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DEPARTMENT OF PHYSICS
BUILDING #81

October 25, 1979

cc
Lew Robbins

Professor Igal Talmi
Department of Nuclear Physics
The Weizmann Institute of Science
Rehovot, ISRAEL

Dear Professor Talmi:

I am sorry if I have confused the issue by addressing your attention to the qualitative writeups. I had hoped that they could lighten the burden of coping with the complete exposition. The qualitative writeups, however, serve a pedagogical purpose at the expense of full correctness. For instance, considering coupling of the field to the nucleus only in the initial state sacrifices gauge invariance. The complete calculation maintains gauge invariance.

I wish to stress that none of the results I arrive at would have the analytical form they do if the electromagnetic field were anything other than a plane wave field. In particular, if \vec{A} were a constant vector potential it would not appear at all in the results.

Let me consider the two cases of a constant vector potential and a plane-wave vector potential (in Coulomb gauge) in sequence, as a way of emphasizing the different behavior of the two cases under a gauge transformation. To expedite this procedure, I first wish to point out that the difference between the "reduced" nuclear charge in initial and final nuclear states is equivalent to having a single proton in the final state (see Eq. (5) on p. 45 and Eq. (73) on p. 70).

First consider constant \vec{A} . If a gauge transformation to remove \vec{A} from the equation of motion is applied to the nuclear wave functions, the net result in the transition matrix element is the phase factor $\exp(i\vec{A}\cdot\vec{r})$. The same gauge transformation acting on the electron removes \vec{A} from its equation of motion, and contributes the phase factor $\exp(-i\vec{A}\cdot\vec{r})$ to the transition matrix element. Therefore, \vec{A} vanishes from the problem. All of this is standard and familiar.

Now consider the case where \vec{A} represents a plane wave in Coulomb gauge. The analogue of the constant-potential-removing gauge transformation is just a Göppert-Mayer gauge transformation, which greatly complicates the equations of motion [see my paper, Phys. Rev. A 19, 1140 (1979)], but certainly does not remove the electromagnetic field. In like fashion, the $\exp(-i\vec{A}\cdot\vec{r})$

October 25, 1979

transformation applied to the electron wave function, when \vec{A} represents a plane wave, serves only to complicate the wave equation and wave function, but certainly does not remove the electromagnetic field from the problem. The mathematical difficulties are so unmanageable in Göppert-Mayer gauge that the only practical way to handle the problem is to carry out the calculation in Coulomb gauge, and then to examine the results for gauge invariance.

The plane-wave vector potential that is introduced in my theory appears in the results as an intensity parameter z , expressible in relativistic notation as $z = -e^2 A_\mu A^\mu R_0^2$ (where $A_\mu A^\mu = (A_0^2 - \vec{A}^2)$). Not only is this expression Lorentz invariant, it is also gauge invariant under all transformations of the type $A^\mu \rightarrow A^\mu + k^\mu \Lambda$, because of the transverse character of the plane wave field. A point I must emphasize is that my theory of induced beta decay is certainly not unique in the way field dependence occurs in it. There is a sizable body of work on the behavior of free charged particles in intense plane wave fields where the results are found to depend on the field through the parameter $z_f = e^2 A^2 \chi_C^2$, where χ_C is the Compton wavelength. (See the section entitled "Strength of the electromagnetic interaction," pp. 121-125). These theories possess gauge invariance in exactly the same way as does my theory of induced beta decay, and for exactly the same reason. That is, for a plane wave, z_f is invariant under $A^\mu \rightarrow A^\mu + k^\mu \Lambda$. Furthermore, these theories all reduce to familiar and correct results in the limit of low field intensity. Were the value of A^2 somehow removable or changeable through gauge transformation in these theories, they would not give the correct limit.

You are quite right that Eq. (12) of "Basic theory of induced beta decay" is meaningless for constant vector potentials, and I understand why you are dismayed by its appearance. However, my point is that the complete expression to which Eq. (12) is a crude and incomplete approximation leads, in fact, to gauge-invariant results for plane-wave \vec{A} . As I pointed out above, all intense-field theories (including my theory of induced beta decay) are explicitly gauge invariant despite depending on field quantities through an A^2 dependence.

Sincerely,

Howard R. Reiss

eas

xc: G. M. Stadler, UPI
Rabbi A. Schindler



מכון ויצמן למדע
THE WEIZMANN INSTITUTE OF SCIENCE
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cc
Rabbin

DEPARTMENT OF NUCLEAR PHYSICS

המחלקה לפיזיקה גרעינית

Direct Tel.: 054-8-2060

October 8, 1979

Professor H.R. Reiss
Physics Department
University of Arizona
Tucson, AZ 85721
U.S.A.

Dear Professor Reiss,

Thank you for your letter of August 24th which I found here upon my return from abroad. I am sorry that my letter was not sufficiently detailed and I have not been able to explain clearly my criticism.

I am well aware that a constant vector potential, corresponding to no electromagnetic field, can be removed by a simple gauge transformation. What I suspect however, is that if you introduce such a constant vector potential into your formalism you will obtain stimulated beta-decay by a non-existing electromagnetic field.

In fact, this seems to me to be the case if I look at your more qualitative writeups. In the one entitled "coupling of the field to the particle in induced beta-decay" you make the statement that it is enough to consider the coupling of the electromagnetic field to the nucleus only in the initial state. In the part entitled "basic theory of induced beta-decay" your derivation of eq. (12) holds also for a constant, and arbitrarily large, vector potential. This is the problem that worries me and the one to which I tried to refer in my letter.

I suspect that lack of gauge invariance invalidates your conclusions. If, however, I have misunderstood your argument, I would be grateful if you could explain the specific point I raised above.

Sincerely yours,

Igal Talmi

cc. Rabbi A. Schindler

August 31, 1979

Mr. Lewis Robins
89 Sturges Highway
Westport, Conn. 06880

Dear Lew:

Enclosed herewith is Dr. Talmi's response. If you want to, you can pursue the matter with University Patents, Inc. and I refer to the suggestion of having Dr. Feinberg of Columbia University review this on a consultative basis. I trust that Professor Reiss will answer.

With warmest regards, I am

Sincerely,

Alexander M. Schindler

Encl.



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המחלקה לפיזיקה גרעינית

13th August, 1979

Rabbi Alexander Schindler
838 Fifth Avenue
New York, NY
U. S. A.

Dear Rabbi Schindler,

Following our telephone conversation I received your kind letter and the papers supplied by Dr. H.R. Reiss.

I looked at the material and I have a few questions which I would like to clarify before giving you my final opinion. I enclose a copy of a letter which I am sending to Dr. Reiss. At this stage it seems to me that the theory is not good enough and I certainly would not recommend investing a large amount of money in conducting experiments which are based on it. In any case, I would recommend that a reputable physicist will be persuaded to read the paper of Dr. Reiss in much more detail than I have been able to do. Perhaps a prominent theorist like Prof. Gary Feinberg from Columbia University could be persuaded to do it. It is better to spend a couple of thousands as consultants' fees than to rush into something with good intentions but no chance to succeed.

I am leaving very soon for a few weeks. Upon my return, if I will have received further explanations from Dr. Reiss, I will gladly let you know what I think about it.

With best regards,

Sincerely yours,

Igal Talmi

13th August, 1979

Professor H.R. Reiss
Physics Department
University of Arizona
Tucson, AZ 85721
U S A

Dear Professor Reiss,

Thank you for your material sent to me by Rabbi Schindler. While I have sympathy for your motives I have great doubts about the validity of your theory.

The most disturbing feature seems to me the fact that the matrix elements of the induced β -decay depend on the magnitude of the vector potential. It seems that your theory is not gauge invariant. In fact, I suspect that your expression (110) could be obtained approximately directly from your eq. (9) (or (18) and (19)) as is done in the ordinary way of approximation used for normal β -decay. This would happen even if the vector potential is a constant vector, i.e. no electromagnetic field at all (in this way there would be no Z_f^2 in the denominator and f_0 would replace your f_1 . So far I have not been able to trace the origin of these differences).

The only way that I can see for an external electromagnetic field to induce β -decay is by mixing into the ground state of the nucleus excited states with lower spins. The spacings between such levels are of order of 1 MeV. I suspect that in order to reach admixtures which will have an appreciable contribution, huge electromagnetic fields will be necessary.

I would appreciate hearing from you about these comments. In any case, I suggest you do a simple approximate calculation of a very simple case which will give the magnitude of the required fields without going through the complicated algebra that you use in your paper.

Sincerely yours,

Igal Talmi

July 27, 1979

Mr. Joseph Vardi
7 Haim Haviv Street
Jerusalem, Israel

Dear Joseph:

Please do not think that I have forgotten the energy matter.

After some thought, I decided to send the material directly to Dr. Talmi for an evaluation. The material is on its way to him now. If he considers it worthy, I will be in touch with you again.

I appreciate your willingness to be of help. With warmest personal regards, I am

Sincerely,

Alexander M. Schindler

*Leona Robbins
89 Sturge's Highway
Westport
06880*



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*No Answer
free*

August 2, 1979

Rabbi Alexander Schindler
838 Fifth Avenue
New York, New York 10019

Dear Rabbi Schindler:

I want to thank you for taking the time last Friday to meet with us and explore the possibilities and potential of the Reiss technology. You certainly have the ability to create action, and action is just what we needed at this point in the project's development.

After you left, we completed our work on a briefing memorandum which I think you will find helpful in understanding Howard's work. I have enclosed a copy for you and for Dr. Talmi.

I hope that I, or UPI, will have the opportunity in the future to return your favor. Please do not hesitate to contact me if and when such a need arises.

Again, thank you and shalom!

Sincerely,

GEORGE M. STADLER
Assistant to the President

GMS/cm

Enclosures

cc: Dr. Howard Reiss
Mr. Lou Robbins
Mr. L. W. Miles



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A Novel Major Energy Source: Controlled Beta Decay

I. Basic Concept

The proposed energy source is nuclear, although it is neither fission nor fusion. It involves the induction of a type of radioactivity called "forbidden beta decay".

Only a few materials found in nature have the requisite nuclear properties, but these materials are relatively commonplace. (They include particular isotopes of calcium, cadmium, etc.) The fuel material is normally quiescent. When exposed to an intense low-frequency electromagnetic field (such as low frequency radiowaves), however, beta decay is induced to occur. This leads to a release of nuclear energy far in excess of the energy involved in the inducing field. The result is a net energy production available for the generation of power. It should be stressed that no gaseous emissions occur, and that the end product of the beta decay is an innocuous material, devoid of further radioactivity.

The same physical process described above may also prove useful to accelerate the decay, or reduce the halflife, of certain nuclear fission waste products (such as strontium -90 and cesium -137) which possess forbidden beta decays.

II. Importance of the Concept

*The total energy resources available from controlled beta decay are larger than those associated with fossil fuels (including coal) and with nuclear fission (including breeding). They are not as large, however, as nuclear fusion resources, if and when these are developed.

*Controlled beta decay fuel resources are widely distributed geographically. In fact, the oceans are a major source of some of the fuels.

*A reactor based on controlled beta decay would be extremely safe to operate. Unless the fuel is subjected to an applied field within a narrow range of the optimum field, the reaction ceases. There is no possibility of an explosion, chain reaction, or any other kind of self-propagating reaction.

*No gaseous emissions of any kind are involved in the proposed controlled beta decay reactor. The emissions from some beta reactor fuels are limited to beta particles, which cannot travel more than millimeters from point of origin. Other beta reactor fuels also emit gamma rays which require shielding. This is in any case a necessary part of reactor design, however, since the gamma rays must be captured in order to employ their energy.

*No noxious wastes are associated with induced beta decay. The end products of the beta decay are conventional materials, with no residual radioactivity. Furthermore, there is no by-product radioactivity, such as occurs in both nuclear fusion and fission.

*There is no weapons potential associated with controlled beta decay fuels or their end products. Both the fuels and wastes are conventional materials with no weapons applications.

III. Elements of the Physics

So-called forbidden (not an absolute term) beta decays are nuclear decay processes which are strongly inhibited in nature because certain angular momentum and parity selection rules are not met. Since each photon (an elementary unit of the electromagnetic field) carries one unit of angular momentum and causes a parity change, a forbidden beta decay can become allowed through application of photons from an external source, leading to a release of nuclear energy in the beta decay which can be put to practical use. Every photon carries the same amount of angular momentum regardless of its energy, and so the use of very low energy photons makes possible a favorable overall energy balance in controlled beta decay. (A somewhat more technical description of some of the special features of the physics of induced beta decay is given below.)

IV. Present Status

A complete theory of induced beta decay has been developed. The theory starts from first principles, is applicable to forbidden beta decay of any order, and carries through to

final results for power density of the released energy in an induced beta decay fuel. Preliminary parameters for beta reactors have been explored. All of this information is contained in a patent application which has been filed with the U. S. Patent Office. In addition, several brief pedagogical writeups have been prepared which address aspects of the physics of induced beta decay which are novel. To some physicists, these novel aspects may even be counter-intuitive.

V. Next Steps And Estimated Costs

The principal requirement is for a laboratory verification of the theory. This may take place in several stages, since the easiest way to apply the inducing electromagnetic field to the target material does not match the idealized conditions reflected in the theory. A field corresponding to the calculations can be provided if simpler experiments prove to be inadequate. More theoretical work is also appropriate. The existing theory considers only the pure induced decay, whereas additional contributions arise from mixed induced and natural decay channels yet to be analyzed. Also, present numerical results have been derived by analytical approximations introduced in the late stages of the calculation. Computer calculations are desirable. Further calculations on intense fields arising from practical physical sources should be explored so that a better understanding of their properties and applications can be established.

In order to accomplish the aforementioned work, a three-phase experimental and theoretical program is envisioned. Phase I experimentation will involve a simple source, based on near field effects and the use of soft permeable materials in a core. Phase II involves a source design with a core, in which only the radiation field component of the source is considered. If necessary, a Phase III source would be developed in which no core is used and only the radiation field component is utilized.

Phase I is expected to take 6-8 weeks at a cost of \$15,000 to \$20,000. Projected costs for a one-year Phase II program are approximately \$200,000, while costs for Phase III work (if necessary) may run as high as \$500,000. (A detailed proposal and budget can be made available upon request.)

VI. Salient Features of the Physics

A very simplified presentation is given here of the basic physical and theoretical concept which is involved in induced beta decay. Then a qualitative discussion is presented

of an interesting feature of the electrodynamics of the induced beta decay process which is quite unfamiliar. Misconceptions can arise if this point is not understood.

To describe the basic process, a four-fermion point interaction is considered, with nonrelativistic treatment of the nucleons. Purely for expository purposes, attention is confined to a Fermi beta decay process involving a single nucleon in the nucleus. The nuclear matrix element which arises in the ordinary theory is (Ψ_f, Ψ_i) , where subscripts f and i refer to final and initial states given by the two-component spinor Ψ . This matrix element gives the selection rules $\Delta J=0$, "no" for change in angular momentum and change in parity. Suppose the final and initial nuclear states differ by one unit of angular momentum and have opposite parity. This represents a first-forbidden beta decay, and the simple matrix element (Ψ_f, Ψ_i) will vanish in this case. There are correction terms to the simple matrix element which do make beta decay possible, although the halflife for this forbidden decay is much longer than for a corresponding allowed decay. One such correction comes from the orbital angular momentum of the electron and neutrino emitted in the decay, which is expressible as

$$(\Psi_f, \Psi_i) \rightarrow (\Psi_f, \Psi_i) - i(\vec{p}_e + \vec{k}_\nu) \cdot (\Psi_f, \vec{r} \Psi_i)$$

where \vec{p}_e and \vec{k}_ν are electron and neutrino momenta, and \vec{r} is the position coordinate of the beta decay nucleon. The nuclear matrix element $(\Psi_f, \vec{r} \Psi_i)$ gives the selection rules $|\Delta J|=0, 1$, "yes" for angular momentum change and parity change. Now consider the effect on a nuclear state of an externally applied plane wave electromagnetic field. For a field of frequency ω such that $\hbar \omega \ll |\Delta E|$, with ΔE a characteristic nuclear level spacing, the effect on the initial state can be shown to be

$$\Psi_i \rightarrow \Psi_i + i(e_i \vec{A} \cdot \vec{r}/c) \Psi_i.$$

Here \vec{A} is the vector potential of the field, and e_i is the effective charge of the beta decay nucleon in coordinates relative to the center of mass of the nucleus. An analogous expression holds for the final state, and since $e_f - e_i = e$, where e is the charge of a single proton, the final effect of the field is to modify the nuclear matrix element to

$$(\Psi_f, \Psi_i) \rightarrow (\Psi_f, \Psi_i) - i(e\vec{A}/c) \cdot (\Psi_f, \vec{r} \Psi_i).$$

The effect of the applied field is just like that of electron and neutrino orbital angular momentum in changing nuclear

selection rules. The magnitude of the modified matrix element can be seen to be significant if $|e\vec{A}R_0/c|$ is of order unity, where R_0 is the nuclear radius. This requires a very intense electromagnetic field, but the required intensity can be achieved on a practical basis with low frequency fields.

An interesting property of the electrodynamics of induced beta decay will now be discussed. The simple analysis above led to the inference that the essential parameter of the field is $|e\vec{A}R_0/c|$. The analysis is based on an interaction Hamiltonian of the field with the nucleon given by $-e\vec{A}\cdot\vec{p}/c$, where \vec{p} is the momentum operator. A comparison of the magnitude of this interaction energy with a characteristic nuclear level spacing ΔE , gives the ratio

$$\frac{|e\vec{A}\cdot\vec{p}/c|}{|\Delta E|} = O\left(\frac{|e\vec{A}R_0|}{c}\right),$$

just as before. In view of the remark that the field should be of low frequency, it is tempting to replace the $-e\vec{A}\cdot\vec{p}/c$ interaction term with the scalar potential $-e\vec{E}\cdot\vec{r}$, as is often done for low frequency fields. \vec{E} is the electric field vector. The ratio of the magnitude of this scalar potential interaction energy to ΔE is

$$\frac{|e\vec{E}\cdot\vec{r}|}{|\Delta E|} = O\left(\frac{\hbar\omega}{|\Delta E|} \frac{|e\vec{A}R_0|}{c}\right),$$

which differs by the factor $\hbar\omega/|\Delta E|$ (hypothesized to be very small) from the previous result. This apparent paradox has an explanation which has only recently appeared in the physics literature (see H.R. Reiss, Phys. Rev. A 19, 1140 (1979)). Although the $-e\vec{A}\cdot\vec{p}/c$ and $-e\vec{E}\cdot\vec{r}$ interaction terms are commonly taken to be equivalent whenever dipole approximation is valid (low frequency fields), this is no longer true when field intensity is large. The vector potential \vec{A} in Coulomb gauge, normally represented by the scalar potential $-\vec{E}\cdot\vec{r}$ in electric-field gauge, requires as well vector potential terms in electric-field gauge at high field intensity. These additional vector potential terms become dominant at high intensity, and, in fact, prevent the usual separation of the equations of motion into center-of-mass and relative coordinate equations. This conclusion, demonstrated in the above-cited article for atomic problems, becomes even more emphatic in the nuclear problem. The origin of the $\hbar\omega/|\Delta E|$ factor in the $-e\vec{E}\cdot\vec{r}$ case as compared to the $-e\vec{A}\cdot\vec{p}/c$ interaction term is simply from the fact that the $-e\vec{E}\cdot\vec{r}$ term represents only a small part of the total field-nucleus interaction energy in the intense field case. These conclusions bear

directly on a different physical problem. Although an electromagnetic plane wave cannot be represented by the scalar potential $-\vec{E} \cdot \vec{r}$ in the intense-field case, a quasistatic electric field can properly be represented in that fashion. A corollary to the above conclusion is that a quasistatic field is less effective than a plane wave field in inducing beta decay by the factor $\hbar\omega/|\Delta E|$ for fields of like frequency and electric field magnitude. Of course, in the case of resonance (i.e., when $\hbar\omega=|\Delta E|$, the usual case that is the subject of electromagnetic transition calculations), the familiar result obtains that there is no difference in the effects of quasistatic and plane wave fields. However, a major difference arises when only a small portion of the transition energy is supplied by the electromagnetic field, in which case $\hbar\omega \ll |\Delta E|$. This is the case associated with obtaining useful energy from induced beta decay.

VII. Available Supportive Material

1. U. S. Patent Application, Ser. No. 968,406, entitled "Induced Beta Decay."
2. A series of background papers which provide a qualitative treatment of some of the more fundamental aspects of the theory. The titles of these papers are:
 - a) "Introduction to the Theory of Induced Beta Decay."
 - b) "Basic Theory of Induced Beta Decay."
 - c) "Comparison of Induced Beta Emission with Induced Emission From Metastable Atomic State."
 - d) "Differences Between a Low Frequency Plane Wave Field and a Quasistatic Electric Field."
 - e) "Coupling of the Field to the Particle in Induced Beta Decay."
3. A recent paper which appeared in Physical Review entitled: "Field Intensity and Relativistic Considerations in the Choice of Gauge in Electrodynamics" (Phys. Rev. A 19, 1140 (1979)).



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The effect of the applied field is just like that of electron and neutrino orbital angular momentum in changing nuclear

selection rules. The magnitude of the modified matrix element can be seen to be significant if $|e\vec{A}R_0/c|$ is of order unity, where R_0 is the nuclear radius. This requires a very intense electromagnetic field, but the required intensity can be achieved on a practical basis with low frequency fields.

An interesting property of the electrodynamics of induced beta decay will now be discussed. The simple analysis above led to the inference that the essential parameter of the field is $|e\vec{A}R_0/c|$. The analysis is based on an interaction Hamiltonian of the field with the nucleon given by $-e\vec{A}\cdot\vec{p}/c$, where \vec{p} is the momentum operator. A comparison of the magnitude of this interaction energy with a characteristic nuclear level spacing ΔE , gives the ratio

$$\frac{|e\vec{A}\cdot\vec{p}/c|}{|\Delta E|} = O\left(\frac{|e\vec{A}R_0|}{c}\right),$$

just as before. In view of the remark that the field should be of low frequency, it is tempting to replace the $-e\vec{A}\cdot\vec{p}/c$ interaction term with the scalar potential $-e\vec{E}\cdot\vec{r}$, as is often done for low frequency fields. \vec{E} is the electric field vector. The ratio of the magnitude of this scalar potential interaction energy to ΔE is

$$\frac{|e\vec{E}\cdot\vec{r}|}{|\Delta E|} = O\left(\frac{\hbar\omega}{|\Delta E|} \frac{|e\vec{A}R_0|}{c}\right),$$

which differs by the factor $\hbar\omega/|\Delta E|$ (hypothesized to be very small) from the previous result. This apparent paradox has an explanation which has only recently appeared in the physics literature (see H.R. Reiss, Phys. Rev. A 19, 1140 (1979)). Although the $-e\vec{A}\cdot\vec{p}/c$ and $-e\vec{E}\cdot\vec{r}$ interaction terms are commonly taken to be equivalent whenever dipole approximation is valid (low frequency fields), this is no longer true when field intensity is large. The vector potential \vec{A} in Coulomb gauge, normally represented by the scalar potential $-\vec{E}\cdot\vec{r}$ in electric-field gauge, requires as well vector potential terms in electric-field gauge at high field intensity. These additional vector potential terms become dominant at high intensity, and, in fact, prevent the usual separation of the equations of motion into center-of-mass and relative coordinate equations. This conclusion, demonstrated in the above-cited article for atomic problems, becomes even more emphatic in the nuclear problem. The origin of the $\hbar\omega/|\Delta E|$ factor in the $-e\vec{E}\cdot\vec{r}$ case as compared to the $-e\vec{A}\cdot\vec{p}/c$ interaction term is simply from the fact that the $-e\vec{E}\cdot\vec{r}$ term represents only a small part of the total field-nucleus interaction energy in the intense field case. These conclusions bear

directly on a different physical problem. Although an electromagnetic plane wave cannot be represented by the scalar potential $-\vec{E} \cdot \vec{r}$ in the intense-field case, a quasistatic electric field can properly be represented in that fashion. A corollary to the above conclusion is that a quasistatic field is less effective than a plane wave field in inducing beta decay by the factor $\hbar\omega/|\Delta E|$ for fields of like frequency and electric field magnitude. Of course, in the case of resonance (*i.e.*, when $\hbar\omega=|\Delta E|$, the usual case that is the subject of electromagnetic transition calculations), the familiar result obtains that there is no difference in the effects of quasistatic and plane wave fields. However, a major difference arises when only a small portion of the transition energy is supplied by the electromagnetic field, in which case $\hbar\omega \ll |\Delta E|$. This is the case associated with obtaining useful energy from induced beta decay.

VII. Available Supportive Material

1. U. S. Patent Application, Ser. No. 968,406, entitled "Induced Beta Decay."
2. A series of background papers which provide a qualitative treatment of some of the more fundamental aspects of the theory. The titles of these papers are:
 - a) "Introduction to the Theory of Induced Beta Decay."
 - b) "Basic Theory of Induced Beta Decay."
 - c) "Comparison of Induced Beta Emission with Induced Emission From Metastable Atomic State."
 - d) "Differences Between a Low Frequency Plane Wave Field and a Quasistatic Electric Field."
 - e) "Coupling of the Field to the Particle in Induced Beta Decay."
3. A recent paper which appeared in Physical Review entitled: "Field Intensity and Relativistic Considerations in the Choice of Gauge in Electrodynamics" (Phys. Rev. A 19, 1140 (1979)).

February 14, 1979

Reverend William H. Millerd, S.J., Dir.
Interfaith Coalition on Energy
1413 K Street, N.W. 8th Floor
Washington, DC 20005

Dear Reverend Millerd:

I wish I could join with you at the press conference. No issue cries out more insistently for inter-religious coalition than energy. Feel free to use the attached resolution, adopted overwhelmingly by the UAHC General Assembly, as well as my personal comments on Mexican oil (enclosed).

Sincerely,

Alexander M. Schindler

DP

Interfaith Coalition on Energy

1413 K Street, N.W. 8th Floor
Washington, D.C. 20005

(202) 393-6700

February 9, 1979

Rabbi Alexander Schindler
Union of American Hebrew Congregations
838 Fifth Avenue,
New York, NY 10021

Dear Rabbi Schindler,

At the urging of Rabbi David Saperstein, I am writing you to inform you of the Interfaith Coalition's plans to launch a campaign for energy conservation in the nation's churches and synagogues. An outline of the program is enclosed with this letter.

To launch the program we are scheduling a press conference for the morning of February 22, 1979,. As part of the initial presentation, we hope to release statements of endorsement and exhortation from the representative leaders of the many religious denominations which share the views of the Coalition on energy conservation. Through David Saperstein I know of UAHK's deep concerns about these matters and I would like to invite your participation in this effort.

If the date matches your travel plans, we would be honored to have you join personally with us in the inauguration of the campaign. If not, a statement of endorsement and of encouragement to your congregations will be a most valuable contribution. We could release your statement to the media as part of the conference.

Thank you for giving this matter your attention. I am very hopeful that you can help us in this morally urgent matter in which the religious community is only beginning to make an effective contribution.

I pray for the success of your work for the Union and for the religious communities of the nation.

Sincerely,

William H. Millerd. 11

William H. Millerd, S.J.
Director, Interfaith
Coalition on Energy

(Here are some suggestions that might be included on a Covenant Card)

COVENANT FOR CONSERVATION

I Will:

- /_/_/ 1. Turn thermostat down to 65° at bedtime
- /_/_/ 2. Turn thermostat down at least to 68° when occupying house in daytime and early evening
- /_/_/ 3. Turn thermostat to 62° when at work and no one is in the house
- /_/_/ 4. Car pool whenever possible to work, for weekly grocery shopping, to church and synagogue
- /_/_/ 5. Turn the hot water heater down to the low-temperature range
- /_/_/ 6. Purchase new appliances with conservation in mind
- /_/_/ 7. Set the air conditioning thermostat at least as high as 76° in the summertime
- /_/_/ 8. Not leave lights burning in unoccupied rooms of my house
- /_/_/ 9. Take public transportation to work *or walk or bike*
- /_/_/ 10. Considerably limit my pleasure driving.
- /_/_/ 11. Buy and use gas-saving car when next purchase of automobile
- /_/_/ 12. *undertake* Subject my house to an "Energy Conservation Audit" *of my house.*

ENERGY CONSERVATION CRUSADE

Sponsored

by

The Interfaith Coalition on Energy

Slogan: "Covenant for Conservation"

Purpose: To encourage local congregations to initiate a program in the local churches and synagogues to covenant for conservation.

Implementation: 1. Pastors and rabbis would speak on Friday nights and Sunday mornings on "The Ethics of Conservation" and ask their respective congregations to covenant with them on behalf of a voluntary crusade for conservation.

2. Members of congregations would be presented with a card listing twelve specific measures they can accept for meaningful participation in the Crusade. To be considered a participant they will be asked by religious leaders to commit themselves to at least seven courses of action.

Function of ICE:

1. Prepare Covenant Card
2. Prepare sermonic materials
3. Distribute back-up materials which will give participants ideas on how they can save on energy
4. Get religious leaders behind campaign
5. Stress cooperation with government in its public call for conservation
6. Emphasize responsible voluntarism as a way of avoiding oppressive bureaucratic mandatory controls
7. Hold a press conference to publicize the religious communities leadership in the conservation movement
8. Serve as a "Clearing House for Conservation" ideas and action
9. Provide ethical, scriptural and theological background for the Crusade
10. Stress the critical need for conservation in the light of world-wide shortages and how conservation can compensate for import losses

February 27, 1979

Enclosed you will find a packet containing statements made at a press conference on February 22, concerning the Covenant for Conservation Campaign. There are statements by William H. Millerd, SJ, Director of the Interfaith Coalition on Energy; Dr. George Outen, General Secretary, Board of Church and Society, United Methodist Church; Reverend Paul Kittlaus, Director, United Church of Christ, Office for Church in Society; Rabbi Alexander Schindler, President, Union of American Hebrew Congregations; and the Lutheran Council in the USA. Also in the packet is a brief description of the Coalition and an outline of the Covenant Campaign.

A copy of the first printing of the Covenant Card is included here too. This was a rush job (done because of the weather) in order to have cards available for the press conference. The card has been revised and is in the process of being reprinted.

We hope you will find this information useful to your faith community.

Sincerely,

A handwritten signature in dark ink, appearing to read "William H. Millerd, SJ". The signature is fluid and cursive, with the initials "SJ" clearly visible at the end.

William H. Millerd, SJ.

ENERGY CONSERVATION CAMPAIGN

Sponsored

by

The Interfaith Coalition on Energy

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STATEMENT BY REV. WILLIAM H. MILLERD, S.J., DIRECTOR,
INTERFAITH COALITION ON ENERGY, FEBRUARY 22, 1979

The Interfaith Coalition on Energy issues today a call to all the members of its faith communities, a call to conserve energy. The Coalition begins today a campaign to awaken and deepen the awareness of all people of faith in this nation to the need - the religious and ethical need- to cut back on our consumption of precious fuel resources. We invite all men and women of good will to join with us in a covenant to conserve energy.

The Interfaith Coalition on Energy today asks all those who share our beliefs in the teachings of the Jewish and Christian traditions, to look at our energy resources and use in the light of these traditions.

All energy resources on which the human race depends for heat, food and a multitude of cultural blessings, these resources some renewable and some being rapidly used up, these resources are gifts of our creator God, gifts which the Lord gives to supply the needs of all peoples

The earth and all it contains is the Lord's. In the Lord's Wisdom , the earth's resources are meant to supply the needs of all humanity. With these resources the Lord feeds us all in due season. We humans possess these resources as gifts; we must use them responsibly as stewards of this wise Master. We of this generation hold these gifts in trust for future generations.

Yet if we examine our consciences about our stewardship of these resources. we find that we -in this nation, at least - are using far more than we need and we are wasting them. With barely

6% of the world's population, we account for more than a third of the world's energy use. As much as 50% of this energy is wasted.

Our excessive consumption allows oil producers to demand artificially high prices. These high prices are financially ruinous to the developing nations. They unjustly deprive the less fortunate in this nation of necessary fuel and food. By wasting these resources, we are burdening our children and grand children with higher priced resources or, perhaps, depriving them of sufficient resources for their needs.

Our excessive use of oil makes us overly dependent on the producing nations. We can begin to seek oil rather than justice and peace between peoples. We increase arms exports to overcome the dollar drain abroad. The weakened dollar increases inflation at home to the harm of the elderly and others living on fixed and low incomes.


In short, our over consumption and waste of energy is a cause of social injustice at home and abroad. We are not acting as faithful trustees towards our children and future generations. We are not being reliable stewards of the Creator's gifts to all humanity. We are doing harm - serious harm - to our neighbors.

For these reasons, the Coalition will work to encourage each and every church and synagogue in this nation to give energy conservation a major role in their educational programs and communal celebrations. We will reach out to pastors and rabbis and all religious leaders to help them direct the attention of their communities to the social injustices of excessive energy use.

INTERFAITH COALITION ON ENERGY
February 22, 1979
page three

We invite the faithful of these communities to commit themselves to undertake seven or more specific programs for energy conservation in their personal and family lives. We are distributing Covenant Cards listing possible actions and asking individuals and families to indicate on them their specific covenant commitments.

We of the Interfaith Coalition on Energy invite communities of all faiths to join us in examining our obedience to the commandment to love our neighbors as this is reflected in our use and misuse of energy. We invite them to see energy conserved as a gift of love for our neighbors - of our neighbors at home, of our neighbors abroad, of future generations. We ask all to join in the pursuit of justice and peace by specific, covenant commitments to conserve energy.



Information about the Covenant Cards and other materials such as sermon outlines, motivational and informational materials can be obtained by writing the Interfaith Coalition on Energy, 1413 K Street, NW, 8th Floor, Washington, D.C. 20005. Telephone (202) 783-2852.

INTERFAITH COALITION ON ENERGY

Nature and Purpose:

The Interfaith Coalition on Energy (ICE) is composed of national religious organizations. The purpose is to educate the public and to increase awareness in the churches and synagogues of the religious imperative for involvement in energy education, conservation and the determination of public energy policies.

Theological and Ethical Basis:

Because of our belief in the responsibility God has given humankind to care for the earth and its environment, we of the religious community have a special obligation to provide the necessary moral leadership the energy issue demands.

In keeping with biblical principles and the Judeo-Christian ethic, stewardship concerns require us to preserve the earth's resources for future generations.

We also recognize our obligations to consider how energy decisions affect human needs, both domestic and international.

Goal:

The Coalition seeks 1) the development of an energy conservation ethic in both individuals and institutions, and 2) the adoption and implementation of public policies which emphasize energy conservation and the rapid development of energy sources that are renewable and nonthreatening to public health or the environment, and which minimize dependence on fossil fuels and nuclear fission together with their environmental and social costs.

Emphases:

The specific focus of ICE will be upon the following:

(1) Encouraging energy conservation and efficiency by

- a. assisting religious organizations to conserve energy in their existing and future buildings;
- b. facilitating the participation of religious bodies in community programs such as weatherization for the elderly and low income persons, and parallel job training programs;
- c. calling for increased commitment to lifestyles in which energy use is minimized.

(2) Promoting solar and other renewable energy technologies by:

- a. building informed, active support among religious leaders for appropriate public policies;
- b. assisting religious organizations and institutions to identify opportunities for their use of these technologies;
- c. encouraging missionary and foreign aid agencies to promote these technologies in developing countries as appropriate.

(3) Insisting that the use of fossil fuels and nuclear fission be dependent upon:

- a. adequate protection of miners and other workers;
- b. adequate reduction of the present and potential environmental costs of these energy sources, especially of the adverse impact of mining, combustion/radioactive releases, and waste products;
- c. respect for moral and legal international obligations requiring that the development and use of fission power not allow the diversion of nuclear fuels to use in weapons, and that fuel imports and overconsumption not block the progress of developing countries.

page three

- (4) Emphasizing the social impact of energy decisions especially as they affect the disadvantaged, people on fixed incomes, the unemployed and minority populations.

Program:

- (1) Energy conservation and efficiency.

Since energy conservation and efficiency is a most effective means of minimizing dependence on fossil fuels and nuclear fission, an immediate focus of the coalition will be to facilitate the involvement by the religious community in the formulation and implementation of public policies that promote energy conservation and efficiency. To these ends, the coalition will:

- a. survey its member organizations and others as to current practice, policies, and needs relative to energy conservation;
- b. share this information among the religious communities and encourage them to borrow successful approaches from one another;
- c. facilitate contact by the groups with sources of technical information, and with pertinent secular agencies, programs, and funding sources;
- d. assist the religious communities in assessing public policies for conservation especially as they affect the elderly, people on low income and minorities, and in promoting just policies;
- e. establish liaison with religious agencies, stewardship councils, aid associations, in challenging energy lifestyles and promoting the conservation ethic.

- (2) Promotion of renewable energy technologies and just policies for fossil and nuclear use.

ICE will seek to activate leaders of the religious communities on national

state, and local levels by an education campaign and assist them in entering into meaningful dialogue with public policy makers. For this purpose, the coalition will:

- a. help keep religious leaders informed on the energy issues outlined under emphases - through the distribution of pertinent literature, through articles in the religious press and through the mass media;
- b. gather local religious leaders for workshops and conferences on energy issues especially in regions from which come principal decision makers on energy policy;
- c. assist involvement by the religious community in the formulation and implementation of public policies, in particular, through cooperation with Impact, Network, and other information networks on energy issues;
- d. facilitate contact by the groups with sources of technical information and with pertinent secular agencies, programs, and funding sources;
- e. encourage religious communities to work with secular energy groups where they share similar purposes;
- f. recruit religious organizations that are not active on energy issues to an increased involvement.

STATEMENT OF RABBI ALEXANDER M. SCHINDLER, PRESIDENT, UNION
OF AMERICAN HEBREW CONGREGATIONS, FEBRUARY 22, 1979

The Union of American Hebrew Congregations is most pleased and ready to cosponsor the Covenant for Conservation Campaign. Our sponsorship follows directly from the energy policy resolution adopted overwhelmingly by the UAHC General Assembly.

The UAHC energy policy resolution reads in part:

"The principles of our Jewish tradition stress mankind's responsibility to care for God's earth and to safeguard its resources, thus fulfilling our trust to generations yet unborn. 'We are but stewards of whatever we possess.' We, therefore, concur that the priorities of a national energy policy should be conservation and development of renewable alternative resources as a means of achieving self-sufficiency for our energy needs."

The resolution concludes: "We call upon the Commission on Synagogue Administration and the Commission on Social Action to provide effective and practical guidance to our congregations in the conservation of energy in our own structures. We also call on individual congregants and congregations to do whatever they can to reduce energy consumption and to join with all public-spirited citizens in helping the United States and other countries to respond affirmatively to this profound challenge which will do so much to shape the future of this country and the world."

For these reasons, the Union Of American Hebrew Congregations joins today in this Covenant for Conservation Campaign. We encourage cooperation by all our congregants in this ecumenical effort for energy conservation.

STATEMENT OF REV. PAUL KITTLAUS, DIRECTOR, UNITED CHURCH OF CHRIST,
OFFICE FOR CHURCH IN SOCIETY, WASHINGTON, D.C., February 22, 1979

The Office for Church in Society of the United Church of Christ encourages its member churches as well as the ecumenical community to participate in the Interfaith Coalition on Energy (ICE) Energy Conservation Campaign.

The American energy crisis is caused in large part by individuals who waste energy in homes and transportation. The ICE covenant among congregations of all faiths to take specific conservation measures will be an effective means to reduce individual energy consumption.

It is clear that the religious community should affirm the value of the judicious use of the earth's resources. Simple measures like turning down thermostats and hot water heaters, forming car pools, taking public transportation or walking whenever possible, and undertaking an "Energy Conservation Audit" in the home are logical outgrowths of religious social values.

We likewise affirm that Christian and Jewish religious leaders alike ought to speak to their congregations about "The Ethics of Conservation".

STATEMENT BY DR. GEORGE H. OUTEN, GENERAL SECRETARY
BOARD OF CHURCH AND SOCIETY
UNITED METHODIST CHURCH
IN SUPPORT OF THE ENERGY CONSERVATION CAMPAIGN
FEBRUARY 22, 1979

When the moral imperatives of religion intersect with the critical needs of the nation, the Christian church is impelled to act. This is one of those times.

We are therefore happy to support and promote the Energy Conservation Campaign among our United Methodist churches. Even if Americans had all the energy they wanted, it would still be appropriate, from a Christian perspective, to encourage stewardship of world-scarce non-renewable resources. In the nation's current dilemma, with oil shortages a grave reality, and future cutbacks threatening, church people have a special responsibility to stress conservation of energy usage.

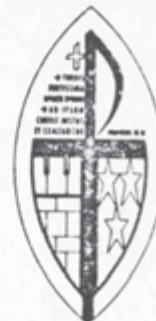
I would like to share a brief portion of the resolution on "Energy" passed by the General Conference of the United Methodist Church at its 1976 meeting in Portland, Oregon. On behalf of the church, these duly-elected officials declared:

"Christians have a special concern regarding energy use and resources. Responsible stewardship of the earth, air, sky and sea stands historically as a religious obligation and opportunity. Thriftiness in the use of God's bounty is not an outworn Christian virtue. And refusing to squander earth's

(over)

LUTHERAN COUNCIL IN THE USA

475 L'Enfant Plaza West, S.W.
Suite 2720
Washington, DC 20024
202 / 484-3950



Statement concerning the Energy Conservation Campaign of the Interfaith Coalition on Energy, February 22, 1979.

It is a privilege for two Lutheran Church bodies to encourage and support the Energy Conservation Campaign of the Interfaith Coalition on Energy. But more importantly, to both the Lutheran Church in America with its 2.9 million members and the American Lutheran Church with its 2.4 million, it is a theological imperative.

This imperative stems from the responsibilities of Christian stewardship of God's creation and its resources. The American Lutheran Church, in a 1970 statement, declares that "we dare not despise, misuse or ignore what God created," and that "our response to the world God created is properly neither fear nor greed." Consequently, the crisis "calls not only for public policy decisions, but for the reevaluation by every individual of his role as a consumer of goods, services and power, and as a molder of public opinion and values." "Not only in its word, but also in its deeds," the ALC statement asserts, "the whole of Christ's Church should be in the forefront of those who care and act in the environmental crisis."

In 1972 the Lutheran Church in America affirmed that "God's commission to humanity to have 'dominion' over the earth and 'to till it and keep it' calls for responsible stewardship of the earth" and that "in its preaching and sacraments, worship and evangelism, education and social ministry, the church is called to teach this biblical understanding of human beings and nature as God's interrelated creation." In addition, the LCA warns that "there is little hope of arresting the mad rush toward ecological disaster unless a very large number of persons and institutions renounce certain values which have

The Covenant for Conservation Campaign is sponsored by

The Interfaith Coalition on Energy

American Baptist Churches, USA, National Ministries

Board of Church and Society, United Methodist Church

Commission on Social Action of Reform Judaism

Jesuit Social Ministries Office

Office for Church in Society, United Church of Christ

Union of American Hebrew Congregations

Lutheran Council in the USA

Washington Office, United Presbyterian Church

Church of the Brethren

NETWORK



Covenant for Conservation

*How many are your works O Lord; in wisdom you have made them all.
The earth is full of your riches. . .
All look to you to give them their food in due season.*

—Psalm 104

*Well done! You are an industrious and reliable servant.
Since you were dependable in a small matter I will put you in charge of larger affairs.
Come, share your master's joy!*

—Matthew 25:21

We have a duty to emphasize the moral value of self-restraint to further social justice, e.g. to slow up the growth in energy demand...; and to make possible a fairer sharing of the existing and limited energy resources among a growing world population."

—World Council of Churches

"The principles of our Jewish tradition stress mankind's responsibility to care for God's earth and to safeguard its resources, thus fulfilling our trust to generations yet unborn. We concur that a central priority of our national energy policy must be conservation."

—Union of American Hebrew Congregations



10C

Interfaith Coalition on Energy
1413 E Street NW / 8th floor
Washington, DC 20005

I join with my faith community in a covenant to conserve energy. As a part of my commitment, I will . . .

- keep my thermostat at 68° during the day, 65° at night, and 62° when no one is home. (Caution: elderly persons need higher temperatures).
- set the air conditioning thermostat no lower than 76°.
- turn my hot water heater down to 60°C. (140°F.).
- turn off unnecessary lights.
- purchase new appliances with conservation in mind.
- use public transportation, car pool, walk, or bike as often as possible.
- choose a car that gets good gas mileage.
- considerably limit my pleasure driving.
- avoid over-packaged goods, highly refined and processed foods, and non-returnable (or recycleable containers).
- improve the energy efficiency of my house, e.g. with insulation, curtains, shutters, caulking.
- spend the money I save on education, health care, community organizations, etc., and not on energy consuming activities.

Signed _____

I join with my faith community in a covenant to conserve energy. As a part of my commitment, I will . . .

- keep my thermostat at 68° during the day, 65° at night, and 62° when no one is home. (Caution: elderly persons need higher temperatures).
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Signed _____

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The Interfaith Coalition on Energy

American Baptist Churches,
U.S.A., National Ministries

Board of Church and Society,
United Methodist Church

The Commission on Social
Action of Reform Judaism

Jesuit Social Ministries Office

Office for Church in Society,
United Church of Christ

Union of American Hebrew Congregations

Lutheran Council in the U.S.A.

CONFIDENTIAL

PROGRAM FOR SECURING ADOPTION OF U.S. POLICIES TO DIMINISH THE POWER OF THE ORGANIZATION OF PETROLEUM EXPORTING COUNTRIES AND ITS MEMBER STATES

By the late 1960s, with Sam Rayburn, Lyndon Johnson, and other oil state powers gone, the influence of the oil industry on public policy waned. It remains to this day a collection of organized interests, but not powerful interests. The power to create policy passed to consuming state politicians. Unfortunately, there was no well-defined and articulated consumer interest to rally around. Because of the inherent diffusion of consumer interests, no group or corporate body has had the incentive, the credibility, and the capability to organize a consumer interest bloc. So-called 'public interest groups' or 'consumer groups' have thus far been able to organize only on ideological or 'civic balance' principles, thus degenerating into little more than anti-producer coalitions. Outside the producing states, even regional and local economic interests have been poorly thought out, with the result that regional blocs, like the bipartisan New England coalition, as often as not vote against their own economic interests.

--Edward J. Mitchell, Professor of Business Economics, University of Michigan, "Energy Politics: The Irrelevant Debate."

OPEC control of the world petroleum market is made possible by the absence of U.S. government policies directed at weakening and ultimately eliminating the cartel.

Implementation of such policies has been prevented by a coalition of interests within the U.S. which benefit from high oil prices overseas.

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(2)

The pro-OPEC coalition within the U.S. is not invincible. For the past five years, however, it has had the field entirely to itself, unopposed by any organization embodying what Mitchell would characterize as the "well-defined and articulated consumer interest" in rationally-priced and amply available oil and gas imports.

The time is ripe for definition and articulation of that consumer interest. The chief adversary of that interest is not domestic oil companies, but the foreign oil cartel.

Constituent elements would include:

Unions in major industries directly injured by overpriced oil

- International Brotherhood of Electrical Workers
- Oil, Chemical and Atomic Workers International Union
- United Auto Workers
- United Steelworkers of America /higher oil prices = lighter automobiles = less steel = fewer jobs/lower wages/
- International Brotherhood of Teamsters /higher oil prices = decline in competitiveness of trucking industry compared to railroads = fewer jobs/lower wages/
- Maritime Trades Department, AFL-CIO /More expensive marine fuel = decline in competitiveness of U.S. shipping = fewer jobs/lower wages/

CONFIDENTIAL

(3)

--Seafarers International Union

--Industrial Union Department, AFL-CIO

Industries directly injured by overpriced oil

--Automobile manufacturers (Motor Vehicle Manufacturers Association)

--Automobile parts manufacturers (Automotive Parts and Accessories Association)

--Automobile dealers (National Automobile Dealers Association)

--Trucking (American Trucking Associations; Highway Users Federation)

--Bus (National Association of Motor Bus Owners; American Public Transit Association)

--Electric utilities (Edison Electric Institute; National Association of Electric Companies; American Public Power Association; National Rural Electric Cooperation Association; Northeast Public Power Association; Northwest Public Power Association; Tennessee Valley Public Power Association; etc.)

--Gas utilities (American Gas Association; American Public Gas Association)

--Steel (American Iron and Steel Institute; Cold Finished Steel Bar Institute; National Steel Service Center Institute; etc.)

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(4)

- Aluminum (Aluminum Association) [extremely energy-intensive smelting process]
- Telephone [Largest single consumer of electricity]
- Electrical Equipment (National Electrical Manufacturers Association; Air Conditioning and Refrigeration Institute; etc.)
- Apartment (National Apartment Association)
- Airline (National Air Transportation Associations; Air Transport Association of America; National Air Carrier Association)
- Shipping (American Maritime Association)
- Small business (National Federation of Independent Business; National Small Business Association; American Federation of Small Business) [Do not export to OPEC, but must bear higher energy costs]
- Importers (American Importers Association) [higher oil prices = devaluation of dollar = higher prices for imports]
- Agriculture (American Farm Bureau Federation; National Farmers Organization; National Farmers Union; National Grange; Agricultural Council of America; National Grain and Feed Association; National Association of Wheat Growers; National Grain Trade Council; American Dairy Association; National Association of Farm Corporations; etc.) [Energy a major expense, but cannot be passed]

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G.I. Forum; Mexican-American Legal Defense Fund; etc.) /Development of Mexican oil provides funds for industrialization to alleviate illegal immigration of Mexican workers into U.S., a primary concern of Mexican-Americans/

--Welfare recipients (National Welfare Rights Organization)

/OPEC erodes purchasing power of fixed incomes/

--Motorists (American Automobile Association) /Concerned about gasoline embargo threat and price increases/

--Consumer organizations (Consumer Federation of America; Nader organizations e.g., Public Citizen, Congress Watch, Public Interest Research Group)

--Civic and issue-oriented organizations (League of Women Voters; Americans for Democratic Action; American Conservative Union; American Association of University Women; General Federation of Women's Clubs; National Planning Association; etc.)

--Religious (Jewish organizations; Protestant umbrella groups; Catholic Church)

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MODUS OPERANDI

Press and broadcast media relations

Staff contact with key columnists, editorial writers, reporters, editors, and public affairs program producers to inform them of need to diminish OPEC's power and techniques for doing so; suggest angles for columns, editorials, stories and programs; point out misstatements and inaccuracies in reportage touching on international energy issues.

Seminars and briefings for groups of above personnel, conducted by authorities on international energy policy.

Hot line on international energy policy issues for above personnel, supplying data upon request, arranging interviews with expert and inside sources.

Distribution and elucidation of articles and research reports bearing on international energy policy to above personnel.

Arrangement of appearances by experts on international energy issues on network television public affairs programs.

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Opinion leader relations

Informational mailings to select list of national opinion leaders, e.g., members of National Association of Bank Directors; members of Council on Foreign Relations and regional affiliates; university trustees; members of Business Roundtable; etc.

Development and placing of papers by authorities on international petroleum economics, geophysics, and political science in influential journals and forums.

Advertisements outlining international energy policy options in influential publications, e.g., Foreign Affairs, Wilson Quarterly, Bankers Monthly, Columbia Journalism Review, Scientific American, Change, etc.

Legislative education

Seminars and briefings for groups of congressional and senatorial staff members to inform them of need to diminish OPEC's power and techniques for doing so.

Hot line on international energy issues for legislative staff members.

Legislative lobbying

Contact with key legislators and their key aides to develop legislation incorporating provisions to eliminate OPEC control of international petroleum market,

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including the following:

--Proliferation of non-OPEC hydrocarbon supplies (See appendix)

- a) Creation of bilateral aid programs for exploration and development in non-OPEC less-developed countries (LDCs).
- b) Specially-earmarked contributions to World Bank, Inter-American Development Bank, etc., for exploration and development in non-OPEC LDCs.
- c) Flat limitation of percentage of imports that may come from any one country.
- d) Imposition of variable oil import quotas specifying amount to be permitted from each foreign supplier.
- e) Augmentation of Overseas Private Investment Corporation program of political risk insurance for U.S. oil company exploration and development in non-OPEC LDCs.
- f) Expansion of Export-Import Bank financing for non-OPEC exploration and development.
- g) U.S. government participation in financing of non-OPEC oil exploration and development by U.S. companies.
- h) U.S. initiation of creation of international agency to provide technical and financial assistance to non-OPEC LDC exploration and development.

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i) Channeling purchases of U.S. governmental and military petroleum needs to non-OPEC suppliers.

j) Purchasing of oil for Strategic Petroleum Reserve exclusively from non-OPEC sources.

k) Import quota with exemption of Mexico and Canada by establishment of "North American Hydrocarbon Free Trade Zone."

--Breaking of "preferred access" link between U.S. oil companies and OPEC countries

a) Oil import quota auction system, requiring competitive bidding for import authorization tickets, with proceeds of ticket sales to U.S. Treasury.

b) Regulation of oil company contracts with oil-producing governments to discourage "open price" contracts guaranteeing preferred access to a country's oil while allowing country to raise prices at will.

1) Permitting U.S.-based companies to enter into long-term contracts only if they specify an advantageous fixed price or one with limited price escalators.

2) Allowing U.S.-based companies to agree to "open price" terms only in contracts with very short durations.

3) Prohibiting importation of foreign crude acquired by any company pursuant to a contract

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which allows the producing country to raise the price unilaterally.

4) Permitting oil importers to pass through to consumers as a cost of foreign crude only the price in effect when the access contract was signed.

c) Control of price at which petroleum is permitted to be imported into the U.S., with "import price differential payments" equal to approximate difference between fixed import price and OPEC price negotiated directly between U.S. and OPEC governments. Adjustment of import price differential payments to reflect responsiveness of each producing country to U.S. energy needs.

d) Requirement that any producing country, oil company or jobber wishing to sell consignment of oil to a U.S. purchaser must offer that lot at auction to highest American bidder.

--Embargo deterrents

a) Announcement of contingency plan for foreign supply disruption, including provision for oil prices to rise to level necessary to clear market, and standby excess profits tax, refundable to consumers.

b) Increase in size of Strategic Petroleum Reserve.

c) Acceleration of creation of Strategic Petroleum Reserve.

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--Economic measures

a) License U.S. bank loans to OPEC countries, with allowable terms dependent on pricing and production policies of each nation.

b) License U.S. investment in OPEC countries, with fees to be adjusted according to responsiveness of each country to U.S. energy needs.

c) License of investment by OPEC countries in U.S., permitting investment only by countries which respond to U.S. energy needs.

d) License U.S. exports to OPEC countries, varying fees according to responsiveness of each country to U.S. energy requirements.

e) Selective boycott of unfriendly OPEC suppliers.

--Security measures

a) Deny arms sales to countries which raise price or cut back production.

b) Make provision of U.S. security umbrella over Persian Gulf regimes contingent upon adherence to minimum annual oil export levels and specified price levels.

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Executive branch relations

Contact with officials of National Security Council; presidential Domestic Council; State Department--Office of Energy and Fuels, Office of Economic Affairs, Policy Planning Staff; Department of Energy--Office of Policy and Evaluation, Office of International Affairs; Department of the Treasury--Office of Economic Affairs; etc., urging prompt incorporation of policies designed to weaken OPEC into U.S. energy and foreign policies, so as to spare administrative agencies risk of legislative mandating of executive action.

Grass roots lobbying

Contact with executives and officials of corporations and organizations directly injured by insecurity and high price of hydrocarbon imports (see above, pp. 2-6) to stimulate lobbying activities by such entities for legislative and administrative action to weaken OPEC; provision of such entities with informational materials for dissemination among personnel and membership; coordination of their lobbying efforts.

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TIMETABLE

By end of 1979

Awareness is created among officials of significant organizations and corporations in affected industries of need for policies to diminish OPEC's power.

Awareness is created among key media personnel.

Awareness is created among key legislative aides and legislators.

Awareness is created among key opinion leaders.

Early 1980

Conference is held of representatives of most significant organizations and major corporations.

By end of 1980

Awareness is created among constituents of significant organizations and affected industries.

Awareness is created among broad spectrum of media personnel.

Awareness is created among broad spectrum of legislative aides and legislators.

Awareness is created among broad spectrum of opinion leaders.

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Legislative proposals incorporating techniques to diminish OPEC control are drafted and presented to key legislators and executive branch officials.

Early 1981

Conference is held to plan organizational and corporate lobbying efforts.

By end of 1981

Awareness is created among informed public.

Administrative action implementing a portion of desired policy proposals has been initiated.

Legislation incorporating policy proposals not being administratively implemented is introduced.

Key congressmen and senators are lobbied.

Early 1982

Conference is held to coordinate organizational and corporate lobbying efforts.

By end of 1982

Awareness among general public is reflected in national opinion polls.

All congressmen and senators are lobbied.

Legislation incorporating provisions for weakening OPEC is passed.

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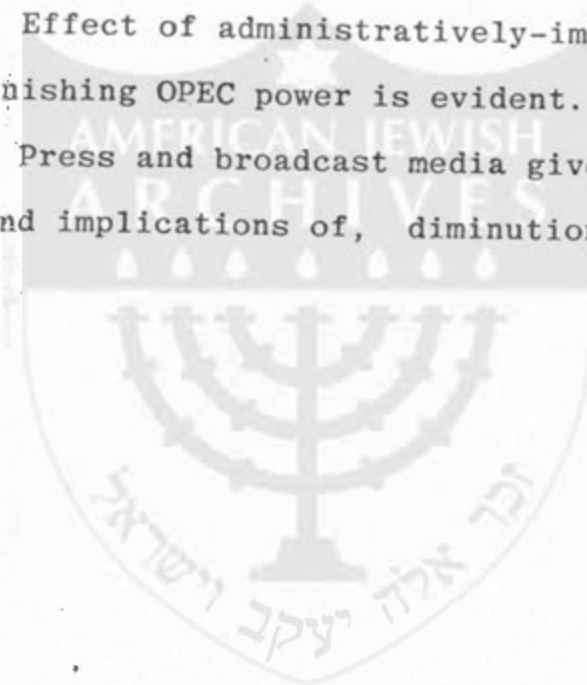
Administratively-implemented techniques for weakening OPEC are fully operative.

By end of 1983

Legislatively mandated programs are fully operative.

Effect of administratively-implemented techniques for diminishing OPEC power is evident.

Press and broadcast media give major play to prospect of, and implications of, diminution of OPEC power.



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APPENDIX

PROSPECTS FOR PROLIFERATION OF OIL PRODUCTION IN NON-OPEC LESS-DEVELOPED COUNTRIES

While it is anticipated that world oil consumption by 1982 will rise by 5.5 million barrels per day (mbd), the following increases in production outside of OPEC are expected:

U.S.:	
Lower 48 states	.6 mbd
Alaska	1.8
Canada	.1
Western Europe	3.2
China and Soviet Union	.4
Mexico	1.1
Other non-OPEC countries	<u>1.3</u>
Total	8.5 mbd

The increase in non-OPEC production is thus expected to exceed the growth in demand by 3 million barrels a day. OPEC will therefore have to cut back its production by 3 mbd, thus reducing the cartel's revenues and threatening its cohesiveness.

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It would be most advantageous if the U.S. were to adopt policies designed to sustain and augment the growth of production outside of OPEC. These include tax and price incentives for increased development of U.S. domestic resources; use of diplomatic means to encourage increased production from the North Sea; technological assistance to the Soviet Union, and broad-ranging exploration and development assistance to China.

The most highly-leveraged source of new onshore oil production is from discovered, but as yet undeveloped, fields in other non-OPEC countries. These include major fields in Mexico; Cuba; Jamaica; northwestern Argentina; the La Brea-Parinas field in Peru; the Paleozoic play of Brazil; Chad; the Congo Basin; the Etosha Basin in Namibia; Turkey; Labuan Island, Malaysia; Bonaparte Gulf, Australia; New Zealand.

Approximately one-half of near-term new production in non-OPEC less-developed countries is expected to come from Mexico. In the immediate future, the U.S. should therefore drastically augment its grant aid, bilateral and multilateral loans, and technical assistance to non-OPEC LDCs with near-term production prospects, with a special emphasis on Mexico.

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Other non-OPEC LDCs requiring U.S. assistance
include:

LDCs currently exporting oil and/or gas

Brunei

Malaysia

Congo

Zaire

Angola

Trinidad & Tobago

Bolivia

LDCs currently producing oil and/or gas for own consumption

Bangladesh

India

Pakistan

Burma

Turkey

Argentina

Brazil

Barbados

Colombia

Chile

Peru

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LDCs not currently producing oil and/or gas but possessing proven reserves and announced commercial discoveries

Phillippines

Thailand

Papua New Guinea

Tanzania

Cameroon

Ivory Coast

Chad

Benin

Guatemala

LDCs not currently producing oil or gas but having favorable geological prospects for potential discoveries and currently carrying on intensive exploratory activities

Sri Lanka

South Korea

Mozambique

Ethiopia

Madagascar

Rwanda

Burundi

Surinam

Uruguay

April 24, 1978

Mr. Paul A. Mazur
33 Conklin Place
Dumont, N.J. 07626

Dear Mr. Mazur:

Many thanks for your letter of
April 14. I am grateful for your comments and for the
various materials you were kind enough to share.

With kindest greetings, I am

Sincerely,

Alexander M. Schindler

Paul A. Mazur
22 Conklin Place
Dumont, New Jersey 07628
201-384-4871

April 14, 1978

Rabbi Alexander M. Schindler
Union Of American Hebrew Congregations
838 Fifth Avenue
New York, N. Y. 10021

Dear Rabbi Schindler:

In 1973, Dr. Rosenblat predicted that it is inevitable that there will be an erosion of support for Israel in the United States, if the Arab Nations are allowed to become the dominant suppliers of our oil imports. Since that time the Arab Cartel has become our dominant supplier and the erosion of our support for Israel is in an inevitable progression.

Dr. Rosenblat suggested that this progression could be neutralized by finding enough oil in new non-OPEC, non-Communist countries that would liberate the United States dependence for nearly half of our oil requirements from the OPEC Cartel.

I am enclosing a copy of the Moody Report and a copy of Dr. Meyerhof's study of World Oil Basins with regard to our future oil supplies entitled Petroleum 2000. Both of these world renowned geologists who have specialized in the study of giant basins believe that vast amounts of oil will be found in some of these basins. Dr. Bernardo Grossling of the United States Geological Survey in Reston, Virginia also believes that vast amounts of oil exist in the unexplored giant basins of Latin America and Africa.

I have the hope that you will mobilize your Energy Task Force to study the problem and recommend a solution. I suggest Dr. Rosenblat's experience and counsel would be very valuable to the members of the Task Force.

I am also enclosing a copy of the Editor's Page from the U S News & World Report of April 3, 1978 entitled Misfortune In The Mideast which illustrates just one aspect of the attrition of our good will toward Israel. Morton Dean's Report (Channel 2-7 PM - 4/14/78) of a survey of US Public Opinion regarding the political attitudes of Begin versus Sadat illustrates another.

Sincerely yours,

Paul A Mazur

Encls. - 3

OIL & GAS JOURNAL

PETROLEUM
2000

SEVENTY-FIFTH
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ISSUE

AUGUST 1977

Best chances onshore are in C

A. A. MEYERHOFF
Consulting Geologist
Tulsa

MOST of the onshore areas of the world where petroleum will be produced in the future already have been discovered. The largest to be developed are inside the boundaries of the Soviet Union and the People's Republic of China.

Fig. 1 shows some of the areas which the author believes have future potential.

North America

North America has for many decades been a major focal point of the petroleum industry, with more than 16,200 oil and gas fields. Most of these are in the U.S., but many also have been discovered in Canada and Mexico. Certainly the most spectacular discoveries on the North American continent have been made within the past decade—9 billion bbl or more at Prudhoe Bay in Alaska and 40 billion bbl or more in the new Reforma fields of Mexico.

The Alaskan discoveries are by no means finished, but the largest Alaskan discovery, Prudhoe Bay, possibly is unique in that area. Farther west, discoveries in the Naval Reserve have been less than encouraging. Despite this fact, it is possible that a fair number of discoveries will be made in the Naval Reserve and that collectively these will make an important contribution to the Alaska-U.S. economy.

In the remainder of the U.S., the major hopes of the future seem to be in plays such as the "South Slope" of Texas, the fractured Austin Chalk belt which extends from the Mexican frontier northeastward into Louisiana. In this area, within the past 2 or 3 years, several important discoveries have been made and a very sizable belt of Austin Chalk production will be developed during the next few years. The wells are not large but, cumulatively, will have an important impact on the U.S. economy. Ultimate recoverable reserves are unknown, but certainly are at least half those of Prudhoe Bay, and may even be larger.

In addition to the Austin Chalk production, I foresee a large-scale development of pre-Chalk production in the area of the South Slope—from the Buda, the Edwards, the Glen Rose, and even from the Smackover. In fact,

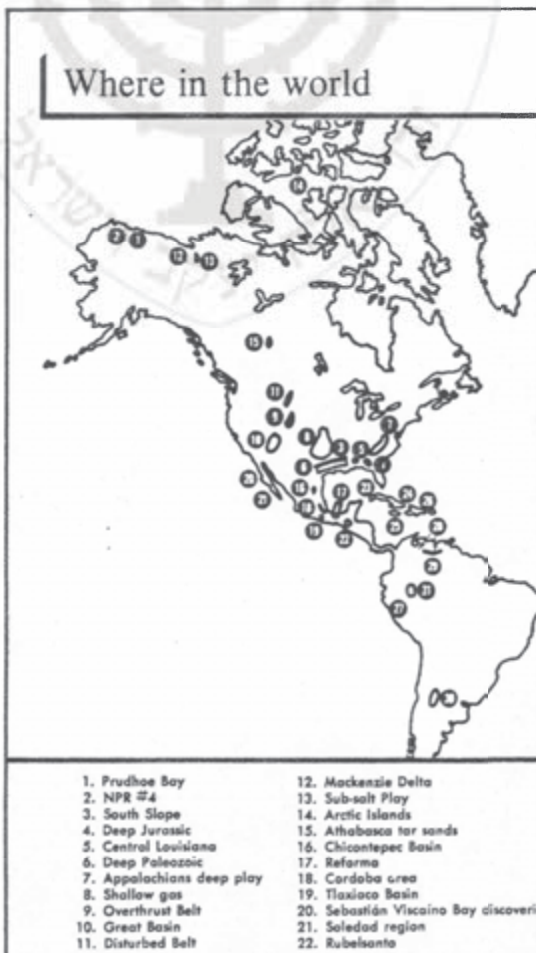
the entire section from Smackover to Austin Chalk, as well as part of the section in the Tertiary, offers very promising exploration targets during the years to come. Thus, the South Slope is not a single play within fractured Austin Chalk, but involves older and younger formations as well.

Additional discoveries will be made in the central and eastern parts of the Gulf Coast, mainly in rocks of Mesozoic age. The Smackover discoveries at Chunchula and Hatter's Pond are indicative of the types of discoveries which may be expected and the depths from which the production will come (5,000-6,000 m).

Another area of the Gulf Coast which has received insufficient attention is Central Louisiana. Here, more than 6,000 m of marine section is present and almost no production has been found. Most of the fields have been rather insignificant discoveries in the Eocene Wilcox.

However, various Cretaceous reef trends go through this area and, ultimately, production will be found from them as well as from some of the Middle and Upper Cretaceous sand-

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Africa

Except for Algeria, Libya, Egypt, Angola, Cabinda, Gabon, and Nigeria, exploration in Africa has been extremely disappointing.

Much of this is related directly to the stratigraphy of much of Africa and to the widespread exposures of continental Paleozoic and Precambrian rocks.

A discovery in Chad, (Fig. 1), appears to offer some promise for the future, and several other discoveries of this type may be made. In addition, there is potential in the Jurassic of Morocco.

The relatively minor production of Tunisia still has not been fully explored or developed onshore. There still remain a fair number of traps to be developed in Algeria, Libya, and Egypt. With few exceptions, these are smaller traps than those now producing, and are only marginally commercial. However, they will be developed through the years. Several giant fields may still remain to be discovered in northern Africa.

Exploration in Zaire has been extremely disappointing, except in the offshore. Much of Zaire is underlain by a huge Jurassic and younger continental basin. If China's experience is any criterion, the presence of continental beds in Zaire does not preclude the discovery of oil. However, the terrain is difficult for operations, and at present there are no economic or political incentives for exploration of this area. Ultimately, the basin could be productive. In the People's Republic of China, Jurassic and younger basins of similar stratigraphy are highly productive.

In the northern part of South West Africa (Namibia), the southernmost edge of Angola, and northwestern Botswana, there is an extensive east-west Paleozoic basin containing up to 6,000 or 7,000 m of marine strata. This is the Etosha basin. Three dry holes have been drilled in the basin. The great size of the basin and the large number

of structures which are present (as determined by reconnaissance seismic work) suggest that this basin might become productive at some time in the future.

Conclusions

Of all of the areas onshore in North America, probably the most important are the Canadian Arctic Islands, the Athabasca tar-sand belt, the North Slope of Alaska, the Overthrust Belt of the northern Rocky Mountains, the South Slope of the Gulf Coast, Central Louisiana, deep parts of the Central Appalachians, the new Baja California fields area, the Reforma fields area of southern Mexico, and the Rubelsanto area (both in Mexico and Guatemala).

In South America the most attractive areas still to explore, in addition to the Orinoco tar-sand belt, include still-undrilled areas in known basins of Venezuela, the late Paleozoic of eastern Ecuador and eastern Peru, many parts of eastern Bolivia which still are undrilled, and northwestern Argentina.

In Africa, several interior basins, such as the Etosha and Chad basins, have some potential, and areas similar to these should be sought and explored. The producing areas of northern Africa have not yet been explored or exploited fully.

The Middle East remains the bastion of the petroleum world and will become an important gas producer from the Permian and possibly from other formations in the years to come. Western Europe offers little potential. The greatest potential areas outside of North Africa and the Middle East are in the Soviet Union and the People's Republic of China.

Finally, there are several areas onshore in Indonesia, Australia, and New Zealand which deserve intensive exploration. To accomplish the exploration tasks suggested in this article will require many years of close cooperation among governments and private sectors.

END

PETROLEUM/2000 • AUGUST 1977



Misfortune in the Mideast

By Marvin Stone

It is disheartening that Prime Minister Begin's meetings with President Carter ended as they began—with a deep chill. For much is at stake in the Mideast and the prospect of peace, rather than brightening, has been darkened by mutual recrimination and a new cycle of violence and counterviolence.

When it comes to assessing blame, there is enough for all to bear.

The Palestine Liberation Organization deserves a major share for its bellicosity and its murderous raid into Israel, coldly calculated to sabotage peace talks.

Egypt's President Sadat does not escape. One could have hoped for more patience once he returned from his initial visit to Jerusalem, rather than the precipitate breaking off of first-stage talks with the Israelis.

Carter has complicated the negotiating process by linking the delivery of warplanes to Israel to the sale of sophisticated fighters to Saudi Arabia. It was meant to show an even hand in the Mideast, as well as displeasure with the Israelis, but the timing was unfortunate.

But what is of the greatest disappointment in this country right now is the policy pursued by the present Israeli government.

In the wake of Begin's March 21-22 meetings with Carter, it is clear that the two leaders are deeply divided over the vital issues.

Whatever the rights or wrongs of Begin's position, many of Israel's friends in the United States fear that the Prime Minister is committed to a course that will force Americans to make an agonizing choice between support for U.S. interests, as perceived by their President, and a Begin policy that they deem unreasonable and potentially disastrous.

For 30 years Israel could count unfailingly on solid American support. That support stemmed from the conviction that Israel was in the right. But it would be a mistake for Begin to assume that he can count on a similar response in the crisis that has now developed.

What has changed? Many believe that Sadat's Jerusalem overture and the beginning of face-to-face negotiations between Israel and Egypt offered the best hope for peace since the establishment of the Jewish state. Now there are questions about Israel's response to that opening, and distress over Begin's positions on two critical issues.

One is his insistence on establishing settlements in occupied Arab territory, which Carter publicly has decried as illegal.

The other is his stand on United Nations Resolution 242, which calls for the withdrawal of Israel from occupied territory as part of a negotiated peace. The Israeli Prime Minister insists that this resolution does not apply to the West Bank and that his country has a Biblical claim to this territory.

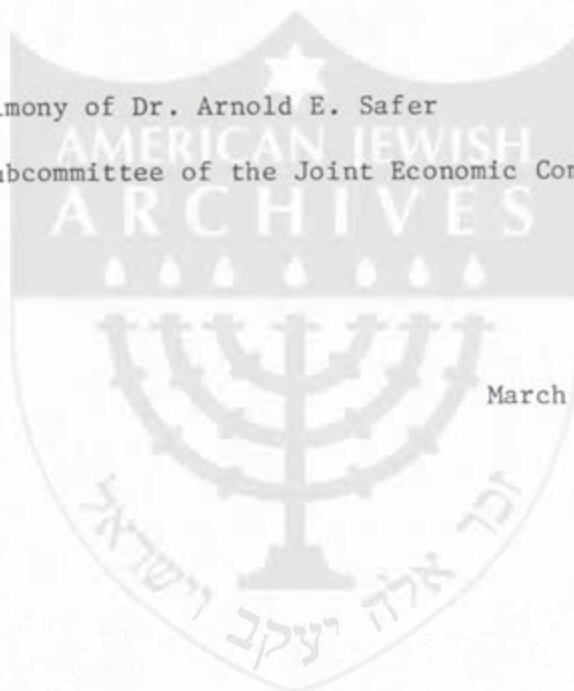
The Carter administration commands strong popular support in rejecting that claim and in warning that Begin's policy, if unmodified, will wreck whatever chance there is of peace. Some members of the Senate Foreign Relations Committee, traditionally sympathetic to the Israeli cause, tried to drive that point home when they told Begin on March 21 that his position on the settlements and retention of the West Bank "has divided Israel, divided the American Jewish community and caused an erosion of support for Israel."

This in no way implies a diminution in America's commitment to Israel's security against unpredictable and implacable Arab hot-heads. But there would be little sympathy in this country for an Israeli policy that foreclosed the possibility of a peace by clinging stubbornly to territory for emotional rather than for legitimate security reasons.

Emotionalism is a policy that Begin's predecessors wisely assessed as potentially suicidal. For it risks a fifth Arab-Israeli war and the alienation of the only nation with an unqualified commitment to the survival and future security of the Jewish state.

Testimony of Dr. Arnold E. Safer
before the Energy Subcommittee of the Joint Economic Committee

March 8, 1978



My name is Arnold Safer. I am an economist with the Irving Trust Company in New York City. My remarks today are my own and should not be viewed as necessarily those of the institution for which I am employed.

I appreciate the opportunity to express my views on the energy problems now facing our country.

The principal objectives of government energy policy, within the limits of the immediate technical and political constraints, appear to me as follows:

- a) Achieve the greatest possible self-reliance from unreliable and monopoly priced foreign oil sources.
- b) Prevent energy shortages from causing increasing economic dislocations.

There are really two separate sets of issues associated with the Energy Crisis. The first is an international problem, affecting U.S. foreign political and economic policies. These problems relate to OPEC control of world oil supplies which represents a fundamental change in the world power structure. The second is a domestic economic problem which is related to a changing set of social values among Establishment decision makers in the United States. Present energy policies have so confused these two sets of issues that neither of the objectives are being met, and we are in fact further away from them than we were in 1973. In particular, increasing constraints on domestic energy production have caused an even greater necessity to import oil from OPEC.

While my remarks here today will stress the international dimensions of the problem, I do not believe that actions on the international side alone will provide a panacea for our domestic energy problems. These domestic problems will be solved by a combination of both effective conservation policies and by the timely development of alternate fuel sources, such as coal and nuclear power. Both of these fuel sources today are mired in environmentalist controversies and are not being developed rapidly enough to insure meeting the goals of the National Energy Plan. But there is a more general energy problem related to the concept of energy conservation. Energy and economic growth are tied together; the so-called "decoupling" of energy and economic growth has some clear limits. A more efficient use of energy means sacrificing some growth in real personal income while the capital investments for new energy conservation technology are implemented. Rising energy prices will continue to shift consumer spending to energy and other necessities whose production costs have risen due to energy costs. This means less growth in spending on other less necessary items. As a result, if general economic policy pushes too hard for a more rapid rate of real economic growth, severe inflationary pressures will resume, and another economic recession may follow. Steady and slower growth is necessary until the economy can make the adjustments to these higher energy costs. Pushing too hard for a reduction in unemployment through higher government deficits will make the energy conservation

job that much tougher. Between now and 1985, the economy will grow at a slower rate than during the past decade. The more rapidly it grows now, the greater the likelihood of a recession later. As a result, we may have to tolerate a higher level of unemployment for a few more years until the growth of the labor force begins to slow in the early 1980's.

Turning to the international issues, I will first summarize my remarks and then proceed to a visual presentation of the details.

Natural economic forces today may be working toward a very gradual reassertion of the market power of the oil consuming nations. A slowing in the growth of world oil demand and the expected rapid increase in non-OPEC oil sources suggest that OPEC production peaked in 1977 and should gradually decline to 1980. OPEC will be most vulnerable to consumer pressures during this period, since a number of the more heavily populated OPEC member nations will have an incentive to expand oil production at a time when world demand for total OPEC oil will be gradually declining. They can only expand output at the expense of the more sparsely populated OPEC countries. If Saudi Arabia reduces output to offset increased production by the more populous OPEC nations, it could be reduced to production levels by 1980 which even it might find intolerably low. As another alternative, if Saudi Arabian production in 1980 were held near current levels, other OPEC members would be forced to cut oil production below levels which would permit the

planned implementation of economic development programs already in progress.

U.S. international oil policy should recognize the likelihood of this natural friction within OPEC. The period ahead offers the opportunity to limit the cartel's power over the world oil market and to reach a more healthy accommodation with the legitimate aspirations of its member governments.

Behind this summary is a detailed forecast of future supply and demand trends for world oil, which I will highlight in the following slides.

SLIDE PRESENTATION ON SUPPLY/DEMAND (SEE ACCOMPANYING DOCUMENTS)

I am providing a copy of these slides for the record, as well as a recent report published by the Irving Trust Company which goes into the numerical details.

I would like to turn now to the institutional mechanisms by which oil is imported into the U.S. and by which oil is priced on the international market. If the U.S. is likely to be importing substantial amounts of oil over the next decade, as I have projected, how can we stem the growing balance of payments drain on our domestic economy? Obviously, the first answer is to increase our exports of all goods and services, but a detailed examination of that issue is beyond the scope of this discussion. Second, we should conserve energy, and I believe

that stronger measures are called for than the Congress is apparently willing to approve. A worldwide abundance of oil, as I have projected, does not in any way lessen the need for a more energy efficient economy. In addition to helping to slow the balance of payments drain, an effective conservation program would help to dilute OPEC's monopoly price-setting capabilities. And this leads me to the third and directly relevant factor, namely to seek a lower price for international oil, or at the least to put into place new mechanisms which limit the capability of OPEC to further increase world oil prices. For example, in the international diplomatic arena, it would be helpful to establish the fact that some kind of market exchange system would be a better mechanism for determining the price of oil than an international treaty based upon political perceptions of a "fair" price. The replacement cost of synthetic energy sources is not a realistic basis for oil pricing; nor is the indexing of oil prices to world inflation a useful departure point for international oil negotiations. Both pricing approaches make little economic sense in the long run and would simply add to the misallocation of the world's resources, both physical and financial. A market exchange system for oil, possibly regulated by representatives of both consuming and producing nations, would be a more useful approach. And it is over the next few years, when the consuming nations may well be able to exercise significant market influence over the OPEC states, that this approach might be

successfully applied.

To be specific, I would recommend a detailed examination and debate over the following complementary approaches for dealing with the monopoly power of OPEC. First, the system of foreign tax credits may help to link the interests of some international companies with those of some OPEC members. As a general proposition, the companies should be encouraged to bargain for crude oil at arm's length, thereby promoting competition among the OPEC states for world markets. The present system of foreign tax credits for certain crude oil purchases may not be helpful in achieving that objective. Second, the U.S. government, together with other international financial agencies, should aid in the financing of oil exploration outside the U.S., primarily in the non-OPEC developing countries. The benefits of this policy should be apparent in terms of potentially adding to the world's supplies of oil and gas, in terms of relieving the balance of payments position of some of these countries, in terms of diluting some of OPEC's price-setting powers, and finally in terms of encouraging more competition in international oil markets. I believe that this additional financing should be complementary to the private sector, engaging perhaps in those ventures where the economic or political risks may be too great for private industry. Third, I support the ideas of Prof. Adelman of MIT concerning the adoption of a bidding system for U.S. oil imports. Essentially, Adelman suggests that the U.S. government estimate our oil import

needs and then use an auction technique to apportion that amount among would-be suppliers of imported oil. The competitive bidding for the right to sell this clearly defined quantity of oil would put each supplier under pressure to sell at a lower price in order to gain access to a larger share of the U.S. market. It seems to me that in the present surplus state of the oil market, this approach has an appreciable prospect for achieving some success. Finally, the development of an organized exchange market for oil products would help to make the pricing process more competitive. There are some futures contracts for certain oil products now being developed by the commodities exchanges in New York. I believe that an open, visible pricing system for oil products would eliminate some of the need for excessive domestic regulation and thereby help both the Department of Energy and the oil companies. To the extent that a surplus appears in the market, the trading of the future's contract will help to insure that oil prices react. And if product prices decline because of slow volume, this will be felt by the refiners who will ultimately cut their production, which in turn will feedback to the crude suppliers. This process could then translate into lower crude oil prices, as crude suppliers compete for market share.

None of these recommendations alone will likely be sufficient to dilute OPEC's hold on world oil prices. Taken together, however, they would certainly alter the expectations of oil market participants, both private companies and govern-

ments. Nevertheless, for the U.S. government to adopt these approaches, some of the concern over offending certain OPEC members would have to be reduced. Oil remains as much a commercial question as a political one. OPEC is a seller; the U.S. is a buyer. Our market interests, therefore, diverge. We can still be the best of political allies with the member governments of OPEC, but we can still bargain with them over the price of oil. I believe that the broad approach to international oil pricing problems should be to "take the politics out of it" as much as possible.



U.S. Oil Policy: Implications For The Mideast

By

Dr. Arnold E. Safer
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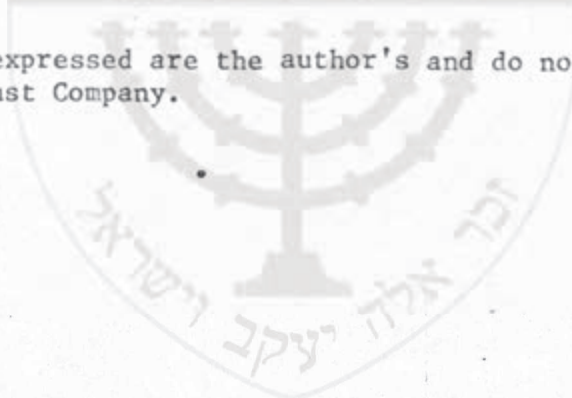
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Introduction:

The most serious flaw in the President's energy package is its virtual silence about OPEC. If the President is asking the American people for sacrifices, then he should be prepared to tell them what plans he might have for at least attempting to dilute the price-setting powers of the cartel. Present sacrifice should have the prospect of future reward.

A Different Economic Perception:

The Administration contends that the world as a whole is facing a physical shortage of oil as early as 1985. That proposition is open to question. There is an economic shortage in the U.S. because controls hold prices below market clearing levels. The U.S. may have a physical shortage at current controlled price levels; but it is improbable that the world as a whole is facing such a shortage. By the end of 1977, OPEC will have excess capacity of 12 MMB/D, some 25% of non-communist world consumption. And that is only in terms of the producing capacity of proven oil reserves! According to even the most conservative geologists, ultimately recoverable oil reserves around the world are vastly in excess of what the world will need for several decades. If world oil supplies run short in the next 20-25 years, it will be due to the politics of oil conflicting with its economic and engineering requirements.

Soaring energy costs today are less the result of impending physical shortage than of OPEC's monopolistic pricing policies. Until the OPEC issue is recognized, dealing with the physical shortage alone may be costly and ineffective.

In his energy program, the President has stressed the goal of reducing U.S. oil imports over the next eight years. Through a mix of energy conservation and new supplies of alternate fuels, the President hopes to gradually reduce our dependence upon OPEC oil supplies. Although the President did not explicitly state that one objective of his energy program might be to dilute the price-setting power of the oil cartel, the goal of reducing U.S. oil imports implicitly leads to the conclusion that the U.S. would like to achieve a greater influence over the setting of international

oil prices. Thus, if our contention is correct that it is only the U.S. which has a temporary physical shortage, sufficient oil supplies will continue to be available from other countries. Therefore, we should be able to change the mechanism by which we import our oil today, and thereby at least try to obtain better commercial terms for our oil imports.

Technical Proposals

Various technical plans have been proposed for altering the oil import system. These range from a complete takeover of all oil imports by the U.S. government on the one hand, to granting an anti-trust exemption to the international oil companies so they can more effectively bargain with OPEC, on the other hand. More recently, proposals have been made to change the system of foreign tax credits granted to American oil companies, thereby changing the profit incentives of the companies in their dealings with OPEC. Perhaps the most widely known proposal for altering the oil import mechanism is the so-called Adelman Plan, involving a system of secret bidding for the right to sell foreign oil in the U.S. Professor Adelman of M.I.T. proposes that each month, the U.S. government should set an import quota and auction off import tickets to those who would like to sell foreign oil in the U.S. An oil company, an OPEC government, or anyone else who might have foreign oil to sell would have to submit a sealed bid as to the amount he would pay for his oil import franchise. The U.S. government would collect those revenues from the sale of the import tickets and rebate them back to the American public. If a foreign oil exporter desired to increase his U.S. market share, he could increase the amount which he would pay for the import ticket, and thereby presumably accept less on a net basis for his oil. The potential would be created for one OPEC country to secretly compete with the other.

Market Conditions:

The "sealed bid" approach, or other plans to stimulate competition in the international crude oil market, become attractive options for dealing with monopoly pricing provided

that market conditions exert sufficient pressure on some OPEC members to expand their oil exports through price-cutting. Since growing surpluses in the international oil market are likely to occur, at least between now and 1980, the time may now be opportune to take direct action to dilute the price-setting powers of the oil cartel. International action does not minimize the need for a strong domestic Energy Policy, but in fact reinforces that need.

OPEC's recent unity on pricing, as well as its benign stance toward oil-consuming nations, may be an attempt to cover up a major underlying problem it will have to deal with over the next two or three years. Even as world demand for oil remains sluggish, new oil sources are coming on stream. Between 1977 and 1980, world consumption (outside the communist bloc) is likely to increase by only 4 or 5 million barrels per day. Yet new oil supplies--from the North Sea, Alaska, Mexico and many other sources--will increase by 6 or 7 million barrels per day. For OPEC as a whole, this means declining sales; for some member countries, it will mean cutting back oil production. And, as almost every OPEC member is realizing, rising import costs are making it almost impossible to cut back oil exports without jeopardizing development objectives.

The way for any one OPEC country to maintain its oil sales in the face of declining demand would be to cut prices. The incentive to do so will grow as excess capacity builds within OPEC over the next two or three years. To prevent this, OPEC must either set up a centralized allocation system or agree to lower prices in an attempt to stimulate overall demand. The adoption of either alternative will further erode OPEC unity and will mean increased bargaining power for the consuming countries.

The timing may now be critical. The period 1978-80 offers the best opportunity to dilute the cartel's influence over the world oil market, or, at the least, to reach a more healthy accommodation with its legitimate aspirations.

A Different Political Perception:

Yet, why has there been little or no U.S. government response in this direction? The answer, it seems to me, is a fundamentally different perception of the energy problem

on the part of U.S. Mideastern policymakers. First, forecast worldwide oil shortages in the 1980's. Second, and as a consequence of this projection, emphasize how dependent the U.S. is upon Mideast oil for the viability of its economy. Finally, couple this oil dependence with growing Arab economic influence to suggest a diplomatic tilt toward the Arab side of the Arab-Israeli dispute.

The corollary to this theorem is that any attempt to confront the OPEC cartel on commercial grounds could be destabilizing to Mideast politics, particularly in the Persian Gulf. That is, if intra-OPEC frictions grow as a result of competitive pressures in the oil market, there could be increased instability in the Mideast oil producing nations. In this volatile area of the world, violence could erupt and could cause serious physical damage to oil producing and transportation facilities, thereby halting the flow of oil. Or, intra-OPEC frictions could even result in the overthrow of conservative pro-Western Arab regimes, and open up possibilities for increased Soviet influence in the Persian Gulf. Thus, it seems to me, that the U.S. government will not attempt to dilute the price-setting powers of the OPEC cartel, at least not directly, but rather accept the monopoly price of international oil and the continuing economic damage which it is doing. This acceptance of the cartel and the dominant role played by the Arabs within OPEC, means a continued erosion of support for Israel in the diplomatic arena. Because, if push comes to shove, the political perception exists that the Arabs can again cut off the oil, or severely damage the economy by raising oil prices significantly.

On the other hand, a different reading of the international oil problem would result in a different political perception of an appropriate U.S. policy role in regard to the Arab-Israeli conflict. If the U.S. were to adopt an international oil policy which attempted to dilute OPEC's monopoly power in the international oil market, seeking in fact to reduce international oil prices during the coming period of market surplus, then a strong, democratic Israel would become vital to U.S. interests if and when a split within OPEC led to increased political instability in the Mideast. That is, if intra-OPEC frictions on commercial oil policy grounds lead to both a lower price for international oil and increased unrest in the Persian Gulf, then a strong Israel may be our best ally

for controlling the diplomatic, economic, and military situations. How long the current regime in Saudi Arabia and the dictatorships in Iran, Iraq, and Libya can last may be independent of what the U.S. does anyway. For example, a recent report from Saudi Arabia states that 1500 army and other officials were arrested for plotting a coup, apparently backed by the Libyan government. Discovered by an Egyptian military advisor, these events could explain last month's border war between Egypt and Libya. But to the extent that commercial actions by the U.S. might be related to growing instability within or among these OPEC nations, then the capabilities of the U.S. to respond to potential left-wing, Soviet backed regimes in the Arab world would be enhanced by increasing the U.S. commitment to Israel. In other words, it's not a one way street heading in the Arab direction, as currently perceived by some Mideastern policymakers in the American government.

Conclusions

To summarize, as political perceptions now exist, attempts to dilute OPEC's price setting powers along commercial lines become counter-productive to the diplomatic thrust of maintaining OPEC's cohesion in the interest of maintaining Mideastern political stability. Unless this perception is turned around, it seems to me that U.S. foreign policy will increasingly tilt toward the Arab cause and away from the Israeli. Domestic political pressure by U.S. Jewish groups for greater American support of Israel will be ineffective rhetoric in the face of the reality of growing Arab dominance of the world's oil supplies and of vastly increased Arab economic influence. Hence, before the U.S. government even contemplates new commercial mechanisms for the import of oil, in the interest of attempting to dilute OPEC's price setting powers, present foreign policy perceptions will have to change significantly.

Washington & Business

A New U.S. Strategy on Oil—Conciliation

By STEVEN RATNER

WASHINGTON — Department of Energy officials are pointing to what they say is a new international strategy—conciliation—in place of confrontation.

In past administrations, high energy officials maintain, the members of the Organization of Petroleum Exporting Countries were treated as adversaries who received harsh words and deserved harsh actions.

Now, these officials maintain, the dialogue has been softened and Government rhetoric has stressed mutual interests and the need to recognize common problems.

"We have taken a very, very complete dedication to an open, nonconfrontational approach," a senior energy official said.

Energy officials, who did not want to be quoted by name, traced the change in approach to a different analysis of the oil supply outlook. Top officials of the department, including Secretary James R. Schlesinger, have argued that almost regardless of OPEC actions, world oil supplies will run short in the middle 1980's and price increases will inevitably result.

On that logic, the officials see little benefit in attempting to produce lower oil prices by breaking the cartel or by jawboning. Such actions, they contend, would only derail efforts to use the current high prices to encourage conservation and development of alternative sources. At the same time, a reduction in oil prices now would only mean a steeper rise in the 1980's when supplies run short, they argue.

"In 1973, nobody recognized what the long-term oil supply situation was going to be," said one high official. "Because we recognize this is a common problem, our approach is different."

By contrast, the official said, "some of the Ford Administration people never understood the supply situation. If you don't believe there is an oil problem coming, you have to fight with OPEC."

"We certainly didn't look for confrontation but we did ask for reasonableness on both sides," said Frank G. Zarb, administrator of the now defunct Federal Energy Administration at the time. "The most significant element of the international strategy they are pursuing was started by us—the stockpile program."

"I don't discern any difference from what they say now from what Frank and I believed," said John A. Hill, then Mr. Zarb's deputy.

Current energy officials ascribe much of the confrontational attitude to William E. Simon, at first head of the Federal Energy Office and later Secretary of Treasury.

"In Simon's view, price was everything, market forces were everything," a current official said. "He felt you had to crush interference with market

forces so the underlying premise became one of confrontation."

Mr. Simon could not be reached for comment.

Energy officials have been stressing the importance of working with the major producers particularly to increase the exchange of information. Greater knowledge of the producers' plans, intentions and capabilities can help the United States improve its own energy planning, the officials believe.

For example, confusion has surrounded Saudi Arabia of late with regard to the technical capabilities of its oilfields, its plans for future investment in production equipment, and projections on production.

All these questions bear on the issue of what the oil supply picture will be in the mid-1980's. That in turn is a key element in the current debate over how important expensive alternative fuels technologies will be after 1985.

To try to implement the strategy, Mr. Schlesinger and his top aides have in the last year visited key nations. For example, in January, Mr. Schlesinger, Harry E. Bergold Jr., Assistant Energy Secretary for International Affairs and other officials visited Saudi Arabia and Morocco.

Earlier, Mr. Bergold and Deputy Secretary John F. O'Leary visited the Soviet Union, the world's largest oil producer. A disagreement is raging over how much oil the Soviet Union, which is not a member of OPEC, will export to the West after 1985.

Mr. Schlesinger is tentatively planning to go to Iran and possibly Saudi Arabia later in the spring.

Moreover, a major delegation attended the meeting of the International Energy Agency in Paris last fall, although the current policy would suggest a shift away from the I. E. A., which was formed as an organization of consumer countries to face OPEC as a united front.

Another aspect of the current international orientation involves identifying the potential major new producers so that diplomatic efforts can begin as early as possible. In this category, the energy officials are now weighing such possible sources as offshore Argentina and Chad, in addition to Mexico, China and the Soviet Union. Top officials from Mexico and China visited Washington in recent months.

The New York Times

THURSDAY, MARCH 2, 1978

IRVING TRUST COMPANY

ONE WALL STREET

NEW YORK, N.Y. 10015

ARNOLD E. SAFER
VICE PRESIDENT

March 1, 1978

Prof. Steven Spiegel
Dept. Of Political Science
University of California - Los Angeles

Dear Steve,

I am writing to express a degree of frustration with the approach taken to energy problems by many in the Jewish leadership, especially in their discussions with the administration. The American Jews are finding themselves increasingly unable to stop the U.S. foreign policy drift away from Israel. Sadat demands all of the Sinai and the Palestinians demand a homeland in the West Bank and Gaza. That's for now. Next, the Syrians will demand all of the Golan Heights, and the Saudi's will demand all of Jerusalem. Finally, all of the Arab states will demand that the Zionist state be eliminated. All of these demands will be negotiated by the U.S. under the pressure of Arab oil, and increasingly, of Arab money. Any U.S. government, be it Republican or Democrat, will continue to judge Mideastern policies in the light of another oil embargo, at least for the next decade. The business community wants sales to Arab countries; the bankers want Arab deposits and investments. Even the universities, hospitals, and non-profit organizations want Arab grants. The only group that seems to see through much of this is organized labor, but that's largely because of George Meany. After he goes, organized labor may well tilt toward the Arabs as well, as business and government increasingly make the argument that Arab oil and Arab purchasing power are vital to the health of the U.S. Economy.

All of this is not new to many in the Jewish leadership, but they seem afraid or incapable of making the oil link in their discussions with government officials. Settlements in the Sinai or the West Bank, arms sales to the Arabs, day-by-day negotiating nuances between Begin and Sadat, and even the moral and historical issues are all today clouded by the link to Arab oil. Not that these longer-standing issues are unimportant, but the psychological preceptions of those who may have had a neutral or indifferent position on these longer standing questions are now swayed by the necessity to maintain access to Arab oil supplies. Thus, when the discussions focus on these legitimate political questions, there is less dialogue and more dispute, because of the constraint upon the U.S. government imposed by Arab oil.

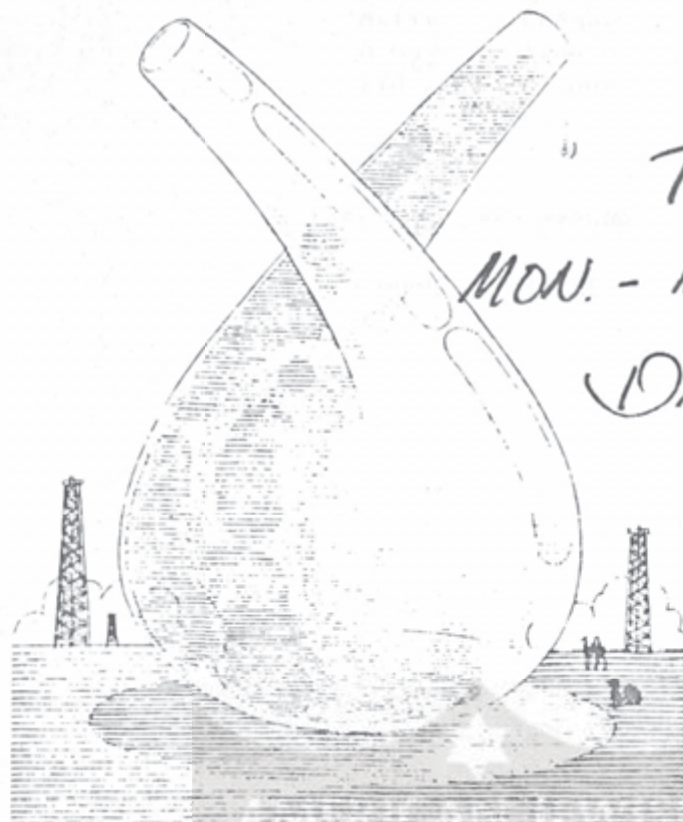
Yet neither side goes into much detail about the real nature of this Arab oil threat. The Administration, in its attempt to oversell conservation, has convinced itself of a world-wide oil shortage by the mid-1980's. That's looking like sheer nonsense today. Conservation makes sense because energy is costly and because the more we save the less we drain our own economy to pay for Arab oil at monopoly dictated prices. But not because the world will run out of oil and thus become hostage to every Arab demand concerning Israel. That is the message about oil which the Jewish leadership must convey.

Yet, it seems to me, out of confusion or lack of knowledge, the Jewish leadership entirely dismisses this energy message, or at the least relegates it to a subordinate position in its discussion agenda. As a result, there is increasing frustration with the government and increasing impotence to sway official decision makers. I believe that tackling the international oil issue directly, and seeking to change Administration thinking around in the energy area may ultimately pay off in discussions about Israel.

To form a cohesive international oil policy among the American Jews, I would recommend an immediate conference on this issue, focusing primarily on the international dimensions of the oil problem. After that, a major public relations or media campaign to turn the perception of this government around. Then, the Jewish leadership may make more progress with the Administration over the Arab-Israel dispute. In other words, pressure by American Jews (and perhaps by non-Jewish groups) should be brought on the Administration, preferably in public fashion. First, the Administration is selling Israel out for oil and Arab wealth. Second, why not do something about the OPEC monopoly, and recommend our program. Not only will this program break the oil logjam, but if successful will be of enormous benefit to the U.S. economy and to the independence of U.S. foreign policy.

Sincerely,

Gerald



TSAI FORUM
MON. - MARCH 13

DR. ARNOLD
SAFER

A Hard Choice: More Recession —Or More Expensive Oil?

That's the global dilemma that Department of Energy experts see—and it explains why the U.S. isn't seriously trying to break or weaken OPEC.

By JAMES COOK

WHY ISN'T the U.S. government taking advantage of the current oversupply of oil to try to break the Organization of Petroleum Exporting Countries? Or, at least, to bring down the price?

The blunt answer is: It doesn't want lower prices for oil.

The best thinking in the Carter Administration is that such a course of action, even if it could be undertaken, would be advantageous only temporarily and dangerous for the long run.

"The price of oil," says an Administration source, "ought to rise 10% or more a year, at least at the rate of inflation and a couple of points besides." He's talking, then, of \$20 a barrel by 1983, \$25 by 1985—a doubling in seven years.

Why are the Administration policymakers acquiescing in developments that are seemingly at odds with U.S. interests? Because they are convinced that oil prices can be held down only at a

price of worldwide recession and political and social instability.

"People on Capitol Hill jump all over us these days," says one high Carter Administration energy official, "to use the current worldwide glut of oil to beat the crap out of OPEC, lower the price of oil, break up the organization. I'm afraid the answer is, 'Lots of luck.'"

The congressmen aren't the only people who are jumping all over. Last fall an International Trade Commission study concluded that there would be no shortage of oil in the foreseeable future.

In January the General Accounting Office issued a report that argued that, with oil supplies abundant, the U.S. ought to use its great technological, managerial, financial and military strength to obtain some control over the price of oil. Then in February, as newspapers always do after OPEC meetings, the *New York Times* began running stories with headlines like "WILL OPEC DROWN IN A SEA OF OIL?"

The current oil glut was so considerable that when OPEC gathered in Caracas for its semiannual price meeting last December, the leaders of the cartel, Iran and Saudi Arabia, decided to hold the line on prices. And last month Iran's Prime Minister Jamshid Amouzegar announced that there would be no price increase later in 1978, either. The conclusion is pretty obvious: If there was ever a time when the consuming countries had a chance to regain the upper hand, that time is now.

Who is right? Those who think there is plenty of oil for the foreseeable future? Or those in the Administration who see a squeeze coming? As in most such arguments, the conclusions depend pretty much upon the assumptions. Those who think that oil is going to be plentiful—like Irving Trust economist Arnold Safer—generally assume that economic growth will continue to be slow worldwide. Thus demand for oil will grow slowly, about 2.5% a year vs. a long-term

elsewhere who think that an oil shortage looms are assuming, in sharp contrast, a somewhat higher rate of growth, one that will at least enable the poorer countries to keep their heads above water.

But it's not simply a matter of demand. The slow-growth-oil-glut adherents tend to be as optimistic about supply as they are pessimistic about demand. Economist Safer, for instance, sees non-OPEC production as more than meeting any increases in demand for some time to come. He predicts that between now and 1982, for instance, consumption will rise by 5.5 million barrels a day, while non-OPEC oil production will pick up by 8.5 million barrels a day, with the result that OPEC production will drop from 30 million barrels a day to 26 million. With OPEC producers crowding to maintain their market shares, Safer argues, it should be possible to break the OPEC cartel or at the very least force down the price.

Nothing could be further from the view that prevails in James Schlesinger's Department of Energy and elsewhere in the Carter Administration. Break up OPEC? Lower the price of oil? Preposterous.

Long before OPEC took power, people in the State Department who thought about such things became convinced that the price of oil was going to go up, and sought to prepare the world for the inevitable. It ought to go up, they argued, because the world was running out of it, because higher prices would encourage conservation and help finance the development of alternative energy supplies, and even because our friends and allies needed the revenues. And the truth of the matter is that these considerations still shape U.S. policy. "Clearly it would not be in our national interest to have the price of oil go down," says Melvin A. Conant, energy consultant and former government energy official. "It has got to stay high and go even higher. But this is absolutely impossible for any political leader to say."

This view prevails in Washington today. The conviction in the Administration is that the oil shortage is going to hit a lot earlier than anyone expected—as early as next year or the year after—so that instead of confronting the cartel, the Administration is seeking even closer cooperation with it. "To the extent that the things we did in 1973 or 1974 aimed at attacking or breaking up the cartel," says

for International Affairs in the Department of Energy and Schlesinger's closest aide, "we have changed our policy. We're trying to let the key producers know we're prepared to work with them."

"The severity of the underlying problem," Schlesinger himself testified to a congressional committee last month, "is veiled by the fact that currently the U.S. and the world are in a temporary period of excess oil supply. . . . The principal oil exporting countries are likely to have difficulties in supplying all the increase in demand expected to occur in the U.S. and other countries throughout the 1980s."



Now Or Never: Now's the time to put the screws on OPEC oil prices, says economist Arnold Safer (right). Not at all, says DOE pooh-bah Harry Bergold. Prices ought to go up.

In the real world, of course, shortages do not really materialize. Prices shoot up to bring supply and demand into balance, and that's what the Carter people foresee: As consumers begin to perceive a shortage, the market will start taking over from the cartel. "Depending on economic growth," says Bergold, "there could be a shortage as early as 1980, 1982, 1983. By 1985 there could be a significant rise in price."

At the center of the problem is Saudi Arabia. Until a few months ago, most government officials and oilmen considered it likely that, when the world needed it in the mid-1980s, Saudi production would rise from the current 8.5 million barrels a day to as much as 19 million.

But State Department strategists have already cut back their estimates of current Saudi capacity to 9 million barrels a day, and foresee a maximum of 12 or 12.5 million barrels a day of production for 1985. And that old 19-million-barrel target? "I would characterize that as science fiction," says one DOE official.

It's not simply a technical restraint, a matter of the capability of the Saudi

to achieve a given level of production. It's a combination of all the economic, financial, technical and political considerations that play upon Saudi Arabia: the uneasy politics of the Persian Gulf and the Middle East, the financial problems generated by oil revenues so vast that they cannot be productively invested, the cost of increasing production substantially. "Now that they're spending the money themselves, and not making Aramco do it," one observer says, "the Saudis are thinking twice about whether they don't have better things to do with \$25 billion than to sink it into expanding their oil production to levels that only increase their financial problems."

So the Administration is downgrading what was generally considered the effective production capacity of OPEC—what OPEC *actually* will produce under present circumstances—from 38 million barrels a day to 33 million, 32 million if you consider the slack normally needed for operational requirements. "In our judgment," says one State Department official, "demand for OPEC oil in 1980 will be about 33 million barrels a day." If this is correct, OPEC, with production last year of over 31 million barrels a day, is already perilously close to capacity.

If the world will accept continued slow growth, high unemployment and a progressive weakening of the poorer economies, a good case could be made that there is plenty of oil. But if you assume the U.S. will remain committed to a high economic growth rate, that Japan and Germany will begin to stimulate their economies and that the prosperity will spread across the world, then the comfortable estimates about oil supply no longer seem valid.

Such a policy will require some particularly delicate balance: enough growth to ease the world's economic problems, but not so much as to send oil prices into the stratosphere and so damage a world economy that yet recovered from the 1973-74 price rises. Which is why the Carter energy program is so heavily committed to conservation: Every barrel conserved is another barrel available to fuel economic growth without putting upward pressures on prices.

"Do we want to avoid an oil crisis at the cost of stagnating the world economy?" a State Department official asks. If the answer is "No," it is hard to be optimistic about oil prices staying down. Next December's OPEC meeting is unlikely to be a rerun of last December's. ■



The Economic View from One Wall Street

Economic Research
& Planning Division

December 1977

INTERNATIONAL OIL REVISITED: COULD THE EXPERTS BE WRONG?

Most experts agree there is an excess of crude oil in world markets. They also concede that oil supplies will continue to be available in ample quantities through at least 1980. They warn, however, that at some point between 1980 and 1985 the world will "run short" again and will probably be hit with another major price hike by the oil cartel. Yet, as this report attempts to show, there is no reason to expect a major oil shortage between now and 1985 given present supply and demand trends. In fact, there is reason to believe that world oil markets will continue to experience surplus conditions through at least 1982 and will not revert to shortages as many observers in both industry and government expect.

This is not to say that the United States will become less dependent on foreign oil. Future U.S. dependence will be determined by the mix of demand growth and new energy supplies, including both non-oil sources that can be brought on stream and major offshore oil discoveries that may be made in the next few years. The U.S. Government's energy policy will affect both energy consumption in the short run and the magnitude of new energy supplies in the longer run. (This is especially true for new natural gas supplies.)

The particular problems in the United States, notwithstanding, the very rise in world oil prices begun in 1974 is likely to lead to major oil surpluses around the world in the years ahead. Both geology and economics support this view; it is largely political trends which suggest the scarcity theory. First, the world's proven reserves of crude oil were some 15 billion barrels higher in January 1977 than they were in January 1974, when the so-called Energy Crisis burst onto the scene. In other words, over the past three years new discoveries outpaced consumption by an average of 5 billion barrels per year, extending our future oil consumption horizon from about 31 years to 33 years. Second, new reserves from the North Sea and Mexico are likely to be identified rapidly over the next two or three years, so that the world's proven reserves will continue to increase at least into the early 1980s.¹ Third, to the extent that the geologist's concept of ultimately discoverable reserves is at all useful, the world is estimated to contain some additional 1.5 trillion barrels, or enough oil to last for another 65 years at projected future consumption rates. Fourth, with world economic activity likely to remain sluggish for some time ahead, there is little possibility of a major boom in petroleum demand. Finally, U.S. energy policy is now committed to allowing higher prices for newly discovered natural gas, either through deregulation or through continued regulation at higher prices. The prospect of higher prices has encouraged significant new drilling which in turn could lead to a greater availability of natural gas, thereby arresting the trend toward substitution of oil for gas. While other energy sources, such as coal and nuclear power, remain mired in environmentalist controversy, drilling for new oil and gas in the United States and around the world is proceeding at a rapid pace.

1. Proven reserves represent expensive capital committed to inventories. No business chooses to tie up more capital than it has to, so proven reserves have seldom exceeded 30-35 years of worldwide consumption. In the U.S., where competition has forced an even tighter inventory control, proven reserves have seldom exceeded 12 years of consumption.

In light of all these trends, we are projecting a continued easing of world oil markets at least through 1982 and potentially through 1985. Not only will more abundant oil supplies offer the prospect of lower oil prices (in real terms), but they will create the market environment in which the U.S. Government could develop policies to dilute OPEC's price-setting powers. Within the context of this gradual shift of the world's oil markets toward an excess supply condition, U.S. energy policy should seek to change the commercial mechanism by which oil is imported. Without this change, it is unlikely that oil consumers will benefit optimally from the improved market conditions.

World Oil Consumption

From 1955 to 1973, world oil consumption grew at an average rate of over 7% per year; since 1973, annual world oil consumption has grown at only slightly over 1%. High prices, slow economic growth, and a new emphasis on energy conservation have all contributed to the sharp decline in the growth of oil consumption.

Table I
Projected World Oil Consumption*
(MMB/D)

	1973 --(actual)--	1976 --(actual)--	1977 (est.)	1978	1979	1980	1981**	1982...1985	
				-----forecast-----					
U.S.	17.3	17.4	18.4	19.1	19.8	20.5	20.2	21.4	23.5
Canada	1.7	1.8	1.8	1.9	2.0	2.1	2.0	2.1	2.3
W. Europe	14.5	14.3	14.1	14.3	14.8	15.1	14.2	14.9	16.3
Japan	5.0	4.8	5.0	5.2	5.6	5.7	5.3	5.5	6.0
Other	8.8	10.1	10.2	10.5	10.8	11.1	11.0	11.1	12.4
Total	47.3	48.4	49.5	51.0	53.0	54.5	52.7	55.0...	60.5

*Excludes Communist countries. Historical data from American Petroleum Institute; projections by Irving Trust Company.

**Year of projected world recession.

Table I contains our projection of world oil consumption to 1985. In 1976 the world consumed 48.4 million barrels per day; by 1985 we expect an annual consumption rate of 60.5 MMB/D. This is an average annual increase of 2.5% per year--a rate of growth higher than in the recession-ridden 1973-76 period but substantially lower than the long-term rate prior to 1973. Our estimate of a 2.5% increase in 1977 world oil consumption reflects the mixed economic performance around the world. In the United States, real GNP is expected to increase about 4.5%-5.0% in 1977, with oil consumption growing at an even faster rate of 5.5%-6.0%, due in part to last winter's cold weather. In Western Europe, however, oil consumption has declined as a result of sluggish economic performance; in Japan we expect only modest growth in both the economy and in oil consumption.

Between 1977 and 1980, we are projecting a 3.5% average annual growth in world oil consumption--somewhat more rapid than in 1977 but still only about half the long-term historical rate. This forecast is based upon GNP projections for the United States (4%), Western Europe (2.5%), and Japan (5%); it assumes that oil consumption grows at about the same rate, despite government rhetoric about conservation and despite attempts to substitute alternate energy sources. It also includes 0.3 MMB/D over the 1977-1982 period for U.S. stockpiling, reflected in the "Other" category which is projected to grow at 3% p.a. over the period.

By late 1980 or early 1981, the world economy is likely to experience a recession. Its magnitude is not expected to be as severe as that of the 1974-75 downturn; it will, however, be of sufficient depth to impact world oil consumption. Although the timing of the European and Japanese downturns might differ from that in the United States, we have assumed a concurrence of recession throughout the world. As a result, we have projected a decline of around 3.5% in

world oil consumption in 1981. After the downturn, we expect strong economic recovery. World oil consumption is projected to grow at 4% in 1982, at 3.5% in 1983, and at 3% in 1984 and 1985. The importance of the projected recession and recovery lies in its relation to the non-cyclical growth of supply. That is, large excess supplies in the oil market can be expected by late 1980 or early 1981, representing a combination of declining demand and increasing supply--a situation likely to persist for some time and one which represents a significantly different perception of the world oil market than is prevalent today.

Non-OPEC Oil Supplies

Table II
Non-OPEC Supplies*
(MMB/D)

	1975 ----actual--	1976	1977 est.	1978	1979 -----forecast-----	1980	1981	1982
W. Europe	.6	.9	1.8	2.5	3.1	4.1	4.7	5.0
Mexico	.8	.9	1.1	1.4	1.7	2.0	2.1	2.2
Alaska	-	-	.2	1.1	1.4	1.7	1.8	2.0
U.S. (lower 48)	10.5	10.4	10.4	10.4	10.5	10.6	10.8	11.0
Canada	1.9	1.8	1.8	1.8	1.8	1.4	1.9	1.9
Rest of World**	3.4	3.6	4.0	4.2	4.4	4.8	5.1	5.3
	17.2	17.6	19.3	21.4	22.9	24.6	26.4	27.4
Net Sino-Soviet Exports***	1.0	1.1	1.2	1.2	1.3	1.4	1.5	1.6
Total	18.2	18.7	20.5	22.6	24.2	26.0	27.9	29.0

*Includes crude oil, condensate, natural gas liquids, and refining processing gains.

**See Appendix for Rest of the World breakdown.

***Net Sino-Soviet exports are gross exports to the West minus imports from the West, largely by Eastern Europe.

Table II shows our projection of non-OPEC oil supplies around the world out to 1982.² Two key assumptions underlie these projections. First, we are assuming that oil production in the lower 48 United States will not continue to decline, but will increase marginally after 1978. In 1977, U.S. oil production in the lower 48 appears to have stabilized, with crude oil at 8.1 MMB/D, natural gas liquids at 1.7 MMB/D, and refinery processing gains at 0.6 MMB/D. We are assuming that continued increases in U.S. exploratory activity will keep lower 48 production stable at 10.4 MMB/D in 1978, and that gradual price decontrol will move this production up to 11.0 MMB/D by 1982. The second key assumption is the continued growth of Sino-Soviet oil exports to the West. This is in sharp contrast to the well-publicized CIA report cited by President Carter at the time of his energy proposals to the American public last April. The CIA suggested in that study that the Soviet Union would turn from a net exporter of one MMB/D at present to a net importer of two MMB/D by 1985. Since the CIA study was issued, there have been a number of critical reviews which found serious fault with the CIA's assumptions. In particular, there is no firm reason to believe that Soviet production will decline significantly. But even if it were to fall off, the Soviets' need for hard Western currencies suggests that they would continue to export oil and substitute coal and nuclear fuel for domestic energy needs. Mainland China is also expected to increase oil exports from a present rate of around 200,000 barrels per day to some 500,000 barrels per day by 1982.

Table II shows an estimated 19.3 MMB/D of non-OPEC oil production in the noncommunist world in 1977, up from 17.6 MMB/D last year. In addition, another 1.2 MMB/D of estimated net Sino-Soviet exports to the West increased the total 1977 oil supplies outside of OPEC to 20.5 MMB/D.³

2. It is almost impossible to forecast oil supplies with any precision beyond a four- or five-year time frame. For further explanation, see page four.
3. In 1977, we estimate that the U.S.S.R. will export around 1.3 MMB/D to the West and China another 0.2 MMB/D. At the same time, the Soviet bloc Eastern European countries will import an estimated 0.3 MMB/D.

For 1978, we expect non-OPEC oil sources to supply 22.6 MMB/D, with most of the increased oil production coming from Alaska and the North Sea. Increased Mexican and Sino-Soviet oil will raise total non-OPEC supplies to 26.5 MMB/D by 1980 and to over 29 MMB/D by 1982.⁴ Part of these new oil supplies will come from smaller but still significant increases in such areas as Brazil, Argentina, and the non-OPEC countries in the Mideast, Africa, and Asia. The average annual growth rate of non-OPEC supplies between 1977 and 1982 is estimated at over 9%, while the growth in world demand is forecast at around 2.5% per year. (Even disregarding our projected 1981 recession, the demand growth number would not exceed 3% per year.)

Estimating oil production beyond 1982 is only guessing at what might be discovered in still unexplored regions. There are many significant potential pools of new oil known to geologists. These include offshore Argentina, Vietnam, the U.S. east coast and Alaska. (Significantly for the U.S. picture, the east coast exploratory drilling is due to start early in 1978.) Policy-makers cannot count on new reserves coming from these areas, but neither can they discount them. Yet longer-term (more than five-year) projections are made, and they normally forecast a decline in reserves. A forecast of declining non-OPEC world oil supplies by 1985 is only a projection that existing reserves will gradually deplete over time; it is also an assumption that no significant reserve additions will be made during that time. Private oil companies sometimes project declining reserves more than five years out, but when they do, they use the forecasts as the basis for budgeting funds for exploration. And they confidently assume that the exploration will lead to new discoveries that will make the original forecasts obsolete. When governments make such projections of declining reserves, they tend to draw doomsday conclusions from them. The latest scare is only one of many during this century. In 1914, 1926, 1939, and 1949, the U.S. Government became seriously concerned over impending oil shortages; each time, though, their fears were premature. At some future time, of course, oil will be a relatively scarcer commodity than it is today, but that day won't come as soon as many think.

Table III
Non-OPEC Supplies in 1985
(MMB/D)

	<u>Low Finding Rate</u>	<u>High Finding Rate</u>
W. Europe	5.0	6.0
Mexico	2.0	3.0
Alaska	2.0	2.5
U.S. (lower 48)	9.5	12.0
Canada	1.5	2.5
Rest of World	4.5	7.0
Sino-Soviet	.5	2.0
	25.0	35.0

To reach some outside limits on possible non-OPEC production levels in 1985, we have projected two scenarios in Table III. In the case of a Low Finding Rate of new sources, non-OPEC production in 1985 would drop from an estimated 29 MMB/D in 1982 to 25 MMB/D by 1985. In the case of a High Finding Rate, as much as 35 MMB/D might be expected. There is absolutely no way at this time to tell which direction the production levels will turn. It depends upon worldwide drilling activity between now and 1980-1981, and upon the success of those exploration efforts. The one message which Table III does have for government policymakers is that an operating environment conducive to more exploration is a crucial element of an effective energy policy.

OPEC Oil Supplies

OPEC oil production reached its peak in 1973 at close to 31 MMB/D. OPEC maintained roughly this rate in 1974, but production declined substantially in 1975 with world recession. In 1976

4. By 1982, the Soviet Union is likely to increase its oil exports to the West to around 1.7 MMB/D, and the Chinese to 0.5 MMB/D, while Eastern Europe will be importing around 0.6 MMB/D.

OPEC oil production rebounded to 30.5 MMB/D, and in 1977 is expected to average around 30 MMB/D. This will include a sizeable inventory buildup toward the end of the year, partly due to normal seasonal patterns and partly due to hedge buying in anticipation of an OPEC price rise in January 1978.

Table IV shows that in 1973 and 1974 OPEC production reached two-thirds of world consumption. In 1975, world oil consumption declined as a result of recession. OPEC production declined even more and the OPEC proportion of total world demand fell to less than 60%. With economic recovery in 1976 and 1977, world demand and OPEC production have expanded at about the same rate, and the OPEC proportion has remained around 60%.

Table IV
OPEC Supplies

	<u>Production</u> (MMB/D)	<u>Proportion of World Consumption*</u> (%)
1970	22.1	56.4
'71	25.1	60.8
'72	27.1	61.5
'73	31.0	65.5
'74	30.7	66.9
'75	27.1	59.4
'76	30.5	63.0
'77 est.	30.0	60.1
forecast:		
'78	28.6	55.9
'79	28.8	54.3
'80	28.0	51.4
'81	24.8	46.8
'82	26.0	47.2
.	.	.
.	.	.
'85	25.5-35.5	42.2-58.7

*Excludes Communist countries. Historical data from American Petroleum Institute; projections by Irving Trust Company.

Our forecast of future OPEC production is derived from the difference between projected world consumption and projected non-OPEC production. Note the dramatic decline projected in Table IV for OPEC production in 1981 and 1982. This results from the dual assumption of economic recession and increased non-OPEC supplies at that time. We are, therefore, projecting that OPEC will be supplying less than half of world consumption in 1981 and 1982, down sharply from the two-thirds they supplied in 1973 and 1974. (Even without the forecast of world recession in 1981, it is likely that OPEC will be supplying only around one-half of world demand in the 1980-82 period.)

The outlook for OPEC production to 1985 is contingent upon the Finding Rate assumed for non-OPEC supplies. With a High Finding Rate, OPEC production would continue to decline over the 1982-85 period, and would only satisfy around 40% of world consumption in 1985. With a Low Finding Rate, on the other hand, OPEC production could increase to over 35 MMB/D by 1985, and OPEC would then supply almost 60% of world demand. That difference is crucial to any assessment of the future viability of OPEC.

It is impossible, however, to project which alternative is more likely by 1985, simply because new oil reservoirs have not been identified as yet through exploratory drilling. Through 1982 our projections of non-OPEC oil supplies are based upon assumptions concerning the degree of exploitation of reasonably well-known pools of oil. While these assumptions could be challenged, there is some basis for the projections in what we know today. For 1985, we have no

basis for a projection of either tighter non-OPEC supplies or more abundant ones, and the outer limits of the 1985 projection in Table IV are simply too far apart to judge the course of prices by that time. For 1980-82, however, where the supply projections are based on the development of known oil reservoirs, we can make the reasonable judgement that supplies will be abundant and that oil prices (in real terms) will likely fall between 1978 and 1982.

Table V
Distribution of OPEC Production
Actual and Projected

	actual		estimated		forecast 1980-82 (3-year average)			
	1976		1977		Case A		Case B	
	(MMB/D)	(%)	(MMB/D)	(%)	(MMB/D)	(%)	(MMB/D)	(%)
Large Population Group:								
Algeria	1.0	3.2	1.1	3.7	1.1	4.2	1.1	4.2
Ecuador	.2	0.6	.2	.7	.2	.8	.2	.8
Gabon	.2	0.7	.2	.7	.2	.8	.2	.8
Indonesia	1.5	4.9	1.7	5.7	2.0	7.6	2.0	7.6
Iran	5.9	19.3	5.5	18.3	6.5	24.7	3.0	11.4
Iraq	2.3	7.5	2.4	8.0	4.0	15.2	3.5	13.3
Nigeria	2.1	6.8	2.2	7.3	2.5	9.5	2.0	7.6
Venezuela	2.3	7.5	2.2	7.3	2.5	9.5	2.0	7.6
<u>Total</u>	15.5	50.5%	15.5	51.7%	19.0	72.2%	14.0	53.2%
Small Population Group:								
Libya	1.9	6.3	2.1	7.0	1.6	6.1	1.9	7.2
Kuwait	2.2	7.1	1.8	6.0	1.5	5.7	1.9	7.2
U.A.E. & Qatar	2.4	8.0	2.4	8.0	1.6	6.1	2.1	8.0
Saudi Arabia	8.6	28.1	8.2	27.3	2.6	9.9	6.4	24.3
<u>Total</u>	15.1	49.5%	14.5	48.3%	7.3	27.8%	12.3	46.7%
Total OPEC:	30.6	100%	30.0	100%	26.3	100%	26.3	100%

Table V shows the distribution of actual OPEC production in 1976 and estimated production in 1977. Note that in both years total OPEC production was split about evenly between the large and small population groups. As total requirements for OPEC oil begin to decline over the next five years, however, OPEC will be faced with a fundamental challenge to its internal cohesion. Some member countries will have to cut back oil production in the face of rising import costs, thereby jeopardizing development programs already in progress. The way for any one OPEC country to maintain its oil exports in the face of declining demand, however, would be cut to prices, and the incentive to do so will grow as excess capacity builds over the next few years. To prevent this, OPEC would either have to set up a centralized allocation system or agree to lower prices for all member countries in an attempt to stimulate overall demand for OPEC oil. The adoption of either alternative will further erode OPEC unity and will mean increased bargaining power for consuming countries.

Table V shows the average production rate for OPEC oil projected over the three years 1980-82, thereby smoothing out the effect of the forecast recession. The average production rate for OPEC over this period is projected at 26.3 MMB/D. Case A assumes that the small population OPEC countries absorb the major portion of the decline in the need for OPEC oil, diminishing their proportion of total OPEC production to around 28%. This would leave 72% to the large population OPEC countries. The problem with this scenario, however, is that an average Saudi Arabian production rate of less than 3 MMB/D for the three-year period 1980-82 would probably be too low for even the wealthy Saudi princes. Case A permits Iran and Iraq to maintain, or even to increase, their market shares, and thus to continue to pursue their economic and political objectives, at the possible expense of Saudi Arabia. Case B, on the other hand, assumes that the current 50-50 split between the large and small population OPEC members is maintained. As a result, Saudi Arabia would be able to sustain an average production rate of more than 6 MMB/D

over the three-year period; it would be able to hold its market share and maintain its development objectives. In this case, however, it is assumed that Iran would cut back its oil production to 3 MMB/D, a production rate which would seriously impair the Shah's development objectives. While Iraq might absorb some of the cutback, its ability and desire to do so seems severely limited.

The two cases outlined in Table V are clearly untenable polar extremes, designed to suggest the inherent friction likely to arise within OPEC. U.S. foreign policy should recognize the possibility that this potential instability within OPEC could lead to political repercussions in the Mideast. Present foreign policy perceptions concerning the Mideast are clouded by the official forecast of increasing world energy scarcities and thus tighter OPEC control over world oil supplies in the mid 1980s.

United States Policy Options

Table VI
U.S. Oil Supply Demand
MMB/D

	1976	1977	1978	1980	1982	1985
Domestic Demand:						
Consumption	17.4	18.4	19.1	20.2	21.4	23.5
Strategic Stockpile	-	.3	.3	.3	.3	-
Total	17.4	18.7	19.4	20.5	21.7	23.5
Domestic Supply	10.1	10.6	11.5	12.3	13.0	11.5-14.5*
Imports Required	7.3	8.1**	7.9	8.2	8.7	9.0-12.0*

*The range of domestic supply projected for 1985 depends upon the Low versus High Finding Rate cases outlined in Table III, resulting in the range of projected oil imports for 1985.

**Actual 1977 imports are close to 8.8 MMB/D, representing a substantial buildup of commercial inventories.

Table VI shows that U.S. imports will rise to at least 9 MMB/D by 1985 and could be as high as 12 MMB/D. This is neither as low as the Administration's goal of 6 MMB/D nor as high as the 16 MMB/D projected by some Government studies in the absence of an official energy policy. U.S. demand is assumed to grow at 4% p.a. over the 1977-85 period. With Alaskan oil supplies building up from an average of 0.2 MMB/D in 1977 to an expected 1.7 MMB/D by 1980, imports can be held at a fairly constant rate of around 8.0 MMB/D through that time. By 1985, however, we expect U.S. demand for oil to outstrip increases in domestic production, even under the High Finding Rate assumption. As a result, U.S. oil imports are likely to rise after 1981, putting further stress on the balance of payments.

Nevertheless, the terms of these oil imports after 1981 could be quite different than at present. First, if OPEC is supplying less than half of the world's oil demand by 1982, versus 60% today, then the cartel may have a more difficult time in maintaining its internal cohesion and could become more susceptible to arm's length bargaining over crude oil prices. Second, if non-OPEC foreign sources are providing 30% of world demand by 1982, versus less than 20% today, then a greater number of oil import sources will be available than at the present time.

But to take advantage of these changes, serious consideration should be given to altering the commercial mechanism by which oil is imported into the United States. In other words, a market exchange system for oil--possibly regulated by representatives of both consuming and producing nations--would be a more useful approach than the current OPEC practice of indexing world oil prices to world inflation rates. Over the next few years, as OPEC's alternatives become more limited, this option might become more acceptable to them. U.S. international oil policy should focus on setting the stage for a new approach to oil pricing. It should also continue a dialogue with the oil-exporting nations that might lead to OPEC's recognition of the mutual gains a neutral market pricing system could provide.

Arnold E. Safer

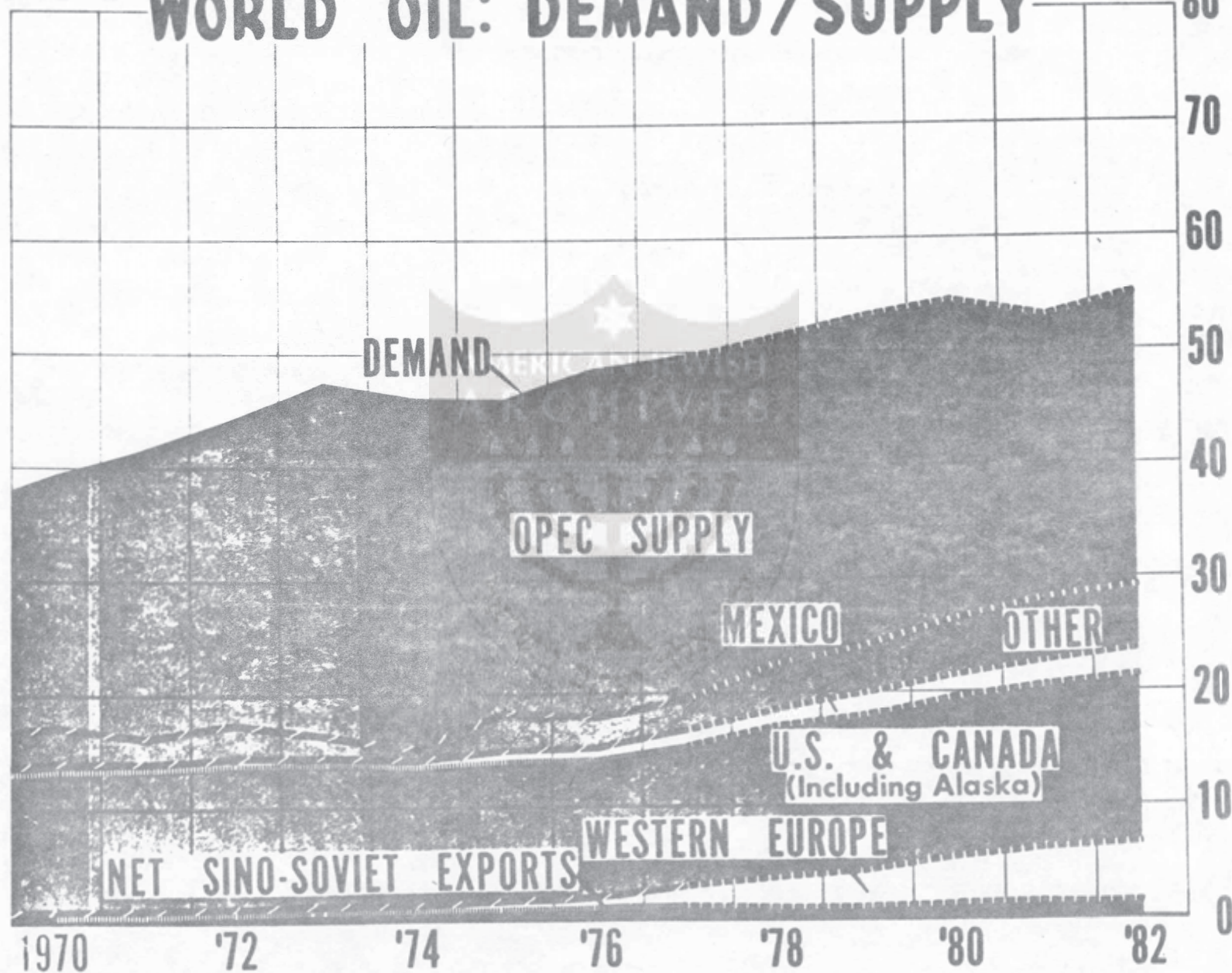
APPENDIX

Breakdown of Rest of World category of non-OPEC supplies in Table II.

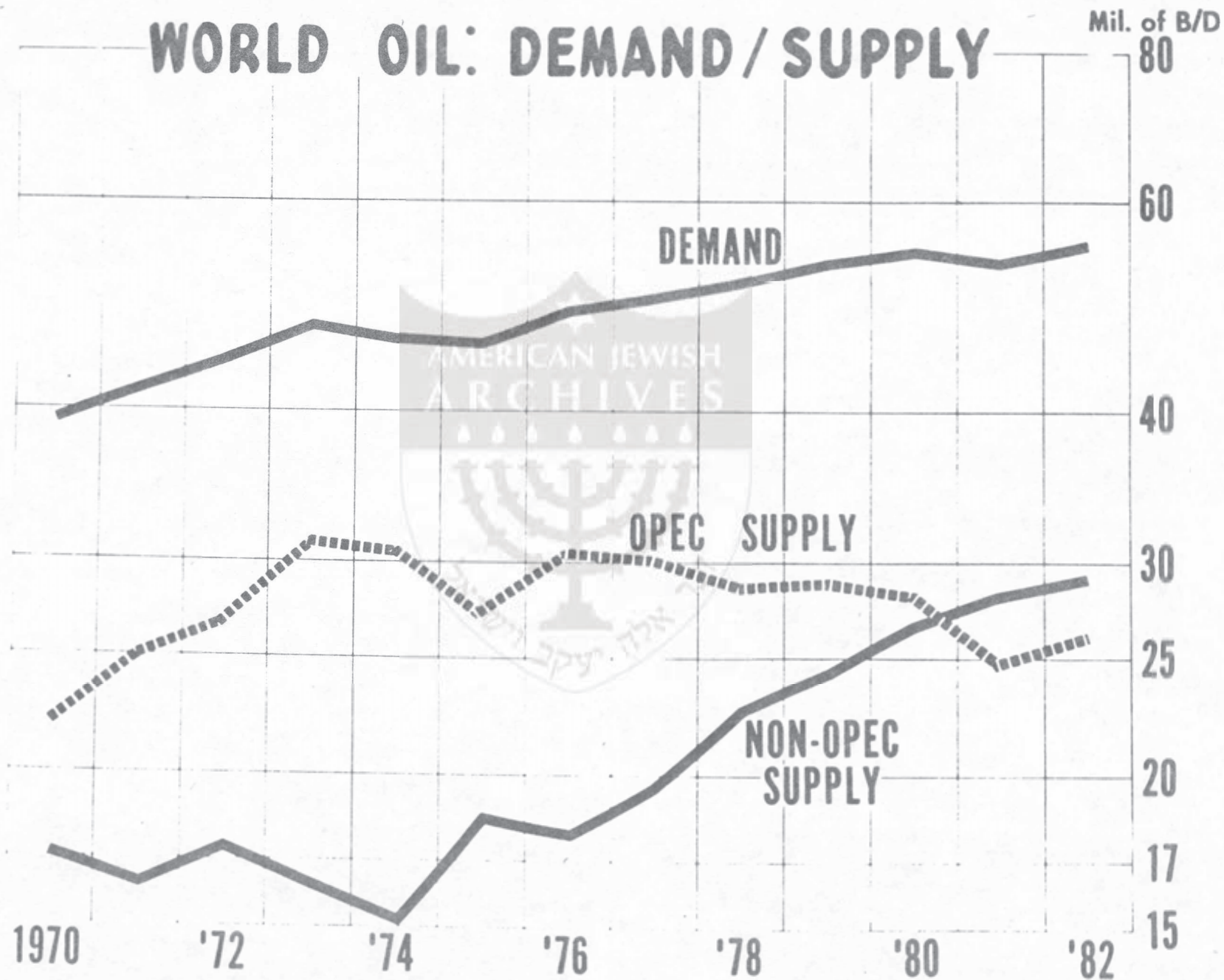
Oil Production (MB/D)		
	Actual 1976	Forecast 1982
<u>Total</u>	3,622	5,300
<u>Latin America</u>	1,267	2,350
Trinidad	395	500
Brazil	172	600
Colombia	152	150
Argentina	395	700
Other	153	400
<u>Africa</u>	571	800
Egypt	331	500
Other	240	300
<u>Non-OPEC Mideast</u>	600	700
Syria	184	200
Turkey	50	50
Oman	366	450
<u>Asia & Oceania</u>	1,184	1,450
India	175	300
Brunei	221	350
Malaysia	165	250
Other Asia	196	200
Australia & New Zealand	427	350

WORLD OIL: DEMAND/SUPPLY

Mil. of B/D



WORLD OIL: DEMAND / SUPPLY



SOURCE: HISTORICAL DATA BY AMERICAN PETROLEUM INSTITUTE. PROJECTIONS BY IRVING TRUST COMPANY.

NEW OIL SOURCES 1977-1982

MMB/D

U. S.

LOWER '48
ALASKA

.6

1.8

CANADA

.1

W. EUROPE

3.2

MEXICO

1.1

SINO-SOVIET

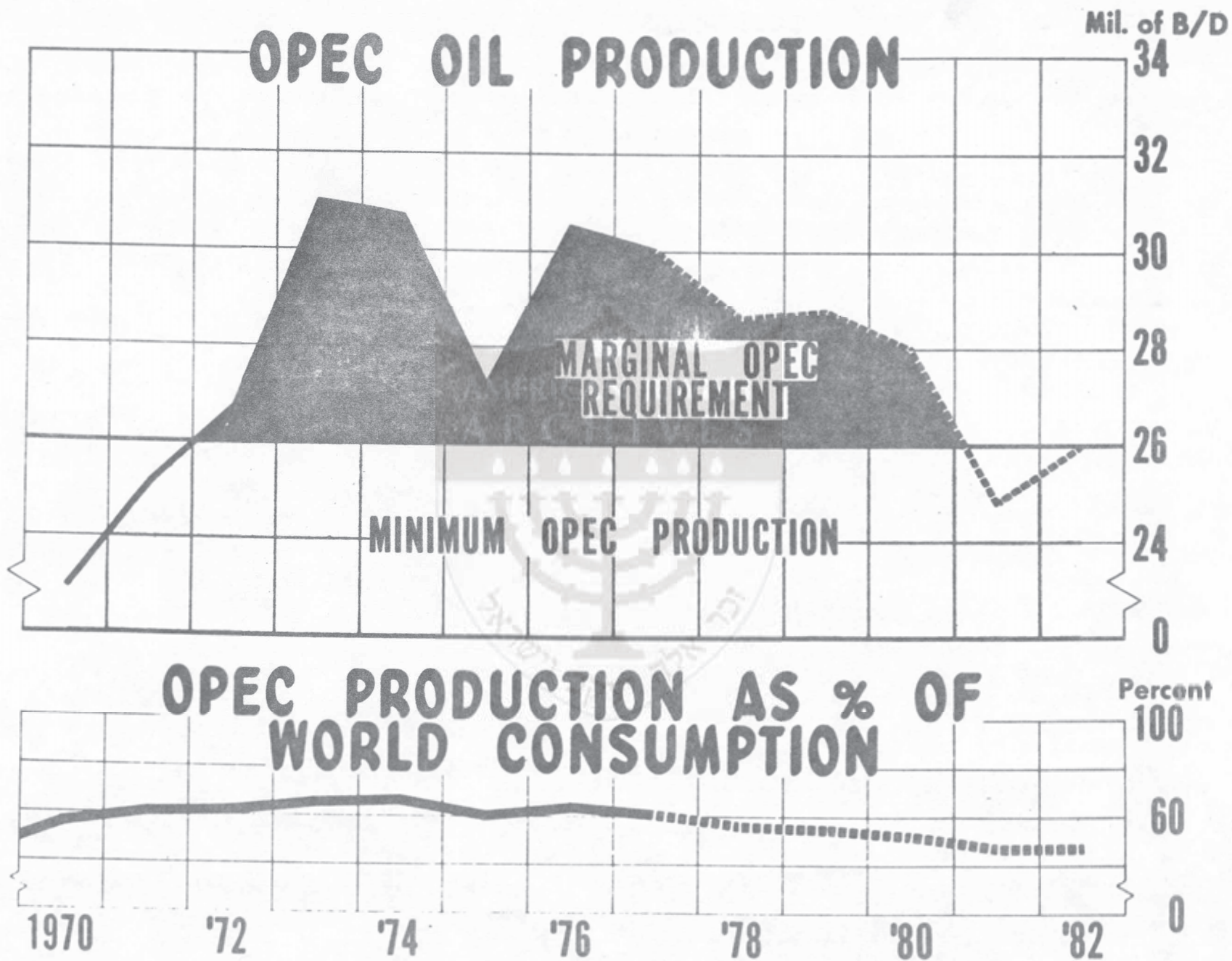
.4

REST OF WORLD

1.3

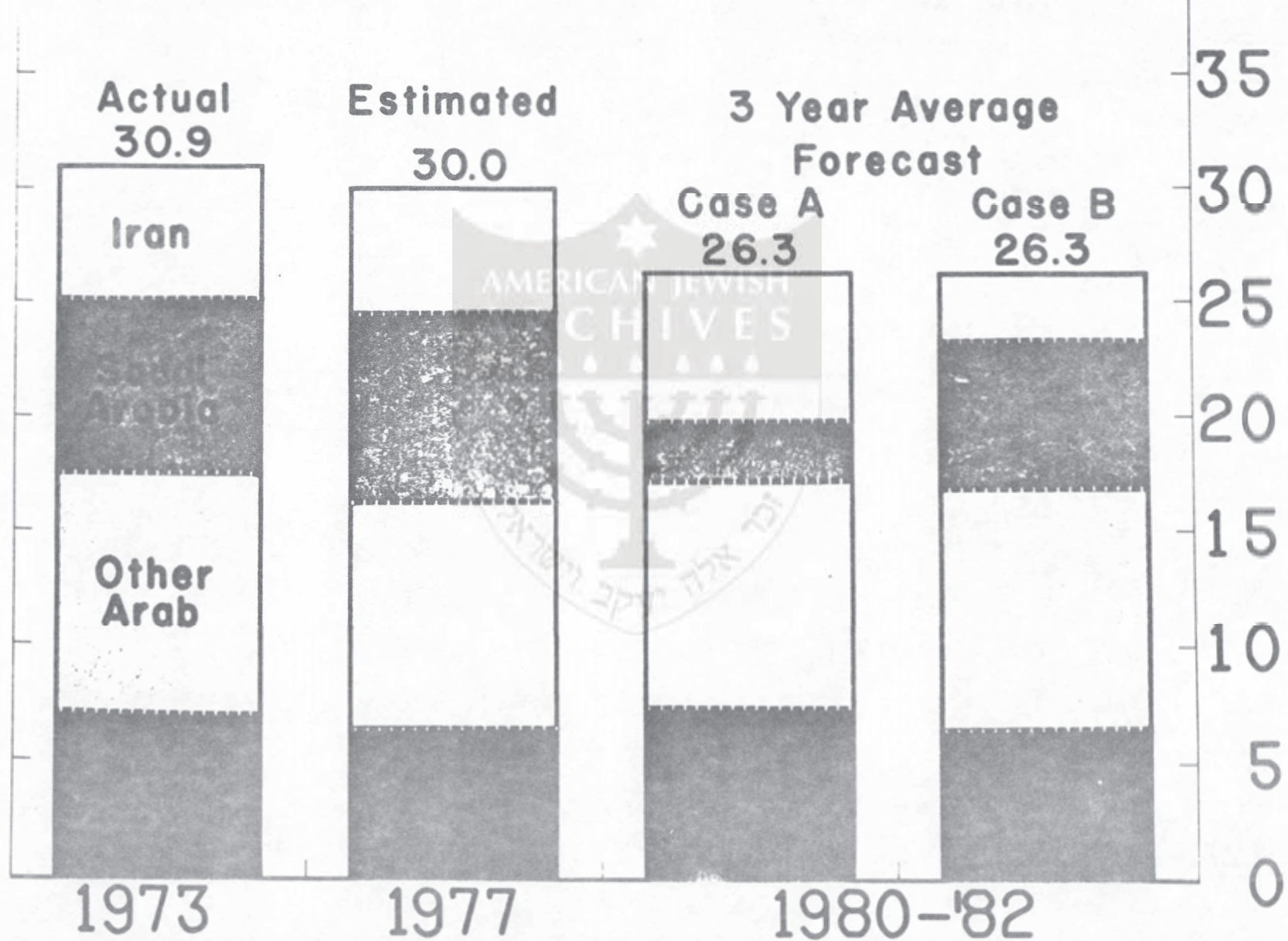
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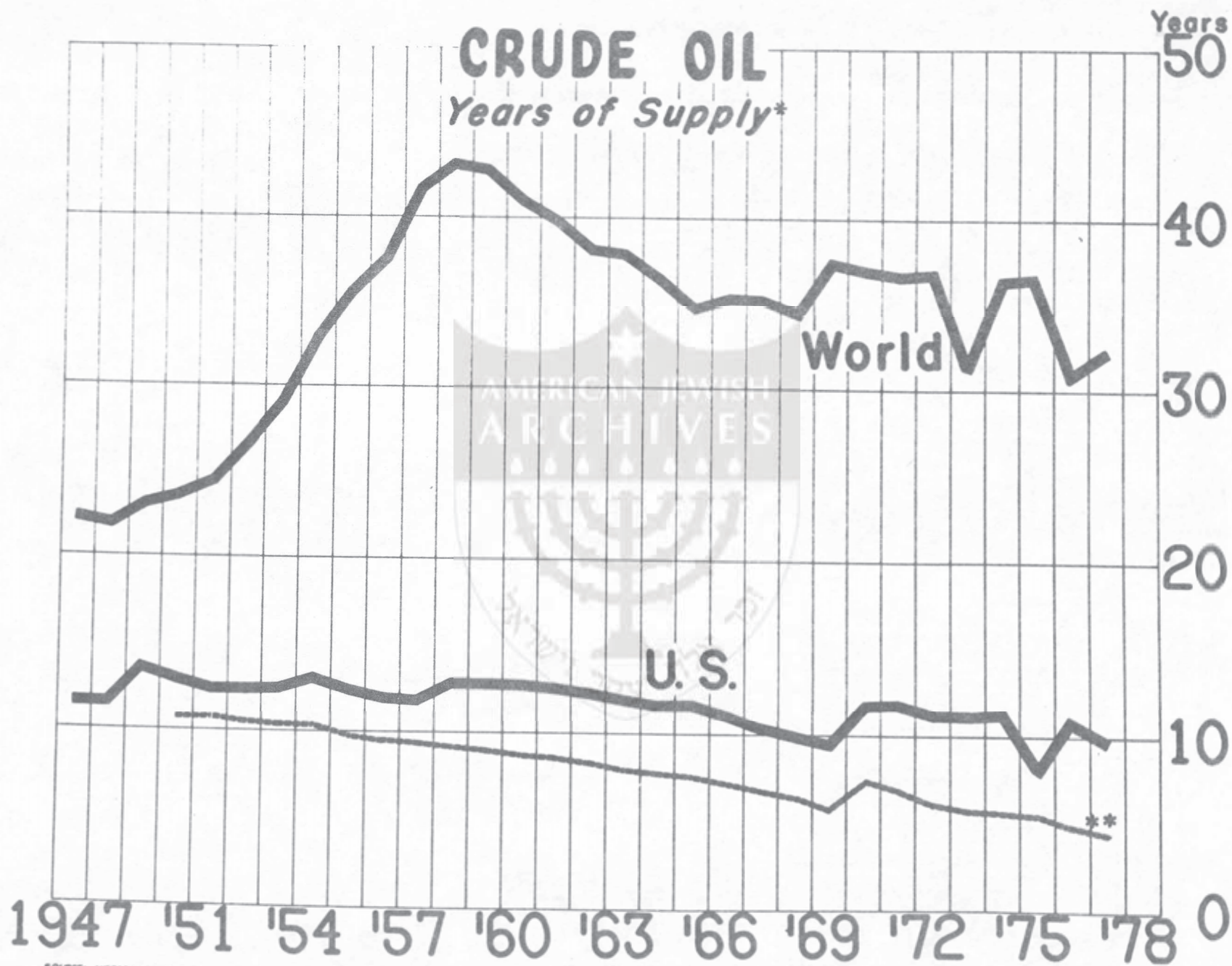


SOURCE: U.S. DEPT. OF INTERIOR, AMERICAN PETROLEUM INSTITUTE.

DISTRIBUTION OF OPEC OIL PRODUCTION ^{Mil. of B/D}



SOURCE: HISTORICAL DATA BY AMERICAN PETROLEUM INSTITUTE; PROJECTIONS BY IRVING TRUST CO.



SOURCE: AMERICAN PETROLEUM INSTITUTE. *AT ANNUAL PRODUCTION RATES **AT ANNUAL CONSUMPTION RATES.

U. S. OIL SUPPLY/DEMAND

MMB/D

	<u>1977</u>	<u>1982</u>
CONSUMPTION	18.4	21.4
STR. STOCKS	.3	.3
	<hr/> 18.7	<hr/> 21.7
DOMESTIC SUPPLY	10.6	13.0
IMPORTS	8.8	8.7
INVENTORY CHANGE	<hr/> + .7	<hr/> —



CONCLUSIONS

1 - ABUNDANCE OF WORLD OIL
SUPPLIES THROUGH 1982

2 - OIL PRICES (ADJUSTED FOR
INFLATION) WILL FALL

3 - OPEC COHESION WILL BE
STRAINED

4 - U. S. WILL REMAIN HEAVILY
DEPENDENT ON FOREIGN OIL



Economic Commentary

Economic Research
& Planning Division

October 17, 1977

THE ECONOMICS OF U.S. OIL SUPPLIES

The Washington perspective on energy is focusing increasingly on the proposition that the United States will soon run out of oil. To quote one former Government official, "The central reality is that the end of our petroleum is in sight and, in all likelihood, the biggest oil fields have already been found. Higher prices to producers (through decontrol) will result, at best, in only marginal increases in output."* But this point of view is open to serious challenge, on both geologic and economic grounds.

The Oil Is There

Even the most conservative geological surveys rebut the thesis that the United States will physically run out of oil in the near future. At the minimum, potential new U.S. oil reserves have been estimated at 120-150 billion barrels--at current consumption rates, 17 to 20 years of future supply. The potential is there. What is needed to tap it is an energy policy that encourages the search for and development of new reserves.

Unfortunately, in the United States, drilling for new oil hasn't always been encouraged. U.S. oil production has been declining since 1971 primarily because the large reserves of Alaskan oil discovered in 1968 could not be produced until a transportation system was built. Technically, a pipeline could have been put into operation within two or three years after the reserves were identified. Environmental disputes, among other things, however, delayed the project. Finally now, some six years later, Alaskan oil is beginning to flow. By the middle of next year, U.S. oil production may well be back to the level achieved in 1971. Similarly, environmental considerations deferred the planned exploratory drilling on the outer U.S. continental shelf, a project which still faces an uncertain future.

Delays such as these in bringing on new energy supplies, coupled with Government-mandated use of oil (particularly low-sulfur oil) in lieu of other fuels, have brought about substantial increases in U.S. oil imports. For a time, the historical oil import quota system kept some semblance of order in international markets. By early 1973, though, the old quota system had become so full of special exemptions that it was eliminated, and the way was paved for OPEC dominance of the world's oil markets.

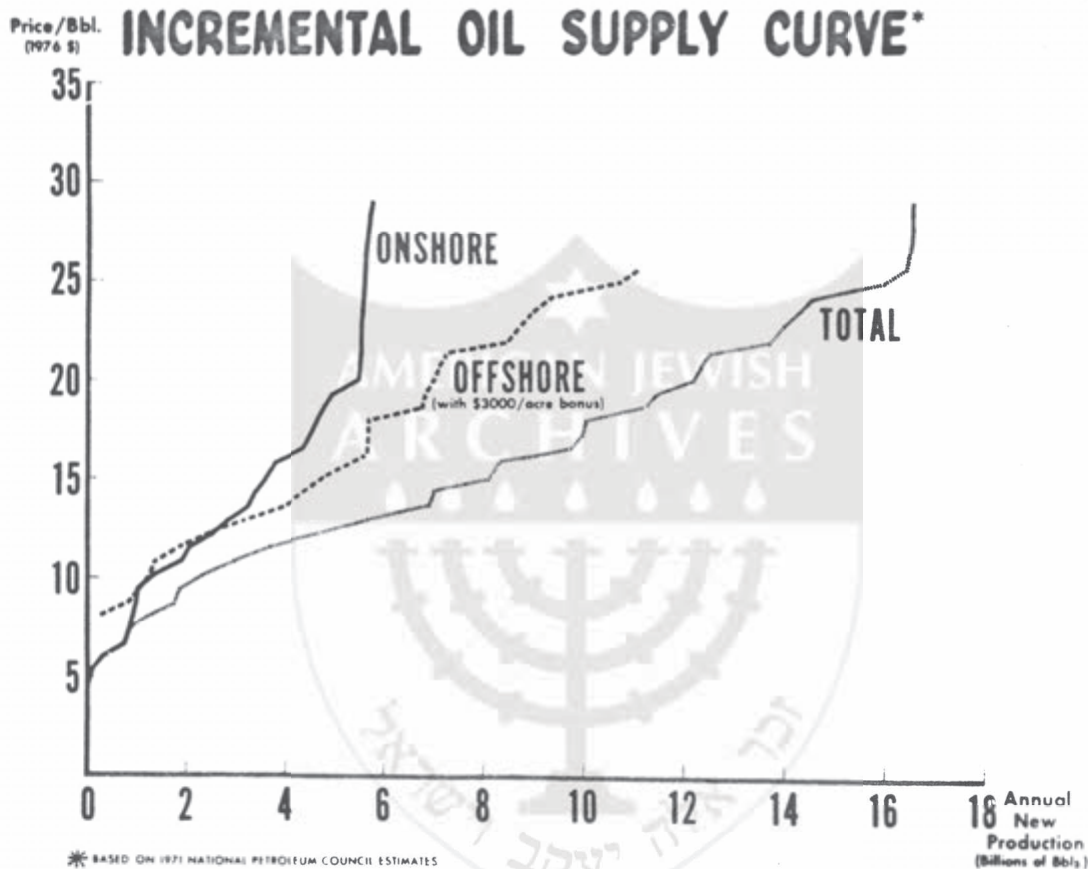
U.S. policy is now faced with a situation where past regulatory excesses can only be corrected gradually. We cannot avoid paying OPEC's monopoly prices, at least temporarily, until we can find and develop the significant new energy sources geologists tell us are out there.

Higher Prices Will Increase Production

There has been substantial debate over the past few years concerning the response of oil output to increased prices. Although all supply elasticity studies are subject to many technical and

*Stewart L. Udall, New York Times, March 30, 1977, Pg. 27. Mr. Udall was Secretary of the Interior from 1961-1969, and is now a Washington lawyer.

economic uncertainties, there is sufficient evidence to suggest that higher oil prices will eventually yield major increases in U.S. oil production. The chart below shows a reasonable approximation to a long-run U.S. oil supply curve. It is based on a technical assessment of each major producing area in the United States and is adapted from studies done in 1971 by the National Petroleum Council.* The projected production levels along the horizontal axis consist of first-year output derived from newly discovered reserves, assumed to be produced over a 15-year period. All secondary and tertiary costs and potential production are excluded. A 10% cost of capital is assumed. There is no attempt to account for the timing of the investments needed to create the new oil reserves nor to delineate when the production from the reserves would come on stream. It does provide, however, a reasonable estimate of potential production rates which could be attained at various prices.



The principal point of this chart is that higher oil prices will induce more oil production from newly discovered oil fields. For example, a price of \$12.50 for well-head crude oil in the United States would eventually bring about an increase of 5.2 billion barrels of annual new production. This is over 14 MMB/D, or 75% of current U.S. oil consumption. Other studies suggest that secondary and tertiary recovery techniques can eventually increase current oil production by 30%-40%, or an additional annual output of 3 MMB/D, provided that the higher prices suggested here can be obtained to justify the extra investment expenditures.

Conclusions

We may, as some contend, run out of oil, but this is not an immediate possibility. Economic studies show that, as of now, U.S. oil production could be significantly increased if prices were permitted to rise to reflect market forces. Geologic studies show that the reserves to be produced are there.

Arnold E. Safer

*Analysis of Regional Incremental Costs of Oil and Gas: Derived from the NPC Oil and Gas Supply Model; National Petroleum Council, Washington, D.C. 1971. We have updated the 1971 figures to account for both inflation and offsetting production gains. Thus, while unit drilling costs have increased 60% since 1971, we believe that only a 40% increase in per barrel production costs and thus in oil prices would be necessary to achieve the desired return on investment.

Oil and the International Economy*

Arnold E. Safer

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Shortly after the OPEC oil embargo was imposed and subsequently lifted, dire predictions were made about the huge balance of payments surpluses that would occur in the oil-exporting countries. This article leads to a more sanguine view than was earlier seen, but it raises problems enough. A major underlying problem is the high price of oil, and no matter what patchwork operations are established, that problem will not go away. Energy policy must become an integral part of economic policy, both domestically and internationally. If slower than desired economic growth is the necessary precondition for energy saving in the short run that will help put in place energy-conserving and energy-producing technologies in the future, that course may have to be followed.

THE WORLD HAS NOT really adapted to the increased price of international oil imposed by the cartel of oil-producing nations. The mounting international debt of many developing countries and of some industrialized nations is one important symptom of the disruptive nature of high oil prices. As long as large OPEC surpluses continue, there will be an ever-increasing burden of deficits in the

oil-importing nations which must be financed through the international monetary system. Chronic international payments deficits can set off a vicious devaluation-inflation cycle, which in turn brings about high unemployment or increased protectionism — key symptoms of the failure of the economic adjustment process. Lest the seriousness of this problem be too lightly dismissed, it is important to remember that most economic historians feel that the failure of the international economic and financial system was a principal element in the Great Depression of the 1930s. Measures taken in the 1930s to defend against these deficits emphasized exchange controls and protectionist trade policies which contributed to a sharp contraction in world trade, an end to economic prosperity, and the ultimate rise of a destructive economic nationalism.

The world has learned much about economic cooperation since the 1930s, and economic history shows that many of the aspirations of individual OPEC nations cannot be achieved except at considerable expense to the rest of the world. The strategy of achieving economic development by imposing high oil prices upon the rest of the world contains certain risks to OPEC as well as to the oil-consuming nations, both developed and developing. The world recession of 1974-75 was in large part the result of the oil price shock; the slow recovery of the world's economies may be another. But it is precisely this slow economic recovery, with its limitations on increasing social goals, that may very well cause the gradual erosion of the strength of the cartel itself. It is important for both Western policymakers and the governments of OPEC to understand the nature of this process.

This economic process depends critically upon

See end of text for footnotes.

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three sets of economic forces. First, the state of the oil market and the resulting pressures on oil prices. Second, the magnitude of the OPEC petrodollar surplus, and the distribution of its corresponding deficit among oil consuming nations, both industrial and developing. Third, the manageability of the system by which these petrodollars are recycled within the context of national economic aspirations and the interdependence of the world economy.

WORLD OIL OUTLOOK

Natural economic forces today may be working toward a gradual reassertion of the market power of the oil consuming nations. A slowing in the growth of world oil demand and the expected rapid increase in non-OPEC oil sources suggest that OPEC production peaked early in 1977 and should gradually decline to 28 MMB/D by 1980.¹ OPEC will be most

valuable to consumer pressures during this period, since a number of the more heavily populated OPEC member nations will have an incentive to expand oil production at a time when world demand for total OPEC oil will be gradually declining. They can only expand output at the expense of the more sparsely populated OPEC countries. If Saudi Arabia alone reduces output to offset increased production by the populous OPEC nations, it could be reduced to production levels by 1980 which even it might find intolerably low. As another alternative, if Saudi Arabian production in 1980 were held near current levels, other OPEC members would be forced to cut oil production below levels which would permit the planned implementation of economic development programs already in progress.

See Table 1 for a description of possible 1980 OPEC supply scenarios. Also, see "World Oil: Challenges and Opportunities," *View From One Wall*

Table 1
World Petroleum Situation: [1]
Forecast to 1980
(millions of barrels per day)

	1975 (actual)	1976 (estimate)	1980 (forecast)	
Consumption	46.0	46.9	53.0	
Inventory Changes	-.9	+.7	—	
Demand	45.1	47.6	53.0 [2]	
Annual Growth Rate	-2.9%	5.5%	2.7% [2]	
Supply				
Non-OPEC [3]	18.0	18.0	25.0	
OPEC	27.1	29.6	27.5	
OPEC Sources				
Heavily Populated [4]	14.4	14.9	Case A [6] 14.7	Case B [7] 18.8
Sparsely Populated [5]	12.7	14.7	12.8	8.7
Total	27.1	29.6	27.5	27.5
Saudi Arabia	7.0	8.5	7.0	3.0

1. Excludes Sino-Soviet bloc.

2. Average annual rate over the four year period 1976-80. Over the five year period 1975-80, the average annual rate of growth in oil demand is projected at 3.3 percent.

3. Includes Sino-Soviet exports to the non-Communist world of one million barrels per day in 1976, rising to 1.4 million barrels per day by 1980.

4. Includes Algeria, Ecuador, Gabon, Indonesia, Iran, Iraq, Nigeria, and Venezuela.

5. Includes Libya, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates.

6. Case A assumes that each OPEC member produces approximately in proportion to the 1975 allocations.

7. Case B assumes maximum production by heavily populated OPEC members, with sparsely populated OPEC members absorbing the production declines between 1977 and 1980.

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U.S. international oil policy should recognize the likelihood of this natural friction within OPEC. The period ahead offers the opportunity to limit the cartel's power over the world oil market and to reach a more healthy accommodation with the legitimate aspirations of its member governments.

In a prior study we argued that over the 1975-80 period OPEC's minimum production level required to sustain its member countries' respective development objectives was in the 24-25 MMB/D range.² This estimate was based on a detailed assessment of each country's oil-producing capacity in comparison with its foreign exchange needs to import Western goods and services. Due to world inflation, we would increase that estimate today to around 26 MMB/D. If our projection of a 28 MMB/D rate for 1980 OPEC production is at all realistic, the world need from OPEC only around 2 MMB/D more than its minimum production levels. This marginal OPEC requirement in 1980 would represent only around 4% of world oil consumption, down from almost 15 percent in 1973-74. International energy policy should recognize that this developing trend will create a situation where a modest program of energy conservation could be highly successful in influencing OPEC's pricing practices. Reducing world oil demand by 2 MMB/D in 1980 seems a target for an effective international energy conservation policy and would make it difficult for OPEC to determine oil prices unilaterally.

Continuing dialogue among representatives of the OECD countries, OPEC, and the non-oil developing countries is necessary to discuss the issues surrounding the price of international oil. For example, it would be useful to establish the fact that some kind of market exchange system would be a better mechanism for determining the price of oil than an international treaty based upon political perceptions of a "fair" price.³ The replacement cost of synthetic energy sources is not a realistic basis for oil pricing; nor is the indexing of oil prices to world inflation a useful departure point for international oil negotiations. Both pricing approaches make little economic sense in the long run and would simply add to the misallocation of the world's resources, both physical and financial. A market exchange system for oil, possibly regulated by representatives of both consuming and producing nations, would be a more useful approach. And it is over the next few years, when the consuming nations may well be able to exercise significant market influence over the OPEC states, that this approach might be successfully applied.

PETRODOLLARS

The second potential source of economic instability derives from the issue of petrodollars — of a very large potential overhang of OPEC-owned financial claims on the consuming countries.

Prior to 1974, the OPEC financial surplus came to around \$15 billion, largely concentrated in Saudi Arabia and Kuwait. By the end of 1977, we estimate this figure will have risen to around \$175 billion, with Saudi Arabia alone accounting for roughly 60 percent of this total. By 1980, this petrodollar surplus will likely be over \$200 billion (See Table 2).

In effect, virtually the entire surplus will be concentrated in the small population OPEC members, principally the Arab states of the Persian Gulf. At the same time, some of the large population OPEC members could very likely go into current account deficit over the next few years.

The petrodollar issue has now assumed a different dimension than had been initially perceived. Two years ago, the fears of the financial community were focused both on the magnitude of the surplus petrodollars likely to build up and on the mechanism by which they would be recycled. The first problem has now receded because it has been recognized that the cumulative OPEC surplus will not build into the completely unmanageable trillion dollar range by 1980, but will likely be more in the neighborhood of \$200 billion. Although some observers have suggested that this smaller sum can be managed without excessive strain on the private financial system, even that proposition is now open to question. The stronger industrialized countries have generally been able to maintain a reasonable balance of trade among themselves. Thus the annual OPEC surplus has become, on balance, a burden for the less competitive industrial countries, for the developing nations, and increasingly for the communist bloc. The continuing ability of these countries to finance their trade deficits has now become the chief concern of the financial community. In other words, the problems now center largely around the world distribution of the balance of payments deficits, and the methods by which these are being financed.

Table 2 translates our forecast of OPEC oil production into OPEC oil revenues. We have assumed an increase of 8% in oil prices in 1977 and a 5 percent per year growth thereafter to 1980. As a result of the expected decline in OPEC volume, therefore, OPEC oil revenues are projected to grow only marginally through the remainder of the decade. With a continued rise in merchandise and service imports, albeit not as rapidly as had been expected, OPEC is likely to experience a decrease in its annual current account surplus through 1980. The cumulative fi-

Table 2
OPEC Current Account and Financial Surplus

	1974	1975	1976	1977	1978	1979	1980
	(actual)		(est.)		(forecast)		
Oil Production (bil. bbls.)	11.1	9.9	10.8	10.7	10.4	10.2	10.0
Domestic Use (bil. bbls.)	.5	.6	.6	.7	.8	.9	1.0
Oil Exports (bil. bbls.)	10.6	9.3	10.2	10.0	9.6	9.3	9.0
Oil Prices (\$ bbl.) [1]	9.45	10.20	11.15	12.04	12.64	13.27	13.93
Value of Oil Exports (\$ bil.)	100.1	94.9	113.7	120.0	121.3	123.4	125.4
Other Exports (\$ bil.)	11.0	12.0	13.0	15.0	18.0	21.0	23.0
Total Exports (\$ bil.) [2]	111	107	127	135	139	144	148
Merch. Imports (\$ bil.)	36	59	70	82	90	100	110
Service Imports (\$ bil.) [3]	15	23	30	36	40	41	42
Investment Income (\$ bil.)	4	6	7	9	11	15	18
Current Account Balance (\$ bil.)	64	31	34	26	20	18	14
Cumulative Financial Surplus (\$ bil.) [4]	80	111	145	175	191	199	213

1. Government Take, Average OPEC
2. Rounded to nearest billion
3. Including Transfers
4. Year-End, 1973; \$15 billion

financial surplus, therefore, is expected to peak at around \$200 billion in the 1979-80 period.

By the end of 1977, the cumulative outstanding non-oil developing country debt is estimated at \$250 billion, with approximately \$90 billion owed to commercial banks. For the past three years, this group of countries has required over \$40 billion annually in external financing, with roughly \$30 billion stemming from current account deficits. This annual flow of resources to the developing nations totals about 1% of the non-communist world's GNP. While in and of itself this figure may not be excessive, there has been a concentration of this flow in the form of increased loans from private Western banks to the developing country debt. While we do not believe that this represents an inordinate level of risk at present, a further expansion of private sector lending to the developing countries could pose problems for the future.

Thus petrodollar recycling is, in fact, occurring. The question is how vulnerable is this process to such unforeseeable shocks as political upheavals, international currency problems, and protectionist trade policies. In effect, OPEC is forcing the Western nations, both governments and private institutions, to co-sign the check on the flow of their surplus to the deficit countries.

IS THE SYSTEM MANAGEABLE?

The present approach to international economic policy runs along two complementary lines. First, a continuation of recycling but increasingly shifting the burden to governments and international financial institutions and away from increasingly reluctant private sources. The advantage of governmental lending is the greater leverage which the governmental body has in imposing constraints upon the domestic economic policies of the borrower. Essentially, this means an insistence upon keeping down the growth of domestic demand, which in many LDC's can mean severe limits upon their aspirations for economic development. This approach has often been accompanied by sharp declines in the value of the borrowing nation's currency, as investors become concerned over the country's economic prospects and as the borrowing country's government seeks to promote exports and restrain imports. The result is often an even more depressed economy with consumers unable to spend and business unwilling to invest. The resulting improvement in the balance of payments position may ultimately bring about renewed growth, provided that the world economy as a whole generates sufficient growth to restimulate demand for the borrowing country's exports.

Enter the second element of international economic policy now being pursued by the new Administration. The proposition is that the surplus industrial countries (Japan, and West Germany) should further stimulate their economies with the objective of creating balance of payments deficits. Easier fiscal and monetary policies in the surplus countries will lead to an increased level of imports, and a part of these increased imports will likely be exports from the deficit countries, either directly or indirectly. For example, as the U.S. stimulates its domestic economy it will buy more commodities directly from the developing countries as well as more consumer goods from Japan. Japan, at the same time, will increase its imports of raw materials from the LDC's, thereby generating a strong second order effect upon exports of the deficit countries.

This two-pronged approach of restraint in the deficit countries and stimulus in the surplus countries may help to gradually restore a measure of equilibrium to the international payments mechanism. The petrodollar recycling is basically a credit flow, a series of loans to carry the deficit countries through their period of adjustment. That, however, could be the "fly in the ointment," because there may be nothing temporary about the growing deficits of the weaker countries, as long as OPEC continues to run these very large balance of payments surpluses, stemming from the high and still rising price of oil. There is reason to believe that increased stimulus in the stronger countries will not lead to an improvement in the weaker countries.

What could happen is an increased world deficit vis-a-vis OPEC, as stronger economic growth worldwide in both the surplus and deficit countries generates a sharply increased demand for oil. As the U.S., for example, stimulates its economy, it may lead to some increase in the demand for goods and services in the deficit countries, but also to an increase in the demand for Japanese goods. At the same time, both Japan and the U.S. will increase their oil imports. As the LDC's increase their raw material exports to both the U.S. and Japan, they could in fact end up with even higher deficits as their economies will require both more oil and more industrial goods, both at even higher prices. In other words, the proposal assumes a fairly constant OPEC surplus to be redistributed among oil consuming countries. Unless there is a greater effort at energy conservation, and U.S. domestic energy development the increased tempo of economic activity and world inflation could generate an even larger OPEC surplus and leave all oil consuming countries with an even larger petrodollar deficit.

Another problem with the proposed course of international economic policy involves the value of

the dollar in foreign exchange markets. With an increased U.S. balance of payments deficit, the international value of the dollar is weakening, despite offsetting capital flows. Over time, the cost of U.S. non-oil imports will rise, as it will take more dollars to purchase foreign goods from other countries. The result could be increased inflationary pressures in the domestic U.S. economy. As the yen and the mark strengthen vis-a-vis the dollar, the U.S. economy might in the short-run be importing inflation from abroad. We might accomplish our goal of reducing the deficits of the LDC's at least temporarily, but at the same time put a new inflationary underpinning into our own economy, and further increase the surpluses of Germany and Japan.

Over a longer period of time, however, an even more perverse effect could occur. As the dollar weakened, U.S. imports might become even more competitive in world markets. This could bring about a renewed U.S. trade surplus, at least vis-a-vis the non-OPEC countries, and would be counter-productive with the goal of reducing the deficit of the LDC's.

CONCLUSIONS

Whether or not the foreign economic policy of the U.S. follows this internationalist course, the key underlying problem will not be eliminated, namely the high price of oil. A system of financial transfers from the surplus industrial countries to the deficit countries, both developed and developing, may not lead to a correction of the economic imbalances unless this underlying cause is removed. Thus energy policy should become an integral part of economic policy, both internationally and domestically. In particular, if we overstimulate the world's economies in the interest of promoting higher levels of employment, we run the serious risk of renewed world inflation, and ultimately another, and perhaps even deeper, world recession. Economic growth may have to be slower than in the past, with more attention paid to the capital needs of the world economy, so that energy-conserving and new energy-producing technologies will be in place to gradually reduce the world's dependence upon OPEC oil.

FOOTNOTES

¹We expect non-communist world oil demand to increase 3.5 percent p.a. to 54 MMB/D by 1980, while non-OPEC supplies should increase to 26 MMB/D by 1980. As a result, OPEC production will decline from a present rate of around 30 MMB/D to some 28 MMB/D by 1980.

²See "Outlook for World Oil: Prices and Petrodollars," *View From One Wall Street*, March 1975. Also published in *Business Economics*, September 1975, pp. 21-31.

³See "International Commodity Issues," "Emotional Side of Divestiture," *View From One Wall Street*, November 1975 and September 1976.

