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UCID- 17207

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MARKET FORCES ALONE WILL NOT PROVIDE TIMELY SOLUTIONS
TO OUR PROBLEMS IN TRANSPORTATION

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July 29, 1976

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Prepared for U.S. Energy Research & Development Administration under contract No. W-7405-Eng-48.

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MARKET FORCES ALONE WILL NOT PROVIDE TIMELY SOLUTIONS
TO OUR PETROLEUM PROBLEMS IN TRANSPORTATION.

The nation's transportation system faces problems on both sides of the supply-demand equation. On the supply side, the problem is to assure the economic viability of the transportation system in the coming post-petroleum era. This will require suitable alternate fuels and/or energy sources. On the demand side, there are several aspects of the problem. Since the potential for public transportation is limited, and therefore auto-mobility will remain necessary in the post-petroleum era, the nation must develop technologies to further reduce the energy intensiveness and environmental insult due to automobiles.

Analysis of these problems has resulted in identification of two broad transportation energy conservation program areas. More efficient and environmentally acceptable heat engine systems are needed. They must be optimized for available fuels and eventually alternate fuels. Alternate propulsion systems such as electric or hybrid vehicles are also required.

A difficulty arises in that these solutions may not come about in a timely fashion due to market forces alone. It is necessary to understand why this is so in order that appropriate government actions can be taken.

We begin with a fundamental premise or assumption that the public good is best served by a free market which presumably allocates resources optimally; in other words, for the greatest positive net social benefit. Optimal resource allocation is to be considered synonymous in this discussion with conservation. This fundamental assumption has been challenged

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in that if public and private objectives diverge sub-optimal resource allocation could result with attendant social disbenefit.

Some examples of social or public objectives which may diverge from those of the private sector are national security, environmental health and safety issues, and acceleration of achievement or elimination of time lag. Each of the public objectives might require different courses of action than the private sector would choose.

This divergence of objectives can come about in the transportation sector in two ways. First, when the market value of energy is below the true marginal value, markets will tend not to effect conservation measures. On the other hand, when the market price of energy is at the true marginal value, markets may still be unable to effect conservation measures. Let us examine both of these issues and see why market-only approaches fail.

When the market price of energy is below the true marginal value due to price control regulations or to externalities such as air pollution effects, the market fails to effect optimal energy conservation, i.e. conservation will not occur naturally since what is cost-effective for the consumer is not cost-effective from the national point of view. For example, environmental externalities were not fully internalized in the price of gasoline in the 1960's. This caused prices to be below the true marginal value of gasoline. The result was increasing automotive-related pollution and increased energy intensiveness.

If on the other hand, energy is correctly priced at the true marginal value, markets can still fail to effect optimal energy conservation because

they take time to function due to the inability of the market to finance improvements, basic inertia, lack of information, or risk associated with uncertain future prices. To the extent that government's actions can accelerate the development and use of energy conserving strategies with positive net social benefits, the actions will produce benefits over and above that which would be obtained under market processes alone.

Now let's examine the situation faced by the industrial portion of the market in implementing conservation strategies. The industrial portion of the market is important since ERDA's R&D programs impact the industrial portion of the market more directly than the consumer portion. Implementation by industry of conservation strategies will encounter difficulties when industrial structure is inadequate, barriers and constraints are so great, or uncertainties and risks are so high that returns on investments are too uncertain. Let's examine each of these points in turn.

Industrial structure can be considered inadequate when industries are too small, too big, too fragmented, or R&D lead times are too long for industry to finance the required R&D. The structure can also be considered inadequate when industry lacks an integrated system viewpoint. For instance, in the transportation sector industries tend to focus on mode, not on providing transportation services or functions. They also tend to focus on supply or demand problems, but not on both simultaneously. Another way of expressing this general thought is that viable technology delivery systems are not in place.

Some examples of barriers and constraints are legal, institutional, regulatory, environmental, health, and safety factors. An institutional

constraint, for example, might be the magnitude of the existing automobile and automobile fuel industries' existing capital investments. The magnitude of these investments mitigate against rapid, non-evolutionary changes. If rapid and/or non-evolutionary approaches are indicated to achieve social objective, industry will tend not to do it or will tend to resist change.

Some examples of uncertainties and risks are the technological, economic and marketability factors. An important risk today is that associated with oil resource economics. This risk impacts directly on the transportation market, both on the supply and on the demand side. Let us examine this factor in detail.

Even if optimistic domestic oil reserves are assumed, a gap exists between projections of domestic oil supply and demand. Figure A shows a very low oil demand projection (growing at 1.8% per year) over the next 25 years. This is on the order of half the traditional growth rate in oil demand. Two projections of domestic oil supply are shown, the higher one being the FEA estimate of domestic oil supply based on optimistic reserves and decontrolled oil prices.⁽¹⁾ Low lower curve is a Lawrence Livermore Laboratory estimate of expected domestic oil supply based on a reserve of 250 billion barrels.⁽²⁾ Clearly with either estimate of expected oil supply, the gap between supply and demand exists and will grow very rapidly larger after domestic production ultimately peaks at some time in the near future.

It has been suggested, of course, that this gap continue to be filled with imported oil, and as can be seen from Figure B, rapid expansion of Non-OPEC world oil production capacity is being reported. This increased Non-OPEC

oil production has a dramatic effect on world oil markets as can be seen in Figure C. This figure compares free world oil demand with supply. The components of supply consists of the OPEC oil exports required to meet minimum OPEC internal revenue needs, exports to the free world from China and Russia, and the free world oil production from Non-OPEC countries as shown in Figure B. The minimum OPEC revenue needs are those required to sustain growth in those countries without damaging their internal economies. Addition of these various supplies together results in a world supply-demand situation in 1979 or 1980 which could result in a shift from a seller's to a buyer's market with attendant price reductions.

These price reductions would be transitory since world oil resources are limited as suggested in Figure C.⁽³⁾

To summarize, the ability of the transportation market to effect optimal energy conservation is unlikely because although world resources are limited, oil prices may soften temporarily thus delaying normal market response to higher prices. If oil prices do soften, conservation programs may even seem poorly advised but are still necessary. As a result of the delay of the market in responding to the inexorable trend of higher prices due to resource depletion, government conservation programs, particularly in transportation, are warranted.

In conclusion, ERDA involvement in transportation energy conservation R&D is justified when attaining public objectives such as national security and environmental health and safety factors requires optimal resource allocation, and the market fails to achieve this in a timely way. This involvement

implies a role associated with technological strategies which, if developed, could result in significant benefit to the nation. An appropriate role for ERDA is to establish technological links between industry and government through which government resources can be used to support and accelerate high risk or long-range R&D, and to test and evaluate technological options. This role will strengthen industry in the technological area so as to enable it to achieve social objectives more rapidly.

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- (1) 1976 National Energy Outlook, Executive Summary, FEA Document No. FEA/N-76/100.
 - (2) Appraisal of Current Methods of Evaluating Crude Oil Resources, I.Y. Borg, LLL, UCRL-51848, June 11, 1975
 - (3) One View of the World's Petroleum Supplies, I.Y. Borg, LLL, UCRL-52075 May 21, 1975

EVEN IF OPTIMISTIC RESERVES ARE ASSUMED, A GAP EXISTS
BETWEEN DOMESTIC SUPPLY AND A LOW DEMAND PROJECTION.

FIGURE A

*FEA ESTIMATE OF DOMESTIC OIL SUPPLY BASED ON OPTIMISTIC RESERVES
AND DECONTROLLED OIL PRICES.

HOWEVER, RAPID EXPANSION OF NON-OPEC WORLD OIL PRODUCTION
CAPACITY IS REPORTED.

FIGURE B

Non-OPEC oil production increases may cause a shift from a sellers to a buyers market (with price reduction) by 1980.

Source: I.Y. Borg, UCRL-52075, "One View of the World's Petroleum Supplies".

FIGURE C

EVEN WORLD OIL RESOURCES ARE LIMITED; THEREFORE OIL IMPORTS
ARE NOT THE LONG-TERM SOLUTION.

THEREFORE, WE MUST PREPARE FOR THE "POST-PETROLEUM ERA"!

FIGURE D

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Printed in the United States of America
Available from
National Technical Information Service
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
Price: Printed Copy \$: Microfiche \$2.25

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