As the United States moves into a new era of governance, evident even at this early stage is the importance which is to be placed on issues of energy security in the administration of Barack Obama. The field is enticing for precisely the reason it is so difficult to address – it cuts across such a large variety of policy areas that consensus as to its vital nature often dissolves into misinterpretation and competing or redundant policy initiatives. At the nexus of energy and national security, then, we must differentiate the challenges we face in order to construct sustainable, viable, and effective strategies. This article will attempt to do that using a simple tri-level model that looks at effects on national security through military, domestic, and economic lenses. At each level, the discrete use of orthodox tools of national security (that is military power or the language of security diplomacy) may prove advantageous in a very limited capacity. The danger, though, is to equate energy issues with national security so bluntly so as to use those tools to the detriment of energy security itself. Without defining energy security in a more nuanced fashion, politicizing or militarizing energy issues can yield confused and aggressive policy choices which hinder the achievement of energy security at any of the three levels described.

That energy is critical to a state's security is self-evident. Energy has always been critical to keeping militaries moving - whether as feed in pack-animals' stomachs, coal transporting Alfred von Schlieffen's troops from front to front by rail, or synthetic fuels keeping Messerchmitts aloft when strategic disasters denied the Nazis crucial oil fields in the east. But this is only the most mortal case of energy's role in national security at the primary, state-existential level.

Military priority and emergency rationing systems usually mean that security services are the last sectors to be denied fuel in time of crisis, and such a level of depletion is hardly conceivable in the West today. That being said, the continued reliance of expeditionary military operations on enormous quantities of energy resources means that guaranteeing supply to and within theatre is a primary concern. Also, rising fuel costs crowd out alternative military investment and reduce overall functionality. Thus "military energy security" as such refers mainly to securing and flexing logistics chains to operations, as well as controlling overall energy costs and demand.

Moving huge amounts of fuel securely into operations is an ancient challenge for military logisticians. With the proliferation of expeditionary missions since the end of the Cold War, however, that task has become only harder. While missions still tend to be adequately resourced, the result is not only huge financial costs, but also security risks to those personnel transporting fuel in dangerous environments, and also quality assurance risks where there is increased reliance on local suppliers.[1] As such, reducing demand, particularly during operations and at forward operating bases but also within the entire system, has increased the strategic as well as the environmental or cost importance of demand management.

The U.S. Department of Defense (DoD) showed renewed interest in the energy intensity of the American military establishment in the middle of this decade, and since 2006 has spent considerable resources to reduce fuel consumption for operational use. [2] (Taking a cue from the broader definition of energy intensity, i.e. the amount of energy consumed per unit of production, military energy intensity can be defined as energy consumed per unit of military effectiveness.) Reducing overall military consumption thus means improving intensity through increased efficiency of systems and planning, including taking on some increased risk or operational burden by reforming the most energy intense activities of the DoD. At Alliance level, NATO works to standardize fuel types and develop common fuel logistics systems to increase reliability and reduce consumption on multinational missions.

Clearly, these are not the problems which historically gripped fuel-starved states contemplating their own military conquest for lack of energy. But they did drive NATO to develop a dedicated military pipeline system in Europe to withstand Cold War attack, and countries continue to maintain emergency systems of rationing (prioritizing military use) in the case that homeland defense is threatened. And at the tactical level, denying energy supply is usually a primary objective which still turns battles, wars, and political trajectories.[3] At the very least, inadequate military energy provision can easily put personnel at risk and cost lives. It is important to remember that guaranteeing energy provision to the organs of state security will, at the extreme, remain the most fundamental form of energy security.

More common, but with potentially grave and wide-reaching implications, are threats to domestic critical services – what I would describe as secondary energy security. While stopping short of debilitating the national security apparatus, the lack of sufficient energy provision to critical domestic networks or infrastructures can cause the break-down of essential services from healthcare and safety systems to communication, transport, emergency response, and basic utilities. Indeed, we can refer here to a 'network' of infrastructures since various nodes are mutually reinforcing. Energy tends to lie at the center of that network due to the necessity of electric power to facilitate the functioning of almost all systems including the production of energy which creates that power.

Determining dependencies and cascading failure modes in critical infrastructures is a complex problem due to such high levels of interconnectedness. Interdependency studies are aimed at identifying these vulnerabilities, and analyze infrastructure-to-infrastructure linkages to determine how localized disruptions can spread.[4] The problem, indeed, is not simply that the disruption of energy resources can starve the overall system – but that local and limited disruptions can have temporally and spatially widespread effects depending on how, where, and when they occur.

When the U.S. Department of Homeland Security (DHS) began to seriously examine domestic critical infrastructure vulnerabilities in light of the September 11 attacks, it focused almost exclusively on risks of terrorist attack or debilitation. It has since become clear that system failure can occur not only from man-made attacks; this was highlighted in the U.S. by Hurricane Katrina and prompted the adoption of an "all-hazards" approach by DHS in 2006.[5] But a second consideration raises the issue of international supply disruptions and potential political vulnerabilities deriving from over-reliance on one supplier, as has been a serious concern in countries supplied almost exclusively by Gazprom.

The key to addressing secondary security is through system-wide resiliency – that is, improving the ability to continue service delivery despite limited infrastructure failures or external supply disruptions – rather than focusing exclusively on infrastructure protection or disruption prevention. In Europe, the reality is that privatization of energy utilities over the past 20 years has made this job much more difficult by reducing redundancy and complicating government oversight (due partly to the simple fact of industry fractionalization). The latter has always been an issue in America, where energy companies successfully lobby to limit government regulation to loosen industry guidelines. As long as critical vulnerabilities exist however, terrorism and potential cut-offs will continue to elicit political costs, whether through interstate blackmail or inevitable infrastructure failure.

At the tertiary level, energy security as it is traditionally defined requires that prices be "reasonable." From this standpoint, economic vitality in consumer countries is dependent on energy prices which do not drastically hamper productivity, restrict consumption, and drive inflation across the economy. At the same time producers seek high prices which do not impede long term demand. The international public policy focus should thus be on price stability. Shocks can certainly be painful, as the West learned in the 1970s, producers learned in the 1980s, and as consumers of food, gasoline, and manufactured goods learned later last year. Indeed, while less deadly in the short and medium run, rising prices to consumers are the bridgehead to primary and secondary vulnerabilities since global prices tend to underpin (usually un-hedged) public civil and military energy budgets – and since national supply crises are initially reflected in soaring local consumer prices. In any case, what 'reasonable' prices are is clearly a subjective matter.

This means, for consumers, prices that are low enough (and stable enough) so as to allow for economic vitality. Between 2002 and 2008, oil prices continued on a more or less constant rise (despite increasing short-term volatility) due to a variety of factors. Some relate to actual supply and demand – the latter from rapid consumption increases in the developing world, and the former from insufficient investment in exploration and refining capacity. The US Energy Information Agency predicted in 2007 that each million barrels per day taken off the market would raise prices $5 to $7 per barrel. Other factors are rooted firmly in the financial sector, including deepening futures markets (which lead to increased volatility and diminished ability of producers to affect the price) and also the dollar's decline. The 2008 price readjustment exposed that misalignment between the real oil market and financial markets, but both continue to play a significant role in pricing.

Tertiary security is the first and most likely of the three levels to be threatened by hydrocarbon supply disruptions. In the short term, oil and gas price spikes can shock the economy – dampen macroeconomic growth by rising inflation and increasing unemployment and by dampening the value of financial assets. Essentially, oil price spikes reduce production output and wages, while inducing inflationary tendencies and interest rates, thus reducing aggregate demand.[6] While the oil-GDP effect is relatively small in percentage terms, producing about 0.5% GDP loss for each 10% price increase, over time and given drastic price changes the costs can become staggering. One report calculates the cost in the US due to oil price movements between 1970 and 2000 at $7 trillion.[7] Volatility will undoubtedly continue to mark prices, but underlying factors in the real energy economy will over the long run continue to push prices higher. The current economic crisis led to wild price fluctuations in 2008, but insufficient investment in both hydrocarbon and alternative energy resource development will only be exacerbate energy supply and price volatility over the coming years.

Given how these three spheres of national security can be variously threatened by inadequate or inconsistent energy supply, effective mitigation measures can be similarly differentiated. The central push in military energy security must be towards consumption reduction, particularly in forward operations where fuel deliveries represent inflated costs and risks to personnel. The emphasis with regard to critical domestic services must be improving systemic resiliency of critical infrastructures. Encouraging diversification and limiting political (particularly foreign state) ownership are the products of smart regulation and targeted incentives which reduce vulnerability in the medium run. In the short run domestic security services work to identify and protect the most critical infrastructures, emergency management agencies' plans for coping with disaster, and cut-offs which portend humanitarian disaster may require concerted international support and relief lifts. Tertiary, or economic, security will be marked by continued energy price volatility but over the long run depend on significant investment in both hydrocarbon production and alternative energy sources.

If our aim is to maintain reasonable and stable prices in a global market, military instruments (except in very specific and tailored applications) are more often than not counter-productive. The potential for military action has a potent ability to scare both traders and investors. Estimates are fuzzy, but fears of violence may add more than $30 in premiums to the per barrel price of oil. Gas is an altogether different story, with prices negotiated over longer periods and with its supply security having much to do with transport related difficulties. But here too, the investment and regulatory environment drives security of supply much more than saber rattling.

It is dangerous to assume that issues which impact national security should be addressed with instruments of security policy, such as military assets or NATO. The crises of the 1970s demonstrated that increased transparency and functioning markets are the keys to security of supply, and indeed the IEA was created for exactly that reason. “Militarizing” energy politics threatens tertiary security by sending the wrong signals to the market and to potential investors in infrastructure, whether they are state-owned monopolies or not. Vague and threatening comments (like aggressive rhetoric towards Russia) do not make traders confident, or national oil companies (NOCs) or international oil companies (IOCs) more willing to increase capacity, thus reducing energy security in the short and long run respectively. If sufficiently exacerbated, secondary and even primary energy security could be put at risk.

All this is not to say that ‘hard-power’ has no role in promoting secure and sufficient energy flows. Supporting infrastructure security and keeping sea lanes safe do improve the economic environment – and most of all sharing security information through training, surveillance assistance, and intelligence cooperation boosts security capacity through transparency. Military tools can be effective toward guaranteeing physical security, and managing their use precisely can be effective toward reassuring those actors with the power to influence price. But swinging the blunt instruments of security policy more wildly is not the way to guarantee energy security in today’s environment.

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NOTES

1. Typically, 70% of tonnage required to position an Army unit is made up of fuel, and the Air Force requires 85% of its fuel budget to deliver 6% of its fuel (showing the expense to deliver fuel to forward operating bases). See More Capable Warfighting Through Reduced Fuel

Burden: The Defense Science Board Task Force on Improving Fuel Efficiency of Weapons and Platforms (Washington, DC: Office of the Under Secretary of Defense for Acquisition, Technology, and Logistics, January 2001).

2. DoD policy has long guided energy security into theatre – that is, maintaining secure and stable supply lines. However as early as 2001 the Pentagon began to show particular interest in reducing operational consumption for reasons of energy independence, costing, and environmental reasons. See More Capable Warfighting Through Reduced Fuel Burden: The Defense Science Board Task Force on Improving Fuel Efficiency of Weapons and Platforms. The 2005 Energy Policy Act and 2007 Executive Order 13423 guided the DoD to improve efficiency and the use of renewable energy at installations and in non-tactical vehicles. In spring 2006 the DoD convened an Energy Security Task Force to devise ways to lower DoD consumption as well as identify alternative fuel sources.

3. Recent examples include the 1991 Slovenian resistance to the JNA (where power was and fuel cut to forward units) or the strategic denial of fuel to Yugoslavia during the 1999 Kosovo War.

4. S. Rinaldi, J. Peerenboom, and T. Kelly. Pp 23

5. “Infrastructure resilience requires all-hazards plan, panel advises DHS”. Emergency Preparedness News. March 21, 2006

6. Awerbuch, Simon. “Exploiting the Oil-GDP Effect to Support Renewables Development” SPRU, University of Sussex, October 2004

7. 43% due to GDP losses, 31% to wealth transfers, and 26% to macroeconomic adjustments. Greene and Tishchishyna, Oak Ridge National Laboratories