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Toward Strategies for Calm and Order During an Energy Emergency

Thomas F. Humphrey

The purpose of this paper is to present background information that can be used as the basis for discussion at the workshop titled Strategies for Calm and Order. This background information is based on a project completed in February 1982, by the Massachusetts Institute of Technology Center for Transportation Studies (MIT/CTS) under the sponsorship of the U.S. Department of Energy (DOE).

The purpose of this project was to develop passenger transportation contingency strategies for implementation at the state and local levels to deal with a sudden interruption in the supply of petroleum in the new environment of price decontrol. This new environment was created in January 1981 by the Reagan Administration, and it has led to the need for reevaluating the problems that might occur and the actions that can be taken to deal with those problems.

MIT/CTS work with the DOE began in August 1978 and was first sponsored by the Economic Regulatory Administration and then the Office of Conservation and Solar Application. The main objective of the initial work was to aid the DOE in designing and evaluating mandatory transportation emergency energy contingency plans for implementation on a national basis, in accordance with the provisions of the Energy Policy and Conservation Act of 1975 (EPCA).

The focus of the MIT/CTS work changed somewhat after the enactment of the Emergency Energy Conservation Act of 1979 (EECA) on November 5, 1979. EECA shifted the responsibility for transportation contingency plan preparation to the states, which were asked to develop their own state-level contingency strategies. In addition, the DOE was required to prepare a Standby Federal Emergency Energy Conservation Plan that could be imposed in a particular state if that state did not have its own plan to implement or if its plan did not meet federal targets during an energy emergency. MIT/CTS assisted the DOE in the anslysis of various measures that were considered for inclusion in the Standby Federal Plan. In addition, MIT/CTS prepared technical assistance materials for use by the states and conducted a series of technical workshops for DOE and state energy offices during Fall 1980.

During 1979-1980 MIT/CTS, in a closely related project, also prepared three technical assistance documents for the U.S. Department of Transportation (DOT). These documents provide guidance on transit, paratransit, and ridesharing strategies to deal with energy emergencies in urban areas (1).

The focus of the MIT/CTS work changed once again after the President removed federal price and allocation controls on domestic petroleum supplies by executive order January 28, 1981. In addition to that presidential action, it is also important to note that on September 30, 1981, the Emergency Petroleum Allocation Act of 1973, with its authority for coupon rationing of gasoline, expired and has not been renewed. Consequently, this new environment of decontrol and the absence of standby authority to implement a coupon rationing program has resulted in the need for reevaluating strategies to deal with the impact of a sudden interruption in the supply of petroleum. The MIT/CTS work on this new set of problems began in May 1981 and was completed in February 1982.

CAN ANOTHER SERIOUS PETROLEUM SHORTFALL OCCUR?

Current world circumstances indicate that there is a reasonably high probability that an interruption in the supply of petroleum will occur at some time in the future. The question, then, is not "What if it

does occur?" Rather, it is, "When will it occur?" Thus, there is a need for state and local officials to be prepared to deal with such an emergency as quickly as possible. Although the situation in the Middle East should be an incentive for the continuing development of contingency strategies, most states have reduced substantially their emergency planning work because of a reduction in the amount of federal funds available for that purpose.

There is no way to predict when a petroleum shortfall will occur, the magnitude of a shortfall, or how long it will last. During the Arab oil embargo of 1973-1974 (which occurred the last quarter of 1973 and the first quarter of 1974) there was an 18 percent reduction in U.S. oil imports (2). During the Iranian crisis in spring 1979, there were some severe but temporary shortages in various parts of the United States, but the average shortfall nationwide was about 7 percent (3).

The crises of 1973-1974 and 1979 were generated to a large extent because the United States was so heavily dependent on imported oil from the Middle East. Currently, that dependency has been substantially curtailed, as the United States has not only reduced its dependence on oil imports in general, but also has reduced its dependence on oil imports from the Middle East. However, this is not the time to become secure about our energy situation; the world is simply too small and too volatile for this attitude to be realistic.

This uncertainty about the future makes it quite difficult for anyone to prepare a set of technical guidelines to assist states to be prepared to deal with a severe petroleum shortfall, but this was the task assigned to MIT/CTS under our contract with the DOE.

There are no data or models that are helpful in trying to forecast what might occur or what the consequences of those occurrences might be. However, a reasonable set of scenarios were developed that describe a range of possible conditions that could occur. Using those scenarios, a number of assumptions could then be made to use as the basis for providing the technical assistance that will be useful to a state in the preparation of energy contingency plans. In the remainder of this paper those assumed scenarios and the nature of the technical assistance products prepared are briefly described.

HYPOTHETICAL SCENARIOS FOR ANALYSIS

The current Administration has established a policy for dealing with potentially serious petroleum supply disruptions that is completely different from the policies of previous Administrations. It consists of the following major elements (2,3):

1. Complete removal of price and allocation controls,
2. Rapid development of the Strategic Petroleum Reserve (SPR),
3. Provision of incentives to the private sector to increase the production of all energy sources, and
4. Reliance on the private sector and the forces of the free market system to minimize the adverse affects of supply interruptions.

This new policy will assure that some of the major problems experienced in 1973-1974 and 1979 will not recur in a future interruption of petroleum supply. For example, it is doubtful that gasoline lines will exist, except for some short-term temporary period or sporadically in some parts of the nation where a breakdown in the supply distribution system may occur. However, as shown in the discussion that follows, new problems will develop. The most significant problem will be the rapid increase in the price of petroleum, possibly to levels that will create significant economic disruptions. A summary is given in Table 1 of one set of assumptions concerning price increases that could result from a 10 percent reduction in the supply of petroleum.

The consequences of current federal policies and resulting problems are, at best, uncertain. Consequently, to be prepared to deal with this environment of uncertainty and for the purposes of this project, the following scenarios (in consultation with DOE) were developed for analysis (4).

Scenario 1: The price of gasoline rises to the free-market level at once and supplies move quickly to markets with highest demand. The major consequences associated with this scenario are as follows:

1. There will be no gasoline lines.
2. Gasoline stations will keep normal operating hours.
3. In a 15 to 25 percent shortfall, the price of gasoline would increase $3 to $5 per gallon. The price increase would absorb 10 to 15 percent of total disposable income nationwide, compared to about 5 to 10 percent currently.
4. The resulting loss in consumer purchasing power could have a severe impact on producers of other consumer goods and on the economy as a whole unless revenues were returned to consumers' income stream immediately.
5. Most states could not deal with the loss in consumer purchasing power on their own.
6. Providers of essential public services, such as urban transit operators and fire and police departments, who face rigid budget constraints might be unable to purchase all the gasoline necessary to function.
7. Businesses and farmers that demand large quantities of gasoline could face cash-flow problems but would eventually be able to pass on their higher cost to consumers of their products.

Scenario 2: The price of gasoline rises freely but logistic or institutional barriers prevent free movement of supplies. The major consequences associated with this scenario are as follows:

1. The impacts of a fuel shortage are similar to scenario 1 with differences in intensity in different parts of the United States; rural areas and those normally most dependent on oil imports would be affected the most.
2. There appears to be little that most states, acting alone, could do to assure themselves a fair share of the nation's fuel supplies in this situation.

Table 1. Price increases resulting from a 10 percent reduction in supply of petroleum (2).

Assumed Demand Elasticity		Expected Price Increase (%)
-0.50		23
-0.20		69
-0.15	↕ Expected Range ↕	102
-0.10		187

Scenario 3: Price and allocation controls are restored after the shortfall begins. Although this scenario is not consistent with current federal policy, it was included in the analysis because it might be considered by the President or the Congress if economic conditions were serious enough to warrant it. The inclusion of this scenario also provides a reasonable envelope of possible conditions that states may want to consider in their own analysis. The consequences associated with this scenario are as follows:

1. Price and allocation controls must be restored immediately to be successful. If successful, problems and strategies similar to those in previous shortfalls will occur; i.e., long lines at gasoline stations and the attendant problems will again be the result.
2. Gasoline lines could be much worse than previously experienced, but they would eventually disappear as gasoline prices gradually increase.

Two variations to the preceding three scenarios were included in the analysis: Scenario 4 is the same as scenario 1, except that a different shortfall assumption was used. In scenario 1 a 14 percent shortfall was used and in scenario 4 a 23 percent shortfall was used. Those two numbers were selected arbitrarily, except that the 14 percent shortfall corresponds roughly to the shortfall during the 1973-1974 crisis.

Scenario 5 was represented by a 23 percent shortfall with no price and allocation controls, but it was assumed that the federal government would introduce some type of tax rebate plan to redistribute excess profits to consumers.

It is important to reemphasize that the five hypothetical scenarios are not forecasts or predictions of what is going to occur or even what might occur. They simply represent five of many possible conditions that could exist. They also provide a basis for making some reasonable assumptions that can be used to produce a useful set of technical assistance materials to be applied at the state and local levels to deal with an emergency.

One of the products of the MIT/CTS work was a paper by Dorfman (4). The purpose of the paper was to examine the new environment in which state and local policies must be framed to prepare for a petroleum supply interruption in the light of the removal of price and allocation controls. It was the first product of two in a series of documents dealing with transportation contingency planning. The other two products are described in the following paragraphs.

DEVELOPMENT OF STRATEGIES TO DEAL WITH PETROLEUM SHORTAGES

A September 1981 Congressional Budget Office (CBO) study (5) concludes that there are two principal tools that the United States could develop in advance to mitigate the effects of an interruption in the supply of petroleum. The first is a Strategic Petroleum Reserve, which is one of the supply-side strategies currently adopted by the Reagan Administration for implementation. A discussion of the Strategic Petroleum Reserve is important, but it is beyond the scope of this paper. The second tool is a set of demand-related policies, which were the subjects of the MIT/CTS project.

As mentioned earlier, the new environment of decontrol will result in the need to solve new kinds of problems. Consequently, some of the policies developed to deal with energy shortfalls in the past may still be applicable, but others may not. This means that new policies and contingency strategies must be developed, which was the purpose of the MIT/CTS contract.

For each of the five scenarios described the kinds of passenger transportation problems that will be encountered in urban areas, in rural areas, and in intercity travel were identified. Then measures and combinations of measures were identified that can help to mitigate those problems, those measures that will not be of help (and which may be counterproductive), and those measures that may or may not be helpful depending on local circumstances.

The results of these analyses were documented in an unpublished report titled An Analysis of Urban, Rural and Intercity Transportation Problems that Could Occur Under Various Shortfall Conditions and Strategies to Deal with those Problems. Two levels of detail were developed. The first level presents the information needed by policymakers at the state and local levels to assist in making decisions on the actions needed to deal with transportation problems at the onset of and during an energy emergency. For those who desire to undertake their own detailed technical analysis, the report also includes technical guidelines and additional references.

The recommendations on how to deal with the five emergency scenarios are based on an analysis of limited available data and the application of some simple models developed for this project. Because of the limited usefulness of available data and because the situation is hypothetical, the major part of the analysis was qualitative. This is an extremely important point. It would be unwise for anyone to place confidence in the numbers that were produced; they simply provide an indication of whether an action is moving in the right direction or in the wrong direction.

To illustrate the kinds of measures that might be appropriate under the vaious scenarios considered, turn to more specific actions. Table 2 gives the demand-reduction measures that were reanalyzed in some detail in a previous work (6) and which assumed that price and allocation controls would be in effect during a 7 percent shortfall. The purpose of those demand-reduction measures was to reduce lines at gasoline stations that would (and did) appear under those conditions. Some of those same measures can be considered in the new environment of no price controls or federal allocation regulations, but in quite a different context.

The following four categories of solutions were developed to deal with problems that might occur during an energy emergency. If prices are allowed to increase with no upper limit:

Category 1: Government can facilitate energy-efficient travel and help people maintain mobility (coping measures) and
Category 2: Tax excess profits and provide a rebate to consumers.

If price controls and mandatory allocations are reestablished by the federal government, the following categories of solutions will also be relevant:

Category 3: Direct restrictions on consumer behavior or
Category 4: Implementation of coupon rationing program.

In the following paragraphs examples and features of these four categories of measures are summarized. If scenarios 1, 2, and 3 are examined and the problems that will likely occur if these scenarios become a reality are analyzed, some conclusions can

Table 2. Demand-reduction range for selected contingency measures.

Reduction Measure	Estimated Range of Percent Demand Reduction	
	Low	High
Demand restriction		
Public information	0.5	2.0
Public information plus mandatory maintenance inspection	1.0	3.0
Minimum automobile fuel purchase	0.5	1.5 (For first month)
	0.0	0.5 (Rest of period)
Odd-even fuel purchase	1.5	2.0
Employer-based measure	0.5	1.0
Speed limit enforcement	0.4	0.8
Speed limit reduction	1.4	1.8
Compressed work week	0.4	2.5
1-day vehicle-use sticker plan	3.0	5.0
2-day vehicle-use sticker plan	8.0	12.0
Sunday off-road restrictions	0.2	0.5
Saturday and Sunday off-road recreational vehicle restrictions	0.5	1.1
Gasoline surcharge (%)		
40	3.5	6.5
100	6.5	13.0
Gasoline rationing using negotiable coupons	Full target requirement will be achieved	

be formed about the usefulness of the measures previously discussed.

Actions to Facilitate More Energy-Efficient Travel and Maintain Mobility

The following actions could be taken to facilitate more energy-efficient travel and to maintain mobility (category 1):

1. Consumer education and information programs.
2. Programs to promote the supply of and the quality of high-occupancy modes (e.g., transit and ridesharing).
3. Programs to expand and augment transit, ridesharing, and auxiliary transit programs (such as school buses).
4. Employer-based plans.
5. Reduce the need for travel by using techniques such as compressed work weeks, staggered work hours, and work-at-home programs.
6. Further reductions in speed limits.

Tax Excess Profits and Provide Rebate to Consumers

Excess profits could be taxed and a rebate given to consumers (category 2):

1. Purpose is to reduce the overall economic impact of a rapid and significant increase in the price of gasoline.
2. Rebate could be provided by two techniques: (a) check mailed to consumer or (b) reduction or elimination of other taxes (such as social security, federal or state income taxes).

Demand-Restraint Measures

If price controls and mandatory allocations are reestablished the following demand-restraint measures could be imposed (category 3):

1. Odd-even day gasoline pump access.
2. Other more severe pump access restrictions (such as once every 3, 5, or 7 days).
3. Minimum purchase requirements.
4. Carless days (sticker plan).
5. Ban on Sunday driving.
6. Restrictions on single-occupant vehicles.

Coupon Rationing Program

The coupon rationing program could be implemented if price controls and mandatory allocations are reestablished (category 4):

1. The purpose of the coupon rationing program is to provide equal opportunities for all consumers to purchase a limited volume of available gasoline at controlled prices.
2. There is a high cost to implement the program.
3. Program requires at least 2 years to prepare for implementation.
4. Authority for implementation no longer exists at the federal level.

Direct restrictions on consumer behavior are not considered to be in the interest of a state when no price or allocation controls are in effect (scenarios 1 and 2), although they will be useful under scenario 3, which assumes the reimposition of price and allocation controls. This is because there will be no gasoline lines under the first two scenarios, whereas there will be gasoline lines under scenario 3. To impose demand-restraint measures under scenarios 1 and 2 could be counterproductive in a particular state.

The measures in categories 1, 2, and 4 can be helpful under all three scenarios, but for different reasons. Measures designed to facilitate energy-efficient transportation (category 1) are useful and provide a positive strategy for any scenario. These measures, which are often referred to as coping measures, are appropriate for scenarios 1, 2, and 3.

Gasoline taxing measures (category 2), which provide a rebate to consumers, could help to mitigate some of the negative economic impacts of a severe fuel shortfall. However, the development and implementation of such a measure requires significant advanced preparation and executive level support as well as legislative authority. This could be a useful measure, and it is definitely worth considering. However, it must be considered well in advance of an emergency.

A state coupon rationing program (category 4) could be counterproductive if applied in only one state, but if applied nationwide it could help achieve a degree of equity not otherwise possible. However, the costs to prepare and administer such a

program are high. Furthermore, the federal standby authority to take that action no longer exists, therefore a state could not depend on the federal government. Also, rationing works only with price and allocation controls.

All the measures included in all four categories can result in some degree of demand reduction, as the data in Table 2 indicate. For scenario 3, with price and allocation controls in effect, the contribution of all the measures to reducing demand is of major concern. However, under scenarios 1 and 2, in which prices rise to the market-clearing level, response categories 2, 3, and 4 would be considered only if they could (a) offset the negative economic impacts being considered and (b) help to maintain essential mobility.

The details of the actions that may be useful and those that may not be useful under the analysis scenarios are explored in the MIT/CTS study. Of particular importance was the analysis of the ability of measures to deal with urban as well as rural and intercity transportation problems.

A COPING MEASURES HANDBOOK

In July 1980 DOE distributed a report prepared by MIT/CTS titled Contingency Planning For A Gasoline Shortage--A Technical Handbook (6). This report was intended primarily to describe the demand-restraint measures given in Table 2. It was used as the basis for a series of workshops presented by MIT/CTS to DOE and then to all state energy offices throughout the nation during the fall of 1980. A companion unpublished document titled Passenger Coping Measures For Use In A Petroleum Shortfall--A Technical Handbook covers the measures described previously as actions that could be taken to facilitate more energy-efficient travel and maintain mobility. The handbook contains the following topics:

Part I: Planning, Evaluation, Funding, and Implementation
- Chapter 1: Purpose and Use of This Handbook
- Chapter 2: The Context For Coping Measures
- Chapter 3: The Planning Process
- Chapter 4: Evaluating Coping Measures
- Chapter 5: Implementation Guidelines
- Chapter 6: Funding and Resources

Part II: Description of the Measures
- Chapter 7: Communication and Public Information
- Chapter 8: Ridesharing
- Chapter 9: Transit
- Chapter 10: Auxiliary and Paratransit
- Chapter 11: Intercity Transportation
- Chapter 12: Rural Transportation
- Chapter 13: Complementary and Supportive Measures

CONCLUSION

The media are full of reports concerning the glut of oil currently flooding the world. In addition, the average price of gasoline has been declining during the past several months, due primarily to the abundance of oil. The member nations of the Organization of Petroleum Exporting Countries (OPEC) are now arguing about how much they are going to reduce their prices rather than how much they intend to raise them.

If this is so, why is there concern about a possible energy supply problem? A look at the headlines every day suggests that the Middle East is one of the most politically unstable regions in the world. It is not unreasonable to conclude that this instability could lead to a serious international petroleum supply interruption at any time. Consequently, federal, state, and local officials concerned with the implications of such an event occurring must seriously consider the need to develop contingency strategies.

Work at MIT concentrated on measures to help mitigate passenger transportation problems that could result from a serious energy supply disruption. However, the three documents described in this paper which were produced for DOE during 1981 have not been distributed for review and comment. Our plan had been to distribute the drafts (completed in February 1982) to state, local, and federal agencies for a critical review. The documents would have then been revised to reflect those comments.

The documents never proceeded beyond the first drafts, as DOE priorities did not provide the funding necessary to do so. But, those documents, together with other material available from DOE and DOT, will provide the basis for state energy and transportation agencies to develop state-level contingency strategies.

There is a need to be concerned because currently there are few incentives and little money available for states to take the initiative to implement a serious contingency planning effort. This is unfortunate because the problems that could occur will be different from those experienced in 1974 and 1979 and new strategies must be devised to deal with them. If states do not act, the nation could again be unprepared to deal with what could be serious but not unfamiliar problems.

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