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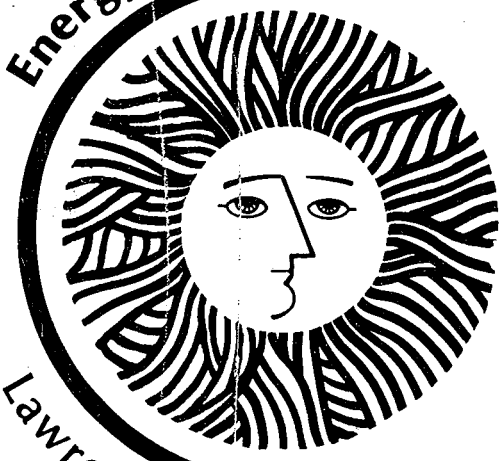

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Bibliography on Institutional Barriers to Energy Conservation

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Bibliography on Institutional Barriers to Energy Conservation

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Bibliography on Institutional Barriers to Energy Conservation

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This bibliography was created as part of a study on institutional barriers to energy conservation, funded by the President's Council on Environmental Quality (CEQ). The bibliography was compiled to aid in the location and identification of literature on the subjects of institutional barriers and enery conservation.

Sources of information included the Department of Energy's RECON computer data bases and current literature in the fields of public policy, management science, energy and engineering. Additional information and references were found through contacts with personnel at the Department of Energy, Washington, D.C.; Argonne National Laboratory, Argonne, IL; the Office of Technology Assessment (OTA), Washington, D.C.; the Council on Environmental Quality, Washington, D.C.; the California Energy Commission, Sacramento, CA; the University of California, Berkeley, CA and the Lawrence Berkeley Laboratory, Berkeley, CA.

The bibliography includes reports on barriers related to public attitudes, lack of incentives, lack of information, and unpaid factors, among others. The bibliography has two sections. The first section deals with issues specific to energy conservation while the second section focuses on the more general topics of barriers to change and problems in implementation and innovation. For example, an extensive literature exists in the areas of public policy and management science related to barriers to innovation. Several of these papers are included here, but no attempt was made to provide an exhaustive compilation. The papers chosen are representative of the larger body of literature.

Carol Backhus, librarian for the LBL Engineering Library and Cheryl Wodley, also of LBL's Engineering Library, were extremely helpful in tracking down references and documents. Mari Wilson, Energy Librarian of the Energy and Resources Program at UC Berkeley, also provided help.

This work was supported in part by the U.S. Department of Energy under contract W-7405-ENG-48.

Bibliography on Institutional Barriers to Energy Conservation

Part I: Energy Conservation

AIA, 1972. Energy and the Built Environment: A Gap in Current Strategies. Washington, D.C.: AIA.

The report analyzes the forms of energy and energy systems used in buildings, defines energy efficient buildings, and quantifies the potential of energy savings offered by energy efficient buildings. The current policy formulations of building design which evolved around economic principles contain incentives which ultimately encourage more consumption. These formulations are seen as major barriers to energy conservation effects. An action plan is proposed which includes specific efforts and programs required for the full implementation of an energy efficient buildings strategy. (bk)

AIA, 1974. A Nation of Energy Efficient Buildings by 1990. Washington, D.C.: AIA.

This report continues the development of ideas set forth in the AIA's Energy and the Built Environment. It outlines a national program to achieve the potentials of energy efficient buildings. It discusses how the program can be made economically, financially and administratively feasible and presents a series of recommendations for immediate action. Present policy will not realize the potential of energy efficient buildings due not to a lack of technological capacity but to conceptual and institutional rigidities. (bk).

Applied Nucleonics Company, Inc. Proceedings of an EPRI Workshop on Technologies for Conservation and Efficient Utilization of Electric Energy. Palo Alto, CA: EPRI.

The workshop examined the R&D needs for efficient energy use as they affect the electric utility industry. Both the physical basis for efficient energy use (technology) and the institutional factors (regulations and consumer end use) were considered. (bk)

Association of Physical Plant Administrators of Universities and Colleges, 1977. A Feasibility Study on the Impact of Agencies and Codes on University and College Energy Use. Volume I: Executive Summary. Volume II: Source Data. Springfield, VA: NTIS.

The Association of Physical Plant Administrators of Universities and Colleges (APPA) assisted ERDA in a feasibility study to determine the impact of agencies and organizations which review and apply codes and standards to new construction and major renovation projects affecting colleges' and universities' ability to use and conserve energy. The conclusions of the study were: "(1) the process of planning, design and construction varies widely and has an undetermined impact on energy use and conservation; (2) the codes and/or standards in effect have a direct impact, but they vary widely between jurisdictions and are in a state of change; (3) public agencies and/or organizations impact by interpreting and apply specific codes and/or standards in use; (4) the university/college physical plant director or facilities planner has an impact through application of written construction guidelines or established practices during the process of planning, design and construction; (5) the academic community has a varied impact, but the level of that impact is undetermined; (6) the architect/engineer has an impact during the process of planning, design and construction. This impact varies according to the selection process of the architect/engineer and the planning guidelines given to the architect/engineer; and (7) the source of funds has an impact." (bk)

Archenbach, P.R., 1973. "Energy Conservation in Buildings: Its Foundation, Cost and Acceptance." In, Abrahamson, D.E. and Emmings, S. (eds.), 1973. Energy Conservation: Implications for Building Design and Operation. Minneapolis, Minn.: All-University Council on Environmental Quality and the School of Public Affairs, University of Minnesota.

One of the barriers to the introduction of energy conserving technologies is the diffuse nature of the building industry. This paper reviews efforts made by the National Bureau of Standards aimed at overcoming some of the problems represented by the building industry. The work done by the NBS includes laboratory projects, field studies, information retrieval and dissemination, and the development of model documents relating to energy conservation in buildings. (bk)

Asbury, J.G., 1975. Problems in the Commercialization of New Energy Conservation Technologies. Paper presented at Energy Conservation: A National Forum Conference 1-3 December 1975, Ft. Lauderdale, Florida.

Problems in finding ready-made markets for energy conserving products and systems stem from two causes: 1) the product is not good; or 2) the markets in which the product must sell are inefficient, i.e. rigged against resource-saving technology. The report focuses on electricity costs. It examines two propositions: 1) the consumer behaves rationally and 2) the effects of government regulatory practice and policy are pervasive. The report concludes that price regulation probably has the greatest effect on commercial introduction of energy conserving technologies. (bk)

Auburn University, 1976. ECASTAR: Energy Conservation: An Assessment of Systems, Technologies and Requirements. Auburn, Alabama: Auburn University.

ECASTAR presents a methodology for a systems approach display and assessment of the potential for energy conservation actions and the impact of those actions. The assessment procedure includes input/output analysis to budget flows between sectors (energy industry, industry, residential/commercial

and transportation) and net economics and net energetics as performance criteria for the conservation actions. An abbreviated 30 by 30 input/output analysis matrix is used. The constraints which were recognized as the most directly influencing the course of the U.S. energy program were the present economic and technical conditions. (bk)

Bee Angell and Associates, Inc., 1975. A Qualitative Study of Consumer Attitudes Toward Energy Conservation. Springfield, VA: NTIS

The purpose of this study is to examine, in-depth, the prevailing attitudes of the public toward the energy situation. A series of ten focus group meetings consisting of 8-10 participants from a widely heterogeneous cross-section were conducted in four different regions of the United States by a professional interviewer. The findings will provide guidelines for the development of public education policies that are responsive to the public's perceptions and needs rather than on economic and political considerations. The following types of information were sought: (1) the public's attitudes toward the credibility of various parties involved in energy conservation; (2) sources from which the public draws its information; (3) public's understanding of the nature of economic shortages; (4) the public's view of its own energy conservation behavior; (5) public's perceptions of the impact of various factors on energy conservation; and (6) the public's understanding of the benefits resulting from altered energy consumption patterns. (author)

Bezdek, R.H. and Maycock, P.D., 1976. "Incentives and Barriers to the Development of Solar Energy." Sharing the Sun Conference, Volume 9.

Various barriers to solar energy are identified and ranked by order of importance. The most serious barriers are high first costs and the solar energy-utility interface. Legal and regulatory problems are identified as the third most serious barrier. (bk)

Blakely, E.J. and Schutz, H.G., 1977. "Energy, Community, and Quality of Life in California: A Survey of Urban, Suburban, and Rural Communities." Journal of Energy Development 2(2): 224-238, Spring 1977.

A survey to find out how California residents perceive the cause and effects of the energy crisis and how these effects influenced their household and lifestyle choices will be used to facilitate long-range community planning. Responses from urban, suburban and rural areas were surprisingly uniform on the overall causes and effects of the shortages. Areas of difference reveal a lack of public confidence and morale, lifestyle modifications in rural communities that were more noticeable, and disagreement over the means of implementing acceptable alternatives. Policy implications from the study indicate a need to (1) build up public support for the institutional framework, (2) emphasize research that conforms technology to human needs, (3) make flexible conservation policies that allow local choice of alternatives, and (4) factor quality of community life into energy policy. (author)

Booz, Allen & Hamilton, Inc., 1978. Building/Housing Outline, Task A. Energy Conservation Assessment Study. Bethesda, MD: Booz, Allen & Hamilton, Inc.

The objective of this report was to define the roles of the participants in the housing network, to assess the contributions that participants can make to energy conservation, and to evaluate the constraints on and opportunities for optimizing the use of existing energy technology. In new construction it was found that: the industry network produces housing designed in response to consumer demand; the consumer is highly sensitive to increases in first costs; increased initial investment in energy conserving improvements is contingent on consumer understanding of life-cycle costing; some channels, including realtors and lenders, do exist for increasing consumer sensitivity to energy costs, including realtors and lenders; consumer education programs can be improved through consumer research; there are limited numbers of professional personnel available who are well versed in residential energy conservation; the structure of the industry may inhibit the accelerated adoption of energy conserving improvements; and high quality fabrication and installation is necessary to ensure equipment and materials perform as designed. The major opportunity for energy conservation is thought to be government intervention, in this sector.

In the retrofit market, the critical issues center on the limited sophistication of the industry. The principal opportunities center on the consumers' growing awareness of the need for retrofit, while the marketing strength of large retail chain stores can aid retrofit.

The findings in the manufactured housing sector are that the factory/mass production aspect of this housing creates several prospects for conservation improvements. (bk)

Boretsky, M., 1977. "Opportunities and Strategies for Energy Conservation." Technology Review 79(8): 57-62.

Energy conservation is a central thrust of President Carter's energy policies and it is clear that regardless of the outcome of the debates now in progress, conservation will be a national goal for the rest of the 20th century. Three approaches can be followed to determine the extent to which energy might be conserved in the United States: (1) the econometric approach, analyzing the historic relationship between changes in energy prices and energy uses; (2) a strictly technical approach, based on analysis of the efficiency with which energy is prevailingly used and judgments of how much the efficiency in each of these uses can be increased with current and readily available new technology; and (3) a comparative approach, in which U.S. conservation potential is inferred from data on uses of energy in foreign countries with environments similar to ours. Comparative data came from the United Kingdom, France, West Germany, the Netherlands, Belgium, Luxembourg, Norway, Sweden, Italy, and Japan. Constraints on technology, economics, capital and life style changes are examined.

The conclusions are that the price mechanism is an excellent tool for solving short-term and specific distributive problems, but is incapable of discriminating between "good" and "bad" uses of energy. Thus for such a complex, varied (full of both "good" and "bad" things), and long-term problem as the energy problem, the price mechanism does not offer a viable solution. No specific suggestions for dealing with the energy problem outside of pricing schemes are given. (bk)

Brookhaven National Laboratory, 1976. Transportation Energy Consumption and Conservation Policy Options in the Northeast: 1972 Profile. Upton, NY: Brookhaven National Laboratory.

The report presents a profile of 1972 transportation energy consumption in the northeast region and projections for the region are given by mode for the years 1985 and 2000. Conservation actions which could significantly affect future transportation energy demand levels are described and their impacts evaluated. Conservation actions are discussed in the context of how they might be implemented by federal, state and local governments. Interactions between actions are discussed and groupings of actions that minimize the disadvantages of individual actions while taking advantage of complementary effects between actions are presented. (bk)

Canfield, M., Jr., and Sieminski, A.E., 1975. "If You're So Smart, Why Ain't You Rich?"—An Analysis of Impediments to Implementing Energy Conservation in the United States. Public Administration Review July/August 1975: 322-327.

Implementing the new concepts of energy conservation involves a journey through a political, institutional, and economic maze replete with false starts, dead ends, and numerous obstacles keeping the country away from defining a final goal, let alone achieving it. This article briefly describes the predicament that the country has gotten into, analyzes the major barriers to conservation that confront us, and offers a few suggestions on how we can make some progress in the direction of rational energy conservation policies. (author/bk)

City Council of Springfield, IL, 1976. Ordinance Establishing the Minimum Requirements and Implementation Procedure for Insulation in Residential Construction. Springfield, IL: City Council.

Two cities (Springfield, IL and Seattle, WA) have moved forward in adopting energy conservation ordinances to overcome barriers to energy conservation. The Springfield, Illinois City Council's ordinance requires minimum insulation standards in new house construction. The Seattle City Council has given preliminary approval to an energy conservation program designed to save 160 megawatts by 1990. It requires home owners converting to electric heat to install minimum amounts of insulation, provides for an Office of Energy Conservation to direct City energy saving programs and requires that home and apartment owners provide information on energy costs of the previous 12 months to prospective owners or tenants, and adoption by 1978 of minimum construction codes based on industry recommendation. (bk)

Committee on Science and Astronautics, U.S. House of Representatives, 1974. Conservation and the Efficient Use of Energy. Washington, D.C.: GPO.

This report summarizes the advice and information presented at a series of joint hearings held in June and July 1973 before the Conservation and Natural Resources Subcommittee of the Committee on Government Operations and the Energy Subcommittee of the Committee on Science and Astronautics. The institutional and technological changes necessary to reduce the growth of energy demand are addressed. Areas discussed are education, labeling and product information in the residential and commercial sectors, building and appliance efficiency standards and incentives for adopting such standards, and in the industrial sector, incentives and tax policy. (bk)

Cooke, P.E. (ed.), 1977. Research and Innovation in the Building Regulatory Process. National Bureau of Standards Special Publication 473. Washington D.C.: GPO.

The subject matter covered in the first NBS/NCSBCS Joint Conference on Research and Innovation in the Building Regulatory Process included new alternatives, environmental research and the building regulatory process; energy conservation, solar energy and building standards; coping with building innovations and environmental considerations; issues in building regulation and administration; organization and structure of building regulations; information processing and the building regulatory process; impact, economics and metrication of building regulation; and preservation, rehabilitation and the building regulatory process. (bk)

Council of State Governments, 1976. Energy Conservation: Policy Considerations for the States. Lexington, KY: The Council of State Governments.

This report is addressed to state officials responsible for developing effective energy conservation policies and programs. The report seeks to balance the myriad studies and recommendations for state action by focusing on potential institutional and market constraints to those recommendations. The report analyzes trends in state energy conservation activities, identifies general assumptions underlying these actions, and discusses some policy considerations for state involvement in energy conservation efforts. It offers a critical examination of energy conservation opportunities and problems in two program areas: the regulation of public utilities for energy conservation objectives and improved energy use in buildings. The research agenda identified by the report focuses on information needs and institutional or capacity building required for effective state energy conservation programs. (bk)

Craig, P.P.; Darmstadter, J. and Rattien, S., 1976. "Social and Institutional Factors in Energy Conservation". In, Hollander, J.M. and Simmons, M.K., Annual Review of Energy, Volume 1: 535-552. Palo Alto, CA: Annual Reviews, Inc.

The paper addresses the status of energy conservation activities, the forces that shape the demand for energy; the historic relationship between energy use and GNP and the questionable inexorability of this relationship; the framework in which to view energy conservation; and what the future might hold. A brief bibliography representative of the rapidly expanding technical literature is appended for readers desiring a more technical and comprehensive investigation of energy conservation activities. (bk)

Davis, F.W., 1977. Brokerage Approach to Public Transportation. Knoxville, TN: Symposium for Public Awareness on Energy.

The Knoxville Public Transportation System, experimenting with several strategies aimed at conserving energy, has developed a brokerage concept based on identifying transportation demand and supply and removing institutional barriers. Express buses, although popular, were not efficient because they were empty for over 50 percent of each run and were not economical because the demand of rush hour scheduling required a large capital investment. Fixed rail systems have a high capital cost also and cannot change readily as the community's needs change. Vans, with lower capital costs, that can be parked easily when not needed, are driven by the commuters, and carry only a few riders, were chosen as an adjunct to the popular carpool. By avoiding the labor agreements required of projects which are federally funded and foregoing a separate system, Knoxville was able to take advantage of available vehicles, capital, and drivers. Changes in the Public Service Commission law, insurance procedures, labor arrangements, and computer scheduling are described as the brokerage concept developed. Once the barriers are removed the final step is to develop van-pooling as a status symbol. (author)

Environmental Law Institute, 1978. Legal Barriers to Solar Heating and Cooling of Buildings. Prepared for the Assistant Secretary for Conservation and Solar Applications, U.S. Department of Energy. Springfield, VA: NTIS.

"In this report we look at ways solar energy will probably be used and ask what legal problems its would-be users may encounter. We consider the potential problems of commercial and industrial users as well as those in new subdivisions...As our assignment was to review existing literature, rather than concentrate on original research, some chapters reflect a paucity of material. There was so little material available on some crucial topics like building codes and utility issues, that we were forced into original work...The scope of our review was extremely broad; our intent was to give at least some consideration to every conceivable issue, even the less pressing ones."

The topics covered include solar access and land use issues; building codes; home financing; utilities; mandatory installation; ERDA patent policy; antitrust and fostering competition; labor union resistence and conflicts; property taxes; mobile homes; and tort liablility, insurance and warranties. (authors/bk)

ERDA, 1976. Life Cycle Costing Emphasizing Energy Conservation: Guidelines for Investment Analysis. Springfield, VA: NTIS.

This report is a guidebook on life cycle costing, aimed at government investment decisions. The guidebook "sets forth a method for dealing with energy conservation design alternatives aimed primarily at retrofitting existing facilities. The procedures are adaptable for use over a broad range of project types... In a more general sense, the procedures presented are certainly applicable for new projects covering long-term maintenance, servicing, and operating performance as well as energy-related decisions." (bk)

ERDA, 1976. Report of the Proceedings of the Energy Research and Development Administration Workshop on Consumer Motivation and Behavior Regarding Energy Conservation: Identification of R&D Opportunities. December 13 and 14, 1976. Report No. Conf-76 1215. Washington, D.C.: Washington Scientific Marketing, Inc. (microfiche)

This workshop was held under the direction of the Chief of ERDA's Motivation and Behavior Branch. The principal objective of this branch is to reduce the absolute level of energy usage in buildings by motivating individual consumers to purchase cost-effective energy-efficient technologies and products. The conference was divided into three groups: a purchase group aimed at identifying strategies and programs to motivate consumers to purchase such technologies and products; a practice group, which talked about ways to motivate consumers to adopt energy efficient practices and habits; and an institutional group which considered the institutional factors which influence an individual on purchasing decisions and practices, by encouraging or discouraging conservation behaviors. Institutional strategies discussed include tax credits, low interest loans and direct grants, as well as persuasion techniques and information dissemination. (bk)

FEA/Arthur D. Little, Inc., 1975. An Impact Assessment of ASHRAE Standard 90-75. FEA Conservation Paper Number 43B. Washington, D.C.: GPO.

The purpose of this report was to analyze the various energy, economic and institutional impacts that might occur following the broad voluntary adoption of ASHRAE 90-75. This standard, "Energy Conservation in New Building Design," represents an attempt to overcome some of the institutional barriers existing in the building industry to energy conservation. (bk)

Fejer, M.E. and Ketels, P.A., 1976. Development of an Industry-Government Cooperative Energy Conservation Program for Small Manufacturers. Phase I. Project 8978 Final Report. Chicago, IL: Institute for Gas Technology, IIT Center.

The objective of this phase of the program was to obtain the cooperation of trade associations representing various small manufacturing industries in determining the industrial energy conservation measures for small manufacturers that are practical, specific, rapidly implementable and of reasonable cost. Phase II is devoted to developing specific recommendations for implementing energy conservation measures in the selected industries and to communicating these recommendations to individual small manufacturers in those industries. Phase III is devoted to the implementation and demonstration of the energy conservation measures recommended in Phase II in a typical production facility of each industry studied. The final report of Phase I in presented in this study.

The study is of interest because of its strategy to implement energy conservation measures through the use of trade association information media. The use of trade associations is "the most effective way to gain access to companies to collect confidential data relative to current operating practices necessary to carry out the program. This approach adds substantial credibility to the program results, thus enhancing the potential for rapid acceptance and implementation thereof." (bk)

Feldman, S.L. and Anderson, B., 1976. The Public Utility and Solar Energy Interface: An Assessment of Policy Options. Executive Summary. Washington, D.C.: ERDA.

Previous research studies have for the most part failed to consider the interaction of solar energy heating/cooling/hot water systems with the provision for auxilliary systems. This study reviews, assesses and critiques existing research and on-going activity in the interface between the public utility industry and solar energy systems for buildings. Institutional conditions such as setting rates by public utilization on an average cost basis are discussed. (bk)

Gordian Associates, Inc., 1977. Overcoming Institutional Barriers to Solid Waste Utilization as an Energy Source. Prepared for the U.S. Department of Energy. Washington, D.C.: GPO.

This study investigated the factors, especially the institutional barriers, that affect the demand for the various forms of energy available in municipal solid waste—processed fuel, low-quality pyrolysis gas and steam. Since all of the products can be converted into electricity, emphasis was placed on possible barriers to participation by investor-owned utilities. The study included evaluation of process technology (excepting pyrolysis oil), product characteristics, marketability, price, environmental impacts and such institutional issues as regulatory constraints and utility attitudes toward risk-sharing in projects to recover energy from waste...

The [utilities] general aversion to directly investing or participating in [energy recovery] projects is traced to technical and economic uncertainties involved in all of the present energy recovery technologies. These uncertainties are compounded by uncertainties in pollution control laws and state variations in their enforcement. To utilities, these uncertainties are inconsistent with their needs to control costs and maintain very high standards of reliability... (author)

Governor's Energy Policy Council, 1976. Draft Energy Conservation Plan for the State of Colorado. Schedule of Public Testimony and Comment on Draft Plan.

This is a draft energy conservation plan for Colorado. Included are measures to overcome barriers to energy conservation through programs which include residential retrofit insulation, new lighting standards, institutional education and technical assistance, loans, tax policy, and loan guarantee studies. Vanpooling, bikeways, staggered work hours and four-day work weeks are also being studied. (bk)

Gross, G.E.; Harper, R.D.; and Ahlstrom, S., 1975. Energy Conservation Implications of Master Metering. Volumes I and II. Kansas City, Missouri: Midwest Research Institute.

A study of master metering of electrical service in apartment and office buildings is reported here. The objectives of the study were to determine (1) the difference between electrical energy consumption by tenants with master metered electric service and those who must pay individual electric bills; (2) the extent and trends of the use of master metering of electrical service in apartment and office buildings; (3) the economic and other factors which influence the initial selection or later conversion to master or individual metering; and (4) to provide and evaluate policy alternatives which could control the practice of master metering. (author)

Hammond, J.; Hunt, M.; Cramer, R., and Neubauer, L., 1974. A Strategy for Energy Conservation. Winters, CA: Living Systems.

The study analyzed California and Davis, CA, household energy consumption. In order to overcome building industry problems, new building standards were proposed (which have since been implemented). Neighborhood planning and solar heating and cooling in Davis are also discussed. (bk)

Hirshberg, A. and Schoen, R., 1974. "Barriers to the Widespread Utilization of Residential Solar Energy: The Prospects for Solar Energy in the U.S. Housing Industry." Policy Science 5(1974): 453-468.

Residential solar energy applications can provide a significant fraction of the U.S. energy budget. However, to do so, they must be combined with other energy-conserving strategies and diffused rapidly throughout the housing industry. Discussed are the potential resistances to the diffusion of solar energy within the U.S. housing industry; implications for the application of residential solar energy are treated. (author)

Hirshberg, A.S., et al., 1976. Energy Implementation Centers: A Method of Speeding the Use of Solar Energy and Other Energy Conserving Technologies. A Report to the National Science Foundation. Pasadena, CA: Environmental Future Inc.

This report examines the role of Implementation Centers as vehicles for speeding the use of solar energy and energy conservation. A study of previous building industry innovations; a brief review of the diffusion of innovation literature; identification of the solar thermal application process and potential problems; and a design for a regional Implementation Center are included. The institutional barriers discussed are frictional resistance, "first cost" sensitivity and the consumer purchase decision. Frictional resistance refers to such things as building codes and the highly fragmented and craft-based, tradition-oriented building industry, and the industry's preference for HVAC systems which minimize "first costs." "First cost" is a barrier since increases in it reduce the potential market for such houses. The consumer purchase decision should be based on life cycle costing, but information for this decision is normally lacking. The cost of the information is so high to each builder or customer that they cannot capture enough of the benefits to justify the expenditure on the information gathering. (bk)

Hittman Associates, Inc., 1977. Barriers Connected with Certifying or Listing of Energy Conserving Products Used in Buildings. Washington, D.C.: ERDA Division of Buildings and Community Systems.

"There is no lack of residential energy conservation technology. There is a large disparity between the rapid rate of technological progress and the slow rate of implementation in this complex market place. Of concern is that energy conserving innovations are restricted, and in some cases, blocked entirely from reaching the marketplace by a variety of institutional barriers. In particular, it is suspected that innovations offered by independent inventors and small manufacturers are not reaching the marketplace."

The barriers of concern in this report were any type of constraint on market penetration of energy conserving products connected with the practices and procedures of the certification and listing processes. The report includes the results of a survey of energy conserving products and certification practices and procedures; energy conserving products identified as being restricted by certification and listing practice and procedures; the identification and analysis of the effects of these barriers; and the recommendation of policies and programs to mitigate the effects of the identified barriers. (bk)

Hoel, L.A. and Herrin, M., 1976. Organizing and Operating a Vanpool Program: Feasibility of Vanpooling in Virginia. Final Report. Charlottesville, VA: Virginia University, Dept. of Civil Engineering.

The report identifies the various elements of passenger transportation vanpool programs and describes the procedures necessary for employers and agencies to implement a vanpool program, based on Virginia conditions. The concept of vanpools is introduced and benefits to management and employees are identified. Among these are reduced needs for parking, reduced traffic congestion, lower commuting costs and conveniences. Employer concerns about vanpool implementation are discussed, such as legal aspects and insurance costs. In Virginia there are no serious legal problems to prevent vanpooling. Experience with vanpools elsewhere in the U.S. indicate that methods for managing and operating programs differ from one company to another although the basic concept is similar to that selected by the 3M Company in its pioneering effort. (author)

Large, D.B., 1973. "Institutional Factors." In, Large, D.B., (ed.), 1973. Hidden Waste: Potentials for Energy Conservation. Washington, D.C.: The Conservation Foundation.

This report argues that our institutional arrangements have historically encouraged energy consumption and that these policies cannot be ignored in the development of an energy conservation policy. (crs)

Martin, D., 1973. Potential for Energy Conservation in Montana. Helena, Montana: Montana Environmental Quality Council.

A brief review of the status of national, regional, and state energy policies is made. The possibility of energy conservation in all sectors is cited and in the state of Montana, the state government can promote energy conservation and surmount institutional barriers through utilities regulation, land use control, tax incentives, or disincentives, police power (such as rationing), and education. An energy flow diagram for Montana is shown, followed by data on natural gas, petroleum, oil shale, coal, electricity, hydropower, geothermal energy, solar energy, and wind power. (author)

Mayo, L.H., 1977. Legal-Institutional Arrangements Facilitating Offshore Wind Energy Conversion Systems (WECS) Utilization. Final Report. Prepared for the National Science Foundation. Springfield, VA: NTIS.

It is the general conclusion of this paper that the existing legal-institutional structure for the promotion and facilitation of offshore WECS is adequate in many significant respects. At least formal authority and specific statutorily provided techniques would seem to suffice for near-term needs for research, development, demonstration and pilot projects. However, to the degree that substantially complete commercial application of offshore WECS is sought, then new legislation directed to this objective may be required. Such legislation would undertake to clarify many of the inconsistencies, uncertainties, and gaps in the existing legal-institutional structure with respect to the promotion and implementation of offshore WECS. In all probability it would also need to provide for a wide range of incentives in order to generate initiative in the private sector to utilize this technology. (author)

Mills, J.L., 1976. Energy: Proposals for State Action. Gainesville, Florida: Center for Government Responsibility, University of Florida.

The report represents a one year study of alternative proposals for energy conservation legislation done by the Florida Center for Government Responsibility. An analysis of alternatives for promoting energy conservation or utilization of alternative sources is included. Draft legislation is supplied, with an analysis of the legal and constitutional implications for Florida. Alternatives are in five categories: utilities, solar energy, land use, returnable containers and transportation. The specific alternatives discussed are peak load pricing, lifeline rates and solid waste utilization for utilities; the creation of solar easements and tax incentives to promote solar energy; state and local land use planning; a proposal for returnable containers; and under transportation, preferential highway lanes, parking facilities and mass transit facilities. (bk)

Nader, L., et al., 1977. "Belief, Behavior and Technologies as Driving Forces in Transitional Stages." In, Christensen, et al., 1977. Distributed Technologies in California's Energy Future, A Preliminary Report. Volume 2. LBL Report No. 6831. Berkeley, CA: Lawrence Berkeley Laboratory.

This chapter of the Distributed Technologies report focuses on "the role of belief systems and their accompanying behavior patterns and technology systems as driving forces in relation to a transition from hard to soft energy paths over the next 25-50 years in California...An examination of the conscious and unconscious patterns of transition illustrates how technologies and beliefs and the organizations with which they work act as constraining and/or incentive forces. [The report] looked at barriers and incentives to conscious and unconscious transitions in the public arena, and in the interactive sphere between the public and private domains..."

Two case studies were done, one on the new California residential building code which incorporates many energy conservation criteria, and the other on the use of dispersed electric generators connected to the electric grid. The discussion centers on the dimensions the case studies have in common that are crucial variables for bureaucrats and technologists. (bk)

National Advisory Council on Research in Energy Conservation, 1975. First Annual Report. Alexandria, VA: Charles W. Williams, Inc.

The report shows that energy conservation should become one cornerstone of a comprehensive energy policy, but that national activities do not give conservation the priority which it should and must have. In the short term, attitudinal and institutional problems must be identified and overcome. To this end, the recommendations include performing "barrier analyses." (bk)

Newman, D.K. and Day, D., 1975. The American Energy Consumer. Cambridge, Mass.: Ballinger Publishing Company. (A Report to the Energy Policy Project of the Ford Foundation.)

The national concern about energy resources and conservation is discussed in the context of household requirements. Energy use by different kinds of households and the extent conservation can reduce that use is outlined. The conclusion is that levels of living vary widely from poor to rich as does the use of energy and the consequences of energy use in the form of pollution. Policies must take into account that poor and lower middle income groups use least energy, are able to conserve it least, and suffer the consequences of its production most. The affluent use most energy, have and can buy energy conserving features, and are the most likely to be protected from air pollution originating from such sources as electricity generation and the use of gasoline. (bk)

Olsen, M.E. and Goodnight, J.A., 1977. Social Aspects of Energy Conservation. Prepared for the Northwest Energy Policy Project (NEPP). Springfield, VA: NTIS.

Summarizes findings from existing social scientific studies of energy conservation attitudes and behavior, which in general show that the American public has thus far adopted only minimal conservation practices. Analyzes six strategies for implementing energy conservation programs, and concludes that informational and persuasive techniques are relatively worthless, that pricing and incentives can be quite effective for altering specific practices, and that governmental regulation and guidance can produce more extensive changes in energy consumption. Examines several possible social implications of energy conservation, including quality of social life, socioeconomic equity, and the development of a "conservation ethic," all of which could be affected by extensive energy conservation programs. (author)

Opinion Research Corporation, 1976. Barriers to Energy Conservation. Washington, D.C.: FEA.

This study's aim is to provide policy guidance to the FEA [Federal Energy Administration] in its efforts to break down barriers to the efficient usage of finite energy sources. Such efforts may involve mechanisms to promote the more efficient usage of current energy sources or to break down the barriers which presently inhibit the introduction of alternative energy sources. In this study we are concerned only with the energy used by finished products and not with the energy used in the production process itself. The majority of barriers that can be easily and/or directly affected involve the marketplace. This is true even where the barriers are technological; for, in many cases, the problem is not the absence of adequate technology, but its cost. For this reason, considerable time was spent developing an understanding of the various ways in which economic barriers affect efficient energy usage. (author)

Rauenhorst, G., 1973. "A Developer's View." In, Abrahamson, D.E. and Emmings, S. (eds.), 1973. Energy Conservation: Implications for Building Design and Operation. Minneapolis, Minn.: All-University Council on Environmental Quality and School of Public Affairs, University of Minnesota.

The building industry is frequently represented as a barrier to energy conservation. This paper presents the view of a developer, and how he views energy problems. First cost problems, availability of energy, price of energy, and the relation of interest rates to energy costs in developers' calculations are all discussed. (bk)

Real Estate Research Corporation, 1975. Incentives for Energy Conservation in Multi-Family Housing. Springfield, VA: NTIS.

Relatively little is known about the characteristics of the multi-family housing market, particularly as they relate to energy consumption. One purpose of this study, then, is to develop information about the multi-family housing market, as a partial remedy of this lack of data. Another purpose is to define the factors that determine present patterns of energy consumption, including present incentives and disincentives to conservation. A third purpose is to outline, evaluate, and develop strategies that might be used to promote energy conservation in the multi-family residential sector. (bk)

Real Estate Research Corporation, 1977. Innovative Financing: Banks and Energy Conservation (Final Report). Chicago, Ill.: Real Estate Research Corp. (Prepared for ERDA, Division of Buildings and Community Systems.)

This report examines the role of banks in promoting energy conservation. Structured in a question and answer format, the questions range from the purpose of the report to what ERDA's role should be, including questions on consumer behavior and bank behavior (present and future). The major realities are: 1) banks have limited interest in promoting energy conservation; 2) economics of bank operation limit bank opportunities to radically improve terms offered to consumers; and 3) banks can't promote energy conservation hardware very effectively because the primary commodity of a bank is money, not hardware. The major conclusion is that banks' strongest role will be "to facilitate the translation of consumer demand into acquisition of suitable hardware in as convenient and easy a fashion as possible, so that financing does not become a bottleneck or obstacle to widespread energy conservation." (bk)

Regional Counsel's Office, FEA, Region IX, 1976. The Legal and Institutional Barriers to Solar Development: A Summary of the Issues. San Francisco, CA: FEA.

Barriers and other issues of concern in the development of solar energy are discussed briefly, including building codes, model regulations, financial incentives, public utilities, land use planning and the right to light. Solar energy replaces conventional fuels, and as such can be thought as an energy conservation option. (bk)

Robbins, R.L., 1976. "Law and Solar Energy Systems: Legal Impediments and Inducements to Solar Energy Systems." Review Paper. Solar Energy 18: 371-379.

Discusses institutional and legal barriers to the widespread implementation of solar energy for space heating in the U.S. at all levels of government. Proposes various strategies for approaching the problems that are outlined. The paper is a review of a forthcoming publication that will contain about 35 model bills for use at all levels of government. (cw)

Schipper, L., 1976. Energy Conservation: Its Nature, Hidden Benefits and Hidden Barriers. Energy Communications 2(4): July, 1976.

This report discusses various definitions of energy conservation and efficiency of energy utilization. The roles of physical analysis as well as economic analysis are related, and it is suggested that energy conservation is the economic and technical procedure of optimizing energy-using systems based on present and future costs to provide greater output for lower energy inputs. Energy conservation is thus a form of higher resource productivity. Many conservation studies of individual systems are referred to, and economic examples are given as well. Methodologies are suggested for evaluating the effectiveness of energy conservation measures.

Some of the indirect effects, or "hidden benefits" of efficient energy utilization are discussed. These benefits include higher total employment, less pollution, lower demands for capital to build energy facilities, and hence lower interest rates, and less reliance on marginal or risky energy resources, meaning a slower rise in the real cost of energy.

Many "hidden barriers" exist that inhibit the functioning of the price system to produce efficient, economic energy utilization. These barriers include ignorance of the unique role of energy in economic processess, the lack of detailed information about individual energy systems or options for increased efficiency, the capital-intensive nature of energy using systems (capital can be economically substituted for energy) and the inability of many classes of energy users to respond to higher prices for energy. Other barriers to more efficient utilization include defects in the prices of energy itself, as well as social or philosophical difficulties in reaching an agreement that energy can be or should be used more efficiently. (author)

Schoen, R., Hirshberg, A.S., and Weingart, J.M., 1975. New Energy Technologies for Buildings: Institutional Problems and Solutions. (A Report to the Energy Policy Project of the Ford Foundation.) Cambridge, Mass.: Ballinger Publishing Co.

The book "discusses ways in which new energy conserving technologies might be encouraged to be widely used on buildings. All innovations no matter how significant require time to be adopted and to become widely used. The rate of this diffusion process is fixed by a) the features (technical and economic) of the innovations, b) the characteristics of potential users, and c) the market context established by supply and demand forces as modified by public policies."

One of the major conclusions is that on-site energy technologies for buildings will play a significant role in energy conservation only if a concerted effort is made at the Federal and state levels to have these technologies rapidly accepted by the construction industry. "As a means of graphically displaying specific problems and suggested means for their resolution, we have developed four problem/solution matrices—one each for residential and commercial solar applications and one each for total energy and fuel cells." (bk).

State of California Department of Housing and Community Development, 1977. The California Residential Energy Standards: Problems and Recommendations Relating to Implementation, Enforcement, and Design. Springfield, VA: NTIS.

One of the frequently mentioned barriers to energy conservation in residential housing is building codes. California has attempted to overcome this barrier by instituting minimum energy insulation standards for all new residential buildings which are heated and/or mechanically cooled. This report evaluates the problems of implementation, enforcement, and the design aspects of the California energy insulation standards for new residential buildings. (bk)

Stein, R.G., 1973. "Architecture and Energy Use." In, Abrahamson, D.E. and Emmings, S., (eds.), 1973. Energy Conservation: Implications for Building Design and Operation. Minneapolis, Minn.: All-University Council on Environmental Quality and School of Public Affairs, University of Minnesota.

Design and performance standards for buildings can be barriers to the implementation of energy conservation. This paper discusses architectural response to these standards and outlines areas where architects can influence such standards. Other problems, such as the lack of interconnection in mechanical systems in buildings, are also discussed. (bk)

Stern, M.O., 1978. "Life Cycle Costing, Government Policies and the Diffusion of Energy-Conservation Technology." Energy 3:173-202.

Energy conservation has become a major goal of State and Federal policy. Governments are called on to play an active role in identifying promising energy-conserving technologies, and in encouraging their timely and widespread adoption.

For their role to be effective, governments must have available—and be willing to use—some economic tools that permit estimation of the costs and benefits of their actions....Governments may assign "shadow prices" different from observed market prices to certain energy forms, to reflect more correctly their perceived value to society. They may also want to use discount rates different from those of private businesses or individuals in their benefit-cost calculus, to better take into account the claims of future generations on earth's remaining resources.

The main purpose of this paper is to show what special economic tools are required in this evaluation, to develop some of them, and to demonstrate their application. Specifically, the aim is to explain and illustrate the usefulness to public policy makers of the techniques of life cycle costing and of market acceptance estimation... (author)

Survey Research Laboratory, University of Illinois, 1977. Public Reactions to Wind Energy Devices. Final Report. Prepared for National Science Foundation Directorate for Applied Science and Research Applications (ASRA) and the Department of Energy. Washington, D.C.: National Science Foundation.

This study was undertaken to explore reactions of the general public toward different types of wind energy devices for generating electric energy. The objectives of the study were: 1) to provide substantive information on public acceptance of different types of wind energy devices in different settings, and 2) to furnish a methodological base for more intensive studies of public acceptance of such devices. (author)

Thompson, G.P., 1977. Energy Conservation: Opportunities and Barriers. Knoxville, TN: Symposium for Public Awareness on Energy.

Those seeking lower energy consumption should keep in mind that comfort need not be lost; that conservation can be viewed as a challenge rather than a threat. Public optimism about energy supplies is translated into legal and institutional barriers to conservation. This optimism plus the lack of realistic price signals all work to discourage conservation. Federal programs for public education and persuasion find the few mandated actions have all been too timid and have tended to pass the hard problems on to the states. The states have responded with programs that are often innovative and comprehensive. The recommendations in the report include energy rate structures that focus on price signals to discourage wasteful consumption and mandatory programs for energy efficiency standards. (bk)

Part II: General Studies Related to Implementation and Barriers to Change.

Angelus, T.L., 1969. "Why Do Most New Products Fail?" Advertising Age Features, March 24, 1969.

Nearly 80% of 9480 new products introduced in 1968 can be classified as failures because they didn't meet their projected sales goals. New Products Action Team, a company specializing in new product services for consumer package goods manufactures, studied 75 of these ill-fated ventures to learn the reasons for failure. The major reasons were (1) vague consumer difference; (2) poor product positioning; (3) no point of difference; (4) poor timing; (5) product performance; and (6) wrong market for the company. (bk)

Appel, J. and MacKenzie, J.J., 1974. "How Much Light Do We Really Need?" Bulletin of Atomic Scientists, XXX(10): 18-24, December 1974.

This report analyzes the research which forms the basis of present recommended illumination levels, and reveals that the method of specifying lighting levels is based on a number of unsupported assumptions. It is suggested that an alternative mode of specifying illumination levels—studying individual visual tasks— be used to determine appropriate illumination standards.

In addition, some background on the lighting industry is given including the presence on Illuminating Engineering Society (IES) committees of a substantial number of lighting personnel from the lighting fixture and electric power industries. This suggests an obvious and serious conflict of interest in the setting of illumination standards, and may explain in part the difficulties experienced by energy conservationists in their attempts to have lighting levels reduced. (bk)

Bator, F.M., 1958. "The Anatomy of Market Failure." Quarterly Journal of Economics, 72:351-379.

This article examines various modes of market failure and suggests a comprehensive ordering of types of market failure. The types of market failure discussed are (1) failure by existence, (2) failure by signal, (3) failure by incentive, (4) failure by structure, and (5) failure by enforcement. An examination of the causes of failure leads to three types: (1) ownership externalities; (2) technical externalities; and (3) public good externalities. The article concludes that there is a need for "more systematic exploration of the inadequacies of market calculation in a setting of growth." (bk)

Czepiel, J.A., 1974. "Word-of-Mouth Processes in the Diffusion of a Major Technological Innovation." J. Marketing Research, Volume XI: 172-180, May 1974.

The major premise of this study is that diffusion in industrial societies can be studied as a behavioral process. The study chose as its vehicle the diffusion of the continuous casting process in the steel industry. The most significant findings were those concerning the existence of a functioning informal community linking together the firms. Barriers cited as militating against informal interfirm communication include the very nature of economic competition, potential legal restraints on collusive activity, and geographical dispersion. The existence of a strong informal community in the steel industry may be due to the industry's maturity and the strong similarity among all the firms in the industry insofar as basic production and technical problems are concerned. It is less likely that such a community would be found in an industry where productive technology may yield significant competitive advantage and therefore may demand a high level of secrecy. (bk)

Doctors, S.I., 1969. The Role of Federal Agencies in Technologies Transfer. Cambridge, Mass.: The MIT Press.

The book represents one of the first attempts at a thorough empirical study of a technology transfer program, the Technology Utilization Program of NASA, measured against its own objectives. NASA has devoted more explicit thought and attention to the area of technology transfer than has any other technology-oriented federal agency and has used technology utilization as one of its chief selling points. The conclusions with respect to the transfer of space and defense technology from large firms are not very encouraging, although the transfer has sometimes been successful in a few small, specialized high-technology firms. The major problems responsible for the lack of success of NASA's program are newness, fragmentation, NASA contractors also being DOD contractors, the program's role as a political tool to justify NASA R&D funding, the focus on industrial uses of the technology, the patent/licensing policy and the orientation of the regional centers toward library functions, rather than entrepreneurial activity and market assistance. (bk)

Freeman, C., 1973. "A Study of Success and Failure in Industrial Innovation." In, Williams, B.R., (ed.), 1973. Science and Technology in Economic Growth. New York, N.Y.: John Wiley and Sons.

Although innovation is a complex social process which encounters many barriers and problems, the crucial step is the commercial launch of a new system or product. The paper discusses the results of a project which attempted to measure a large number of characteristics of successful attempts to innovate and compare them with corresponding unsuccessful attempts. (bk)

Furash, E., 1968. "Chapter 8: The Problem of Technology Transfer." In, Bauer, R.A. and Gergen, K.J., 1968. The Study of Policy Formation. N.Y., NY: The Free Press.

This chapter presents a brief review of technology diffusion and then proceeds to look at the actors and agencies involved in federal R&D and technology transfer. Two major information needs are identified: (1) to order and enumerate different points of view in an attempt to achieve mutual agreement on what the goals of technology transfer are; and (2) an understanding of the transfer process itself is needed. A number of barriers to the transfer of a technology were also identified: "(1) there is a marked and increasing divergence between much of the federal technology that has been developed (especially missile and space technology) and the needs of the civilian economy. Transfer must occur by analogy rather than by imitation; (2) there is a lack of adequate communication between the body of technology generated from federal R&D and potential users; (3) the increasing volume of technological data generated from federal R&D programs is making the process of searching for information in this technology cumbersome, uneconomic, and unappealing; and (4) there are traditional ways of doing things, as exemplified by business practices, building codes, and work rules, that inhibit innovation in general." (bk)

Graham, S., 1956. "Class and Conservatism in the Adoption of Innovations." Human Relations, 9: 91-100.

The association between conservatism in accepting innovations and social class affiliations was examined for five new items of different types. The amount of contact between innovation and potential acceptors was crucial, as was the extent to which innovational characteristics and the culture of the receiving group were compatible. (bk)

Gross, N.; Giacquinta, J.B. and Berstein, M., 1971. Implementing Organizational Innovations. N.Y., NY: Basic Books, Inc., Publishers.

In Chapter 6, "Barriers to the Implementation of the Innovation," the major obstacles encountered by the teacher were (1) lack of clarity about the innovation; (2) lack of capability to fulfill the new role model; (3) unavailability of the necessary materials; (4) incompatible organizational arrangements; and (5) lack of staff motivation. (bk)

Hopkins, D.S. and Bailey, E.L., 1971. "New-Product Pressures." The Conference Board Record. June 1971, pp. 16-24.

The article is based on the findings of a survey of 125 members of the Conference Board's Senior Marketing Executives Panel. The competitive features most preferred by marketers in a manufactured product new to a company but not to the market turn out to be superior quality, lower price (or better value), and more features, options or uses. These three represent 69 percent of the marketing executives' first choices. The principal causes of failure of new products or service include inadequate market analysis, product problems or defects, lack of effective marketing effort, higher costs than anticipated, competitive strength or reaction, poor timing of introduction, technical/ production problems and other miscellaneous causes such as a company's lack of competence in areas outside its accustomed product range. (bk)

House, P.W. and Jones, D.W., Jr., 1976. Getting It Off the Shelf: A Methodology for Implementing Federal Research. Boulder, Colo.: Westview Press.

This study is concerned with the implementation of federally sponsored technology R&D. It focuses on the process of technology adoption and diffusion in both the public and private sectors. Whereas the issues of implementation feasibility, market potential, and users acceptance are studied, the implementation of technologies is left to chance. In the case of energy-saving technology—the case which generated this research—it appears that too much is at stake to permit a laissez-faire attitude toward commercial adoption and technology implementation. Problems which must be confronted are addressed. (bk)

Lazer, W. and Bell, W.E., 1973. "The Concept and Process of Innovation." In, Kelley, E.J. and Lazer, W. (eds.), 1973. Managerial Marketing: Policies, Strategies and Decisions. Homewood, IL: Richard D. Irwin, Inc.

This article defines and describes the different categories of innovation and various theories of the innovation adoption process. Innovations are divided into three types—fundamental, functional and adaptive—and characteristics associated with each type are listed. (bk)

Linvill, W.K., 1974. "A Process for Overcoming Barriers to Technological Revolution." In, Chen, K., 1974. Technology and Social Institutions. New York, NY: IEEE Press.

In facing internal societal problems such as urban and regional planning, health care delivery, mobility of human resources and life-long education there appears to be a compound barrier to innovation of solutions having three components: barriers to initiating the process; barriers to integrating potential client-sponsors; and barriers to integrating potential producers. The compound barrier may be overcome by a compound incentive which would be a process with three essential aspects. First is an exploratory mode so that potential client-sponsors and potential producers can study a broad problem area in a sanctuary away from the pressures of the operational world and formulate alternatives for its solution. The second aspect is a catalytic brokerage process by which new sovereign entities may be brought into the solution team in an open market situation. Thirdly, a chain of initiatives can then be formed by a cascade of such explorations followed by catalytic brokerage processes so that the transition from initial exploration to implementation may be staged in a number of phases. Thus, the compound barrier is addressed by a process involving a chain of exploration-brokerage stages to carry the initiative for the solution. The overall set of societal problems requires a network of exploration and brokerage centers to provide an overall illumination of interlocking problems without violating the sovereignty of existing public and private organizations concerned with them. The remainder of this article discusses the various aspects of this central theme in detail. (author)

Mansfield, E., 1973. "Determinants of the Speed of Application of New Technology." In, Williams, B.R. (eds.), 1973. Science and Technology in Economic Growth. New York, NY: John Wiley and Sons.

An important question for any new technology is how rapidly it can be applied. This paper discusses the basic factors influencing the speed of application of new technology in general. The basic findings in each of several areas are summarized, including: (1) the rate of application of new technology: a)the time interval between invention and commercial introduction seems to average about a decade; b)this average time interval varies from industry to industry; c)the time interval also varies considerably within an industry; d)the time interval is shorter if the inventor attempts to introduce or commercialize the product; and e)the time interval is shorter now than it was fifty or seventy-five years ago; (2) science, education and the application of new technology: a)new technology is dependent on scientific discoveries; b)leadership in science is not a prerequisite for leadership in technology, on the international level; c)the educational level in a country, the number of scientists and engineers and the inventiveness and adaptiveness of a nation's work force are all important; and d)better educated managers tend to be quicker to adopt new technologies than poorly educated managers; (3) industrial organization and the nature of markets: a)innovations are not likely to occur at the crest or trough of a business cycle; b)for firms to respond quickly to technical innovations, they must be beyond a certain threshold size; c)there is no evidence that highly concentrated industries are quicker to introduce new technologies than less concentrated industries; d)the scale of the market influences the extent to which a firm can spread the fixed costs of innovation; and e)the availability of risk capital is also important; (4) the management and organization of firms: a)the rate at which new technology is utilized is dependent on the willingness of firms to accept risk; b)commercial risks are usually greater than technical risks; c)typically, technological innovations seem to be stimulated by perceived production and marketing needs and requirements, not by technological opportunities; and d)one of a firm's biggest problems is proper coupling between R&D and the rest of the firm. (bk)

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Morris, W.W., 1964. "Market Considerations in Successful New Product Introduction." In, Marting, E. (ed.), 1964. New Products, New Profits. N.Y., NY: American Management Association, Inc.

This article discusses some of the "laws" of marketing which are simply not true, including (1) "people who tell researchers they like a test product are duty bound to buy it when it goes into retail distribution;" (2) "my new product will sell because my salesmen tell me competition has beat us to the market with its new widget;" (3) "let one man use his own judgment and handle all new products; forget about committees;" and (4) "new products are introduced to meet our own needs; what's best for the company is best for the customer." (bk)

Nabseth, L., 1973. "The Diffusion of Innovations in Swedish Industry." In, Williams, B.R. (ed.), 1973. Science and Technology in Economic Growth. New York, NY: John Wiley and Sons.

This paper discusses ten new processes which have been introduced to Sweden, and identifies why each process was adopted by individual firms. The most important variables for adoption of the new technology were found to be: (1) profitability; (2) differences in the attitude of different managements towards new technology; (3) awareness of the new technology; and (4) company or plant size. (bk)

Oster, S.M. and Quigley, J.M., 1977. "Regulatory Barriers to the Diffusion of Innovation: Some Evidence from Building Codes." Bell Journal of Economics, 8(2): 361-377. Autumn 1977.

Previous studies, including the reports of the Douglas and Kaiser Commissions, have suggested that outmoded local regulation of residential construction has impeded technical progress in the [building] industry. In this paper, we try to identify the determinants of differences across communities in these regulations. The permissibility of four particular innovations in a cross section of jurisdictions in 1970 and the timing of those innovations are explained by attributes of local firms, labor unions, building officials and housing demand. [The] results suggest that the educational level of the chief building official, the extent of unionization, and the relative size of house building firms in an area affect the diffusion of innovations in residential construction. (authors)

Pincus, J., 1974. "Incentives for Innovation in the Public Schools." Review of Educational Research 44(1): 113-144.

This paper sets out some propositions about the structure and incentive systems of public schools as they relate to the adoption of innovations and to their implementation in the schools. These propositions may have certain systematic implications for educational R&D policy as well as for such broader questions as how to implement planned change in bureaucracies. The propositions are not based on careful testing of hypotheses, but on a blend of evidence and speculation, and are aimed at influencing how we might think about educational R&D policy. Furthermore, implicit herein is the notion that society will be better off if schools could offer more diverse alternatives in respect to both organization of schools and curriculum. It also implies that such changes are possible—i.e., that society is neither so rigid nor so well satisfied with its schools as to veto increased diversity. The general thesis of this paper is that the market structure of the public school "industry" has a major effect on schools' decisions to adopt innovations, and the bureaucratic structure and incentive of schools shape in specific ways the transition from adopting innovations to implementing them. (author/bk)

President's Committee on Urban Housing, 1968. A Decent Home. Washington, D.C.: GPO.

The committee examined all existing Federal housing subsidy programs and many aspects of housing production. Two basic goals of the committee were (1) rapidly accelerating and increasing the production and rehabilitation of decent housing for the poor; and (2) attracting the fullest private participation in developing, sponsoring and managing Federally subsidized housing.

In regard to institutional barriers, "the committee is aware that shortages and higher prices of building materials could be minimized by substitutions among materials and by more off-site fabrication. Such steps, which could also produce cost [and energy] savings, could encounter barriers in restrictive local building codes, labor practices, and work rules. Conditions of widely fluctuating and highly seasonal employment are characteristic of the home building and construction industries. Improved conditions bringing better job security and more full-time year-round employment should lessen labor's fears which may form the basis for those restrictive work practices which actually do exist...Our two major recommendations in the area of research and implementation of new technology call for limited Federal preemption of local building codes for subsidized housing and creation of a national testing institute for building products and systems." (bk)

Pressman, J.L. and Wildavsky, A., 1973. Implementation. Berkeley, CA: University of California Press.

This is a case study of the problems of implementing a government policy where no great conflicts existed, participants were in general agreement, political issues were minimal and adequate funding was available. The study focuses on the Economic Development Administration's attempt to provide training and jobs for the hard core unemployed in Oakland, CA. The ordinary problems which the program faced, such as maintaining agreements once they were reached, and obtaining approvals and clearances from a variety of participants effectively blocked and/or delayed all the elements of the program. The suggested remedy is to link implementation to policy more effectively. For EDA the suggestion is to make payment for performance (i.e. employing the hard-core unemployed) rather than payment for capital expansions which may not directly lead to decreased hard core unemployment. (bk)

Richman, B.M., 1962. "A Rating Scale for Product Innovation." Business Horizons. Summer 1962.

The article describes and discusses an evaluation matrix which can be used as a rating scale. Such a matrix has two major functions and involves a two-part analysis: 1) a ranking and weighting of the various spheres of company performance in relation to the overall future success of the company and 2) assignment of values to these spheres of performance to determine the product fit. An estimate of profitability is not provided by the matrix. Possible problem areas for the company introducing the product can be deduced from the matrix and include new product effects on: company personality and goodwill; the marketing group; research and development; personnel; finance; production; location and facilities; purchasing and supply. (bk)

Roessner, J.D., 1975. "Federal Technology Transfer: Results of a Survey of Formal Programs." Paper presented at the Winter Annual Meeting of the Aerospace Division of the American Society of Mechanical Engineers, Houston, Texas, 30 November - 4 December 1975.

In early spring of 1975, 25 Federal agencies having formal technology transfer programs or activities were surveyed via structured questionnaire. Data on program structure, procedures, staffing, budgets, and relationships with user groups were collected and analyzed. This paper reports the findings of the study. Measures of program effectiveness are developed and related to factors that research and experience suggest are likely to influence program success. In addition, patterns suggesting differences and similarities across programs are identified and analyzed. Strategies likely to improve the effectiveness of transfer/utilization programs are identified and needs for further research discussed. (author)

Rogers, E.M., 1962. Diffusion of Innovations. New York, N.Y.: The Free Press

The main purpose of the book is "to synthesize and evaluate available research findings and theories in the diffusion of innovations." More than five hundred publications on the diffusion of innovations were reviewed. Areas covered include traditions of research on diffusion; culture, norms, and diffusions; the adoption process; characteristics of the innovation; opinion leaders and the flow of ideas; the role of the change agent; predicting innovativeness; and a theoretical approach to diffusion. One conclusion is that "in order for adoption to occur, the individual must perceive that the potential rewards of adoption outweigh the expected efforts required for adoption." (bk)

Romeo, A.A., 1975. "Interindustry and Interfirm Differences in the Rate of Diffusion of an Innovation." The Review of Economics and Statistics, LXII(3): 311-319, August 1975.

One of the most important stages of the process of technological change is diffusion. Based on data obtained from a sample of 152 firms in ten industries, a number of propositions concerning the diffusion of numerically controlled machine tools were tested. The results indicate that the basic model of the imitation process developed by Mansfield in 1961 can explain interindustry differences in the rate of growth of the percentage of new machine tool purchases that are numerically controlled. Further, new light has been shed on the role of R&D. R&D has a significant positive effect on the rate of diffusion of an innovation, even when the innovation is not directly related to the areas in which the R&D is done. (bk)

Rubel, J.H., 1965. "The Aerospace Project Approach Applied to Building New Cities." In, Eldridge, H.W., 1965. Taming Megalopolis, Volume II. New York, N.Y.: Doubleday, Anchor Paperback, pp. 854-874.

This paper examines new approaches to overcoming barriers to urban betterment, especially those barriers which interfere with the fullest and most effective participation of the private sector. Because "it is not likely that the American population will stop growing or that migration patterns into and around major cities will change sharply, it is to be expected that urban problems will continue to become more pressing." The solution to this problem lies in part in the creation of new cities. The paper describes ways in which mechanisms might be established that would make it possible to create new cities rapidly. "The barriers to innovation are not technical. The important barriers are institutional—cumbersome and overlapping political and administrative jurisdictions; the codification of conventional techniques that forbid innovation; the fragmentation of markets for urban betterment that foreclose [innovation]." The way to create new cities is analogous to how space technologies were developed—by creating a marketplace, "a wholly new marketplace, one that does not now exist and never has, where private industry can come and sell the development, creation and administration of new cities." (bk)

Schary, P.B., 1977. "Transportation Rates and the Recycling Problem." Transportation Journal 16(3): 46-56, Spring 1977.

An examination of the power that transportation rates exert on markets leads to the recommendation that decentralizing production of recyclable commodities is desirable. Small-scale localized industries would allow regional economies to develop and become more self-sufficient, while reducing the movement of materials. Two studies of the issues involved review subsidies for the cost of transporting recycled materials that will be competing with virgin materials. (author)

Socolow, R.H., 1974. Failures of Discourse: Obstacles to the Integration of Environmental Values into Natural Resource Policy. Princeton, N.J.: Center for Environmental Studies, Princeton University.

The report discusses the proposed Tocks Island Dam on the Delaware River. It is a case study of institutional barriers and environmental values. The failure of technical studies to assist in the resolution of environmental controversies is part of a larger pattern of failures of discourse in problems which put major societal values at stake. This report examines the reasons why technical analyses are not done on the most important questions in the debate, i.e. value questions. (bk)

Stone, A., 1973. "The F.T.C. and Advertising Regulation: An Examination of Agency Failure." Public Policy, XIX(2): 203-234.

This paper analyzes "various theories which have been employed to explain the impact or nonimpact of public policies on the problems which they are supposed to attack." The Federal Trade Commission (FTC) has been studied many times yet its numerous critics have not convincingly explained its consistently "trivial impact on consumer protection." The study concludes that theories based upon the "capture" of public officials by regulated interests simply do not make sense in this case, while

a theory of administrative conduct based upon an analysis of the pertinent statute—in this case the Wheeler-Lea Act—"enables us to explain an agency's performance in a rational manner." The possible barriers to the FTC's implementation of its mission include bad personnel, imprecise standards to enforce, expansive jurisdiction, and waning public support. These are all rejected in favor of deducing the FTC'S impact on advertising regulation from its operative statute and certain characteristics inherent in the statute. (bk)

Thompson, J.K.L., 1970. "Barriers to Information Transfer and Technological Change." In, ASLIB, 1970. Accelerating Innovation; Papers given at a symposium held at the University of Nottingham (UK) in March 1969. New York, NY: Chicorel Library Publishing Corp.

The paper discusses "missionary activities among backward firms and under-developed industries." Topics covered include what barriers exist, how to overcome them, barriers within the work force and Mintech's (Ministry for Technology?) role. (bk)

Urban Institute, 1971. The Struggle to Bring Technology to the Cities. Washington, D.C.: The Urban Institute.

Chapter 5 of this book is "What Keeps Cities, Industry and Technology Apart: A Catalog of Major Obstacles." Three major categories of change agents listed are: (1) the users of hardware; (2) the manufacturers or potential manufacturers; and (3) the creators of applied technology—the R&D community. The obstacles facing the cities include such institutional factors as reluctance to change operating modes, political risk, budget constraints, job security requirements, distrust of industry experts, lack of accepted performance and cost data, and lack of technical evaluation capability. Obstacles facing industry and the research community include market fragmentation, research budget constraints, and ignorance of what cities need. (bk)

Wasson, C.R., 1971. Product Management: Product Life Cycles and Competitive Marketing Strategy. St. Charles, Ill.: Challenge Books.

The book "aims to bring together the various streams of knowledge available for the understanding of product competition and pricing strategy into a comprehensive analytical framework helpful in the planning and execution of the marketing strategy of any organization." The view is that of the business community. Using past experience as a guide, a framework for profitable management of innovation is presented. (bk)

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