USAWC STRATEGY RESEARCH PROJECT

PETROLEUM AS A STRATEGIC CENTER OF GRAVITY

by

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ABSTRACT

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Petroleum engineers, geologists, and economists forecast no change in the long-term availability of worldwide petroleum supplies. But, according to policymakers, the increasing worldwide competition for this commodity by countries with emerging economies and the nation's increasing dependence on foreign petroleum imports threaten national security. National policy and strategy over the past 25 years have not been effective in addressing the geopolitical energy environment leaving the United States vulnerable to strategic surprise. Militarily, Department of Defense policy delegates Defense Logistics Agency and ultimately Defense Energy Support Center as Executive Agent for petroleum products in support of Unified Command requirements. Current national policy also increases risk to DoD's responsibilities in effectively fueling the force. My research will prove or disprove if petroleum will become a strategic center of gravity and if current policy can adequately protect this resource that threatens national security.

PETROLEUM AS A STRATEGIC CENTER OF GRAVITY

According to United States policymakers, growing dependency on foreign petroleum coupled with increasing global competition for supply poses a threat to United States national security. Several administrations over the past 25 years have attempted to address this threat to mitigate the consequences of strategic surprise -- a looming energy crisis – without much success. Since the 1970's, national security considerations have served as a rationale for energy policy initiatives. As imports of foreign petroleum increased, the potential adverse economic impact of supply disruptions became the primary motivation for interest in energy policy. If petroleum is vital to our national security and economy, then why has policy and strategy been ineffective for over a quarter century? Global competitors view this resource as a potential strategic center of gravity that they can leverage for political and economic ends. This review examines past energy policies and strategies, current National Security Strategy, National Energy Policy (NEP), and Energy Policy Act of 2005 (EPA05) to determine if they sufficiently protect petroleum as a strategic center of gravity (COG). Further, this paper analyzes the petroleum aspects of the NEP and EPA05 to determine the impact on the Department of Defense's (DoD) ability to support the military services in the conduct of their missions. Lastly, I will recommend policy options for consideration that will reduce consumption through energy efficiency where we will become less dependent on foreign imports and allow DoD to effectively fuel the military force.

Adequate Supply

Petroleum is the most important energy source in the United States. It provides as much as 40 percent of total U.S. energy needs with the transportation sector depending almost entirely, 96 percent, on petroleum. These proportions have remained relatively constant since the 1950s. According to Energy Information Administration (EIA) statistics, U.S. petroleum production has decreased by about 35 percent since 1970, whereas consumption has increased by 40 percent. Between 1970 and 2004, petroleum imports have quadrupled going from approximately five to 20 million barrels per day (one barrel equals 42 gallons). Since 1998, the U.S. has imported more than 50 percent of its petroleum and it is expected that petroleum import dependency will increase even further[1].

Diminishing supplies is not a primary concern. According to the British Petroleum Statistical Review of World Energy 2005, proven oil reserves today, mainly concentrated in the Middle East, are greater than they were in the 1970s. Growth is expected from both non-Organization of the Petroleum Exporting Countries (OPEC) and OPEC states. The largest non-

OPEC growth is projected for Canada, Kazakhstan, Brazil, Azerbaijan, Angola, and Russia.[2] In the OPEC countries, significant growth is expected from Saudi Arabia, Nigeria, Algeria, and Nigeria.[3]

Additionally, technology will drive the growth of petroleum supplies in the future by diversifying supplies. Unconventional petroleum such as Canadian oil sands, ultra deep water developments, and natural gas liquids are expected to increase in total capacity by up to 30 percent in 2010. New facilities will transform inaccessible natural gas reserves in different parts of the worlds into a diesel like fuel.[4]

History of Past Policy

Prior to the 1970's, most policies focused on how to increase energy production in order to provide abundant, stable, and low priced energy. Concepts of energy conservation and increased energy efficiency were nonexistent because energy was abundant at low prices. After World War II, mandatory petroleum import quotas were established to protect domestic oil producers. In response to the energy crisis in 1973 with the OPEC oil embargo, the quotas were removed to increase petroleum supply and ease the pressure of the oil embargo. By 1974, gasoline prices doubled compared to pre-embargo prices.[5]

The sudden petroleum supply shortages put energy issues high on the political agenda and forced U.S. energy consumers to consider energy consumption. The focus of national energy policy linked energy supply to economic growth and national security. Energy became increasingly tied to foreign policy and the growing dependence on foreign imports was perceived as a threat to national security. To counter this threat, President Nixon set an aggressive but unrealistic goal of achieving energy self-sufficiency by 1980. This failed policy was followed by an approach focusing on efficiency and conservation.[6]

In 1976, President Carter placed greater emphasis on efficiency and conservation through policy set in the National Energy Conservation Act and the National Energy Act of 1978. Carter also created the cabinet-level Department of Energy (DOE) to coordinate energy-related activities and started the Synthetic Fuels Program to produce fuels from coal. However, the program was terminated by President Reagan due to its high cost and inefficiency. [7]

A deregulation policy was the focus of the Reagan administration. In order to limit government intervention, he restructured the DOE, reduced its budget, and decontrolled energy prices. The prevailing assumption during the 1980's was that price controls would reduce investments in the energy sector. Prices set by market forces would increase domestic supplies

of petroleum as well as the development of alternative energy supply.[8] Energy policy became more market-oriented and the role of government was reduced.

The only significant energy act in the 1990's was the Energy Policy Act of 1992 that contained measures in energy efficiency, renewable energy, and the strategic petroleum reserve. Passage of the Act marked the first time in more than a decade that Congress became intensively active in the energy field. Due to relatively low and stable energy prices, energy issues became less important. An opportunity was missed to promote a more comprehensive future oriented energy policy when it would have been less costly to do so. A Congressional Research Service paper concluded that "an energy policy that would most effectively shield the nation and the economy from the worst effects of supply shortages would be a policy that might well deny the nation the full benefits of cheap and plentiful energy when markets are stable."[9]

Shortcomings of Past National Policies

Past energy policy making and implementation had limited success. First, there has never been sustained national leadership to develop and pursue a long-term energy policy or to convince Americans that energy supply and demand are areas of concern. Instead, policy initiatives were stimulated by short-term supply shocks that led to public concern about rising prices or shortages of petroleum. These concerns stimulated demands for government action, policy proposals were made and some implemented, and the impacts of the supply shocks and public reaction subsided to the point that interest in energy policy faded.[10]

Second, the one proven way to reduce energy demand in the long-term was to raise prices by allowing energy markets to function with unregulated prices to reflect energy security and environmental concerns in energy prices by applying taxes or tradable permits mechanisms to internalize the associated concerns. However, the interest of Americans in energy policy issues was triggered by price increases and the public expectation is that policies would reduce prices. Politicians willing to support energy price increases normally face short political careers.[11]

Third, energy policy debates are always extremely contentious and tend to reflect regional interests at least as much as partisan politics. They pit energy production states against energy consuming states and also pit the petroleum industry against consumer groups fighting for lower prices. Increasingly over time, energy policy debates have become intertwined with environmental policy debates. The confrontations between traditional "supply side" policies focused on increasing domestic energy supplies and "demand side" policies centered around energy conservation and alternative fuels has intensified over time.[12]

Analysis of Current National Policy

In the NSS, under Section VI, Ignite a New Era of Global Economic Growth through Free Markets and Free Trade, "Enhance energy security" is listed as a comprehensive strategy to promote free trade. It states:

> We will strengthen our own energy security and the shared prosperity of the global economy by working with our allies, trading partners, and energy producers to expand the sources and types of global energy supplied, especially the Western Hemisphere, Africa, Central Asia, and the Caspian region. We will also continue to work with our partners to develop cleaner and more energy efficient technologies.

In May 2001, the National Energy Development Group (NEDG) headed by Vice President (VP) Cheney submitted NEP recommendations to President Bush that would meet the challenge of "the most serious energy shortage since the oil embargoes of the 1970s."[13] The NEDG approach focuses on increasing the supply of fossil fuels and nuclear energy. VP Cheney's report states that "energy policies that have emphasized reliance on market forces have led to major energy security gains over the past two decades."[14] It appears that political measures are seen as secondary options only when private companies fail to provide sufficient energy supply. [15] The National Energy Policy followed three basic principles:[16]

> 1. The Policy is a long-term, comprehensive strategy. Our energy crisis has been years in the making, and will take years to put fully behind us.
>
> 2. The Policy will advance new, environmentally friendly technologies to increase energy supplies and encourage cleaner, more efficient energy use.
>
> 3. The Policy seeks to raise the living standards of the American people, recognizing that to do so our country must fully integrate its energy, environmental, and economic policies.

In June 2005, the Government Accounting Office (GAO) released the findings of a comprehensive examination of the NEP, Inventory of Major Federal Energy Programs and Status of Policy Recommendations, that assessed a range of programs and tax preferences, and eight major energy activity areas to include petroleum. The GAO identified the federal government's current energy related efforts, reviewed the status of efforts to implement the May 2001 NEP report by agencies, and determined the extent to which resources associated with federal energy related efforts had changed since the release of the NEP report. The GAO found "that it is difficult to independently assess the status of efforts made to implement the NEP report recommendations because of limited information and the open-ended nature of some of the recommendations themselves…some of them are open-ended and lack a specific, measurable goal, which makes it difficult to assess progress. Without a specific measurable

goal, it can be difficult to understand how and to what extent activities are helping to fulfill a recommendation."[17]

Finally in June 2005, President Bush signed the EPA05 that he characterized as "essential to the U.S. national and economic security" and "a critical first step toward making U.S. energy more affordable and reliable."[18] The Act was debated for four years and basically provides tax cuts and incentives for almost all forms of energy including renewable energy and energy efficiency, but ultimately the biggest winners are oil, gas, coal, and nuclear energy suppliers.[19] From a petroleum perspective, the act gives major incentives to the oil industry to drill in the Gulf of Mexico. However, the act does not provide a comprehensive, sustainable approach to energy production and use – a National Energy Strategy -- and it relies strongly on technical solutions to energy challenges.

Analysis of DoD Policy

In accordance with DoD Directive 4140.25, DoD Management Policy for Energy Commodities and Related Services, the Defense Logistics Agency (DLA) is responsible for:

1. Executing the integrated materiel management for petroleum including procurement, ownership, transportation, accountability, budgeting, quality assurance, and quality surveillance.

2. Providing contingency support in concert with the Combatant Commanders (CCDR) to acquire necessary petroleum products, storage, and/or services to support military needs

3. Allocating resources in support of Petroleum War Reserve Stocks (PWRS) requirements and computing Peacetime Operating Stocks (POS) requirements.

4. Developing an inventory management plan (IMP) that lists approved inventory levels and requirements by location.

5. Developing the annual quantity of PWRS requested for funding in any particular fiscal year.

6. Continuously evaluating the petroleum market and advising the Under Secretary of Defense (Acquisition, Technology & Logistics) (ODUSD(L)), the Chairman of the Joint Chiefs of Staff, and the Secretaries of the Military Departments of considerations critical to peacetime and wartime operations and planning.

The Defense Energy Support Center (DESC), a component of DLA, is designated as the executive agent for providing the DoD and other government agencies with comprehensive energy solutions in the most effective and economical manner possible. DoD requirements for refined petroleum products are supplied by DESC through contracts negotiated with oil companies. As such, DoD is subject to the same market influences associated with the petroleum commodity. DESC negotiates fair market prices for high quality petroleum by seeking competitive bidding by suppliers and through efforts to streamline the acquisition process. They also develop worldwide purchase programs structured to the needs of the

Military Services in conjunction with contracting patterns. Purchase programs are designed to consolidate DoD requirements by region to obtain lowest possible unit cost of product.[20]

In general, stocks are managed by product type on a regional basis as defined by the IMP. DoD fuel is stored in Defense Fuel Supply Points (DFSPs), and are based on ensuring stock availability to meet operational needs, cost effectiveness of resupply, and maintaining appropriate inventory levels. The IMP provides requirements for regional and base inventories. Operations and economics of resupply play a major role in stockage at a DFSP.[21]

POS is the maximum amount of fuel required to sustain peacetime operations and reflects projected in-service storage determined during the IMP coordination and development process. If additional storage is available, DESC may direct (on an exception or emergency basis) additional POS be stored at a DFSP for short periods, based on regional requirements and other economic factors.[22]

Inventory held in support of a Petroleum War Reserve Requirement (PWRR) is termed PWRS. To the extent practical, PWRS is held at or in proximity to the PWRR specified location. PWRS may be subject to storage/funds availability. Any domestic PWRS must directly support an Operational Plan (OPLAN) and is limited to a stockage level for mobility requirements (primarily strategic lift), strategic air operations, civil defense requirements when approved by ODUSD(L), and logistics requirements in support of strategic operations such as load-outs of ships and aircraft in-flight refueling operations. Overseas, PWRS supports military operations in each CCDR's respective theater. PWRS stored outside the region is normally located in close proximity for transportation to support designated contingency operations.[23]

PWRS is in addition to POS and is based upon Petroleum War Reserve Requirements (PWRR) which is sized to meet the most demanding OPLAN requirements for each location, until resupply is conducted from a secure source. PWRS is stored as near to the point of intended use as economical and practical to minimize transportation requirements and the impact of hostile disruption of supply lines.[24]

DESC charges a standard price for fuel to the customers it supports.[25] From 2001 to 2005, the price for JP8, a type of jet fuel predominately used by the military services, has increased from approximately $1.50 to $2.01 a gallon. [The standard price of fuel is a tool that was created by DoDs fiscal managers to insulate the Military Services from the normal ups and downs of the fuel marketplace. It provides the Military Services and OSD with budget stability despite the commodity market swings, with gains or losses being absorbed by a revolving fund known as the Defense Working Capital Fund (DWCF). In years that the market price of fuel is higher than the standard price, the DWCF loses money. In years that the market price is lower

than the standard price, it makes money. This gain or loss can be made up by adjusting future standard prices or by providing DoD customers with a refund. This decision is typically made by the Office of the Secretary of Defense, Comptroller. However, the DWCF must remain cash solvent.] As a result, in instances such as fiscal year 05, the standard price changed during the fiscal year in order for the fund to remain solvent. To cover the additional costs of fuel in FY 2005, the military services reprogrammed their budgets to ensure the solvency of the DWCF. The standard price is established well in advance of the fiscal year it is used. It is built by assembling the following blocks:

1. A projection of the price of fuel 18 months in the future. (In the late fall the standard price is determined for fuel that will be sold to our customers during the Fiscal Year. As an example in the fall of 2005 the price is set that will be in effect from October 06 through September 07.)

2. The budgeted cost of transporting, storing, and managing the government fuel system, including war reserve stocks and some adjustment to these costs which reflects whether the revolving fund lost or gained money during the previous years.

Emerging Competition for Petroleum Supply

Worldwide competition for petroleum supplies is increasing especially from the emerging economy of China. President Hu's economic diplomacy seeks to secure access to future energy supplies. The EIA estimates that China's dependence on foreign oil is expected to increase from about 42 percent now to 67 percent by 2020. OPEC recently revised its forecast anticipating that China's consumption will exceed 20 percent of the world's total petroleum production for 2006. China has energy deals with Australia and Africa and Hu is currently negotiating with Canada to discuss natural resource cooperation. Beijing is also cultivating closer relations with oil-rich nations that the U.S. desires to isolate, including Burma, Iran, Sudan, and Venezuela. Energy concerns in many ways now dominate China's strategic thinking.[26]

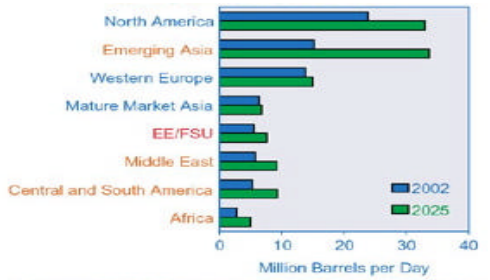
In correlation with oil consumption, the Pentagon recently estimated China's defense spending at some $90 billion, more than three times the $29.9 billion 2005 budget figure disclosed by China. If the report is accurate, the mainland is the third-largest defense spender. Only the U.S. and Russia spend more. As China's defense spending grows, their energy demands will continue to grow.[27]

According to the regional International Energy Outlook 2005 (IEO2005) Report and EIA, two parts of the world account for most of the projected growth in world oil demand: emerging Asia and North America (Figure 1). Outside North America, oil consumption in the mature

market economy regions grows at approximately 0.3 percent per year in both Western Europe and mature market Asia. This forecast is due to expectations of slow growth or declines in population and economic growth over the next two decades.[28]

In the emerging economies, strong expansion of oil use is projected, as robust economic growth fuels demand for oil to fuel burgeoning industrial sectors and rapidly expanding transportation use. The fastest growth in oil demand is projected for the emerging Asian economies at an average rate of 3.5 percent per year over the forecast period with the other emerging economy regions also expected to experience fast-paced increases in oil use as well. From 2002 to 2025, consumption of petroleum is projected to increase on average by 2.1 percent per year in the Middle East, 2.5 percent per year in Central and South America, and 2.7 percent per year in Africa.[29]

Economic development in Asia will be crucial to long-term growth in oil markets. China, India, and the other nations of emerging Asia are expected to experience combined economic growth of 5.5 percent per year between 2002 and 2025, the highest rate of growth in the world. This robust expansion in gross domestic product (GDP) translates to a 3.5-percent annual increase in regional oil use. The projected evolution of Asian oil demand could strengthen economic ties between the Middle East and Asia, as Asian nations rely more and more on Middle East oil supplies. [30]



Sources: **2002:** Energy Information Administration (EIA), *International Energy Annual 2002*, DOE/EIA-0219(2002) (Washington, DC, March 2004), web site www.eia.doe.gov/iea/. **2025:** EIA, System for the Analysis of Global Energy Markets (2005).

FIGURE 1. WORLD PETROLEUM CONSUMPTION BY REGION AND COUNTRY GROUP, 2002 AND 2025

Issues

Policymakers for the past 25 years have tied energy policy to market-based forces on the assumption that supply disruptions of foreign supply would adversely impact the economy. However, economists question governmental intervention due to the relatively insignificant

impact on the gross domestic product figures or longevity of impact during the three most significant supply disruptions; the oil embargo of the 1970's and the two Persian Gulf Wars.

At the interagency level, there is a lack of any correlation between the Department of DOE's EIA projections and current energy policies. This is important because energy policies are not explicitly analyzed in the forecasts of either the IEO2005 reports or the EIA's annual report on U.S. energy.[31] If the IEO2005 report were accurate, it would have significant impact on U.S. energy imports, although any realistic projection of the impact on current policies, and/or high oil prices would not change the level of U.S. strategic dependence on oil imports.[32] The U.S. will remain critically dependent on direct and indirect oil imports through 2025. In the case of current policies, the potential impact will not only will be limited, but also prove that basic energy policies are flawed. Policy assumes that America's problems are solvable by focusing on American imports. The reality is that the U.S. is steadily more dependent on the global economy and on the global flow of energy imports. Focusing on marginal reductions in U.S. oil imports is of virtually no strategic importance at all.[33]

Even when policymakers agree on an objective to reduce dependency on foreign imports, they cannot agree on a strategy to achieve that objective. This is clearly evident in recent congressional actions regarding the increase of domestic production to offset foreign imports. On December 21, 2005, the Senate blocked opening the nation's largest untapped oil reserve in the Arctic National Wildlife Reserve (ANWR).[34] Those who advocate drilling contend the oil -- an estimated 1 million barrels a day during peak production -- is needed for national security to reduce the country's dependence on imports while drilling opponents contend that ANWR's resources would not curtail imports.[35] Analysts predict that oil flowing at one million barrels a day -- equal to 20 percent of today's domestic oil production -- would almost equal America's daily imports from Saudi Arabia.[36] It also equals the supply loss that Hurricane Katrina temporarily caused among distressed consumers. For many opponents of drilling in the refuge, the debate is only secondary about energy and the environment and is more a disguised debate about elemental political matters.[37] Such hidden agendas have plagued energy policymakers for the past 25 years leading only to policies of discontent because they have no efficacy.

The above issues potentially affect DoD policy because fuel support to the military services is contingent upon the contracting and acquisition processes that are heavily influenced by the market-based forces fostered by national policy. U.S. military petroleum consumption overseas is not recorded in world oil demand computations. According to the DoD's annual Base Structure Report for fiscal year 2003, the Pentagon currently owns or rents 702 overseas bases in 130 countries. Overseas petroleum consumption is recorded in DESC's

Annual Fact Book, but is not incorporated in the EIA or International Energy Administration world oil demand statistics because the commodity does not cross a U.S. border for consumption in the U.S., its territories or possessions.[38] By excluding this data, overall U.S. demand is understated and the inability to accurately project military petroleum requirements in the outyears could prove detrimental in supporting future contingencies.

The ability of DESC to execute its mission will come with increased risk as the U.S. seeks petroleum from emerging petroleum countries that are developing nations in the global South – Caspian Region, Latin America, and Africa. Countries in these areas are generally politically unstable, torn by ethnic and religious ideology, or home to extremist organizations.[39] The unstable conditions that exist in the developing countries coupled with the emergence of petroleum production will become a destabilizing influence as new found wealth in these otherwise poor and underdeveloped countries will deepen divides between the rich and poor that fall along ethnic or religious lines.[40] Political instability, outright conflict, and terrorism will become friction points for DESC in the contracting and acquisition of petroleum supplies.

Strategic Center of Gravity Analysis

According to The North Atlantic Treaty Organization (NATO) Glossary of Terms and Definitions, center of gravity (COG) is defined as "those characteristics, capabilities, or localities from which a nation, an alliance, a military force, or other grouping derives its freedom of action, physical strength or will to fight." At the strategic level, the COG may be the national will, an economic resource or geographic locations that also support sustainment and transportation. Further, COG is power or the ability to prevent others from interfering. According to Dale Eikmeier in his article, "Center of Gravity Analysis," there are only two elements of national power at the strategic level: military or economic power. In war, these translate into two strategic level centers of gravity, either a military security capability or an economic/industrial capability.[41] As seen in the past 25 year of energy policy, policymakers attempt to influence control over petroleum resources through market-based forces in the name of national security. These attempts to control market forces through policy classify petroleum as a strategic COG.

Retired U.S. Air Force Colonel John Warden defined COG in a model of five concentric circles that could be targeted during the Gulf War air campaign (Figure 2). The center ring consisted of leadership targets, then means of production or organic essentials, infrastructure, population, and then fielded forces in the outer most circle. Warden argued that almost all states and other political entities have the five concentric circles and the center ring is always leadership. This is no different for the United States. Using this model substantiates petroleum

as a strategic center of gravity when defining the second innermost circle, organic essentials or means of production, and policymakers attempting to control the resource, as the leadership in the innermost circle.

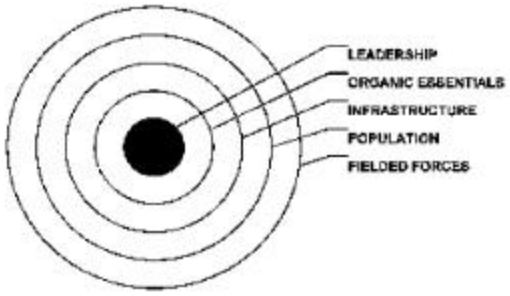


FIGURE 2. WARDEN'S FIVE STRATEGIC CIRCLES

To define center of gravity, one must first understand what capability it brings, how it strengthens an adversary, and what requirements are needed to execute the capability. A second approach to use is Operational Net Assessment (ONA). ONA integrates people, processes, and tools that use multiple information sources and collaborative analysis to build a common, shared, holistic knowledge base of the operational environment.[42] ONA considers how to employ friendly instruments of power to achieve desired effects relative to the operational environment's PMESII (political, military, economic, social, information, and infrastructure) systems.[43] The initial "baseline" ONA effort is to develop a system-of-systems analysis (SoSA) which populates the baseline ONA with data on PMESII systems and their organization, characteristics, and relationships.[44] SoSA emphasizes a multi-dimensional approach toward understanding the battlespace, characterized by an analysis of six interrelated PMESII systems.[45] Understanding each of these systems and their interrelationships enables a holistic perspective of the operational environment. Within each of these systems are nodes (a person, place, or physical thing that is a fundamental component of a system) and links (the behavioral, physical, or functional relationship between the nodes). SoSA identifies the relationship between nodes within individual systems and across systems.[46] These nodes and associated links are then identified for diplomatic, information, military, and economic (DIME) actions to influence or change system behavior and capabilities in order to achieve desired objectives.[47]

The major nodes within each respective PMSEII system are heavily affected by policy. Politically, energy policies are inconsistent and vary from administration to administration and each respective policy proved ineffective. Militarily, our forces are highly dependent on

petroleum to power platforms both domestically and wherever force is projected. Economically, reliable supplies of petroleum are important in fostering economic growth and development; distortions in prices, consumption, supply, or reliability in the petroleum industry can lead to adverse economic and social costs.[48] Socially, the U.S. transportation sector is entirely dependent on petroleum and price increases are contrary to the public's expectation of low-priced products. Informationally, the Energy Information Administration (EIA) projects increased petroleum demand by the United States and from emerging global economies from finite sources while projecting decreased domestic production. From an infrastructure standpoint, domestic petroleum industry refining capabilities are in need of recapitalization or new construction to sustain public demand. The U.S. has not constructed a new refinery since 1970. Policy is the lynchpin that can mitigate effects of an adversary's elements of power on each system whether a supply disruption of petroleum imports or reduced or denied access to petroleum to deployed or employed forces overseas.

Policy Recommendations

Irrespective of GAO findings and a lack of consensus, only portions of the NEP 2001 were approved in the EPA05. There are no quick solutions to foreign dependency on petroleum and its threat to national security. The NEDG consisted of members belonging to both the Principals Committee and National Security Council, but there was no DoD representation. A National Energy Strategy supportive of policy is required for review and consensus by the Principals Committee with subsequent approval by the National Security Council. This will encourage increased interagency coordination.

Synchronizing policy and strategy that promotes petroleum growth and diversifies supply, while simultaneously reducing consumption through conservation and fuel efficiency, will ensure that supply disruptions have minimal effects on the economy and that DESC can continue to effectively function in support of OSD and the military services. Counter to what is stated in the NSS and the first principle in the NEP, policy and strategy differ. Policy is an objective whereas strategy addresses how to achieve the objective balancing ends, ways, and means while minimizing risk. The following recommendations, in priority, are provided in the development of a National Energy Strategy:

1. Ensure Adequate Crude Supply. Meet growing demand for petroleum without substantially raising prices. Studies have shown that vast amounts of proven crude oil reserves and undiscovered crude oil resources exist, both domestically and abroad. However, polices that support continued investments in finding and producing these resources are needed to bring these crude oil supplies to market. The same is true of petroleum products. Adopt policies that ensure an

adequate supply of gasoline, diesel fuel, and jet fuels. Concerns about environmental impact should take into consideration the unparalleled improvement in exploration and production technology. [49]

2. Ensure the Security of Petroleum Supplies. Policies that promote diversification of supply through a number of sources and that enhance domestic petroleum production would minimize supply disruptions. Consider developing an effective stockpile program (similar to the Strategic Petroleum Reserve) to manage unanticipated supply disruptions. Base releases from the reserve to cushion effects of supply disruptions on prices.[50]

3. Transportation. As the sector that drives the majority of petroleum requirements in the U.S., policymakers must be aware that while developing newer powertrain technologies the internal combustion engine—running on petroleum—will remain the dominant powertrain for personal vehicles for the foreseeable future.[51] DoD's R&D programs in conjunction with DESC must be resourced to continue research in advanced technologies. Our military systems must become more fuel efficient and operate with alternative fuels.

4. Stimulate Needed Investments. Develop polices that encourage major investment in petroleum refining, distribution and marketing. The refining and distribution industry will be significantly challenged to meet the increasing petroleum product demand. The petroleum industry must recapitalize its infrastructure to meet these demands by upgrading existing refineries and building new refineries. [52]

5. Encourage International Energy Trade and Development. Because the U.S. faces increased dependence on petroleum imports during the coming decades, U.S. energy companies will need to find and produce petroleum internationally. American companies are well positioned to do this. Most have gained a technological advantage that ensures a fairly high rate of discovery and production. However, policies to support these international initiatives, which often involve considerable financial risk, need to be in place. Some existing tax laws and other public policies hamper international efforts to find and produce petroleum in promising areas. Such policies should be reviewed and, if needed, revised to strengthen U.S. leadership in new petroleum exploration and production[53].

6. Energy Technology Research and Development (R&D). The U.S. petroleum industry is one of the most technologically advanced in the world. A range of energy technologies should be encouraged, and the market should be allowed to adopt the most successful technologies as each new technology proves its worth to consumers.[54]

7. Environment. Over the years, conflicting and overlapping regulations have made expansion of the petroleum supply structure nearly impossible. Policies should be put in place that reflects growing demands on the U.S. petroleum supply infrastructure as well as the need to maintain environmental quality. [55]

8. Conservation. While developing more efficient powertrain technologies through advanced R&D innovations, pursue conservation as an economical

> energy source. Temporarily subsidize energy conservation investments to the transportation industry until petroleum supplies are built. Continue to develop bio-fuels, synthetic fuels, and hybrid technologies. The practice of conservation must be aggressively marketed to consumers.[56]

Conclusion

If strategic level policy attempts to exert controls over the petroleum market, the resource will become a candidate as a COG. Past and current energy policies do not adequately protect petroleum as a strategic center of gravity and increases risk on DoD Policy on Energy Management to fuel the force. The complexities of the political process coupled with the unpredictable nature of global market forces causes a major domestic social issue as the public expects government action to reduce rising energy costs. Transportation's current inefficient use of petroleum will continue to drive our nation's demand for foreign imports. A national policy promoting conservation through efficiency, and a strategy ensuring adequate and secure crude supplies internationally in the near-term while simultaneously developing efficient powertrain technologies, alternative sources of fuel, environmental protection, and stimulating trade and investments for the mid- to long-term is a necessity. Policy and strategy must address these complex areas to protect petroleum as a strategic COG and mitigate the consequences of future strategic surprise.

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