
Chapter I
OVERVIEW

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The Conservation and Solar Energy (C&SE) Programs of the Department of Energy (DOE) have had a brief but troubled history. The importance assigned to conservation and solar energy in our national energy thinking has never been as great as it is now. Last year the President announced dramatic goals for solar energy and, by implication, conservation. The budget levels for the programs have never been so high. Public interest and expectations are also ever increasing with conservation and solar investments growing rapidly. Yet disappointment and frustration with the programs are common. A March 1975 OTA report, *An Analysis of the ERDA Plan and Program*, identified many problems that are still painfully relevant today.

This review was undertaken with the **intent** of performing a constructive critique for both Congress and DOE. Some of the issues identified in this report suggest how Congress and the Secretary of Energy can set the stage for C&SE to become more effective. Others raise questions over the direction some programs have taken. Finally, some point out where programs are functioning inefficiently, and what might be done to improve them.

This report naturally dwells on C&SE weaknesses because that is where improvements are most likely, but C&SE also has strengths. There are many highly competent, dedicated people working there. Some programs are moving forward effectively. The organizational structure of the programs seems improved now with the consolidation of Solar Technology and Solar Applications. While efficiency could no doubt be improved by various modifications, an era of stability would probably be more productive. Major reorganizations invariably produce major jurisdictional disputes, seriously detracting from the real business of the office. DOE would be better advised to concentrate on putting the right people into the existing positions and giving programs an opportunity to settle down.

Under the best of operating conditions, however, C&SE will have to overcome some major problems. **A striking conclusion of the panels was that C&SE lacks a clear vision of where it is going and how it will get there.** Some of the programs are doing as well as might be expected, but no coherent theme permeates the entire office and guides the directions and paces of the various programs. Evidently, this deficiency results from the lack of clear direction from DOE management and the lack of a strong analytic capability within C&SE. The Office of Policy, Planning, and Evaluation has only **13** professionals. A staff of this size is entirely inadequate to perform the long-range, in-depth studies required. **C&SE needs to develop the capability to determine what it can accomplish for the country, to make sound policy and program decisions to reach these objectives, and to keep the programs moving steadily toward the goals in the face of pressures to alter course in ways not necessarily in the national interest.** The new Program Summary Documents are encouraging, but the quality of the planning effort needs to be higher if C&SE is to push the country forward to meet its goals. Improved analytical capability will allow for comparisons between conservation and solar technologies and other approaches, such as synthetic fuels. Such comparisons are badly needed.

Another major deficiency is inadequate program evaluation. C&SE must have the capability of determining which programs have wandered off course or become irrelevant, and which might be usefully expanded. Evaluation will become crucial to some programs in controlling costs as they reach the demonstration stage. Widespread implementation of these technologies will largely depend on their costs becoming competitive with other options. For instance, the President's goal for photovoltaics is 1 Quad* in 2000. **At present,** a kilowatthour of electricity generated from photovoltaics

*One Quad equals one quadrillion (1 0¹⁵) Btu

might cost \$0.50, compared to \$0.05 from conventional sources. Several studies, including OTA's solar assessment, make a plausible case that photovoltaics will be competitive. If cost reductions fall short, however, subsidies of \$1 billion per year for every cent per kilowatthour differential will be required to reach the 1-Quad goal. Thus, if society has a choice between photovoltaic electricity delivered at \$0.15/kWh and electricity from other sources delivered at \$0.10/kWh, choosing the Quad of photovoltaics will cost an extra \$5 billion per year. Program evaluation is a critical element in keeping programs on track and in determining when goals should be revised.

Other problems that concerned the panels were the long delays in DOE processing of C&SE requests for hiring new staff and letting contracts. Reports of procurements that took up to 18 months are common. This is a nearly impossible situation. Not only are important projects delayed, but high-quality people and companies may not be willing to wait so long. **There is a pervasive belief within and outside of DOE that senior DOE management does not really care about the C&SE programs, and that the quality of management has been inadequate, as well as transient.** The present staff in some programs is clearly overburdened. There is a tendency to rely on existing contractors to do work for which they may be unprepared. These delays are evidently so crippling for C&SE that upper levels of DOE management should be quite concerned if they take solar and conservation seriously.

The panels also noted that **C&SE could improve its coordination with other Federal agencies, such as the Department of Housing and Urban Development, and other governmental levels** (State, local, and foreign). Such cooperation could greatly facilitate the implementation of solar and conservation technologies. By the same token, cooperation with private industry (both suppliers/installers and utilities) is vital for C&SE's planning. All of these institutions are involved in C&SE's implementation and R&D programs, but not to the degree that appears desirable.

A final general suggestion is **for C&SE to develop its own perspective in keeping with long-range planning.** C&SE is the focus of a great many expectations, but as mentioned above, **C&SE** cannot simply react to pressure. Some technologies may be worth developing in the national interest but may presently lack a large, well-organized constituency; for example, decentralized applications of solar energy. **It** is easier to find parties with an interest in centralized applications, but **C&SE** must find an appropriate balance between the two even while cooperating with the unequal constituencies.

The panels also identified a series of issues related to specific programs:

- **Wind.**— Wind is a nearer term technology than DOE appears to believe. Rapid commercialization could have a high payback, but commercialization programs must be designed appropriately for the different machines and applications.
- **Photovoltaics.**— This program may not meet its goal unless its budget is enlarged. DOE has been slow in meeting congressional requirements for detailed plans and an advisory panel. An emerging shortage of refined silicon may also interfere with growth.
- **Solar thermal.**— **The wide range of technologies and applications** require intensive evaluation and planning to achieve the fastest possible implementation into the energy system.
- **Ocean systems.** — Ocean thermal energy conversion may be very expensive to develop and demonstrate, but a full plan for Federal involvement has not been prepared to estimate the total costs. Rapid development could entail large economic risks.
- **Biomass.**— Management of the biomass programs should be tightened and the staff augmented. Several potentially attractive systems are neglected, particularly small and multipurpose facilities. Large increases in the use of alcohol fuels must be carefully planned.
- **Transportation conservation.** — The advanced-engine program has made progress, but it is

not clear that even successful developments will be the preferred choice for many applications. Electric vehicles (EV) have a more readily identifiable market, but extensive commercialization will depend on the availability of improved batteries. At present, battery development takes only 20 percent of the **EV** budget, which seems remarkably low in light of its importance.

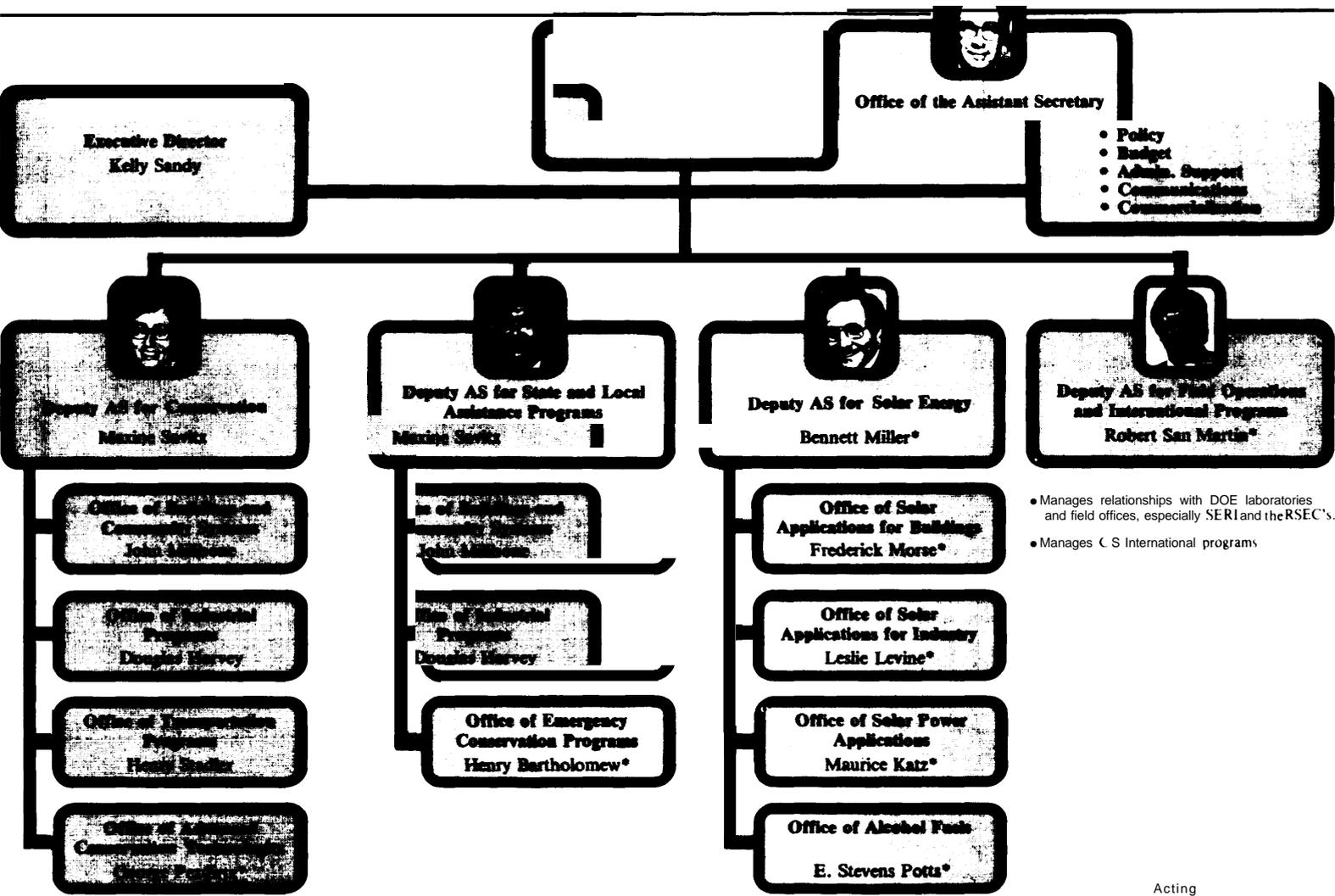
• **Solar active and passive.** — Closer cooperation with conservation programs is needed to formulate a least cost buildings strategy for combining passive features, active systems, and conservation measures in the most economical way for different types of buildings and climates. Several important areas are underemphasized, especially building retrofits, solar district heating, solar ponds, passive product development for commercial buildings, passive cooling, and demand analysis for solar industrial process heat.

Buildings and community systems. — The enormous potential for saving energy and protecting people against rapidly increasing costs means that improving the energy efficiency of buildings should be a high priority. Research on products to improve the energy efficiency of existing buildings should be in-

creased, as well as research on neighborhood-scale technologies and the energy uses of commercial structures. Non hardware research on institutional questions and on the attitudes and behavior of consumers is also necessary. This type of research, combined with an increased attempt to commercialize products, can help to move products into the marketplace. The buildings program must improve its interaction with the Office of Solar Applications for Buildings.

- **Office of State and Local Programs.** — Existing State programs should be consolidated, and DOE must find ways to provide more technical assistance to States.
- **Office of Industrial Programs (OIP).**— In view of the urgency of the energy situation, OIP should continue its emphasis on funding near-term technologies, and should emphasize those that can save the most energy quickly. This would select against those projects that save little or no energy but allow fuel-switching or assist ailing industries. Questions remain as to whether the existing priority selection criteria best serve national needs. Long-term, basic research relating to process and thermodynamic principles is urgently needed.

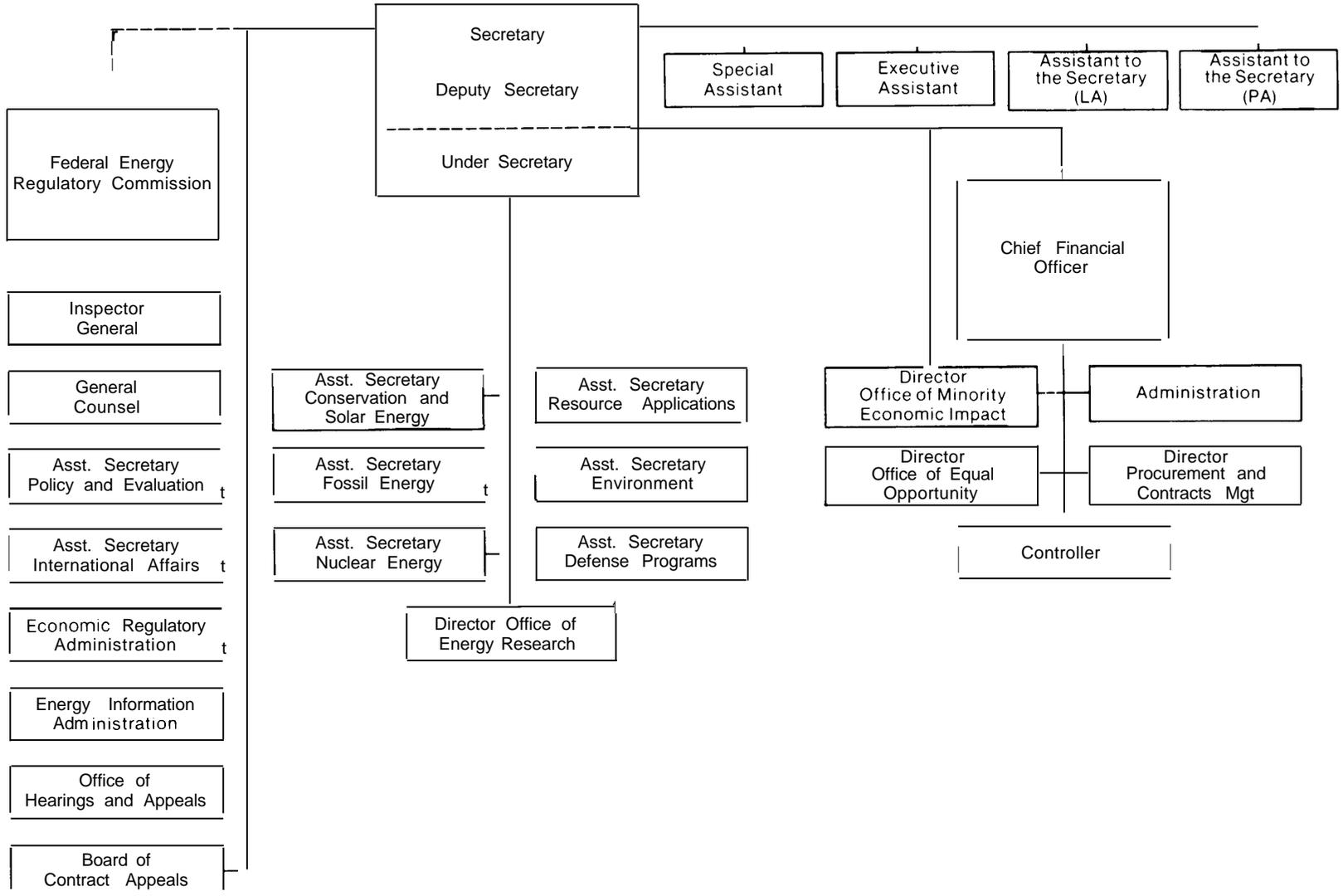
Figure 1.—Organization of Conservation and Solar Energy Programs at the Department of Energy



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SOURCE: Department of Energy

Figure 2.—Organization of the Department of Energy



SOURCE Department of Energy