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14 **Fuel price, Availability, and Mobility: What We Can Learn from North**
15 **Carolina in the Aftermath of Hurricane Katrina, and Oil Shocks of the 1970s**
16 **and early 1980s**
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36 **Kathy Leotta**
37 **Parsons Brinckerhoff**
38 **999 Third Ave., Suite 2200**
39 **Seattle, WA 98104**
40 **Phone: 206-267-3810; Fax: 206-382-5222**
41 **Leotta@pbworld.com**
42

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ABSTRACT

Our transportation systems rely heavily on petroleum. Not only does this reliance contribute to climate change, it also increases our susceptibility to oil supply disruptions. To many experts, it's not a question of whether or not we'll experience fuel shortages, but rather when. By planning for those shortages at the local level now, our agencies will be on better footing to respond during an emergency. This paper revisits lessons learned from oil shocks of the 1970s/80s and offers new insights from North Carolina following Hurricane Katrina. Following are some conclusions:

- Changes in non-work trips may occur far more frequently than changes in work trips.
- Fuel availability impacts travel behavior much more than price.
- Transit systems have only limited capabilities for quickly increasing service to respond to emergencies.
- Although planners in the 1970s and 1980s concluded that fuel shortage planning and response should occur at the lowest levels of government, currently nearly all fuel shortage planning occurs primarily at the state level.
- In some areas of the U.S. transit agencies may need to remind decision makers of the importance of maintaining transit service during fuel shortages.
- Unlike the 1970s and 80s, today there are ample opportunities for telecommuting; however, it is not always well-promoted.
- Perhaps because energy contingency planning primarily occurs at the state level, some local agencies may feel they are "on their own" in dealing with fuel supply disruptions.
- In an emergency, reliance on just-in-time fuel delivery is problematic.
- Government agencies at all levels should better understand their daily fuel requirements, buy some fuel under firm contracts, and reassess how to quickly secure fuel in emergencies.
- Over the long-term regions should strive to become more self sufficient regarding fuel.

This paper also identifies several fuel saving strategies, summarizes an implementation timeframe for these strategies, and recommends actions local government agencies may want to undertake to better prepare for fuel supply disruptions.

FUEL PRICE, AVAILABILITY, AND MOBILITY: WHAT WE CAN LEARN FROM NORTH CAROLINA IN THE AFTERMATH OF HURRICANE KATRINA, AND OIL SHOCKS OF THE 1970s AND EARLY 1980s

INTRODUCTION

Worldwide, our transportation systems rely heavily on petroleum. Following are a few statistics on petroleum production and consumption that highlight this dependence:

- In the U.S., the transportation sector consumes about 67 percent of all petroleum.
- About 97 percent of U.S. transportation systems rely on petroleum products.¹
- The U.S. increasingly relies on imports. As shown in Figure 1, U.S. domestic oil production has been on the decline since 1970, when the U.S. imported just 22 percent of its oil. By 2004 imports had increased to 62 percent.
- Due to the depletion of oil at existing fields, and the finding that most new oil fields are much smaller than those found decades ago, most oil-producing countries are very limited in their ability to increase their production of conventional oil.

This reliance on petroleum products for our transportation systems is problematic. For example, we are becoming increasingly aware of the impacts of our use of fossil fuels on climate change, and we increasingly rely on oil from unstable parts of the world.

As our dependence on imported oil deepens and supplies become tighter — as many experts agree is inevitable — oil importers such as the United States become increasingly susceptible to oil supply disruptions. These disruptions could occur for any number of reasons, including:

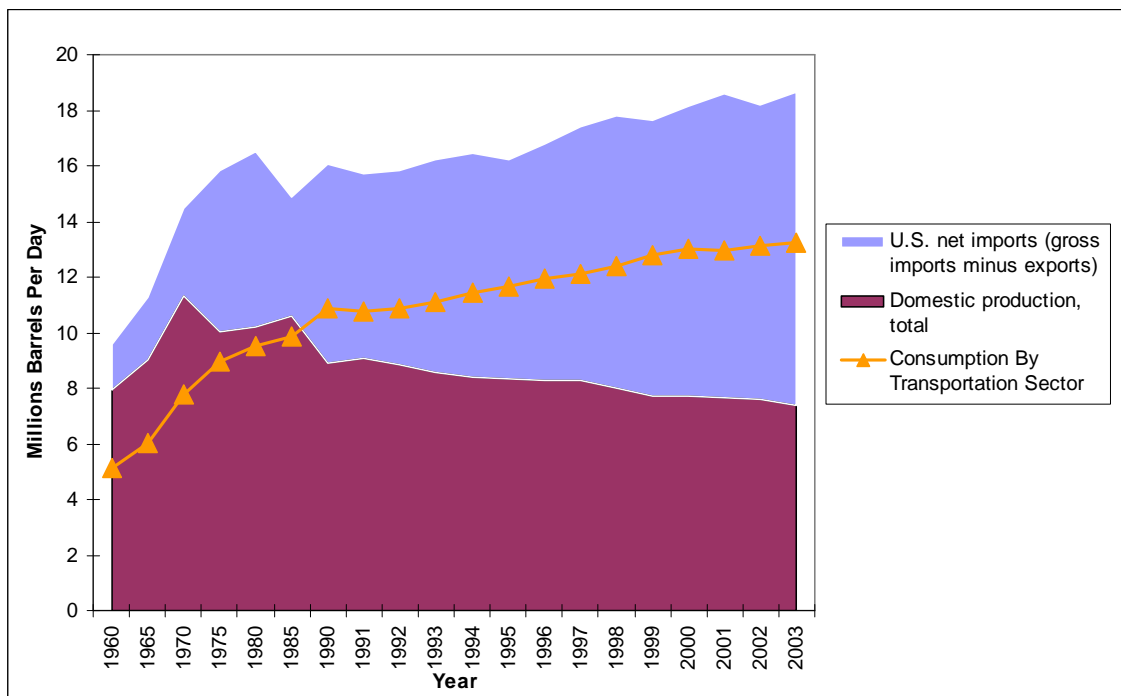
- Geopolitical disruptions
- Inadequate petroleum refining or processing capabilities
- A global peak in the production of oil
- Natural disasters, such as additional hurricanes in the Gulf of Mexico
- Coordinated terrorist attacks on critical energy infrastructure

The International Energy Agency's (IEA's) *2004 World Energy Outlook*² indicates that, increasingly, oil will be concentrated in more unstable areas of the world, stating:

“A central message of this *Outlook* is that short-term risks to energy security will grow. Recent geopolitical developments and surging energy prices have brought that message dramatically home. Major oil- and gas importers – including most OECD countries, China and India – will become ever more dependent on imports from distant, often politically-unstable parts of the world. Flexibility of oil demand and supply will diminish.”

Because oil and fuel prices have increased considerably in recent years, and disruptions in coming years are according to some experts inevitable, a review of lessons learned from previous fuel and oil supply disruptions will help us to better prepare for increasing fuel prices and future supply disruptions.

FIGURE 1 U.S. Oil Production and Consumption 1960 - 2003³



OIL SHORTAGES FROM 1973-1981

In 1973, several Arab nations instituted an oil embargo against the United States and Holland in response to United States' support of Israel in the 1973 Arab-Israeli War. By the time the embargo ended six months later, world crude oil prices had tripled.⁴ As shown in Figure 2, while fuel consumption in the U.S. had been increasing by nearly five percent annually for the decade preceding the embargo, in 1974 fuel consumption in the U.S. decreased by almost 2 percent. Within a couple of years, OPEC restored output to pre-embargo levels, and over the next few years fuel consumption in the U.S. increased by about three percent a year.

In 1978, the Iranian Revolution resulted in a decrease of crude oil production from 1978 to 1981; while in 1980, the Iran-Iraq War began, and resulted in additional decreases in oil production in the region.⁵ Overall global oil production declined by nearly five percent between 1979 and 1980, and by an additional six percent between 1980 and 1981.⁶ Crude oil prices rose sharply between 1979 and 1981, but price controls were instituted that kept fuel prices artificially low.

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3 On July 15, 1979 President Jimmy Carter gave his now famous “Crisis of Confidence” speech⁷
4 in which he laid out his six point plan to achieve energy independence for the United States.
5 This included a federal government set aside of \$16.5 billion for long-term conservation in the
6 transportation sector. The basic goal of the conservation program was to cut oil imports in half
7 by 1990.⁸ Contrary to this goal, as oil prices again fell and the urgency of energy independence
8 abated, U.S. oil imports have for the most part steadily increased. In 1980 the U.S. imported
9 about 38 percent of its petroleum, while by 2004 imports had increased to about 62 percent.
10

11 The following sections revisit how travelers’ behaviors changed in response to these fuel
12 shortages, and describe lessons learned. Much of this section is drawn from two documents: (1)
13 the proceedings of the 1980 National Energy Users’ Conference for Transportation, as
14 documented in *Transportation Research Board Special Report 191 – Considerations in*
15 *Transportation Energy Contingency Planning*, and (2) *Energy, the Economy, and Mass Transit*,
16 prepared by the U.S. Congress Office of Technology Assessment, October, 1975.
17

18 **Fuel Prices, Supplies, and Changes in Travelers’ Behaviors in the 1970s and early 80s**

19
20 In 1974 and in 1979/80, many regions of the U.S. experienced occasional or regular gas lines and
21 gas shortages. Figure 2 shows motor fuel consumption from 1949 to 2004. As shown, fuel
22 consumption in the U.S. decreased by nearly 2 percent in response to the 1973 oil embargo. In
23 1979 it decreased by 5.1 percent, with an additional 6.3 percent decrease in 1980.
24

25 As shown in Figure 3, motor fuel prices increased considerably in 1974, and continued
26 increasing, although not as quickly, until 1981. Figure 3 shows that when motor fuel prices
27 increased quickly, fuel consumption usually decreased (although at a much slower rate). Clearly,
28 travelers changed their travel behavior during the 1970s and early 80s.
29

30 Several surveys were conducted after these oil crises to assess how and why people changed
31 their travel behavior. Following are some key findings regarding traveler response to fuel
32 shortages in 1970s and early 80s⁹:
33

34 *Most People Changed Off-Peak Discretionary Travel First*

- 35 • Data from Baltimore’s Regional Planning Council and the Maryland DOT indicated that off-
36 peak auto travel decreased much more than peak travel during the first 3 months of 1974.
37 This suggests that discretionary trips (social, recreational, shopping, etc.) were cut back much
38 more than work trips.¹⁰
- 39 • The journey to work trip was the least flexible in responding to periods of gasoline shortage
40 and price increases. Alterations in shopping trips were typically made long before carpooling
41 or modal changes in the work trip were made.
- 42 • In Dutch Fork, South Carolina, a suburb west of Greenville, auto travel by residents was
43 estimated to be reduced by 10 to 15 percent. Traffic volumes decreased primarily on
44 weekends, with less decline on weekdays. At the height of the crisis weekend traffic was
45 down by 25 percent.¹¹
- 46 • Linking of non-work trips, particularly shopping trips, was common.
- 47 • Travelers also drove at lower speeds to conserve gas.
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Changes in Transportation Mode

- Travelers were more likely to change their travel behavior based on the *availability* of gasoline rather than price.
- Nationally, transit ridership increased. The largest increase was experienced during the month of July 1974, when transit ridership was 12.3 percent higher than in July of 1973.¹²
- According to another summary of travel behavior at that time: “The role of transit in alleviating the impact of the 1979 energy crisis is found to be minor: Gasoline savings due to transit patronage increases amounted to less than 5 percent of the decrease in gasoline sales. Methods of calculating ridership increases and gasoline savings attributable to transit for a variety of energy futures are developed. The results indicate that transit cannot be expected to play a major role in a future energy emergency.”¹³
- An analysis of the capacity of transit to respond to petroleum shortages indicated that existing transit systems were limited in their ability to respond to any major energy shortfalls. According to one transportation analyst at the time, “Even a modes shift (1 – 2 percent) of automobile commuters to transit can cause inordinate delays due to overcrowding and may leave regular transit users without service. This contrasts with the WWII situation when a 48 percent increase in transit riders was accommodated by the much larger system in existence at that time.”¹⁴
- During the 1979 shortage, a survey taken in New York State indicated that about 14 percent of household heads said that they increased their carpooling to work.¹⁵ However, carpooling was generally not an option taken in response to shortages. During the 1973 embargo, the number of commuters engaged in carpooling increased by less than 4 percent, and only 1 percent of commuters shifted from driving alone to carpooling.
- Much of the reduction in travel was a net loss of travel; very little of this reduction represented shifts of commuters from driving alone to carpooling, transit, or walking.
- In the 1970s many motorists purchased more fuel efficient automobiles rather than alter their travel behavior.¹⁶

Overall, the public adjusted its travel behavior by altering shopping and recreational trips, but generally avoided altering the automobile trip to work. The public did seem interested in policy actions that would increase travel options and offer incentives for their use. As would be expected, the public was less favorable toward punitive or restrictive measures.

Researchers during the early 1970s concluded that achieving major increases in the use of transit and reducing energy consumption would depend on long-run land use and urban growth policies. They found that existing patterns of metropolitan growth were not conducive to the achievement of these goals, and cited studies by the Council on Environmental Quality that indicated that substantial savings in energy consumption could be achieved through less scattered patterns of metropolitan settlement.¹⁷

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FIGURE 2 Total U.S. Consumption of Motor Gasoline and Annual Change (1949 to 2004)¹⁸

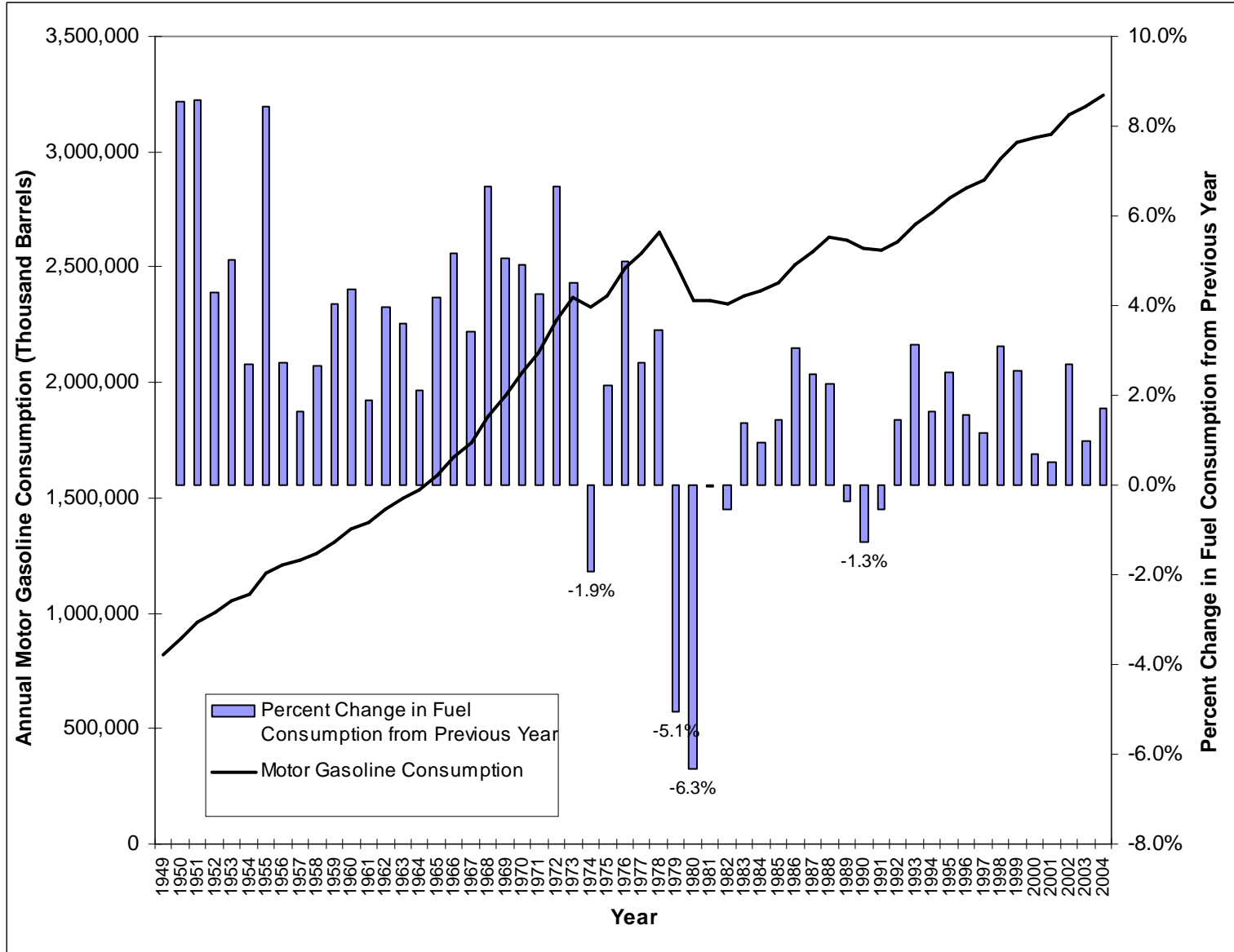
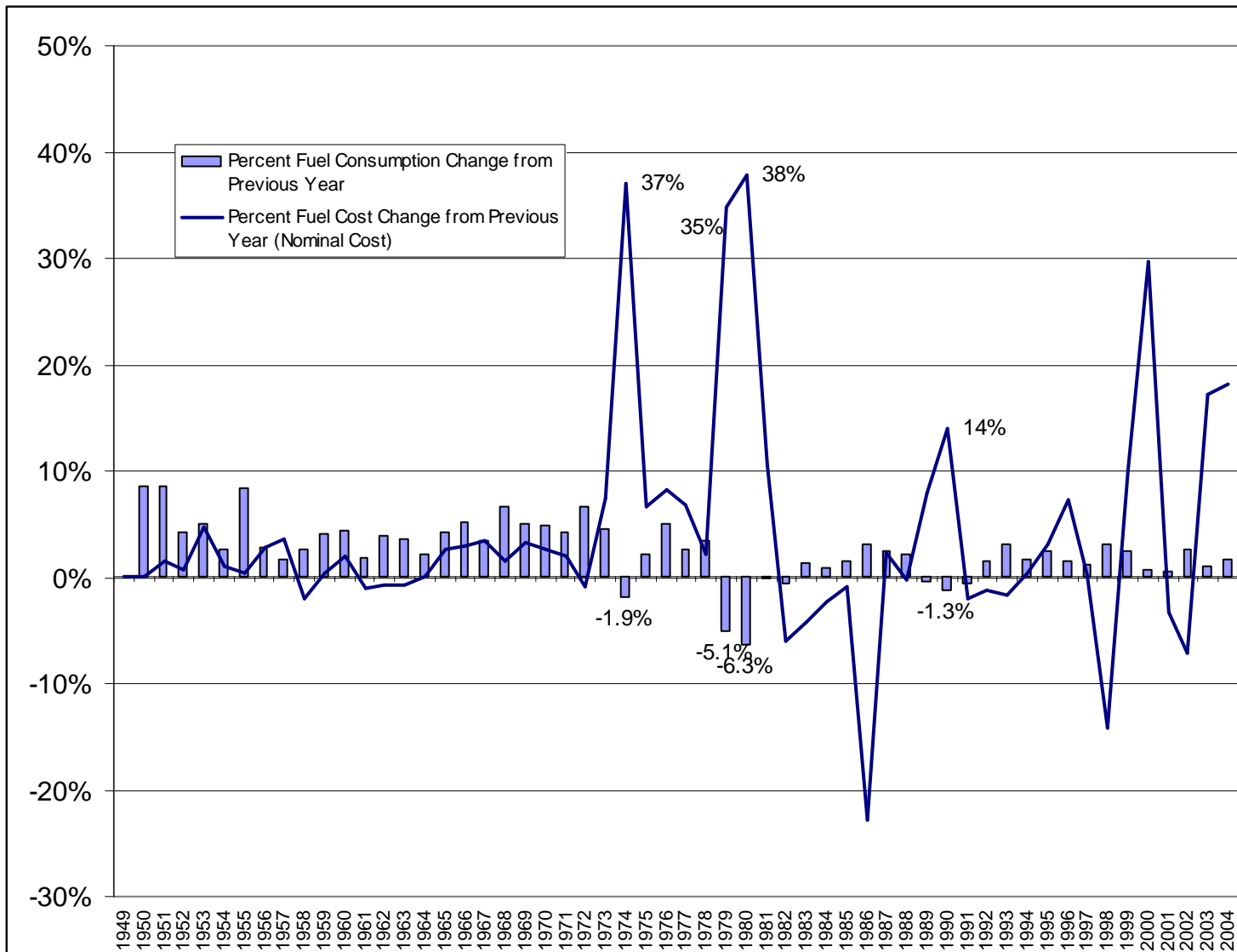


FIGURE 3 U.S. Annual Change in Motor Gasoline Cost Versus Consumption (1949 to 2004)¹⁹



Lessons Learned by Public Agencies in the 1970s and early 80s

In 1980, transportation planners and agencies met at a workshop to reflect on the oil crises of the 1970s/80s and to plan for future energy shortages. Following were some lessons learned by agencies at that time.

Transit Systems

Transit planners concluded that there were five basic categories of limitations that determine the capacity of the several modes of transportation in response to energy shortages:²⁰

1. Capacity of the physical system (vehicles and drivers),
2. Institutional and regulatory constraints to act decisively to implement fuel contingency plans,
3. Political capacity to make decisions facilitating transportation services,
4. Limitations caused by lack of public information (regarding the seriousness of the energy problem, blaming oil companies, lack of information on travel needs and impacts, etc.), and
5. Fiscal capacity – emergency funding for to provide prearranged support for both capital facilities and operations that are required by contingency plans.

Government and Private-Sector Roles

Following are a few of the lessons learned regarding government sector roles in 1980:²¹

- Government should serve as the last recourse; it should allow the private sector to respond to relatively minor shortfalls.
- Stronger government response is appropriate when a shortage is so severe that social and economic institutions are threatened.
- Planning and response to shortfalls should occur at the lowest levels of government that can effectively handle specific problems and actions.
- Responsibilities and authorities for all required actions should be agreed upon by the appropriate government units before shortages occur.
- MPOs should serve as technical information sources, forums for coordination of local plans and actions, and channels for financial support.
- Despite a strong private market orientation of participants, especially as it related to government actions vis-à-vis consumer behavior, it was felt that government should not fail to act because some sacrifice may be necessary and some opposition may occur regarding contingency plans.

Some of this recommended contingency planning is now being coordinated through state energy offices. Beginning in the mid-1970s²², each state in the U.S. has maintained an

energy office that typically helps to develop energy policies and programs, and organizes responses to energy emergencies.

Relatively little occurred in the fuel conservation and energy emergency planning arena occurred between 1981 and 2005, probably largely due to lower oil and fuel prices, and relatively few oil shocks or supply disruptions.

Although our political challenges are not entirely unlike the political climate that led to the oil shocks of the 1970s and 80s, a number of factors have changed since then. A more recent fuel shortage illustrates our current state of readiness for what in North Carolina's case was an extreme fuel supply disruption.

NORTH CAROLINA'S FUEL SHORTAGES DUE TO HURRICANE KATRINA

Hurricane Katrina made landfall at New Orleans on Monday, August 29th, 2005. While the Gulf region was devastated, other areas of the country were impacted due to the damage Hurricane Katrina inflicted on energy infrastructure, including oil platforms, refineries, and pipelines. The entire southeastern United States, for example, although many hundreds of miles away from the gulf region, was impacted by Hurricane Katrina when the Colonial and Plantation pipelines were temporarily shut down.

This paper describes some impacts to the state and transit agencies within the State of North Carolina. Detailed evidence on travel behavior changes in North Carolina due to the fuel shortage is scarce, perhaps because the shortage occurred very suddenly and was also over fairly quickly. Because every organization and individual was impacted in some way by these fuel shortages, the summary isn't offered as a comprehensive analysis. Rather, it's a snapshot of some of the problems encountered along with lessons learned, and is based on phone interviews with five transit agencies, the state energy office, and the North Carolina Department of Transportation (NCDOT). It is unknown whether North Carolina's fuel shortages were more or less severe than other states.

Dependence on Pipelines Leads to Shortages

Because North Carolina does not have any refineries in state, it depends entirely on pipelines, rail, barges, or trucks for its motor fuel. Motor gasoline provides about 75 percent of the state's transportation energy, distillate fuel (primarily diesel) provides about 20 percent, and jet fuel represents about 5 percent of the state's transportation energy use.²³

The great majority of motor fuels, 90 percent, is transported by the Colonial and Plantation pipelines. These two pipelines originate in the Gulf area (the Colonial in Houston, and the Plantation in Baton Rouge, LA), and both were shut down by Hurricane Katrina.

According to the U.S. Department of Energy, at the outset the scope of damage, loss of communications, and lack of access to affected facilities delayed an assessment of when

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3 the pipelines would be operational.²⁴ Fuel supplies in the southeastern U.S. quickly
4 began to diminish, and on August 31st, Governor Easley of North Carolina issued a press
5 release to explain the problem and direct the state to take various measures to conserve
6 fuel. He asked residents to conserve gas and suspended all non-essential state
7 government travel. He also asked state employees to carpool whenever possible and
8 asked residents to limit non-essential road trips.²⁵
9

10 Gas shortages persisted. For example, the next day, more than 60 of about 100 gas
11 stations in Buncombe County ran out of fuel.²⁶ Some parts of the state were impacted
12 more severely than others. According to the NCDOT, some gas stations in the western
13 part of North Carolina completely ran out of fuel.
14

15 **North Carolina's Energy Emergency Plan**

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17 Like other state energy offices, North Carolina's state energy office has developed an
18 energy emergency plan to prepare²⁷ for energy emergencies. The *Energy Emergency*
19 *Plan* identifies four categories of petroleum shortages, along with mitigation measures, as
20 described in TABLE 1. However, according to the state energy office, the energy
21 emergency that occurred didn't clearly fit into any of the four categories (Leotta,
22 unpublished data). This energy emergency was a very severe and sudden shortage, but
23 one that wasn't expected to last long. During this time the Governor did not declare an
24 energy emergency, although according to the state energy office, it came close. If the
25 Governor had declared an energy emergency, the state could have taken even more
26 drastic actions than those described below, such as initiating the fuel set-aside program
27 that is described later in this section.
28

29 **State Actions**

30
31 For about two weeks the state limited travel to only that which was absolutely necessary,
32 and the state energy office estimates that at one point the state was about one day from
33 having to close the schools because there wasn't enough fuel for the school buses to run.
34

35 The state energy office convened all major players, agencies, and major users of fuel.
36 Each prepared a list of how each could curtail fuel consumption, and each agency made
37 decisions on fuel priorities. Some travel was required to continue. For example, meat
38 inspectors could not stop inspecting the food supply.
39

40 The list of how agencies could curtail fuel consumption was published through news
41 conferences with the governor and through written memorandum, then through each
42 department. This meeting included a member of the department of public instruction
43 (DPI), which could influence all 108 school systems in North Carolina.
44

45 Following are some examples of actions taken by the state or other agencies:

- 46 • The State DOT implemented a compressed work week (four-day work week).
- 47 • The ferry systems curtailed a number of ferry trips.
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- 4 • Athletic events and field trips at schools were cancelled, and they were considering
- 5 going to a four-day school week.
- 6 • The state school superintendent distributed a memo to all schools providing
- 7 guidelines on school closures in the event of a shortage of fuel for school buses.²⁸
- 8 • Prisoners weren't transferred,
- 9 • Meetings were cancelled so there would be no transportation involved.

10 According to the NCDOT, cities also developed their own lists of priorities. For
11 example, operating a meals on wheels program might be considered a priority while
12 replacing a functioning traffic signal would be postponed. Some agencies provided the
13 entire agency with daily updates on the current inventories of fuel on site.
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TABLE 1 North Carolina Energy Emergency Stages of Petroleum Emergency

	Conditions (one or more may apply)	Probable Impacts Observed	Mitigation Measures
<p>Shortage Level 1 - Monitor and Alert - No discernable shortage in North Carolina. Possible shortages elsewhere.</p>	<p>Reports of shortages in other parts of the United States, or reports of natural or political difficulties in oil producing countries, may affect petroleum and petroleum product prices on the New York Mercantile Exchange (NYMEX).</p> <p>Local prices may move up rapidly in response to spot market prices.</p>	<p>Jobbers (state & local fuel companies) may report temporary supply difficulties.</p> <p>Some gasoline stations, if queried (especially during the summer driving season), will report greater than normal buying as motorists attempt to secure the current lowest price.</p>	<ul style="list-style-type: none"> • Public information for energy conservation
<p>Shortage Level 2 - Mild Shortage - 5 to 10% reduction in petroleum supply for a week or more.</p>	<p>The Department of Energy (DOE), American Petroleum Institute (API) or other sources report a decrease in the availability of product (e.g., from Middle East, South America, and domestic refineries).</p> <p>Spot prices increase rapidly. National and regional oil companies (prime suppliers) put more dealers on "allocation."</p> <p>Regional prices rise due to temporary imbalances between supply and demand. Causes may include refinery outages, transportation problems or sudden increases to tertiary (consumer level) storage and higher spot market prices.</p> <p>Dealers report increased pressure on their ability to deliver fuel.</p>	<p>Some jobbers report supply and delivery problems or related issues (such as long queues at fuel loading racks). Deliveries extend into evenings and weekends to keep up with demand.</p> <p>Dealers are uncertain about product availability and question information received from prime suppliers.</p> <p>Government assistance in removing retail driver hour limitations may be sought.</p> <p>Some customers call dealers to top off home storage tanks.</p>	<ul style="list-style-type: none"> • Public information for energy conservation • Employer-based travel assistance • Variable work hours and telecommuting

TABLE 1 continued

	Conditions (one or more may apply)	Probable Impacts Observed	Mitigation Measures
<p>Shortage Level 3 - Moderate Shortage - 10 to 15% reduction in petroleum products for three weeks or more</p>	<p>Petroleum product imports to the state drop 5% from the previous year or other base period. Allocations for a growing number of petroleum retailers are reduced.</p> <p>Local weather or storms in other regions result in problems that lead to temporary curtailment in North Carolina.</p> <p>Product prices are rising steadily. Prices for key fuels rise at a rate of 10% or more per week.</p> <p>Demand from other countries draws product away from the U.S.</p>	<p>Jobbers report difficulty in obtaining or delivering enough supply to satisfy customers. Queuing at wholesale loading racks keeps drivers in line for several hours or more.</p> <p>Some transportation companies add a “fuel charge” to their usual price.</p> <p>Some retail dealers have difficulty meeting contract obligations.</p> <p>Supplies diminish as demand for heating oil increases. Prices increase significantly.</p>	<ul style="list-style-type: none"> • Public information for energy conservation • Reduce government hours of operation. • Modify fuel purchase times (i.e., reducing fuel station hours of operation) to alleviate long lines at retail gas stations. • Employer-based travel assistance • Temporary HOV lanes • Compressed work week • School system fuel conservation • Parking management • Variable work hours and telecommuting • Odd/even min/max fuel purchases
<p>Shortage Level 4 - Severe Shortage - 20% to 30% and upwards reduction in petroleum product for more than two weeks.¹</p>	<p>Regional and state fuel dislocation is brought on by hurricane-scale storms; extended, widespread, winter cold; embargo or terrorist acts.</p> <p>Prices do not level off but continue to rise.</p> <p>Local product storage is extremely low or exhausted.</p> <p>Dealers are on less than 75% allocation and have difficulty maintaining contract delivery.</p> <p>Shortages are regional and possibly broader.</p>	<p>In peak driving seasons, gasoline stations curtail operating hours and motorists form lines to purchase available fuel regardless of price.</p> <p>During winter months, noncontract customers have serious difficulty locating heating oil even if they can afford it.</p> <p>Petroleum fuel hoarding is observed.</p> <p>Suppliers sharply reduce allocations to dealers and dealers cannot manage customer inquiries.</p> <p>Government agencies are called upon to provide relief.</p>	<ul style="list-style-type: none"> • Public information for energy conservation • Reduce government hours of operation. • Modify fuel purchase times (i.e., reducing fuel station hours of operation) to alleviate long lines at retail gas stations. • Employer-based travel assistance • Temporary HOV lanes • Enhanced speed limit enforcement • Compressed work week • School system fuel conservation • Parking management • Variable work hours and telecommuting • Odd/even min/max fuel purchases • State petroleum fuel set-aside

¹ In addition, the Energy Emergency Plan indicates that conditions may deteriorate to what might be called “beyond severe.” The probable causes include war, concerted petroleum embargo, widespread natural disasters or other calamities that can initiate a long-term reduction in fuel availability.

Lessons Learned from North Carolina

Following are a few lessons learned from this fuel shortage based on the description of events from the state and transit agencies.

Identify Fuel Supply Vulnerabilities and Plan for the Unexpected

In North Carolina, most agencies appeared to be caught off-guard that the state received about 90 percent of its fuel from the two pipelines, with most of the remaining 10 percent coming from the Wilmington Port. The closure of the two pipelines represented a huge supply disruption. This major, but brief, supply disruption did not clearly fit into any of the four categories of energy emergencies.

Government Agencies at All Levels Need to Better Understand Their Daily Fuel Requirements

In North Carolina, the state energy office found that cities and counties have little understanding of how much fuel their services require per day. The state energy office is recommending that cities and counties determine their fuel requirements, especially for first responders (fire, police, etc.), and buy some percentage of that fuel under a firm contract.

Government Agencies Should Buy Some Fuel Under Firm Contracts

Within a few days after Hurricane Katrina hit Louisiana, fuel suppliers in North Carolina informed the state that their fuel contracts were not going to be honored. Because the state bought fuel from independents based on the lowest bid, the state had no firm supply for its 28,000 fleet of vehicles. In addition to the state's own vehicles, prisons, some mental hospitals, some local agencies, many school systems buy fuel through the state contract. A firm contract wouldn't guarantee that local agencies would obtain fuel, but North Carolina's energy office believes that under a firm contract the dealer may feel more commitment to provide that fuel.

For an Emergency, Reliance on Just-in-Time Fuel Delivery is Problematic

The North Carolina DOT manages 122 fuel sites. According to NCDOT, when North Carolina developed the fueling infrastructure 15 years ago the state did not include extra capacity to handle future growth. According to the NCDOT, the fuel storage facilities were sized to take the state's fleet through a 10-day period. With the additional growth in vehicle travel since then, today the state's fuel storage capacity is insufficient and the state is very dependent on just-in-time fuel delivery.

In addition, some local agencies indicated that they need to expand fuel storage capacity in order to be better prepared to handle future emergencies. The state energy office found

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3 that few state and local agencies have fuel storage on site and that most are also relying
4 on just-in-time delivery.
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6 One transit agency that typically buys fuel from the local DOT fuel depot indicated that
7 during any kind of crisis the DOT immediately cuts down on the purchase of fuel by
8 other agencies (Leotta, unpublished data).
9

10 An additional potential problem was that the National Guard relies on the state for its fuel
11 supplies. According to the state energy office, if an emergency had been declared, the
12 state would have had a very difficult time providing them with fuel and would have been
13 unable to carry the National Guard for very long.
14

15 According to the NCDOT, within recent years North Carolina has experienced about nine
16 major hurricanes. During these occasions they periodically experienced situations in
17 which they could not get to the fueling sites, which were put under water due to the
18 hurricanes. NCDOT has an emergency contact list for fuel suppliers that can be
19 contacted at any time, but when Hurricane Katrina hit the situation was different because
20 the supply to the entire state was low.
21

22 NCDOT knew that Amerada Hess in Wilmington was the only major fuel supplier that
23 didn't get fuel from the two pipelines. So immediately following Hurricane Katrina
24 NCDOT contacted Amerada Hess and locked in a million gallons each of diesel and
25 gasoline. The state understood that this sale was made as a favor to the state and they
26 paid market price, but without it the state would have had to shut down.
27

28 *States or Regions May Want to Become More Self Sufficient Regarding fuel Supplies*

29

30 Over the long-term, North Carolina has determined that it needs to become more self-
31 sufficient regarding fuel. One action the state took toward this goal was the purchase of
32 its own fuel tanker truck. This allows the state to independently move fuel from one part
33 of the state to the other in the event of an emergency.
34

35 North Carolina is also trying to increase its usage of alternative fuel. The state already
36 uses B20, a fuel blend consisting of 20 percent biodiesel and 80 percent petroleum diesel,
37 on state vehicles. They are seeking to develop additional alternative fuel sources within
38 the state, and also reduce the fuel usage of state-owned vehicles by 20 percent. The state
39 and regions are also looking into increasing their fuel storage capacity, and considering
40 additional fuel sources/providers beyond the two pipelines²⁹. One transit agency
41 indicated that it would like to see more stockpiles of diesel available for transit agencies.
42

43 *Agencies Should Reassess How They Can Most Quickly Secure Fuel Supplies for Priority* 44 *State and Local Agencies* 45

46 During this fuel shortage, agencies quickly developed their own strategies and plans for
47 securing their own fuel supplies. For instance, according to the state energy office, early
48 in the shortage the state highway patrol fueled vehicles at public fueling stations in order
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4 to save their fuel supplies. At least one city advised critical city employees to
5 immediately fill up their vehicles at public gas stations before word got out to the public
6 about the impending fuel shortages. One transit agency described how a local
7 convenience store had a contract with the county to supply most of the fuel for the sheriff
8 and some others. Apparently this convenience store “took some heat from the public”
9 when it took steps to reserve part of their fuel for the county (Leotta, unpublished data).
10 The City of Winston-Salem understood during this emergency that state statutes would
11 not allow the City to qualify for priority delivery of fuel purchases, although similar to
12 the example of the convenience store provided above, one of the City’s suppliers
13 voluntarily offered priority status to local governments.³⁰

14
15 By the second week, the state was getting calls from municipalities who asked where
16 they could obtain fuel for their first responders. The state let municipalities know that
17 because they didn’t have enough fuel for all the state responders, and Hurricane Ophelia
18 was approaching, the state was unable to provide fuel for cities or counties (Leotta,
19 unpublished data). The state did, however, continue to fuel the highway patrol (Leotta,
20 unpublished data).

21 *Some Agencies May Feel They are “On Their Own” in Coping with Energy Emergencies*

22
23 Some of the interviews suggest that local municipalities to at least some degree felt they
24 were on their own in dealing with their fuel shortage concerns. The state energy office
25 was working primarily with the NCDOT, trying to find fuel supplies for the state.
26 Because transit agencies were normally funded by the county or municipality, the state’s
27 perspective was that transit agencies would work with local government agencies rather
28 than the state (Leotta, unpublished data).
29

30
31 One transit agency representative indicated that at meetings he attended with the city,
32 they had not received any directives or plans from the state, other than the directive
33 provided by the governor (Leotta, unpublished data). Another transit agency
34 representative indicated that he wasn’t aware of any organized plan of action, but hoped
35 there would be one: “I would imagine, and I would like to believe, that the elected
36 leaders of the City and State, if it got to that point, would come up with a plan of action to
37 stretch out the limited supplies of fuel, much as they did in the 70s gas rationing and
38 fueling on even days based on license plates. I would like to believe that there would be
39 some type of plan to stretch the fuel as far as it would go and provide priority allotments
40 to provide some to public safety and public transportation.” (Leotta, unpublished data)

41 *In Some Areas, the Need to Maintain Transit Service May Not Be Widely Recognized*

42
43 Although public transportation is one of the State of North Carolina’s suggested “priority
44 users” of fuel, public transportation was not always recognized as a critical service during
45 this fuel shortage. Some transit agencies and ferries cut service to conserve fuel.³¹
46

47
48 One transit agency representative indicated that transit agencies weren’t exempted from
49 the Governor’s call for state agencies and citizens to conserve fuel (Leotta, unpublished
50
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3 data). This representative described attending meetings having to remind others that
4 public transportation helps save fuel by keeping cars off the road. Although the
5 Governor asked citizens to carpool, he did not ask them to take public transportation.³²
6 This particular transit agency never suffered a fuel shortage since it was a college campus
7 transit agency, and the campus steam plant runs off of diesel fuel. Because the campus
8 wasn't making steam at that time, the diesel was available for transit usage.
9

10 Another transit agency indicated that public transit in their area was identified as one of
11 the priority services within the City since it was a method to conserve fuel, and the mayor
12 did emphasize using public transportation and carpools (Leotta, unpublished data).
13 However, this agency also developed a plan where they could, if needed, reduce transit
14 service levels.
15

16 At the City of Asheville, the priority users for fuel controlled by the City were police and
17 fire, followed by public works, and then followed by transit. The transit agency had its
18 own tanks that they believed contained a nine-to-ten day supply. Their supply was as low
19 as three days at one point. Asheville also had a plan in place that had certain service
20 thresholds that related to fuel reserves. They planned to reduce service depending on the
21 fuel stockpile, but maintain enough fuel to assist with evacuations. Although the City
22 didn't have these plans in advance, they were able to formulate them very quickly
23 because they knew what the priorities were.
24

25 *Public Announcements of Fuel Shortages Appeared to Result in Some Fuel "Hoarding"*

26

27 North Carolina's State Energy Office, in its description of stages of energy emergencies,
28 recognizes that in severe shortages, hoarding may be observed. This appears to have
29 occurred, at least to some degree, in North Carolina during this fuel shortage.
30

31 According to one transit agency representative (Leotta, unpublished data) although there
32 had been discussions on how to get the message out about fuel shortages without creating
33 panic, it didn't seem to work. With the public announcements and news conferences,
34 both at the state and local level, these announcements may have instead contributed to a
35 run on gasoline stations, causing many stations to run out of fuel. The state energy office
36 also indicated that because drivers were "topping off" their tanks to keep their tanks full,
37 the demand for fuel increased as people were not letting the tank empty down before
38 going back for a refill (Leotta, unpublished data).
39

40 Although fuel hoarding may be difficult to avoid when people are informed of pending
41 fuel shortages, it may be possible to develop public information that could reduce fuel
42 hoarding.
43

44 *Increases in Transit Ridership/Carpooling*

45

46 A number of transit agencies in North Carolina reported increases in transit service and
47 ridesharing. According to the Asheville Citizen-Times on September 2nd, "It was
48 standing room only on the Route 6 bus between downtown Asheville and the airport
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3 Thursday morning. That hasn't happened before. But with gas prices climbing and some
4 local stations running out of gas, some in Western North Carolina are scrambling to find
5 an alternative way to work.³³ Another newspaper article indicated that several Triangle
6 Transit Authority routes showed ridership gains of 25 percent and more at the peak of the
7 Katrina-fueled gas shortages.³⁴
8

9
10 According to the Charlotte Area Transit System (CATS), transit ridership grew by 16
11 percent during this period. CATS reported that their express services had greater
12 ridership increases than their local services. They were able to add buses and vanpools to
13 meet demand, but received some complaints on overcrowding.

14
15 In Charlotte, the City had conducted press conferences where the mayor emphasized
16 public transportation and carpools/vanpools. To respond to the increase in calls they
17 received, they added staff to their customer service center and put information on their
18 website.

19
20 Charlotte also initiated an early launch of its commute trip program for city employees.
21 They had been planning to launch it in December, 2005 but in order to reduce fuel usage
22 they introduced it in early September to allow city employees who work downtown
23 (about 5,000 employees) to give up their parking space in exchange for a free transit pass.

24
25 In Asheville, people were urged to carpool and the transit agency publicized the
26 carpooling website. Their carpooling program, which was only a few weeks old at that
27 time, jumped from 75 people registered to 200 people registered overnight.

28 *Dealing with Increased Costs of Fuel*

29
30 One issue common to all public agencies in North Carolina, as well as the rest of the
31 country, was the increase in the cost of fuel. Some agencies covered increased fuel costs
32 by making cuts in other areas of the budget, but a very sudden and prolonged fuel price
33 increase could be problematic.
34

35 *If Fuel Shortages Had Persisted...*

36
37 If fuel shortages had persisted or worsened, the Governor likely would have declared an
38 energy emergency (Leotta, unpublished data). Doing so would have allowed for
39 additional actions (such as activation of the fuel set-aside program described below) but
40 also presented challenges.
41

42
43 For instance, as described previously due to low state fuel supplies, the state DOT would
44 have had trouble providing the National Guard with fuel, and would also have to cut off
45 other state agencies (Leotta, unpublished data).

46
47 According to the NCDOT, most other state agencies use the DOT's fuel services. In
48 addition, the state was receiving requests from every city and county in the state for fuel,
49 and for the most part they were unable to provide fuel to other non-state agencies. One
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3 complication the DOT was facing post-Katrina was that another hurricane (Ophelia) was
4 on the way, and the DOT felt that needed to keep fuel on hand to enable the DOT to clear
5 roads after the hurricane hit.
6

7 In general, many hard choices would have had to be made had fuel shortages persisted.
8 Just a few other actions considered had the fuel shortages persisted include:
9

- 10 • At least one university looked at having to alter the academic schedule and shut down
11 for a period of time, and for public schools.
- 12 • Consideration was given to compressed school week.
- 13 • Some transit agencies were planning which routes they could cut or reduce service
14 on.
15

16 17 **North Carolina's Fuel Set-Aside Program** 18

19 North Carolina has a fuel set-aside program that can be activated during a declared
20 energy emergency to redirect fuel to "priority" customers. Following is a description of
21 the fuel set-aside program³⁵:
22

23 *During a proclaimed state of emergency, the distribution of intrastate petroleum*
24 *and petroleum product stocks that are essential to life, property, and critical*
25 *services, and designated to be set-aside, shall be physically held by the*
26 *wholesaler-reseller (prime supplier) subject to release orders from the State*
27 *Energy Office. The allocation of these essential fuels constitutes the Petroleum*
28 *Fuels Set-Aside Program. The total amount of all fuel types available for the*
29 *Petroleum Fuels Set-Aside Program is based on the amount of petroleum fuel*
30 *imported into the state as recorded on the monthly U.S. Department of Energy,*
31 *Energy Information Agency form EIA-782C.*
32

33 *You may be eligible for the program, if you use petroleum fuel for operating*
34 *equipment, producing crops, moving goods and people, or maintaining essential*
35 *services, and can prove justifiable hardship. ...*
36

37 *The Petroleum Fuels Set-Aside Program is implemented only after the Governor*
38 *proclaims a state of emergency and when market forces, voluntary conservation,*
39 *or other mandatory programs are unable to maintain an adequate and equitable*
40 *distribution of fuel.*
41

42 *The State's Petroleum Fuels Set-Aside Program is designed to cause only*
43 *minimal interference with the market, using a percentage of imported volumes*
44 *that are sufficient only to satisfy hardship and emergency cases. The program*
45 *makes no attempt to reduce or inhibit the market price of fuels. All fuel delivered*
46 *through the program will be purchased at the market price, and whenever*
47 *possible, through the usual supplier.*
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Fuel is allocated on a month-by-month basis. To obtain fuel, applicants must fill out an application form, and that form must be filed within a certain number of days at the beginning of each month (e.g. 7 business days). The state energy office will then send a receipt of approval or denial. The applicant may receive approval for emergency fuel but not for the full amount requested. The applicant must then deliver the letter received from the state energy office to their distributor (or retailer) to obtain their fuel. In addition, they must make their own arrangements with the supplier for delivery and payment. If an application was denied (or only partially approved), they may appeal the decision.

Had the Governor declared an energy emergency, the fuel set-aside might have been activated during this emergency. This program has a maximum percentage of incoming product to be set aside by major suppliers and reallocated to priority users. For example, a suggested maximum monthly set aside level is five percent of motor gasoline. The State's suggested priority customers include:

- Agricultural production and distribution,
- Aviation including ground support,
- Cargo, freight & mail,
- Emergency services,
- Energy production,
- Government/sanitation,
- Health care,
- Public passenger transportation,
- Telecommunications,
- Utility services (including water),
- Nonmilitary shipping.³⁶

Other states have their own programs and policies for a fuel set-aside program. Washington State implements a fuel set-aside program during a Stage 4 energy emergency when declared by the Governor.³⁷ The State of California's fuel set aside program appears to be almost identical to North Carolina's.³⁸ The states of Vermont and New York allow up to three percent of fuel to be set-aside during an energy emergency.³⁹

However, it is unknown whether the fuel set-aside programs will be sufficiently flexible to enable priority users to quickly obtain fuel. For example,

- Would states have the flexibility to easily adjust the set-aside level depending on supply circumstances (for example, if fuel supplies are greatly reduced, say by 75 percent, will three to five percent of available fuel adequately supply all priority users)?
- Can the requirement that applications be submitted by a certain day during the month (e.g., the 8th business day) be waived?
- During a sudden and severe emergency, would the state energy office be inundated with applications from every priority user across the state, and if so is there prioritization for which priority users would be approved first?
- Is there a quicker to way, at the outset of an energy emergency to ensure that priority users can very quickly obtain fuel?

STRATEGIES TO QUICKLY REDUCE FUEL CONSUMPTION

In 2005, the International Energy Agency (IEA) prepared a report titled *Saving Oil in a Hurry*. This publication identifies the most effective strategies for reducing oil use for all IEA countries under the circumstances of a temporary oil supply disruption that may result in physical shortages of oil or a sudden severe price spike. Table 2 below presents the estimated fuel savings for the United States and Canada for various strategies.

TABLE 2 *Saving Oil in a Hurry* Estimated Fuel Savings for Various Measures in U.S./Canada

Measure	Potential Total Regional Petroleum Fuel Saved (Percent)
Odd/even day driving ban	9.5
Comprehensive policy of carpool lanes, preferential parking, and information systems	5.2
Comprehensive promotion of "Ecodriving"	3.7
Telecommuting twice/week	3.4
Speed limit reduced to 55 mph	2.4
Compressed work week (4/40)	2.4
Policies to provide rideshare information and link ride sharers	0.7
One in ten day driving ban	0.7
100 percent transit fare reduction	0.6
Increased peak and off-peak transit service	0.3
Increased off-peak transit service	0.2
Bus and HOV expansion	0.05
Bus and HOV enhancement	0.02

The forthcoming report *Implementing the Most Effective Transportation Demand Management (TDM) Strategies to Quickly Reduce Oil Consumption* by Kathy Leotta at Parsons Brinckerhoff presents a timeframe for implementing some of these strategies to quickly conserve fuel, and also identifies some pre-planning activities that agencies may want to consider to be better prepared for fuel supply disruptions. Although a full summary of that report goes beyond the scope of this paper, Table 3 and Table 4 below summarize some of those findings.

Table 3 indicates the timeframe to implement some of the strategies listed in Table 2. As shown, many of these strategies require a number of months to implement, so would be unlikely to be implemented unless a fuel shortage was expected to last for a number of months. However, as also indicated in Table 3, several of these strategies can be implemented extremely quickly. These strategies include public information campaigns on fuel saving strategies, increased carpooling/vanpooling, alternative work arrangements, changes to non-work trips, and offering free public transit.

Table 4 indicates pre-planning activities that agencies should consider undertaking to better prepare them to quickly respond to fuel supply disruptions. A few examples of pre-planning activities include:

- Encourage employers to develop a telework policy at the organization or office level, including developing teleworker agreements for eligible employees, and encouraging all eligible employees to telecommute at least occasionally to ensure that the communications systems are operational.
- Determine policy regarding reducing/eliminating fares in response to an emergency, and determining the financial capacity to reduce fares, especially given that fuel costs will also likely increase.
- Assess where other emergency or supplementary park-and-ride parking could occur (such as at public libraries, public schools, shopping centers, etc.) and develop some emergency agreements, particularly near lots that are already at or approaching capacity.
- Determine the transit agency's current capacity to increase service during the peak or off-peak, determine how quickly this service could be increased, and develop an approach for how increased service could be implemented.
- Review the legality of emergency public transit services, and identify any legislation that might enable this type of service to be implemented more quickly.
- Explore transit agency union issues that could constrain the ability of an agency to quickly expand transit service.
- Inventory vehicles (buses, paratransit vehicles, shuttles, and vans) and drivers that could be available on short notice.
- Explore the feasibility of setting up agreements in advance with charter bus and school bus companies to make use of their vehicles and drivers in an emergency.
- Determine how much fuel agencies use each day, particularly for first responders, and purchase some fuel under firm contracts.
- Develop policies and procedures at the lowest levels of government for allocating fuel in a fuel supply emergency.
- Identify rideshare waiting locations at park-and-ride lots.
- Develop policies or plans for changes to HOV lanes during an emergency.

More details on constraints to implementation and recommended pre-planning can be found in the full report *Implementing the Most Effective Transportation Demand Management (TDM) Strategies to Quickly Reduce Oil Consumption*.

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TABLE 3 Most Appropriate Strategies Based on Expected Length Fuel Shortages⁴⁰

Strategy	Time to Implement (in months)	Most Appropriate Strategies Based on Expected Length Fuel Shortage			
		0 - 1 month	1 - 6 months	6 - 12 months	12+ months
Public information campaigns on fuel saving strategies	0 - 1	✓	✓	✓	✓
Increased carpooling/vanpooling	0 - 1	✓	✓	✓	✓
Alternative work arrangements	0 - 1	✓	✓	✓	✓
Changes to non-work trips	0 - 1	✓	✓	✓	✓
Free public transit	0 - 1	✓			
Adjust existing transit routes	3 - 6			✓	✓
Driving ban based on license plates	3 - 7*			✓	✓
Speed limits reduced to 55 mph	3 - 6*			✓	✓
Expand vanpool/shuttle fleet	2 - 12			✓	✓
Change designation HOV lanes	2 - 12				✓
Convert arterial lanes to HOV lanes	2 - 12				✓
Widely expanded transit service	18 - 24				✓

*limited enforcement

From the forthcoming report, *Implementing the Most Effective Transportation Demand Management (TDM) Strategies to Quickly Reduce Oil Consumption*, by Kathy Leotta at Parsons Brinckerhoff.

TABLE 4 Summary of Recommended Pre-Planning to Better Prepare for Fuel Supply Emergencies⁴¹

Strategy	Recommended Pre-Planning
Alternative Work Arrangements	<p>Telecommuting:</p> <ul style="list-style-type: none"> • Promote the development of telework policies at the organization or office level. • Identify any local labor and tax issues. For example, how does the state labor department classify injuries that occur during work hours but while telecommuting? • Provide employees with information on all the communications tools available to facilitate web conferencing and information sharing. • Develop teleworker agreements for all eligible employees. • Ensure that all eligible employees telecommute at least occasionally to ensure that the communications systems are operational. <p>Compressed work week:</p> <ul style="list-style-type: none"> • Develop policies regarding employee eligibility for working a compressed work week. <p>Flexible work hours:</p> <ul style="list-style-type: none"> • Promote the establishment of FlexTime policy and worker agreements, which may include a requirement that all employees be in the office during set “core” hours (e.g., 10 am to 3 pm).
Reduced Speed Limits	<ul style="list-style-type: none"> • Consider under what conditions it may be desirable to reduce the maximum speed limit. • Evaluate enforcement constraints to quickly reducing speed limits. • Evaluate the feasibility (cost, etc.) of installing variable speed limit signs.
Driving Ban Based on License Plates	<ul style="list-style-type: none"> • Determine policy regarding when and how driving bans might be implemented. • Determine capacity to enforce such a ban.
Public Transit Service Improvements	<p>Free Public Transit</p> <ul style="list-style-type: none"> • Determine policy regarding reducing/eliminating fares in response to an emergency. • Determine financial capacity to reduce fares and strategies to consider to quickly increase revenues if needed. <p>Making Better Use of Existing Transit Service, Increase Existing Service</p> <ul style="list-style-type: none"> • Develop some emergency park-and-ride lot agreements near park-and-ride lots that are at or approaching capacity so agreements are in place when an emergency occurs. • Further assess where other emergency or supplementary parking could occur (such as at public libraries, public schools, shopping centers, etc.) • Determine the transit agency’s current capacity to increase service during the peak or off-peak. • Determine how quickly this service could be increased, any impediments, and a plan for implementation.

Strategy	Recommended Pre-Planning
Public Transit Service Improvements, Cont.	<p data-bbox="544 231 1291 262"><i>Expanding Transit Service By Using External Vehicles and Drivers</i></p> <ul data-bbox="544 262 1469 514" style="list-style-type: none"> • Review the legality of emergency public transit services, and identify any legislation that might enable this type of service to be implemented more quickly. • Explore transit agency union issues that could constrain the ability of an agency to quickly expand transit service. • Inventory vehicles (buses, paratransit vehicles, shuttles, and vans) and drivers that could be available on short notice. • Explore the feasibility of setting up agreements in advance with charter bus and school bus companies to make use of their vehicles and drivers in an emergency. <p data-bbox="544 535 860 567"><i>Potential Fuel Supply Issues</i></p> <ul data-bbox="544 567 1469 745" style="list-style-type: none"> • Know how much fuel is needed each day, particularly for first responders and transit operations • Purchase some fuel under firm contracts • Develop policies and procedures at the local level for allocating fuel in a fuel supply emergency • Strive to become more self-sufficient regarding fuel over the long-term
Public Information Campaign	<ul data-bbox="544 745 1445 934" style="list-style-type: none"> • Develop a plan for how a regional public information campaign would be coordinated and kept consistent during a fuel supply emergency • Identify which fuel saving measures should be most strongly promoted through an information campaign (e.g., “eco-driving,” voluntarily reducing speeds, ridesharing, using transit, trip chaining, working compressed work week or telecommuting, on-line commerce)
Increased Carpooling and Vanpooling	<ul data-bbox="544 934 1347 1123" style="list-style-type: none"> • Identify supplementary parking for park-and-ride lots • Identify rideshare waiting locations (for “slugging”) at park-and-ride lots • Develop guidance for larger employers on developing their own in-house ridematching tool • Develop policies or plans for changes to HOV lanes during an emergency • Promote changes to non-work trips
Promoting Changes to Non-Work Trips	<ul data-bbox="544 1134 1421 1354" style="list-style-type: none"> • Promote use of alternative modes (transit, walking, ridesharing, biking) for non-work trips • Assess potential fuel savings of on-line commerce • Explore how on-line commerce can be promoted to quickly conserve fuel and potential barriers, such as delivery charges • Investigate how non-work trips can be made more practically using alternative modes (i.e., how ridesharing for shopping could be easily facilitated)

From the forthcoming report, Implementing the Most Effective Transportation Demand Management (TDM) Strategies to Quickly Reduce Oil Consumption, by Kathy Leotta at Parsons Brinckerhoff.

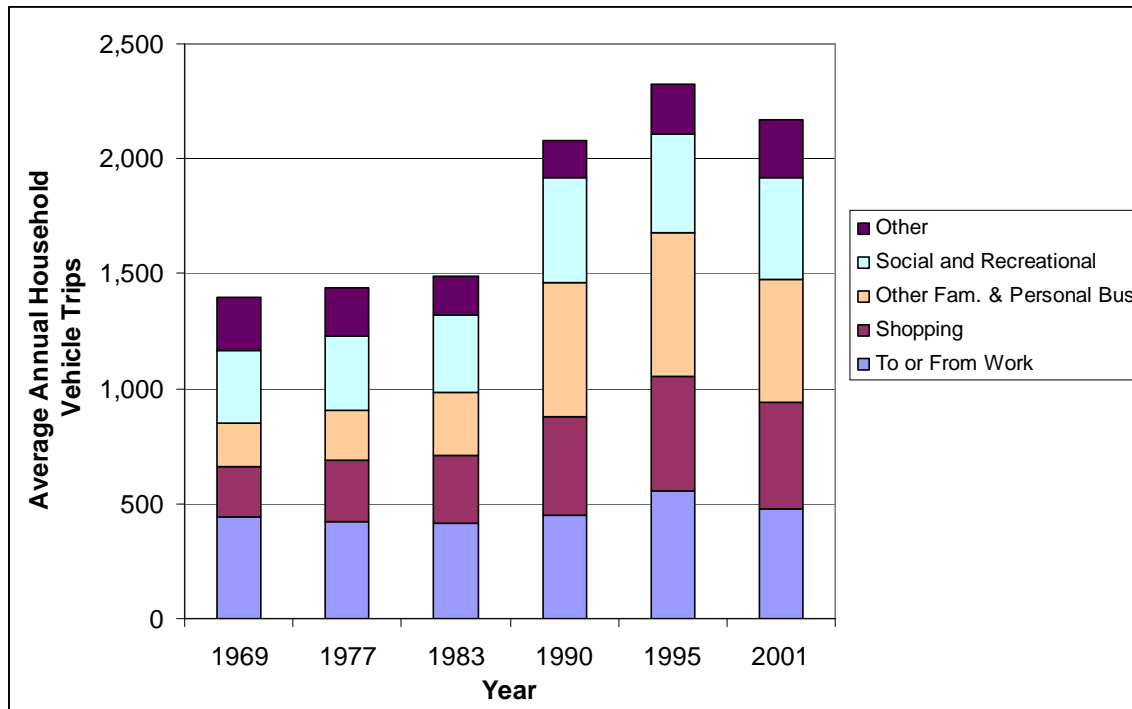
A FEW DIFFERENCES BETWEEN TODAY AND 1970S AND EARLY 80S

“This is not your parents’ energy crisis,” warns journalist Thomas Friedman at the outset of his 2006 film *Addicted to Oil*.⁴² While Friedman’s point is to stress that our energy predicament today may be more dire than it was in the 1970s and 80s, one can’t help but feel a sense of déjà vu when comparing circumstances that led to fuel shortages decades ago to our political situation today.

As in the 1970s, today we continue to struggle with land use patterns that are difficult to serve efficiently, and perhaps rely even more heavily on the automobile. Other challenges we face today are more families requiring two incomes to make ends meet, and families who are busier transporting kids to sports and other activities.

For example, Figure 4 shows how household vehicle trip behavior has changed over the last several decades. Since the last nationwide oil shock in the 1970s, household vehicle trips have increased by about 50 percent, but primarily for non-work related trips, including shopping, family and personal business, and social and recreational trips. In 1977 vehicle trips to and from work represented about 29 percent of total household trips, while in 2001 about 22 percent of all household vehicle trips were to and from work trips.

FIGURE 4 U.S. Household Vehicle Trips by Trip Purpose (1969 to 2001)⁴³



Although we generally depend upon the automobile more today than we did in the 1970s, how we respond to fuel shortages today can be very different. For example, today many more options for online shopping are available, and we have many more systems in place to facilitate and encourage ridesharing. In addition, unlike the 1970s and 80s, today there

1
2
3 are ample opportunities for telecommuting; however, it is not always well-promoted.
4 Although the Federal Government's Office of Personnel Management did encourage its
5 employees to telecommute following Hurricane Katrina⁴⁴ no evidence was found of a
6 widespread encouragement of telecommuting in North Carolina. However,
7 telecommuting was one of the strategies encouraged by Georgia's Governor Sonny
8 Perdue as Hurricane Rita approached a few weeks later in September, 2005.⁴⁵
9

10 To many experts in the petroleum industry, it's not a question of whether or not we'll
11 experience fuel shortages, but rather when. By planning for those shortages at the local
12 level now, our agencies will be on better footing to respond during an emergency.
13

14 **CONCLUSIONS**

15
16 Based upon a review of lessons learned from the 1970s and 1980s, our current travel
17 behavior, and a new look at lessons learned following fuel shortages in North Carolina
18 due to Hurricane Katrina, one finding is that changes in non-work trips may occur far
19 more frequently than changes in work trips. This may be particularly true since today a
20 greater proportion of our trips are unrelated to work than was the case in the 1970s and
21 early 80s. On the other hand, today we have many more options for telecommuting,
22 which can reduce the number of work-related vehicle trips.
23

24 Although planners in the 1970s and 1980s concluded that fuel shortage planning and
25 response should occur at the lowest levels of government, today nearly all planning
26 occurs at the state level. Local government agencies can and should undertake many
27 actions now to better prepare for future fuel supply disruptions.
28

29 Although carpooling and vanpooling was an option seldom taken in the 1970s and early
30 80s to conserve fuel, it may still represent one of the best options available to us to
31 conserve fuel today. Due to constraints on buses and bus drivers, most transit systems
32 will have only limited capabilities for quickly increasing service to respond to a short-
33 term fuel price increase or shortage.
34

35 A final conclusion is that over the long-term states or regions should strive to become
36 more self sufficient regarding fuel supplies.
37
38

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40
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4 This paper is part of a forthcoming report titled *Implementing the Most Effective*
5 *Transportation Demand Management (TDM) Strategies to Quickly Reduce Oil*
6 *Consumption*. The report describes how to quickly implement several TDM strategies
7 that the International Energy Agency has identified as being the most effective in
8 conserving energy. The report focuses on strategies that could be implemented fairly
9 quickly and without new infrastructure, especially in the case of extraordinary events
10 such as geopolitical disruptions; inadequate petroleum refining or processing capabilities;
11 new evidence on severe impacts of emissions on global warming and health; a global
12 peak in the production of oil; natural disasters, such as additional hurricanes in the Gulf
13 of Mexico; or coordinated terrorist attacks on critical energy infrastructure. As a case
14 study, this report details what it might take to implement these measures in the greater
15 Seattle region and applies some of those findings to other areas of the world.

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