in projects which could result in substantial energy savings.

It is also indicative that an inventor who has the option of working with the United States or with foreign governments to secure the benefits of Government financing for a potentially interesting energy project finds
it preferrable to work with foreign governments. The further points that we are attempting to make are that: (1) Not only are the Department of Energy and related Government bodies presumably concerned with working with energy technology and encouraging energy innovations geared to work with large companies rather than with small ones but also that; (2) One of the great strengths of small business, its ability to learn of processes that have been developed outside the United States and to apply them to United States conditions, is often also in effect discouraged by the policies and actions of the Department of Energy and other U.S. Government agencies.

The "If It Doesn't Fit the Print, Let's Ignore It" Attitude.—There exists in commercial production a product called Gastel. Gastel is a one piece electronic vacuum sensor which monitors intake manifold pressure in gasoline internal combustion engines, and converts its signals to audible and visual indicators to tell a driver when his car's manifold pressure is too low to allow full combustion of the fuel entering the radiator. The better the combustion, ceteris paribus, the more efficient the energy usage and the greater the fuel saving. Clearly, this is an energy conserving device. Rather than encourage it, however, the Government has:

a) Failed to provide any source of financing. For example: in the course of the last two years, the Small Business Administration absolutely has refused to make an SBA Energy Loan to continue research, development and marketing of such an invention, and

b) The Environmental Protection Agency, and the Federal Trade Commission have come out with blanket condemnations of all
gasoline economy products. The owners of Gastel cannot effectively reply by showing its product does work to save gasoline since the agency has refused to test any item. The Government agencies, in effect, are taking an attitude of; A—it's not invented here; B—even if it's invented here, we really aren't particularly in favor of it; C—we really don't know how to work with small business, because it does not fill out all the paper work we need, and consequently we are just going to deny anything on the grounds that if the papers aren't filled out, it's not our job to do any investigation or to think the thing through at all on our own time.

Another example of a situation where the U. S. Government has, despite various programs that are presumably very much concerned with energy conservation, ecology, and small business failed to provide anything resembling financing for a small businessman who is involved in the energy area relates to oil pollution and oil salvage. It is known that the spillage of oil and the pollution problems resulting from it have had at least two major effects on the energy industry:

1. Because of the difficulty of cleaning oil spills, the citizenry in areas that might be affected by such oil spills (including people who are in the fishing industry) strongly oppose offshore drilling, oil ports, pipelines, refineries, and similar facilities.

2. The oil which is spilled and not picked up is wasted and this generally conflicts with the idea of conservation.

The small business involved in this example had invented an item
called Oil Harvester. Oil Harvester is a machine which cleans up offshore spills, and does so by picking up the oil from the surface of the water, rather than picking up the oil using straw or some other fibers which are then burned, thereby creating air pollution and also wasting the oil. What is also of considerable interest in respect of this matter is that Oil Harvester had been brought to the attention of the U. S. Navy in mid-1971 and it was not until November 24th, 1971 that any reply was received. The patent on Oil Harvester was filed for in July, 1972. In August 1972, some help was secured for Oil Harvester through a State Technical Assistance Program carried through by Pennsylvania State University. That proposal was first signed in March 1973. After testing resulted in Oil Harvester's being accepted by Penn State as the most promising idea to come along for an oil spill cleanup machine, the proposal was again submitted to the U. S. Department of the Navy. The Department replied in June 13, 1973 and then apparently dropped the matter.

The U. S. Coast Guard was also approached, and subsequently nothing further developed from the discussion with the U.S. Coast Guard. Nor was any help received from the Environmental Protection Agency, although a test conducted in the Environmental Protection Agency's test facilities in New Jersey on June 6, 1975 was considered successful.

The cost of developing Oil Harvester to its current stage of development in addition to the costs expected to be incurred in construction of the first full scale Oil Harvester total between $150,000 and $175,000, a reasonably typical small business outlay. The product apparently has a market. The product was advertised and many potential customers wrote
away for it. It turned out, however, that these customers were only interested if the Oil Harvester was approved by the U. S. Navy or the U. S. Coast Guard. Since the U. S. Navy and the U. S. Coast Guard had not been involved in financing the project and had not been involved in research and development, they also refused to approve or disapprove Oil Harvester. They simply ignored it.

Here again is a case where a U. S. Government agency has simply ignored any sort of responsibility toward the small business community. Moreover, there continues to be no place where this type of-at-best-lackadaisical and-at-worst-negligent type of approach by any U. S. Government agency can be sorted out or appealed. The Department of Energy, the Small Business Administration, and other agencies concerned with energy or small business do not have the necessary consultative and facilitative interdepartmental access to the U. S. Navy, U. S. Coast Guard and other Government agencies which have the ability to block a project, if only by their failure to do anything. Here is one more example of where the U. S. Government has failed in its responsibility to small business. (See Appendix E for correspondence from the inventor, a description of Oil Harvester and the technical literature related to it, and somewhat of a blow-by-blow description of what has developed.)

Does the Right Hand Know (Or Care) What the Left Hand is Doing?—Further example of the lack of coordination of various government departments in their dealings with small businesses, i.e., a) their acting in such manner that small business does not have the opportunity to successfully finance
itself, and b) how policies enunciated by the Department of Energy or the Small Business Administration are defeated by other policies carried out by other Government departments which act without coordination, is shown by the following situation: The Internal Revenue Service (IRS) has come up with a set of proposed regulation that would hurt a great many small firms that are already in existence. The regulation particularly affects those firms that are startups in the energy area and that are working with new technology—whether for developing new energy sources or for energy conservation. The IRS proposals involve bonds, notes, debentures, and accounts payable which businessmen have looked upon as credit instruments in the past. Henceforth, the Internal Revenue Service bureaucrats have ruled that these instruments will be treated as equity rather than debt.

The distinction between debt and equity is very important for tax purposes. Companies can deduct interest on debt or income tax purposes, but they cannot deduct dividends paid on equity. Also, any repayment of debt is tax-free to the company or to the person who is being paid, while payments made in respect of equity may be treated as dividends and subject to taxes in the very highest tax bracket. So, obviously the businessmen usually wants a financial instrument to be considered debt, while the IRS wants it to be considered equity. The Internal Revenue Service, under the Tax Reform Act of 1969, were authorized by Congress to come up with a clean line of demarcation between debt and equity. The regulations, which were just issued by the Internal Revenue Service within the past several months, provide that when an individual (or for that matter a venture capital company) lends a corporation a substantial
sum of money and also owns more than 5% of the borrower's stock, there will be special rules applied. Since most companies give a major lender an amount of stock as an equity "kicker," and since the definition of stock is also extended to cover options and warrants, the less favorable special rules apply. The ultimate effect is to reduce the attractiveness of investment in small business, including energy related small business.

Another example of the failure of the Department of Energy to respond adequately to some of the problems which affect small business engaged in energy related areas has been its apparent failure to respond in a timely manner to some of the recent rulings, i.e. one by the Labor Department and another by the Securities and Exchange Commission which have threatened to block the flow of pension fund money into the venture capital area. According to the National Venture Capital Association, about 30% of the money invested by venture capital firms, a figure in the area of $200 million dollars in 1979, is provided by the pension funds. Under a rule proposed last summer by the Labor Department which administered ERISA, venture capital companies would be off-limits as qualified investments for pension funds.

The Department proposed that if a pension fund invested in a pooled investment vehicle which was not a registered investment company, the venture capital company's total assets would be considered as directly held assets of a pension plan, even though the pension fund investment financed only a portion of the venture capital firm's asset base. Most venture capital firms (in fact) almost all venture capital firms) are not registered investment
companies. Consequently, under the proposed interpretation of the Government decision, all of a venture capital firm's assets would have to be judged as prudent or have to meet the other technical requirements of ERISA.

Fund managers in investment companies registered under the Investment Company Act of 1940, basically mutual funds, are viewed differently. Just the shares themselves, and not total assets of the investment company, are subject to ERISA. This resulted in the withdrawal of quite a few firms' pension plans from negotiations with several venture capital companies in respect of various proposed acquisitions, just shortly after the proposal was issued. The withdrawal of Boeing Company and the General Electric Company's pension plans are two illustrations of this fact. Complaints were received by the Labor Department and two days of administrative hearings were held on that matter later in February, 1980. Interestingly, despite the potential deleterious effect on the companies that are engaged in energy research and projects, the Department of Energy was not among the agencies represented at the hearings.

Venture capital companies could, of course, solve the problem by registering with the Security and Exchange Commission (SEC) under the Investment Company Act of 1940 and the Investment Advisors Act of 1940. But registration would create a whole set of other problems, including those of motivating the management of the venture capital investment companies. Among other things, Registered Investment Advisors are prohibited from charging investors a fee based upon the profits of the venture capital company, thereby stripping away the incentive managers of venture capital
firms now have for investing in new and untried enterprises. Recognizing this problem, the SEC suggested making some amendments to the rules by allowing investment advisors to base their compensation on the earnings of a venture company. But according to the information provided by the National Venture Capital Association, the SEC's plan still failed to recognize the essential nature of many of the companies in which the investments were potentially made. Here, again, there are three items worth noting:

a) That the Department of Labor came up with a proposed rule whose consequences have not been fully thought through.

b) The SEC came with a proposed rule which also had consequences that had not been completely thought through.

c) As judged by its relative lack of action in these situations, the Department of Energy, which theoretically should be very sensitive to anything which could adversely impact research upon and investment in energy self-efficiency in the United States, has so far been unable to even decide that it is affected in any way, shape, or means.

The "Mushroom Treatment" of a Small Business Active in Solar Energy.—Another example of various problems with U. S. Government programs relating to energy conservation and energy production corporation funding from the viewpoint of small business, can be seen in the Solactor Corporation matter (Appendix F). As can be deduced from the information attached, the company produces high temperature concentrating solar collectors using circular fresnel lenses. On December 1, 1978, the company hand-delivered
a preliminary proposal to the Department of Energy. It was given to Dr. Fredrick H. Morse, who is with the Systems Development Division, Office of Solar Applications, Office of the Assistant Secretary, Conservation and Solar Applications, of the U. S. Department of Energy. The opinion of Dr. Morse was that some response would be received by Solactor within six weeks, since preliminary proposals are supposed to move under a faster set of procedures than formal proposals. It was not until a letter dated August 10th, 1979 arrived that the company received any indication that the proposal had been reviewed within the Department of Energy. In fact, efforts to locate the proposal and find out who in the Department of Energy was reviewing or working with it until subsequent to December 1, 1978, had been unsuccessful.

In its comments on the proposal, the Department of Energy described an operating invention as a "concept" rather than noting that a working mechanism which had been demonstrated in actual operation was what was being discussed. Moreover, the Department of Energy stated that the equipment and the entire technological approach was not cost effective at the time and that the Department of Energy did not believe that the solar collector that Solactor made would be cost effective. When making this statement, the Department of Energy did not indicate its evaluation of what the probable costs and other problems of alternative fuels used and processes involving the Solactor would be. In addition, the Department of Energy had never asked Solactor for any cost information or any other information from which it could determine the dollar cost of the Solactor
product. Considering these two factors, it was difficult to see how Department of Energy personnel had reached any sort of conclusion about cost effectiveness.

This example typifies one of the worst continuing curses of dealing with the bureaucracy at many Government agencies. Matters are not dealt with expeditiously, i.e., as soon as a proposal is made, and followed up with continuing interaction and information flow between the firm which is trying to secure funding or help, and the Government agency (whether the Department of Energy or other Departments). Rather, the agency seems to put the request on ice for several months while stating that it is being studied. Then, when it becomes painfully embarrassing for some bureaucrat to discover that an envelope containing a proposal has been sitting unopened and unanswered in his In box, some sort of nonsensical, irrelevant reply is drafted. The reply then becomes the official policy of the Department of the Energy or any other Department with bureaucrats then prepared to defend this particular slap-dash answer as the "Ultimate Truth." It would appear that the small businessman and, in fact, all businessmen of the United States are entitled to better treatment than that.

Also, to the extent that some bureaucrat at the Department of Energy or any other Department sits down and calculates whether a project will be feasible or not, he may well be engaging in another species of impracticality. One can only measure whether something is cost effective relative to its proposed market. For example, a solar photo-voltaic system may not be terribly cost effective if the objective is to generate base-electricity in
the City of New York. It may be very cost effective—in fact, the only acceptable system—if the objective is to generate electrical current for a remote radio transmitter on some isolated mountain peak. Consequently, one of the further aspects of gross negligence by the Department of Energy personnel reviewing this particular proposal was that they did know that the major potential market for the product was the Department of Defense. That is, since Department of Energy personnel did not speak to Solactor's personnel, they were not aware that for the Department of Defense (which was deemed to be a probable major potential market for this product) Solactor was in fact quite likely to be cost effective.

Another important problem which the letter from the Department of Energy evaluating this project points out is the consistently inconsistent nature of targets and of United States Departments and agencies. Projects and goals which were listed in the preliminary proposal of Solactor had been selected from the National Program Plan Descriptions and Research and Development Program tasks. Most of the objectives described were shown as not yet having been funded nor having contracts. Keeping in mind that this program has been designated high priority by the Department of Energy, the statement by the Department of Energy that the needs of the solar heating and cooling systems development program were no longer of such priority was difficult to understand. Where needs change, it should be incumbent upon the Department of Energy or any other U.S. Government agency engaged in the areas of new technology for energy or providing funding for small business in energy-related businesses to publicize the new
directions being pursued and to explicate what the new objectives are in that particular area.

The above comments should not be considered to be an attempt by the writer of this report to evaluate the quality nor legitimacy of the technical aspects of the proposals, and the Department of Energy's evaluation thereof. It just appears from an outside observer's viewpoint that the length of time it takes until any reply is heard, and the failure to provide an ongoing dialogue between the interested parties, are in utter violation of all the rules that would be followed by any sensible venture capitalist or investment banker seeking to find ways of profitably investing funds in new technology. Furthermore, the unwillingness or inability to communicate on a timely and ongoing fashion is discouraging the application of new resources by other parties to energy conservation and development technology. It appears that various judgments were made about the complexity and expense of certain aspects of various inventions and technological improvements put forth to the Department of Energy without proper investigation. It was as if the decision had been reached and then the Government moved forward, either prejudging or misjudging what was done. This sort of action reduces the probability of the U. S. being able to function successfully in solving energy problems and to enlisting the efforts of small business.

Solar Energy Generally.—Solar energy is an example of an area where the Department of Energy's policies during the past five years in respect of providing capital for small business in energy technology have proven to be
quite inadequate. During the past five years, hundreds of companies have sprung up in the solar energy field. Most are very undercapitalized and relatively few are profitable. The majority of them are run by people who are not business people. Rather, they include aerospace engineers, plumbing contractors, building material dealers, research scientists, and occasionally some people who would probably have difficulty passing a sanity test. The infant industry's start-up firms make everything from space age solar cells to conduction, convection and radiation systems; change buildings themselves to trap, store, and transport solar-source thermal energy; work in a more complex manner with photo-voltaic cells which converts solar energy to electricity through semiconductors; or provide solar collectors which transfer the sun's heat to a circulating liquid or to air. In any case, their technology has been expensive. By and large, it has been relatively or entirely unproven and the market for their product has been erratic or nonexistent in many cases.

Many of these firms have not been able to persuade venture capitalists to provide them with any cash. The companies have the double burden or triple burden of pioneering an unproven new technology, an unproven market (i.e., the demand for their product is unproven) and a political situation in which the Government appears to be more concerned about stopping them then about helping them. Certainly, the degree of cooperation that these firms report having received from the Department of Energy is underwhelming. The solar practitioners are attempting to reduce their costs over time, beef-up their technologies, open up a new overseas market and slowly learn
how to be business managers.

Those firms that have made money for their investors to date have been those that appeared to be pioneering a promising technology and consequently were acquired by larger corporations. Also, (perhaps it is an ill wind that blows nobody any good) the dismantling of the nuclear energy industry as a consequence of the Three Mile Island incident, the increasing gloom over the use of coal, and the ever-increasing price of oil and natural gas is spurring further interest in solar energy. Nonetheless, the direct grants, subsidies, loans and other incentives offered by the Federal Government have generally been perceived by investors as quite inadequate.

The best indication of this perception is that even in Denver, which is the nation's major public underwriting area for young energy companies, there have been very few underwritings of solar energy companies, while there have been numerous underwritings of petroleum companies, and some underwritings of companies that are in the biomass and gasohol business. Fifteen or so solar energy companies have gone public in the last four years in the United States. In terms of net worth, sales, earnings and creating experienced solar energy management, most of the companies have accomplished very little. The Government business that has been promised to these companies has actually been available only on a spasmodic basis, thus preventing such firms from making enough money in their usual operations to permit them to accumulate the capital for continuing operations. Those firms which are able to run the gauntlet of the various Government forms that need to be filled in order to get any Department of Energy monies, have been the ones that have generally benefited from
the Government market.

The Department of Energy's Deputy Undersecretary for Commercialization, Jackson S. Gouraud, has been setting up a program with the Small Business Administration calling for energy loans to set up new solar ventures. So far, those people who tried to benefit from this program found the delays easily take a year or two. By that time, any ongoing small energy operation (especially in solar energy, which in many respects is fairly capital intensive) has found that it has long run out of all the money that had been raised beforehand. As noted earlier, those firms that have shown some degree of success in the solar energy area have found that they are increasingly dependent upon raising capital by selling out in whole or in part to larger firms which have the ability to function in this business and to provide its ongoing funding needs. The consequence is that companies such as Mobil and Atlantic Richfield have been able to buy their way into the solar energy business at a relatively low cost. Also, because such larger firms are much more knowledgeable about the various Government programs that are available, and have the attorneys and other specialized manpower that is necessary to process forms and deal with various Government bureaucrats, they end up getting the Government funding, rather than the smaller firms for whom such funding was notionally established.

The steps taken by the solar energy industry in respect of its learning curve have indicated the importance of commercialization in the learning process. Some energy systems, while conceptually simple, have actually turned out to be quite complex and to require a great deal of attention to
detail if they are to function effectively. Installation mistakes, that may not be terribly important in a heating system that uses a more concentrated form of energy, demand exceptional skill at execution if the solar heating system is to work properly. For example, a program in conference run by the Department of Energy Solar Energy Research Institute showed that a space heating system was only able to deliver 18% of the solar energy which was collected by that space heating solar system. However, just insulating the pipes tripled the amount of heat delivered. Control settings which were off by as little as 5 degrees reduced efficiencies by 8% to 12% in respect of the solar system while having much less impact on a fossil-heat system. Thus, a solar system that was well designed but badly installed could result in a situation where a system that could theoretically meet 50% of a building's heat load would be unable to meet any portion of the building's heat load—a 100% loss—simply because of the sloppy way in which it was installed. This means that the manufacturers of solar systems have to discover how to make their system fool-proof (or at least sloppy-proof) so that the installers would not be able to foul up a system entirely. Regretably, the various types of funding offered by the Department of Energy's programs do not even begin to deal with this sort of situation.

Related to the above, most of the work that is being financed today by the Department of Energy involves technological sophistication of the solar energy systems. Lowering the cost of the systems themselves tends to be secondary. Yet, lower cost would be more important than almost anything else in order to get solar energy into the mass market. Most
solar energy systems sold today are designed to achieve the highest possible efficiency in converting sunlight into heat or light. However, the idea of having systems designed to provide more BTU's per dollar, even if they are scientifically less elegant, is far more important from the viewpoint of the energy consumer and from the viewpoint of increasing United States energy self-sufficiency.

An amusing (except that it is so devastating) example of the lack of coordination, within Government of its policy occurred in respect of the solar industry in the following situation: The Government had tried to lessen solar's economic disadvantages relative to other forms of energy through legislation. The National Energy Act of 1977 gave consumers tax credits of up to $2,200 for solar system purchases and also provided a 10% investment tax credit for business purchases. The Federal gesture brought a disadvantage of its own, as a great deal of bungling accompanied the 1977 tax change. Since the proposed tax credits were not approved by Congress until 18 months after they were initially proposed, many consumers waited to see what the government would do. Consequently, for 18 months, sales of solar equipment actually collapsed, as did several companies. After the President called for further tax credits and for a low interest loan program to benefit the solar energy industry to become effective in 1981, the result was just as bad. The customers were, in effect, being told by the Administration to wait another 18 months before they bought solar energy equipment.

The point is that a policy (or series of policies) that is either inadequately thought through or ineptly administered is quite likely to do a fair bit of
harm rather than the good it is supposed to do. This unfortunately has been the history of many of the Government policies which were supposed to have been carried out for the benefit of the energy industry and particularly for the benefit of the small business firms engaged in that industry.

Tunnel Vision—Federal Agency Style.—One of the major problems in dealing with the Federal Government Programs relating to energy, insofar as securing any sort of acceptable funding, is that the Government bureaucracy has created its own particular definitions and criteria which do not necessarily relate to the viewpoint of the energy consumer. Consequently, the ability of the small businessman (or businessmen in general, in fact) to come up with an acceptable product for the consumer is misperceived and misunderstood by the bureaucrats. For example, attached herewith (Appendix G) are some correspondence and background relating to a product which was created not simply as an electricity-generating photo-voltaic system but rather as a complete system for generating from the sun a substantial portion of the heating and energy requirements of a home, i.e., a solar system.

Rather than the program and the product being evaluated by the Department of Energy and the various Government agencies connected with evaluating energy devices on the basis on the total system, the relevant Government agencies only evaluated this system in terms of its capacity for generating electricity. This system does not generate sufficient energy savings through the generation of electricity to make the system worthwhile to the consumer. However, if the system is viewed as one which provides hot water for the home, generates electricity for lighting and various home
uses, generates some of the heat needed for heating the home, and can also be combined with a system for cooling the home, the system becomes economic for the consumer. For reasons which the author has been unable to discover or fathom, other than perhaps tunnel vision, the various agencies which evaluate the commercial, economic, and technological feasibility of various items or inventions have only examined this invention and discussed its photo-voltaic aspects. The photo-voltaic aspect is the basis on which these agencies can condemn the invention. They have not discussed the other aspects of it.

Also of interest in this regard is that even as a total energy system, the package of equipment involved requires an investment of about $12,000 for a family home. This is ordinarily more money than a homeowner has available to invest into a new piece of equipment for his home. In this context, our discussion of the need for a delivery system which would permit the delivery of technological advancements in commercially usable form to the ultimate consumer of energy is of considerable importance.

One of the forms of innovation which is not at all focused on by the Department of Energy or by any of the U. S. Government programs is the development of appropriate financial intermediaries and financial mechanisms to permit the ultimate energy user to acquire the necessary capital equipment which would be needed for energy conservation. For example, a financial and legal mechanism which would permit solar energy equipment to be covered by a mortgage, comparable to the equipment financing which is available for major capital items in a home, i.e., a home freezer, would
clearly have been of use in getting this sort of a technology accepted in the market place. This has been continuously one of the major faults of all of the U. S. Government programs in this area—failure to focus on delivery of the final product to the consumer.

Persons Who Did Not Get Funded.—We have suggested repeatedly throughout this report that it is far more useful to ask those persons who were not beneficiaries of the Government program being evaluated for advice about improving the adequacy and quality of the program rather than speaking to those people who were beneficiaries. The beneficiaries would obviously have several reasons for having a different viewpoint than those who were not beneficiaries. Among those difference would be:

1. A belief, obviously aided by their self interest, that the program was working reasonably well since they have benefited from it.
2. The fear that were they to criticize the program too strenuously, their own benefits under the program might cease.
3. The fact that those persons who benefit from Government programs are frequently not those parties whom the program was theoretically intended to benefit but rather those parties who are the most who are adept at getting on with the bureaucracy. This group includes those firms well acquainted with filling out various forms and who possess the ability to make presentations in such manner as meet the bureaucratic requirements, etc. Such persons are not necessarily the inventors, businessmen, or other types whom these small business energy programs are intended to benefit.
Consequently, we have attempted to get some input from parties who have made an investment in the energy business of such nature that they should have benefited under some Government program dedicated to increasing U.S. self-sufficiency in energy (whether by increased production or by decreased usage, i.e. conservation). These parties could theoretically have met a program goal except that they had found that the requirements for qualification were different in practice than the law as they had interpreted it or as it had been set forth in the regulations. Obviously, it is much more difficult to get a listing of those people who had contemplated getting benefits under a program rather than those persons who are in fact benefiting from the program. Consequently, the data on this subject (some of which is included in appendices to this report) is not complete by any means, nor is it necessarily a statistically valid sample. Rather, it is intended to be indicative of some of the problems which are met by those persons who should, at least in theory, have benefited from the program but have not so benefited.

The situation related to Schneider Lift Translator Company, U.S.A., (see Appendix I) is rather indicative of the problems which are imposed by bureaucracy, as distinguished from those imposed by the law itself. There was a very long period (from June 16, 1979, through August 17, 1979) before the Small Business Administration acted. When an approval letter was received from the Small Business Administration, it apparently contained conditions and restrictions well beyond the restrictions which were to be expected on the terms of the legislation for the Small Business Administration Loan Approval Program under Section 7(L).

In both these cases related to the Schneider firm, the project for
which Government aid was sought had already been evaluated previously.
For example, in the case of the Schneider Aerodynamic Power Generator,
there had been a National Bureau of Standards-Office of Energy Research
(NBS-OERI) Evaluation, which made a positive recommendation to ERDA in
September, 1976. The application was submitted on October 12, 1975. This
had followed up an unsolicited proposal to ERDA in May, 1975. A grant
was made in September, 1977, which covered the anticipated cost effectiveness,
technological feasability, and commercialization probability for the proposal.
Progress reports and the final report dated November 6, 1978 were finally
delivered showing that the proposal was in fact cost-effective, technologically
feasible, and probably commercial. Despite that, the Small Business
Administration Loan Program took a great deal of time before it went
ahead with its own evaluation and came to a conclusion about feasability.
Such duplication of effort and waste of time is utterly destructive of any
small business that is attempting to survive on rather limited funds. By
the time the help does come in from the Government, most of the money
has already been pre-spent in an effort to keep the business going until
those funds came in. Thus, the business does not have a chance to really
expand and get itself off the ground.

Similarly, in the case of the Schneider Hydrodynamic Power Generator,
the NBS-OERI Evaluation had a proposal approval as of August 19, 1977.
The letter contract was executed December 23, 1977 and the final contract
executed in February, 1978. The final report was submitted to the
Department of Energy in March, 1979 and yet it again took the Small
Business Administration a great deal of time before it went through any
sort of an approval. Moreover, the terms and conditions which were attached to the approval were such as to basically make the loan not worth having. For example, the parties to the loan were required to collateralize the loan to such an extent that a commercial lender would even have been satisfied with the collateralization and made the loan. This requirement was entirely contrary to the directive that Small Business Administration loans for energy be made on a basis that was less acceptable and more risky than those which a regular commercial lender would accept and even more risky than those requirements applicable to the ordinary loans made by the Small Business Administration.

The utter lack of realism displayed by the bureaucracy can also be illustrated by another aspect of the requirements imposed. Included in the requirements proposed by the Small Business Administration were some which were not achievable, including requirements for second liens on lands that were not owned by parties which related to this company and on lands and properties that have had previously been sold by the company.

Moreover, the requirement for the patent assignment and the requirement for the complete coverage of all the possible assets of the firm and its shareholders would have made it impossible to get additional financing from anyone else who would ordinarily be a source of funds for the business. That is, the Government loan would preclude getting any other financing and in itself would just about guarantee the failure of the business.

Yet another aspect of the problems occurring with Government funding and Government programs in respect of energy conservation or other methods
of financing U.S. energy independence is shown by the data contained in Appendix H to this report. A firm called Automotive Devices, Inc., (ADI), has invented a device which monitors the vacuum pressure within various parts of an automobile engine. The basic rule is that the lower the intake manifold pressure, the more fuel and the less air an engine takes in. Pressure must be maintained, therefore, at sufficient levels to get the optimum fuel and air mixture. When the engine of an automobile is running properly, and getting sufficient pressure, the optimum gasoline mileage is being secured. The device involved is an electronic sensor which converts its signals to visible instant visual indicators and also to an audible indicator. As the indicator is an audible one, as well as a visual one, there is no need for the driver's eyes to leave the road.

Broadly, if the proper intake manifold pressure exists, a green light will appear on the indicator (which is called Gastell). A red light will appear and an audible tone will sound when gasoline is being wasted either through improper acceleration, faulty ignition, carboration or sparkplug performance. The device does not control the engine itself. Rather, it provides information to the driver, who can then make the control decisions himself. The device also has been demonstrated to be safe for the engine. The precise way in which the device works is shown in the article from the March, 1980 Popular Mechanics (pages 109-111 and then continuing on page 196, which is part of Appendix H).

It is clearly not the purpose of this report to get into the technical aspects of the device, nor to comment on the precise degree of energy saving which this device results in, although it appears from driver tests
that have been run that gasoline saving exceeds 20% on the average. Rather, what is significant in respect of Gastell is that the various Government agencies that should notionally have been involved in evaluating and funding this type of device and getting it to the marketplace functioned in a counterproductive manner. The Office of Energy Related Inventions Program (OERI), felt that Gastell was a good idea but had already been developed. It appears both from the fact that the patent application was not thrown out for reasons of its imitating previous technology, in addition to the fact that no such previous device had been marketed before January 1, 1980, that the evaluation that Gastell was simply an old device was not entirely accurate. Indeed, it is also amusing that the Department of Energy in a publication entitled "Driver Aid and Education Report, No. DOE/CS-0043" suggests that the Department of Energy support research in this area. Consequently, the OERI had managed to basically misunderstand a device intended for driver behavior modification and, by treating it as a device intended for equipment modification, proceeded to put it off into a completely different category.

One result of the OERI delay has been to permit other larger companies to get into the market. These larger companies are quite effective competitors, and may prevent the original developer of the device from ever securing a substantial economic benefit from his invention—typical of the results a small businessman expects when dealing with a bureaucracy. (The ordinary result of Government bureaucracy has been to favor the large corporation versus the smaller one in the course of the regulatory process. The fact that another set of Government agencies labeled anti-trust then proceeds
to try to undo some of the damage done previously is a form of government make-work program which we needn't discuss at this point.)

The Environmental Protection Administration Emission Control Technology Division has also issued reports, which apparently disagree with the reports of the Department of Energy on the subject of the adequacy of various emission control devices. While the two Government agencies are busy hassling one another, the businessman who is in the middle loses, since each Government agency will simply issue its public relations releases on the subject. The releases confuse the public, thereby making marketing the device very difficult. Consequently, getting financing for the device (whose commercial adequacy is a function of its market of acceptance) is also more difficult. Interestingly enough, the comments from the bureaucrat at the Environmental Protection Agency regarding Gastell also appear to be agreed to by the New Concepts Evaluation Branch, Transportation Conservation, Office of Assistant Secretary, Conservation and Solar Application, Department of Energy. However, their agreement lay in an area where there was no disagreement with the concept of a particular invention. That is, they indicated that certain mechanical devices could not control the operation of the engine. They did not focus on the question of whether hooking up those mechanical devices to a sensor mechanism which signalled the driver could result in the driver behavior modification necessary to achieve the required energy saving result.

All too often, one of the consequences of working with Government staffers is that having stated the problem in their terms, they proceed to provide the answer to the question as they have stated it. Unfortunately,
those terms frequently have very little to do with the marketplace or with other aspects of reality that businesspeople have to work in. Consequently, having asked the wrong question, the bureaucrat's answer is also irrelevant. The publication of the answer, however, is frequently mischievous and results in a great deal of damage to the public and the businessman by making marketing and financing of appropriate devices difficult, if not impossible.

The requirement in the Federal Non-Nuclear Energy Research Development Act of 1974 for evaluation of appropriate technology to determine which technology is appropriate for support by the Government is also rather amusing in this regard. The testing for the type of technology deemed appropriate for Government support under the program only focuses upon evaluation of the direct actions of mechanical devices, rather than upon the consequences of using devices which will modify consumer behavior in a nonmechanical way. It appears that the Government is more concerned with making sure that the device invented works by modifying the behavior of an energy consuming machine, rather than having something which works in the real world by modifying the behavior of the person who is consuming the energy.

Thus, after the U.S. Department of Commerce National Bureau of Standards evaluated a device, it stated in its letter that the device was technically sound, commercially competitive, that its installation use in automobiles could lead to significant fuel savings by the drivers of such vehicles, but that, nonetheless, the invention did not qualify under the
Appropriate Technology Program. It would appear that in that case the program ought to be modified very substantially to accommodate such devices.

I must point out that the greater the degree of unreality in drafting legislation (or in drafting regulations under such legislation) which removes from consideration those devices that are most likely to accomplish desired results simply because they do not meet the specific means set out in the testing, the less successful those Government programs involving financing for small business will be. It should be stated to the credit of the U.S. Department of Commerce National Bureau of Standards that NBS personnel who were involved in the Office of Energy-Related Inventions were willing to provide the inventor of the device with letters that could be usable for financing purposes and also in combatting some of the unfortunate negative publicity that had been put out by Federal Trade Commission personnel.

In summary, in this report, we have attempted to point out the problems that arise under the existing legislation and scheme of legislation, including bureaucratic action. Our recommendations for improving the situation are included in the chapter entitled Recommendations which is to be found at the beginning of the report. These recommendations have been based on the real-life experiences and problems of small businessmen involved in the energy area. We hope that this report will prove to be useful to those businessmen attempting to secure funding under the existing legislation. In addition, we hope that these recommendations, when implemented, will improve the legislation and existing energy funding programs.
Appendix A

One example of a European Common Market country's approach which the United States Government could study to its advantage is that of the United Kingdom. The British Government is now engaged in a program under the National Research and Development Corporation (NRDC), a quasi-governmental agency that is supposed to service the British business community. Since the British Government apparently is not unduly affected by a "Not Invented Here" (NIH) complex, the NRDC is encouraging small businesses of all types—in the United States as well as in Britain—to submit ideas and products for possible marketing in the U.K. and then overseas. In fact, the National Research and Development Corporation is working with the United States consulting firm of Arthur D. Little, Inc. The job of the corporations is to find products and technologies that are worthy of investment by British firms. The agency is eager to purchase some of the commercial ideas available in the United States.

The NRDC program works in this manner: The person who has an invention or innovation is invited to submit a written description of this plan or product to Arthur D. Little, Inc. The initial correspondence is required to outline the product performance, special features, estimated manufacturing costs, and the suggested sales prices. The NRDC first reviews all submissions, then it purchases options on those inventions or innovations it considers most suitable. Confidential disclosure agreements give the NRDC exclusive rights to negotiate for the technology over a
fixed period of time, but also prohibit it from revealing secret information to any third parties. The options are generally effective from three to six months, and provide cash payments to the owner ranging from $25,000 to $1 million dollars. (The difference between this type of payment and the $50,000 limitation on grants made by the United States Government in respect of energy technology requires no further comment. Assuming that the evaluation proves favorable, the final agreement between the inventor or innovator and the British firm can follow any one of the following lines:

1. Licensing authority for the British corporation is arranged so that they can produce this product in certain stipulated markets. In such case, a royalty would be received based upon the price of each unit sold. This would permit the energy innovation to be marketed in certain markets where a U.K. manufacturer might have a tariff or other advantage, while permitting the United States innovator to manufacture and market the product in the United States and also export it to other non-licensed markets.

2. A joint venture contract then can be arranged which may call for (and ordinarily would call for) the establishment of a separate company in Great Britain to market the product. The equity in the new company would be shared by the British and the American companies making the deal. In some cases, the NRDC might also provide some of the capital and take an interest in the venture.

3. Purchases can also be arranged providing for cash payment for
the invention in exchange for the exclusive rights to use and market the invention. The purchase price would obviously depend upon market factors, the negotiating ability of the two parties etc.

Products most in demand by the NRDC include energy conservation devices and energy producing devices. But the NRDC will consider not only high technology but also so-called low technology innovations if there is a promise for high volume production. This leaves the door open for just about any kind of product in energy or for an innovation which by itself may not appear to be all-that-brilliant a scientific achievement but still has certain practical benefits. The entire British program contrasts with the United States program. That is, the United States program is stressing new technology, scientific development, and research and development. The British approach is (and this is quite different than what would classically be considered the British approach) to take someone else's technology and tie it to commercial products. Commercialization and marketing are the touchstones for the British effort—something the United States might well learn.

One of the forms of finance for small business in the energy industry which the NRDC makes available are revolving loans (or as the English call them, recirculating loans) which are working capital loans by which a company is helped to meet specific orders for new technology products. In the case of a small manufacturer of solar equipment, who is trying to finance his work-in-process, his raw materials inventory and his receivables, this sort of financing can be absolutely imperative. Furthermore, to the extent that this revolving loan can be made by the factoring affiliate of a
bank or a factoring company itself, but can not be guaranteed by a Government agency, there is an additional benefit. Such hands-on lending experience by the bank and/or by the factoring firm permits their personnel to train in making loans to small energy firms and to feel comfortable in making such loans. The availability of such loans, in turn, encourages energy innovation and the actual manufacture and delivery of energy conservation and energy development systems by small firms.

Interestingly, the NRDC has booklets which describe in fair detail what can be done under its programs and what it is currently doing. These booklets are informative and useful, a substantial contrast to the type, adequacy and presentation of data regarding the financing available from the United States Government to small business for energy projects. In the United States, the information available is not easy to find and the format in which it is presented is difficult to follow.

The National Research and Development Corporation specifically states that the financing it makes available may be used not only for development work but also for production plants, tooling, working capital, and for the cost of launching a product into the market. In such cases, the NRDC states that it can contribute 50% of the estimated negative cash flow of the project as a whole, rather than the development costs alone. Also included in the project costs are agreed upon overhead as well as subcontracting costs. Also, NRDC financing is rather different than some of the programs in the United States in that NRDC financing is not restricted to patentable inventions. It includes items which cannot be patented and/or which do not constitute an enormous technical step forward.
but which merely constitute a significant innovation for that particular industrial sector at that particular time.

In comparing some of the financing provided by the Small Business Administration and other United States Government sources with those provided by NRDC, we pinpoint the following aspects:

1. The NRDC shares the risk in the projects without taking any share in the company.

2. The company does not make any repayments of the sum provided by NRDC until the product is sold, since the entire repayment to NRDC is stated in terms of a percentage of sales realization.

3. The duration of the levy on sales is limited by a predetermined formula.

4. Payments to NRDC are entirely geared to sales so that if sales do not meet projections repayments are automatically reduced.

5. If the project is a total failure, NRDC takes its share of the loss and there is no obligation to repay NRDC's investment or loan except for the sale or sharing of proceeds from the sale of the project assets for which the NRDC cash advanced was used.

6. Joint ventures financed with the NRDC are off balance sheet and unsecured. Thus, the ability of the company to secure additional funds from the private sector remains unimpaired. In contrast, the terms that the Small Business Administration puts on various of its loans include total corporate and often personal liability, mortgaging of specific assets, credit, life insurance, etc.

7. Funds received from NRDC enter into the profit and loss account.
There is the disadvantage that these funds are therefore taxable, except to the extent that these sums are offset by the write-off of the sums expended. Under U.K. rules, one is allowed to have 100% write-off of equipment in one single year, so that for tax purposes this is really a wash. The funds received from the NRDC can also be reported as income for accounting purposes for the profit and loss account. Thus, if the project is expected to cause a considerable increase in a company's development expenditure, NRDC's contributions can be used to protect the level of reported profits and thus protect the firm involved from a takeover by a corporate raider.

8. NRDC is normally willing to have its investment bought out on terms negotiated at the time of the buy-out.

9. NRDC also has in house technical and patent expertise which is generally not available from other financing sources. In the case of the Small Business Administration or other such sources, the firm frequently finds itself chasing about from one place to the other just trying to get some attorney or accountant to deal with the Small Business Administration's forms, and certainly does not get technical and patent advice from the Department of Energy or the Small Business Administration.
Electrides Corporation is a firm which was set up in order to manufacture a base for fluorescent bulbs. The company's product is an energy conservation product in that it saves about 35% of the energy used by fluorescent bulbs. Electrides Corporation has been in business for about five years, and has been running a negative cash flow most of the time. When the company applied for grants about four years ago, it was told that about 14,000 other applications had been made for funding under the Approved Technology Program. Its' application was approved by the National Bureau of Standards as one of the 35 or 40 firms and inventions approved by the NBS. The National Bureau of Standards then passed on the approval to what was then the Energy Research and Development Administration (ERDA). At ERDA the company was told that it was one of six firms or so that had been approved for a grant. The amount of the grant to be given was $50,000. Interestingly, at that point ERDA was supposed to be going through a reorganization and getting additional funding. The Government then decided that the research and analysis done by the National Bureau of Standards was not adequate, and Electrides Corporation was invited to participate further in a government testing which would take place in Livermoor, California at the Laurence Laboratory. At that point, Electrides Corporation decided that it had already spent much more money in time, travel expenses, and telephone bills than the $50,000 maximum that it would be able to get under the grant. Thus, Electrides decided not to
waste its time by going through this next stage of reapproval. Consequently, the company never got the grant, after pursuing it and being scheduled for the grant for more than two years. The company now has its product approved by Underwriters Laboratories, and is a functioning viable entity in the commercialization stage of its invention. The total capital invested in the company to date by its principles is about $500,000. The comments of Mr. Russo, the Chief Executive Officer of the Company, were as follows:

1. The program would have taken at least two years to get funding. If any company has enough capital to carry itself through the first two years, it basically doesn't need the government funding to begin with.

2. The total amount of executive time, travel expense, and telephone bills that are necessary in order to get government funding make the whole project generally not worthwhile.

3. The inconsistency of the government agencies in first saying that something is approved and will be funded and then that it will not be funded adds to the lack of desirability of doing business with the government.

4. He did not think that the programs were worthwhile and pitied any company that was dependent only upon government financing because they were going to find themselves going into a great deal more trouble and grief than the whole project was worth.