

Chapter 7

Private Sector Efforts to Stimulate Energy Retrofit of Buildings

Contents

	Page
Traditional Businesses	198
Energy Services Companies.	199
Capital Investment and Shared Savings.	200
-Savings Guarantee.	201
Audits and Retrofits.	201
Audits and Retrofit Quality Control	202
Audit Only.	202
Audit Assistance to Utilities	203
Energy Management Systems Design... .	203
Computerized Energy Management Systems	203
Prospects for Energy Service and Energy Management System Companies.	204
Traditional Lenders.. . . .	205
Nontraditional Financing.	206

LIST OF TABLES

Tab/e No.	Page
68. Energy Services and Building Markets for a Sample of Energy Service Companies and Energy Consulting Firms Primary Building Markets.	200
69. Comparison of Capital Needs for EMS and ES Companies.	204
70. Sample Calculation of Investment Return From a Limited partnership to Purchase Offshore Oil-Drilling Equipment	207

Private Sector Efforts to Stimulate Energy Retrofit of Buildings

Energy conservation retrofits in buildings represent a good investment—over time they generate a return on the dollar well above many opportunities available elsewhere in the economy. This fact suggests that there is money to be made in energy conservation, and consequently that there should be a strong private sector, profit-oriented market in retrofitting buildings. At the same time, it is well understood that new private sector responses to any need take some time to develop, just as new products often experience a 10-year period from conception to market availability. A look at private sector energy businesses directed at building retrofit indicates that while many traditional businesses have shifted focus to take advantage of available profit, some new and specially designed business ventures are emerging.¹

With the rise in fuel prices and the increasing body of information on how to save energy, many entrepreneurs have started to look for ways to make money. Many policy analyses done from the perspective of Federal-level investment choices have demonstrated the economies available through using conservation instead of new fuel supply. These macroeconomic analyses have concluded that profit should result from the savings in fuel cost generated by conservation. Quantification of the "conservation market" is difficult, except to say that the numbers are very large. Roger Sant, former Federal Energy Administration (FEA), Assistant Administrator for Conservation and Environment now involved in his own private sector effort, has estimated that the total market for energy services of all types will generate some \$400 billion in new profit.² In addition to the

hundreds of small companies trying to get a piece of the energy action, major corporations are now entering the field. Reynolds Aluminum, for example, has announced the opening of a chain of stores stocking energy products, designed for affluent consumers trying to hold down fuel bills.

Energy conservation in buildings is complicated as a profit opportunity, due to the complexity of buildings and the variables represented by the behavior of building users and the climate (see ch. 3). Energy conservation also faces some special marketing problems, in that investments to save money in the future are often less attractive than investment to generate cash flow or expenditures to obtain products or services that are desired by the user (see ch. 4). In other words, people are not enthusiastic about spending money to avoid paying an expense they resent anyway. A final problem confronting the private sector is that there is an enormous number of products and services, and unlimited combinations of those products and services, that can be defined as "energy conserving." The multiplicity of choice, the millions of decision makers involved, and the difficulty of selection make it hard for business to define the true market.

In addition to these marketing problems, the potential investors in substantial retrofits that are the main subject of this study—commercial and multifamily buildings—face two particular barriers examined in more detail in chapter 4. Most of these owners have access only to debt financing, and current interest rates mean that financing a major retrofit is extremely costly. The amount of interest paid out on a large retrofit project means that the time period before the retrofit actually results in a real dollar saving is greatly lengthened. The investment picture is further complicated by the fact that the savings may vary, due to uncertainties in the diagnosis of energy retrofit applications, the behavior of building occupants and the climate itself. Some

¹The first section of this chapter is based on the references footnoted on the following pages covering energy service companies, plus *An Assessment of the Potential for Large Corporations to Provide Retrofit Services to Homeowners*, Robert Dubinsky, a Rand paper, July 1981, and the following interviews: Honeywell Commercial Services, McLean, Va., Aug. 11, 1981, Certain-Teed Corp., Washington, D. C., July 23, 1981, and OTA Advisory Panel, Washington, D. C., Apr. 27, 1981.

²"Thinking Ahead" (Coming Markets for Energy Services), Roger W. Sant, Harvard *Business Review*, May-June 1980, p. 6.

companies entering the energy area are specifically oriented to meeting these problems of financing and uncertainty.

There has been no systematic analysis of the private sector response to conservation retrofits; most available information is anecdotal. This partly reflects the newness of the field and the question of what businesses to include. It also reflects the fact that new companies basing their effort on generating 3- to 5-year payback projects do not yet know if they will succeed. Until sufficient time has passed to allow analysis of actual costs, cash flow impacts, and returns, it will be difficult for firms to learn what investment characteristics clearly result in profitability. One aspect of the market pattern is already clear,

however. Most firms offering extensive auditing, major retrofitting, financing, and/or guaranteed savings for the residential sector are aimed at middle- and upper-income consumers. Similarly, commercial and multifamily building owners with some discretionary capital are likely to be the largest users of more sophisticated private energy services.

This chapter will describe briefly some of the traditional and new responses by business to the energy conservation opportunity. Two of the findings of this study—that financing and risk reduction play critical roles in accelerating urban buildings retrofit—have influenced the selection of examples and emphasis in describing the new companies.

TRADITIONAL BUSINESSES

Rising energy costs have made it important and cost effective for consumers to purchase and install products to help cut energy use, and resulting energy cost. Retail merchants have increased the exposure given to energy-saving products. This retail sales market is largely directed to the homeowner or tenant who wants to keep fuel costs down, but who may not undertake a thorough analysis of the structure. The best known energy-saving products, such as insulation and weatherstripping, are likely to be featured in retail displays of this type. Insulation, storm windows, and those products typically associated with saving energy in cold climates have been the focus of much homeowner and building owner buying.

Rising energy costs also mean that it now pays consumers to invest more to hold down fuel cost than it used to. Accordingly, manufacturers have invested in producing and marketing products that were not cost effective in the early 1970's but are now. A good example of this shift is the larger market share of heating and air-conditioning appliances with high efficiency ratings. Federally required labels displaying energy consumption, and the actions of California and Minnesota in requiring energy efficiency minimums for appliances sold in those States, have reinforced a movement by some manufacturers

toward higher efficiency products, with corresponding advertising and market efforts.

Data compiled by the Carrier Corp. points out a continuing difference between appliances that are purchased directly by homeowners and tenants, and those installed principally by contractors, such as central air-conditioning systems. Products normally purchased directly by customers that showed a marked improvement in energy efficiency from 1978 to 1980 included refrigerators and refrigerator freezers (+ 16.2 percent), freezers (+ 11.5 percent), room air-conditioners (+5 percent), dishwashers (+15 percent), and clothes washers (+16 percent). The Carrier analysis attributes this increase to market forces. ^s

in contrast, appliances purchased primarily by contractors such as central air-conditioning units, heat pumps, furnaces, and water heaters, which constitute 15 percent of the total national energy consumption, improved efficiency by only 1.1 percent. Carrier attributes even this increase to the force of the California standard for central conditioning, which was raised from 7 to 8 in 1979.⁴ Since California represents a suffi-

³"Shipment-Weighted Average Efficiency (E ER)," Carrier Corp., Analysis of Industry Data, May 1981.

⁴1 bid.

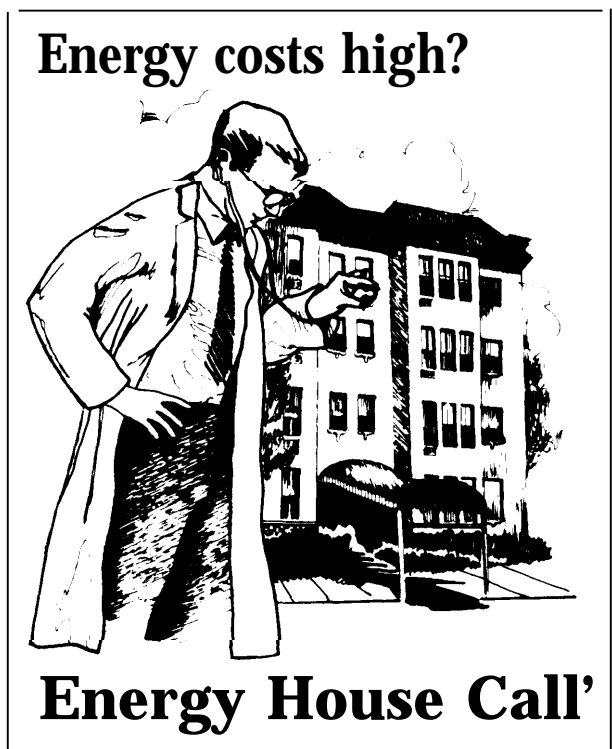
ciently large portion of the central air-conditioning market, this change influenced manufacturing practices. Carrier concludes that if the California standard had not been strengthened, the national average would have actually decreased slightly. The lack of improvement in the energy efficiency of these appliances appears to reflect the importance of first cost to the contractor, who seeks to enter the market at the lowest possible price, thus shifting the operating cost to the buyer, while, on the other hand, appliances likely to be purchased directly by the users are beginning to reflect the reality of operating costs.

Another response to energy cost awareness within the traditional business framework has come from trade and professional groups. Architects and engineers, both groups with a major impact on building energy use and a large potential gain from understanding the energy market, have undertaken to train themselves to provide improved energy design and engineering services. Both groups became involved in the attempt to fashion new energy efficiency standards for building construction; the American Society of Heating, Refrigeration and Air-Conditioning Engineers (ASHRAE) developed the model for the building code revisions adopted in most States over the past 5 years; the American Institute of Architects was heavily involved in the development of guidelines for the proposed building energy performance standards. Both of these massive efforts at code reform resulted in extensive research and information dissemination among these groups. ASHRAE is now trying to develop a set of retrofit standards. Large architecture and engineering firms that have traditionally provided information and services for large commercial buildings

have developed the new skills now in demand by their clients.

Energy consulting firms, generally providing audits, specifications and guidance for retrofits and new buildings (but not installation or financing of retrofits), have flourished. One-third of the 4,000 members of the Association of Energy Engineers are energy conservation consultants, according to the Wall Street Journal.⁵

⁵"Energy-Consulting Business Booms as Building Operators Seek Savings," *Wall Street Journal*, June 16, 1981.



* "Energy House Call" is a registered trademark of the Potomac Energy Group, Inc.

Illustration and slogans from a business card used by a firm of "house doctors" in the State of Virginia

ENERGY SERVICES COMPANIES

Distinctive and new business ventures are now underway in addition to the adjustments of traditional business to the "energy crisis." One of the underlying themes of these businesses is selling energy as a service, rather than as a commodity or Btu. This is a return to the early view

of Thomas Edison, who wanted to sell light instead of current. "The reason I wanted to sell light instead of current was that the public didn't understand anything about electric terms or electricity . . ." This view is also in line with the modern marketing approach that people

will buy what they understand. New businesses are building on this principle.

While there is little actual data on the performance of these firms, and no data on the impact of such firms on reduction in energy use, there seems to be a momentum building. OTA research consistently encountered a prevailing belief that "things are starting to roll." The attitude is that a momentum gathering behind conservation, driven primarily by price and supported by government emphasis and research, has created a private sector response that is about to pass through the embryonic stage to assume a major role in increasing retrofit. This enthusiasm is somewhat offset by the awareness that a number of firms have already come and gone, and others are barely surviving.⁶

The new companies offer a wide range of services, often tailoring their services to a client's need. While the energy audit is the basis of the business, other features may include in-

⁶Survey work for this report was completed in summer of 1980. As of fall 1981, OTA was unable to verify whether or not all of the firms described were still actually doing business in energy services. A number of energy newsletters and other sources reported that continuing high interest rates and other difficulties had lead to a cessation of operations of some firms.

stallation of equipment, supervision of contractors to ensure that installation is correct, financing, the guaranteeing of savings, or assuming full responsibility for providing energy to a building based on a contract with the building owner. Table 68 gives an idea of the variety available and the range of markets for a number of traditional energy consulting firms and for newer types of energy service companies. The next few pages describe briefly each of the companies in table 68.

Capital Investment and Shared Savings

Scallop Thermal Management, Inc. (STM), subsidiary of Royal Dutch Shell in New York, markets energy services in the New York City and Washington, D. C., areas. STM offers to assume supervisory responsibility for the entire heating, cooling, and hot water systems, for a specified sum that is usually 10 to 12 percent below the building owner's budgeted cost. STM makes the initial low-cost investment and changes in procedures that are intended to dramatically reduce energy bills. After operating and monitoring the building for several months, STM may recommend that larger capital invest-

Table 68.—Energy Services and Building Markets for a Sample of Energy Service Companies and Energy Consulting Firms Primary Building Markets

Services	Single-family low-income		Single-family moderate and high		Multiunit dwellings 1-4 units	Multiunit dwellings 5 + units	Small businesses	Large commercial buildings	Institutions
Audit only						American Energy	American Energy		American Energy
Audit assistance to utilities	Cook Energy	Enercom	Cook Energy	Enercom	Energy Audit	Energy Audit	Enercom	Energy Audit	
Audit and supervise/monitor retrofit						Energy Investment	Energy Investment Seidman	Energy Investment Seidman	Energy Investment
Audit and retrofit/weatherization	Energy Bank		Energy Bank	Energy Works	Energy Bank	Energy Bank	Energy Bank	Energy Bank	Energy Bank
			Energy Unlimited		Energy Unlimited	Energy Unlimited	Energy Unlimited	Energy Unlimited	Energy Unlimited
Energy management systems and hardware							Xenergy	Xenergy	Xenergy
							Lockheed	Honeywell Lockheed	Lockheed
Capital						Scallop		Scallop	
								Pacific Energy	
Savings guarantee							Ebasco Diversified	Ebasco Diversified	Ebasco Diversified

SOURCE: Office of Technology Assessment.

ments be made, and will either make the investment or split the cost and savings with the building owner. STM assumes the total risk or profit for being able to reduce fuel bills to a point lower than the contract price.⁷

Pacific Energy Spectrum, Inc. (PES), Los Angeles, Calif., provides energy systems management services to commercial and light industrial building owners. PES will install equipment at no cash outlay to building owners. In order to finance initial investments, PES relies on pools of investors to form partnerships to take advantage of rapid payback and flow-through tax and accelerated depreciation benefits. Savings are shared by PES and the building owner according to a previously agreed-upon formula. At the end of the contract, PES will either sell equipment to the building owner at a depreciated value or remove it. PES customers include shopping malls, office buildings, and light manufacturing business owners in the Los Angeles area. These building owners are attracted to the PES approach because they are not required to invest large amounts of capital to achieve substantial savings.⁸

Savings Guarantee

Ebasco Services, Inc., is a general architecture/engineering and construction services firm headquartered in New York City. It provides services to utilities, the commercial and industrial sectors, governments, and institutions. The company has established an energy conservation department which has expertise in lifecycle costing, building system design and operation and energy consumption, fuels and utility services.

In October 1979, Ebasco announced that its energy conservation department would offer to small- and medium-sized commercial and institutional clients energy audits that are guaranteed to save energy. The investor is guaranteed that the agreed-upon energy conservation investments will be recovered in 60 months or less through reduced energy costs, or Ebasco

will pay the differential. In addition, Ebasco will provide assistance in securing financing for retrofit costs, through banks, financial institutions or through groups of private investors. Ebasco does not do the actual weatherization or retrofit, but will secure contractors for clients and supervise the construction and installation activities. When the work is completed, an Ebasco representative will monitor energy use for 5 years. To date, Ebasco has provided audits for 17 hospitals, 28 universities, and a number of office buildings and industrial plants.⁹

Diversified Energy Systems (DES), King of Prussia, Pa., installs energy management systems which are guaranteed to reduce utility expenses by at least 15 percent. If DES fails to cut costs by the amount guaranteed, they will restore the building to its original condition and refund the customer's investment less the amount actually saved while the equipment was operating.¹⁰

Audits and Retrofits

The Energy Bank, Boston, Mass., was founded in 1975 to provide home energy audits and has since expanded to include commercial audits, as well. Audits are offered directly to individuals/organizations or through public utilities and consumer groups. For example, the Energy Bank audits costs usually range from \$25 to \$45. The Bank is one of the few companies equipped to implement its recommendations. Because the Bank has its own crews, it is able to install a full range of improvements—insulation, window and door work, oil/gas heating systems, domestic hot water, and solar energy systems. Energy Bank surveys indicate that about 87 percent of its audit customers made substantial conservation investments because of the audits. The Bank will also assist clients in arranging financing. According to Energy Bank, loans for the purchase of materials and installation work are available through local banks.¹¹

⁷Mellon Institute, Energy Productivity Center, Preliminary Review of Energy Management Companies Securing the Commercial Building Market, July 22, 1980, pp. 4, 5, and 42.
al bid., pp. 37-38.

⁹Telephone conversation with Michael Munk, Ebasco, Inc., Energy Conservation Dept., Aug. 15, 1980, and Ebasco promotional material.

¹⁰Mellon Institute, Op. cit., p. 20.

¹¹Letter of May 30, 1980, and attached promotional information on the Energy Bank.

Energy Unlimited (EU), New Britain, Conn., established in 1904, has broad experience in energy supply and demand, conservation techniques, and powerplant operation and maintenance. The company owns a cogeneration plant in New York and provides assistance to groups interested in installing district heating or cogeneration plants,

Through its fuel oil division, EU offers class A audits (designed by EU staff) to its oil customers at no charge. EU also conducts audits for commercial, institutional, and municipal clients. Clients can purchase materials needed to make recommended improvements and/or contract with EU to install the materials. According to an EU spokesman, clients are not pressured into purchasing EU materials or installation. Furthermore, EU will arrange for financing and in some cases, although rare, will provide the financing to meet the client's needs.¹²

Energyworks, Inc., is a West Newton, Mass., based energy service company established in September 1977. It conducts energy audits (about 800 yearly) and retrofits as well as providing energy conservation training to a variety of clients: residential, municipal and institutional. Audits are offered directly to clients or through utilities. Furthermore, Energyworks will assist its clients in arranging for financing needed to implement its recommendations.

Audits and Retrofit Quality Control

Seidman & Seidman is an accounting firm located in Grand Rapids, Mich. As energy prices began escalating, Seidman & Seidman clients sought their advice on cutting energy costs. In response to this, the company's management advisory services division developed energy management techniques, including energy reporting systems, Btu accounting and tax credit analysis. For the last 4 years, the company has conducted audits, performing about 20 to 30 per year for commercial and industrial clients. Audits have been conducted on small- and medium-sized commercial buildings, schools, hospitals, and a manufacturing plant. At the client's

request, Seidman & Seidman will monitor the work to be sure that the vendor has done the job correctly.¹³

Established in 1973, Energy Investment (EI), Boston, Mass., is an energy consulting firm specializing in the development of energy management and cost reduction programs for business and industry. Its primary service is an audit, which is conducted onsite and provides engineering and financial evaluation. EI clients include light and heavy manufacturing plants, office buildings, retail stores, schools, hospitals, and apartment complexes. The company will provide construction supervision and other follow-on implementation services to ensure that conservation measures are implemented promptly and efficiently for actual energy savings. Other energy services offered include designing centralized energy accounting systems and conducting boiler conversion feasibility studies. In addition, EI has authored manuals and conducted workshops to train and motivate client's personnel in pursuing conservation goals. EI claims that its clients typically implement their recommendations to achieve 20 percent energy savings annually, with a payback period of about 2 years.¹⁴

Audit Only

American Energy Services (AES), Cambridge, Mass., provides help to organizations in need of managing their energy consumption. Within the last 2 years, AES has designed a building energy audit computer program and auditing procedures. This computer program is used to analyze energy use for clients. Over 80 energy audits have been done for **AES** clients, which include institutional, commercial, residential, and industrial sectors. In addition, **AES** has developed and implemented residential audit programs for utilities and fuel oil dealers.¹⁵

¹³ Telephone conversation with Thomas Hollen, Aug. 14, 1980, and Seidman and Seidman Informational Brochure, and letter dated Aug. 14, 1980.

¹⁴ Energy Investment Inc. Resume (no date).

¹⁵ American Energy Services, Inc., letter dated Aug. 15, 1980, and attached information; telephone conversation with Ann Hudson on Aug. 14, 1980.

¹² Telephone conversation with Mr. Benson, Energy Unlimited, Sept. 8, and Oct. 2, 1980, and letter dated Oct. 28, 1980.

Audit Assistance to Utilities

Enercom, Inc., Tempe, Ariz., has been providing support services to the utility industry since 1975. About 90 gas and electric utilities located in 27 States are currently using Enercom computer systems for home and small commercial audits. Enercom provides a custom designed computer system that can be taken into a home for utility-tailored onsite audit. The system takes into account climate, rate structures, labor and product costs, and construction techniques. According to the company, all of the utilities under contract are using or soon will be using the Enercom system to comply with the Residential Conservation Service program. In addition to its computer services, Enercom will train or supply some or all of the needed auditors to utilities, through Equifax Services, Inc., a nationwide property inspection company with considerable auditing experience. Furthermore, Enercom will provide marketing and advertising assistance to help utilities promote audits to customers.¹⁶

Cook Energy, Chagrin Falls, Ohio, is another company actively pursuing the utility home energy audit market. It is presently assisting 12 utilities in establishing home energy audit programs. The company offers a computerized audit program and conducts auditor training programs for utilities. The computer program used by Cook Energy is available nationwide on a time sharing basis from Boeing Computer Services and Fukon Data Systems.¹⁷

Energy Audit, Inc., Cranston, R. I., also provides computerized energy audit programs to the utility industry for use in residential (includes apartment buildings) and commercial buildings. Like the other two companies, Energy Audit will also train auditors.¹⁸

Planergy, Inc., Austin, Tex., is an energy management and conservation services firm established in January 1977. During the past 3 years,

the firm has developed energy management programs and conducted auditor training workshops in 22 States. Its clients include hospitals, schools, government, and utilities. In addition to training auditors for the utility industry, planergy will provide technical and management support to utilities.¹⁹

Energy Management Systems Design

Xenergy, Lexington, Mass., is an engineering consulting firm incorporated in 1975. The company has designed computer energy management systems for industrial, commercial, and public clients. According to an Xenergy official, about 50 percent of its workload is residential (multifamily housing), industrial, commercial (hotel/motel, office buildings and restaurants) and institutional energy auditing. Xenergy does not perform installation work; however, it will assist clients in securing financing to implement its recommendations.²⁰

Computerized Energy Management Systems

Honeywell's expertise in computers and controls systems naturally expanded into computerized energy management systems. Honeywell offers a wide range of hardware and software, and its buildings operations service system is available nationwide on a time-sharing basis. To date, Honeywell's energy management system has primarily been designed for large commercial complexes, although a system for small commercial buildings has been recently introduced. Honeywell manufactures its own equipment and its staff work directly with building owners who purchase and contractors who sell the systems. To assist its clients, Honeywell will also provide training classes on load management and energy conservation.²¹

Lockheed Electronics Inc., Plainfield, N. J., markets an energy management system which

¹⁶Enercom Marketing Information and Telecon of Sept. 8, 1980, with Jim Marquedt.

¹⁷Telephone conversation with Bill Robertson, Cook Energy, Sept. 8, 1980.

¹⁸Telephone conversation with Paul Calego, Energy Audit, Inc., Sept. 4, 1980, and Energy Audit promotional material, dated 1979.

¹⁹Planergy Informational Material and telephone conversation of Sept. 8, 1980.

²⁰Telephone conversation of Aug. 14, 1980, and Xenergy resume.

²¹Telephone conversation of Sept. 11, 1980, and letter dated Oct. 7, 1980, and attached information.

can be used in any size commercial building. The system uses a centralized minicomputer programed to take English commands and designed with modular components for expansion capability. The system costs \$100,000. Lockheed offers a computer training course to building management personnel who purchase or lease the equipment. Lockheed has recently initiated a program to test the feasibility of using a master station to monitor and control energy consumption for 20 hospitals. The hospitals will use the money saved from lower utility bills to pay for the system.²²

Propsects for Energy Service and Energy Management System Companies

If energy service companies are to play a major role in reducing energy consumption in the commercial sector, they must expand beyond their present markets and services. Energy services operating in the commercial sector currently consist almost entirely of computer systems programed primarily for large commercial buildings and complexes. For this building type, control systems are often the most appropriate way of controlling energy consumption. Large commercial building owners have the financial resources to purchase the hardware and hire the personnel needed to monitor building energy consumption. However, this is not the case with the vast number of small- and medium-sized commercial buildings, many of which are located in cities. Small buildings owners do not have the capital to invest in equipment and personnel to operate the equipment nor can they assume all the risk should the system fail to achieve specified energy savings. In general, these owners will require more services to meet their needs. To appeal to this market segment, energy service (ES) companies will have to become energy management system (EMS) companies and expand their services to include ongoing management, financing, and savings guarantees.²³ Some companies have organized

around these goals. Scallop Thermal Management Corp., which has offered energy services in Europe for the past 11 years, has already secured contracts for several buildings in New York City and has selected apartment buildings as its primary target. Also, Honeywell is now testing the full energy services concept.²⁴

A major obstacle to the expansion of services is capital. An EMS company will need 10 times more capital in order to move toward the full energy services concept (see table 69 for a comparison of EMS and ES companies' capital needs). Generally, the large corporations in the EMS business are financially sound and can supply the needed capital. However, their financial commitment is determined by the role energy services will play in the corporation's future. [n other words, if energy services figure importantly in the corporation's future, the capital will more than likely be available. For smaller EMS companies, the capital supply requirement will be a much greater problem. Small EMS companies face the same problems as other small businesses—they are not publicly held and debt availability is limited. Often the capital needed for expansion is obtained through the sale of the company. Because of the great market potential for energy services, EMS companies may be able to attract the needed capital. If not, serv-

²⁴ Roger Sant, "Coming Energy Markets," *Harvard Business Review*, May/June, 1980, pp. 20, 24.

Table 69.—Comparison of Capital Needs for EMS and ES Companies

	EMS company	ES company
Type of sales	Direct	Financed
Terms of payment	60 days	5 years
Annual sales	\$10 million	\$10 million
Maximum capital need to finance	\$1.7 million ^a	\$20 million ^b
Terms of payment:		

^a 60 days \times \$10m sales/yr = \$1.7 million

^b 360 days/yr

^c Represents maximum amount financed in the fourth year of sales. In its first year of sales, the company would need \$8 million (\$10 million \times 80 percent); the second year, \$14 million (\$10 million \times 80 percent + 10 \times 60 percent); the third year, \$18 million; and the fourth, \$20 million. This assumes that payments are made evenly over the 5-year term.

SOURCE: U.S. Department of Energy, Office of Conservation Policy and Evaluation, *Energy Management Systems: An Industry Appraisal*, August 1980, pp. 16-18.

²² Mellon Institute, Op. Cit., P. 33.

²³ U.S. Department of Energy, Office of Conservation Policy and Evaluation, *Energy Management Systems: An Industry Appraisal*, August 1980, pp. 16-18.

ices will not expand and market penetration will suffer.²⁵

Energy services companies will probably have a limited impact on the residential sector. Generally, ES companies have limited financial and manpower resources. Consequently, they focus their advertising and marketing on those middle- and upper-income groups that are likely to be able to afford their services and exclude those that cannot. Low-income people, for example, probably cannot afford the cost of an

energy service company audit and will have to rely on utility audit programs.*

Because utilities have access to their customers and can support extensive promotional advertising campaigns, they will probably penetrate the residential audit market faster than ES companies. ES companies will appeal to a smaller audience of paying customers who will expect more specific information and will be more inclined to implement energy savings recommendations.

²⁵U.S. Department of Energy, *Energy Management Systems*, August 1980, pp. 26-27.

*By law, utilities are required to conduct residential audits on request (see ch. 9, Public Sector).

TRADITIONAL LENDERS

As indicated in chapter 4, financing large retrofits and assuming some of the risk have been identified by OTA as critical factors in increasing retrofit, particularly in commercial and multi-family buildings.

Some financial institutions have been leaders in offering help to customers facing rising energy costs. Most of the work in this area has been with homeowners, rather than commercial investors. Savings and loans (S&L), which have historically financed three out of five home loans, have necessarily taken an interest in this issue. Available information suggests that the strong involvement of S&L (and banks) in energy lending reflects the commitment of a leader—just as cities with active energy programs generally reflect a mayor's strong commitment. Richard L. Bryan, president and chairman of the board of Des Moines Savings & Loan, moved his S&L into the energy business in a big way in early 1977. Special loan programs were offered to homeowners, and mortgage customers and others were offered up to \$2,000 at 1 percent below market rates. Appraisers visiting properties for new mortgages started checking energy features (and carrying stepladders to check attic insulation). Each new loan customer was given a calking gun and a tube of calking, and the S&L

opened an energy information center in its Des Moines office.²⁶

According to Bryan, these steps were taken because energy investments in new and existing homes would result in homeowners being better able to maintain their financial security, and because of his strong personal belief in the national importance of using energy more efficiently.

While it is true that the number of home mortgage defaults have risen and that energy costs have also risen dramatically, it is difficult to assign the burden of defaults to energy costs alone. Rising energy costs do affect the disposable income of loan holders, and so lenders financing large numbers of home purchase and improvement loans can clearly justify a concern with energy. On the other hand, the small size of most retrofit loans (for homes) means that the loans are not attractive to a lender, and may be of negative financial value.

There may be methods of subsidizing retrofit financing which offer particular appeal to lenders. Some Federal programs, notably the Solar

²⁶"Energy Conservation: It Pays You: So Says Des Moines Savings & Loan," *Des Moines Magazine*, Dec. 5, 1979.

Energy and Energy Conservation Bank, have been designed to work through existing lenders. The loan subsidy for the borrower may apply against interest or principal. When the subsidy is used to offset interest costs, for example lowering the rate from 18 to 13 percent, the lender receives the difference. Depending on the calculations used in computing the payment, the lender can legitimately profit on the difference in value between a lump sum paid at the beginning of the loan term as a subsidy, and the same amount paid monthly over the full term of the loan by the borrower. Subsidies of this type, which could be offered by States or localities as well as the Federal Government, could increase the interest and participation of lenders,

Nontraditional Financing

Building owners who wish to retrofit large buildings may well be faced with cash flow problems, costly debt financing, and uncertainty about return on investment. To some extent, the ES companies have developed methods to relieve these concerns but still provide mutual gain. While the potential for syndicating equipment ownership has been mentioned in descriptions of some of the ES companies, it is useful to focus directly on these mechanisms, which form the basis for many "deals" that could accelerate retrofit.

It may often be profitable for people other than the owner of the building to finance the entire investment. The arrangement is conceptually the same as the many limited partnerships that now characterize the real estate market in general (see ch. 4), and the current use of these partnerships in multifamily and commercial building properties may make the transition easier. The basic structure of the arrangement is as follows: a number of investors, presumably individuals in the 50-percent tax bracket, decide to pool resources for investment purposes. They provide funds for the purchase of equipment necessary to improve the energy efficiency of a specified building, based on the recommendations of an auditor or engineer. The investors, who have organized as a limited partnership for

the specific purpose of the investment, enter into an agreement with the building owner as to terms of use, payment for the energy used, etc. Terms of payment by the owner are much less significant than the tax advantages of the partnership, except that the agreement may not represent a sale disguised as a lease or service. The partnership profits from the flow-through depreciation of the equipment, from the investment tax credit, and from the energy tax credit if the equipment qualifies. The arrangement will be structured to optimize the return to the investors. The arrangement will normally conclude at a point about 5 years from initiation, when maximum tax advantages have been gained by the investors. Assuming that equipment is reasonably priced and based on actual specifications for the building, this method shows promise of making funds available for many owners lacking in capital and averse to risk.

Details of syndicated investment vary according to each project and the profile of the investors, and details are semi proprietary in nature. The investment breakdown shown in table 70 is based on purchases of equipment for operating business, such as offshore supply and utility boats, river barges, drilling rigs, executive aircraft, and other kinds of equipment. While the total investment pool is larger than would be likely for an investment in buildings, the structure of the package gives an idea of the ways return on investment can be developed through a partnership approach.

A variation on the method, which has been suggested by Ebasco, is the formation of investor pools by tenants for retrofitting their own buildings. This would circumvent the classic lack of incentives facing multifamily structures for saving energy (see ch. 4) by allowing the tenants themselves to gain from installing the equipment, with no loss even if they move. This assumes the tenants have sufficient tax liability to use the tax benefits.

Leasing arrangements serve a similar purpose. Recent changes in the tax law may offer increased opportunities for profitable leasing by widely held corporations, but no estimate of this impact can be made yet.

Table 70.—Sample Calculation of Investment Return From a Limited Partnership to Purchase Offshore Oil-Drilling Equipment

Investment Company X					
4,000 limited partnership interests	\$5,000 per interest			Minimum purchase 2 interests	
Expected returns based on Economic Recovery Tax Act of 1981 for an initial investment of \$10,000					
	Annual investment tax credit	Annual cash flow	Pre-tax loss (gain)	Taxes saved (paid) (500/0 taxpayer)	After tax cumulative benefits
1981	\$ 950	\$ 325	\$ 425	\$ 212	\$ 1,487
1982	700	1,100	1,609	804	4,091
1983		1,200	2,508	1,254	6,545
1984		1,300	1,533	767	8,612
1985		1,400	(1,400)	(700)	9,312
1986		1,500	(1,500)	(750)	10,062
	Pretax cash flow	Taxes	After tax cash flow	After tax cumulative benefits	Compounded after tax return
1987 sale with:					
8% inflation . .	\$15,711	\$7,339	\$8,372	\$18,434	17.8
100/0 inflation. .	18,303	7,876	10,427	20,489	19.8
120/0 inflation. .	21,135	8,463	12,672	22,734	22.1
Assumptions:					
. In addition to the \$8 million in barges already contracted for company X anticipates to purchase several offshore supply vessels and a unit tow, consisting of a tank barge and towboat.					
•Capital gains rate of 20 percent.					
•ITC earned over 5 years instead of 7 years.					
•Depreciation over 5 years using the new formula set forth in the Economic Recovery Tax Act of 1981.					
. Sale at end of sixth year instead of at end of ninth year.					
There can be no assurances that the above expected returns will be realized.					
	Price to public		Selling commission		Proceeds to partnership
Per interest	\$ 5,000				\$ 4,575
Total minimum	\$ 7,500,000		\$ 637,500		\$ 6,862,500
Total maximum	\$20,000,000		\$1,700,000		\$18,300,000

SOURCE Based on a prospectus filed with the Securities and Exchange Commission in the summer of 1981