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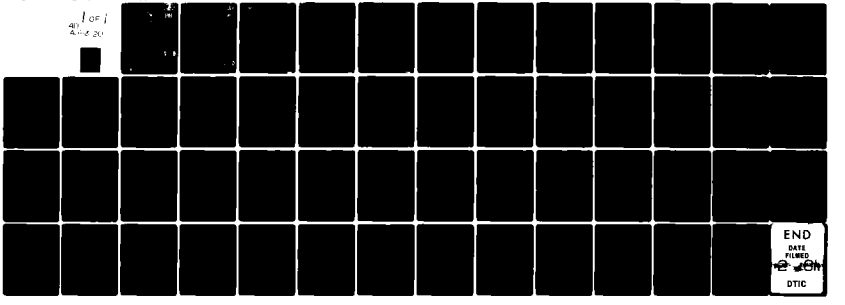

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LEVEL II

DEPARTMENT OF THE AIR FORCE
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LEVEL II

A STRUCTURAL EVALUATION OF THE AIR FORCE ENERGY MANAGEMENT PROGRAM

Michael D. Pflieger, Capt, USAF

LSSR 82-80

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Management of the energy resource has been, and will continue to be critical to the operational effectiveness of the Air Force. In order to properly manage that resource the Air Force instituted an Energy Management Program. However, due to the rapidity with which it was developed and the unstable nature of the energy problem, that program has experienced severe problems with coordination. Research indicated that this problem is primarily the result of structural deficiencies in the program organization. To determine the nature of these deficiencies a structural model was developed utilizing contemporary organization design theory. A comparitive analysis between this model and the features of the existing Energy Management Program indicated which features might be more fully developed in order th enhance the effectiveness of the existing program. The conclusion of the author is that although many structural deficiencies presently exist, the Air Force Energy Management Program is in the process of change in a direction that is compatible with contemporary organization design theory.

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A STRUCTURAL EVALUATION OF THE AIR FORCE ENERGY MANAGEMENT PROGRAM

A Thesis

Presented to the faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

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In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Systems Management

By

Michael D. Pflieger, BS
Captain, USAF

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I. Introduction

Background

The primary mission of the Air Force is to provide military air power sufficient in strength to deter war, or failing that, to fight a war and win. However, the Air Force must achieve that goal while at the same time operating within the limits of various resource constraints. One of the most significant resource constraints at this time is energy.

Energy has become, and will continue to be, a scarce high-cost resource of extremely significant national importance. Beginning with the Arab Oil Embargo in 1973, Americans have become more aware of the role energy plays in the American way of life. It is now widely recognized that: (1) fossil fuel resources are not inexhaustible; (2) foreign sources of oil are insecure and politically sensitive; (3) the low cost of fuels in the past was artificial due to government intervention; (4) the nation is extremely reliant

on energy intensive technology for it's very existence, let alone it's way of life; (5) energy technologies other than petroleum have been virtually ignored; and (6) any approach to resolving the energy problem involves a host of economic, political, social, moral, and environmental issues (2:1-12). With these factors in mind, the energy problem has received a great deal of national attention.

Energy, however, is also essential to the accomplishment of the Air Force mission. Most obviously, aircraft use a great deal of energy in their operation. Support operations, vehicles and facilities all require the use of some form of energy. Because of the necessity of using energy to the nation as a whole, the Air Force has an obligation to utilize this resource in the most economical ways possible. To work toward that objective, the Air Force established a requirement that every Air Force organization develop and implement an energy management program (15:1-4). However, the energy problem itself escalated rapidly and so required a rapid response to meet the need for a management program. This rapid response resulted in an overall Energy Management Program that does not seem to be as fully developed as it might be.

Problem Statement

The requirement for energy management in the Air Force was established with specific goals directed by the

President and DOD. However, little information was given as to how an energy management program should be implemented. As a result, the various organizations within the Air Force developed their individual programs based on their separate interpretations of the requirement. Preliminary investigation of the present overall program has shown some dissatisfaction among the managers involved with implementation. The most common comments concern a lack of coordination that detracts from their effectiveness, and makes program change and development difficult (7:17). These types of comments indicate a possible deficiency in the basic program structure. This is because the purpose of structure in any organization is to facilitate coordination. The possibility of structural deficiencies in the Air Force Energy Management Program is further supported by manager's comments regarding the diversity with which the program is being implemented in the various organizations.

Hypothesis

The basic hypothesis of this thesis is that the Air Force Energy Management Program could accomplish it's purpose more effectively through a more fully developed program structure. It is further hypothesized that the Energy Management Program structure can be more fully developed through the application of appropriate organizational design theory.

Objectives

Major Objective. The main objective of this thesis is to formulate recommendations for the purpose of more fully developing the structure of the Air Force Energy Management Program.

Sub-Objectives. Sub-objectives of this thesis are:

1. To accomplish the major objective within a framework commensurate with established Air Force policy and structure.

2. To accomplish the major objective by utilizing the principles of appropriate organizational design theory.

Scope

This thesis will be limited to the organizational structure of the Air Force Energy Management Program as implemented in the continental United States. Of primary concern is the impact of program structure on overall program effectiveness. Within this frame of reference, program structure at all levels of command will be considered. Specific initiatives implemented at various installations will not be considered except as they may pertain to overall program development.

Methodology

The objectives of this thesis will be accomplished by developing a model structure for an Air Force energy management program, and then comparing it to the existing

program structure. The model structure will be developed utilizing appropriate organizational design theory.

The next phase of this thesis will be analysis by comparison between the model features developed from theory and the actual features of the existing Energy Management Program. Also included in this comparison will be the program structure being proposed in a new AFR 10-1 presently being coordinated. This phase will focus on significant similarities and differences with respect to their impact on overall program effectiveness. This phase will also develop the arguments for or against changes to the present program. The final phase of this thesis will present recommendations regarding the structural features of the Energy Management Program.

II. Literature Review

The purpose or intent of organization design is to enhance the effectiveness of organizations through development of their structure. Structure in this sense means not only the anatomical features of the organization but also the mechanics of how an organization carries out it's various activities (9:221). In general there are two approaches to organization design: classical and contemporary. The classical approach, developed early in this century, regards the organization as a machine with many working parts. This approach stresses certain universally applicable laws that dictate how any organization should be designed, much the same as how the laws of physics dictate machine design. The contemporary approach, on the other hand, states that optimal organization design varies between organizations depending on the specific situational environment. In this respect, the contemporary approach recognizes validity in many of the principles of the classical approach, but does not accept them as universally applicable (9:271-273). In this thesis the contemporary approach was used, however many of the classical viewpoints are applicable because of the requirements peculiar to a military organization.

Perspective

Contemporary literature generally agrees that organ-

ization design is situational. That is, the specific structural features of an organization are dependent on the nature of it's operating environment. The operating environment of an organization is composed of the set of conditions outside the organization that have a direct impact on the day-to-day functioning of the organization (9:227). The studies of Burns and Stalker provide a broad perspective within which the environment of the Air Force Energy Management Program can be analyzed. These studies define two distinct types of organization structure, based on environmental factors, which they term mechanistic and organic structures (9:228). Mechanistic organizations are characterized by classical design features such as task specialization, hierarchic form, and precisely defined responsibilities. This type structure, they determined, is very appropriate to organizations operating in a stable, well-defined environment. Organic organizations, on the other hand, are characterized by less extreme specialization, broader responsibilities, and more collaborative management forms. Organic structures are very flexible and so are better suited to unstable, poorly defined environments. Burns and Stalker are very firm in stating that neither form is superior, but both are appropriate to their own set of circumstances (9:228-229; 11:207-208,210). As applicable to energy management in the Air Force, both mechanistic and organic features are evident.

Mechanistic Aspects

The Air Force, as a military organization, has a valid requirement for a high degree of formal structure as described by the concept of mechanistic organizations. A viable military organization must be able to respond quickly and precisely to a call to perform it's mission. In order to do that, there must exist a high degree of certainty and stability throughout the organization regarding it's capability to perform (3:87). These elements of certainty and stability are the earmarks of a mechanistic organization. Although Burns and Stalker describe these elements as external stimuli which promote the use of mechanistic features, the reverse is also true and is more applicable in the military establishment. That is, military organizations apply the mechanistic features in order to promote certainty and stability. To understand how this impacts the Energy Program's operating environment, it is appropriate to review some of the classical design features commonly employed by military organizations (3:84-85).

The principle of division of labor is probably the most basic element in classical design theory. First put forth by Adan Smith in 1776, this principle forms the basis of the entire school of classical design (11:1-2). This principle basically holds that greater efficiencies of production can be achieved when labor is divided into several basic tasks. Developing this principle further, Smith stated

that each of these basic tasks should then be performed by personnel specifically trained in that task (11:4-9). This division of labor and task specialization has been highly refined in the Air Force. The logic being that if the total operation is divided into specialized tasks, each task being performed by highly qualified and proficient personnel, then a certainty about the ability to perform is achieved (11:4-9; 3:130-131).

Another element of classical design theory common in the military is standardization. The concept of standardization was first developed in theory by Frederick Taylor in his "Principles of Scientific Management" (1916). This concept states, essentially, that there is a "right" way to accomplish any given task, and when that way is determined, all task specialists should conform to it (11:9-19). As applied in the military, standardization is used to ensure stability. Standardization introduces stability in that, even without direct supervision, managers have some certainty as to what levels of performance can reasonably be expected in any given task situation (8:5-10). Standardization also introduces stability in that those expectations about performance can be maintained even in a typical military atmosphere involving high turnover in personnel. This is because standardization to an accepted mode of operation ensures that a task will be performed in essentially the same manner regardless of who accomplishes the task (9:35; 12:199).

One of the most obvious classical design features employed by the military is a strict hierarchy of authority. Although this feature is a traditional part of military organization, it's validity is supported in organization design theory. Max Weber, in "Bureaucracy" (1922), stated that on a purely technical basis this form of organization is superior to all others. Some of the advantages cited by Weber are: precision, speed, unambiguity, unity, and strict subordination (10:41). These are exactly the type of features required by a military force in responding to an emergency, and the reason that a bureaucratic form of organization is traditional in the military (3:84-86). Although this feature in particular is heavily criticized by contemporary schools of organization design, it is still considered to be a necessity to a military force.

These typically mechanistic features, as just discussed, are traditional in the military and have a valid basis in purely technical logic. The main implication for an energy management program is that these features are a major part of the operating environment and so cannot be ignored. Whatever features are considered for an energy management program must be compatible with that established environment.

Organic Aspects

Burns and Stalker, Land, Lawrence and Lorsch, and

Mintzberg have written describing a type of operating environment that is characterized by terms such as: dynamic, complex, unstable, and ill-structured (6:294-295; 8:270-271; 11: 208). The energy problem itself is stereotypical of those conditions. The problem arose, and escalated quite rapidly, out of a previously stable environment. New technologies, at various stages of development, are now in abundance. Data about the situation is often biased or otherwise inaccurate. National, international, and industrial politics are involved to a high degree as are environmental and social issues (2:421-457; 4). This type of operating environment is extremely difficult to deal with through a conventional mechanistic form of management. The authors mentioned above all agree and have shown that this unstable environment is best suited to an organic form of management.

An organic form of management is suggestive of a committee or team whose members have been chosen based on their special expertise in some pertinent subject area. These team members work together in a collaborative manner with little or no established hierarchy. Decisions are reached through consensus rather than by decision of authority. There is very little bureaucratization, each member contributes to the best of his ability regardless of specialty (8:431-465; 11:208). Organic forms of management are inherently very flexible and so are especially well suited to dynamic environments like the energy problem.

Integration

It would seem that the need for an organic form of management is incompatible with organizations which have a traditionally mechanistic form of management. However, contemporary literature refutes that idea. Burns and Stalker stress that the mechanistic/organic concepts are two ends of a continuum rather than an absolute dichotomy. That is, any given organization will have aspects of both concepts to some degree based on it's own particular operating environment and situation (11:208-209). Umstot, writing particularly about the military, discusses how sub-organizations may have more organic forms of management even though the larger parent organization is quite mechanistic (12:189-190). Zand presents the concept of a collateral organization aimed specifically at incorporating the essence of organic management into a mechanistic organization in a way that does not detract from established bureaucracy (6:293-306). These authors all have as common themes a recognition of the validity of both mechanistic and organic forms of management, and a concern about the compatible integration of the two. These themes are especially pertinent to the problem of designing an energy management program for the Air Force, and are the basic themes that are followed in this thesis.

III. Design Features

Contemporary organization design theory offers very little specific guidance regarding desirable structural features in a given management situation. This is in keeping with it's basic tenet that organization design is situational. This problem, however, is not so severe when considering design features for a model energy management program in the Air Force. Since the parent organization (the Air Force) is highly mechanistic, it seems reasonable to begin with a classical approach to design, and where appropriate, indicate where contemporary organic features can be incorporated. Classical design theory does offer more specific guidance for design features. In particular, Luther Gulick (11:60-61) presented seven key features which he felt were essential to good management. These features are: planning, organizing, staffing, directing, coordinating, reporting, and budgeting. These features have become a mainstay of the classical school of design. Using Gulick's outline as a basis, revisions were made as seemed appropriate to the specific problem being addressed. First, Gulick's concept of planning included both planning and goal setting. Because of the unique importance attached to goal setting, that aspect is considered separately. Next, reporting is not considered separately because it is inherent in the

concepts of directing and coordinating. Budgeting is not considered in this thesis because there is not a unique budget for the Energy Management Program to manage. As a final result, the features that are considered in this model are: goal setting, planning, organizing, staffing, directing, and coordinating. These features are discussed both in general and in their implications for use in a model energy management program for the Air Force.

Goal Setting

Both classical and contemporary schools of organization design agree on the importance of goals. Goals provide a source of legitimacy to an organization. They focus an organization's activities and serve as standards against which to measure performance (1:42; 9:78; 5:81). Summing and condensing the treatments by various authors, goals should be: explicit, measureable, attainable, acceptable, and congruent (1:50-54; 9:79-87; 5:81-84).

The explicitness criterion states that goals should be as clearly defined as possible. Ambiguous goals often result in confusion which frustrates an organization's efforts. It should be noted also that although an organization's official goals may be very clearly defined, ambiguity can also arise from the existence of certain ulterior objectives within the management system. Activity being directed at achieving these unstated objectives also can result in a

great deal of confusion (1:43; 5:31,504-505).

Goals should be measureable so that progress and/or achievement can be observed. Also, efficiency of operation is based on being able to measure increments of achievement against the cost of that achievement. Measurement also provides clarification in the sense that the specific criteria used for measurement further define more nebulous terminology (e.g. "efficient", "successful", and "satisfactory"). (1:50).

Goal attainability does not imply that goals should be easily achievable, only that there should exist some reasonable expectancy that the goals are indeed achievable. Motivation towards goal achievement is seriously hampered when goals are (or are perceived as being) impossible to achieve (1:50-52).

The most significant consideration in goal acceptibility is that the goals must be perceived as being worthwhile by those tasked with accomplishing them. This is especially important with goals which are "accepted" by virtue of being imposed by higher authority. If those goals are perceived as lacking merit, motivation towards achievement is frustrated (1:52-53).

Managers and organizations are seldom concerned with only a single isolated goal. As a general rule several individual goals make up the entire system of goals. To

be congruent these individual goals must be compatible with each other. Conflicts between goals should be resolved, and priorities among goals specified (1:53).

Pertinent to an energy management program in the Air Force, the pervasiveness of energy considerations in every aspect of Air Force activity ensures that there will be many goal conflicts. Because of the widespread distrust of the oil industry, OPEC, and government involvement, the need (or worth) of energy management is often questioned (?:11). This worth is questioned also because of the relatively small percentage (about 2%) of energy used by the Air Force compared with total national consumption (16:11). These factors would exert powerful influence on the effectiveness of any resource management program. Establishing a sound system of goals, with attention to the criteria described above, would provide a firm basis for counteracting these forces.

Planning

As with goals, both classical and contemporary schools of organization design agree on the importance of planning to organization effectiveness. Albanese (1:93) speaks of the "primacy of planning" to convey the importance of this feature. A plan is a predetermined set of actions directed toward achieving a goal. Plans add stability to an organization by setting out, in advance, what should be done in order to achieve goals, and how it should be done. This

advance planning helps to eliminate confusion and delays during the course of an organization's normal activity (1:98-99). Plans are developed also to deal with possible abnormal situations. Even though these plans may not be able to cover every conceivable contingency, they may provide a good starting point from which to proceed.

Considering the unstable and dynamic environment of the energy situation, both types of planning, routine and contingency, seem appropriate to the Air Force Energy Management Program. Routine plans, based on the best available current information, are necessary to provide stability and continuity of effort despite the effects of personnel turnover and involvement of multiple interests. Separate contingency plans are appropriate also in view of the uncertain energy environment and the need of the Air Force to maintain a readiness capability. Again, even though these plans could not cover every conceivable situation, they could provide a basis that would reduce response time. Also considering the nature of the environment and the need to maintain force readiness, all plans should provide for periodic update.

In discussing the planning process, Albanese (1:107-110) addresses the issue of how plans should be developed. Regarding this issue, the contemporary concept of team effort would seem more appropriate in contrast to the classical approach of delegating the responsibility to a single manager. Considering the pervasiveness of energy issues in all

Air Force activities, the single manager approach would most likely result in either a nebulous plan, or a plan that would neglect appropriate consideration of some activity. A team approach, involving coordination and cooperation among the several affected activities, is more likely to result in a more detailed and complete set of plans, and would ensure proper consideration was given to all concerned activities.

Organizing

Organizing implies the establishment of specific duties and responsibilities, and the establishment of an organization's anatomical dimensions. This is the area where classical and contemporary design theory splits. The classical approach, typical in mechanistic organizations such as the Air Force, advocates a strict hierarchy of superior/subordinate relationships. Duties and responsibilities also follow these lines. However, considering the nature of the energy environment, contemporary theory would advocate a more organic structure emphasizing a team approach. This is where Zand's concept of a collateral organization seems especially pertinent. In a collateral organization, the team approach is used on a part time basis while, at the same time, the team members still maintain their respective positions in the normal organizational hierarchy. Management of a given program is accomplished through the collaborative efforts of the team members (6:293-297).

Zand's collateral organization approach is quite appropriate to energy management in the Air Force. However, it was designed to address problem solving situations where, once the problem was resolved, the team mode of operation would be discontinued. The Energy Management Program is not so transitory. The team approach is still valid, but it needs an element of permanence in order to satisfy the needs of the Energy Management Program. For this reason, the team structure might be established on a permanent basis. Team member duties would be performed on a part time (additional duty) basis. In addition, one member might serve as full time program coordinator. This one person would have special training in the energy situation and it's various intricacies, serve as the focal point for energy program matters, and serve as energy advisor to the commander. The organization commander would still maintain overall responsibility and authority for the energy program. In this way, the benefits of an organic form are achieved while maintaining the normal mechanistic structure. This would also conserve manpower by negating the need for a full time staff organized under a relatively high ranking supervisor.

Staffing

Literature regarding staffing is deficient in that it assumes sufficient personnel resources are available. The various authors address staffing in the sense of how to

pick appropriate people for a given job which is not the problem facing the Air Force Energy Management Program. The problem affecting the Energy Management Program is that manpower is at a premium in the Air Force in all areas. For this reason energy management personnel would logically perform their duties on a part-time basis. This does not represent such a severe problem when a team approach, as advocated in Section C of this chapter is used, because all specialist skills are available as necessary and they need not devote full time to the program. However, in the interest of more efficient coordination, the efforts of these part-time specialists should be coordinated by one person.

Directing

Directing is described as "The continuous task of making decisions and embodying them in specific orders and instructions"(11:60). In this sense "directing" is synonymous with the more frequently encountered concept of "controlling". Controlling is the process of assuring that actions are in line with desired results. This is accomplished through comparison of performance with some predetermined goals, standards, or plans; and taking corrective action when required (1:124-125). This concept of controlling is the backbone of bureaucratic forms of management. The strict superior/subordinate relationships are primarily for the purpose that the superior can make decisions regarding

the appropriateness of action and direct changes as necessary. Albanese stresses the special need for this feature in a rapidly changing environment. He implies that as the situational factors in the environment change, so do priorities and objectives. For this reason the process of assuring that actions are in line with objectives (controlling) is even more important than if the environment were stable (1:125).

The need for control in an Air Force energy management program is unquestionable. First of all, the bureaucratic nature of the Air Force requires it. More important, the uncertain and dynamic nature of the energy environment encourages the possibility of inappropriate actions. With no controls, individual organizations would implement programs based on their own interpretations of the situation. This has a considerable potential for dysfunctional consequences in light of the fact that even the various energy "experts" in the nation are not in agreement on how the energy problem should be handled (4:6-24,43-51). Attitudes about the energy problem range from "doomsday" reports to oil industry hoaxes (2:11). With this in mind, it is inconceivable that the approximately 90 Air Force installations and the several MAJCOMS could all implement individual programs all of which were in line with HQ USAF policy. Some form of control is necessary. As a minimum this would

include evaluation of performance and approval of action plans by some higher echelons of command. These higher echelons should also have authority to direct changes as necessary. This form of control need not be absolute in the sense of dictating all actions, but only ensure that actions are in line with objectives.

Coordinating

Henry Mintzberg states: "The structure of an organization can be defined simply as the sum total of the ways in which it divides it's labor into distinct tasks and then achieves coordination among them." (3:2). Webster's New World Thesaurus lists "organize" as a synonym for "coordinate". Coordination, then, is the essence of organization. Although Mintzberg lists five mechanisms through which coordination is facilitated, his descriptions condense into two major themes: communication and standardization (3:2-7).

Communication is usually treated as a separate distinct feature in organization design simply because of it's importance. Albanese states that communication is the single most important factor in organizational effectiveness because some form of communication is necessary in all aspects of an organization's operations (1:400). Formal communication facilitates the issuing of policy in one direction and reporting of performance in the other. Informal communication provides for clarification of policy and the exchange

of mutually pertinent ideas. In both cases, the most important factor is the need for clearly defined lines of communication. Without that feature, policy and direction from above may never reach the offices for which they were intended, and requests for guidance may easily be misdirected. The end result may be a great deal of confusion throughout the organization.

Standardization encourages coordination in that it lessens the need for guidance, clarification, and close supervision in routine matters (8:5). With standardized operations managers need not be concerned with "tailoring" policy and guidance to separate unique situations and can still maintain a reasonable expectation about performance.

A good system of communication is vitally important for coordination in an energy management program. Biased and inaccurate information is in abundance in the energy arena, also the pervasiveness of energy considerations ensures that there will be many conflicts of interest requiring clarification. Also, standardization, the second mechanism for coordination, is of minimal value due to the unique situations encountered by the various MAJCOMS and Air Force installations. For these reasons it is essential that clear lines of communication be established and that managers involved with program implementation be aware of them. Informal communications for the purpose of information exchange

can also be enhanced through the use of newsletter type periodical publications. This would aid managers in keeping up to date on developments in their areas of interest, help dispell rumors, and aid managers in implementing their particular programs.

As mentioned above, standardization does not seem feasible on a large scale in an energy management program due to the unique situational and geographical environments of the various MAJCOMS and installations. However, standardization can be used effectively in at least two areas: program organization, and program OPR (Office of Primary Responsibility). If all the MAJCOMS and installations utilized the same basic team approach (as outlined in Section C of this chapter) and the same program OPR (defined as program coordinator in Section C of this chapter) coordination would be enhanced since everyone involved would be on common ground. For this reason, standardization should be implemented in these two areas.

Chapter Review

This chapter has attempted to develop specific features to be incorporated in a model energy management program for the Air Force. These features were developed through the application of contemporary organization design theory to the energy situation and to the management requirements of the Air Force. The features determined to be appropriate

are:

1. Goals which are explicit, measureable, attainable, acceptable, and congruent.

2. Plans for routine operations and contingencies developed through the collaborative effort of all affected activities.

3. Organization utilizing a team approach, similar to a collateral organization, with a single full time program coordinator.

4. Staffing of the management team by personnel from each affected activity, and by one full time program coordinator specially trained in energy issues.

5. Controls involving approval of action and contingency plans, and periodic review of performance by higher echelons with authority to direct changes as necessary.

6. Coordination achieved primarily through clearly defined lines of communication, and enhanced through standardization of program organization and program OPR.

IV. Analysis

This chapter presents a comparitive analysis between the model features developed in Chapter III and the features of the Air Force Energy Management Program as it presently exists. This comparison also includes the features incorporated in the proposed AFR 13-1. Analysis is based on research of available documentation (13; 14; 15; 16) and on personal interviews with managers tasked with implementing the Energy Management Program (7; 17). The basic format of this chapter is a discussion of each of the features presented in Chapter III.

Goal Setting

The goals of the Air Force Energy Management Program were established based on various presidential and DOD directives (16:1-31; 14:43-45). These specific goals are:

1. For aircraft operations, the level of energy consumption in FY 1985 is limited to that for operational usage in FY 1975.

2. For vehicle operations, the level of energy consumption in FY 1985 is limited to that for operational usage in FY 1978. In addition, average fuel economy in the administrative vehicle fleet is to exceed minimum statutory mileage requirements by three miles per gallon in FY 1979

and four miles per gallon in FY 1980 and thereafter.

3. For installation operations, average annual energy use per gross square foot of floor area is to be reduced 20 percent in existing buildings and 45 percent in new buildings by FY 1985 as measured from the FY 1975 usage level and, in existing buildings energy conservation retrofits are to be installed by 1990 and consumption of petroleum based fuels reduced by 30 percent. In addition, a dual-fuel capability is to be established in all natural-gas-only heating units and plants over 5 million BTU capacity by 1982; alternative energy sources are to provide, by 1985, at least 10 percent of the energy used in Air Force installations, and renewable energy sources, at least 1 percent; energy consumption levels are to be identified and monitored through metering and energy audit/survey programs; and potential energy conservation measures are to be identified.

These specific goals are published in the U.S. Air Force Energy Plan 1978. In addition, the Air Force maintains an open-ended objective, published in AFR 13-1, to "use the least amount of energy it needs to achieve the mission and keep force readiness". The proposed AFR 13-1 includes all the specific goals, expands on the open-ended objectives, and provides for annual updates of the specific goals.

As stated, these goals fit the criterion of explicitness very well. They are also measureable with well-defined

baselines and measurement techniques. Generally speaking, these two criteria form the basis for a sound system of goals.

There is some question in the area of attainability. Goal attainment is apparently no problem in the areas of aircraft and vehicle operations. The specific goals established in these areas have been exceeded, and even further improvement is predicted (15:2,15,25-26). Goal attainability in installation operations is questionable. Facility energy managers and the Civil Engineering community generally agree that the required energy reduction in facilities is not attainable given current funding levels (7; 15:1-39).

The criterion of acceptability is also somewhat subject to question. Although these goals must be "accepted" by virtue of the fact that they have been directed by higher authority, they may not be accepted on their own merit. Conversations with energy managers at varios levels of command (7; 17) indicate that there is still an element in the Air Force that believes the entire energy situation is a sham propagated by the oil industry, and that there is no real need for energy conservation and management.

The problem of goal congruence is particularly difficult in energy management. Because of the pervasiveness of energy considerations in all areas of Air Force activity, goal conflicts are inevitable. It would be virtually impossible to establish firm guidelines for resolving all of these

conflicts. The Air Force addresses this issue by emphasizing in it's open-ended objectives (13:2; 14:5), that energy goals are not to be accomplished at the cost of degrading mission requirements, force readiness, safety, security, health, or welfare. Specific conflicts are resolved by higher authority based on these guidelines.

Planning

The Air Force does recognize the importance of planning in it's Energy Management Program. AFR 13-1 gives responsibility to HQ USAF to "formulate and coordinate Air Force plans"(13:3). Additionally, all levels of command (HQ USAF, MAJCOM, and base level) are directed to establish an Energy Conservation Task Group whose duties include setting up a contingency plan for energy shortages (13:3). The guidance regarding the contingency plan includes the suggestion that this plan be updated at least annually (13:4). The proposed AFR 13-1 reiterates these directives but is much more specific as to responsibilities and requirements. In addition to the broad guidelines given in the present AFM 13-1, the proposed AFR 13-1 includes provisions for:

-- contingency plans regarding defense contractor energy shortages (14:10).

-- plans specifically directed at facility energy goals (14:11,12).

-- a ten year base level energy plan which includes

contingency planning (14:13).

The requirement for planning in the present AFR 18-1 would seem adequate if the spirit of the directive were followed. However, there is little evidence that this has been done. Contact with HQ USAF/LEYSF (7) indicates that plans at the MAJCOMs and at the separate installations generally are either superficial or fragmented. Many plans consist mainly of background information concerning the need for energy management and past performance data. They include little regarding guidelines for future activity. Other plans are fragmented in that the separate base organizations have their own plans but there is no real integration into a single overall plan. In addition, HQ USAF/LEYSF (7) indicated that many plans exist in name only, with no real content, solely for the sake of meeting the requirements of AFR 18-1. If adopted, the new AFR 18-1 should do much to combat the deficiencies in planning. With it's more specific guidance, backed by authority of HQ USAF, the new AFR 18-1 would force the various organizations into developing more realistic plans.

Organizing

Both the present AFR 18-1 and the proposed AFR 18-1 direct all levels of command to establish an Energy Conservation Task Group to coordinate all matters pertaining to energy conservation. This group is to be made up of members from

all major energy managing activities (13:3; 14:13). This approach is in keeping with the team approach outlined in Chapter III and could be very effective in managing the energy program. However, conversations with HQ USAF/LEYSF and AFLC/XR (7; 17) indicate that the loyalty of team members to their own functional areas often outweigh their sense of responsibility to the energy effort. This opinion is given further credence by the schism that exists between activities concerned with mobility fuels and those concerned with facility energy. Mobility fuels are generally the domain of the Base Fuels Office, and facility energy is handled by Civil Engineering. Rarely do the two offices coordinate their activities toward the accomplishment of the overall energy management objectives. HQ USAF/LEYSF (7) has stated that the first true integration of these two factions occurs at his level of responsibility. So even though the team approach is advocated, it is not, in fact, being used effectively.

Having one person as a full time program coordinator is not addressed in the present version of AFR 18-1, but is specifically included in the proposed AFR 18-1. The proposed AFR 18-1 requires that every installation commander appoint a full time Energy Management Officer to coordinate the base energy program (14:12). Research into this area has shown that the few installations using this approach have had high degrees of success with their energy management programs, and that as a result, other installations are adopting this

approach. However, the appointment of a full time program coordinator has not been well accepted in the past because of manpower shortages. Also, at the present time only two MAJCOMS have single point program coordinators, neither of which is a full time position (7). Again, although the MAJCOMS generally agree on the desirability of this feature, few are willing to divert the manpower from other areas of concern.

Staffing

One of the major problem areas in the Air Force Energy Management Program is in staffing. Personnel for energy management must presently come from existing resources. Given the reduced manning levels in practically all Air Force organizations, most MAJCOMS and installations have been reluctant to provide sufficient personnel to effectively manage the energy program. This is a recognized and unavoidable problem, and is one of the reasons that HQ USAF/LEYSF is promoting the use of the team concept (Energy Conservation Task Group) of management with a full time program coordinator (Energy Management Officer). That approach is not only a very valid and effective management concept, but it also requires the least amount of personnel resources.

Directing

Directing, or controlling, in the Air Force Energy

Management Program has been minimal. The only apparent control has been the review of the DEIS I (mobility fuels) and DEIS II (facility energy) reports which provide the minimum information necessary to measure conservation performance against the specified goals (14:41). Although this is in keeping with the espoused concept of decentralized management (14:18) it has resulted in the continuance of inadequate energy management programs. Energy managers, tasked with program implementation, have little authority to direct program activities. The authority to direct lies with MAJCOM and installation commanders (13:3) who have many other responsibilities and priorities, and energy management has not received much priority in the past (7). However, this situation is changing as the energy problem continues to escalate and commanders become more aware of the impact (7). The situation also is being relieved through the establishment at HQ USAF/LEYSF of a formal Air Force Energy Program Policy Memoranda (AFEPPM). This publication is used to promulgate energy policy initiated by the Department of Defense, Department of Energy or internally by the Air Force (14:4). HQ USAF/LEYSF has reported encouraging results since the AFEPPM was initiated. Energy management officers are receiving the publication well, and are bringing their programs more in line with the intention of AFR 18-1 because of the policy clarification and direction AFEPPM provides. Further relief from

the lack of direction is anticipated if the proposed AFR 13-1 is adopted. With it's more specific guidance, backed by the authority of HQ USAF, plans and programs would likely be much more adequate and effective.

Coordinating

In Chapter III, coordination was said to be facilitated through the mechanisms of communication and standardization. Neither mechanism is highly developed in the present form of the Air Force Energy Management Program.

One of the major problems in researching this thesis was the lack of clearly defined lines of communication. Both questionnaires and telephone interviews were rejected as research methods because the lines of communication were so fragmented. At the time research for this thesis started (January 1980), only one MAJCOM (AFLC) was known to have an office with responsibility for overall program integration. Energy managers in most commands were found to be responsible for specific areas of interest (e.g. aircraft operations, facilities, vehicles, or energy awareness), but had little or no information regarding the overall management program. This lack of clearly defined lines of communication not only caused frustration in the research of this thesis, but also has resulted in severe coordination problems throughout the Energy Management Program (7).

Standardization in the Air Force Energy Management

Program is limited to who is responsible for submitting the DEIS I and DEIS II reports. Actual program management is standardized very little. HQ USAF/LEYSF has stated (7) that this lack of standardization has had a profound effect on program coordination. Guidance from his office cannot be issued uniformly, but often must be tailored to the various MAJCOM and installation programs. Policy directives have not been approved at times because of the diversity with which programs have been implemented. Directives applicable and beneficial to some programs could be inapplicable or detrimental to others (7).

The proposed AFR 18-1, if adopted, would provide for much better coordination. The establishment of an Energy Management Officer (14:12) would help eliminate the fragmentation in the lines of communication. With that feature, plus the Air Force Energy Program Policy Memoranda (AFEPPM) to disseminate guidance (14:4), coordination should be greatly enhanced. Also, the AFEPPM is already having positive effects toward standardization. Because of it's clarification of Air Force program intentions, several installations and MAJCOMs are in the process of bringing their individual programs more into line with expectations (7). This trend is expected to continue, but should be more rapid and complete if the proposed AFR 18-1 is adopted (7).

Chapter Review

This chapter has compared the energy management program model, developed in Chapter III, with the features of the presently existing Air Force Energy Management Program. This comparison has also included the conditions that are expected to exist following adoption of the proposed AFR 18-1 Specific findings were:

1. The goals of the present program are clearly defined and adequate, but there is some question about their acceptability and attainability. The proposed AFR 18-1 spells out these goals even more clearly, and combats the problem of acceptability through clarification provided by the Air Force Energy Program Policy Memoranda. Problems with goal attainability will also be more easily resolved because of the more clearly defined lines of communication and responsibility.

2. Present planning afforts throughout the existing Energy Management Program are fragmented and often superficial. There has been little effort to develop integrated and meaningful plans. This can only be corrected through emphasis on the importance of adequate planning in the energy program, and clarification of the requirements. The proposed AFR 18-1 provides clarification of requirements and emphasizes their importance.

3. The team approach to program management is advo-

cated but not being [illegible] ance to their "home office" [illegible] efforts. Also the concept of [illegible] is rarely used due to a manpower [illegible] being partially rectified through [illegible] PPM, and should be fully resolved with the [illegible] authority contained in the proposed [illegible].

4. Staffing of the Air Force Energy Management Program is a major problem due to Air Force wide manpower shortages. This is probably the most significant argument for more fully developing the team approach to management.

5. Directing has been minimal because of the espoused concept of decentralized management and the lack of authority vested in program managers. This problem is being gradually rectified as energy costs increase and the importance of energy management becomes more apparent. Adoption of the proposed AFR 18-1 will also aid in resolving this problem with it's more specific guidance backed by HQ USAF authority.

6. Program coordination is probably the most serious problem facing the Air Force Energy Management Program. Lines of communication are very fragmented and standardization is essentially non-esistent. Again, this situation is being gradually corrected, aided by the recent publication of the AFEPPM, and should be almost fully relieved with the

adoption of the proposed AFR 19-1.

These findings, in general, indicate that the Air Force Energy Management Program has many deficiencies, but that it is also in a state of change directed at correcting those deficiencies. The change that the present program is undergoing is in the direction of the program features incorporated in the proposed AFR 19-1. These specifications are almost identical to the features developed in Chapter III for a model program. Adoption of that regulation would speed the process of change and result in a more adequate and effective management program.

V. Recommendations

At the time of completion of this thesis it is felt that any specific recommendations for changes to the structure of the Air Force Energy Management Program would be superfluous. The program is already in a state of change directed at achieving the structure which was originally intended, and which is more specifically detailed in the proposed AFR 19-1. That structure is essentially identical to the model developed in Chapter III of the thesis. Therefore the only recommendation to be made is in regard to the overall Energy Program management, and is that the proposed AFR 19-1 be adopted immediately. With it's greater clarity and depth, backed by HQ USAF authority, the new AFR 19-1 would compel a more fully developed Air Force Energy Management Program.

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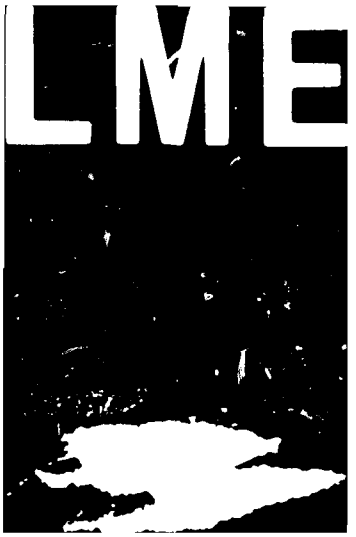
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