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Tom Cutler discusses the myths of the US' military oil supply vulnerability, arguing that dependence on foreign-source oil doesn't necessarily threaten military oil supply security.

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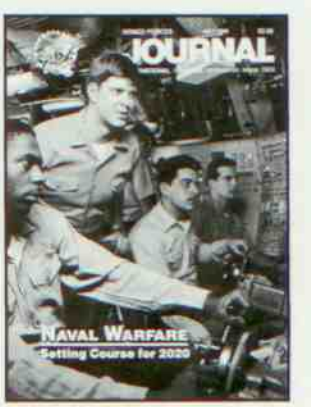
And our Paris Air Show coverage includes a wrap-up of the show and, as always, the Best and Worst of the Paris Air Show. ■ ☆ ■



(Photo courtesy of International Defense Images)

Foreign Oil Can Enhance US Military Energy Security

Myths of Military Oil Supply Vulnerability

by Tom Cutler

Although tomorrow's wars could consist of short-lived nuclear exchanges or confrontations in the distant vacuum of outer space, all military conflicts since World War II have been waged short of the nuclear threshold, in the conventional arena, where petroleum has a vital role to play. Adequate supplies of fuel are arguably more important to combat units than ammunition, since without fuel an army can neither maneuver along the battlefront nor pursue a fleeing enemy; when endangered, it cannot even retreat. In sum, vulnerabilities in supplies of oil can pose as great a threat to national security as the destructive power of an adversary's armed forces.

Central to the concepts of defense preparedness and national security is military oil supply vulnerability—defined as the probability that oil supplies might be disrupted on a scale sufficient for it to be impossible to fulfill minimum requirements. The specter of debilitating oil shortages has such important political and military implications that governments have developed a broad array of energy policies and contingency plans to ensure that the effectiveness of their military forces is not undermined by insufficient supplies of petroleum. However, myths and misconceptions abound in regard to the domestic and international dimensions of military oil supply vulnerability, including the conventional wisdom that foreign-source oil necessarily threatens US military oil supply security.

To some extent, this and other misunderstandings about the fundamentals of the military demand for oil and how supply problems can be resolved could ultimately result in misguided defense policies and energy programs.

Military Demand for Oil

The military's share of the total oil market in peacetime amounts to only about 2-3% of commercial demand. In general, a nation's military demand for oil varies according to several factors, including the size and structure of the armed forces, their strategic and tactical doctrine, geography, and—of course—the extent to which the military is engaged in hostilities. Oil accounted for 79% of US military energy consumption in Fiscal Year 1987, followed by natural gas (8%), electricity (8%), coal (4%), and other sources (1%). Due to America's diverse energy resource base and the substantial use of nuclear power (i.e., submarines and surface ships), petroleum's share in the US military energy mix is actually slightly under the world average. US military oil consumption worldwide during FY87 totaled 490,000 barrels per day (b/d), down more than 50% from the 1969 Vietnam peak of 1.1-million b/d.

Vulnerabilities in supplies of oil can pose as great a threat to national security as the destructive power of an adversary's armed forces.

The Air Force accounted for 61% of US military oil demand in FY87, mostly jet fuel, followed by the Navy (35%) and the Army (4%). The airplanes, ships, and tanks which comprise a modern nation's fighting force make conventional military mobility operations an oil-intensive activity that can account for up to 90% of a nation's military oil consumption (as opposed to consumption for "installation" purposes for which there are nonoil energy substitutes such as solar-powered radar stations in remote locations). For example, the most fuel-intensive US military consumer is the nonnuclear aircraft carrier, averaging 134 barrels per hour of propulsion fuel while at sea, followed by battleships at 68 barrels per hour. The peak rate of the M-1 tank during pursuit exceeds seven barrels per hour. A B-52 bomber on average consumes 86 barrels per hour, and the F-4 Phantom fighter/bomber 40 barrels per hour. Supersonic speed requires use of afterburners, which literally dump fuel into the engine. This can triple air speed but increase consumption twenty-fold. For example, at peak thrust the relatively fuel-efficient F-15 fighter burns fuel at the rate of four gallons per second, equivalent to a consumption rate of 14,400 gallons per hour.

The key role played by military aircraft accounts for the fundamental disparity in the mix of products supplied to civil and military consumers. In the case of both the

Figure 1

Civil and Military Oil Demand Mix of the Superpowers in 1987

(in thousands of barrels per day)

	United States				Soviet Union			
	Civil		Military		Civil		Military	
Product	Amount	% Share	Amount	% Share	Amount	% Share	Amount	% Share
Gasoline (motor & aviation)	7,231	43	7	2	1,660	18	28	8
Jet fuel	1,385	8	373	76	703	8	238	68
Diesel distillate	2,976	18	88	18	1,572	18	77	22
Residual fuel oil	1,264	8	11	2	3,127	35	Not specified	–
Other	3,809	23	15	3	1,913	21	7	2
Total	16,665	100	490	100	8,975	100	350	100

Numbers and percentages may not add due to rounding. "Other" category includes lubricants, greases, refined products, and refinery fuel.

United States and the Soviet Union, as shown in Figure 1, jet fuel accounted for more than two-thirds of military oil consumption compared with its share of only 8% in the national market. In each case, the military accounts for only a small share of the total market in peacetime; but upon the outbreak of war, the military demand for oil could surge to levels several times peacetime volumes. Although it is generally accepted that even in a sustained conventional war the military's share of the US market would not likely exceed 15%, it is nevertheless a historical fact that during World War II the military's share went from 1% in 1940 to 29% in 1945. Moreover, in addition to direct military needs there would also be essential requirements for defense industries whose goods and services support war efforts, including mobilization. The level of these oil requirements is difficult to quantify but would likely exceed direct military oil needs.

To mitigate the impact of oil supplies being curtailed by enemy action and to meet surge demands, military authorities hold pre-positioned war reserve stocks in hardened storage in amounts calculated to sustain combat operations until additional supplies are projected to arrive. The US military, for example, holds in excess of 30-million barrels as peacetime operating stocks and approximately 60-million barrels as wartime reserves. With its worldwide military responsibilities and commitments, the US holds the largest portion of its war reserves not domestically but in Europe, with the second largest amount in the Pacific region. Soviet military oil reserves, including those held in Eastern Europe, are estimated to be 380-million barrels. Soviet pipelaying squadrons are capable of laying 80 kilometers of pipe per day in accordance with Moscow's offensive doctrine that its armies should have sufficient fuel available to advance at a rate of 100 kilometers per day.

The military's primary objective is to ensure adequate oil supplies for the national defense in peacetime and to anticipate war situations and develop pre-arranged plans to serve as the theoretical basis upon which it will, initially at least, conduct war. Tactical plans must not only estimate how much fuel will be needed, but what type, where, and when. Military planners also incorporate into their oil plans estimates of how much fuel will be needed to provide the necessary logistical support to acquire, transport, and deliver the oil to the combat zone amid rising combat demand, possible supply reductions, distribution constraints, and inevitable battle attrition.

In combat, fuel and ammunition use by ground forces fluctuates considerably and unexpectedly, depending upon military movements. These rates tend to vary inversely with one another because high rates of mobility activity (and fuel consumption) often result from a low scale of enemy resistance and, hence, less firing. Conversely, combat vehicles generally fire their weapons when in a stationary position, consuming fuel at an idle rate sufficient to operate their weapon systems and sensors.

Figure 2 shows US Army estimates of consumption rates for its armored divisions and infantry under various sets of combat conditions. It is interesting to note that the average rate of consumption by armored division offensive operations is double that of infantry divisions. But during defensive operations, infantry activities are more fuel intensive. The highest consumption rate occurs during armored offensive pursuit.

Because fuel consumption rates of armored tracked vehicles such as tanks are so high, Israeli forces operating in the Sinai during the 1973 war transported tanks on flatbed trucks, thereby saving fuel and enabling the rapid movement of its armored forces across treacherous desert sands and roads.

Much of the fuel required by armies is not used to fight, but rather by vehicles operating behind the combat zone in support of the battle effort. Crippling fuel shortages in the front lines are more often due not to availability problems per se but rather to an inability to deliver fuel to consuming units at the right place and time. Therefore, the underlying concept of military oil supply security is the fundamental need for a reliable source of oil and a reliable means of getting fuel to combat users in the battle zone.

During World War II the Allied energy strategy relied heavily upon the United States as a provider and protector of fuel. US crude oil production and refining capacity each accounted for two-thirds of the world's total at the time, and therefore America was able to not only provide for all its needs but 70% of all oil used by its allies, including Russia. During the Suez crisis of 1956 and (to a lesser extent) the June 1967 war, the US was still able to serve as a supplier of last resort to its European allies. But by the 1973 Arab/OPEC embargo and the 1979-80 Iranian crisis, the US no longer had the spare oil-producing capacity to resupply its overseas allies with significant quantities of oil.

Figure 2

Estimated Oil Consumption for US Ground Forces in Selected States of Combat

(pounds per man per day)

Armored Division		Infantry Division	
Offense		**Offense**	
Pursuit and exploitation	23.3	Pursuit	15.3
Attack	13.8	Attack of hastily organized position	8.5
Average	18.6	Attack of deliberately organized position	7.9
		Attack of fortified position	4.9
		Assault of hostile shore	4.6
		Average	8.2
Defense		**Defense**	
Hold-off	7.5	Covering, security force, retirement, or delaying action	12.5
Reserve	5.8	Defense of position	6.8
Average	6.7	Inactive situation	6.4
		Reserve	2.2
		Average	7.0

Source: *US Army Field Manual*, FM 101-10-1 (1969), pp. 5-107, 108

Foreign Oil and US Energy Strategy

Now the US faces a risk of increasing dependence on insecure foreign sources of oil, with imports reaching up to 50% of demand, or 8- to 10-million barrels a day by the early- to mid-1990s. During this same time period OPEC may acquire 60% of the world oil market, with 45% of the free world's oil coming from the Persian Gulf alone. This has prompted some observers to express concern that rising US oil imports could hold it hostage of Middle East producers in the next decade. However, the security implications of higher US oil imports can also be evaluated from a broader perspective since—as the major military guarantor of oil destined for Western Europe, Japan, and elsewhere—US strategic interests are intrinsically intertwined with the oil dependencies of its allies and the extent of their capability to safeguard their own energy security, regardless of its own oil import levels.

While the magnitude of overall US oil imports is an important concern, military reliance on foreign sources of supply does not necessarily constitute an import dependence which critically undermines national security. This is because in peacetime one-third or more of US military oil consumption occurs outside US territorial boundaries. Surges in direct military oil demands due to war would most likely be for overseas use due to the global nature of America's

fuel held by Turkey (with price differentials between the fuels accounting for the difference in quantities proposed). Following a series of bilateral talks, several exchanges were consummated over the ensuing months. Soon thereafter, however, DFSC began experiencing its own problems in obtaining fuels, particularly the scarce F-22 grade sought by Turkey, which for unrelated economic reasons was being phased out by US refiners. Nevertheless, the exchanges continued until February 1980, when additional supply difficulties prompted Turkey once again to approach NATO, which made arrangements for additional swaps and purchases of supplies from sources located in northwest Europe.

Turkey was also encountering difficulties in obtaining crude supplies for its domestic refineries and subsequently spurned an offer by US armed forces in Turkey for 200,000 barrels of diesel fuel on the grounds that what it needed most was crude, not oil products. Following the halt of oil through the Iraqi pipeline, which had been providing supplies equivalent to 25% of its imports, Ankara estimated that by the end of the year it wold be suffering crude oil shortages of up to 100,000 b/d. The Turkish government thereupon approached the IEA's Governing Board in October 1980 for emergency supply assistance.

Not wishing to activate its oil sharing scheme under its selective trigger procedure, for which the Turkish situation appeared to qualify, the IEA arranged for informal consultations with governments and companies to be conducted under its auspices. Within a matter of weeks participating companies made offers totaling over two-million barrels for immediate delivery to Turkey from tankers which they controlled on the high seas. Most of these commercial offers were rejected by Turkey on the grounds that their price was too high, but some crude was acquired as a result of this process.

It is evident that NATO and the IEA played separate but useful roles in facilitating solutions to Turkey's oil problems, but questions remain as to how they might operate during a "creeping crisis" of increasingly severe energy shortages and rising political tensions. In addition, the Turkish case study as a peacetime occurrence does not generate any new insights into the crucial importance of military protection of oil supply lines in war. This is an important consideration since neither IEA nor NATO can expect to share oil that they do not control.

Future Strategies

There are a variety of strategies and methods nations can employ to ensure their energy security, but the unpredictability of events makes these endeavors uncertain at best. The oil sharing plans of NATO and the IEA are significant elements in the preservation of Western oil security but, as in the case of Turkey, it may be that in future crises ad hoc measures tailored to the specific circumstances and needs of member countries will be preferred instead of activating formal sharing mechanisms.

Evolutions in the geopolitical premises of Western oil security will complicate NATO and IEA planning; differences in member country oil supply situations will present others with opportunities to disrupt these alliances if they wish to exploit them. Of special concern to NATO and IEA nations should be how they will develop common positions in situations warranting military solutions to oil problems. Such situations are likely to be particularly problematical since military action is not an IEA function and can lie beyond NATO's mandate in "out-of-area" contexts such as North Africa and the Middle East. Moreover, oftentimes the political/military and economic/energy interests of member countries are divergent in these regions.

The fact that NATO does not plan for military operations outside its defined area of activity means that it must rely heavily upon civilian initiatives to maintain an appropriate level of oil security. This could include increases in civil and military crude and product strategic stocks as well as a greater focus on nonoil energy sources, including replacement of Soviet and North Sea gas in particular.

Another issue to monitor is the outcome of unresolved territorial disputes between Norway and the Soviet Union in the Svalbard area affecting oil production rights in the Barents Sea, whose military significance stems from its proximity to the strategic Kola peninsula and the fact that 70% of all Soviet submarines are based nearby at Murmansk.

Obviously, the NATO and IEA member countries can also act on their own or in concert with others outside these multilateral frameworks. Although they are more dependent upon Gulf oil than the United States, neither Western Europe nor Japan has the capability or willingness to project decisive military force in the Gulf. Japan, in particular, has the greatest economic vulnerability to disruptions not only because of its extreme import dependence but because its oil supply lines are so long. In military terms, it is the least capable of safeguarding its own needs, owing to the oft-cited constitutional limitations upon the scope of operations of its Maritime Self Defense Force. The US has taken certain steps on its own (e.g., establishing the Rapid Deployment Force and CENTCOM), but being a superpower has its costs, and the notion of a more equitable sharing of the burden in protecting oil flows appears to be gaining acceptance. Indeed, participation by the United Kingdom, France, Italy, Belgium, and the Netherlands in the tanker escort operation in the Gulf has been a useful step in this direction and illustrates that NATO countries can coordinate out-of-area military operations on an ad hoc, non-NATO basis, and gain valuable practical experience in the process.

Energy policies designed to reduce oil imports and minimize oil supply vulnerability are very important components of any national security strategy. These include conservation policies, enhanced production incentives, and increased use of oil substitutes, including synthetics. But military oil supply vulnerability is not defined by import dependence alone. For example, diversifying suppliers can offset some of the risks of excessive dependence on oil imports, as can effective contingency plans for both domestic and international shortages. Emergency oil stockpiles can reduce a nation's vulnerability to crippling oil shortages even if these stocks do not actually reduce a nation's dependence on imported oil. Sometimes diplomacy can deter politically inspired disruptions. Using military force to protect oil import flows remains an important component of national energy security in crisis or war.

Of great importance to strategic planners and policy-makers is how oil considerations might serve as a catalyst to crisis, or as a direct cause of war. Now is an opportune time to reassess US strategic thinking on the role of energy in general and military oil supply vulnerability in particular in defense and energy security policies since the lower oil prices of the past few years have lulled some into complacency about the energy security challenges of the next decade. Certainly the Iran-Iraq cease-fire and the Soviet withdrawal from Afghanistan are important recent developments. Moreover, the recently concluded INF Treaty and other ongoing arms-reduction talks may well have significant implications for conventional force sustainability, particularly in the NATO context.

Although the exigencies of war are invariably the mother of invention in the conduct of military oil supply activities, the challenge for the future is to devise and pursue strategies that ensure secure supplies of oil without at the same time running the risk of escalating international tensions to the point that such access becomes a cause for military contention. ■ ☆ ■

Tom Cutler served two terms as Chairman of NATO's Petroleum Planning Committee between 1983 and 1987. He is currently a foreign affairs officer at the US Department of Energy and a lecturer on military jet fuels at the College of Petroleum Studies at Oxford. The views expressed in this article are personal and do not reflect official positions of the US government or NATO. Portions of this article are derived from his book The Military Demand for Oil, *recently published by* Petroleum Economist, *London, England.*