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ABSTRACT

Intended for use by high school debaters and their teachers, this book provides guidelines for research on the debate topic for the 1978-1979 school year: "What should be the energy policy of the United States?" The first section is designed to broaden the student's comprehension of the debating process by focusing on the meaning of the energy problem, stressing the importance of being problematical, and defining the terms involved in three resolutions generated on the debate topic. Over half of the book discusses the energy problem in the world today and presents 14 tables of information on the subject such as: United States gross energy input by source, the framework of the energy department, the world production of crude petroleum, United States fuel production and consumption, and nuclear and solar power. A selected bibliography of pertinent books, periodicals, law journals, and government documents is appended. (MAI)

ERIC First Analysis:

Energy Policies

1978-79 National High School Debate Resolutions

ERIC Clearinghouse on Reading and Communication Skills
National Institute of Education

SCA Speech Communication Association
5205 Leesburg Pike, Falls Church, Virginia 22041

ERIC First Analysis: Energy Policies

1978-79 National High School Debate Resolutions

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Foreword

The *ERIC First Analysis* of the 1978–79 National High School Debate Resolutions was prepared by the author for publication by the Speech Communication Association in cooperation with the Educational Resources Information Center Clearinghouse on Reading and Communication Skills (ERIC/RCS).

ERIC First Analysis, published annually since 1973, provides debaters with guidelines for research on the debate resolutions selected by the National University Extension Association's Committee on Discussion and Debate. This year the resolutions center on the problem of the energy policy of the United States. Through study of the author's analysis, students should gain insight into the breadth and depth of the issues involved in the debate resolutions. Educators will also find the resources useful in planning debate workshops or in teaching students about the processes of research in argumentation. Individuals studying the problem of U.S. energy policy in contexts other than debate will also find *First Analysis* to be a valuable guide to issues and resources.

This project fulfills the directive from the National Institute of Education (NIE) that ERIC provide educators with opportunities for knowledge utilization beyond that provided by the ERIC data base. NIE, recognizing the gap between educational research and classroom teaching, has charged ERIC to go beyond its initial function of gathering, evaluating, indexing, and disseminating information to a significant new service—commissioning from recognized authorities information analysis papers focusing on concrete educational needs.

As an ERIC information analysis paper, *First Analysis* has two unique features: (1) it is intended for direct use by high school students as well as by their teachers, (2) it must be written in one month following the announcement of the national debate topic (on February 1). The author's thorough analysis of issues and sources in so short a time and his adaptation to the needs of high school debaters are tributes to his excellence as a forensics educator.

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National High School Problem Area, 1978-79

What should be the energy policy of the United States?

Discussion Questions

To what extent should the federal government control the development and distribution of energy resources in the United States?

How can the federal government best reduce energy consumption in the United States?

How can the federal government best increase the energy independence of the United States?

Debate Propositions

Resolved: That the federal government should exclusively control the development and distribution of energy resources in the United States.

Resolved. That the federal government should establish a comprehensive program to significantly reduce energy consumption in the United States

Resolved. That the federal government should establish a comprehensive program to significantly increase the energy independence of the United States.

Preliminary Observations

The purpose of this material is to stimulate your thinking about a subject which will occupy a great deal of your time as a debater over the next several months. This book is also designed to broaden your comprehension of the debating process and generate a whole series of questions which you, your fellow students, and your instructor can consider. Admittedly, this is not the final word on the subject area or on any theoretical concept concerning debate. Those issues will be argued by the disputants within classes, small groups, debates, and society.

The materials cited in this book have been verified for accuracy, both in language and in scholarly citations. However, you are encouraged to verify each and every item you choose to incorporate into your own file of evidence. As a firm rule, this writer always holds the debater who is speaking absolutely responsible for whatever is read into a round. The automatic consequence of evidentiary error is the loss of a round of debate. If extenuating circumstances exist, this writer does not make a final judgment about the ethics of the offending debater. However, the responsibility for accuracy may not be shifted to "other members of the squad," "the handbook," "a friendly squad," or "carelessness."

Another observation relates to the changing nature of debate as an activity. During the past ten years, a number of basic assumptions have changed, and the final rounds of many recent tournaments attest to this shift. For example, consider first the quick birth, life, and death of circumvention. Five years ago, teams noted that the attitudes of people persist even after adoption of a new policy. This time-worn notion was paraded before judges by debaters under a new title—circumvention. Within a year, teams across the land argued that attitudes precluded solvency. By shifting to rigorous wording of plan mandates, teams blocked the applicability of circumvention, and the argument is not now used in very many rounds of quality teams. Consider also the current popularity of the counterplan: "Study it, and then we'll let democracy take its course." So say many teams across the country. Three years ago, to counterplan was to lose.

Whether or not this particular trend will continue to grow will depend upon any number of circumstances. But *change* is the phenomenon to be noted. The debater who expects to compete for local, regional, or national honors based upon a static view of debate will be disappointed. Last year's evidence, as well as last year's theory, can be updated.

No undertaking like this one can be accomplished without substantial assistance. This year, Barbara Lieb-Brilhart of the Speech Communication Association guided my efforts. Dorcas Rohn lent moral support at the ERIC office. Neil Phillips and Lee Parsley accepted additional travel responsibilities with my debaters, and the debaters themselves ignored my ill-temperedness as the work on *First Analysis* mounted. Several varsity debaters lent an evening's time and patience to this project: Rock Demarais, Philip Durst, Darryl Carter, Bill Elsonbrock, Glenn Shafer, and Robert Lawing.

A group of undergraduates at the University of Houston, selected by their enrollment in an upper division course in argumentation, are, in a sense, coauthors of this book: They researched, originally prepared, verified, and in some instances wrote the material on the following topics: Nixon L. Schrader (oil as an energy source) and Craig E. Simmons (oil); Harold Dwane Caldwell, Jr., and Daniel R. Mitchell (coal, coal gas, etc.); Douglas Earl Dryer (international trade and finance); Jim Alvarez and James Wm. Bell (nuclear energy), Weldon L. White (electric power as an energy medium); Michael Ready (other energy resources); Kay Morris (conservation of energy); and Ramon Rosales, Jr. (solar energy prospects)

This work is dedicated to Beth and Sarah, two young friends who make the future of debate look brighter.

The Problem Area

Are you a beginning debater? If so, this year you will argue the worth of various United States energy policies. The material in this section focuses upon the meaning of the energy problem area and the importance of being problematical.

Are you continuing your debate career this year? This section provides common ground for debaters, coaches, and judges across the nation. Commissioned by the Speech Communication Association, *ERIC First Analysis* will be read by many members of the high school debate community. Therefore, the impressions gathered while reading this material will influence the research and analysis of these many readers.

Will your students be debating this year? This material should stimulate their thinking on energy—a challenging, vital subject. No definitive answers are presented here. But there are sources, thoughts, and some patterns for examining the subject of energy.

The 1978-79 high school debate community will be focusing upon an urgent national issue. In December 1977, the Committee on Discussion and Debate formulated the problem area in an Atlanta, Georgia, meeting. The National University Extension Association (NUEA) committee annually selects three alternatives. Then the debate community selects one of the alternatives for the year's concentration. This February, the NUEA announced that a referendum vote of thirty-five states and two forensic leagues resulted in the selection of energy as the problem area. Rejected problem areas were mass media regulation and the direction of our foreign policy. The Appendix includes the actual preferential-voting of the membership.

Defining the Problem Area

Three primary definitional approaches are incorporated below. First, the words and phrases have individual meanings. Second, the discussion and debate questions imply some meaning for the problem area. Finally, placing the problem area within a historical context aids understanding. Although many other definitional approaches exist, these three should be adequate to begin your search for meaning in the problem area. Remembering that only the actual participants in a communication exchange can make a final judgment about a definition, the following should be read as advisory, not ultimate, interpretation. The exact statement of the problem area is: *What should be the energy policy of the United States?*

"What should be . . ." The phrase notifies debaters that the problem area is, as might be expected, a question. Further, there is the philosophical implication that, as a question, there is no firm answer as yet. As most debaters realize, we argue about things which are problematic, not things which are certain. Only the ill-informed debate over certainty. Putting the problem area into question form merely accepts the premise that there is no certain answer at this moment to the question of U.S. energy policy.

One key conclusion to be drawn from this notion is that there will be no certain case which will "win" during this debate year Of course, there never is a certain winner. But many beginning debate teams think, as their research begins, that they are seeking the perfect case. Seek, but you will not find.

A second key conclusion to be drawn from the choice of phrasing the problem area as a question is that the framers generally assume that there is an "even" amount of argument available to both the affirmative and the negative teams in the debate. Whether this is true or not does not emerge until *after* the season, and then only in the minds of the various participants. However, in the past, there has been a general balance of arguments on most topics. As a consequence, debaters should attempt to develop an understanding of the question without assuming (or fearing) that one side or the other will have a disproportionate number of arguments available.

"Should be" deserves special attention. Both the resolutions and the problem area employ this verb form. The rationale for use of "should be" is vital in the understanding of the debate activity. Debaters argue the merits of a policy, with one team defending and the other rejecting it. The reason why the two teams argue is that, by argument, a clearer judgment about the question being debated emerges for the participants. The word *should* implies a projection into the future. Most debaters use the phrase "ought to, but not necessarily will" to describe the distinction between the words *should* and *would*. In other words, the debate talks about what policy change "should" be adopted, and not what policy change "would" be adopted. This definition can be viewed in another way: after the debate ends, no real policy change occurs except in the verdict of the judge(s). The bottom line of the debate is the ballot line of the debate.

Should also generates the notion of *fiat power* as an issue which should be discussed here. To prevent debate from focusing upon whether or not particular congressmen would vote for a policy, debaters have adopted a convention called granting fiat power for the adoption of a proposal. The convention is that both teams assume that the legislation would be passed. This issue is thus waived from the debate. The convention is applied equally: when either team proposes a policy, it is given fiat power, and the other team will not argue that the policy would not be adopted.

Fiat power does not mean that a team is unable to argue that a policy might be circumvented. Clearly, the policy must be such as to warrant continuance. The policy must therefore be of a type which would generate public support, since serious flaws in the policy would mean its circumvention.

Nor does fiat power mean that a team may include just any provision in its plan. A team may include only topical provisions, thus, any provision which cannot be defended as being part of the system identified by the resolution (the topic) *must be* jettisoned from the debate. Once the plan provision is eliminated (no longer considered as having been presented in the round), the judge would still consider the validity of the policy, however. For example, a team might fund a policy with an extratopical provision. Jettison the extratopical part of the funding, and the plan would be funded by regular budget procedures. The policy would not be rejected on this basis, but arguments against the policy would be considered from this framework.

One final reservation: fiat power should not mean the power to claim the advantages of the case as a consequence of getting the plan adopted. For example, a plan which granted $5 million to support a national debate tournament could claim that tournament as the advantage. But the advantage for adoption would have to extend beyond the dollars. All *reasonable* people should support the proposal, once all arguments are considered, or the proposal should be rejected. A second example might aid understanding of this critical problem of the word *should* and its mechanism in debates, fiat power. If the inherency of a problem is government inertia, then to fiat the policy into existence with "better people directing the policy" would be a distortion of the power of fiat. (For further discussion of this concept, students should consider comments in various texts on fiat, inherency, and plans.)

"The energy policy . . . " The second phrase of the resolution identifies this year's debating as being about "policy questions." This means affirmative teams will be expected to present plans. The choice of the word *policy*, as well as [illegible]ion, dictates this approach. That the affirmative will be expected [illegible]velop a policy does not eliminate other obligations, of course. To gain assent from a judge about a policy different from that employed currently usually requires additional burdens to be discharged. For example, the typical judge will expect a team to identify a problem, isolate probable causes which are corrected by the policy, and isolate the advantages which the policy yields before voting for an affirmative.

Most debaters are distressed if the plan (policy) is not presented early in a debate. The reason for this is the typical "duty system" employed by negative teams in debates, the first negative speaker works on the "case," and the second negative speaker works on the "plan." When a plan is not presented early in the debate, the negative team feels that their opponents are taking undue advantage of their presentation time by delaying introduction of the plan into the debate. You are thus encouraged to present the plan very early in the first affirmative speech. Policy in the problem area will be discussed at length later in this book. At this point, you should remember that the policy focuses upon "energy."

Definitional work on key terms will influence the development of cases on the resolutions of 1978-79. In Greek, the word *energy* meant work. The application of effort to accomplish a task—work—can serve as a beginning definition of energy. A second definition identifies energy as consisting of the various types of energy: mechanical, heat, light, chemical, electrical, and nuclear.[1] There are in fact a great number of varied definitions for the term *energy*, and you will examine many of them before the debate season ends. But the meaning of "energy policy" lies between "work" and "types of power," or at one of these ends.

The combination of the two words *energy policy* should be considered as well. When discussing this phrase, one remembers the first fireside chat of President Carter, which focused on a national energy policy. The various indices of scholarly journals, the comments of legislators and news commentators, and everyday interpretations all seem to agree: when the phrase "energy policy of the United States" is mentioned, the subject matter concerns a comprehensive program of power generally related to the changing conditions created by the OPEC oil embargo of 1973-74.

"Of the United States?" This phrase completes the statement of the problem area. Clearly, the *policy* being discussed this debate season will be *of* our nation, not *of* other nations. Equally as obvious, one would suspect, is that the nation being considered is the one with major offices in Washington, D.C., not some new group located in the several states. This distinction becomes important when the question of counterplans is considered. One caution is necessary, however. As with some debates last year, teams will want to study the problem area carefully, for certain notions relating to "the energy policy of the United States" might appear to be an energy policy, but closer examination would reveal that the energy policy would be *of citizens,* not *of the government*. Without careful argumentation, one would expect affirmatives including such elements in their policies to be judged as including extratopical provisions in their policies.

On Being Problematical

The high school debate community selected the 1978-79 subject. The ballot was democratic, yielding majority support for the energy problem area. One rationale for being *problematical* is that the problem area was selected by consensus of the debate community.

A second rationale is that testing issues in debate is heightened if both sides know the subject in advance. Argumentation is useful in public policy making for this reason. Some maintain that debate should mirror this function for reasonable citizens as well.

Third, a debate about a nonproblematic area might be unimportant. No clear mandate from the debate community warrants nonproblematic discussion. The tournament rules and the students and coaches attending the tournaments all assume problematic discussions. Questions would therefore emerge about nonproblematic subjects.

Finally, the most frequently mentioned rationale for remaining within a problem area relates to *justice*. If the activity is a game, then justice demands that the subject of the game be known. If the affirmative can choose *any* problem area, no negative can expect fair play.

Consensus, testing issues, important subjects, and justice all call for clear understanding of the problem area. Being problematical matters in debate. This preliminary analysis should assist you in understanding. But the research is ahead.

Defining the Terms

Three resolutions on the energy problem area were generated by the Committee on Discussion and Debate. The comments below "define" the terms of these resolutions, but only provisionally. No finality should be assumed about them. Rather, you should be (1) stimulated to accept, reject, or augment these definitions and (2) challenged to improve upon these definitions.

The 1973–74 oil embargo probably epitomizes the public concept of an "energy crisis." Against this background, President Carter's energy policy, discussed in his first fireside chat, various pieces of legislation, the new Department of Energy, and the multitude of public statements by leaders of the United States all suggest a view of energy related to fuel. Fuel for automobiles, industry, or homes would therefore appear to be the center of this year's resolutions.

The first topic focuses upon development and distribution of energy *resources*. The second aims at reducing energy *consumption*. The third is concerned with increasing energy *independence*. The meanings discussed below are generated by considering the words and phrases first in isolation, then within the context of the propositions and the problem area, and finally as they relate to national affairs.

Topic One *Resolved: That the federal government should exclusively control the development and distribution of energy resources in the United States.*

There are six phrases requiring definition in this topic. Several of these phrases are duplicated in one or both of the other resolutions and thus are only discussed here. For example, the phrase "the federal government" is in each resolution.

"The federal government . . ." As the agent of change identified in the resolution, the new energy policy which affirmative teams will advocate

under this resolution will be under the aegis of *the federal government.* Most would define this phrase as referring to the men and women in Washington, D.C., as noted in the previous section on the problem area. Additional support for this interpretation is found in the full statement. Here, the final phrase talks about "the United States." Given this information, the federal government probably refers to the government of the United States. Also, as noted earlier, the choice of "the" as the article within the phrase further identifies the government Jimmy Carter currently heads as the government this resolution discusses.

"Should exclusively control . . ." The second phrase of this resolution needs clarification. (Material relating to "should" is included in the discussion of the problem area and is omitted here.) The choice of the adverb *exclusively* makes this resolution very difficult to debate, in the opinion of this writer. There is no question that the adverb is all-inclusive in implication. The only exception, it would appear, would be for that which is not within any agent's control. The exclusivity of federal government control would lead to very serious plan problems as well as questionable completeness of rationale for change by affirmative debaters.

The agent of change, the federal government, is to be given "exclusive control" according to the resolution, but the word *control* might prove to be an escape valve for affirmatives on this resolution. One dictionary defines this word as "restraining power or influence; check; restraint; power; authority; government; command. . . . To exercise control over; to hold in restraint or check; to subject to authority; to regulate; to govern; to subjugate."[2] Drawing from these definitions, a debater might be able to claim that having exclusive control means that final authority rests with the federal government and that setting up regulations which give individuals some latitude represents exclusive control. A law saying "no factory may utilize coal for the production of energy without first obtaining government permits relating to the amount of allowable air pollution" would therefore be topical from this perspective.

A further distinction about exclusive power: power can be defined as being potential. Just as energy exists, whether it is being utilized or not, so exclusive power can exist. So a government agency with exclusive power to regulate hydroelectric power might delegate daily management to a private company but retain exclusive power to make judgments about the company.

Ultimately, the issue would probably become, "What is the distinction between partial and complete control?" The belief of this writer, in advance of hearing the arguments, would be that the negative would carry the argument launched in the paragraph above. That is, exclusive power could not be divested by a government agency quite so much as is suggested in that definition. By negation, the definition would probably exclude private individual power and collective individual power. Only the government would have ultimate power.

"The development and distribution . . ." The common sense definition

of the phrase would seem to indicate the production and sale of energy. But *development* might also be narrowly defined as activities related to creation, i.e., the research part of the productivity process. *Distribution* might be narrowed into the transportation of the finished product (in this instance, of energy) to the marketplace. In any event, the possible meanings implied by this phrase vary greatly. Production and sale of energy would incorporate everything from extracting coal from a mine to collecting the money from the customer in Boston. Research and transport would mean a much smaller segment of the energy picture.

The interpretation of this phrase, as with any other aspect of the debate process, will remain with the debates in a round and their judge. But for the moment, consider several implications of the broader definition. First, this would require a team to include a rationale on a much broader level. Second, the evidence used by the team would therefore become much more generalized, since the time within which the debate is held remains the same. Third, the kinds of objections raised to the affirmative rationale will be equally generic as a consequence of the broad interpretation. Given these problems, many teams prefer to develop narrower definitions. Consider the opposite approach, however.

The narrower definition omits consideration of the interactions which must exist when one deals with public policy. The narrower definition also omits much of the potential clash anticipated when the subject area was selected for debate and thereby distorts the nature of the activity. Thirdly, the narrower definition is, by definition, of lesser importance than the broader definition. A debater must find a place between the extremes or accept certain limitations upon the definitional approach chosen for a particular case area.

Three prospects of meaning for *distribution* should give a starting place to debaters. Harold Lazarus, in the *American Business Dictionary*, defines *distribution* as follows:

> 1. Another term for marketing.
> 2. A term for two of the many functions of marketing, buying, selling, and all that implements them.
> 3. In economics, the division of the total income of society among the factors of production, which are land, labor, capital and management. Also, personal distribution, which is the division of the total income of society among individuals or classes.[3]

A second definition is given in *A New Dictionary of Economics*:

> *Distribution.* The main sense in which the economist uses this term is the apportionment of the national income among the factors of production (ggu) which co-operate to produce that income. The distribution is then into interest, profit, rent and wages (ggn), and a theory of distribution can be evolved to account for the actual apportionments in the economy.... Distribution is also used to refer to that part of commerce responsible for the channeling of goods from producers to consumers.[4]

A final definition is found in *The Price System and Resource Allocation:*

> *Distribution, Output*—How the output of net national product of an economy (usually defined in terms of one-year time periods) is shared among individuals and/or families.[5]

The meaning of *development* begins with an understanding of two kinds of research: basic and applied. *The McGraw-Hill Dictionary of Scientific and Technical Terms* defines basic research as "fundamental theoretical or experimental investigation to advance scientific knowledge, immediate practical application not being a direct objective. Also known as pure research."[6] The same source defines applied research as "directed toward using knowledge gained by basic research to make things or to create situations that will serve a practical or utilitarian purpose."[7] If *development* refers to research, both applied and basic research are important.

The meaning for *development* might be less technical. One approach might be to equate the word with *manufacture*. Thus, in combination, development and distribution would mean *manufacture and sale*. Taking coal from the mine and putting it into the customer's hands would all be part of the process defined by this approach.

"*Of energy resources* . . . " The prepositional phrase modifies "development and distribution." As a consequence, the phrase must be consonant with the definitional approach used for the other phrase. For example, if the broader meaning mentioned in the preceding paragraph were employed, this phrase would apply to the resources which could be sold, not those which were not salable. *Energy resources* clearly refers to the same energy identified in the problem area: the Carter-fireside-chat-energy, the Arab-oil-energy, and the polluted-coal-energy. The definition of *resources* is less obvious, however.

Webster's New International Dictionary of the English Language defines *resource* as "a new or a reserve source of supply or support; a fresh or additional stock or store available at need."[8] Most people would think of fossil fuels and water, solar, and nuclear power as our resources of energy. These represent one basic approach to defining "energy resources." Others exist, however. The dictionary approach might deny that which would later be developed as being a resource. The dictionary notes "available at need" as an aspect. But if technical knowledge existed to make the energy available at need, then that energy could well be called a resource.

"*In the United States.*" The final phrase of this resolution validates interpreting that the agent (the federal government) is located in Washington. But there are other implications to be drawn from this phrase.

The choice of the preposition is important in this resolution. "In" the United States is clearly not "outside" the United States. The energy resources, therefore, are not those outside of our country. The agent (the federal government) will have exclusive control over the energy resources *in* our country. One additional clarification for the use of the preposition *in* for this resolution: no regulation of energy resources outside the United States would be topical in ordinary circumstances. That is, unless the affirmative could demonstrate that the regulation controlling resources outside of the United States was an inherent, systemic part of the totally topical provision of the affirmative, that regulation would be stricken from the policy before judgment would be made by this critic.

An additional remark about this resolution is important. The resolution identifies an action, agent, and object of policy, but it does not identify the intended benefit of the policy. The resolution, in terms of policy, would produce certain effects, but those effects are not the benefit. The benefit will be determined by the choice of arguments by the affirmative and negative debate teams in individual rounds held during the year. Thus, there are two meanings for the word *effect*, and only the policy effect relates to topicality.

The rephrasing (in parentheses) of the first topic shown below summarizes the definitional approach:

> *The federal government* (that group with central headquarters in Washington) *should exclusively control* (ought to, but not necessarily will, have final regulation of) *the development and distribution* (the manufacture and sale) *of energy resources* (of power generation for business and recreation currently tapped and untapped) *in the United States* (the resources here, not abroad).

There are as many other definitions for the first resolution as there are thoughtful debaters in the nation. No one is "right" outside of a debate round, for the judgment about a definition occurs there, not in advance.

Topic Two *Resolved: That the federal government should establish a comprehensive program to significantly reduce energy consumption in the United States.*

Three phrases in this resolution need defining here. Omitted are (1) "the federal government," (2) "should," and (3) "in the United States." Each were defined above. Also omitted is the definition of energy, defined in both the problem area and in Topic One.

"Establish a comprehensive program . . ." This phrase requires attention to each word, including the article, and then to the combination of words. The greatest difficulty debaters might have on this resolution is found in this set of words, since some contrast between "real world" and "debate world" considerations can be discovered herein. For this reason, this writer is pleased that the third topic is apparently the favorite of most states, rather than this topic.

To define *establish* is to indicate that the affirmative is to "launch" with one definition. *Webster's New Third International Dictionary* provides a number of others: "to make firm or stable, . . . to place, install, or set up in a permanent or relatively enduring position especially as regards living quarters, business, social life, or possession, . . . to found or base securely (as a theory), . . . to assist, support, or nurture so that stability and continuance are assured, . . . to settle or fix after consideration or by enactment or agreement, . . . to bring into existence, create, make, start, originate, found, or build usually as permanent or with permanence in view."[9] That the topic uses *establish* allows certain interpretations by affirmative teams, but, by the same token, denies other options. Establishment entails some continuity, but how much? That is a task to be determined within a round.

"A" policy is less demanding than "the" policy. The indefinite article permits variety; the definite article does not. By extension, an affirmative team on this resolution could propose one of any number of energy policies. Were the resolution to utilize "the," affirmative teams would be expected to supply *the* policy for the energy of the United States.

The word *comprehensive* is an adjective, and the grammatical function of an adjective is to describe or limit the meaning of a noun or noun substitute. The noun is *program* and therefore *comprehensive* must indicate some limitation or describe *program*. Dr. Leo P. Vernon, Brigham Young University, is quoted in the *Congressional Record* using the word *program* in the sense this resolution may mean:

> What is needed is the well rounded program, including a foundation of basic research, upon which applied research and technological development can proceed in logical sequence in the years to come. This is the only way we can maintain our scientific position in the world as well as provide for our own means.[10]

Program is a concrete noun. *Webster's New Collegiate Dictionary* defines the word as "a brief outline of the order to be pursued or subjects embraced, in any public exercise, performances, etc."[11] *The American College Dictionary* defines *program* as "a plan to be followed."[12]

In summary, when the full phrase is combined, the meaning might well be that the affirmative should propose one well-rounded policy intended to have a sustained role in the energy plans of the United States.

"To significantly reduce . . ." The usual definition of *significantly* is related to the meaning employed in the development of a debate issue. How harmful is the condition identified by the affirmative? In breadth? In intensity? What numbers can the affirmative identify which would provide a clearer understanding of the importance of the problem being discussed?

But there is a second definition for *significantly* which is equally acceptable for use in debate. Debaters often refer to a *philosophical* problem; in recent debates, this has sometimes been called a *process* problem. Both refer to approximately the same thing. *The nature of an act* represents the philosophical dimension; *the way something is done* represents the process dimension. To deny freedom would be significant.

To rely upon private business, not government, to develop energy supplies might be a process advantage.

When used within a debate resolution, *significantly* means that either quantitative or qualitative measurement will be an expectation of the policy. In 1976, an article employed the word in a similar way:

> The reduction in energy consumption of 2% in the 1973 base period is, however, significant as the trend during the 60s and early 70s was for energy consumption to grow annually by about 4%.[13]

Clearly, the burden for an affirmative team is to provide more than an insignificant reduction, but less than a drastic one. One author assumed that a 6 percent shift from +4 percent to −2 percent would be a significant trend. Others might consider even smaller changes significant. "Reduce" establishes the direction of change required of the policy. To significantly reduce energy consumption would mean that the program would be an energy reduction program in the sense of consumption.

"(Energy) consumption . . ." Omitting consideration of energy (covered in Topic One) and moving to the definition of the word *consumption* requires that the reader accept the notion that energy is related to power. *Consumption* relates to an act by the public and government. Using energy does not, in physics, consume that energy. But in the economic sense, the energy is consumed in satisfying the needs of energy users. When Houston Light and Power generates electricity, the expectation is that customers will "consume" the energy. The gasoline manufactured by Texaco will be consumed by automobiles driven by customers. This is probably the kind of consumption which the framers of the resolution had in mind, although that, of course, is basically irrelevant since the meaning of the resolution is what is determined by the debaters for a judge during a round of debate.

As was done with the first topic, a rephrasing alongside the original wording of Topic Two is provided here:

> *The federal government should establish a comprehensive program* (the Washington-centered part of our government should launch a well-balanced system) *to significantly reduce* (to either quantifiably or qualitatively decrease) *energy consumption in the United States* (use of various power resources of our nation).

Topic Three *Resolved: That the federal government should establish a comprehensive program to significantly increase energy independence of the United States.*

Only three words in this topic need specific attention. The rest of the language has been treated above. There are several general observations that must be made, however, about the overall language of this topic.

If the observation of the NUEA (see Appendix) is correct, most of the readers of this book will debate Topic Three. Very special attention, therefore, should be given to the implications of this phrasing of the problem area.

"Increase," "independence," and "of" are considered below. This is followed by a discussion of the direction, nature, and potential meaning of the entire resolution.

"Increase . . ." In the material on Topic Two, *reduce* is indicated as a shift in direction of consumer use of energy. In this resolution the assumption is reversed. Here, national independence is anticipated as being on the increase as the policy effect of the resolution. Critical to the comprehension of the definition suggested for this term is the key phrase "policy effect." The resolution does not identify the policy's advantage or benefit but merely identifies the policy anticipated. The policy dimension (the plan) would increase (make larger) the independence.

To augment understanding, several comparisons are in order. Consider two other resolutions:

1. A resolution calling for "an increase in building permits in Atlanta, Georgia."
2. A resolution calling for "an increase in the courts of law in the United States."

These resolutions identify the policy effect which affirmative teams must define and then "operationalize" with their policy. The judge will be expected to evaluate whether or not a team is topical, based upon the definition of the policy effect anticipated by the resolution when laid down side-by-side with the policy. The first resolution requires increased building permits. The policy would have to increase building permits one way or another as the core action. The second resolution requires more courts of law. The policy of the affirmative would be to increase courts of law. The policy effect, more courts of law or more building permits, need not, and in fact probably would not, be the advantage.

In summary, a team must provide the policy effect in the plan. Once the judge and teams agree (or the judge decides) what the topic requires as the policy effect, an affirmative which offers something not part of that policy effect is guilty of extratopicality, and the element is eliminated from the consideration of the judge.

Increase, then, determines the direction of the affirmative policy effect. *Webster's New Third International Dictionary* provides ample definitional grist for debaters:

> To become greater in some respects (as in size, quantity, number, degree, value, intensity, power, authority, reputation, wealth) . . . opposed to decrease . . . to multiply by the production of young . . to make greater in some respect (as in bulk, quantity, extent, value, or amount): add to: enhance . . multiply: increase intransitively may carry the idea of progressive growth in numbers, size, amount, quantity, or intensity.[14]

Clearly, the word without a meaning*ful* "item to increase" is meaning*less*. Therefore, the next term must be discussed.

"Independence . . ." This word is defined by *The Oxford English Dictionary* as meaning "the fact of not depending on another (with various shades of meaning: see the adj.); exemption from external control or support; freedom from subjection, or from the influence of others; individual liberty of thought or action. Rarely in bad sense."[15] The key implication to this writer of the definition is the notion of exempting external control. When the United States eliminates the control of foreign governments and/or businesses involved in the supply of energy, then the United States has become independent. If the program of the affirmative were to *increase* the exemption from external control, then the affirmative would seem to be responding to the demand in the resolution to "increase independence."

A second source defines the word similarly: "The quality or state of being independent: freedom, liberty."[16] The definition of *independent* is "one that is not bound by or definitively committed to a political party."[17] The notion of independence thus relates to individual action. The political party portion of the definition might be quite useful for development of an analogy: those who declare themselves independent in elections have the opportunity to vote for candidates of other parties; the United States should have the same opportunity to purchase oil or other energy resources while increasing independence.

A final source defines the word as follows: "Exemption from reliance on, or control by, others; self-subsistence or maintenance; direction of one's own affairs without interference."[18] The additional meaning for the term suggested by the inclusion of the word *reliance* should be obvious. To reverse the direction from more to less reliance would be responsive to the resolutional demand. The term *control* also enters into the definition. An option which should be explored by debaters is to meet the "policy effect" demand of the resolution by presenting a plan that reduces external control of the U.S. energy supply.

"Of . . ." The final term "of" requires special consideration. *Webster's* gives the following as the first definition: "used as a function word to indicate the place or thing from which anything moves, comes, goes, or is directed or impelled."[19] The energy independence is "of" the United States, hence the potential meaning of this definition would be the "going from" the United States. An examination of other options for this function word might assist debaters:

> . . . at an interval or in a direction with respect to—used to indicate something from which position or reckoning is defined . . . used as a function word to indicate something from which a person or thing is actuated or impelled . . . to indicate the agent or doer of an act or action . . . to indicate the material, parts, or elements composing something or the contents held by something . . . to indicate a particular example belonging to the class denoted by the preceding noun.[20]

The options are many for this term. While the straightforward meaning would appear to be clear, the debater should beware of this sort of approach. Thoughtfulness requires giving due consideration to all potential meanings. The third topic which affirmative teams will be supporting can be rephrased as follows:

> *The federal government* (the Washington group) *should* (ought to) *establish a comprehensive program* (initiate a well-constructed, well-rounded system) *to significantly increase* (which redirects or substantially augments the) *energy independence* (power for private and public work with freedom of control) *of the United States* (by the nation).

The Energy Picture Today

The 1973 Arab oil embargo made the American public energy conscious. As gasoline prices increased, auto travel became a hardship. Other fuel costs also escalated. For the first time, a large part of the public was aware that fossil fuel reserves are limited. At the time, college debaters were arguing government regulation of energy. The debates that year centered on pollution, mass transit, alternative energy sources, and many other aspects of the subject. The transcript of the 1974 final debate, published in another source, is an interesting supplement to this analysis of energy and government policy.[21]

Five years after the oil embargo, the United States still has no firm energy policy, and one wonders whether an overall policy is possible. The following pages are intended to introduce this broad subject to you. But remember that the introduction of this subject will not be enough for debate students. This *First Analysis* will introduce the basic energy types and discuss them from perspectives which will aid your development of cases and negative briefs. But your evidence files will come from your own individual research.

Table 1 should help introduce the subject. The six columns represent energy types; the four rows of remarks describe one professor's judgments about the energy types. By next spring, and perhaps much sooner, debaters will have sharp disagreements with the judgments reflected in this table.

As Table 1 shows, national energy policies will influence international policies. The result is that no affirmative argument can ignore the international implications of U.S. energy policy without risking serious weaknesses in analysis. If, for example, the United States were to increase coal production substantially beyond current projections, our balance of trade would be altered. Although we might benefit by such a shift, other nations would be distressed and would probably take steps to modify that circumstance. The same kind of action-reaction cycle can be expected in most aspects of the energy picture.

Table 1 also suggests how important *time* is in discussing this topic. The energy needs of the United States vary year by year. No single solution can be found to the problems of 1980 and 1985, nor is there a single answer for 1978 and 2000. As our sources of fossil fuels, such as oil, gas, and coal, are exhausted, we must discover replacements or drastically change our life styles. The result of this is that, as time passes, *we must shift our energy needs or shift the source of our energy supplies.*

Table 1. Alternative U.S. Energy Systems and Issues in Global Interdependence

	Coal	Natural Gas	Nuclear Fission	Solar	Geothermal	Tar Sands Oil Shale
Political and economic consequences	1. Expansion of total resources 2. Exportable 3. Domestic gains 4. Transport costs 5. Balance of payments reduction	1. Expansion of total energy resources 2. Higher domestic costs 3. Transport costs	1. Expansion of total energy resources 2. High cost 3. High capital use 4. Uranium costs 5. Balance of payments reduction	1. Expansion of total energy resources 2. High cost 3. High capital use	1. Expansion of total energy resources 2. High cost	1. Expansion of total energy resources 2. High cost 3. Exportable
Security of access	1. Nonvulnerable resource	1. Increasingly vulnerable resource	1. Nonvulnerable resource 2. Proliferation potential 3. Terrorist potential	1. Nonvulnerable resource	1. Nonvulnerable resource	1. Nonvulnerable resource
Implications for international cooperation	1. Frees oil resources for allies 2. Technology transfers 3. Divergent allied interests	1. Frees oil resources for allies 2. Increased Soviet trade possible 3. Possibility of cartelization	1. Frees oil resources for allies 2. Divergent allied interests	1. Frees oil resources for allies 2. Technology transfers	1. Frees oil resources for allies 2. Technology transfers	1. Frees oil resources sources for allies 2. Technology transfers
Potential environmental effects	1. Strip mining costs 2. Black lung costs 3. Air pollution costs	1. Transportation hazards	1. Radiation hazards 2. Accident potential 3. Waste disposal 4. Thermal pollution	1. Heat release costs	1. Air pollution costs 2. Land disturbance 3. Water pollution	1. Water use costs 2. Strip mining costs

From. Nazli Choucri and Vincent Ferraro, *International Politics of Energy Interdependence* (Lexington, Mass., Lexington Books, D.C. Heath and Company, 1976), p. 212. Reprinted by permission of the Center for International Studies, Massachusetts Institute of Technology, and of the Publisher, D.C. Heath and Company, © copyright 1976

Energy Inputs by Type

We rely upon coal, petroleum, natural gas, nuclear power, hydropower, and, to a very small degree, solar power. In 1974 almost half of our energy came from petroleum and a third from natural gas. The major question which you will debate this year is how we can make the U.S. less reliant upon external sources. Should we conserve our energy? If so, how and to what effect? Should we become significantly more independent? If so, through what devices and how will we fare as a consequence? Shall we let the government control development and distribution of energy resources? If so, what modification will this make in the general energy picture of the United States?

While current predictions are subject to serious question, Table 2 shows that the energy demands of the United States are expected to increase substantially by 1985 from 73.1 quads of power to 103.5. Such an increase in so short a time will surely tax our resources. The decrease in natural gas reliance should also be noted as well as the massive increase in nuclear power. As a sidelight, one seriously wonders whether the latter will occur, given President Carter's reservations about nuclear power. Finally, the relatively small increases in coal contributions to our energy input should be considered.

The most important observation one could make about the projections is that no single energy input is projected to dominate by 1985. Clearly, the United States must maintain a broadly based energy program during the next few years. One also wonders why solar energy was not included in the projections. Given the infusion of large amounts of money for research and development, solar energy could represent a substantial portion of our energy inputs within a few years according to some experts. Students arguing any of the three topics will need to raise such questions to properly prepare for debates. The short-term projections of Table 2 must be balanced against the long-term energy picture.

Table 2. U.S. Gross Energy Inputs by Source, 1974–1985 (Quads)

	1974	1980	1985
Coal	13.2	17.2	21.3
Petroleum	33.5	41.0	4[illegible].6
Natural Gas	22.2	20.6	20.1
Oil Shale	—	—	0.87
Nuclear Power	1.17	4.55	11.8
Hydropower and Geothermal	3.05	3.80	3.85
TOTAL	73.1	87.1	103.5

From: Bernard D. Blaustein, Gerst A. Gibbon, and Fred R. Brown, "Increasing Coal Production and Utilization through the Next Decade Some Technical Aspects of the Problem," *Duquesne Law Review* 14 (1975–76) 557 Reprinted by permission of Duquesne University, © copyright 1976.

One important question relates to the future *energy mix* of the United States. Most affirmative teams will refer to two key stages: the intermediate period (to 1985) and the long-range period (to the year 2000). The conditions expected by 1985 are not the same as those anticipated for the year 2000. Not only can we expect differences in the percentages, we also must recognize the serious methodological problems posed by attempting to predict conditions twenty-two years in advance.

The most difficult problem, therefore, relates to the reliability of the data. Debaters must come to grips with these issues if they expect to propose modifications in our current policies or oppose those changes. This writer suggests that no file will be complete without carefully developed evidence which evaluates the projections made about energy inputs of the United States. Conditions in the next century may not be exactly as current authors predict.

Energy Regulation by Government

Regulation of energy exists in many forms. As the various types of energy sources are discussed in this book, state, local, and federal regulations will be identified. For instance, the task which confronts the student who wishes to consider all of the legal limitations which exist relating to strip mining alone is almost unending. However, an overview is appropriate here.

The first presidential message devoted entirely to energy was delivered by Richard Nixon in June 1971. In April of 1973, the second such message announced a lifting of oil import restrictions. Shortly thereafter, the United States intensified energy research. The Arab oil embargo forced us both to conserve and to launch broad programs of energy research and development.

By 1975, the Energy Resources Council included the secretary of the interior, the federal energy administrator, the head of the Energy Research and Development Administration, the secretary of state, the director of the Office of Management and Budget as well as other federal officials designated by the president. The two intervening years obviously had broadened the scope of federal interests. We were seeking freedom from domination caused by reliance upon Arab oil. By mid-1977, a federal energy program had finally emerged.

The U.S. Department of Energy (see Table 3) has a large budget and many employees since it has absorbed many functions previously conducted by other government departments, bureaus, and agencies. The department also acts with newly created powers. Its various functions, illustrated in Table 3, should be studied carefully.

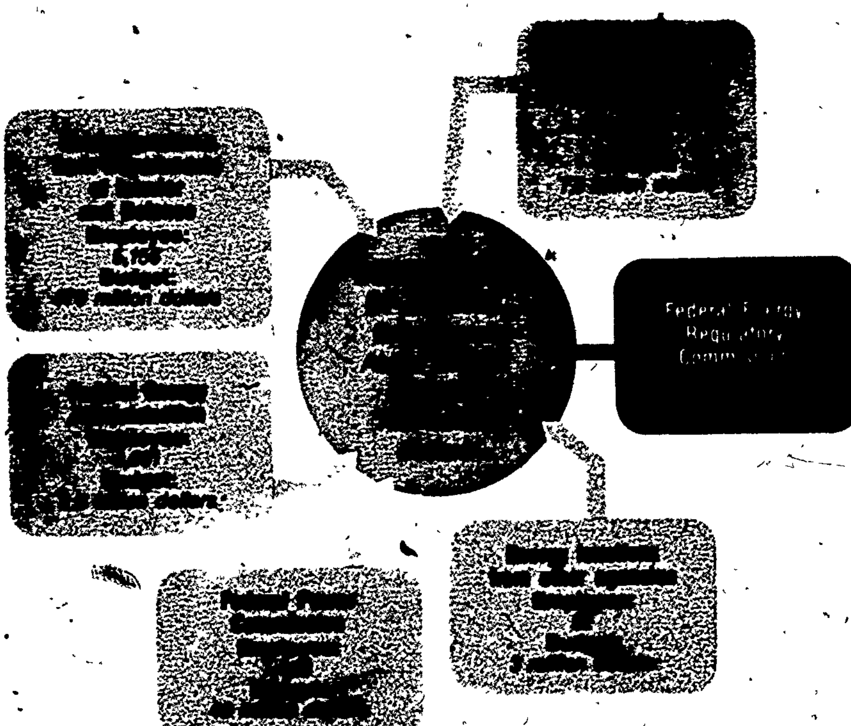
The functions of the Energy Research and Development Administration (ERDA) have contributed substantially to our understanding of the energy picture for our nation. An affirmative team interested in developing a case on alternative energy research and development would have to study the various ERDA reports issued over the past several years.

Negative teams interested in arguing that the present system has the capacity to respond to the research needs of our nation would also need to examine ERDA reports.

The activities of the FPC, FEA, and other agencies and commissions absorbed by the Department of Energy must also be studied. The various pollution control agencies, the regulations imposed upon strip mining, and a vast array of governmental regulations concerning the environment are equally related to the broader questions posed by our topic.

Besides the federal government, state and local levels of government also regulate the development of energy. The local power companies which provide you with the light by which this material may be read must operate within city and state, as well as federal, regulations. Thermal pollution of water, land and air pollution, pricing policies, cooperative activities with other energy companies, and safety regulations for employees are all part of the regulatory structure for the power company

Table 3. Framework of the Energy Department



From. *U S. News & World Report*, 15 August 1977, p 18. Reprinted by permission © copyright 1977 *U.S. News & World Report*.

in your community. Small wonder that there is a growing demand for energy lawyers in this country.

Finally, one must consider the implications for negative teams of the vast number of regulations. The most obvious, the prospect that somewhere there is a structure already regulating whatever the affirmative proposes, may not be enough to win many debates. Less obvious, however, are the implications for developing arguments about *changing* the present system. There are two primary methods by which the negative could argue for change. First, the negative could support repairs to the present system. Second the negative could introduce a counterplan into the debate. Either strategy requires proper development and support. The development would normally include indications that (1) the change could be made, and (2) the change could be expected to work. The supports should be evaluated with the same criteria as would other evidence in a debate.

Most debaters would expect a team presenting a counterplan to do three things: (1) present the details of the counterplan, (2) develop the reasons why it is not topical, and (3) develop a rationale which would reject the virtue of adopting *both* the plan and counterplan at the same time. Some people would also expect the counterplan to provide additional benefits beyond those which might be obtained by adopting the affirmative policy.

A pair of final observations about a negative team which presents *changes* within its defense of the negative in the debate: the fact that changes are supported does not deny defense of the "untouched parts" of the present system, and the introduction of changes should not cause a team to "lose" presumption. Just because I have my hair cut does not mean that I dislike having hair. By the same token, changes in the present system do not necessarily mean total abandonment of a commitment to current approaches.

These theoretical remarks are essential if teams are to address themselves to the governmental regulations which should exist regarding energy sources of the United States. How could a team be expected to defend a dynamic status quo without recognizing that change is as much a part of the present system as any other characteristic?

The material which follows should assist you in understanding many aspects of our energy picture. The organization consists of seven sections. (1) oil, (2) coal, (3) nuclear power, (4) solar energy, (5) electrical generation, (6) conservation, and (7) other sources. Each section generally treats existing conditions, regulations, and prospects for the future. By reading this material, you should have an adequate first analysis of the complexities involved in our 1978–79 debate resolutions.

Oil and Natural Gas

Petroleum and natural gas presently represent the largest percentage of energy input for the United States. The difficulty with this situation is expressed by Thomas Reese:

> How much oil actually exists is a question debated by geologists, but all agree that it is a finite resource. Some say there will be a serious shortage in 10 years; others say 20; only a few do not think there will be serious problems by the beginning of the next century.[22]

We cannot continue to use this energy resource indefinitely because it is rapidly disappearing. But there is an equally compelling reason why we must cut back upon our oil and gas dependance. Table 4 suggests this reason. First, consider that the states in the Middle East produce almost 40 percent of the world's crude petroleum. Second, study the list of states friendly to the United States, and contrast that list with those who generally oppose our international aims. You quickly discover that the political implications are not in our favor.

Table 4. World Production of Crude Petroleum[1]

Source: Bureau of Mines
(thousands of 42-gallon barrels)

Country	1974	1975	Percent of change
North America:			
Canada	616,532	518,878	−15 8
Mexico[1]	238,271	294,190	+23 5
United States[1]	3,202,585	3,052,048	−4 7
Cuba (E)	775	775	
Total	4,068,183	3,885,891	−4.7
South America:			
Argentina	151,110	144,364	−4 5
Barbados	48	123	+156 3
Bolivia	16,603	14,732	−11 3
Brazil	64,751	62,766	−3 1
Chile	10,055	8,946	−11 0
Colombia	60,867	57,685	−5 2
Ecuador	63,678	58,753	7 7
Peru	28,069	26,384	−6 0
Trinidad	68,131	78,613	+15 4
Venezuela	1,086,332	856,364	21 2
Total	1,549,644	1,308,730	15 6
Western Europe:			
Austria	15,609	14 205	9 0
Denmark	689	1,327	+92 6
France	7,863	7 460	5 1
Germany, West	44,718	40 900	8 5
Italy	6,956	6 743	3 1
Netherlands	10,227	9 676	5 4
Norway	12,707	68 900	+442 2
Spain	14,334	14 822	+3 4
United Kingdom	3 289	8 000	+143 2
Yugoslavia	25 613	27 347	+6 8
Total	142,005	199,380	+40 4
Middle East:			
Bahrain	24,597	20 805	15 4
Iran	2,197,901	1 952 650	11 2
Iraq	720,729	808 840	+12 2
Israel[2] (E)	36 500	27 345	25 1
Kuwait	830 580	670 918	19 2
Neutral Zone	198 195	181 040	8 7
Oman	106 046	124 600	+17 5
Qatar	189,348	159 482	15 8
Saudi Arabia	2 996 543	2 491 855	16 8
Syria	45,352	65 930	+45 4
Turkey	24 555	21 719	11 6
United Arab Emirates	616 485	618 310	0 3
Total	7,986,831	7,143,494	10 6
Africa:			
Algeria	368,139	350,753	−4 7
Angola	61,392	57,943	−5 6
Congo	22,424	12,410	−44.7
Egypt[2]	53,715	81,069	+50 9
Gabon	73,548	81,948	+11.4
Libya	555,291	551,150	−0.8
Morocco	191	171	−10 5
Nigeria	823,347	651,890	−20 8
Tunisia	31,841	34,567	+8 6
Zaire	51	—	—
Total	1,989,898	1,821,952	−8.4
Asiatic Area:			
Australia	140,396	149,873	+6 8
Brunei	70,338	65,932	−6 3
Burma	7,581	6,700	−11 6
India	55,733	61,611	+10 6
Indonesia	501,838	477,055	−4 9
Japan	4,936	4,378	11 2
Malaysia	29,537	35,774	+21 1
New Zealand[1]	1,385	1,423	+2 7
Pakistan	2 923	2,190	−25 1
Taiwan	1,321	1 351	+2 3
Thailand (E)	42	42	0 0
Total	816,030	806,329	−1.2
East Europe and Peoples' Rep of China			
Albania	15 045	15,012	0 2
Bulgaria	1 095	913	16 6
Czech	1 085	1,017	6 3
Germany East (E)	2 500	2,500	0 0
Hungary	15 237	15,306	+0 5
Peoples Rep of China	474 500	571 590	+20 5
Poland (E)	4 080	4 200	+2 9
Romania	107 964	108 739	+0 7
U S S R	3 373 650	3,608 850	+7 0
Total	3,995,156	4,328,127	+8.3
Total World	20,537,727	19,473,903	5 2

(E) Estimate
[1]Crude oil and field condensate [2]Israeli production from Sinai peninsula oilfields included with Israel rather than Egypt

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Additional aspects emerge when the table is given careful reading. Saudi Arabia and the United Arab Emirates together produced more oil than the United States in 1975. The implications of the data are magnified when compared to the other tables in this book.

Current Status of Oil

The years of uncontrolled profits for the large oil companies would appear to be limited. More and more of the money earned by the export of oil from OPEC nations will remain under the control of those nations, rather than pass quickly to multinational corporations. And few doubt that this shift in the power structure has put severe political pressures on our leaders. As one noted: "The economic consequences of high oil prices now appear so severe and the political implications so explosive that experts are beginning to say that the risks of acquiescence far outweigh the risks of a determined effort to get the price of oil down."[23] One condition debaters must analyze this year is *the consequences of price manipulation by external powers for the United States.* Many analysts believe that regulation, whether it be directed towards conservation,

Table 5. U.S. Petroleum and Natural Gas Resources

(onshore and offshore to water depth of 200 meters)
Source: U S Geological Survey

Crude Oil — billions of barrels

Area	Cumulative[1] Production	Demonstrated Resources: Measured	Demonstrated Resources: Indicated	Inferred[2] Reserves	Undiscovered Recoverable Resources: Statistical Mean	Undiscovered Recoverable Resources: Estimated Range[3] (95%-5%)
Alaska onshore	0 154	9 944	0 013	6 1	12	6- 19
48 states onshore	99 892	21 086	4 315	14 3	44	29- 64
Total onshore	100.046	31 030	4.328	20.4	56	37- 81
Alaska offshore	0 456	0 150	—[4]	0 1	15	3- 31
Pacific offshore	1 409	0 858	0 258	0 2	3	2- 5
Gulf of Mexico	4 135	2 212	0 050	2 4	5	3- 8
Atlantic offshore	0 000	0 000	0 000	0 0	3	2- 4[5]
Total offshore	6.080	3.220	0 308	2.7	26	10- 49
Total U.S.	106.126	34.250	4.636	23.1	82	50-127
Subeconomic[6]			120 — 140			44-111

Natural Gas — trillion cubic feet

Area	Cumulative[1] Production	Measured Reserves	Inferred[2] Reserves	Undiscovered Recoverable Resources: Statistical Mean	Undiscovered Recoverable Resources: Estimated Range[3] (95%-5%)
Alaska onshore	0 482	31 722	14 7	32	16- 57
48 states onshore	446 366	169 454	119 4	345	246-453
Total onshore	446.848	201.176	134.1	377	264-506
Alaska offshore	0 423	0 145	0 1	44	8- 80
Pacific offshore	1 415	0 463	0 4	3	2- 6
Gulf of Mexico	32 138	35 348	67 0	50	18- 91
Atlantic offshore	0 000	0 000	0 0	10	5- 14[5]
Total offshore	33.976	35.956	67.5	107	42-181
Total U.S.	480.824	237 132	201.6	484	322-655
Subeconomic[6]		90 — 115			40- 82

[1] To Dec 31, 1974 [2] Based on historical data [3] The low value of the range is associated with a 95% probability that there is at least this amount, the high value has a 5% probability that there is at least this amount [4] Less than one million barrels [5] Based on 75%-25% probability [6] Recoverable with improved technology or higher prices

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independence, or production increases, represents the only approach for the United States which might avoid a serious decline in our world leadership role.

Our dependence upon oil imports can be examined from other perspectives. The United States does not have very much of the world's reserves of petroleum. Several politicans have humorously, but accurately, observed that the safest place to store our petroleum reserves is in the ground. These wags also note that, by using the petroleum reserves of other nations, we increase the value of our own. A second subject which debaters must consider is *the effects of supply manipulation by our own government for the international energy picture.*

One way to consider this latter question is by examining our oil production. In 1970 domestic production peaked. We have not increased our output except by the addition of the oil from the Alaskan North Slope. Therefore, our current manipulations are not doing much to increase our production. A second way to consider the question is by examining our oil utilization. Here again, we face serious problems. We continue to demand more and more oil and gas. Current estimates suggest that our demand may peak sometime in 1980–81 at nearly 120 billion gallons of gasoline. The federal fuel economy regulations will then make their largest impact upon national fuel demands.[24] A third approach to the question of U.S. oil manipulation is considering the ultimate amount of our petroleum and natural gas resources.

Table 5 clearly illustrates the fact that there is substantial oil and natural gas available to the United States, but much of that oil is offshore—well over half of the crude oil and a great deal of natural gas. Tapping these reserves is thus a vital question for debaters this year. The timing of the efforts, the costs and profits of such undertakings, and the political implications of extensive revision in our energy commitment represent three of the principal questions of this kind of approach. But ecological questions must also be evaluated. What would such extensive recovery policies do to oil spill risks offshore? How would the atmosphere be affected by additional commitment to petroleum? The third critical subject which debaters must consider is *the implications of increasing petroleum supplies from all sources for the other national interests of the United States.*

The reserves of the United States must be considered in the context of both the amount of petroleum available in the world and the amount being produced in the United States today. Table 6 provides that data.

The most obvious trend indicated by this table is the substantial increase in the value of petroleum. Comparing 1975 to 1945, crude oil production was nearly twice as great, but the value of the crude oil increased elevenfold. But other conclusions may also be drawn. The number of barrels produced has remained relatively constant between 1970 and 1975. This is also true for production of natural gas liquids and natural gas during the same period. Important data is provided as well in the table of crude petroleum production by chief states. If the vast majority of the crude comes from Texas, then a modification in national commitment to this energy form would naturally be expected to generate economic effects there.

The Oil Embargo: Power Shift

The 1973 Arab oil embargo by OPEC nations was not a new approach. In 1967 the first attempt by Middle Eastern states to use oil as a political weapon was made. Blackmail of European nations which relied upon oil from the Middle East failed that time. But six years later, the situation reversed:

> The potency of the weapon became highly visible within a short period. Arab oil exporting nations succeeded in disrupting the life-style of every major industrial power, caused fissures in the Atlantic Alliance, precipitated upsets in international money markets and prompted the United States to make an intensive search for a peace settlement in the Middle East.[25]

By 1975, Senator Abraham Ribicoff still felt that we were insecure. He noted that we were drawing on our inventories at an alarming rate and that "the nation still hangs by the thread of Arab indulgence for full

Table 6. U.S. Petroleum and Natural Gas Production

Source: Bureau of Mines

Year	Crude oil		Natural gas liquids			Natural gas	
	Production 1,000 bbls.	Value $1,000	Production 1,000 bbls.	Value $1,000	Total 1,000 bbls.	Marketed Mil. Cu. ft.	Value $1,000
1946	1,713,655	2,094,250	112,004	187,564	1,825,539	3,944,021	191,006
1950	1,973,574	4,963,380	181,961	419,605	2,155,533	6,282,060	408,521
1955	2,484,428	6,870,380	281,371	619,006	2,766,325	9,405,351	978,367
1960	2,574,933	7,420,181	340,157	808,385	2,915,385	12,771,038	1,789,970
1965	2,848,514	8,158,298	441,566	911,603	3,290,083	16,042,753	2,494,542
1970	3,517,450	11,173,728	605,916	1,275,112	4,123,366	21,920,642	3,745,880
1971	3,453,914	11,692,988	617,815	1,366,054	4,071,729	22,493,012	4,085,482
1972	3,455,368	11,706,510	638,216	1,452,233	4,093,584	22,531,698	4,180,482
1973	3,360,903	13,057,905	634,423	1,867,073	3,995,326	22,647,549	4,894,072
1974	3,202,585	21,580,549	615,998	3,057,927	3,818,583	21,600,522	6,573,402
1975	3,056,779	23,116,059	595,958	2,772,586	3,652,737	20,108,661	8,945,062

U.S. Crude Petroleum Production by Chief States

Source: Bureau of Mines (Figures in thousands of 42-gallon barrels)

Year	Ark.	Cal.	Ill.	Kans.	La.	Miss.	N.M.	N.D.	Okla.	Tex.	Wyo.
1950	31,108	327,607	62,028	107,586	208,965	38,236	47,367	-	164,599	829,874	61,631
1960	30,117	305,352	77,341	113,453	400,832	51,673	107,380	21,992	192,913	927,479	133,910
1965	25,930	316,428	63,708	104,733	594,853	56,183	119,166	26,350	203,441	1,000,749	138,314
1970	18,035	372,191	43,747	84,853	906,907	65,119	128,184	21,998	223,574	1,249,697	160,345
1972	18,519	347,022	34,874	73,744	891,827	61,100	110,525	20,624	207,633	1,301,686	140,011
1973	18,016	336,075	30,869	66,227	831,524	56,102	100,986	20,236	191,204	1,294,671	141,914
1974	16,527	323,003	27,553	61,691	737,324	50,779	98,695	19,697	177,785	1,262,126	139,997
1975	16,133	322,199	26,067	59,108	650,840	46,614	95,063	20,452	163,123	1,221,929	135,943

From: *The World Almanac and Book of Facts 1976* (New York: Newspaper Enterprise Association, Inc., 1976), p. 133. Reprinted by permission of The World Almanac and Book of Facts, © copyright 1976.

satisfaction of our basic energy needs."[26] He addressed himself to the American attitude that we could survive without others, but others could not survive without us. The oil crisis proved this concept wrong. We had only rationed gas once, during the second world war, and then only to conserve tires. In fact, we were surviving the oil crisis when the Senator made his comment. We had learned to live with higher gasoline prices and, to this day, we still buy all the gas we want and waste about half of it. As noted earlier, our consumption is projected to increase for several more years despite the reserve limitations. Americans seem unwilling to accept the implications of who "owns" the energy reserves upon which much of our national prosperity has been based.

A typical reaction to the power currently wielded by the OPEC nations is that they could "cut the price in half and still make a healthy profit."[27] This reaction ignores the fact that the oil belongs to those nations. Basic international political and economic issues are interwoven with the issue of oil pricing, production, and distribution. All debaters this year should consider these variables whenever you attempt to analyze the oil picture of the United States. The international aspects of the problem cannot be ignored. *No affirmative plan which attempts to undercut OPEC prices can escape severe political and economic implications for the United States and the rest of the world.*

Impact upon the United States

The 1973 crisis caused both governmental and private actions. The nation started projects to get more energy. People cut back on energy use, at least temporarily. But these were immediate, reflex actions. The debate resolution calls for something more than reflex action by the government. The following shopping list of ideas might prove beneficial to the team wishing to find empirical data on alternative energy approaches. The list includes fission nuclear plants, breeder nuclear process plants, offshore drilling, home heating and cooling improvements through insulation, daylight savings time, speed limits, less stringent regulations on pollution, and electric power from solar energy. These few items represent just a sample of the approaches launched following the embargo.

Tilton has noted: "interruptions in energy supplies, or even large unexpected increases in prices, can play havoc with the economy."[28] And in the Unied States, whatever affects the economy gets quick attention. Yet, the economic costs were not spread equally across the nation. Neither were other effects. The Northeast experienced a cold winter without sufficient heating oil. Cities like Houston, totally dependent upon the automobile, suffered because of an inadequate mass transit system. And in general, the job market began to suffer. Indeed, this aspect might well end up being the most important observation which can be drawn from the oil embargo. Oil-generated employment is capital intensive and therefore more productive for the economy. In other words, it takes a lot of money to make a buck with petroleum, but, once that buck is made, it gets spread around a lot. As oil diminishes in importance and availability, our economy will be diminished accordingly.

Although the domestic economy was seriously affected, the international economy may well have suffered more. The balance of payments of the United States may not, for instance, have suffered as much as other nations. The oil-exporting countries have been spending much of their foreign exchange earnings on American products. We are also far less dependent on foreign oil than most other industrialized countries. As a result, some positive aspects for the U.S. can be developed relative to the realignment of the world power structure based upon the rise of the Arab states through oil politics.

Impact upon the World

Other nations are facing serious balance-of-payment difficulties. Some have begun major modifications of trading patterns. Both Britain and France trade extensively with the Middle East and, like the United States, recognize the importance of bilateral trade deals when multilateral trading reaches an impasse.[29] But the impact of the power shift created by the oil-producing nations' actions is much more substantial than that indicated by shifting trade agreements. While the full economic implications are still undetermined, several elements can be identified here so that debaters can begin focusing upon potential cases.

The first implication is for the developing countries. These nations need capital for development. The sudden increase in the price of imported oil denies these nations development capital and also foreign exchange. George A. Lincoln suggests that "the effect of the price increase on those developing countries needing capital for development, and foreign exchange for such essentials as fertilizer to support the essential food supply, is potentially devastating."[30] One international effect of energy policies, then, might well be *starvation*.

A second effect of oil shortages relates to the crippling effect on national economies. Some would say that the failure of the United States to react effectively to OPEC's price rise weakened the prestige of the United States and therefore seriously limited our foreign policy options. Whether true or not, this possibility is an outgrowth of the weakening of the industrialized nations created by the interruption of their oil supplies. Tilton claims that the disruption was economically severe.[31] Another international effect of energy politics, then, is *economic chaos.*

When the less-developed countries must pile up external debts to purchase high-priced petroleum products, their economies suffer. But the more efficient industrialized countries face problems, too. Both Japan and Italy, for instance, face severe and continuing problems. Petrodollars threatened the British pound sterling. Clearly, the changing status of the Arab states is attributable to their power-plays based upon control of oil. But the future is not going to change, whether the Arab oil flows more freely or not. For within a few years, the nations of the world must face the end of petroleum as an important energy source. And in the short run, we are on the twin horns of a dilemma: either unemployment or inflation. As noted by *Business Week*, "the world economy is doomed to rising unemployment if governments refrain from economic stimulus, but to inflation if they resort to demand-boosting measures."[32] Since the long-term prospects for more acceptable energy substitutes are far from certain, the capital shortage situation would appear to be permanent. The ability of capital stock to produce would appear to be permanently lowered. The final prediction, then, for the international scene is for *inflation*.

Regulation of Oil

Much government regulation has taken the form of making energy use more costly. This trend, contrasting with the ecological concerns of the very recent past, has begun to slow the upward curve of our energy use. But the principal question posed by many economists is *whether or not the federal government should regulate energy resources*. At least with regard to long-term application of this concept, many argue that regulation actually reduces the utilization of our resources. There is much evidence to support this view, although a great deal of it is found in oil industry publications. And while the oil industry is opposed to regulation, it denies that its own price policies have damaged our economy. The issue of regulation cannot be settled quite as simply as the president of Republic Oil Company, Eldon Doty, would like. In 1977, he said that you cannot legislate your way out of a shortage: "You have to drill oil wells, which we could do if the government would let us."[33] The real question consists of at least these two aspects: (1) How much of a dent in the shortage can be made by government legislation? and (2) At what price are we willing to let the oil companies provide us with oil?

Conservation is one current government approach to our energy problems. Although pollution threatens people, energy shortages apparently represent an even greater danger, for our regulations today relate less to clean air than to the conservation of energy. Catalytic converters are mentioned less often today than are methods of fuel economy. For example, the 1980 models of car manufacturers must meet a fleet average of 20 miles per gallon; the 1985 models must meet a fleet average of 27.5 miles per gallon.[34]

Public transportation is another government approach to our energy needs. Tax relief to communities which develop mass transit helps. So does environmental impact taxation; improved inter- and intracity rail networks could represent a major breakthrough for our oil-starved economy. The single-passenger automobile might almost disappear from the roadway if some alarmists have their way.

Richard B. Hancke has noted a series of critical weaknesses in our current *policymaking processes*. Debaters might wish to give considerable attention to these notions, not only as they relate to oil and the United States, but as they apply generally to the energy picture:

1. The failure of policymakers to articulate the principal goals of energy policy and to establish priorities for achieving them; the result is a wasteful misallocation of resources.
2. The fragmentation of energy policy decision-making. No single decision-making unit has ultimate responsibility for energy policy. Various agencies work without coordination and frequently at cross-purposes.
3. The ambiguity of the basic economic, environmental, political, and technological constraints on policy and the tendency of these constraints to change without warning.
4. The politicization of debate over energy policy and the tendency to dwell on false or emotionally charged issues.[35]

Negative teams which discover the politicization of energy policy within their opponent's case will be the negative teams which win rounds.

Solutions must be viable, and, unless the policymaking process is developed carefully, we can anticipate that governmental energy actions will not substantially improve our conditions. A series of remarks by Robert C. Paehlke are also very important here. He suggests ten principles for present and future policies related to energy. Serious discussion about these variables will generate useful arguments on this year's topics. The list includes (1) government responsibility, (2) economic growth, (3) environmental protection, (4) reduced vulnerability to foreign interruptions of supply, (5) equitable sharing of sacrifices, (6) restrained growth of energy demand, (7) replacement cost considerations, (8) consistent energy policy, (9) shifting to ample-supply sources, and (10) expanding nonconventional sources of energy.[36] The policy of our government must respond, then, to *existential conditions* if it is to be effective.

Government regulations could extend to many aspects of energy use. Short-haul airline traffic is energy-wasting. So is the current energy consumption of many commercial buildings. Modified building codes which eliminated excessive construction and new lighting standards could improve our use of energy. Insulation standards, air conditioner regulations, and alterations in government tax structures could modify use of energy. Therefore, the approaches to a situation where we can anticipate ultimate scarcity of oil are many and varied. Only interactive programs can create a satisfactory national solution. And in all probability, even these programs will force substantial modifications in our way of life.

Government deregulation could also serve our society. This is thought to be true, particularly, about natural gas. Richard Sheahan, for instance, argues in his 1976 book *Fueling the Future* that deregulation of natural gas prices could stimulate exploration of new gas fields.[37] To increase supply without abandoning environmental controls, more efficient controls and more efficient production fields would be necessary. Whether or not society should use up the supply of natural gas was introduced as an issue earlier; here, the question is one of short-term action by the government. The price of natural gas is regulated carefully, and similar regulations exist for gasoline. We might well be paying much more for a gallon of gas were the government not involved in the pricing policies of oil companies. Several factors are responsible for this situation, and the future importance of U.S-produced petroleum may well be determined by these factors. The following section takes up the matter of oil drilling in the United States.

Prospects for Future Oil

Offshore drilling. One of the more expensive approaches to producing oil is offshore drilling. Oil companies have, for example, built giant rigs many miles out in the Gulf of Mexico which produce massive amounts of oil. The cost of maintaining these rigs is substantially greater than maintenance on shore. But the profits persist. Environmentalists notwithstanding, offshore drilling has supplied the United States with large quantities of oil. The projections for this kind of drilling generally indicate a sharp turn upward because of the very large quantity of oil under the oceans.

Oil shale. Oil shale is neither oil nor shale—it is kerogen fused with rock which can be separated and distilled into standard petroleum products. It exists in abundance. In one area near the Green River in the United States, it is estimated that oil produced from oil shale could amount to "at least 1.8 trillion barrels, or roughly 20 times the amount used by the U.S. since the Civil War."[38] The major difficulty, of course, is that oil shale is expensive. We could produce this form of energy, but the costs would limit the utility of the product.

Superships. VLCCs or ULCCs, Very (or Ultra) Large Crude Carriers, are now in service. Carrying half a million plus tons of oil each, these superships represent giant profits to shippers. The ecological disaster threatened by oil spills involving these ships becomes less important as our oil reserves are depleted. Even so, the risk to the environment is serious, according to Jacque Piccard: contamination of the oceans threatens the end to all sea life within twenty-five to thirty years. Thus, another aspect of dwindling reserves and the impact of continuing reliance on oil must be considered: *the end of all life in the sea.*[39]

Coal

What should we do if we are going to run out of oil within the foreseeable future? Most people suggest that we should turn to our own most substantial energy resource, coal. President Carter has urged both industry and utilities to substitute coal burning for the use of oil and natural gas. (He might well have regretted that proposal as he invoked the Taft-Hartley Act in March 1978.)

As an introduction and transition, Table 7 should allow you to consider our oil reliance as compared to the ongoing projections for use of coal.

To shift from oil to coal would require massive changes in both employment and energy utilization patterns of our nation. Consider the shifts anticipated in Table 7 between 1970 and 1980 for use of coal in electricity generation. This downward trend might well be reversed, but at what price to the public utilities? Evidence indicates that the switch is attributable to environmental requirements placed upon the utilities by local, state, and federal regulations. Examine the two figures for coal use in transportation; greater use of coal for rail transportation is possible, but not by 1980. Clearly, the shifts between these two energy types can occur, but not without time and not without economic difficulties.

The material below is divdied into three units. First, the current status of coal production and use is introduced. Second, the regulation prospects for coal are discussed. Finally, the potential of this energy source, as it relates to development of cases on this year's topic, is analyzed.

Table 7. U.S. Fuel Consumption—Past, Present, Future

Source: Joint Congressional Committee on Atomic Energy report Understanding the "National Energy Dilemma," published by The Center for Strategic and International Studies 1973

(millions of barrels per day of oil equivalent[1])

Energy Source and Use	1950	1960	1970	1980[2]
Natural Gas	2.9	5.9	10.7	12.2
(imported)	—	(0 1)	(0 4)	(1 9)
(from coal and oil gassification)	—	—	—	(0 3)
Electricity generation	0 3	0 8	1 9	1 6
Residential and commercial	0 8	2 0	3 5	5 0
Industrial	1 6	2 8	4 6	4 7
Transportation	0 1	0 2	0 3	0 4
Non-energy	0 2	0 2	0 3	0 5
Coal	6.5	5.3	7.4	10.5
Electricity generation	1 1	2 0	3 7	5 2
Residential and commercial	1 4	0 5	0 2	0 1
Industrial	2 8	2 3	2 5	3 5
Transportation	0 8	0 1	—	—
Non-energy	0 1	0 1	0 1	0 1
Exports	0 4	0 5	0 9	1 4
Gassification	—	—	—	0 2
Oil	6.5	9.7	13.9	21.5
(imported)	(0 9)	(1.9)	(3 5)	(10 0)
Electricity generation	0 3	0 3	1 0	2 0
Residential and commercial	1.2	2.0	2 5	2.0
Industrial	1.0	1 3	1 6	2 7
Transportation	3 2	5 0	7.4	11 5
Non-energy	0 4	0 8	1.5	3 1
Exports	0 3	0 2	—	—
Gassification	—	—	—	0 2
Nuclear	—	—	0.1	3.6
Geothermal	—	—	0.003	0.2
Hydroelectric	0.2	0.3	0.4	0.6
TOTAL INPUT	16.1	21.3	32.5	48.3[3]

	1950	1960	1970	1980
Electricity generation input (from above sources)	1.9	3.4	7.1	13.2
Residential and commercial	0 2	0 5	1.3	2.7
Industrial	0 2	0 7	1.2	2.0
Transportation	—	—	0 007	0.5
Conversion losses	1 4	2.3	4.6	8.1
End Use and Loss				
Residential and commercial	3.6	5.0	7.5	9.9
Used	2 7	3.5	5.6	7.3
Lost	0 9	1.5	1 9	2.6
Industrial	5.6	7.1	9.9	13.0
Used	4.2	4.9	7 4	9 6
Lost	1 4	2 1	2.4	3 4
Transportation	4.1	5.3	7.7	12.0
Used	1.0	1.2	1.9	3.0
Lost	3.1	4 0	5.8	9.0
Total Used Energy	7.9	9.6	16.0	18.9
Total lost[4]	6 6	9.9	14.7	23 3
Exports	0.7	0.7	0.9	1.4
Non-energy	0.7	1.1	1 9	3 7
TOTAL OUTPUT	16.1	21.3	32.5	48.3

[1]All energy sources have been converted to barrels of oil equivalent (B/DOE) by determining their heat value and converting that Btu figure to barrels of oil, viz., 5,800,000 Btu = one barrel of crude oil; 3,412 Btu = one kilowatt-hour; 1,000 Btu = 1 cu. ft. of natural gas; 26,000,000 Btu = one ton of coal. Figures may not add to totals due to rounding while converting to B/DOE

[2]"There are many reasons for the high degree of confidence in the predictability of 1980 . . . The Nation has already ordered a large part of the electrical capacity that can be functioning commercially by the year 1980; it has already ordered every major rail-based mass transit system that can be functioning by 1980 . . ." etc.

[3]Corrected for coal and oil gassification

[4]Including conversion loss in electricity generation and in coal and oil gassification.

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Current Status of Coal

"Though dirty both to mine and to use, coal is this country's most abundant fuel reserve."[40] Currently recoverable through our mining technology are 217 billion tons of coal. By 1985, this figure could reach 1,040 million short tons. And were the coal at greater depths included, even more coal would be available. Timothy Bay claimed in 1977 that we had total reserves of roughly 437 billion tons—enough to last hundreds of years at our present rate of consumption.[41] Of course, running out of oil insures that we will consume coal at a much higher rate. We use coal because it is cheap. But switching over from oil to coal is not cheap. Industrial prices might increase as much as 2 percent according to some estimates.[42]

Underground Mining

About half of our coal comes from underground mining, but there are modifications which might increase this output considerably. Coal slurrying is one such method. Coal is ground up, transported through pipelines containing water, and spun out of the water by centrifuges at the end of the pipeline. The ground up coal is then ready for use in boiler furnaces of public utilities, which burn the coal to generate steam.

This kind of mining process has drawbacks, however. First, the amount of water required by the slurry system is large; and we are short of water in the West, where this sytem would be used. Second, the use of pipelines for coal transport reduces commitments to railroads, whose financial well being depends upon coal transportation. Significant problems would therefore be created were coal slurrying the method utilized in transporting coal.

A separate problem of deep mining is acid mine drainage. Deep mines, especially abandoned ones, are prime sources of acid drainage. The mine is leached free of acid by exposure to the weather, thus contaminating adjacent water and land. The resulting danger to our food chain through fish and to land use is serious.[43]

The coal industry also has important labor problems. Strikes, shortages of supervisors and engineers, and a work force that is either too young or too old could generate serious operations problems for coal companies. One difficulty for the producers is that productivity is not increasing (see Table 8). In underground mines, the productivity peaked in 1969 at 15.6 short tons per man-day and then decreased in each succeeding year to 11.7 short tons per man-day by 1973.[44] At the same time, the overall decline in bituminous coal production from underground mines between 1969 and 1973 was substantial, amounting to about 14 percent. The price of the coal from underground mines rose during this period, but the increase of 93 percent, compared to increases of 54 and 94 percent for strip- and auger-mined coal, respectively, did not represent enough to reverse the manpower and productivity trends.

Table 8. Data for the U.S. Coal Industry on Number of Mines, Production, Productivity, and Cost of Coal—1965–1973

	1965	1966	1967	1968	1969	1970	1971	1972	1973
Number of Mines									
Underground	5,280	4,741	3,908	3,381	3,097	2,939	2,268	1,996	1,737
Strip*	1,541	1,572	1,507	1,492	1,551	2,103	2,290	2,309	2,309
Auger*	407	486	458	454	470	559	591	574	698
TOTAL***	7,228	6,749	5,873	5,327	5,118	5,601	5,149	4,879	4,744
*Production, Millions of Short Tons***									
Underground	333	339	349	344	347	339	276	304	299
Strip	165	180	187	186	197	244	259	276	277
Auger	14	15	16	15	16	20	17	16	16
TOTAL***	512	534	552	545	561	603	552	595	592
Productivity—Short Tons Per Man-Day									
Underground	14.00	14.64	15.07	15.40	15.61	13.76	12.03	11.91	11.66
Strip	31.98	33.57	35.17	34.24	35.71	35.96	35.69	35.95	36.30
Auger	45.85	44.43	46.48	40.46	39.88	34.26	39.00	43.00	43.63
WEIGHTED AVERAGE	17.52	18.52	19.17	19.37	19.90	18.84	18.02	17.74	17.58
Cost, Dollars Per Ton, f.o.b. Mine									
Underground	4.93	5.05	5.18	5.22	5.62	7.40	8.87	9.70	1.84
Strip	3.57	3.64	3.68	3.75	3.98	4.69	5.19	5.48	6.11
Auger	3.36	3.58	3.59	3.53	3.81	6.08	6.57	6.54	7.39
WEIGHTED AVERAGE	4.44	4.54	4.62	4.67	4.99	6.26	7.07	7.66	8.53

*Strip mining and auger mining are the two types of surface mining practiced in the United States today.

**These figures do not include the data for Pennsylvania anthracite production which is about 6 million tons per year or about 1 percent of the bituminous coal and lignite production.

***Data may not add to totals shown because of independent rounding of numbers.

From: Bernard D. Blaustein, Gerst A. Gibbon, and Fred R. Brown, "Increasing Coal Production and Utilization through the Next Decade: Some Tec[illegible]ects of the Problem," *Duquesne Law Review* 14 (1975–76): 568. Reprinted by permission of [illegible]e University, © copyright 1976.

A year-by-year evaluation of the number of mines, production in tons, productivity per man-day, and weighted average of the U.S. coal industry establishes a cost-benefit advantage for strip mining when it is compared to both of the other principal types. The trend over the years is consistent with this economic incentive, but surface mining cannot do the job alone. Despite the upward curve of productivity from this source, our energy needs cannot be entirely met by this one kind of mining.

Strip Mining

Strip mining began in 1914, and since the large power shovel was developed, it has equaled deep mining as a primary source of coal. The main advantage of this kind of mining is the high recovery rate. Stripping will recover 80 to 100 percent of the coal in a vein, while only 40 to 60 percent is recovered in a deep mine. The cost of recovery is therefore about two-thirds that of underground mining.[45] The adverse environmental effects of strip mining should not be ignored, however—it damages the landscape, reclaiming mined land is expensive, and the air is polluted. Balancing the ecological damage with the greater safety and efficiency of the strip mining process may become one of the games of debaters this year.

Coal Gasification

Coal gasification is the chemical processing of coal to produce gaseous fuels. When the process produces liquid fuels, it is called *coal liquefaction*.[46] This process permits production of low-sulfur, low-ash, environmentally safe coal from high-sulfur, high-ash coal. Both Union Carbide and Chemical Construction Corporation own demonstration plants. Commercial production may be possible after 1985, and some long-term benefits may be realized by the implementation of this process. Yet, G. Alex Mills, director of ERDA Fossil Energy Materials and Exploration Research, has cautioned that there are problems with synthetic fuels that could be barriers to gasification and other synfuel processes. These include safety hazards, use of expensive alloys, equipment redundancy, complexity, high consumption of hydrogen, and costly environmental controls.[47]

Current Uses of Coal

In 1974, 63.5 percent of U.S. coal production was used to generate electricity; Table 9 shows that this situation is expected to continue to at least 1985. In fact, the other uses to which coal is put are quite limited, although important. Utilities will remain the primary users of coal if this table is correct.

One of the questions for debaters this year is whether diversion of coal to other purposes would damage our economy. The issue seems to be that increasing depletion of our coal reserves does not increase our energy independence, but actually decreases it over the long run. To elaborate briefly, the United States currently has full control of our coal reserves. That we do not utilize those reserves more rapidly than we do is incidental to the actual potential use of these reserves. Therefore, shifting from use of imported oil to our own coal depletes our reserves and, in the long run, hastens the day when we will be dependent upon others.

A broader perspective of our energy utilization pattern is provided by Table 10, which identifies our reliance upon various energy types. Several important observations can be made after study of this table. First, you might want to study the definition of Btu, an essential term in any study of the energy picture. Second, the various levels of U.S. energy consumption trends by fuel type reveal a strong shift over twenty years ago to petroleum and natural gas. Third, the slight dip noted in 1974, due to the Arab oil embargo, is merely a preview of the future energy crunch. If predictions are correct, future modifications in energy patterns are going to be substantial.

As Table 10 suggests, there are good reasons to believe that the shift from oil to coal will not represent the final shift in energy source for the United States. Many experts would prefer that we carefully review the situation and act only when we have a complete system which can supply our power far into the future. Robert Lokachman, who is representative of such experts, noted in 1977 that "as a society, we might begin rationally to evaluate the relative merits of solar, nuclear, geothermal, wind and tidal alternatives to fossil fuels."[48]

The counterplan, a viable strategy for some negative teams, can permit a careful study. Should teams employ this as a strategy in debate? This writer would suggest that reasonable people frequently choose to avoid action because there is insufficient knowledge currently available. From this rationale, one could construct a defense of the study counterplan.

Table 9. 1974 Coal Consumption and Values Projected for 1985
(Millions of tons per year)

	1974	1985
Electric Utilities	388	715
Industrial	64	124
Coke and Gas	90	100
Household/Commercial	9	5
Synthetic Fuels	—	16
Export	60	80
TOTAL	611	1040

From: Bernard D. Blaustein, Gerst A. Gibbon, and Fred R. Brown, "Increasing Coal Production and Utilization through the Next Decade: Some Technical Aspects of the Problem," *Duquesne Law Review* 14 (1975-76): 570. Reprinted by permission of Duquesne University, © copyright 1976.

Table 10. U.S. Energy Consumption Trends

(Quadrillion Btu)*

Year	Coal	Petroleum	Natural Gas	Hydropower	Nuclear	Fuel Wood	Total
1850	.2	—	—	—	—	2.1	2.3
1860	.5	—	—	—	—	2.6	3.1
1870	1.0	—	—	—	—	2.9	4.0
1880	2.0	.1	—	—	—	2.9	5.0
1890	4.1	.2	.3	—	—	2.5	7.1
1900	6.8	.2	.3	.3	—	2.0	9.6
1910	12.7	1.0	.5	.5	—	1.9	16.6
1920	15.5	2.6	.8	.8	—	1.6	21.3
1930	13.6	5.4	2.0	.8	—	1.5	23.3
1940	12.5	7.5	2.7	.9	—	1.4	25.0
1950	12.9	13.5	6.2	1.4	—	1.2	35.2
1960	10.1	20.1	12.7	1.7	—	—	44.6
1970	12.7	29.5	22.0	2.7	.2	—	67.1
1971	12.0	30.6	22.8	2.9	.4	—	68.7
1972	12.4	33.0	23.0	2.9	.6	—	71.9
1973	13.4	34.7	22.8	2.9	.9	—	74.7
1974	13.0	33.8	22.3	2.9	1.2	—	73.2

*"Btu" is an abbreviation for British thermal unit. It is defined as the quantity of heat, which is a form of energy, necessary to raise the temperature of a pound of water from 39°F to 40°F. A conceptualization of the magnitude of the Btu may be provided by the following examples:

1. Approximately 2,000 Btu's are required to operate a lightbulb rated at 100 watts for one hour.
2. A furnace in an average 6-7 room single family residence typically will be rated at 100,000 Btu; *i.e.*, during one hour of continuous operation, 100,000 Btu's of heat will be liberated from the fuel utilized.

A quadrillion is 1,000,000,000,000,000 or a million-billion. Transposing 1 quadrillion Btu's into the units of measure more commonly associated with the particular fuels used,

1 Quadrillion Btu
- : 170 million barrels of petroleum
- : 41 million tons of Eastern bituminous coal
- : 57 million tons of Western sub-bituminous coal or lignite
- : 1 trillion cubic feet of natural gas
- : 100 billion kilowatt-hours of electricity [based on a 10,000-Btu/kw-hr heat rate]

Hereinafter, a quadrillion Btu will be referred to as a Quad.

From: Bernard D. Blaustein, Gerst A. Gibbon, and Fred R. Brown, "Increasing Coal Production and Utilization through the Next Decade: Some Technical Aspects of the Problem," *Duquesne Law Review* 14 (1975-76): 551. Reprinted by permission of Duquesne University, © copyright 1976.

Regulation of Coal

Regulating coal mines in the United States involves many different agencies. Mining regulations exist on state, local, and national levels in different parts of the nation.[49]

The Clean Air Act of 1970, as amended, directs the secretary of Health, Education, and Welfare to compile and publish useful indicators, based upon the latest scientific knowledge, of the effects to be expected from various quantities of air pollutants.[50] This applies to the burning of coal, of course. Negative teams are encouraged to notice that the law does include both compilation and publication of the latest scientific knowledge. Inherency, therefore, would appear a more appropriate approach than a study counterplan if the affirmative team argues about pollution.

The Federal Power Commission attempts to protect users from gas shortages. Under FPC regulations, residential consumers have first priority. Clearly, the laws relating to the use of this energy are supportive of the general welfare, but not at the expense of the residential user of energy. The Energy Research and Development Administration (ERDA) was established with six program areas. The areas are fossil energy; nuclear energy; environment and safety; energy conservation; solar, geothermal, and advanced energy systems; and nuclear weapons programs. Not only federal but state regulations exist relative to clean air. However, the morass of legislation has been difficult for producers and bothersome for environmentalists. A recent court decision identified distinctions between federal and state powers; *Sierra Club v. Ruckelshaus* may prove useful to debaters as well.[51]

Other laws have had an impact upon coal mining. The Coal Mine Health and Safety Act is credited with a significant reduction in the number of mining accidents and deaths. The incidence of black lung, a miner's disease caused by inhalation of coal dust, has also been reduced; insurance benefits aid those who still suffer from the disease. Pollution devices facilitate cleaner use of coal. Fly ash, controlled by electrostatic precipitators, is a coal by-product now used as a raw material in the manufacture of bricks.[52]

Coal as a Future Energy Source

Pollution, capitalization, and industrial troubles represent three primary difficulties which must be surmounted if coal is to become our prime energy source in the near future. Coal is dirty, but it can be cleaned. But if it is cleaned, the process is expensive. And if sold efficiently, other industries suffer.

Debaters must be wary of cases which single out one energy source, and yet many debaters this year will want to do just that with regard to coal. The reason is obvious: there is substantial data to indicate that the United States has great quantities of coal and that the coal can be retrieved without some of the more serious problems mentioned above occurring.

However, the problems discussed might cause you to reconsider the virtue of an affirmative case which encourages expansion of coal production and use. The price of energy independence might well be far too costly if the data related to pollution is accurate.

Pollution of the Air, Water, and Land

There is no doubt that pollution from coal can be a killer. As one comment pictures it, "at present, coal pollutants have achieved potentially dangerous levels in some area of the country. This is reflected in recent health studies: tens of thousands die prematurely each year as a result of diseases seriously aggravated by such pollution."[53] There is much similar evidence. And, although there are contradictory studies and many government regulations which apply to the control of the pollution, most experts are fearful that any substantial increase in the amount of coal use would produce critical levels of pollution. Experienced debaters will chuckle at this statement: there is "inherent conflict in the nation's commitment to both a cleaner environment and to coal as the main alternative to over-dependence on imported oil."[54] Such made-to-order language is simple to discover when balancing coal and pollution.

Problems caused by coal mining are not confined to secondary effects, i.e., those arising from the use of the coal product. There are also pollution problems caused by the mining process itself. For example, surface mining causes dust and other fine particulate matter. Underground fires burning uncontrolled in abandoned mines likewise contribute to air pollution. Water pollution also plagues coal mining. In many parts of the country, the mining industry is the primary cause of water pollution problems, according to one source. A major part of the problem, acid-water pollution, destroys fish and creates odor and water purification difficulties. Sedimentation is another type of water pollution caused in part by coal mining. One and one-half million acres of land in the United States were disturbed by coal mining betwen 1931 and 1971. Most of this was caused by surface mining. Land reclamation is the remedy, but it is a costly one. And that cost prevents this approach from being as economic as many claim it is. Waste disposal is another problem caused by mining. Flash floods, caused by mine dumps accumulated in hollows, have killed many people.[55]

Capital: The Way Coal Works

Energy shortages preclude proper capitalization for new products. The stagnation facing our economy unless we generate more energy will be a major feature of many affirmative cases this year. While economic cases require some sophistication, they certainly deserve development this year.

From another perspective, the absence of capital currently inhibits development of coal reserves.[56] This absence could easily represent a basis for inherency argumentation, for without capital, the coal industry will not be able to give the United States energy independence, some teams will argue. Fluctuations in capital are influenced by government regulations. If, for example, the United States commits itself to regulation for ecological purposes, this might divert capital from expansion programs.

As most debaters would realize, our policies will also influence the policies of our neighbors. *Business Week* noted in 1976 that the shortfall of energy resources in the United States has meant "a crisis whose dimensions are only now becoming fully visible."[57]

Industry: The Worries about Coal

There are many dramatic problems related to the loss of life involved in coal production, as well as those related to pollution. Underground mining, made safer by the Mine and Safety Act and Occupational Health and Safety Act (OHSA) regulations, still could be improved by use of coal slurrying. Coal dust could be reduced by regulations; unless it is, negative teams can at least argue a disadvantage in expanding coal energy development. But there is another problem much more likely to attract debaters this coming season. Timothy Bay has commented in *Science Digest* that "highly adverse consequences may follow if the world, as now seems likely, depends increasingly on coal for energy over the next two centuries."[58] Melting ice caps, for instance, may seem outrageous, but atmospheric heating caused by dramatic shifts to this energy form may cause such a thing to occur. Debaters must consider the truly long-range prospects of coal, or suffer the consequences.

Many debates will discover that the points made above in the discussion of coal might well apply generically to all energy. Of special interest are the large industries involved in the energy field. For example, in coal, there is special concern for the railroad industry. Railroads learned early that coal can be profitable. Both by purchasing bituminous mines and setting high transportation rates, the industry has profited. If coal production were dramatically increased, the industry would benefit. This would be true for several reasons, not the least of which is the distance between the location of the new coal mines in the West and the prime customers in the East.[59]

Nuclear Power

At one point, nuclear power appeared to be the wave of the future. Now it may well be a fad of the past. The potential of this energy resource is great, without any doubt. The problem facing the United States is whether use of the energy might not cause world proliferation of the energy as a weapon. A second problem is the possibility of contaminating the earth's atmosphere with deadly radioactivity. Whether causing destruction by bomb or emission, the problems of nuclear energy are of a type which spawns debate cases and debate disadvantages. You should therefore spend some research and analysis time on this aspect of the 1978–79 topic.

Nuclear power is converted into electrical power. The conversion provides substantial amounts of energy for public utilities. Beyond policy matters, the initial start-up costs for nuclear reactors and the problems with close-down times have made the expansion of this type of energy slow. These drawbacks, coupled with the general fear that the risks of this kind of power are much greater than the benefits, have almost stopped development of nuclear power for public use in the United States.

Current Status of Nuclear Power

Congressman Mike McCormack gave the industry view in April 1977: "Nuclear energy is the safest, cleanest, cheapest, most reliable source of energy available, with the least environmental impact of any significant option."[60] Affirmative teams might take a tip from the congressman. The four advantages identified in his statement could well be the start of a case. But one additional element might be the most substantial aid to affirmative teams: there isn't very much growth occurring in the nuclear energy field right now.

Consider Table 11, taken from the *World Almanac*. In 1976, there were 55 nuclear power reactors in this country out of a worldwide total of 135. The list shown in Table 11 has not changed much since 1976. Note also the small number of companies involved and the few states which have nuclear power plants. The conclusions are attractive to teams interested in developing nuclear power cases.

There have been no new applications since mid-1976 for nuclear power plants. Small shifts in capacity have occurred at several of the sites; shutdowns have plagued some; ecological complaints bother others; and reliability is a problem at most. The plants are not reliable. Expected to be on-line 80 percent of the time, the reactors are shut down for inspection or repairs about 40 percent of every year.[61] Part of this inspection time is spent complying with government regulations. Radioactive emissions are feared, and government has set very rigid safety requirements. Regular maintenance also requires much time, and even more time is lost repairing the reactors.

So nuclear power has not been growing much. Since the first atomic power plant began operation in 1957, little commercial success has occurred. And President Carter's commitment to nuclear energy is not substantial. At most, one would now assume he might support light-water reactors until other energy systems come on line around the year 2000.

Nuclear Power and Proliferation

One [illegible]r which has persisted is the use of reactor fuel for less desirable purposes. The scenario of a thief who steals plutonium is a commonplace story today. Were such a thing to happen, the results could

Table 11. Energy—Nuclear Power Reactors in U.S.

Source: U S Energy Research and Development Administration (June 30 1976)

State	Site	Plant Name	Capacity (kilowatts)	Utility	Commercial Operation
Alabama	Decatur	Browns Ferry Unit 1	1 067 000	Tennessee Valley Authority	1974
	Decatur	Browns Ferry Unit 2	1 067 000	Tennessee Valley Authority	1975
	Decatur	Browns Ferry Unit 3	1 067 000	Tennessee Valley Authority	1976
	Dothan	Joseph M Farley Unit 1*	829 000	Alabama Power Co	1976
	Dothan	Joseph M Farley Unit 2*	829 000	Alabama Power Co	1977
Arkansas	Russellville	Arkansas Unit 1	850 000	Ark Power & Light Co	1974
	Russellville	Arkansas Unit 2	912,000	Ark Power & Light Co	1978
California	Eureka	Humboldt Bay Unit 3	65 000	Pacific Gas & Electric Co	1963
	San Clemente	San Onofre Unit 1	430 000	So Calif Ed & San Diego Gas & E Co	1968
	Diablo Canyon	Diablo Canyon Unit 1	1 084 000	Pacific Gas & Electric Co	1976
	Diablo Canyon	Diablo Canyon Unit 2	1 106 000	Pacific Gas & Electric Co	1977
	Clay Station	Rancho Seco Station	913 000	Sacramento Munic Utility District	1975
Colorado	Platteville	Ft. St Vrain Station	330,000	Public Service Co. of Colorado	1976
Connecticut	Haddam Neck	Haddam Neck	575 000	Conn Yankee Atomic Power Co	1968
	Waterford	Millstone Unit 1	662,100	Northeast Nuclear Energy Co	1971
	Waterford	Millstone Unit 2	828 000	Northeast Nuclear Energy Co	1975
Florida	Florida City	Turkey Point Unit 3	666 000	Fla. Power & Light Co	1972
	Florida City	Turkey Point Unit 4	666 000	Fla. Power & Light Co	1973
	Red Level	Crystal River Unit 3	825 000	Florida Power Corp	1976
	Ft. Pierce	St. Lucie Unit 1	810 000	Fla. Power & Light Co	1976
Georgia	Baxley	Edwin I. Hatch Unit 1	786 000	Georgia Power Co	1975
Illinois	Morris	Dresden Unit 1	200 000	Commonwealth Edison Co	1960
	Morris	Dresden Unit 2	809 000	Commonwealth Edison Co	1970
	Morris	Dresden Unit 3	809,000	Commonwealth Edison Co	1971
	Zion	Zion Unit 1	1 050 000	Commonwealth Edison Co	1973
	Zion	Zion Unit 2	1 050 000	Commonwealth Edison Co	1974
	Cordova	Quad-Cities Unit 1	800 000	Comm Ed Co-Ia.-Ill Gas & Elec Co	1972
	Cordova	Quad-Cities Unit 2	800 000	Comm Ed Co-Ia.-Ill Gas & Elec Co	1972
	Seneca	LaSalle County Unit 1	1 078,000	Commonwealth Edison Co	1978
Iowa	Palo	Duane Arnold Unit 1	535 000	Iowa Electric Light and Power Co	1975
Maine	Wiscasset	Maine Yankee	790 000	Me Yankee Atomic Power Co	1972
Maryland	Lusby	Calvert Cliffs Unit 1	845 000	Baltimore Gas & Electric Co	1975
	Lusby	Calvert Cliffs Unit 2	845,000	Baltimore Gas & Electric Co	1977
Massachusetts	Rowe	Yankee Station	175,000	Yankee Atomic Electric Co	1961
	Plymouth	Pilgrim Unit 1	670,000	Boston Edison Co	1972
Michigan	Big Rock Point	Big Rock Point	75 000	Consumers Power Co	1965
	South Haven	Palisades Station	700 000	Consumers Power Co	1971
	Bridgman	Donald C Cook Unit 1	1,090,000	Ind & Michigan Electric Co	1975
	Bridgman	Donald C Cook Unit 2	1,060 000	Ind & Michigan Electric Co	1978
Minnesota	Monticello	Monticello	545,000	Northern States Power Co	1971
	Red Wing	Prairie Island Unit 1	530,000	Northern States Power Co	1973
	Red Wing	Prairie Island Unit 2	530,000	Northern States Power Co	1974
Nebraska	Fort Calhoun	Ft. Calhoun Unit 1	457,400	Omaha Public Power District	1973
	Brownville	Cooper Station	778,000	Neb Pub Power Dist.-Ia. Power & Light Co	1974
New Jersey	Forked River	Oyster Creek Unit 1	640 000	Jersey Central Power & Light Co	1969
	Salem	Salem Unit 1	1,090 000	Public Service Electric & Gas Co	1976
New York	Indian Point	Indian Point Unit 1	265,000	Consolidated Edison Co	1962
	Indian Point	Indian Point Unit 2	873,000	Consolidated Edison Co	1973
	Indian Point	Indian Point Unit 3	965,000	Power Authority of State of N Y	1975
	Scriba	Nine Mile Point Unit 1	610,000	Niagara Mohawk Power Co	1969
	Ontario	R.E. Ginna Unit 1	490 000	Rochester Gas & Electric Co	1970
	Brookhaven	Shoreham Station	819 000	Long Island Lighting Co	1978
	Scriba	James A. FitzPatrick	821 000	Power Authority of State of N Y	1975
North Carolina	Southport	Brunswick Steam Unit 1	821,000	Carolina Power & Light Co	1977
	Southport	Brunswick Steam Unit 2	821,000	Carolina Power & Light Co	1975
	Cowans Ford Dam	Wm B McGuire Unit 1	1 180,000	Duke Power Co	1978
Ohio	Oak Harbor	Davis-Besse Unit 1	906,000	Toledo Edison-Cleveland El Illum. Co	1977
Oregon	Prescott	Trojan Unit 1	1,130 000	Portland Gen Electric Co	1976
Pennsylvania	Peach Bottom	Peach Bottom Unit 2	1 065,000	Philadelphia Electric Co	1974
	Peach Bottom	Peach Bottom Unit 3	1,065 000	Philadelphia Electric Co	1974
	Shippingport	Shippingport Station	90,000	U S Energy Research & Devel Admin	1957
	Shippingport	Beaver Valley Unit 1	852,000	Duquesne Light Co-Ohio Edison Co	1976
	Goldsboro	Three Mile Island Unit 1	819 000	Metropolitan Edison Co	1974
	Goldsboro	Three Mile Island Unit 2	906,000	Jersey Central Power & Light Co	1978
South Carolina	Hartsville	H B Robinson Unit 2	700,000	Carolina Power & Light Co	1971
	Seneca	Oconee Unit 1	871 000	Duke Power Co	1973
	Seneca	Oconee Unit 2	871 000	Duke Power Co	1974
	Seneca	Oconee Unit 3	871 000	Duke Power Co	1974
Tennessee	Daisy	Sequoyah Unit 1	1,148,000	Tennessee Valley Authority	1978
Vermont	Vernon	Vermont Yankee Station	513,900	Vt. Yankee Nuclear Power Corp	1972
Virginia	Gravel Neck	Surry Unit 1	788 000	Va. Electric & Power Co	1972
	Gravel Neck	Surry Unit 2	788,000	Va. Electric & Power Co.	1973
	Mineral	North Anna Unit 1	898 000	Va. Electric & Power Co	1977
	Mineral	North Anna Unit 2*	898,000	Va. Electric & Power Co	1977
Washington	Richland	N-Reactor/WPPSS Steam	850 000	U S Energy Research & Devel Admin	1966
Wisconsin	Genoa	Genoa Station	50 000	Dairyland Power Cooperative	1971
	Two Creeks	Point Beach Unit 1	497 000	Wis Mich Power Co	1970
	Two Creeks	Point Beach Unit 2	497 000	Wis. Mich Power Co	1972
	Carlton	Kewaunee Unit 1	541 000	Wis Public Service Corp	1974

Nuclear plant capacity (kilowatts) operable 41 257 400 being built 97 421,200 planned 98,294 000 total 236 972 600

From: *The World Almanac and Book of Facts 1976* (New York. Newspaper Enterprise Association, Inc., 1976), p. 132. Reprinted by permission of The World Almanac and Book of Facts, © copyright 1976.

be catastrophic; as a result, many thoughtful citizens prefer almost any other answer for our energy needs to a nuclear answer.

The light-water reactor and the fast breeder reactor represent the two primary approaches. Congressman McCormack addressed himself to the danger of the breeder reactor as it relates to weapons in 1977: "The Japanese have started operation of their first breeder facility; the German government has announced a $2.5 billion breeder program; South Africa has announced that it will sell enriched uranium on the open world market."[62] In his view, nothing the United States could now do could, realistically, change a fact. Therefore, he believes that use of the breeder should not be delayed based upon a fear of weapons proliferation.

President Carter nonetheless fears development of the breeder because of the international risk of nuclear weapons proliferation, according to one source.[63] But another clearly related fear is declining. Few people in government are worried that terrorism would be a serious threat to the operation of nuclear reactor power plants. The rationale for reduced concern, while based partially upon safety precautions, is that "terrorism based on nuclear weapons appears to be a costly high-risk, low-yield proposition."[64]

Nuclear Power and Emissions

Harmful reactor emissions can be caused by leaks and by accidents. Proper regulations can generally attend to the former, but serious reservations exist for many people about the latter. Before introducing nuclear reliance into our economy, people argue we should be sure we are willing to accept the risks that go with the power resource.

The Rasmussen Report, a reactor safety study done by a scientist for the government, demonstrates the basic argument about nuclear emissions. Most scientists agree that Rasmussen was honest and careful in his work, but there the agreement seemingly ends. Frank von Hippel minimizes the accident danger:

> The worst accident, which the Rasmussen study estimates might happen once in 1,000,000,000 years per reactor, might cause 3,300 immediate fatalities, about 10 times that number of early illnesses, some additional genetic effects and long-term cancers, and perhaps $14,000,000,000 in property damage.[65]

In contrast, Robert Pohl notes that the Rasmussen study omits the health impact of radon-222, an isotope which he proves does have negative health effects. He also discusses another dimension of nuclear energy which gets close to the underpinning of our arguments about using this form of energy:

> The discussion of the health impact of radon-222 raises the fundamental moral question—how far into the future our responsibility extends. If such a long term responsibility is rejected, then we must at least try to predict the environmental buildup of radioactive pollutants, in order to avoid unacceptable and irreversible levels of radiation dose rate.[66]

Do we need power badly enough to risk loss of life? We need automobiles and airplanes enough to risk accidents. Clearly, our society does risk loss of life for comfort and convenience. Such philosophical and practical problems must be resolved by debators when the nuclear power question is debated this year.

Some of the early arguments introduced against use of nuclear power were based upon studies far less precise than those cited in Rasmussen's work. Still, people abuse the statistics. Ignoring the small degree of risk (probability of occurrance) and noting death estimates are the most common abuses. Comparisons intended to support the use of nuclear power also abound. One such comparison is to the risk of smoking. This form of support, while vivid, is not particularly meaningful. Debaters are urged to use care when selecting evidence about the risk of using nuclear reactor power. The emission threat certainly exists, but the level of that risk is a debatable question.

Are reactor safety precautions effective? Von Hippel says, "In the area of long-term consequences it would appear that another review is called for. The analysis of these effects has completely changed and the space devoted to it in the original Rasmussen report has been expanded approximately tenfold as a result of the APS critique."[67] In short, the Rasmussen study may not have fully reviewed the calculations of early fatalities nor examined in detail accident-causing events.

Another prospect of risk—transporting the nuclear material and wastes—must be considered by debaters. The early fears regarding transportation of nuclear materials have not been realized, and therefore the problem is probably not so great as it might once have appeared. This writer has seen estimates as low as one fatality each decade based upon transport accidents and radioactivity releases.[68] Not discussed in this book are the arguments, pro and con, related to the *storage of nuclear wastes.* The issues which surround this question are essentially related to the length of time the waste remains "hot," the places where the material should be stored, and the security of these places.

If you argue for nuclear reactors, you may discover evidence comparing the risks to meteors, fires in large oil storage compounds, and the like. If you argue against reactors, you will probably compare your opponents to unknowing children who play with fire. Whatever one's approach, precaution is necessary. Both the argument and the event deserve careful study which goes beyond easy comparisons.

Future of Nuclear Power

Debaters are more concerned with the future of nuclear power than with its past. The regulations of the federal government about use of this energy resource began in World War II and grew until the most recent modifications. These regulations and the development of nuclear energy are discussed below.

Regulation of Nuclear Power

The legislation which created ERDA also established the Nuclear Regulatory Commission (NRC). This five-member commission is appointed by the president. Its three tasks, taken over from the Atomic Energy Commission, relate to safety, licensing, and regulation. No nuclear reactor plant can be built without a federal license, nor can that plant continue to operate unless the regulations concerning safety and normal productivity are met.

The regulatory division of the Atomic Energy Commission became the Office of Nuclear Material Safety and Safeguards. Debaters who want to review the current regulations will want to request data from this part of the NRC. Because substantial changes were made in the regulations in 1975, data on regulations prior to that time may not be accurate.

A second change in the structure of federal government management of nuclear power is that the NRC also has offices of Nuclear Reactor Regulation and Nuclear Regulatory Research.

Development of Nuclear Power

In 1975, Robert A. Georgine predicted that nuclear plants would represent 23 to 28 percent of electrical generating capacity by the year 2000.[69] Unless substantial change occurs soon, this will not occur. In 1975, only 8 percent of our electrical generating capacity came from nuclear plants. The reasons for the slow growth include the matters mentioned earlier and the issue of cost, which is discussed below.

Nuclear power plants are expensive. Lead time is approximately ten years between the intent to construct and getting the plant into operation.[70] This contrasts with a seven-year lag for coal mining. The amount of money required for reactor construction is increasing because of inflation. Businessmen are therefore reluctant to invest. However, contradictory figures do exist. One source claims that the cost per kilowatt of nuclear generating capacity is less than coal power.[71]

Whatever the initial costs, some argue that nuclear power is the eventual answer to U.S. energy problems. Gerald Decker noted in 1977 that "improved technology to increase oil and gas production rates and yields will help some, but it is clear that the biggest assist must come from new coal combustion and conversion methods and from nuclear technology that will get the development and growth of nuclear power back on track."[72] Like many people, Decker believes that a combined approach must be developed if our future energy needs are to be met.

Consider another factor relating to power generation. In the future, power grids may be established which would allow peak-load sharing between one electrical generating plant and another. Were the safety and efficiency problems of nuclear power resolved, plant siting might be far less important than it has been.

Solar Energy

Solar energy is the largest single potential source of power for the earth. Every fifteen minutes enough sunlight shines on the earth to meet its energy needs for the entire year.[73] Therefore, this is one of the most important areas debaters should consider as they do their first analysis of this year's topic.

Current Status of Solar Energy

The technology necessary to use solar energy has existed for more than one hundred years. But only recently have we seriously considered the broad use of solar energy. In 1975, only 136 homes were solar-heated in the United States. A year later, there were thirty-eight solar contractors in the Solar Energy Industries Association.[74] Large-scale introduction of solar heating and cooling in buildings would produce energy savings that exceed the flow of oil from the Alaskan oil fields, according to one prediction.[75] However, although the technology has existed for some time and there are predictions of expanded use, solar power is now in an experimental stage.

Installed solar systems cost somewhere between $5,000 and $10,000 per home, an investment that would take more than a decade to recover. At the current rate of inflation, few are willing to make the investment. The principal technological hurdle for use in homes, according to a solar heating consultant, is the economics of high capacity units: "A [solar] system designed to carry 50 percent of the heating load is within reach of most home owners while a system designed to carry 75 percent to 90 percent of the heating requirements might cost two or three times that amount."[76] In general, then, solar energy is not yet competitive. One source summarizes the situation this way:

> This is particularly a fact of nature, but it is also the consequence of many other factors including past research priorities, past environmental policies, past economic policies such as price regulation and depletion allowances. Simply stated, it has been easier and cheaper —(although perhaps not smarter in the long run) to live off capital (fossil fuels) than income (renewable energy sources).[77]

This series of observations indicates some of the major aspects of the present system which should be examined if you are to develop a case on this alternative energy source. But the issues are broader, of course, and deserving of extensive research.

Law and Solar Energy —

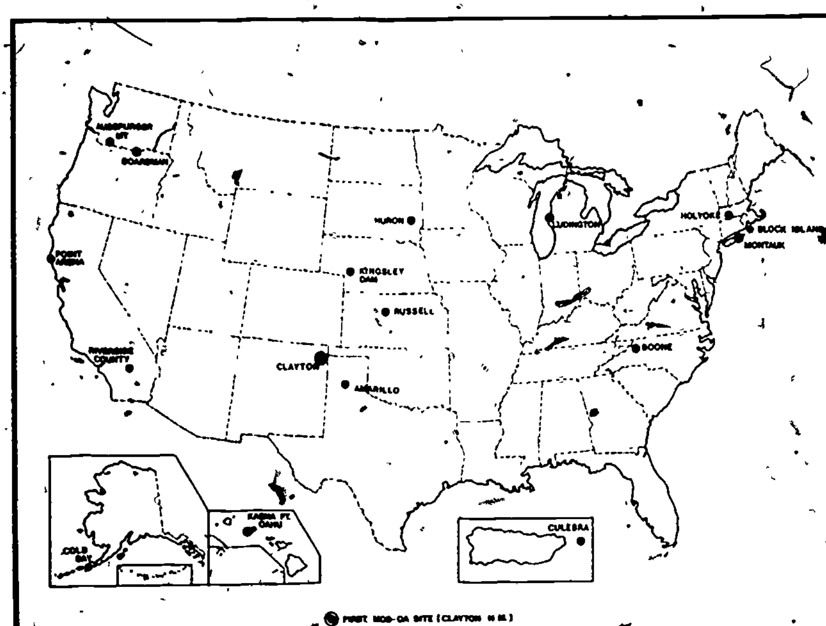
The major thrust of arguments by affirmative teams on development of government commitment to an alternative energy source might be that *we need a renewable energy source*. Solar energy meets that need.

Current federal programs are exploring the prospects of solar energy, but these programs are contradicted by some local and state laws. For example, in Colorado Springs, you must install a completely redundant gas or electric system if you want to have solar power. Moreover, one source notes, "even with successful solar R&D, if solar is to be competitive the federal government must move away from policies which hold down the price of existing resources."[78]

The majority of the current governmental actions, then, relate to research and development. ERDA has a Division of Solar Energy which, by 1977, had initiated numerous cooperative activities with NASA in its programs on wind energy, photovoltaics, heating and cooling of buildings, and satellite power stations. In fiscal year 1977, the federal budget included $88 million in developmental funding for heating and cooling, as well as $136.1 million for other solar energy programs.[79]

The wind program illustrates the continuing research into solar energy. The federal Wind Energy Program was initiated in 1973 by the National Science Foundation and transferred to ERDA in 1975. Test applications include refrigerators at remote Indian villages and power generation for Forest Service lookout towers. One source predicts that by 2000, 14 percent of our electricity will be produced by this source.[80] The extent to which our government has committed itself to investigation of this power source can be seen in Table 12, which identifies the current

Table 12. Seventeen Candidate WTG Field-Test Sites



From: Federal Wind Energy Program, *Summary Report* (Washington, D.C Government Printing Office, 1977), p. 12

utility company sites for large horizontal wind turbines. The turbines are intended to work in combination with the normal electric generation systems of the companies. Were there also locations offshore which could take advantage of the ocean winds, the percentage of use for this energy source might go much higher.

ERDA also works with industry. In 1977, thirty-six development contracts were in existence, mostly with small businesses. Sixty-seven fully instrumented operational test sites were using various systems and subsystems for solar heating and cooling.[81]

One overall concern of ERDA is the discovery of viable applications of the three forms of solar energy which keep working day and night—wind power, biomass conversion, and ocean thermal energy conversion. Biomass is nothing more than fire. Ocean thermal energy conversion is more complex, consisting of utilizing the heated surface water of the ocean.

Use of Solar Power

Today the United States applies approximately 25 percent of the energy it produces to heating and cooling of buildings. If solar power were used for a substantial part of this application, the energy problem might be much less severe.

The prime solar energy system is the solar cell. Glass-covered, flat-plate solar collectors heat air or water to temperatures of 100 to 200 degrees Fahrenheit. "The inherent advantage of solar cooling is that the maximum requirement coincides roughly with the time when the maximum amount of energy is available to operate the system."[82] A second form of solar energy system is the thermal power plant. Radiant energy from the sun is easily convertible into heat; the only requirement is a proper absorbing surface which can be transferred to the place of use. Massive application of this kind of device is possible.

The solar fuel cell also excites the imagination. The glassy-looking little squares produce electricity when exposed to the sun. When in space, the cells receive up to fifteen times as much solar energy as they would on earth. In either place, there is a substantial technological basis for further development.[83] One aspect still needing development is the cost factor: the cells used in space cost from $200 to $600 per watt of generating capacity.[84]

A primary problem in solar energy efficiency is storage. One solution is a short-term thermal energy system, single-tank units which use the generated heat. "In the operation of a typical central-tower powerplant, superheated steam from the tower is directed to the turbine-generator and/or a thermal storage system, which is used to drive the turbine during non-sun periods."[85]

Future Status of Solar Energy

If predictions about exhausting world fossil energy resources are valid, solar energy use must occur if we are to avoid scarcity. Current predictions about the possible contribution of solar energy range from 4 to 25 percent. Whatever the percentage, the cost comparisons will determine the swiftness of our turn to the sun as an energy source.

One major problem for this new industry will be market penetration. Breaking into the power-generating business would be almost impossible without a cost break. Even then, building codes will have to be changed, gas and electric utility systems will be affected, and employment patterns will change. As one expert noted, some professions, including architecture, law, sales, and real estate and appraisal, will be affected.[86] So legal changes will be a second major problem for the new industry.

Most estimates indicate a downward turn in the price of the solar watt because of technological improvements. One such projection says that the price will probably be reduced to between thirty and fifty cents a watt by some point in the 1980s.[87] Obviously, as oil and coal prices rise, solar energy becomes more attractive. With the price gap narrowing between solar and conventionally produced energy, market penetration and the other problems of solar-power just discussed may ease.

Affirmative teams advocating solar power as a primary alternative energy resource will need to defend the effectiveness of this source. Negative teams combating affirmative policies using solar energy may want to develop the opposing view. Below are a few of the difficulties which must be resolved.

Problems with Solar Energy

One problem mentioned above, but undeveloped there, relates to land use. For solar-thermal or photovoltaic (solar cells) energy systems, the requirements are currently 7 to 15 square miles of land for a 1000 MG(e) plant.[88] Using this much land for that little power would disturb many. This probably explains the search for space technology which could get beyond the land use problem.

A second problem involves future community planning. A "total energy system" approach would appear to be necessary if efficiency in energy use is to occur. Existing plants could not use both electric and thermal energy, but new plants might have such capacity. The limitations on conversion prospects should be considered by debaters, since there are substantial difficulties. For example, underground ducts, pipes, and electrical cables leading from the central powerplant to outlying buildings would be necessary.[89]

Third, manpower creates a problem which any new solar policy would have to resolve. Consider the massive information problem created for the 300,000 residential homebuilders in the United States if solar systems were to be widely employed. Who would inform them about the new systems? How reliable would the information be during the early years? What would be the impact of distorted information?

But the employment problem is even more complex. Solar installation involves at least five separate crafts or unions. Roofers, plumbers, glaziers, electricians, and carpenters all would be involved. What jurisdictional lines should be drawn? Such questions would confront any affirmative team choosing to argue a case which incorporated solar power as an alternative energy resource.

Electrical Generation

The demands for electrical energy continue to climb. Forecasts are that this trend will continue into the twenty-first century. The ways to make the several sources for electrical power compatible are introduced in this section. The importance of the material should be evident: unless the various alternative energy sources can be utilized in ways which would allow several systems to make contributions, the energy supplies of our nation will be significantly less than is desirable.

The Present Electrical System

The United States uses a lot of electricity. In 1973, we used 74.7 quadrillion Btu's. That energy was used in the following ways, according to the National Energy Information Center:

Transportation:	25%	Water Heating:	4%
Space Heating:	18%	Feedstocks:	4%
Process Steam:	16%	Air Conditioning:	3%
Direct Heat:	11%	Refrigeration:	2%
Electric Drive:	8%	Cooling, Electrolytic processes, and other:	4%[90]

A debater might wish to consider the implications of the above breakdown of the use of electrical energy. For example, little modification should be expected were the affirmative merely changing the use of electricity for refrigeration. But a change in use for space heating is another matter, of course. A broader treatment of electricity consumption is shown in Table 13.

The industrial use of electricity fell in 1975. The recovery of consumption during the first half of 1976 may parallel the economic recovery of the industrial sector. That kind of difference might have occurred with limited conservation in effect, but if, for instance, lighting requirements were placed on industry, how would the electrical utilities respond? Would economic difficulties result for them? The cost of conservation may be economic readjustment for the public utilities.

Any plan involving conservation of electricity would be obliged to take into account the use of household appliances. Four appliances use 70 percent of the electrical power in the home. space heaters (16 percent), air conditioners (13 percent), water heaters (16 percent), and refrigerators (25 percent).[91]

Current Law

ERDA activities relevant to this section are the Electric Energy Systems approaches. EES is building a technical capability and supporting research and development programs intended to link the needs of today with future requirements. Other activities related to electric generation are included in the conservation programs conducted by ERDA: "The successful R&D and industry implementation of the EES program can be measured quantitatively in terms of direct energy savings—estimated to be 1.0 million barrels per day equivalent by 1985 and 5.0 million by the year 2000."[92] Developing program concepts which give a better understanding of present electric energy systems permits ERDA to forecast future developments, needs, and concerns. The systems approach considers all aspects of the energy picture of electricity.[93]

A few of the other activities conducted by the government related to electric generation need mentioning here. Load management increases energy efficiency by reducing the reserve requirements for generation and transmission. Development of larger voltage transmission systems, such as the 1200kV system, may well improve our system. Transformer losses have been reduced through research into low loss steel for transformer construction. Finally, grid connected systems can be extended to permit sharing.[94] The Electric and Hybrid Vehicle Research, Development, and

Table 13. Percent Shares of Electricity Consumed by Class of Customer, 1960 to 1976

	Residential	Commercial	Industrial	Other[1]	Total
1976					
Second quarter	30.0	23.3	42.9	3.8	100
First quarter	35.4	22.0	38.6	4.0	100
1975					
Fourth quarter	33.3	23.3	39.7	3.7	100
Third quarter	36.9	24.3	35.5	3.3	100
Second quarter	32.2	23.7	40.2	3.9	100
First quarter	35.5	22.2	38.3	4.0	100
1975 totals	34.6	23.4	38.3	3.7	100
1974 totals	33.9	22.6	40.1	3.4	100
1960 totals	29.0	17.5	47.9	5.6	100

[1] Includes street lighting and transportation uses.

Source: Federal Power Commission, Form 5.

From: National Energy Information Center, *Quarterly Report. Energy Information Report to Congress*, NTISUB/B/027076/003, 3rd qtr. 1976 (Washington, D.C.: Government Printing Office, 1976), p. 106.

Demonstration Act of 1976 authorized a federally funded program of energy research. The hybrid, which would use both electric and internal combustion engines, should give desirable options for the future. Batteries for autos, buses, and vans have also been studied. Current technology may need to be expanded, but there are many possibilities for the use of electric generated power.[95]

Future Prospects for Electric Generation

A 1976 advisory report published by the government indicates that a qualified yes can be given in answer to the question of whether we are moving to a period of chronic electric power shortages or inadequacies during the late 1970s and early 1980s. The report notes that the answer must be qualified "because many of the technological, economic, financial, political and environmental factors which affect that answer are subject to control by the public and its elected and appointed representatives."[96] Debate teams which attempt to incorporate this energy type into their cases must consider these limits. The research and development may not be assumed to be complete, but the aspects of the programs which are merely experimental will not provide firm data for conclusive judgments by the debaters. Six factors must be considered before the electric system can be deemed acceptable. These may assist the debater in evaluating various approaches and their potentialities.

Electricity use must be considered in any electric system. Will there be growth in use or not? Can electricity substitute for other energy sources? How can changes be developed in the distribution load factors? What are the implications for conservation?

Electrical systems represent the second factor to consider. One scenario for energy development mentioned above would be the implementation of automated distribution systems. The grid system could switch energy based upon programs which maximize rate predictability and control.[97]

Electrical supply, frequently based upon the energy park and dispersed generation approaches, can be a vital factor in evaluating the overall energy picture. New sources, energy storage techniques, multipurpose plants, and high-capacity transmission all represent areas of needed research. To the extent that various problems can be corrected, our electrical generation might be increased substantially.

Environmental constraints exist for electric generation as they do for coal mining. Clearly, we must make programmatic choices in the near future. There is disagreement, for instance, over government restrictions on the size of transmission lines.

Reliability requirements must be sustained. Unless the public can be satisfied that current standards will be maintained, changes in source of energy will not occur.

Public policy, the final factor, relates to the general responsiveness of the public. As noted earlier, there must be a national energy policy. Then a new rate structure and regulatory approach in electric generation could modify behavior. Public policy might also influence cooperative actions by consumer and public interest groups with industry, actions which are essential to make any new program work.

Approaches to Electric Generation

Converting energy to electricity without the use of the thermal cycle is possible with the *fuel cell*. Fuel cells are quiet, safe, and modular in construction so that very large increments in capacity need not be added at the same time. According to an ERDA report, using these cells could save over one-quarter of a million barrels of oil a day by 1985.[98]

A project on phosphoric acid fuel cells was also conducted by ERDA. The system may save over $1 billion in electric costs by 1985. Other gains include improvement in environmental impact as well as helping to balance loads.

Magnetohydrodynamics, called MHD, is an extremely simple but effective process: "An extremely hot gas derived from burning coal—or other fuel—is turned into an electrical conductor by 'seeding' it with another material such as potassium or cesium. The gas moves at a very high speed through a channel enclosed by a magnet. Electricity is produced and tapped by electrodes in the wall of the channel."[99] A system that does not pollute the air, requires little water, and is 40 percent more efficient than other electrical generation systems is obviously attractive. MHD systems will not be on-line until 1985, but they deserve consideration as an energy alternative by debaters on this year's topic.

Conservation

Most of our energy now comes from depletable resources in the earth's crust. Unless a renewable source is rapidly expanded as our source of energy, we will run out of nonrenewable resources soon. Gerald Decker puts the picture into grim but accurate focus:

> In order to meet our country's energy needs even by the year 2000, we must pursue and bring to fruition just about every energy source we now know about, as well as conserve energy in every possible way. The alternative is economic stagnation, unemployment, and considerable unwelcome change in the American lifestyle.[100]

Some would say that our era of "plenty" has ended. These people talk in terms of certain change in our lifestyle. Others contend that the period which is ending is simply the fossil fuel era and that the future will see the rise of other energy sources. However, both groups recognize the pinch which will occur sometime after 1985 and before the turn of the century. Whether or not you place yourself in either corner, your arguments this year must recognize these two positions.

An Energy Overview

We cannot dramatically increase our supply of energy from fossil fuels by building more producing plants. We can only improve what we now do. *Exploration* might be successful. We can *develop and produce* more effectively. Our *refining and treatment methods* can augment our supplies, and we can improve *transportation*.[101] But none of these approaches changes the finite amount of fossil fuel avaialble. Only conservation can "stretch" what we have. Home insulation, for instance, means the homeowner will need less heat in winter and less cooling in the summer. Reuse of waste heat in factories means less energy would be necessary for industrial production. Cooling ponds or canals require far less energy than closed-cycle cooling systems, yet they do the same thing.[102]

National Objectives

Our energy goals during the past five years have been aimed at slowing the growth of consumption, not reversing it. No political leader interested in reelection can be expected to call for severe economic changes. Yet that may be the end product of conservation. The question is, What do we want, properity now and pain later or a little pain now and an answer later? Our government has apparently chosen the latter answer to the question.

Government programs have been aimed at electric energy systems, energy storage, energy conversion, industry conservation, buildings conservation, and transportation energy conservation. The ERDA programs developed within these six areas should prove interesting to negative teams interested in providing evidence of how the present system is responding to the problem. Inherency positions should include reference to the research and development programs on two levels. (1) the experimentation is moving forward as rapidly as possible, and (2) when the program is established as beneficial, no additional legislation would be necessary. Consider the following example of federal conservation objectives.

Waste heat utilization in the diesel trucks project of 1976 intended to improve fuel economy. By using heat which would normally be wasted, a steam engine could provide power for refrigeration or other auxiliary needs. The project proposed to cut fuel consumption by 13 percent.[103] Prior to the project, no diesel fuel conservation device was available. But once the project was completed, the cost benefit would be sufficient to cause truckers to install the device. Result? No new program would be necessary to implement this conservation approach. This sort of argument may be very important to your debate position on this year's topic.

No negative team should ignore the implications of such programs for their inherency argumentation. But to argue that the present system is actually conserving and then argue that conservation will slow down our economy would appear to be contradictory. A balance between these two positions is necessary if you are to be effective in your arguments.

Another national objective which must be considered is what we will tolerate with regard to our environment. We are revising our previous commitments to clean air. How much noxious gas and fumes can we accept? Some conservation efforts are directly opposed to environmental efforts. The implications for the development of disadvantages should be obvious. If, for example, we allow "dirty" coal to pollute our atmosphere, the rate of lung disease will increase. Again, a balance must be struck in one's arguments.

The cost of a kilowatt-hour has been rising steadily, and no end appears to be in sight.[104] This is to be expected when we live off inventory. But one national objective which might aid debaters in arguing about conservation is that *conservation saves money*. The economic benefits of eliminating fuel wastes created by engine friction is a case in point. One estimate claims that friction in engines, generators, and industrial equipment is consuming as much as 11 percent of all the energy the country uses.[105] Any company which could eliminate 11 percent of its energy costs without sacrificing anything would do it

Conservation Future

Even with conservation efforts, our national energy policy must include fossil fuel for at least twenty-five years. And the stretching anticipated by use of conservation may mean fossil fuels will be important for more than twenty-five years. We cannot expect rapid refinement of solar energy technologies except by government commitment. The capital intensiveness of these technologies delays wind conversion systems, ocean thermal energy conversion (OTEC), and most of the more esoteric energy approaches in part because it discourages private research and development. Present systems involving some of these approaches are ruled out because the costs are just too large when compared to fossil fuel alternatives.[106]

Government Research and Development

There are many reasons for government control of energy research and development. John E. Tilton has observed that businesses generally avoid substantial research because they rarely pool projects to reduce the risk, they discount societal benefits, and they do not want to risk their money.[107] Furthermore, the benefits from research and development usually spread out beyond the immediate interests of the researcher. (NASA programs illustrate this, as do National Institutes of Health efforts.) Most important, private firms do not directly profit from all general research. Thus, *only the government has broad enough interests to sustain a commitment to research and development.*

There are two opposing views on the urgency of conservation. Some believe that conservation must be a deliberate and coherent effort closely tied to research and development. Others believe that conservation must be immediate. Whatever tension there is between these two views will be a matter for debaters to argue this year. Thomas Reese feels that the second goal is more critical: "If we don't act now, in a few years it will be too late."[108] Others focus upon the need for coherence: "It is important that policy makers give some attention to the whole package rather than just proceeding on a piecemeal basis."[109] The debater must consider the whole package: the short and long run, alternative energy sources and conservation, and government and industry.

Government Regulation

The government now does a great deal of regulating and will do more. All firms operating in the energy sector are now subject to regulations of one type or another. Natural gas prices, domestic oil production, oil imports, uranium imports, electricity rates, allowed costs of electric utilities, and safety standards for coal mining have all been regulated for some time.[110]

We need to remember that the government will be active in energy development for another reason. Most of the major petroleum reserves that have not been developed are under the direct control of the federal government. This includes both the outer continental shelf and the public domain lands of the West and in Alaska. How rapidly these lands are developed will depend upon the government.[111]

Some would argue for a future with *less* government involvement. Deregulation is looked upon as the panacea for all petroleum-related ills. Let the market set the price, the argument goes, and industry will find the supplies. Further, keeping prices low encourages overuse of fuel; consumers have been spoiled, some say. The aims of regulation are not always consistent. Congressman Rhodes of Arizona has pointed to one power plant in Virginia which spent $25 million converting from coal to oil just a few years ago but has now switched back—at a cost of $150 million. Both changes were made at government request.[112]

A third position, argued by many, advocates a cautious approach to government studies on energy. Most energy statistics should be taken with a grain of salt, they say. Others think that greater understanding of the domestic energy supply sector would aid in the development of an overall policy. In any case, all would seem committed to the notion that knowledge is essential in making policy judgments to withstand the shortages to come.

Other Sources of Energy

No single source can supply all our energy in the future. According to the statements included above, we will need more energy sources than we have now, and we must conserve. Only two alternative sources of energy are mentioned here. The purpose of including them is to suggest the prospects which many claim for any number of exotic approaches to energy. Included in this section are hydroelectric power and ocean thermal energy conversion.

Hydroelectric Power

Eleven percent of the total generating capacity in the United States now comes from hydroelectric power. This represents a decline from former years when almost one-third of our power came from this source. This decline is expected to continue. The question discussed here is whether we can utilize this power source better than we do currently.

One benefit from the continued use of hydroelectric power is the low outage rate. This power source is not only reliable, it is also renewable. The prices charged are becoming competitive as the prices of other energy resources increase. Finally, hydroelectric plants are well adapted for serving peak loads, since they can start quickly and make rapid changes in power output.[113] But the benefits of this power source do not end there. Dams create recreational areas and provide flood control, and there is no air pollution generated by hydroelectric power systems. The system is also reliable, and there are enough trained personnel to manage it.

The problems of hydroelectric installations are few. They boil down to costliness and a shortage of additional sites. Building a huge dam costs a lot of money; there are obvious limits on site flexibility, careful engineering is required, and ecological and social consequences must be considered. But given the benefits, many more dams would be built were there places available to build them.

Government and Cost Regulations

One reason why construction has not begun in more locations is that the federal government prohibits or restricts the licensing authority of the regulator, the Federal Power Commission, on certain rivers.[114] What has happened is that our government has decided, for one reason or another, to limit the number of dams. Sites not currently developed are those where development was ruled out either because of high costs or the limitations imposed by the government.

In Table 14, the location of hydroelectric generating plants in the U.S. is shown. As is clear by considering the number of plants located in the United States, there is substantial commitment to this energy source. There is also little doubt that nonfederal hydroelectric plants can be developed in the United States. The question posed by the table is whether this source can be expanded without ecological damage or incurring very high government costs. Comparison of this information to the previous material related to electrical generation should assist the debater in deciding whether this alternative is worth extensive development as an energy resource.

Table 14. Hydroelectric Plants

World's Largest Hydroelectric Generating Plants

Source: Bureau of Reclamation
UC—Under construction NA—Not available Year—Initial operation

Name	Present Megawatts	Ultimate Megawatts	Year
Itaipu, Brazil/Paraguay	—	12,600	UC
Grand Coulee, U.S.A.	2,161	9,780	1941
Paulo Afonso, Brazil	1,299	6,774	1955
Guri, Venezuela	524	6,500	1967
Tucurui, Brazil	—	6,480	UC
Sayansk, U.S.S.R.	—	6,400	UC
Krasnoyarsk, U.S.S.R.	6,096	6,096	1968
La Grande, Canada	—	5,416	UC
Churchill Falls, Canada	5,225	5,225	1971
Bratsk, U.S.S.R.	4,100	4,600	1964
Sukhovo, U.S.S.R.	—	4,500	UC
Ust-Ilimsk, U.S.S.R.	720	4,320	1974
Ilha Solteira, Brazil	3,200	4,100	1973
Cabora Bassa, Mozambique	2,000	4,000	1975
Inga, Zaire	350	3,700	UC
Rogunsky, U.S.S.R.	—	3,600	UC
Inga, Zaire	350	2,820	UC
John Day, U.S.A.	2,160	2,700	1968
Nurek, U.S.S.R.	—	2,700	UC
Sao Simao, Brazil	—	2,[illegible]	UC
Volgograd-22nd Congress, U.S.S.R.	2,560	2,560	1958
Chicoasen, Mexico	—	2,400	UC
Volga-V.I. Lenin, U.S.S.R.	2,300	2,300	1955
W.A.C. Bennett, Canada	1,816	2,270	1969
Foz Do Areia, Brazil	—	2,250	UC
High Aswan (Sadd-el-Aali), Egypt	2,100	2,100	1967
Iron Gate, Romania/Yugoslavia	2,100	2,100	1970
Bath County[1], U.S.A.	—	2,100	UC
Itumbiara, Brazil	—	2,100	UC
Chief Joseph, U.S.A.	1,024	2,069	1956
Salto Santiago, Brazil	—	2,000	UC
Robert Moses-Niagara, U.S.A.	1,950	1,950	1961
Salto Grande, Argentina	—	1,890	UC
Dinorwic[1], Great Britain	—	1,880	UC
Ludington[1], U.S.A.	1,872	1,872	1973
St. Lawrence Power Dam, U.S.A./Canada	1,824	1,824	1958
The Dalles, U.S.A.	1,807	1,807	1957
Karakaya, Turkey	—	1,800	UC
Mica, Canada	—	1,740	UC
Beauharnois, Canada	1,021	1,670	1950
Kemano, Canada	813	1,670	1954
Blue Ridge[1], U.S.A.	—	1,600	UC
Patia, Colombia	—	1,540	UC
Racoon Mountain[1], U.S.A.	1,530	1,530	1975
Kariba, Rhodesia	600	1,500	1959
Tumut-3, Australia	750	1,500	1972
Marimbondo, Brazil	1,440	1,440	1975
Jupia, Brazil	1,411	1,411	1966
McNary, U.S.A.	980	1,406	1953
Cheboksary, U.S.S.R.	1,404	1,404	1972
Agua Vermelha, Brazil	—	1,380	UC
Saratov, U.S.S.R.	1,360	1,360	1967
Daniel Johnson, Canada	650	1,353	1970
Hoover, U.S.A.	1,345	1,345	1936
Wanapum, U.S.A.	831	1,330	1964
Ingun, U.S.S.R.	—	1,300	UC
Zeya, U.S.S.R.	300	1,290	1975
Takase, Japan	—	1,280	UC
Priest Rapids, U.S.A.	789	1,262	1959

(1) Pumped storage installation

Non-Federal Hydroelectric Plants in U.S.

Capacities of 150,000 Kilowatts or More as of Jan. 1, 1976

Auxiliary and pumped storage units are not included in hydroelectric capacities.
Source: Federal Power Commission, Bureau of Power

Plant	State	Owner	Kilowatts
Robert Moses, (Niagara)	N.Y.	Power Authority State of N.Y.	1,953,900
Rocky Reach	Wash.	Chelan County Dist. No. 1	1,213,100
Robert Moses, (Massena)	N.Y.	Power Authority State of N.Y.	912,000
Wanapum	Wash.	Grant County Dist. No. 2	831,250
Priest Rapids	Wash.	Grant County Dist. No. 2	788,500
Wells	Wash.	Douglas County PUD No. 1	774,300
Boundary	Wash.	Seattle Dept. of Lighting	551,000
Conowingo	Md.	Philadelphia Electric Co.	474,460
Hells Canyon	Ore.	Idaho Power Co.	391,500
Brownlee	Idaho	Idaho Power Co.	380,400
Ross	Wash.	Seattle Dept. of Lighting Co.	360,000
Edward Hyatt	Calif.	Calif. Dept. of Water Resources	351,000
Cowans Ford	N.C.	Duke Power Co.	350,000
Upper Smith Mt.	Va.	Appalachian Power Co.	300,200
Mossyrock	Wash.	City of Tacoma	300,000
New Colgate	Calif.	Yuba County Water Agency	284,400
Noxon Rapids	Mont.	The Washington Water Power Co.	282,880
Round Butte	Ore.	Portland Gen. Elec. Co.	247,050
Safe Harbor	Pa.	Safe Harbor Water Power Corp.	226,500
Walter Bouldin	Ala.	Alabama Power Co.	225,000[*]
Rock Island	Wash.	Chelan County Dist. No. 1	212,100
Swift No. 1	Wash.	Pacific Power and Light Co.	204,000
Cabinet Gorge	Idaho	The Washington Water Power Co.	200,000
Saluda	S.C.	So. Carolina Electric and Gas Co.	197,500
Oxbow	Oreg.	Idaho Power Co.	190,000
White Rock	Calif.	Sacramento Mun. Utility Dist.	190,000
Caribou No. 1 & 2	Calif.	Pacific Gas and Electric Co.	184,800
Gaston	N.C.	Virginia Electric and Power Co.	177,920
Lay Dam	Ala.	Alabama Power Co.	177,000
Osage	Mo.	Union Electric Co. of Mo.	172,000
Kerr	Mont.	The Montana Power [illegible]	168,000
Lewis Smith	Ala.	Alabama Power Co.	157,500
James B. Black	Calif.	Pacific Gas and Electric Co.	154,800
Martin Dam	Ala.	Alabama Power Co.	154,200

[*] Units out of service Feb. 1975 in dam failure.

From: *The World Almanac and Book of Facts 1976* (New York: Newspaper Enterprise Association, Inc., 1976), p. 137. Reprinted by permission of The World Almanac and Book of Facts, © copyright 1976.

Ocean Thermal Energy Conversion

Commonly called OTEC, this vast energy source has yet to be tapped. John D. Isaacs of Scripps Institute of Oceanography estimated in 1975 that "ocean thermal gradients and salinity gradients are the two greatest potential energy sources."[115] If the United States could resolve the many technological problems in ways which would be economically acceptable, the power problem that was created when the OPEC nations initiated their 1973 embargo would be over.

Technology

The source is vast, renewable, probably nonpolluting. Yet the technology is still immature: "The state of the art must be advanced in several areas to produce power plants economically competitive with fossil- and nuclear-fueled systems."[116]

Simply put, OTEC uses the gradient between the warm surface water of the ocean and the cooler water underneath to generate power. One of the technological problems is the impact of the temperature changes generated by the OTEC process. Clarence Zener noted in the *Bulletin of the Atomic Scientists* that "no one knows what the climatic impacts would be of very large-scale OTEC development."[117] Translated into debate terms, this may mean a serious disadvantage if an affirmative team develops this as the alternative energy source. Melting the icecaps might be linked to the climatic changes. Clearly, water temperature changes in the Gulf Stream might cause it to alter course, to flow faster or slower, and potentially affect weather systems, as Zener notes.

A separate technological problem is the remoteness of this resource. It is inherently unstable since it is in the ocean. As one researcher noted: "If the [conversion] platform is more than a few miles in the ocean—and the experts are talking about platforms 50 or 100 miles out—then it's just not feasible to string power lines from shore."[118]

Solutions may exist for these many problems, of course. For example, a hydrogen fuel link might be the key to large-scale use of OTEC. Power lines would then be unnecessary. And proper placement of the platforms might avoid the temperature modification problems. But one thing is certain—the team which does not consider the implications of this power source may well lose rounds as the price for their carelessness.

Final Observation

The one month spent researching the various energy types which might contribute to our independence, conservation, and research has been profitable. No summary could cover the variety of other sources which might contribute to our national well-being. But by selecting the two extremes relating to water use, the variety might become clearer to you.

Omitted from this discussion are such things as geothermal power, the steam which comes spewing from the earth at many spots across our nation. Old Faithful in Yellowstone National Park, for example, could supply considerable power were it tapped. Iceland has used this natural energy resource, and so might the United States. Despite this and other omissions, you have been introduced to a number of approaches which you might investigate further as a consequence of this *First Analysis*.

One difficulty in putting something of this sort together is that there is so little time to reflect upon what has been learned. The advantage that you, the reader, have is the time to reflect before you begin your debates.

Appendix: NUEA Referendum

Problem Areas

I. What should be the role of the federal government in regulating the mass media in the United States?

II. What should be the direction of the foreign policy of the United States?

III. What should be the energy policy of the United States?

Choice of Problem Areas by Official Referendum Vote

In the balloting shown below each state or organization ranked the three problem areas in order of preference. Arizona, for example, ranked problem area II first, III second, and I third. Thus, the problem area with the smallest preference vote total is selected as the National High School Problem Area.

	I	II	III
Arizona	3	1	2
Arkansas	2	3	1
Colorado	3	2	1
District of Columbia	1	3	2
Florida	1	3	2
Georgia	3	2	1
Idaho	1	3	2
Illinois	2	3	1
Indiana	1	2	3
Iowa	3	2	1
Kansas	3	1	2
Louisiana	3	1	2
Maine	3	2	1
Maryland	1	2	3
Massachusetts	2	3	1
Michigan	1	3	2
Minnesota	3	1	2
Mississippi	2	1	3
Missouri	2	3	1
Montana	3	2	1
Nebraska	2	3	1
New York	1	2	3

	I	II	III
North Carolina	3	1	2
North Dakota	2	3	1
Ohio	2	3	1
Oklahoma	3	1	2
Oregon	2	1	3
Pennsylvania	1	3	2
South Dakota	2	3	1
Tennessee	2	3	1
Texas	2	3	1
Utah	1	3	2
Vermont	3	1	2
Virginia	3	2	1
Washington	1	2	3
Wisconsin	3	1	2
Wyoming	3	1	2
NFL	3	1	2
NCFL	3	1	2
Votes cast: 39	85	81	68

Method of Voting	States Using	First Place Votes I	II	III
Balloting of schools	31	9	9	13
Director	4	0	3	1
Committee	1	1	0	0
Other methods	3	0	1	2

Vote by Problem Area	1st	2nd	3rd
I. Media	10	12	17
II. Foreign Policy	13	10	16
III. Energy	16	18	6

In Problem Area III, resolution three was the near unanimous choice. That resolution was worded, "Resolved. That the federal government should establish a comprehensive program to significantly increase the energy independence of the United States."

The National Conference, cosponsored by the Committee on Discussion and Debate of the NUEA and the National Federation of High School Activities Association, will meet at a site yet to be determined, December 28–29, 1978.

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