MEMBERS PRESENT: Chairman Dini
Vice Chairman Schofield
Mr. Craddock
Mr. DuBois
Mr. Jeffrey
Mr. May
Mr. Mello
Mr. Nicholas
Mr. Polish
Mr. Prengaman
Mr. Redelsperger

MEMBERS ABSENT: None

TESTIFIERS: Mr. Jack Warnecke, Supervisor, Carson City
Mr. Robert Sullivan, Carson River Basin, COG
Mr. John Hoole, Planning Director, Carson City
Ms. Barbra Reedy, Nevada Society of Architects
Mr. William Hancock, Public Works Board
Mr. Irv Sandorf, Professional Engineer
Mr. Kelly Jackson, Nevada Department of Energy
Ms. Peggy Twedt, League of Women Voters
Mr. Dan Fitzpatrick, Clark County
Mr. Patrick Pine, Clark County
Mr. James Lien, Las Vegas Metro. Police Dept.
Mr. Joe Midmore, Affiliated Wedding Chapels
Ms. Judi Bailey, Washoe County Clerk
Mr. Ross Culbertson, Nevada Wedding Chapel Assn.
Mr. William Cozart, Nevada Association of Realtors

Chairman Dini called the meeting to order at 8:05 A.M. He stated that the first bill to be discussed will be AB-61 (Amends Planned Unit Development Law).

The first speaker, Jack Warnecke, Chairman of the Carson River Basin Council of Governments. He indicated that the council had reviewed the bill and it was agreed by the representatives of the five counties (Churchill, Lyon, Douglas, Carson City and Storey County) in Western Nevada, that this needed to be changed. We are asking that commercial and industrial plant unit developments be included in the law, as well as residential.

The next speaker was Bob Sullivan, the Executive Director of COG, who stated that we now have industrial/commercial planned unit developments for some counties. Many of our local governments have ordinances that deal with industrial/commercial planned unit developments. What we don't have is the statutory authority to have those ordinances. We requested from the Counsel Bureau a plan to merely marry the industrial/commercial concept into the existing residential language, which I think they did fairly well.

You will see throughout the bill many 'Daykin-isms' that add length to the bill. However, the jist of it is that the term 'residential' has been modified to include residential/industrial/commercial. During the review period, two things were pointed out to me and one was that there was some satisfaction with the existing statute. Secondly, elsewhere in Chapter 278, there is Section 278.325, which speaks to mapping for industrial/commercial development. Throughout our planning statutes, we often have cross-over language that no one knows anything about.

Mr. Dini asked what the significance was of the wording on Line 25 of Page 9 of the bill, which reads: 'The ratio of residential to nonresidential use'.

Mr. John Hoole stated that he did not think he could answer that. Mr. Warnecke referred the committee to the first paragraph on the first page in which the wording is, in part: '...one or more public, quasi-public, commerical or industrial areas, or both, within proportions of nonresidential uses to residential uses specified in the zoning ordinance', and felt that might be what it referred to.

End of testimony on AB-61.

Mr. Dini described AB-48, which requires designs for new public buildings to provide, where feasible, for use of renewable sources of energy. It would require that all future public buildings built by the state or a local entity will have to be designed, as far as practicable, to use renewable energy. This concept, of course, for energy efficient buildings goes back to 1973, 1974 when the energy crises became a fact of life. I realize that there are costs involved in this and a fiscal note to it. In 1977 the Legislature passed SB-301 that directed that all future state buildings had to include total costs. This was defined as initial construction plus operation and maintenance costs for the life of the building. As of July, 1979, there were twelve other states that required that life cycle costs be determined on all state construction. California has a law requiring the use of solar water heating in any state building of 10,000 square feet or more. In other states, by executive action, initiated the use of renewable energy in state buildings. I believe we should hear the bill and if there are deficiencies in it we can point those out. The concept is workable at the local level. We would like to hear from you about it and we will continue to work on an accurate fiscal note for it. He asked if there were any proponents who wished to speak.

Ms. Barbra Reedy's testimony is attached hereto as EXHIBIT A.

Mr. DuBois asked what is involved in the architect's initial design stages. How much work, how much time and money is involved to determine the feasibility of solar.

Ms. Reedy answered that she thought it was approximately 8%, which is a conservative figure, and would vary from project to project.

Mr. Dini asked if Ms. Reedy would describe the passive and active types of solar energy.

Ms. Reedy stated that a passive solar system is a system that does not have any mechanical means of transferring heat. The prime example is an open window where sunlight comes in and heats up the room. An active system has some sort of mechanical device involved with it, whether it is a fan to move air or pumps to move water. Normally, heat is collected in a collector in a medium, such as air, water or oil, masonery. It is then transferred to a storage location like rock beds. Also, hot water being conducted by pipes to heat up rocks and rocks would be the storage then of the heat.

Mr. Bill Hancock indicated that the Public Works Board would have no objection to this bill, with the understanding that it is going to increase initial first costs and initial design costs. Considerable work is being done in passive and active solar systems now. We don't find at the present time that pure active systems for space heating are cost effective. Passive is cost effective, we find; domestic hot water, of course, is cost effective.

Mr. Dini stated that we are going in that direction anyway, aren't we. What experience have you had with the local governments.

Mr. Hancock answered that they see more and more systems coming into the school district building construction program. We do not have a direct handle on local government construction. Our life cycle costing analysis, with the State Department of Energy, can realize an increase of about 3% in the normal design fee of a proposed building. This is a very cost effective expense.

Mr. DuBois asked if it is feasible to go into a retro fitting program that would be cost effective.

Mr. Hancock answered that it is possible and that they have done a considerable amount of retro fitting as a result of energy audits done by the Department of Energy, as far as insulation, building modifications. Again, I would be a little hesitant to say that you can go into a complete active space heating system by retro fitting a building and make it cost effective.

Mr. Sanford testified that although he is a member of the Public Works Board, he was not testifying as a member. He spoke in favor of the bill. He suggested that we must become more specific.

He indicated that the prison at Indian Wells considers using heat pumps as a major source of heating and solar will be supplementary to that. In referring to the Department of Energy report on their experience with solar, many of their solar designs would not pay for themselves within the lifetime of anybody here. They are very expensive. These are actually research projects. In the bill that Mr. Prengaman is going to introduce for me, I propose that the state will try a system of heating in buildings where it is appropriate. We will put in solar as the basic system. We feel that by increasing the architect's fee so that he can spend adequate time to design a solar system, we will get a more complete and economical system. A conventional system will be supplementary to the solar system installed. It is our proposal to eliminate the standby system as it is expensive. I have designed solar systems already that are functioning successfully. There are considerable variations in the solar systems. Barbra Reedy talked about passive and active systems, but there are other systems that passive and active that will use the sun to heat up water and the water is conducted around the building, or goes to a storage tank. There is also a panel that heats up air and you can blow the air around a building. There are all sorts of variations here and I would expect the architects, if they were given an adequate fee would study these with the idea of getting the most economical system.

Mr. DuBois asked if there was quite a variation between solar designs and structures in northern Nevada and southern Nevada.

Mr. Sandorf answered that the economics is in favor of the south because they have a larger percentage of sunshine down there than they do in the north. It is warmer there and you don't need the capacity there that you do in the north. You understand that in every solar system you need storage. I am trying to encourage more study given to the problem of design before you go in an build and spend a lot of money on it. You would need more storage in the north, and, of course, it is expensive, too.

Mr. Craddock indicated he did not understand the added cost breakdown to the architect's fee.

Mr. Sandorf stated that he put that in simply to be an incentive to architects and engineers to put more time on the study, not say it's a weekend design. I agree that it will cost more, but I think that in presenting these to architects we are going to say, specifically, we are going to give you a somewhat bigger fee to make sure that you spend a lot of time on the design and economics of it.

Mr. Jackson indicated that they would like to go on record as supporting this bill. However, the major issue is trying to insure that over a long period of time, we have designed and constructed state buildings that represent the least overall cost to taxpayers. We feel that this bill is a step in that direction, but we would suggest two things we think could be done that would help make that step a little more direct. The first would be to expand this coverage, in terms of the types of systems that are required to be analyzed or considered, from renewable resources to renewable resources and advanced conservation measures and techniques, as well. The way you determine what in fact is the most cost effective is to perform life cycle cost analysis at the time the building is being designed. We have worked with the Public Works Board in this area in the past and provided them with funding to look at the design of a life cycle cost system that could be used. We would certainly encourage that the Legislature affirmatively consider this legislation but we would also encourage that more specificity be put into it so that we in fact get buildings that are not monuments to state government's inefficiency but rather reflect a real concern for effective use of the taxpayer's money.

Mr. Jackson stated that in reply to Mr. DuBois' question about north/south, this is an area that really reflects the need for doing life cycle cost analysis because in the north, although we don't have quite as high a level of solar insulation, I want to add also that it isn't a very great difference, we have electrical rates that are 2½ to 3 times as high as they are in the south. So when you start looking at the life cycle cost, you look at those higher electrical rates, you look at the fact that natural gas is coming into northern Nevada which predominantly comes from Canada at a much higher price than is being paid for natural gas that is coming into the south, you start taking those factors into consideration - solar, geothermal, wind, advanced conservation techniques bear up fairly well, irrespective of where you are in the state.

Mr. Prengaman noted that while in New Mexico and Colorado this past August, everywhere you go you see solar, not just public buildings and schools, but you see condominiums in Colorado with solar, and I am wondering why a state like Nevada, which has so much sun and so much potential, is not doing things like they are doing. Why are we so far behind when it comes to implementing solar?

Mr. Jackson answered that New Mexico has had a very progressive system in terms of state government financing. They have used revenues from their coal mining for the financing of solar use. We are seeing, however, particularly in the last twenty-four months much more interest in terms of home builders' associations and the financial community. Looking back, we probably could have worked more closely with local governmental agencies to get zoning, planning ordinances that put more emphasis and stress on giving preference

in the zoning and planning process to projects and subdivisions that have got better energy efficient design.

Mr. Redelsperger asked if in New Mexico and Colorado they had within the Department of Energy any kind of a fund or grants or low interest loans for these subdivisions to help them with their financing.

Mr. Jackson stated in New Mexico they have had an ongoing program for at least the last three years providing grant money to developers and private individuals. You can put Idaho, Nevada and Utah in a category of states where the legislatures have not been able to identify a source of funding which could be directed to this without adversely affecting someplace else. Some of the big producer states have used their severance and excise taxes on their energy production to do that.

Mr. Mello asked how Nevada rates in the 50 states for efficiency in solar energy.

Mr. Jackson said that southern Nevada is probably third or fourth to Texas, New Mexico and Arizona.

Ms. Peggy Twedt, speaking on behalf of the League of Women Voters, indicated their support of AB-48

Mr. Dan Fitzpatrick spoke in favor of the bill. He had a concern regarding the language in Line 5, the words, "appropriate" and "feasible", which he felt need to be further defined. Also, Line 7 and 8 need to be expanded in terms of solar, geothermal, wind and other renewable sources of energy. Bond issues that include high costs of energy plans need to be explained to the public.

Mr. Jack Warnecke advised the committee that there is a public building in Carson City that is heated by solar energy. That is the Seeliger School. It is third from the bottom in terms of energy costs per square foot. There are two other schools in Carson City that are cheaper to heat and cool than that school. Seeliger School was designed for solar energy and what they save in natural gas costs they spend in electricity with the electric heat pump system that is installed. My point is that there are other ways of doing it. I have attended seminars where federal funding is discussed and one of the things that fascinates me is that people tend to forget the value of federal government money. The state spent about $35,000 on a solar heating system for the Nye Building at UNR, according to one man's report at a seminar I attended. The federal government spent $100,000. In arriving at a cost effective figure, he indicated that the rate of return on investment was about 30%. He was basing it only on the state's cost, forgetting completely the $100,000 the federal government put in. So, when we start talking about cost effectiveness for these things, let's make sure that we include

all costs, not the money that somebody pumped into it as a demonstration project.

Mr. Dini asked regarding the buildings Mr. Warnecke had talked about as being more economical - what is their design?

Mr. Warnecke answered that they are conventional schools with gas heat and fairly heavy insulation. They are older schools, by the way.

Mr. DuBois asked if the insulation is equal to the third school that has solar.

Mr. Warnecke answered that they are a different design. The Seeliger School is a single story school, the others are multiple story schools and multiple story buildings tend to be more energy efficient than single story buildings.

Mr. Dini asked that any information Mr. Warnecke can get to the committee will be appreciated.

This concluded the testimony on AB-48.

The next bill to be discussed was AB-62. (Authorizes county commissioners to fix certain fees).

Mr. Jack Warnecke advised that this is part of the COG package and has been accepted by the Nevada Association of County Commissioners and the Nevada League of Cities as a 'do pass' recommendation. We would like to be able to make it possible for county commissioners to set by ordinance all of the fees that are set in the counties. Some of the fees are now established under state law and it causes quite a bit of confusion within the state. He introduced Bob Sullivan, who continued the testimony.

Mr. Sullivan stated that we had this bill during the last session as ACR-35 and an interim study was requested to look at the fee structures, try to get them identified. What we have before you in this bill is what appears to be a partial compilation of fees. There may be hundreds, as far as I know, of fees not scheduled or incorrect. The bill before you show forty-five sections and speak to only twenty-one chapters of the statutes. We have to present to you a resolution from the Nevada Association of Counties. We would like to establish some mechanism to get into a thorough review of these fees. The County Clerks resolution speaks for a need on their behalf to have uniformity of fees in the state. Resolution is attached hereto as EXHIBIT B.

Mr. Dini stated that this matter was heard about two sessions ago. The objections we had were mostly from the legal profession as regards filing fees in the different counties. You might be able to work it out so that you could have local control over some, but some do not adapt themselves to the different county fees.

Some small county staffs, Mr. Sullivan said, it probably isn't worth collecting the fees because of the expense in running them through receipt journals. The larger counties do have a larger activity and is a source of money.

Mr. Redelsperger stated the the recorder/auditor of Mineral County is concerned about the number of documents mailed in to his office and with seventeen different fee structures, it has created a lot of confusion.

Mr. Dini stated that there are probably some areas that we can work on. However, legal fees we probably couldn't touch.

Mr. Patrick Pine was the next testifier. He believes that there are portions of AB-62 that still have problems. He has heard from sheriffs and constables that they have some problems with each county setting the fees for service or processing of legal papers. He also suggested that the committee discuss the different fees charged by counties for marriage ceremonies.

Mr. Jim Lien also testified that fees should be consistent and uniform throughout the state. We would like to see Line 35, Page 3 and the wording on Page 4 expanded to include .."or in counties with a metropolitan police department by the department". This would then cover all seventeen counties. On Page 18, Section 43, Line 40, could be amended to insert after the word 'sheriff', "or licensing office as prescribed by the Board of County Commissioners". On line 42, you could delete the word 'sheriff' and insert instead, 'appropriate office'. I, too, feel that some categories are missing. Pat mentioned voters lists, we know it in the assessor's areas in 361, there are fees which are not being included, etc. I would think your research division could run a word search and pick up, using 'permit' and 'fees' as perhaps key words and could tell you where all of them are.

Mr. Joe Midmore spoke against the bill, representing about one-third of the wedding chapels in the state. They are concerned about Pages 10-11. He prefaced his remarks by saying that he feels it is an extremely dangerous bill. At a time when the Legislature has been doing its utmost to keep a very close control on the spending of local governments, as well as of our state government, this is an attempt to take a large number of charges that are made to the public for various services and take them totally out of the control of the state and thus put them in the position where they could be moneymaking, and I don't think that most of them

have ever been intended to be moneymaking charges. They are charges that were intended to pay for the services provided. Licenses are not moneymakers. The marriage license fees referred to on Pages 10-11 are paid 95% by tourists. It is a large part of the tourist industry. The marriage industry spends part of its money in motels, casinos, shops, restaurants, places of entertainment - it is a large part of the tourist industry. It would create havoc if you have different charges in every county in the state. It would be well for you to leave alone Sections 24, 25 and 26 and the repeal of 122.181 in Section 45 and keep them under state regulation. These services were not meant to be revenue producers.

Judy Bailey, Washoe County Clerk stated that she also felt that it would be a dangerous thing to have each county set the marriage fees. It also should be clarified whether the state or the county will set the fee for certifying.

Mr. Ross Culberson spoke on behalf of the other two-thirds of the wedding industry in the state. I agree with that portion of Mr. Midmore's testimony that dealt with the wedding industry.

Mr. William Cozart stated that his group is concerned with Page 12 in the section regarding NRS 278, which is the subdivision section of our law. We feel that these could possibly be revenue producing sources if the lid or the cap is taken off. With the loss of revenue in other areas, this is a prime area for county governments or local entities to perhaps gain some additional revenue at the expense of the customer. This could also be used to inhibit growth and development in communities by fees that were somewhat high or exorbitant, which in turn would prevent developers and builders from building in the area. We suggest that you leave the law as it is in that section. If any modification is necessary, that the fee structure is not covering the cost at the present time, we would certainly support looking at that and raising the cap to sufficiently cover the cost.

This concluded the testimony on AB-62.

Mr. Dini asked if the committee was ready to consider AB-61. Mr. Jeffrey moved to DO PASS. Mr. Schofield seconded. Motion carried.

Mr. Dini stated that we now have a broad area to work with for AB-48. He asked Mr. Prengaman about his bill and how it fits in.

Mr. Prengaman stated that it provides and speaks to backup systems and giving an advantage in the bidding process to those who come in with a solar design. If you wish it as an amendment to your bill, that would be fine.

Mr. Dini indicated he was thinking about appointing a subcommittee to tie both together and include the testimony received today. Conceptually, we are on the right ground. With the committee's approval, I will appoint Mr. Prengaman and Mr. DuBois to pursue AB-48 based on the testimony received today.

Mr. Dini stated that AB-62, at best, needs a lot of work. I would like to take a look at it and with the permission of the committee, go back to research, ask Clark County to give us the data they have, and study it. I will take it upon myself to go down to Research and dig into this. As the bill is now, it can't fly. If you take out everything that everybody wants to take out, we won't have a bill.

Mr. Nicholas stated that he had received a communication from the Commissioner of Veterans Affairs regarding AB-36 in which they stipulate "we have reached the conclusion that no part of AB-36 is necessary or needed. We recommend that this complete bill be deleted in its entirety, and is attached as EXHIBIT C.

Mr. Dini said that part of the bill is from the legislative auditor, right?

Mr. Nicholas stated that the same conclusion was reached by Mr. Crossley and Mr. Wood.

Mr. Schofield moved that we indefinitely postpone AB-36. It was seconded by Mr. Nicholas. Motion carried.

Mr. Dini requested that the record show that the auditor and the veterans affairs commissioner both wanted the bill killed.

Meeting was adjourned at 10:20 A.M.

Respectfully submitted,

Lucille Hill

Lucille Hill, Assembly Attache

ASSEMBLY GOVERNMENT AFFAIRS COMMITTEE

GUEST LIST

Date February 10, 1981

PLEASE PRINT YOUR NAME	PLEASE PRINT REPRESENTING:		I WISH TO SPEAK FOR	AGAINST	BILL NO.
Bob Sullivan	Consolidated Electric Co-op	✓	—		AB 61, 62
Patrick Pine	Clark County		— w/ amendments		AB 62
~~Barbara Leedy~~	~~Nevada Assn of Assy~~ +		X		~~AB 48~~
W E Hancock	Public Works Board +		+		AB 48
Peggy Twedt	League of Women Voters +		X		AB 48
Irv Jesse Sandorf	Prof. Eng. +				
Russ Culbertson	NE Wedding Chapels				AB 62
Bill Cozart	Realtors				
Sharon Clary	Realtors				
Judi Bailey	Washoe County Clerk			✓	AB 62
Joe Midmore	Affil. Wedding Chapels +			✓	AB 62
Kelly Judson					
Jim Linn					
~~Patrick Page~~					

1977

Exhibit A

2/10/81 Testimony presented by Barbra Reedy for Nevada Society of Architects to Assembly Committee on Government Affairs

Nationally and within Nevada, architects are ~~one~~ concerned with energy conservation. Last year the American Institute of Architects budgeted $6000. for its energy programs. This year that budget is a quarter of a million dollars with the goal of educating 25% of its member during 1981 in the latest building energy conservation techniques

Eight years ago, the AIA began to explore the relationships between energy and the built environment and to determine how the design professions can contribute to solving the nation's energy problem. Studies conducted in 1972-73 indicated that energy consumption of buildings could be ~~reduced~~ reasonably reduced 60% by new construction and 30% by retrofitting existing structures. By the end of 1974, further studies reinforced these estimates that these percentages appear very conserva

Two reports were prepared by the AIA. The first "Energy and the Built Environment: A Gap in Current Strategies" indicated that roughly 23% of the nation's fuel consumption is attributable to space heating, water heating and air conditioning of residential and commercial facilities and that ~~the~~ a notable reduction in national fuel consumption would be realized if buildings were made to conserve energy. This report concluded that 12.5 million barrels of petroleum per day could be saved if a high-priority national program emphasizing energy efficient buildings were adopted. This is about as much energy produced by the production capacity of any one of the prime energy systems: domestic oil, nuclear energy, domestic and imported natural gas or coal. A later report, "National Energy Efficient Buildings by 19~~Wood~~ examines capital ~~vehicle~~ investments, and states:

- Present policies will not realize these potentials. The basic reason that opportunity

may be lost is not a lack of technological capacities but rather the existence of conceptual and institutional rigidities"

The design services of life cycle cost analyses and exhuberant investigation of alternative energy utilization, ~~have to be~~ have not been considered ~~to be~~ as part of normal design services. Pragmatically this situation has not provided ~~a~~ incentives to Nevada designers to acquire the tools and techniques necessary to perform these tasks — much less a competitive atmosphere in which such tools and techniques would become increasingly competitive. It must be understood that provision for use of alternative energy sources requires more time and hence more compensation.

~~Second, we question what is meant by the words, "appropriate"~~

Second, we question what is meant by the words "appropriate" (line 5) and "feasible" (line 6). Who defines these words when it comes down to fulfilling the conditions of a public works contract? Establishment of two goals, one which defines target fuel savings, say fifty or sixty per cent in new construction, a relatively conservative figure when studies now indicate 80% savings is possible with increase in construction costs from 10-20%. The second goal which would limit the word "feasible" would be to establish a reasonable pay-back period for invested capital. Fifteen years, for example is again a conservative estimate when retrofit analyses are ~~not~~ now showing pay back periods of less than five years.

The last question we have is

Would the Nevada Public Works Board be charged with the enforcement of this act, and would that Board be able to prepare itself to evaluate designs according to previously-mentioned or similar goals and criteria.

End

FROM NEVADA SOCIETY OF ARCHITECTS
137 VASSAR ST
RENO, NV 89502

ENERGY AND THE BUILT ENVIRONMENT: A GAP IN CURRENT STRATEGIES THE AMERICAN INSTITUTE OF ARCHITECTS

FOREWORD

Earlier this year I asked Leo A. Daly, FAIA, chairman of the Institute's Task Force on Energy Conservation, to report to me on his personal findings and observations regarding this critically important subject. I did so because I felt that, while the task force was pursuing its work, members of the AIA—indeed members of all the design professions—needed to be better informed about the nature and dimensions of the energy crisis and the role they might play in its solution.

I am delighted that I made the request, because Daly's report is, I believe, an important and far-reaching document. It shows, quite convincingly in my opinion, how sustained efforts to achieve energy efficiency in the built environment can make a significant contribution toward solving our nation's energy crisis, and it proposes specific programs for bringing these efforts about.

Daly has done his homework well. His report is the result of intensive research and study carried out by himself, by a research consultant whom he commissioned, and by associates in his firm, with backup and support provided by members of the AIA staff. The report is being distributed to all AIA members for their review and discussion. It will also be made available to other members of the design professions, to legislators and other government officials, and to private citizens concerned with this issue.

Daly's report, which represents his own viewpoints, deserves to be read, studied, and discussed. I recommend it not only to members of the AIA, but also to all those whose actions and decisions affect the way we use energy.

Archibald C. Rogers, FAIA
President, The American Institute of Architects

INTRODUCTION

In the fall of 1972 Max O. Urbahn, FAIA, who was then president of the American Institute of Architects, asked me to chair a task force to explore ways in which the design professions could contribute to the solution of the energy problem and to develop appropriate methods to involve the AIA membership in this endeavor. Members of the task force are George T. Heery, Frithjof M. Lunde, Richard G. Stein, FAIA, and Herbert H. Swinburne, FAIA.

The Task Force on Energy Conservation has made an important contribution to the Institute's work in the area of energy. I would like to stress, however, that the present report reflects my own observations on the energy question.

In preparing this report I have been concerned not only with the question of energy conservation in the built environment, but with the entire energy problem. While the presentation is personal, its observations summarize extensive work, including an independently commissioned preliminary strategic policy evaluation of the national energy problem, the present strategies for solving the problem, and the opportunity offered by a national program for energy conservation in the built environment.

This experience has given me a deep appreciation for the depth and complexity of the energy problem and for the great opportunity the design professions have to make a significant contribution toward its solution. The degree of the potential contribution of our members is substantially greater than I had originally supposed, but then so is the severity of the problem itself. The magnitude of the energy problem is such that it is not realistic to suppose that it can be adequately encapsulated in a form as concise as this summary. However, I will endeavor to reduce the most critical issues to brief, understandable terms.

These are the basic conclusions I have reached:

1. The energy problem is a long-term problem whose resolution is possible—but only through sustained, multifaceted approaches.

2. Every individual in the building design and planning professions will be profoundly affected by the solution of the energy problem over the next several decades. If these individuals are to provide their most worthwhile services to their clients and communities, they will need a comprehensive perspective on dimensions of the problem and their role in its solution.

3. The building design and planning professions are important links in the nation's solution to the energy problem in both the short and long term.

4. Public and private policymakers need to understand the potential offered by the building design professions because it is they who ultimately will determine whether architects, engineers, and planners are allowed to make their maximum contributions.

5. The general public also needs to be informed about the important place of buildings and land use in long range solutions, because ultimately the approaches adopted will be based more on political than technical decisions.

6. Present energy policies, with their emphasis on increased supply, seriously underplay the important role of conservation in general and of conservation in the built environment in particular. This imbalance results in forfeiting major opportunities for better investment of the nation's energy resources.

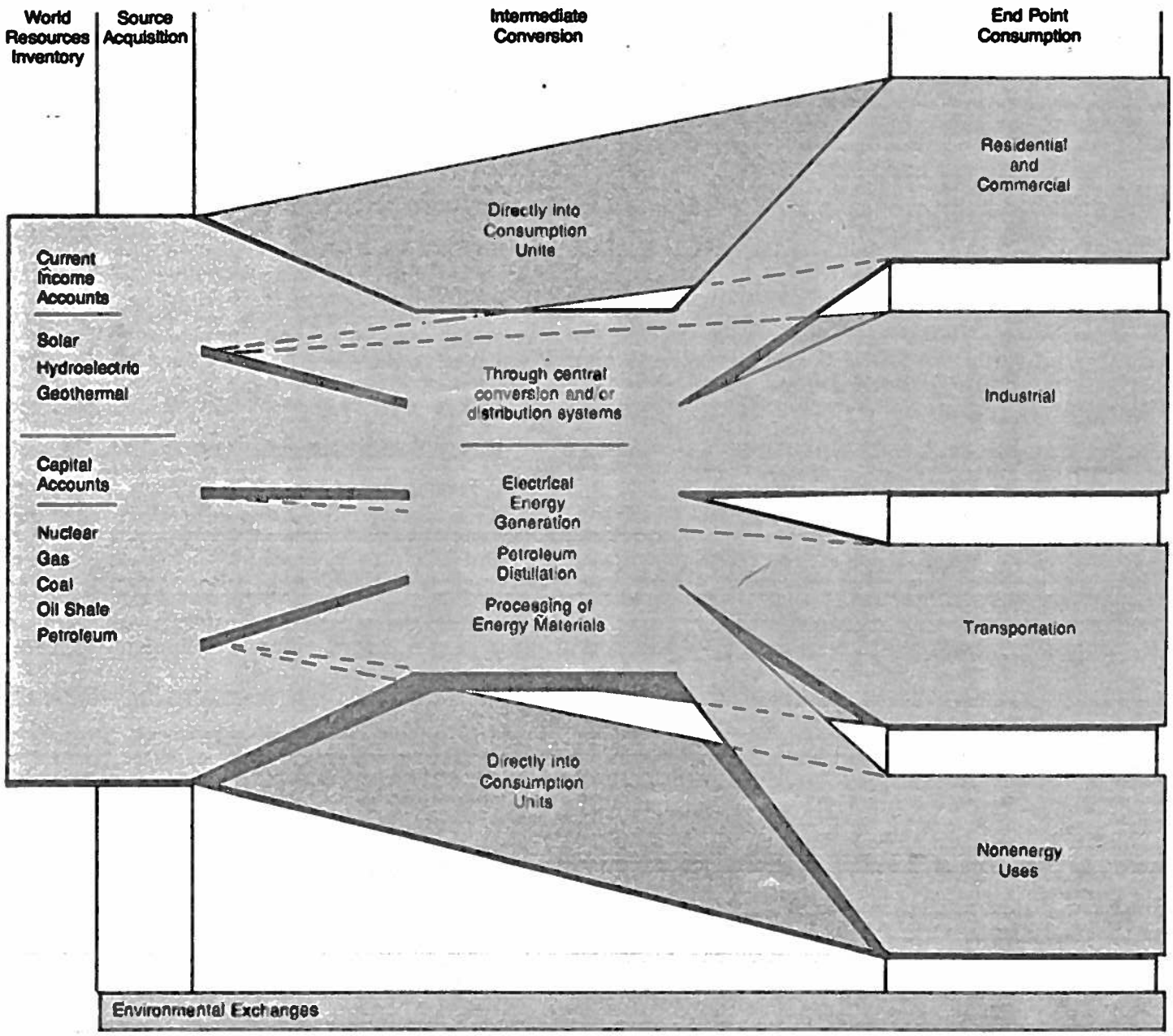
7. Energy conservation in buildings has such potential magnitude and near-term developmental possibilities that it warrants an immediate high-priority national program. The potential compares favorably, in terms of equivalent energy availability, with the potentials of the domestic petroleum industry, the nuclear power industry, the natural gas industry, and the coal industry as those supply systems are projected to exist in 1990.

8. Because the energy problem is now so visible, the rush to remedial action increases the risk of wasted and counter-productive efforts. We must learn a great deal more than we know now before we can confidently inject rigid energy standards into building design codes or other forms of legislation.

9. The American Institute of Architects should immediately take the initiative to form a private-sector forum and the coordinating mechanism to provide the needed leadership in developing strategies for energy conservation.

These conclusions summarize the results of a comprehensive

Figure 1. The Basic Energy System



analysis of the energy problem as it relates to the built environment. The presentation of this analysis is organized under the following headings:

A. A Conceptual Framework for Evaluating Energy Policy
B. A Quantitative Perspective: Energy Supply/Demand Patterns
C. A Note About Strategic Evaluation
D. A Deeper Look at Present Policies and Priorities
E. An Alternative Strategy: The Compelling Case for Energy Conservation in Buildings
F. Toward a Strategy for Energy Conservation in Buildings
G. An Action Plan

A. A CONCEPTUAL FRAMEWORK FOR EVALUATING ENERGY POLICY

The way one conceives of a problem determines the framework within which its solution is formulated. If the energy problem is viewed as only a temporary interruption in supply, then the building design professions might lend their expertise and counsel to a series of conservation efforts, such as turning down thermostats, adding insulation, and installing storm windows. On the other hand, if the problem is seen not simply as a question of temporary supply shortfalls, but as a more fundamental change caused by our moving from an era of abundant, cheap energy into an era of scarce, expensive energy, then the building design professions must consider sweeping changes in their attitudes about how building systems interface with energy supply and consumption. Current information indicates an era of energy scarcity.

DEFINING THE ENERGY SYSTEM: Man intervenes in nature to acquire energy that will fulfill his needs and desires. River flows are captured to produce electricity which in turn can provide heat or cooling. But the same heat or cooling is more likely produced from burning coal, petroleum, or natural gas. This suggests that the energy systems created by man are of two types: (1) those that reorganize natural forces in a manner that gives energy as a by-product; and (2) those that represent a permanent conversion of energy stored by nature in one form into a consumption unit which represents not a by-product of natural forces but a permanent exchange of a nonrenewable natural resource.

These two types of humanly developed energy systems might be called (1) man-organized energy systems and (2) man-made energy systems. A key distinction between these two is that the first draws upon renewable resources while the second draws upon nonrenewable resources. We might think of the former sources as nature's current income accounts and the latter as nature's capital accounts.

Until the middle of the 19th century, man-organized systems dominated human existence. Animal power and the diversion of natural processes were the principal sources of energy to do man's work. With the advent of the steam engine, electricity, and the industrial revolution, mechanical energy generated from fossil fuels caused more intensive energy conversion.

Energy consumed from both of these systems is regarded as a consumption good—meaning that the more of it that is consumed the better. Yet, we can clearly see that in the case of man-made energy, the energy is a consumption of capital. In most economic evaluations, capital is regarded as something to be conserved. But thus far we have not evolved economic incentives to recognize this feature as it relates to goods (including energy) that represent permanent conversions of nonrenewable resources: nature's capital. This difference in accounting concepts makes a profound difference in the economics of energy systems and particularly in the economic incentives of conservation versus consumption.

Within the past 100 years man's energy systems have shifted from those dominated by nature's current income accounts (man-organized energy) to systems dominated by nature's capital accounts (man-made energy).

The contemporary energy problem is contained in these m organized and man-made systems. This calls for a closer look at how these systems are organized. There are five basic subsystems involved:

A. **The World Inventory of Energy** (stored in capital accounts and flowing in current income accounts).

B. **Energy Source Acquisition Systems** (mining, oil wells, dams).

C. **Intermediate Conversion and Distribution Systems** (electrical generating plants, oil refineries, pipelines, electrical transmission lines).

D. **End-Point Consumption Systems** (heating and cooling buildings, driving industrial machinery, running engines).

E. **Environmental Exchange Systems** (residual effects of obtaining, processing, and using energy).

From this perspective, we can define the energy problem as some combination of:

—Acquiring sources for the adequate supply of energy raw materials.

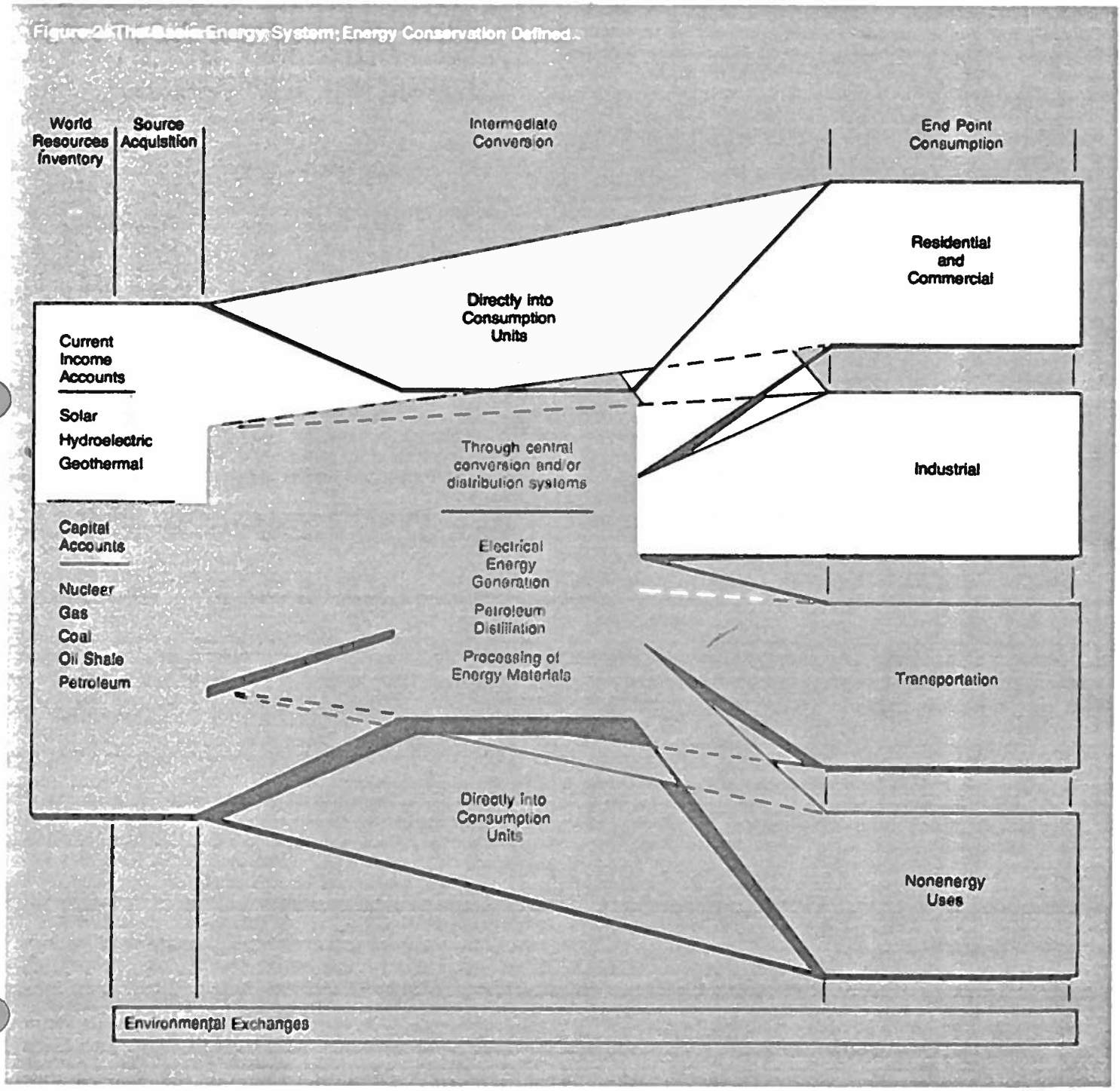
—Determining what demands are to be fulfilled, at what price, and in what manner.

—Linking these supply and demand relationships technologically through some form of "optimal efficiency" in terms of need or demand, cost, and resource management.

—Maintaining acceptable environmental exchanges balanced in terms of the consumption of finite natural resources, the restoration of natural balances upset by man's intervention (such as strip mining), and the way in which residuals or pollutants are dealt with.

The present "energy industries" generally assumed to comprise the energy system are concentrated in the processes of source acquisition, conversion, and distribution—almost exclusively f nature's capital accounts. The problem of balanced energy s tegies and policies is compounded by institutionalization along the lines of the raw materials utilized, i.e., petroleum, coal, natural gas, and nuclear power. These concepts are illustrated in Figure 1.

Figure 2: The Basic Energy System; Energy Conservation Defined.



Policy formulations, whether originated in government or industry, now evolve around economic principles in which the incentives ultimately encourage more, rather than less, consumption. This helps explain why an effective and well-financed national strategy emphasizing energy conservation is not now a long-term objective. An understanding of this subtle but important reality is essential to understanding the economic and political dimensions of policies that would seek to shift the focus from "more consumption is good" to "less consumption is good".

DEFINING ENERGY CONSERVATION IN BUILDINGS: The preceding concepts suggest the following definition of energy conservation in buildings: The reduction of energy demand through the elimination of waste and the substitution, to the degree feasible, of on-site generation and regeneration capacity within an independent decentralized acquisition and conversion system that draws on nature's current income.

More specifically, energy conservation in buildings includes:

—The reduction of energy consumption in buildings by changing behavior: lowering thermostats in winter and raising them in summer, reducing levels of lighting, and a variety of other rationing efforts. Short-term success in behavior changes of this type may be quite high, as has been the case with gasoline and electricity during the current crisis. However, experience has shown that the long-term success in effecting such behavioral change is generally low. It is, therefore, not a reliable nor even desirable strategy, but should be reserved for the short-term crisis in which hardships are more readily accepted if there is relief in sight.

—The reduction of energy consumption in buildings through increasing the efficiency of the buildings as an energy-saving mechanism. Through appropriate design, construction, and management, buildings can be made to consume substantially less energy without any basic impact on their users.

—Reduction of the demand upon energy raw materials from nature's capital accounts through substitution of nature's current income sources captured through on-site acquisition and conversion systems. This conceptualization of the diversified, decentralized energy conversion system is important. If one considers changing the concept from large, centralized acquisition, conversion, and delivery systems (which is the current structure) to a decentralized, smaller-scaled, site-oriented system, insofar as that can go toward fulfilling energy demands, then current technologies offering substantial conservation opportunities are already available. In fact, these technologies are at a more advanced state of proved feasibility than many of the more elaborate large-scale technological alternatives that are receiving more priority and most of the funding. These observations and their implications will be discussed in more detail later.

Figure 2 shows how this definition of energy conservation in buildings fits into the conceptual model of the energy system shown in Figure 1.

These opportunities for conservation programs that reduce traditional demand requirements for energy to operate buildings have not been considered in the projections on which present policies are based.

B. A QUANTITATIVE PERSPECTIVE: ENERGY SUPPLY/ DEMAND PATTERNS

Figure 3[1] shows the basic energy supply/demand patterns within the United States during the past 120 years. It also shows what the future demands will be if past trends are continued. The large boost in energy demands that began in the 1940s was a takeoff point. Between 1946 and 1965 the average annual growth rate in consumption was 3.1 percent, resulting in a doubling time of 23 years. But between 1965 and 1970 the annual growth rate averaged 5 percent, which implies a doubling of the 1965 consumption in only 14 years. Electricity, a system that now loses about two-thirds of its energy input as waste, is the most rapidly growing source of energy delivered to the consumption units. The annual growth rate in electrical consumption averaged 7.6 percent from 1940 to 1970 — an average doubling time of only [illegible] years.[2]

U.S. energy consumption between 1950 and 1970, broken down according to sources of energy raw materials, shows the degree to which man-made energy dominates the present system (see Figure 4).[3]

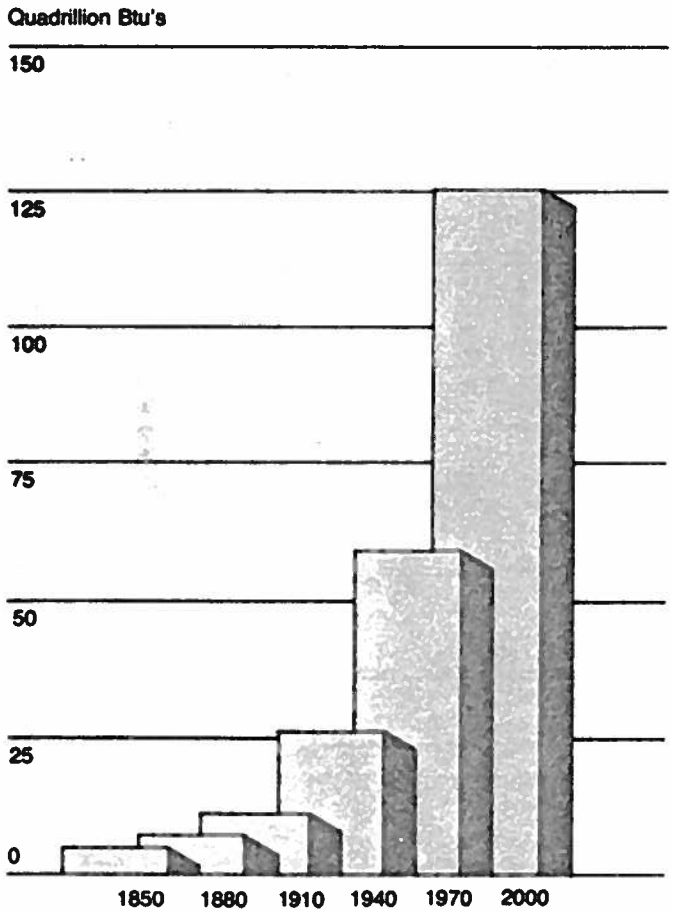
But the key to understanding the energy problem rests not so much in the picture of the past as in what the future patterns are likely to be. A 1972 Congressional analysis[4] lists 35 energy-demand studies made by a variety of government and private organizations between 1960 and 1971. All of these forecasts were inaccurate if put into a context of 10 to 20 years. For example, Figure 5 shows the rate at which the various forecasts for total energy consumption in 1980 have fluctuated just since 1960. Considering that in many of the energy supply systems the lead time for building capacity is seven to 10 years, one can readily grasp the lack of strategic reliability exhibited by policies formulated in 1962 based on the then current projection to 1980. The error most common to these forecasts is their consistently low estimates of usage.

It was after 1968 that these studies began to express serious concern about the capacity to fulfill the expected energy demands, and no serious attention was paid to developing coordinated and balanced national energy policies until the current crisis hit.

In policy formulation, including the present policies, the demand curves are generally considered sacred requirements. Thus, policy concerns are overwhelmingly biased toward how to generate increased supplies of energy. These attitudes allow to go unanswered questions about what energy demands should be considered legitimate requirements.

A serious question arises, for example, about the wisdom of withdrawing billions of units of nonrenewable resources to supply buildings with 30 percent to 50 percent more energy than they need just to accommodate the level of inefficiency generated by present building practices. It is one thing to

Figure 3: Total U.S. Energy Consumption



condone such practices if tnere is no choice; it is quite another matter if there is a choice. This difficult question may have to be faced in the future, and present policies will be found lacking. In that climate, the search for conservation measures may be expected to increase. Because conservation systems, like supply systems, require long lead times for development, there should be a sense of urgency in getting started now.

This sense of urgency with respect to the conservation of energy comes into sharper focus when one considers that the "normal" demand growth may have to be depressed simply because there will be no way to meet it. This question of supply shortfalls is slowly penetrating, and there are indications that efforts toward energy conservation will receive more favorable audience.

Figure 4: U.S. Energy Consumption, 1950-1970

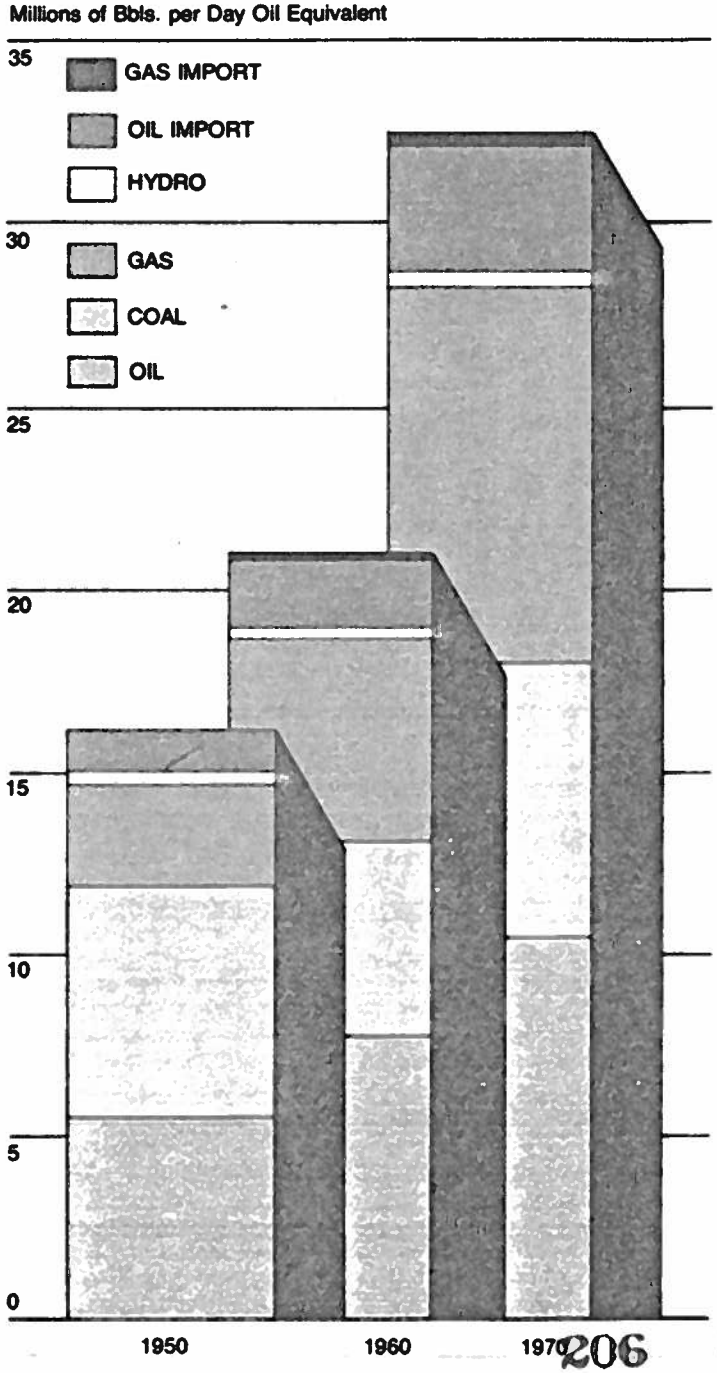


Figure 5: Forecasts of Total Energy Consumption for the Year 1980

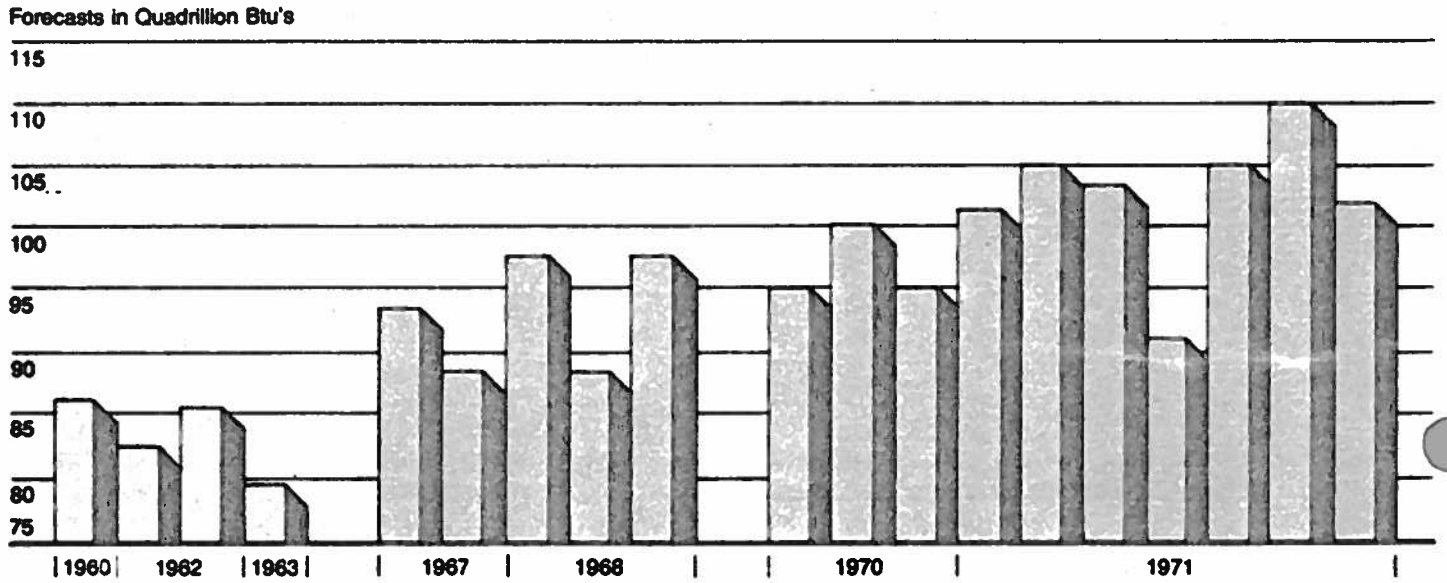


Figure 7: The Supply/Demand Picture—1950

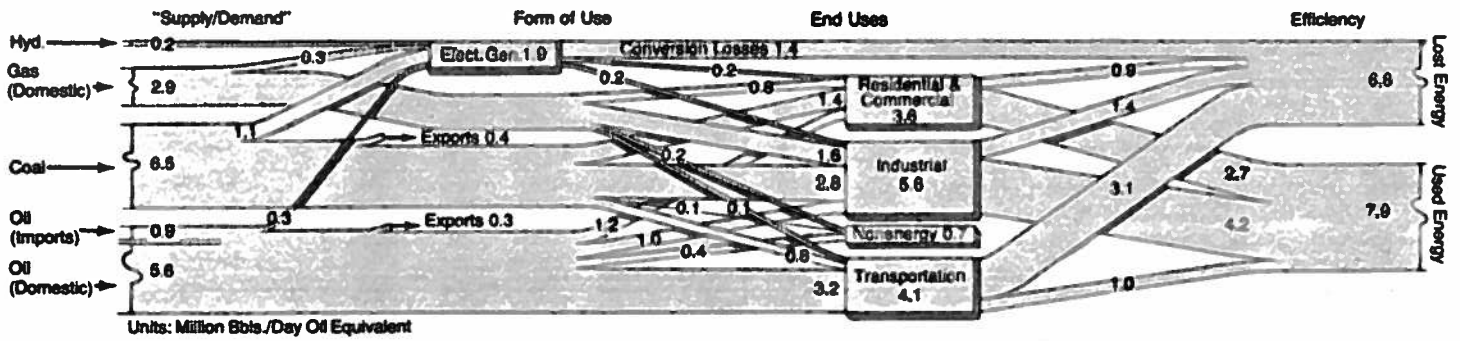
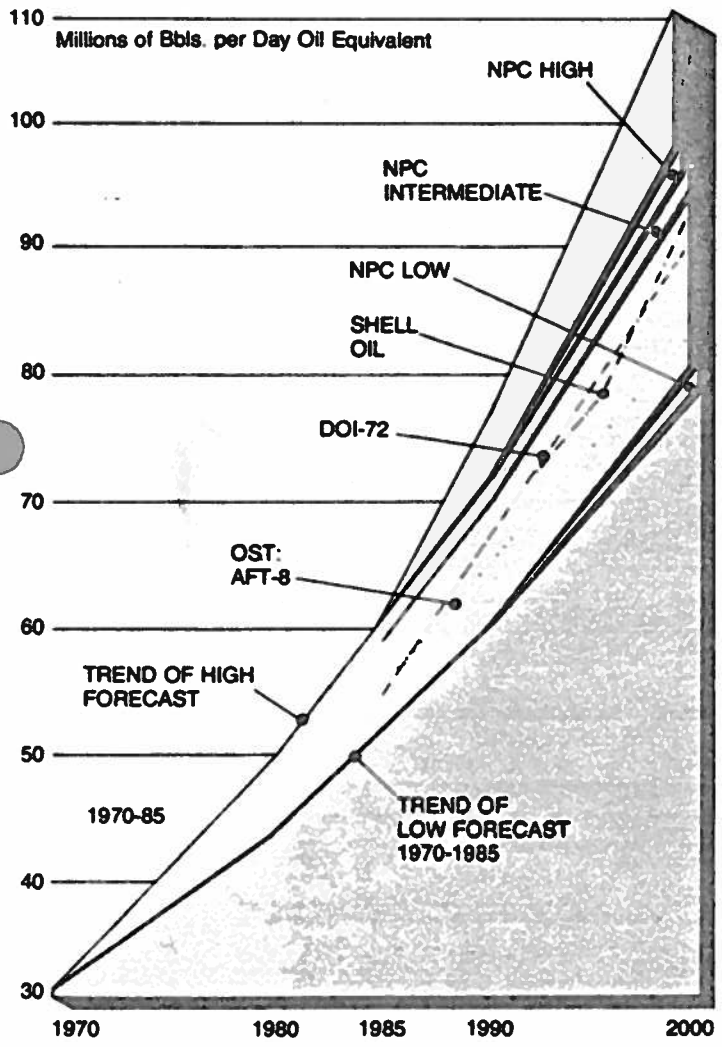


Figure 6: Forecast of Energy Demand to 2000



NPC: National Petroleum Council. *Report on United States Energy Outlook.* (1972) "High," High Forecast; "Intermediate," Intermediate Forecast; "Low," Low Forecast.

DOI-72: Department of the Interior. *United States Energy Through the Year 2000.* (1972)

OST:AET-8 Office of Science and Technology. Document AET-8

Shell Oil: Shell Oil Company. *The National Energy Outlook* (March 1973)

Trend of High Forecast 1970-85: Projection of energy usage if present energy usage growth rate were decreased by 1/10% every decade.

Trend of Low Forecast 1970-85: Projection of energy usage if present energy usage growth rate were decreased by 4/10% every decade.

The Joint Atomic Energy Committee of Congress recently evaluated the probable capabilities of the nation to increase its supply of energy from both current and prospective technologies. The committee used forecasts below the extrapolations from recent growth rates (see Figure 6).[5] Assuming the successful installation of the Alaska pipeline, nuclear energy, shale conversion, and the other remedies being discussed currently, it was estimated that even the low forecast would be accommodated in 1990 only by a heavy reliance on imports. These calculations were converted to a common denominator of millions of barrels of petroleum per day equivalents, with the relationships between sources, conversion systems, and consumption.

Figures 7, 8 and 9[6] show the results of these calculations for 1950, 1970, and 1990. All of the charts are plotted on the same vertical scale. Note that if the extrapolation of current growth in demand were reduced by about 30 percent (as shown by the difference between the high and low forecasts on Figure 6), a substantial supply gap would remain to be filled, in these projections, by imports.

Thus, a strategy to conserve energy is not in competition with the present energy industries nor with present efforts to increase the supply capacity of these industries. Rather, it is a complementary, commonsense effort that offers substantial promise for helping to meet anticipated demand requirements, and for minimizing the economic and social costs of any crises resulting from unexpected supply problems.

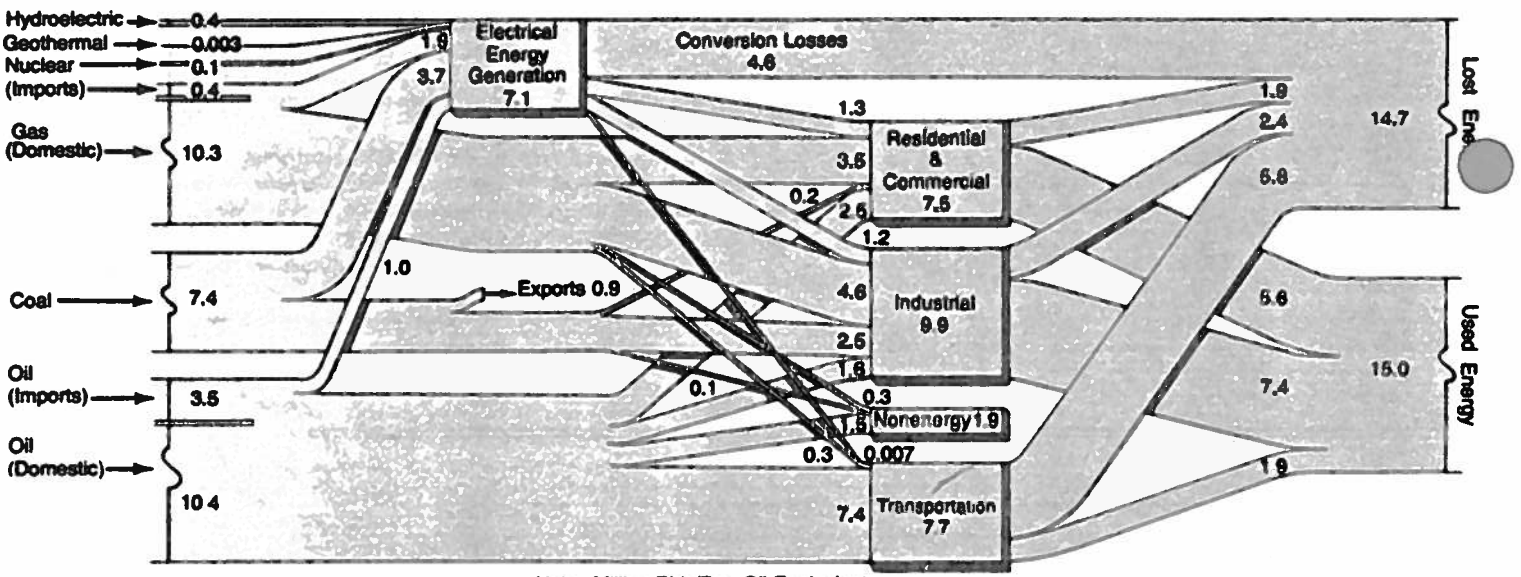
C. A NOTE ABOUT STRATEGIC EVALUATION

Far too often, in trying to resolve problems not nearly as complex as the energy problem, the nation has pumped billions of dollars into priority efforts that were later found to have been ill-advised. I have been impressed with the difference in perspective one gets with respect to what should be done immediately if he steps back and looks at present policies and alternatives as if they were longer-term strategies.

This means that we first assume that present policies will prevail for the next two or three decades. A principal advantage of this mode of thought is that it permits us to examine carefully whether or not the path we are following will lead where we wish to go. In short, will we regret what we are doing now when we look back on it 10 or 20 years from now? I should emphasize that the purpose of such long-range considerations is solely to improve the quality of choices we make about what is to be done now.

The strategic perspective also helps us to see opportunities for immediate steps that otherwise would be overlooked because they appear so small in contrast to the dominant activities of the present. It now appears that energy conservation in buildings falls into this category. Its potential within the next three to five years, when evaluated against the magnitude of the current energy

Figure 8: The Supply/Demand Picture—1970



Units: Million Bbls/Day Oil Equivalent

problem and when cast beside the enormous quantities of energy needed, looks too small to warrant a major thrust. But, if this perspective is extended 10 or 20 years, we see that in terms of needed supplies, energy conservation in buildings offers opportunities on a scale that, if present estimates prove reliable, few reasonable men would reject.

Strategic thinking permits us to capture the principles of compound interest that apply to policy strategy just as they apply to savings and investment. For example, a change of only 6 percent a year will result in the 100 percent transition of a system within just 12 years if this change is pursued as a sustained and coherent strategy. But if the changes are a series of shorter-term jerks associated with reactive, crisis-oriented policymaking, we not only lose the value of the compound interest, but also often much of the original principal.

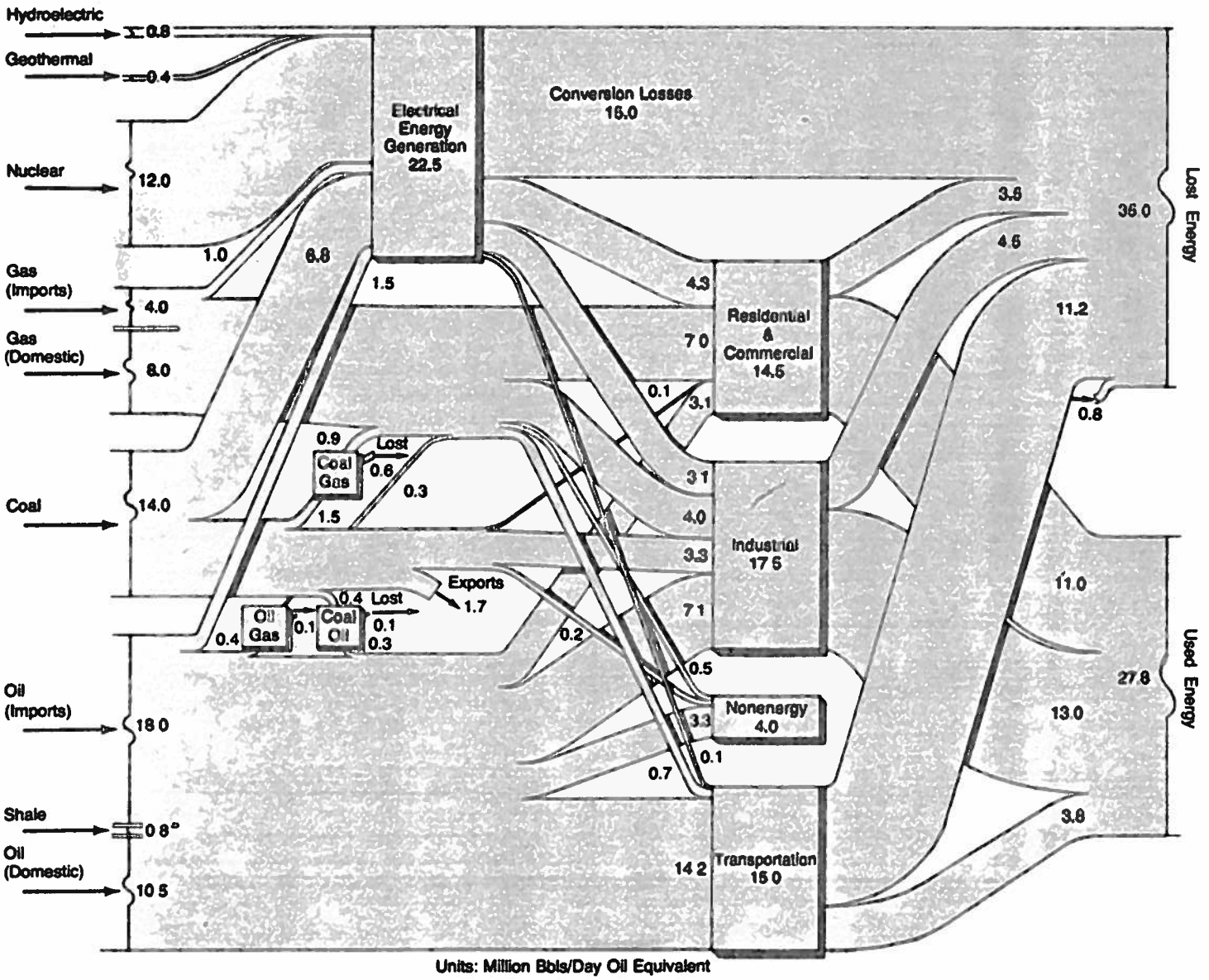
Finally, the strategic perspective allows us more time to adjust policies that, though they have been adequate for years, will become less adequate or desirable in the future.

We can say that the most desirable national energy strategy would point us in the following basic directions:

—From reliance on man-made energy systems toward reliance on man-organized energy systems; i.e., from energy converted from nature's capital accounts toward energy diverted from nature's current income accounts.

—From inefficient energy systems that waste energy in either conversion or consumption processes toward more efficient systems.

Figure 9: The Supply/Demand Picture—1990



—From activities that generate environmental pollution toward ecologically closed systems that minimize the undesirable environmental impacts.

—From increasing reliance on centralized generation and distribution systems, with the problems of vulnerability and conversion losses they entail, toward decentralized, site-oriented energy systems flexible enough to utilize a variety of alternative energy sources.

—From the potential risks associated with nuclear power (however acceptable they may be represented to be) toward less risky means of acquiring energy.

I could develop a longer list, but these principles suffice to provide a framework for an evaluatory statement about present policies and the desirability of a strategy emphasizing energy conservation in the built environment.

D. A DEEPER LOOK AT PRESENT POLICIES AND PRIORITIES

A good idea of current energy strategies is obtained from examining the priorities given to the research and development expenditures considered necessary to solve the energy problem within the next several decades.

In Figure 10[7] I have recast the President's recently announced five-year energy program into the conceptual model of the energy system shown in Figures 1 and 2. This shows the overwhelming priority being given to extending existing man-made supply systems that consume nonrenewable resources (operate from nature's capital accounts).

Just 6.5 percent of the proposed five-year program is allocated to end-point consumption, and the majority of this sum involves increasing the efficiency and flexibility of the transportation sector. Only $200 million of the monies in this five-year program of nearly $11 billion is allocated to research and development on energy conservation in buildings. **This budget overlooks major opportunities in conservation that offer more certain returns and higher cost benefits than many of the other investments.** These opportunities will be discussed in more detail.

Present policies contain only modest provisions for exploring opportunities that could help to move us in the strategic directions desired. The dominant priority continues to carry us down the path we trod to arrive at our present predicament. This increases the chance that 20 years hence we will regret that a more balanced strategy and set of priorities were not started today.

E. AN ALTERNATIVE STRATEGY: THE COMPELLING CASE FOR ENERGY CONSERVATION IN BUILDINGS

To relate the total energy consumed just in building-related operations, we must combine the residential and commercial sectors as shown in Figures 7, 8, and 9 with the portion of the industrial sector that involves building operation.

Data compiled by the Stanford Research Institute provide a basis for this combination.[8] Figure 11 shows estimates of the ratios of energy consumption expressed in trillions of Btu's for 1968. Buildings account for 33.6 percent of the total.

Assuming that these relationships remain essentially stable, the application of these same ratios to the estimates in Figures 8 and 9 gives us an approximation of the millions of barrels of oil per day equivalent consumed in building operations in 1970 and projected for 1990.

The potential savings in energy conservation in buildings are still somewhat ambiguous, with estimates ranging from 25 to 50 percent in older buildings and between 50 and 80 percent in new construction.[9] The higher figures incorporate on-site energy generation from nature's current income accounts, usually solar. I should emphasize that these conservation opportunities are available within existing technology and knowledge. The only stumbling blocks to their implementation are either economic, political, or attitudinal.

In the interest of being conservative, I have taken 30 percent and 60 percent as the average potential energy savings in old and new buildings.

Applying these percentages to the estimated consumption in 1970 and 1990, I derive an estimated potential savings of 4.1 million barrels per day of petroleum equivalents in 1970 and 12.5 million barrels per day of petroleum equivalents in 1990. Applying a dollar value of $6 per barrel in 1973 and a very modest $12 per barrel in 1990, these calculations result in an estimated economic value of saved energy of $9 billion and $54.8 billion for each of the two years (see Figure 12).

These gross savings result from not consuming energy that would otherwise have been wasted; the amortization of additional building costs required to obtain these savings is not included. Estimates of these costs range up to 33 percent.[10] This would have increased the cost of new construction in 1971 by $36 billion, or about four times the potential annual savings in 1970. Of course in more refined estimates this $36 billion would be offset against the reductions in capital required to produce the energy to be wasted. Also, the capital and operating costs required to control or remedy the pollution that waste would entail would be added to the savings.

Fig. 10: Energy Research Budget Trends

(Millions of dollars)

	FY 1973	%	FY 1974	%	FY 1975	%	FY 75-79	%
Supply	$647.8	89	$834.1	88	$1,332.1	77.5	$ 8,315.0	75.9
Conversion and distribution	15.2	2	32.8	3	163.3	9.5	1,185.0	10.8
END-POINT CONSUMPTION	64.4	9	82.1	9	105.7	6.1	705.0	6.5
Overall system and environmental interface	1.6	0	1.7	0	119.9	6.9	745.9	6.8
Total	$729.0	100%	$950.7	100%	$1,721.0	100%	$10,950.9	100%

Figure 11: Ratios of Energy Consumption

	Consumption (trillions of Btu's) 1960	1968	Rate of growth (percent per year)	Percent of national total 1960	1968
Residential					
Space heating	4,848	6,675	4.1%	11.3%	11.0%
Water heating	1,159	1,736	5.2	2.7	2.9
Cooking	556	637	1.7	1.3	1.1
Clothes drying	93	208	10.6	0.2	0.3
Refrigeration	369	692	8.2	0.9	1.1
Air conditioning	134	427	15.6	0.3	0.7
Other	809	1,241	5.5	1.9	2.1
Total	7,968	11,616	4.8	18.6	19.2
Commercial					
Space heating	3,111	4,182	3.8	7.2	6.9
Water heating	544	653	2.3	1.3	1.1
Cooking	98	139	4.5	0.2	0.2
Refrigeration	534	670	2.9	1.2	1.1
Air conditioning	576	1,113	8.6	1.3	1.8
Feedstock	734	984	3.7	1.7	1.6
Other	145	1,025	28.0	0.3	1.7
Total	5,742	8,766	5.4	13.2	14.4
Industrial					
Process steam	7,646	10,132	3.6	17.8	16.7
Electric drive	3,170	4,794	5.3	7.4	7.9
Electrolytic processes	486	705	4.8	1.1	1.2
Direct heat	5,550	6,929	2.8	12.9	11.5
Feedstock	1,370	2,202	6.1	3.2	3.6
Other	118	198	6.7	0.3	0.3
Total	18,340	24,960	3.9	42.7	41.2
Transportation					
Fuel	10,873	15,038	4.1	25.2	24.9
Raw materials	141	146	0.4	0.3	0.3
Total	11,014	15,184	4.1	25.5	25.2
National total:	43,064	60,526	4.3	100.0	100.0

Figure 12: The Potential Offered by Energy Conservation in Buildings
(expressed in millions of barrels of oil equivalent)

		1970		1990
Total consumption		29.7		57.5
Amount consumed in operation of buildings (33.6)*		10.0		19.3
Add: The amount of energy lost in intermediate conversion processes using centralized large-scale electrical generation in which the loss is approximately 66%				
Electrical demand consumed in buildings	1.3		4.3	
Total requirement electrical generation	3.8	3.8	12.6	12.6
Total energy consumption in operation of buildings including generation of electricity at centralized facility		13.8		31.9
Potential savings with a high-priority conservation program:				
Estimated potential for present building stock	30 percent	4.1	6.7	
Estimated potential for new building stock (assuming about 30% of building stock in 1990 will be built after 1973)	60 percent		5.8	12.5
Dollar value of potential savings per day @ $6 per barrel in 1973 and $12 barrel in 1990 (1973 dollars)		$24.6 million		$150 million
Annual dollar value of potential savings		$ 9.0 billion		$54.8 billion

* This underestimates the 1990 projection because the proportionate share of energy used in buildings has grown more rapidly than the total energy demand. However, this is ignored in the calculations in the interest of conservatism.

There will be those who correctly point out that the present data base for these estimates has gaps and is questionable. However, the combination of

—no assumed advances in technology;
—taking savings estimates at the lower end of the present range;
—using a conservative estimate for price increases;
—ignoring the savings in capital costs associated with having to generate the energy in the first place, which may essentially neutralize the additional building costs;
—excluding estimates for cleaning up or controlling pollution generated by the wasted energy; and
—ignoring the trends that show that the proportion of the total energy going into buildings is increasing,

leads me to believe that the estimated savings can be regarded as reasonable. These could be annual savings which recur year after year.

Since policy formulation is so heavily oriented toward supplying energy, and since the realization of these savings is equivalent to an increase in that supply, it can be clearly seen that energy conservation in buildings deserves as significant a place among energy supply alternatives as do the domestic petroleum industry, the natural gas industry, the nuclear power industry, and the coal industry (see Figure 13).

The conservation potential of buildings is nearly equal to the forecasted shortfall in supply, or about two-thirds of the imports projected. Thus, whether considered as a trade-off in competition with other investment opportunities or as a complementary opportunity to reduce the projected shortfalls, the statistics clearly indicate a compelling opportunity which warrants a high-priority national program. More confidence can be assigned to this position when we recognize that the same conclusion would emerge even if the actual savings were to be substantially less than these estimates.

F. TOWARD A STRATEGY FOR ENERGY CONSERVATION IN BUILDINGS

An initial and understandable reaction to the question of what to do is to advocate the development of a set of procedures — a field manual — which can become the text that specifies what the building engineer or designer should do.

The fact that many of these energy-conserving procedures are commonsensical has led some to believe that it would be relatively easy to produce a set of prescriptive standards. This seductive idea of simple, straightforward, no-nonsense action may lead to a variety of actions that will later prove to be counterproductive or at least not the best choice. The risk of these nonproductive outcomes is significantly higher when collateral drives begin for incorporation of these procedures into energy standards for local building codes and other legislative instruments.

The basic points are:

1. Within the present state of knowledge we do not know exactly how, and under what conditions, certain actions might be effective.
2. Even if we did know these details, the variations of building situations would tend to make a "standards approach" ineffective.
3. We lack adequate knowledge of the psychological and physiological relationships of some energy-conserving tactics.
4. We can specify many things that might conserve energy, but at increased costs of operation.

There is a need for and value in lists as idea-joggers, but the greater need is for individualized professional evaluation of each potential conservation measure as it relates to the highly variable and often difficult-to-measure factors unique to a particular building and site.

INITIAL CRITERIA FOR A CONSERVATION STRATEGY: First, there needs to be an extension of the principle of self-sufficiency. The President has proclaimed a national objective of self-sufficiency, meaning that the United States should become capable of supplying itself with all of the energy it needs by 1980. The previous discussion on the supply-demand projections shows how difficult it would be to reach that goal. Present policies will have to be substantially modified to make it possible. One such modification is the extension of the concept of self-sufficiency first to conservation in buildings and then to the remainder of the built environment.

The building unit should be as "self-sufficient" as possible. It should import the minimum amount of energy required to fill its energy gap after it has utilized as much as it can of the energy available on site. It should emit the minimum amount of waste into external systems.

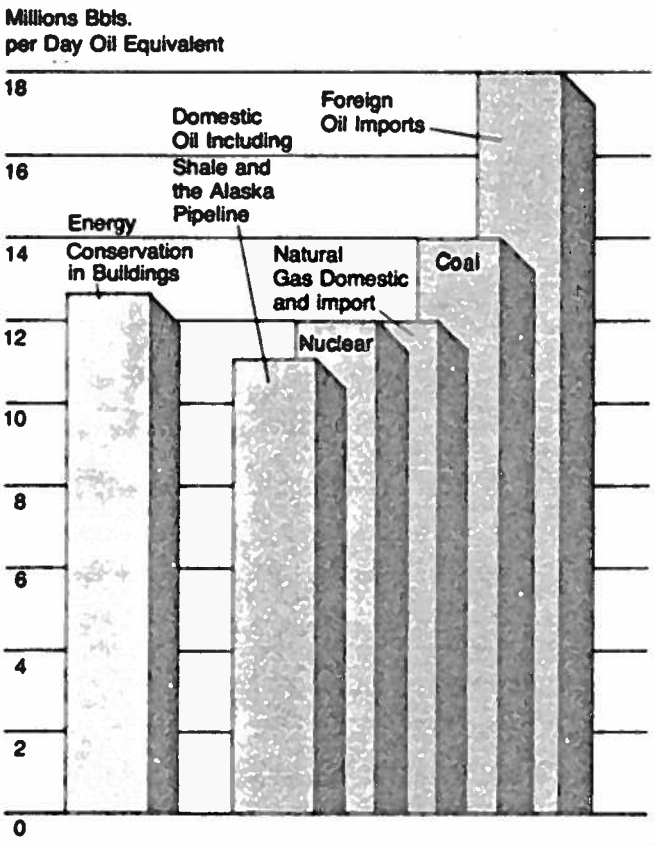
Figure 14 illustrates a comparison between the present and the proposed concepts. Present concepts:

—Generally treat the building system or site development as a somewhat independent entity which levies a demand upon a series of external and independent energy supply systems.
—Do not evaluate how the building unit relates to overall energy demand systems.
—Generally disregard the effects of discharges into either the natural environment (thermal pollution) or other independent external processing systems (sewage).

Each of these various systems consists of a variety of subsystems which are generally specialized in both concept and operation. Under this concept, any recycling or ecologically closed system entails such emerging trends as using solid waste for fuel within a central energy-generating plant.

Proposed concepts illustrated on the bottom half of Figure 14 show how this would change under a principle of maximum self-sufficiency beginning at the level of the building. The building considered as an entity that will, to the degree possible, use man-organized systems of energy acquisition, employing as much as possible of the natural energy in which the building exists.

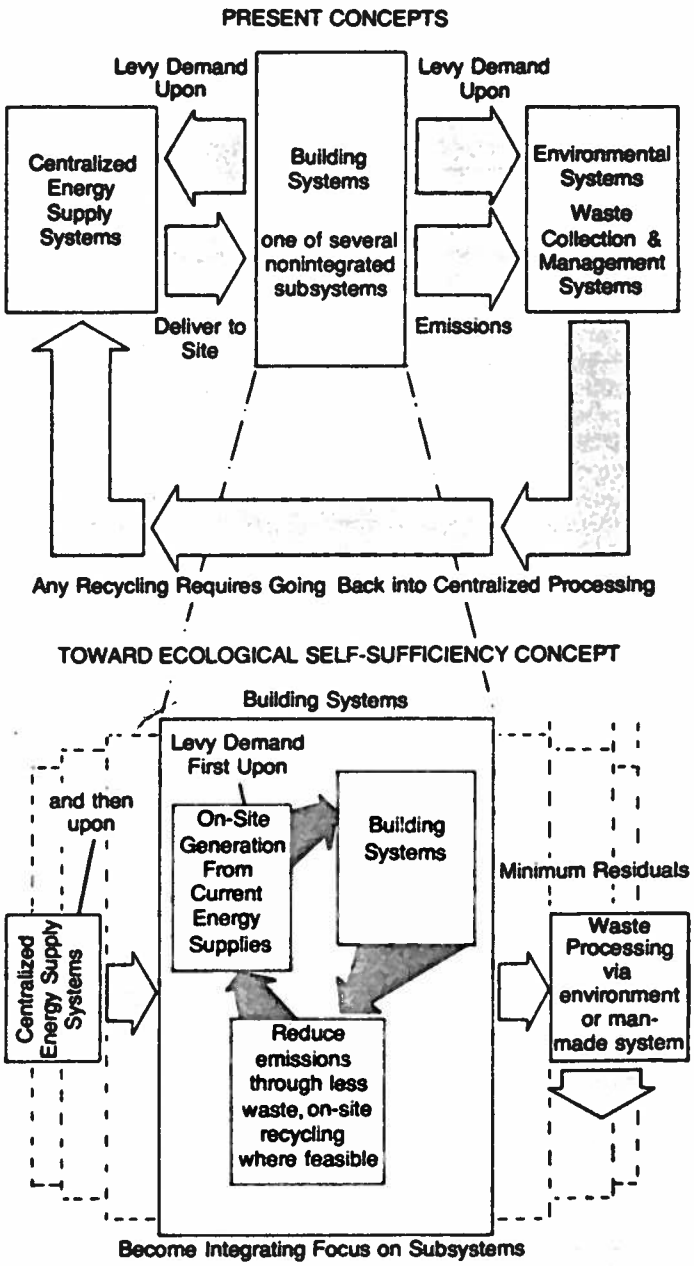
Figure 13: Energy Conservation in Buildings as a Substitute for Supply—1990



Waste and pollution would be regarded first as something to be recycled internally, emitting only that which is not digestible internally or which, by virtue of its characteristics, can be recycled more efficiently or more desirably by going into a centralized processing facility. Thus the building design principle would be one in which a minimum import and minimum export of net energy demands and net operating residuals becomes a basic objective.

What is entailed is a reverse hierarchy in which one starts with the concept of self-sufficiency at the smallest unit — the building — and then progressively applies the principle outward to the site plan, to adjacent site plans, to districts, to regions, to entire towns or cities, and then ultimately to national systems.

Figure 14: Moving Toward Concepts of Self-Sufficiency in the Built Environment



Second is the recognition that only energy from nature's current income accounts (man-organized energy systems) is legitimately considered a consumption good, and only then to the degree that it does not increase environmental pollution loads.

Third is the consideration of diversified, low-intensity, decentralized energy conservation and generation systems as the first line of energy acquisition — particularly since the energy required for building operation is generally of much lower intensity than that required for manufacturing processes. It should be emphasized that this is a complementary and not a competitive concept. The centralized system would still be needed as a reserve capacity for buildings and would serve as the prime supplier for high-intensity energy needs, such as industrial processing requirements. These demands would employ the capacity of the existing centralized systems even if they were substantially expanded.

Fourth is the need to extend our thinking to incorporate the built environment as a part of the energy supply industry. It captures and generates energy as well as consuming it; thus, the present market/producer dichotomy needs modification.

COULD SUCH A PHILOSOPHY BE MADE TO WORK? The principal constraints to this philosophy are conceptual, attitudinal, institutional, and political. They are neither technical nor economic — if the economics are optimized in a total system context. For example, we are readily and even frantically investing increasing amounts to accelerate the development of atomic and nuclear power, while ignoring the site-generating, low-intensity, decentralized capabilities of small solar collectors in buildings. **If we change our manner of conceptualizing the proper "energy system," then we have a proven technology, in a more advanced state than nuclear technology, which would, if properly pursued, give as much equivalent energy as nuclear technology is expected to provide within the next 20 or 30 years — and it could start now.**

G. AN ACTION PLAN

There are a number of actions that should be launched without further delay:

1. The new AIA Energy Steering Committee should take the initiative to become a focal point for coordinative leadership in developing and monitoring a national strategy for energy conservation in the built environment. It should be supported by an adequate capability for strategic policy research and assistance. It should not engage in operational research (see Figure 15).

2. The committee should establish an Advisory Council on Research in Energy Conservation to provide annual evaluations of needed research.

3. The following special programs should be developed under the auspices of the Steering Committee until they are sufficiently defined to permit a clear decision as to the appropriate institutional setting for continuing operation:

a. The development of a National Program for Energy Conservation in Buildings.

b. A program for legislative evaluation and assistance.

c. A program for the development of an "Energy Opportunities Notebook."

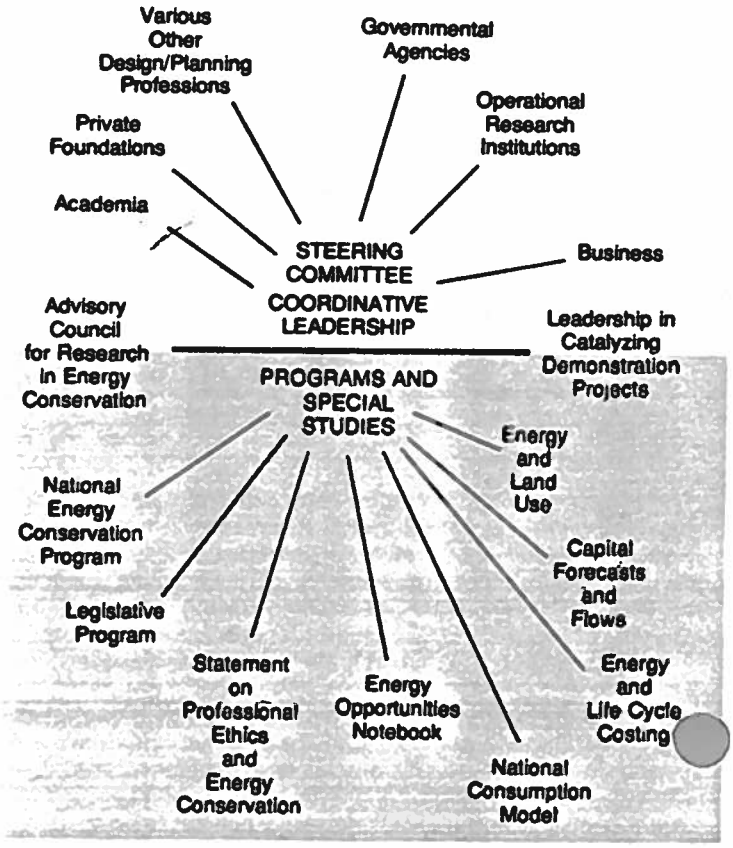
d. A program for a National Model of Energy Consumption in Buildings.

e. A program for leadership to catalyze innovative demonstration projects.

f. A program for evaluating relationships between energy and land-use patterns.

4. The following special studies should also be undertaken:

Figure 15: Action Plan for the AIA Energy Steering Committee



a. A statement on professional ethics and energy conservation.

b. A statement to the profession on special capital-flow forecasts and analyses.

c. A statement to the profession on special analyses of energy conservation alternatives and life-cycle costing.

Now, let's define each of these actions.

THE STEERING COMMITTEE: The new AIA Energy Steering Committee should be organized to provide unusual flexibility at least for the next year or so, until more definitive institutional procedures can be developed. Consideration should be given to having the committee include individuals from other disciplines within the community of professionals concerned with creating the built environment. In addition to the normal support provided by the AIA staff, the committee should have adequate policy-research capability to support its activities.

Present and proposed policies need to be evaluated constantly in the changing dynamics of the strategic context—but they seldom are. Initial activities of such an effort would extend the work begun here and transform it into material usable at the policy-evaluation level. An annual report on national energy strategies—rhetorical, operational, and feasible alternatives—would be a useful and constructive document for policymakers working in the public and private sectors. Such a report can be compared to the present reports on the federal budget issued by the Brookings Institution.

AN ADVISORY COUNCIL ON RESEARCH IN ENERGY CONSERVATION: Conservation programs will need an informal advocacy and advisory group if they are to become politically successful in winning some degree of budgetary priority. Funding agencies and legislative officials need a resource offering integrated, coherent advice so that federal efforts in this field can achieve their maximum yield for the monies expended.

The council could be assigned the task of preparing an annual report on energy conservation research and making recommendations for a research agenda as the vehicle for publicizing the AIA's concern with this field. Liaison with other professional societies and organizations could complement the advisory role of the committee and greatly increase its utility as an adviser to the federal structure. This council could go far in providing the nation with an effective, dynamic, and better coordinated research effort and thus encourage the strategy of energy conservation in the built environment.

A NATIONAL PROGRAM OF ENERGY CONSERVATION IN BUILDINGS: This report has presented a variety of arguments for immediate, vigorous efforts to formulate an operational strategy for energy conservation. These efforts can be pursued on three fronts.

1. The AIA could resolve at its next convention that such a strategy should be pursued, and offer to provide guidance to the strategy by providing an umbrella for an alliance of building-related professions interested in energy conservation.

2. The AIA could develop a joint statement with several other professional associations.

3. The AIA could formulate a general resolution calling on Congress, the executive branch, state and local officials, various professional organizations, and other interested parties to join in the formulation and promotion of a strategy of energy conservation. A simultaneous effort would be made to encourage the general public to support energy conservation in a political sense as well as in its private decision-making.

If discussions were undertaken immediately, at least a general resolution could be offered at the next AIA convention. Actions of this type will be necessary if the energy conservation strategy is to receive the political and budgetary attention enjoyed by the petroleum, gas, coal, or nuclear energy industries. Of course these resolutions would require sustained staff work to develop the detailed initiatives.

LEGISLATIVE EVALUATION AND ASSISTANCE: The groundswell of local and state legislation that appears to be underway should be guided to a positive role. A priority effort should be launched to develop a framework within which legislative proposals could be evaluated. In addition, consideration should be given to the feasibility of a "Model Packet" for "Legislation for Energy Conservation in Buildings" appropriate for passage at local and state levels—and perhaps at the national level. This initial effort should be followed by a sustained "legislative clearing house" which would monitor the various activities around the nation and update the recommended packets. Only by such positive leadership is it likely that the building professions can lead rather than react. Only through such leadership is it likely that we will minimize the number of mistakes that we institutionalize.

AN ENERGY OPPORTUNITIES NOTEBOOK: There is need for a procedure to collect and evaluate all of the "energy savers" that have been and will be suggested. Reported data should include a brief but complete technical description of what was done, adequate detail as to the critical variables concerned, data as to the probable cost with comparisons of alternative systems, including the nonenergy saver systems, and estimated data on the expected operating cost differential for each of the alternatives.

An information exchange center would receive these reports and constantly seek a complete inventory of energy conservation practices. Simple reporting forms should be designed and various incentives could be developed to encourage practitioners to report their ideas. The reporting could be simplified by having a toll-free telephone number where the information could be taken informally; the processing and evaluation could then take place. Credit should always be given to the reporting individual. Those ideas regarded as appropriate for inclusion could be written up and inserted into notebooks. The notebooks could be distributed through a subscription service with a charge to help defray the costs of the clearinghouse operation. However, stable funding should be assured through some form of subsidy for several years.

The looseleaf "Opportunities Notebook" should be regarded as just that. **Efforts to convert these ideas and opportunities to building codes or other forms of legislation, or any forms of rigid institutionalization, would be premature and should be discouraged.**

DEVELOPMENT OF A NATIONAL MODEL OF ENERGY CON-

SUMPTION IN BUILDINGS: The current data base used for national policy decisions has some serious shortcomings. There is a need for more precise modeling capabilities with respect to particular energy-related actions. For example, solar alternatives may yield the highest returns in some sections of the country or in some types of buildings while other processes may serve better elsewhere. A basic policy evaluation model of energy consumption patterns and opportunities should be constructed. The model could be developed by the modified sampling type of approach used extensively in other areas of policy evaluation.

The first step is to derive a scientific sample of a manageable set of representative buildings strategically located throughout the nation. This would give a legitimate profile from which to make national estimates. Conceivably, a definitive number of building types can be determined which will account for a substantial percentage (say 85 percent) of the buildings within the United States. An energy monitoring instrumentation system, appropriate to yield the energy flow data needed, would be designed. These instruments would be installed in a set of buildings fitting the representative national profile, properly taking note of functional, regional, and other variations. The system would be put into operation for a sufficient period to establish the necessary base-line data. Then various interventions would be tested in the form of energy conservation techniques retrofitted to existing buildings.

Controlled experimentation would then be possible, achieving comparative analyses of the respective advantages and full consequences of various combinations of energy-conserving processes and devices retrofitted to varying conditions.

This national energy monitoring system would provide more precise information on which to construct policy initiatives, various incentives, and a system of tailored priorities to optimize the energy saving strategy in retrofitting existing building inventory.

The data would also be useful in design alternatives for future buildings. Should this system be developed, it would become a prime source of the material to be put into the "Energy Conservation Opportunities Notebook" discussed previously.

LEADERSHIP IN CATALYZING INNOVATIVE DEMONSTRATION PROJECTS: The most powerful persuader in our economic and political system is to do something that works. A variety of combinations might be tried. Natural gas and electric companies could be asked to join hardware suppliers, developers, and building designers in a consortium to develop and install energy conservation packages including solar and other forms of on-site generation. Reserve capacity of the regular energy system would provide a fallback for these systems. Perhaps the energy-generating equipment on site could be owned by the utility, which would then sell the energy through meters at a preferential rate. This organization of service could retain an integrated maintenance and management responsibility and provide the utilities with a new energy-generating and conversion strategy. This strategy would also allow a ready means for the utility to optimize its capital investments consistent with an optimum national energy strategy. Meanwhile, the utility rate structure could be used as the means to raise the necessary capital. Such a system would avoid the difficulties posed by the concern for initial construction costs. Thus, the marketing problem of capital-intensive on-site energy conservation packages could be shifted from a market that resists it (owners) to a market that seeks it (utilities), making our present systems of economic and technical incentives work for, rather than against, the energy conservation strategy.

Such a series of experimental demonstrations is more than an illustration of hardware capability. Rather, it is a demonstration that institutional rigidities and the other nontechnological barriers to the strategy can be overcome. Such projects should be set forth as business opportunities, not government subsidy programs. The design and management costs might well be partially underwritten from current research authorizations. Special subsidies of the pilot projects may be in order also, but the ultimate objective should be absorption as a normal, economically advantageous business opportunity.

THE RELATIONSHIPS OF ENERGY AND LAND-USE PATTERNS: The planning/design professions have impacts on energy use or conservation that stretch far beyond buildings themselves. The spatial layout of the national land-use patterns, and of local land-use patterns, are prime determinants of energy demands such as transportation. At the other end of the spectrum, it is generally conceded that townhouses clustered together use less energy than the same amount of living space built on detached single-residence lots.

A commonsense viewpoint might be that the more dense the development, the more energy efficient it would be. But there are a variety of other dimensions to the question. If we were successful in developing the "self-sufficiency" concepts to include recycling or ecologically closed systems insofar as possible, then the benefits of centralization might be offset, and a richer array of qualitative options retained.

Investments in land with high development potential may be threatened because, as interest rates rise and development timetables extend, substantial losses can occur due to the increased holding costs and the extended time the holding costs will have to be borne. In some instances, the intended developmental patterns are not likely to be realized.

There is a cluster of essential research projects that should be formulated in order to build the necessary information for choosing more reasonable strategic locational choices.

A STATEMENT ON PROFESSIONAL ETHICS AND ENERGY CONSERVATION: Architects, like others in the building design professions, do not have complete autonomy in what they decide. Builders, lenders, public officials, and ultimate users all have a profound impact upon what can be done. However, a statement of energy ethics could be developed and adopted as a principle to be employed by practitioners to the degree possible. For example, it could become routine procedure to provide a client builder with a complete evaluation of the economic and other factors associated with the various energy conservation measures that he should employ. The principles of life-cycle costing should be brought to bear, in order to show the economic payout

THE AMERICAN
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of various increased capital costs. In addition, the probability of the continued availability of the various fuels might be included, although this information would require a rather extensive and constant research effort. The means of carrying out the ethical charge would essentially be provided through the "Opportunities Notebook." As a minimum, the professional architect should be expected to advise his client on the possibilities considered appropriate from the list of opportunities appearing in the notebook. He could, of course, amplify that list based on his own knowledge and judgment.

A STATEMENT TO THE PROFESSION ON CAPITAL-FLOW FORECASTS AND ANALYSES: A variety of studies and estimates suggests that we are entering a period in which there will be increasing competition for scarce capital. Thus it cannot be safely assumed that the energy-generating demands can be met, because they may encounter a capital shortage that cannot necessarily be overcome by increasing the interest rates. The problem goes beyond national boundaries. Capital currently returns interest rates of 14 percent or more in some countries. The rapidly growing international capital market, supplemented by the emerging network of multinational corporations, makes possible an economic decision-making structure unlike those which have traditionally prevailed.

The inflationary price implications of scarce critical materials are already evident even in the present stage of the energy problem. Groups not directly involved could conduct analyses of the economic implications of the energy situation. Among the main interests to the building design professional would be the implication for building costs and indeed for building projects themselves if capital is either short or more expensive. This capital limitation could become most critical for the architectural profession.

A STATEMENT TO THE PROFESSION ON SPECIAL ANALYSES OF ENERGY CONSERVATION ALTERNATIVES AND LIFE-CYCLE COSTING: The implications of life-cycle costing are well known. Indications are that energy conservation in building is an economically viable alternative, and will become increasingly so as energy costs rise. In terms of an energy economy, it has been estimated, for example, that every Btu required in the construction of a building is matched by another Btu during each year of its life. Thus, in terms of energy conservation, front-end investments get returns of 30, 40, 50, or even 100 to 1. Of course this analysis does not necessarily translate into similar economic payoffs. It does, however, suggest the possibilities that could be tapped if the economic consideration of alternative building construction included energy conservation versus nonenergy conservation techniques.

The methodology for such studies in the energy area is still quite crude, but well worth immediate exploration. □

IN CONCLUSION:

I recognize that these actions are broad, challenging, and difficult to attain. But the energy problem, like the environmental problem, refuses to comply with our human and institutional desires to divide things into narrowly defined and easily managed pieces.

Leadership aimed at resolving the energy problem must consider this broad perspective of energy and respond in ways that match its magnitude and complexity, rather than relying solely on traditional approaches.

Who more than architects might be expected to meet this challenge?

Leo A. Daly, FAIA
Chairman, AIA Task Force on Energy Conservation

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Exhibit B

NEVADA ASSOCIATION OF COUNTIES

RESOLUTION 80-3

RE: EVALUATION OF LEGISLATIVE FEE STRUCTURE

WHEREAS, the Nevada Revised Statutes establish fees for certain county functions; and

WHEREAS, the presentation of this fee structure is confusing, and it is apparent that many fees are inadequate to cover the cost of service; and

WHEREAS, the 1979 Legislature had no appetite for such a review and revision; and

WHEREAS, a proper review and revision of this legislative fee structure is an arduous and time-consuming task and the counties have now taken steps to assist the Legislature on this matter;

NOW, THEREFORE, BE IT RESOLVED that the Nevada Association of Counties requests the 1981 State Legislature to review all such fees in order to alleviate the problem; and

BE IT FURTHER RESOLVED that, in that the County Clerks of the State of Nevada by majority vote agree that the current uniform fee structure for Clerks as set forth in the Nevada Revised Statutes serves the purpose for which it was established, that the Nevada Association of Counties supports retention of the currently authorized schedule of Clerk's fees as well as retention of uniformity in the fee structure generally.

PASSED AND ADOPTED this 15th day of November, 1980.

Jack R. Petitti
JACK R. PETITTI, PRESIDENT

ATTEST:

Thalia M. Dondero
THALIA M. DONDERO, SECRETARY

Attachment to R0-3

RESOLUTION

ON UNIFORMITY OF FEES
FOR COUNTY CLERKS

Presented by County Fiscal Officers Association

WHEREAS, the County Clerks of the State of Nevada by majority vote agree that the current uniform fee structure for Clerks as set forth in the Nevada Revised Statutes serves the purpose for which it was established;

NOW, THEREFORE BE IT RESOLVED that the County Fiscal Officers Association of the State of Nevada urges the Nevada Legislature and the Nevada Association of Counties to support retention of the currently authorized schedule of fees as well as retaining uniformity in the fee structure generally.

SIGNED: _____
President, CFOA

ATTEST: _____

DATED: _____

SPECIFIC FEE RECOMMENDATIONS

NRS	RECORDING	CURRENT FEE	PROPOSED FEE
247.305(1)	For recording any document, first page	$3.00	$4.00
247.310(1)	For each additional mining claim embraced in a certificate of proof of labor	$0.25	$0.50
247.310(2)	For each 100 words in excess of the first 100 words in a certificate of proof of labor	$0.30/ 100 or fraction thereof	Delete
278.468(2)	Filing and indexing each parcel map	$5.00	$10.00
625.370(1)	Filing and indexing any record of survey	$5.00	$10.00

JOE DINI, JR.
ASSEMBLYMAN
104 N. MOUNTAIN VIEW
YERINGTON, NEVADA 89447

COMMITTEES
CHAIRMAN
GOVERNMENT AFFAIRS
MEMBER
AGRICULURE
COMMERCE
ECONOMIC DEVELOPMENT AND
NATURAL RESOURCES
LEGISLATIVE COMMISSION

Nevada Legislature

SIXTY-FIRST SESSION

February 13, 1981

Mr. Gary L. Barton
Recorder and Auditor
Mineral County
P. O. Box 1305
Hawthorne, NV 89415

Dear Gary:

Thank you for your letter concerning Assembly Bill 62.

Uniform fees are a serious problem and to allow county commissioners to have different fees in each county will cause quite a lot of confusion. We have put AB-62 in a subcommittee and we will use it for an avenue to correct some of these structures in the state, but I think there is little chance of the main meat of that bill to allow the county commissioners to set the rates in each county to pass.

Thank you very much for giving me your input on this and I will notify the committee of your feelings.

Sincerely,

Joseph E. Dini, Jr.
Chairman, Government
Affairs Committee

JED:lh
cc: Gov. Affairs Committee
members

MINERAL COUNTY, STATE OF NEVADA

GARY L. BARTON
Recorder and Auditor

PATRICIA FISK
Chief Deputy

Office of Recorder and Auditor

P. O. Box 1305
HAWTHORNE, NEVADA 89415

CLAUDIA REYNOLDS
Deputy

NANCY BLACK
Deputy

February 6, 1981

Honorable Joe Dini
Chairman, Government Affairs Committee
Room 210A
Assembly Chambers
Nevada State Legislature
Carson City, Nevada 89701

Re: AB 62

Dear Assemblyman Dini:

This letter is intended to alert you and your committee of a major problem if AB 62 is allowed to pass out of the Government Affairs Committee.

Uniform fees for the entire state has been the number one priority of many County Recorders for the past two decades.

Admittedly, there are some problems with the current fee schedule, mostly with interpretation, but basically it is used quite effectively by all seventeen counties.

A very significant number of documents and instruments offered for recording are mailed in, and much confusion would result in the event seventeen different fee schedules were in effect.

I appreciate the pressure legislators are under during each session from "special interest" groups, but this type of legislation would be very detrimental to local government and county elected officials, who administer the several fee related statutes.

I hope hearings on this important bill will be announced timely, so Recorders and other interested public officials have the opportunity to testify.

Respectfully submitted,

GARY L. BARTON

GLB/pf

Exhibit C

ROBERT LIST
GOVERNOR

William A. Hatfield
COMMISSIONER

STATE OF NEVADA
COMMISSION FOR VETERANS AFFAIRS
245 E. Liberty St.
RENO, NEVADA 89520
TELEPHONE (702) 784-6237

February 6, 1981

Dave Nicholas
Assemblyman
401 South Carson Street
Carson City, Nevada 89710

REF: AB #36

Dear Mr. Nicholas:

I appreciate your kindness to meet and invite me to your subcommittee meeting, reference to the problems AB #36, which we discussed at length during the meeting.

Subsquent to that meeting, Mr. Crossley, along with Mr. Wood and myself, reached the conclusion that no part of AB #36 is necessary or needed.

We recommend that this complete bill be deleted in its entirety.

Thank you for your cooperation in this matter.

Very Truly Yours,

William A. Hatfield

William A. Hatfield
Commissioner

WAH/pg