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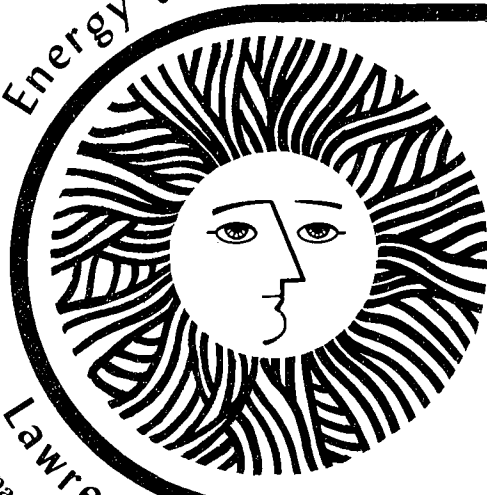
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Promoting Energy Conservation  
Through Occupational Licensure:  
A Feasibility Study

*Wellford W. Wilms*

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Lawrence Berkeley Laboratory University of California/Berkeley

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Promoting Energy Conservation Through Occupational  
Licensure: A Feasibility Study

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\*A report to the California Energy Resources Conservation  
and Development Commission

Work performed under the auspices of the U. S.  
Energy Research and Development Administration



THE PROBLEM

Architects, engineers and the many others who design and build California's living and working environments are in a unique position to affect how energy is used. Houses and commercial buildings can be designed and built to minimize energy consumption and to maximize the use of natural, renewable sources. Buildings' power and lighting systems can also be designed to minimize energy use. Landscaped spaces, parks, freeways and building sites can be designed and planted to minimize the use of water-thirsty (and energy-consuming) vegetation.

But, to actually achieve these and other energy-conserving measures, the ways in which people are trained for occupations that effect energy use will have to change. This report analyzes a key way of intervening in such education and training to promote energy conservation through the State licensing process. This study rests on the assumption that if candidates for State licenses were tested on their knowledge of energy conservation, each licensee would know how to conserve energy through his or her chosen profession. The study also assumes that once licensing examinations include questions on energy conservation the ways in which people are trained for occupations that affect energy use would change rapidly. We assume further that if candidates were tested on their knowledge of energy conservation, training institutions (colleges and universities) and publishers would institutionalize energy conservation in their curricula and publications to prepare candidates for the examinations, which would achieve a long-term structural change.

## THE STUDY

The objectives of this study were:

1. To identify approximately five licensed occupations, which because of their size or function, can promote energy conservation.
2. To assess the extent to which energy conservation is already part of the licensing process.
3. To assess the feasibility of amending the licensing procedure in those occupations to highlight energy conservation.
4. To recommend strategies to bring energy conservation into the licensing process.

### Licensing in California

California licenses over one million men and women in occupations ranging from funeral directors to accountants (See Appendix 1). The State licenses these practitioners to certify their competence, thereby protecting the public interest. Each year nearly 100,000 California citizens apply to State registry boards to be licensed, which in all cases requires successfully passing an examination. At least a quarter of the annual applicants, and practitioners already in the field, are in occupations that can directly affect energy conservation. Architects, contractors and engineers alone account for 175,000 licensees.

There is little doubt that conserving energy is in the State's interest. Most of the currently wasted energy is non-renewable and the costs which are passed onto the consumer are staggering. The American Institute of Architects estimates that between 1974 and 1990 the cumulative cost to consumers to buy wasted energy will be between \$892 billion and \$1,499 billion (AIA, 1974). This view was firmly supported by Richard Spohn, the Director of the Department of Consumer Affairs, which oversees the licensing of all licensed occupations

except lawyers and real estate agents. The department oversees thirty-six licensing boards, bureaus and commissions that run the gamut from architecture to veterinary medicine. Board members are appointed by the governor, usually for four-year terms on a staggered basis. The rules and regulations under which the licensing boards operate specify the boards' makeup. In the past, boards have had a majority of members from the licensed occupations themselves. Those provisions were recently changed by the enactment of SB 2116 (Gregorio's public member bill) that changed the boards' makeup so that "public members" or appointees from outside the occupations now comprise a majority on each board. Those who supported SB 2116 claimed that a majority of public members on each board would allow more public participation and accountability.

Under the authority contained in the California Business and Professions Code, the boards have the authority to formulate and adopt rules and regulations to guide examination of candidates who seek State licensing. The boards have full power to repeal, amend or modify their rules and regulations.

The boards operate in a highly political environment. Consumer interest groups both within and outside State government often claim that the licensed occupations have captured the regulatory machinery, which is used to further their own ends. Occupational licensing is often charged with promoting anti-competitive and discriminatory practices by restricting entry to trades and professions. When push comes to shove, many of the boards and their professional associations repeatedly demonstrate they are effective lobbyists with the legislature.

Licensing boards counter these general criticisms by pointing out their value in protecting the public interest by investigating consumer complaints and taking disciplinary action against license holders. More recently some

boards have argued they protect the public interest by protecting the environment. A major study of the impact of licensing is now underway within the Department of Consumer Affairs.

Despite a lack of definitive information about licensing boards' effect, a number of states including California have begun to move toward subjecting boards to greater public scrutiny, and accountability. Some states are looking elsewhere in the state government for regulatory authority to stop the proliferation of licensing boards. The state legislatures in Minnesota and Virginia have turned over decisions about requests for new regulation to citizen commissions, and in some states some licensing boards have been abolished completely. In California, the Board of Landscape Architecture faces such a threat from Assemblyman Leroy Greene's AB 63 that would abolish it. In yet other moves, some states are considering the implementation of "sunset laws". Such legislation allows boards and agencies to operate for fixed periods of time, after which the case must be made for their continuation. If their continuation cannot be justified, the board or agency automatically goes out of business. During this session the California legislature will deal with ten bills with thirty-two authors and co-authors aimed at exploring or implementing sunset laws. Finally, in California and other states, the composition of the boards has been changed to put public members in the majority with the aim of increased accountability.

#### The Boards

We initially identified seventeen boards that were likely to have an impact on energy conservation. Ten were considered marginal (including nursing home administrators, veterinary medicine, repair services, and others) and were dropped. After initial interviews with people in the field and the executive

secretaries, two others (Bureau of Auto Repair and Structural Pests) were dropped.

The Bureau of Automobile Repair was dropped because, although it is huge (It has 112,000 licensees.), much of what can be done to promote energy conservation is already being done as part of an emissions control program.

The Structural Pest Control Board which licenses termite inspectors, could be an important vehicle for implementing retrofit insulation programs now on various State agency drawing boards. But, the acting executive secretary explained that he felt certain that both his board and the trade association would oppose additional licensing requirements because they were generally opposed to any additional responsibility. Consequently, we dropped the Structural Pest Control Board from further consideration.

We narrowed the study down to the following five boards: architecture, engineers, contractors, landscape architecture and accounting.

1. Architecture: The 9,000 licensed California architects have a heavy impact on energy use through building siting and design, and power and lighting system design. In 1975-1976, 1,600 candidates took the architects' examination (about 63% passed). The examination is made up by the National Council of Architecture Registration Boards (NCARB), and administered by the California Board of Architecture Examiners. The California Board acknowledges architects' responsibility in designing structures and systems that are energy efficient, yet energy conservation is not specifically reflected in the examination.

While licensed California architects are not required to take continuing professional education, interest in continuing professional education has risen dramatically, according to the board's executive secretary, Robert Duncan. Duncan thinks the increased interest in

continuing professional education reflects architects' need to keep up with rapidly changing technology.

Three university architecture programs are approved by the National Architects' Accrediting Board - part of the NCARB - Cal Poly at San Luis Obispo, University of Southern California, and the University of California, Berkeley. While architecture faculty members, we have interviewed support giving increased attention to energy conservation, very little explicit recognition is given to it in the actual curricula.

In 1972 the American Institute of Architects began to explore ways in which the design professions could contribute to solving our energy problems. The AIA has since taken the position supporting energy conservation through retrofit programs and design, and has lobbied the Congress for a national energy conservation policy (McGinty, 1977). In their 1974 report, "A Nation of Energy Efficient Buildings by 1990", the AIA pointed out in their view that the real barriers to energy conservation were not technological rather conceptual and institutional rigidities.

Despite the gap between the acknowledged support for energy conservation and practice, there are some promising signs. The Berkeley Department of Architecture has created a new faculty position that calls for a background in both architecture and energy. A new journal, Energy and Building, is being published and practicing architects claim that increasing number of clients are demanding energy-efficient building designs. Recently, the California Citizen Action Group filed a petition with the State requesting that architects be required to prove they can design energy-efficient buildings as a condition for licensing.

Representatives of the California Council of the American Institute of Architects suggested they would help efforts to encourage the NCARB to amend their examination to include conservation, and would be willing to discuss strategies to amend the act regulating architecture in California. They also expressed an interest in increasing the prominence of conservation in continuing professional education offerings.

The Center for Planning and Developmental Research at Berkeley's School of Architecture has offered help in the effort to bring energy conservation into a prominent spot in both the collegiate curriculum and the licensing procedure.

2. Engineers: California's 55,000 licensed engineers play an important part in determining energy use and conservation through their role in planning and designing structures, machines, and power and lighting systems. About 7,000 new engineers are licensed each year in a variety of specialties including civil, mechanical, industrial and structural. The eleven-member board administers two licensing examinations. The first exam, the Engineer in Training examination (EIT), usually is administered in the candidate's junior year of college. The eight-hour exam was designed by the Educational Testing Service. After successfully passing the EIT exam and completing two years of experience, the candidate is eligible to take the Principles and Practices exam, also a national examination.

Education of professional engineers is done in California's four-year colleges. According to the Board of Registration for Professional Engineers, about 90 percent of the four-year engineering programs in California is accredited by the Engineers' Council for Professional

Development (ECPD), or about thirty programs. The major exceptions are new state university programs that are in formative stages. Discussions with faculty members at the University of California, Berkeley schools of Engineering indicate that while there is a general sensitivity to the need for designs that use less energy more efficiently, conservation is not specifically dealt with in either the examination or the college curricula. One faculty member who served on the State Registration Board, Charles Wilke, said that students are routinely taught how to minimize energy costs, and a "cost-consciousness" theme is embedded in the licensing examinations. But he acknowledged that energy conservation could be emphasized more directly.

Patricia Conacher, an electrical engineer who was recently appointed to the Board, pointed out that many clients, particularly the military, have begun to require energy conserving designs. For example, in August 1975 the Department of the Army issued a memorandum updating the 1972 Construction Criteria Manual aimed at conserving energy in military installations through more efficient lighting design and use (Department of the Army, 1975). Similarly, energy conservation guidelines have been issued by other agencies including the Department of Commerce, and Department of the Navy (Gatts, 1974, Bannister, 1975). According to Conacher, the Corps of Engineers has issued energy conservation guidelines requiring a 15 percent reduction of energy used in military installation buildings.

The executive secretary of the Board of Registration for Professional Engineers, Don Wright, fully supports the concept of including knowledge of energy conservation in the licensure process. He feels

that with his Board's help the national examinations can be amended to include conservation items within a year.

3. Contractors: Each year, nearly 10,000 newly-licensed contractors join the ranks of the 100,000 licensed California contractors who do the actual installation and construction of power systems and structures. When ERCDC residential and non-residential standards go into effect, contractors will implement them. The Contractor's State License Board licenses 38 separate specialties that include at least five that bear directly on energy use (Acoustical-Insulation; Plumbing, Heating-Cooling; Drywall, Heating, Airconditioning, Sheet-metal and Refrigeration; and General Building). Each specialty is represented by an independent association (for instance, Plumbing contractors belong to the Plumbing-Heating-Cooling Contractors of California). Each association has an examination committee that generates questions for the state licensing examination, and forwards them to the Board's Licensing Deputy for consideration.

We discussed the project with representatives of the Insulation Contractors Association of California, the Roofing Contractors Association of California, the California State Builders Exchange, and the Plumbing, Heating, Cooling Contractors of California. Once they understood the project was not going to be mandated by the State, the response was generally favorable. The associations place great emphasis on upgrading the standards and examinations in each of the fields, and want to promote expanded continuing education. Perhaps our discussion with the Association of General Builders representative was most typical. Earl Beattie, the director of the Building division thought

that the AGB would likely look favorably upon a project to promote energy conservation through licensure if it were developed jointly with them. He suggested that AGB members should be notified of the impending license examination change, perhaps two years in advance, with maximum effort going to curricular revisions in high schools and junior colleges. Beattie also suggested mounting a continuing education program to prepare currently licensed contractors for the new examination questions when renewing their licenses. He pointed out that the AGB has extensive contacts with the education world in California high schools, community colleges and four-year schools, and could bring considerable resources to bear in creating new curricula.

The Contractor's Board, which oversees fourteen field offices and a \$6 million annual budget, has the authority, as with other boards, to amend the licensing standards to include specific references to energy conservation. Both the Board's Executive Secretary, Leo Hoschler, and the Licensing Deputy, Ray Boddy, are aware of the need for relating energy conservation to the contracting business which is not now covered adequately in the examination. Both Hoschler and Boddy felt favorably about the project, and offered to help implement it, should it go ahead. They felt that candidate questions for the examinations should be first developed by the associations, then forwarded to them for consideration.

4. Landscape Architecture: Landscape architects number about 900 in California, with about 150-200 new licensees each year. Because landscape architecture is generally defined as the art of arranging land and objects upon it, the profession can have a large impact on energy use despite its diminutive size. In some cases, landscape architects

are teamed with architects and have an influence on all decisions from siting through design. In more typical cases where landscape architects work independently of architects and engineers, they have a major hand in decisions about site planning, the design of parks and other outside spaces, and the use of materials and plants. Landscape architects with knowledge of energy conservation can not only help clients make good decisions like using certain kinds of plants for shading to conserve energy, they can help avoid bad ones. For example, the City of Lafayette finds itself trapped because they have neither the staff nor budget to maintain water and energy dependent grass in street medians. According to authorities in the field, parks, freeways and other planted spaces are usually designed without regard for future energy needs.

The six-member licensing board administers a newly-written national examination, given in thirty-eight states. Yet, because of wide national variations in landscapes, some landscape architects acknowledge the need for a California or a regional examination. As mentioned earlier, the Board has been singled out for abolition under AB 63 (Greene).

We have met with members of the California Council of Landscape Architects and the Board President and Executive Secretary. There seems to be general agreement that the project is in the consumers' interest, has merit and should be promoted.

Five schools offer programs in landscape architecture. They are the University of California at Berkeley, Davis and Los Angeles, and Cal Poly at Pomona and San Luis Obispo. While some individual faculty members are developing courses relating energy conservation to landscape architecture, the concept is not explicit in most curricula.

5. Accounting: California's 20,000 Certified Public Accountants and its 8,500 Public Accountants can also have an impact on energy conservation. While this relationship is less obvious than the building trades or design, accountants are in a position to educate their clients about emerging federal and state financial incentives for energy conservation, commercial energy audits and the concept of life-cycle costing. Also, as more lending institutions provide low-interest loans, accountants can help make their clients aware of financial advantages.

The national, four-part accountancy examination is made up by the American Institute of CPAs and is administered by the State Board. The examination makes no reference to energy conservation. The Board also administers State-mandated continuing professional education. The profession is represented by two associations, the California Society of CPAs and the Society of California Accountants.

We have found no evidence that either collegiate curricula or continuing professional education curricula give attention to financial incentives to encourage energy conservation or life-cycle costing.

Don Otten, Executive Secretary of the Board, suggested the Board would request the AICPA to incorporate energy conservation in the examination. He also felt new courses could be designed for both collegiate and continuing professional education curricula. Typically, continuing education courses are given through the professional associations, university extension, and large public accounting firms. He pointed out that if such courses were available through all channels and were in the public interest (which they would be), the Board would be likely to give them special notice in their official bulletin.

We met with representatives of the California Society of CPAs and found general agreement that the project should be pursued, though time did not allow a complete discussion of ways in which it could be implemented.

#### SUMMARY AND CONCLUSIONS

Our investigations have identified architects, engineers, contractors, landscape architects and accountants as the five licensed occupations most likely to have the greatest impact on energy conservation. If the licensing process can insure that those who practice these trades and professions can protect the public interest through conserving energy, the impact would be large and long-lasting. Each year, almost 15,000 new licensees join the 160,000 licensees who design and build California's structures that consume nearly two-thirds of California's gas and electric energy. Likewise, the 28,000 accountants licensed to practice in California can provide increasingly important links between clients and energy conservation practices whether the client is a corporate employer who wants to cut energy costs or learn life-cycle costing, or a homeowner anxious to maximize tax benefits through conservation.

The investigation has further found that although these five boards and their member associations have become increasingly conscious about the needs for energy conservation, the licensing process does not address it in any systematic way. Nor does energy conservation have a prominent role in any of the curricula designed to train people for these occupations, except in the most fragmentary way.

#### RECOMMENDATIONS

As we neared the half-way point in the study, it became apparent that it was not only feasible to amend the licensing process to include energy

conservation in selected occupations but that such a project should move ahead quickly. Support for the idea is high. Individual board members we have interviewed as well as the boards' executive secretaries support the idea. New public members appointed under the provisions of the Gregorio public member bill are now just finding their footing in the boards and are likely to advocate such a proposal. Key professional associations appear to uniformly support the concept, and Richard Spohn and his staff at Consumer Affairs continue to express enthusiasm for moving ahead. Statewide, the need to conserve energy is widely acknowledged.

We felt that the job of working with the boards and associations should be done by interests outside of the Department of Consumer Affairs and the Energy Commission because of the natural institutional constraints. We submitted a draft proposal outlining the proposed project to ERCDC in January 1977 and in February the Commission committed funds to carry it out.

This implementation project, now in its formative stages, proposes to work with each of the five occupations to raise energy conservation to a prominent place in the licensing process. There is considerable variation between the boards in terms of organization, methods of examination, and progress on incorporating energy conservation in licensing. We plan to develop a strategy and set of objectives with each board and professional association that will bring their resources to bear on the project most effectively. We will focus not only on stimulating the boards and associations to generate energy-conservation questions for the examination, but also on providing guidance to training institutions on changing their curricula to help prepare candidates for the exam.

We will emphasize publicizing successful efforts to help speed the adoption of the idea and gain the full cooperation of constituent groups in the field.

We have already begun to identify people within each occupation to write articles targeted at specific journals.

We hope to develop a model from this limited effort to reach out to other occupations that lie outside of the Department of Consumer Affairs, or secondary candidates within the Department such as fabric care, the cemetery board and others. Such a model might be based on amending rules, the acts or broader legislation.

The project should be viewed as a relatively low-cost effort to bring about long-term structural change. Therefore conventional evaluation measures like KWh and therms saved elude this project. We will evaluate the success of the project during the year against the specific objectives we reach with each licensing board and professional association in the next few months. At the end of this one-year effort, we will prepare a report on the outcome of the project.

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Gatts, Robert and others, "Energy Conservation Program Guide for Industry and Commerce (EPIC)", Institute for Applied Technology, National Bureau of Standards, U.S. Department of Commerce, 1974.

McGinty, John M., "AIA President Sees Change as An Opportunity for Growth", Consulting Engineer, Vol 48, No. 1, Barrington, Illinois, January 1977 (pp. 43-45).

Appendix I: Department of Consumer Affairs Licensing Boards and Bureaus  
by Number of Licensees, Individuals Examined, and Examination  
Pass-Rate for 1975-1976 (unverified)

Name of Board or Bureau	1975-1976		
	Licensees	Individuals Examined	% Pass
Accountancy	29,821	8,939	43
Architectural Examiners	9,054	1,648	63
Athletic Commission	4,230	85	99
Automotive Repair	112,630	15,719	74
Barber Examiners	30,034	1,278	76
Behavioral Science	17,113	1,633	70
Cemetery Board	1,700	400	95
Collection Agency	5,883	129	56
Private Investigators	95,867	968	57
Contractors	106,634	11,261	88
Cosmetology	205,795	10,400	86
Dental Examiners	23,948	2,123	57
Employment Agencies	1,094	385	60
Fabric Care	14,216	620	74
Funeral Directors	4,479	355	14
Geology	4,500	85	50
Guide Dogs	33	3	100
Landscape Architects	903	349	50
Medical Quality Assurance	85,474	1,541	79
Hearing Aid Dispenser	1,050	160	60
Physical Therapists	8,000	383	91
Psychology Examination Committee	4,220	918	82
Nursing Home Administrators	2,307	218	84
Optometry	3,882	188	87
Pharmacy	21,523	943	75
Professional Engineers	55,874	12,714	69
Registered Nursing	173,379	10,478	63
Repair Services	9,549	N/A	N/A
Shorthand Reporters	2,541	949	38
Structural Pest Control	6,148	1,999	37
Veterinary Medicine	6,140	665	63
Animal Health	316	552	62
Vocational Nurses	55,423	7,392	70
Psychiatric Technicians	12,330	1,165	70

Appendix 2: Principal Contacts in Study

Bruce Allen	Assistant Director, California Society of CPAs
Roy Alper	California Citizens Action Group
Kare Anderson	Legislative Assistant to Senator Peter Behr
Tom Bates	Assemblyman, State of California
Earl Beattie	Director, Building Division, Association of General Contractors of California
Russ Beatty	Lecturer in Landscape Architecture, UC Berkeley
Tilda Becker	Executive Secretary, Roofing Contractors of California and Insulation Contractors of California
Yashiro Befu	Past President, California Council of Landscape Architects
John Berner	Director, IPA Project
Wilfred Blessing	Member, California State Board of Architectural Examiners
William Blurock	President, California State Board of Architectural Examiners
Ray Boddy	Licensing Deputy, Contractors State License Board
Patricia Conacher	Member, Board of Registration for Professional Engineers
Ed Dean	Lecturer in Architecture, UC Berkeley
Jan Des Voignes	Staff Member, California State Board of Accountancy
Richard Dittmar	Executive Vice President, California State Builders Exchange
Robert Duncan	Executive Secretary, California State Board of Architectural Examiners
Bill Faux	Staff Member, California State Board of Accountancy
Melton Ferris	Executive Vice President, California Council of American Institute of Architects

Lenny Goldberg	Legislative Assistant to Assemblyman Tom Bates
Calvin Hamilton	Director of Planning, Los Angeles
Warren Holman	Staff Member, Board of Registration for Professional Engineers
Leo Hoschler	Executive Secretary, Contractors State License Board
Dan Johnson	Landscape Architect, Division of Buildings and Grounds, State of California
Walter Kehm	Chief Landscape Architect, Project Planning Associates, Ltd.
Elizabeth Kersten	Legislative Assistant to Assemblyman Willie Brown
Nicholai Konovaloff	Executive Secretary, Plumbing, Heating, Cooling Contractors of California
Richard McManus	Chief Deputy Director, Department of Consumer Affairs
Clair Cooper Marcus	Associate Professor of Landscape Architecture, UC Berkeley
Richard Meier	Professor of Environmental Design, UC Berkeley
Richard Murray	President, Board of Landscape Architects
Lew Osteen	Assistant Executive Secretary, California State Board of Architectural Examiners
Don Otten	Executive Secretary, California State Board of Accountancy
Joe Ouye	Member, Contractors State License Board
William Pettite	Executive Secretary, Board of Landscape Architects
Richard Pryor	President, California Council of Landscape Architects
David Pesonen	Attorney
Keith Sexton	Dean of Extension, University of California
Robert Simpson	Architect
Richard Spohn	Director, Department of Consumer Affairs

Milton Stern	Dean of Extension, UC Berkeley
Judy Tasoya	Former Executive Secretary, Board of Landscape Architects
Don Turner	Associate Professor of Architecture, UC Berkeley
Robert Tetalow	Professor of Landscape Architecture, UC Berkeley
Dennis Tsuboi	Officer, California Council of Landscape Architects
Sim van der Ryn	State Architect
John Vasconcellos	Assemblyman, State of California
David White	Attorney, Childhood and Government Project, UC Berkeley
Robert Wiens	Chief, Bureau of Automotive Repair
Charles Wilke	Professor of Engineering, UC Berkeley
Ed Wilkinson	California Council of Landscape Architects
Eddie Womack	Acting Executive Secretary, Structural Pest Control Board
Don Wright	Executive Secretary, Board of Registration for Professional Engineers
John Zierold	Legislative Advocate, The Sierra Club

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