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Issues in Developing Contingency Plans for Intercity Freight

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Inherent in any understanding of the relation between trucking and energy must be an awareness of the impact of the truck industry on the U.S. economy. We live in a complex and highly advanced society. In our transportation system, trucks offer source-to-market speed and versatility to serve our needs. A special study by the U.S. Bureau of the Census revealed the importance of trucks. Consider that trucks move 83 percent of all fresh and frozen meats; 73 percent of all radios, televisions, phonographs, and records; 84 percent of all clothing; 92 percent of all ice cream and frozen desserts; 84 percent of all office and accounting machines; and 83 percent of all carpets and rugs. In fact, trucks move three out of every four tons of urban and intercity freight and generate over 100 billion dollars in revenue. Most important, all this movement depends on the availability of petroleum. Ironically, although the job done by trucking is big, the amount of petroleum needed by commercial trucks is small—only about 20 billion gal of diesel fuel and gasoline a year. This is about 7 percent of the total energy supply consumed by transportation.

The problems encountered by the trucking industry with DOE's contingency plans are twofold: (a) DOE fails to recognize the critical position motor carriers have in the nation's economy, and (b) DOE fails to recognize the variety of fuel-purchasing patterns.

I have already touched briefly on the first problem. Needless to say, it would appear that most contingency plans approach trucks per se as "overgrown" cars. The ultimate contingency plan, i.e., DOE's gasoline-rationing plan, proposed to base truck fuel coupons on an index of what the average automobile used and the truck's gross vehicle weight. Neither of these criteria recognize how and where trucks are used.

A more recent example is DOE's Special Rule 9. Under this rule, DOE allocated diesel fuel to agricultural production at 100 percent of current need. Production was not defined to include distribution. As a result, farmers were allowed the diesel fuel they needed to produce food, but trucks could not get the fuel to haul it. Later, DOE amended the regulations to include distribution. However, DOE so narrowly defined distribution as to make it meaningless. Trucks had to have the cargo already loaded. Specifically excluded were trucks on their way to pick up agricultural products. Ironically, these same amendments expanded the 100 percent allocation level to other categories, including the exploration and production of oil and natural gas. Again, DOE excluded distribution. Apparently, the rationale was that gasoline could be produced but not distributed to the local retail outlet.

FUEL-PURCHASING PATTERNS

The second shortcoming is equally disturbing. Most contingency plans cannot handle the diversity of fuel-purchasing patterns. As a result, there is no equity. Consider that trucks use more than 20 billion gal of fuel per year. About 11.7 billion gal is diesel fuel; the rest is gasoline. Many carriers use both fuels. Also, not all carriers purchase fuel in bulk. In fact, we have no idea of the percentage purchased in bulk, and neither does DOE. We do know, however, that many carriers buy exclusively in bulk quantities, others buy all fuel retail, and still others buy both ways.

As a result, some carriers find themselves falling under four sets of contingency plans: (a) diesel fuel purchased wholesale, (b) diesel fuel purchased retail, (c) gasoline purchased wholesale, and (d) gasoline purchased retail.

Diesel Fuel Purchased Wholesale

Diesel fuel purchased wholesale is currently under no allocation plan. All middle distillates were decontrolled in 1976. However, in January 1979, DOE's Economic Regulatory Administration published Standby Product Allocation and Price Regulations and Imposed Allocation Fractions. These regulations allow cargo, freight, and mail carriers 100 percent of current requirements (reduced by an allocation fraction). This is the second priority level. Base period is no longer the month of 1972 corresponding to the current month, but a period defined inadequately as "the month or quarter corresponding to the current month or quarter in the 12-month period ending with the second full month prior to the month which (DOE/ERA) issues an order...."

Although this is DOE's standby or contingency plan in case of a diesel fuel shortage, DOE did not insitute it during the diesel fuel crisis of May and June 1979. Instead, it instituted Special Rule 9, which gave 100 percent of current need to agricultural production. The trucking industry was not prepared for this action.

Fuel oil distributors were also ill prepared. Some could not even meet the demands of farm customers and cut off all other diesel users. Almost overnight, diesel fuel all but dried up in the Midwest. Apparently, the nation's farmers defined "current need" as something called "future perceived need". There were even some instances of farmers selling their "current need" to motor carriers and railroads.

Currently, motor carriers buying diesel fuel in bulk are at the mercy of the distributors. Depending on the commitment the oil company has to home-heating oil customers, motor carriers in 1979 had allocations as low as 40 percent of 1978 levels. Base periods, however, are not uniform and can be anything the oil company determines. Carriers with allocation levels below their current needs can do one of four things:

1. Seek other suppliers willing to take on new customers,
2. Purchase diesel fuel on the spot market,
3. Purchase fuel at the retail pump, or

4. Appeal to a state for set-aside supplies.

In general, carriers have found few suppliers who are willing to take on new customers. Suppliers fear that allocation controls will be reimposed and they will not be able to meet their commitments. Carriers have found, however, that, if they are willing to pay the price, they can obtain fuel on the spot market. Most carriers are hesitant about relying on the spot market for the long run. Such reliance destroys any historic record of base-period use and a supplier-purchaser relation--should allocations be reimposed. Finally, carriers have discovered that state set-aside programs (a) are on a first-come, first-served basis, (b) have usually set a priority for agricultural production, and (c) are dry before the fifteenth of the month. Carriers that anticipate running dry find no relief unless they are actually out of fuel. Contingency planning is apparently outside the realm of some set-aside managers.

In summary, with enough money and enough ingenuity carriers can find fuel. But DOE's standard response to carriers facing difficulties in the purchase of diesel fuel is that it is decontrolled. However, diesel fuel is not decontrolled. The existence of state set-aside makes it a controlled product, as did Special Rule 9 and the mandating of primary storage levels for home-heating oil in 1979.

Diesel Fuel Purchased Retail

Obviously, diesel fuel purchased retail is not under allocation. However, the truckstop itself is under DOE's Standby Allocation Plan. Truckstops under this plan are treated like extremely large suburban retail outlets. Again, no consideration is given to the fact that its many customers would receive priority status if buying bulk fuel. As a result, truckstops are forced to ration fuel on a per-gallon basis. While a limit of 20-50 gal may seem extreme to an owner of a compact car, a truck that averages 4-6 miles/gal is more severely limited.

As noted earlier, carriers buying bulk diesel fuel often resort to retail purchases to augment low allocation levels. Truckstops find themselves with new customers and traditional truckstop purchasers find themselves with new competition for limited supplies. If DOE is to have an equitable and workable diesel fuel contingency program, it must address the problem of truckstops. Attempts like those under Special Rule 9, which sought to make truckstop owners regulators of various carrier-commodity groups in terms of fuel purchase, should be abandoned.

Gasoline Purchased Wholesale

Under past gasoline allocation regulations, motor carriers receive 100 percent of current requirements (as reduced by an allocation fraction). However, the base period used was November 1977 through October 1978. On July 19, 1979, DOE published a final rule that changed the allocation levels and base period. Cargo, freight, and mail hauling by truck will not receive 100 percent of base period and will not be subject to an allocation fraction. This is the highest priority level.

It is too early to tell what effect these changes will have. By eliminating allocation levels based on current need, DOE avoids the problems experienced in auditing current need. Unfortunately, a larger problem remains. The category cargo, freight, and mail hauling by truck seems clear on the surface, but DOE regulations (especially Section 211.102 of the allocation regulations) define a truck as a gasoline-powered vehicle of more than 20 000 lb (gross vehicle weight). In other words, a gasoline-powered truck under 20 000 lb that hauls freight receives the lowest priority level. Such a definition is arbitrary and inconsistent with other DOE regulations, and it totally ignores the practical use of trucks by the motor carrier industry.

In the course of our operations, the trucking industry uses many combinations of vehicles; some are powered by gasoline, others by diesel fuel. Each truck is purchased to perform a specific function. The Commercial Vehicle Post-1980 Goals Study, cosponsored by FHWA, DOT, ICC, EPA, the National Science Foundation, and the U.S. Postal Service, pointed out that

> Most trucks used in commercial service have accordingly been purchased against quite detailed customer specifications which have been drawn up to tailor the vehicle to its job—not too big, not too small, not too powerful, not underpowered, etc. Much efficiency is built into trucks by this tailoring to the job, but much complication also arises when one attempts to characterize or average the national fleet or projected improvements in the fleet. Attempts to standardize the national fleet about some average could destroy the service evidenced today and result in greater national consumption.

Yet, despite this expressed recognition of user specialization, DOE attempts to standardize the gasoline-powered truck fleet, albeit in a contingency plan. Moreover, compounding the problem, is the fact that Section 211.123 of the regulations allocates 100 percent of current requirements (reduced by an allocation fraction) to diesel-powered vehicles transporting cargo, freight, and mail, without any limits on size or weight. The net effect of these two conflicting regulations (Sections 211.102 and 211.123) encourages the intercity hauling of cargo, freight, and mail, where most vehicles are diesel-powered, while, at the same time, it limits the pickup and delivery of cargo, freight, and mail in the urban area, where most vehicles are the smaller gasoline-powered vehicles with gross vehicle weights of less than 20 000 lb.

The nation's distribution system, however, requires the use of both diesel-powered long-haul tractors and smaller gasoline-powered vehicles if the work is to be performed at all. It is not even a question of performing the job efficiently. If we were to use only 40-ft trailers for all of the hauling performed, the cost of the service would be astronomical and the waste of fuel would be unjustified, with the result that the motor transportation system would ultimately collapse. It must be understood that conservation is not always achieved nor promoted through the use of just large vehicles that can transport a lot of materials. Rather—and it is stated repeatedly in The Commercial Vehicle Post-1980 Goals Study—conservation is achieved by using the most appropriate vehicle. Any contingency plan for the U.S. freight system must be based on this principle. As trucks switch from gasoline engines to the more fuel-efficient diesel engines, contingency plans will have to reflect and encourage this change.

Gasoline Purchased Retail

Obviously, the same problems that affect the diesel fuel retail buyer affect the gasoline retail purchaser. But, in this instance, the driver of a gasoline-powered commercial vehicle is waiting in line with drivers of passenger cars. The cost to the user is tremendous. In the past, DOE has had little empathy for gasoline-powered trucks. Its attitude seems to be that (a) with a little bit of hustle, the carrier can find gasoline, and (b) the gasoline truck is an anachronism—all truckers should be using diesel-powered vehicles.

Certainly, the recently proposed gasoline-rationing plan reflects both of these perspectives. Specifically, the plan did the following:

1. Failed to assign the trucking industry a priority level that reflected its essential role in the nation's economy and commerce;
2. Did not define the criteria that would be used in designating firms entitled to receive supplemental allotments and did not identify those documents that would be used in determining base-period use;
3. Incorrectly adopted the use of motor vehicle

registration files during the start-up period of the program as a basis for distributing ration rights to firms;

4. Unfairly distributed ration allotments to firms based on gross vehicle weight indexes during the initial phase of the program;

5. Placed too much confidence in a white market to equalize the supply and demand for ration rights;

6. Discriminated against gasoline-powered commercial trucks in assigning administrative costs on a per-gallon basis, whereas processing costs are incurred on a transaction basis; and

7. Failed to recognize that fuel use varies among different classes of vehicles within the states.

ENERGY EFFICIENCY

No statement on contingency planning would be complete without some comment on the issue of relative fuel efficiency in freight transportation. One often hears that rail is four times more fuel-efficient than truck. The implication is that tremendous amounts of fuel could be saved if traffic were moved by railroads instead of motor carriers.

Most claims of railroad superiority are based on the simple standard of per ton-mile. Yet everyone concerned recognizes no single standard of comparison is acceptable. For example, on January 15, 1980, in a press release concerning the Minneapolis-Chicago intermodal fuel comparison test, DOE's Sidney D. Berwager said

> It is abundantly clear that simply dividing the total amount of fuel that railroads consume in a year into the total number of ton-miles moved and comparing the results for intercity truck freight transportation is not realistic. Instead, a true comparison can only be obtained when the modes concerned transport freight between the same origination and destination points.

In the only true demonstration test to determine truck-piggyback fuel efficiency, DOE found that, for a dedicated train, the average trailer revenue weight for the pigtrailer revenue weight was 12.1 tons; whereas, the actual trailer revenue weight for the motor carriers was 17.1 tons. The results of this study showed that piggyback traffic operating under ideal conditions was only 1.9 times more fuel-efficient per revenue ton-mile per gallon than a motor carrier operating under normal conditions. The table below cites this and other comparisons between truck and rail fuel-efficiency factors:

Factor	Truck	Rail
Distance (miles)	420	412
Speed (mph)	42.6	38.2
Trailing gross weight (tons)	23.1	1466
Total fuel consumed, including that for line-haul and terminal use (gal)	82.3	1283.2
Trailer-miles per gallon	5.1	13.5
Trailer gross weight (tons)	23.1	18.1
Gross ton-miles per gallon	117.7	257.8
Trailer revenue weight (tons)	17.1	12.1
Revenue ton-miles per gallon	86.9	172.9

In addition, the loaded-to-empty ratio was shown to be 1 to 0 for trucks (with 45-ft trailers) and 42 to 3 for rail (with 40-ft trailers).

Interestingly, not even the Association of American Railroads (AAR) believes that railroads are superior to trucks in fuel efficiency. The AAR notes that absolute statements based on Btu's per ton-mile fail to account for average loads, circuity, empty movements, and actual engineering efficiency. As a result, only in the case of unit train service can one find railroads to be significantly more fuel-efficient than motor carriers. Left unanswered is the question of relevance, "How many trucks attempt to compete with 100-ton unit trains?"

Empty Backhauls

Contingency planners have always pointed out that trucks on the highways often travel empty. In fact, an ICC study of 13 165 trucks on Interstate highways in 1976 found that 20.4 percent of all truck miles is empty. Of these trucks, 3 percent (466) traveled empty due to factors other than traffic imbalances or equipment types.

Most planners recognize that natural traffic imbalances between geographic areas—for example, between producing and consuming regions—may often mean that there will not be a return load for every truck hauling freight to a particular point. Furthermore, most planners recognize the effect that equipment specialization has on total empty miles.

Fuel Conservation Efforts

Motor carriers are currently conserving fuel at impressive rates. For example, fuel-saving devices—once deemed too expensive to be practical—are now paying for themselves as the price of fuel increases. In fact, DOT estimates that the purchase of new and more fuel-efficient equipment has saved more than 4 billion gal of gasoline and diesel fuel through 1979. That is enough to heat more than 3.3 million homes, or all the homes in Columbus, Ohio; Boston; Pittsburgh; and Minneapolis. As of the first nine months of 1979, the major sources of these savings are 531.9 million gal due to the increased use of standard diesel engines, 1507.5 million gal due to the use of new fuel-efficient turbocharged diesels, 1133.4 million gal due to the use of variable fan speeds, 536.5 million gal due to the use of radial tires, and 229.6 million gal due to various aerodynamic devices.

Truck Size and Weight

In addition, state governments must recognize that they have a responsibility to truck fuel conservation. Fuel economy is needlessly restricted by those states that have not increased weight limits to the permissible federal maximum of 80 000 lb and by those states that do not permit the use of at least 65-ft trailer combinations. Carriers crossing multiple state lines are now forced to load equipment to the lowest limit, regardless of the fact that several of the states entered may have higher limits.

To demonstrate the degree to which the higher limits can and will result in increased efficiency and fuel savings, consider Table 1, which is computed in terms of the fuel and equipment required to transport 1 million tons of freight a distance of 1 mile. A 65-ft twin trailer operating at 80 000-lb gross vehicle weight, for example, can handle 1 million tons of freight in 38 979 trips by using 9628 gal of diesel fuel. This represents a 39.1 percent saving in trips

Table 1. Comparison of fuel and equipment required under old and new federal limits to transport 1 million tons of freight a distance of 1 mile.

Federal Limit	Gross Combination Weight (lb)	Number of Loads	Diesel Fuel Required (gal)
Old			
55-ft tractor semitrailer			
Dense freight only	73 280	42 544	10 125
Light and bulky freight	57 500	64 041	13 138
65-ft twin trailers			
Any freight	73 280	44 853	10 316
New			
55-ft tractor semitrailer			
Dense freight only	79 000	38 201	9 397
65-ft twin trailers			
Any freight	80 000	38 979	9 628

and a 26.7 percent reduction in fuel consumption, when compared to a tractor semitrailer combination under the lower weight and size limits that still exist in some states.

CONCLUSION

Trucks are essential to the national economy and cannot survive for long with existing low-allocation fuel levels. Two-thirds of the communities in the United States have no alternative to truck transportation.

A modest updating of vehicle size and weight laws could significantly reduce the diesel fuel requirements of the trucking industry. These vehicle dimensions have for some time been endorsed by the American Association of State Highway and Transportation Officials. In addition, the National Cooperative Highway Research Program, in a recently completed study on truck size and weight, noted that

> Nonuniformity in state laws relating to motor vehicle sizes and weights is costing the American public from $1.6-$2.8 billion annually. Although these additional costs most directly affect the trucking industry, transportation costs are ultimately reflected in the marketplace and in the cost of living.

It is essential that a uniform minimum 80 000-lb gross vehicle weight limit and 65-ft length limit be implemented nationwide. The sooner this is done, the sooner fuel saving as a result of such action will occur.

No matter how or what type of fuel a carrier buys, problems with most contingency plans will most likely be experienced. The only way, it seems, for a carrier to get supplies is to demonstrate repeatedly what happens when trucks do not roll. For example, it is likely that

1. Factories will close because the inbound raw materials cannot be moved;
2. Factories will close because produced goods cannot leave the shipping dock;
3. Consumers will be inconvenienced more if they cannot get gasoline, food, or clothing; and
4. A significant number of motor carrier employees will be without jobs.

Urban Goods Movement: Management Solutions to an Energy Problem

Cathryn Goddard

Urban goods movement, or local freight transportation, may appear unglamorous or perhaps unimportant, compared to stirring issues such as those prompted by an energy crisis. The movement of goods and services to and from urban areas, however, represents fully 5 percent of the gross national product of this country. Most of us are familiar with long-haul freight transportation, which accounts for 47 percent, or $103 billion, of all freight. But, in 1978, local freight transportation expenditures accounted for the majority of the freight bill (53 percent), or $116 billion.

Urban goods movement represents a part of our distribution system that can respond effectively in the short run during emergency situations such as those experienced during the 1973-1974 oil embargo. Part of this responsiveness during a crisis is also an indication of the cost saving that can take place under normal circumstances with more effective planning (1).

IDENTIFYING THE PROBLEM

Some key statistics will put our discussion in perspective. Initially, we will examine a few energy-related issues and then look at urban goods movement.

Energy Context

When I served as the director of the Office of International Energy Research at the U.S Department of the Treasury, I was one of the principal authors of the Secretary's Report to the President on the National Security Implications of Oil Imports (2). The Treasury Department has the responsibility to report on these national security implications because they stem from the impact of oil imports on the balance of payments.

Statistics prepared for this investigation highlight the nature and gravity of the oil import problem the United States is facing. Our analysis essentially compared the volume and value of oil imports for the three years (1959, 1975, and 1978) during which previous investigations had taken place.

If we look at the volume of oil imported in millions of barrels per day, excluding the strategic petroleum reserve, we observe a dramatic increase from 1.8 million bbl/day in 1959 to 6.5 million bbl/day in 1975, reaching 8.7 million bbl/day in 1978. Imported oil as a percentage of domestic production also increased significantly in the same time frame: 18 percent in 1959, 39 percent in 1975, and 45 percent in 1978. Similarly, the share of imported oil in total domestic energy demand increased dramatically in the same direction. From 9 percent in 1959, it rose to 19 percent in 1975 and reached 23 percent in 1978.

The vulnerability of the source from which the petroleum originates represents a key element for determining the effect of oil imports on national security. In 1959, OPEC did not exist, but, if we compile a total of oil imports from OPEC-member countries in that year, the share of OPEC imports over total oil imports was 70 percent. It rose to 78 percent in 1975 and to 83 percent in 1978. (This share has declined somewhat in 1979 because of increased production from the North Sea and Mexico.) Perhaps of more concern than OPEC itself, the Middle East has traditionally been considered a source of vulnerability for our imported oil supplies. Imports from the Middle East represented 21 percent of total imports in 1959, 27 percent in 1975, and 34 percent in 1978.

The value of U.S. oil imports has increased even more dramatically than the volume. The price per barrel in 1959 was only about $2.26, which, of course, was considered exorbitant at the time. The price rose to $11.45 in 1975 and to $13.28 in 1978. Current market prices vary from $26.00 to $32.00 for contract crude and even higher for spot-market purchases. Price times quantity will give you the oil import bill, which increased markedly from $1.5 billion in 1959 to $27 billion in 1975 and reached $42 billion in 1978.

Although the investigation itself was presented in 1979 and relied on 1978 statistics, the numbers for 1979 oil imports are in. In that year, we imported 8.8 million bbl/day at a cost of $60 billion. That $60 billion figure can be personalized by recognizing that it represents about $275/person in the United States.

Urban Goods Movement

Let us now turn to urban goods movement to present some key statistics for 1978. The orders of magnitude involved in