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Office, Assistant Secretary of the Army for Installations, Energy and Environment

Methodology & Analysis for Energy Security in Military Operations (MAESMO)

Executive Summary

January 2011

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Background

In February 2008, the Defense Science Board (DSB) issued an extensive report, Department of Defense (DoD) Energy Strategy "More Fight - Less Fuel", which presented a clear case for the Army's need to establish Key Performance Parameters (KPPs) for operational energy by concluding that DoD faces unnecessarily high and growing battle-space fuel demand which compromised operational capability and mission success; created more risk for support operations than necessary; and increased life cycle operations and support costs of its world-wide contingencies.

In a parallel and almost concurrent assessment of our nation's energy challenges the Government Accountability Office (GAO) issued a March 2008 report, Defense Management: Overarching Organizational Framework Needed to Guide and Oversee Energy Reduction Efforts for Military Operations. GAO's study mirrored some of the DSB's findings and included a recommendation for establishing a governing framework to align and integrate DoD's energy reduction efforts in military operations.

Given the level of awareness brought on by the DSB and GAO, for DoD's energy usage as a national security issue, the Secretary of the Army (SECARMY) directed the Assistant Secretary of the Army for Installations and Environment (now the Assistant Secretary of the Army (Installations, Energy and Environment)) to stand up the Army's first Energy Security Task Force (AESTF) on 15 April 2008. The AESTF was comprised of subject matter experts representing all Principals of Headquarters, Department of the Army (HQDA) who were charged with: addressing both the DSB and GAO reports; the analyses and development of recommendations for necessary strategic/action plans and an Army governing framework to achieve the Army's energy security vision and goals; and lastly, to ensure its energy policies and practices are aligned to effectively operate our installations and conduct contingency operations world-wide.

Over the next several months the AESTF deliberated on the recommended solutions sets outlined in the 25 September AESTF Report – Army Energy Security Strategy Way Ahead resulting in the establishment of the Army's first energy security governing body, the Senior Energy Council (SEC)[i] which was charted by the Secretary of the Army and the Chief of Staff of the Army on 28 September 2008.

To institutionalize the oversight and implementation of all energy efforts the AESTF drafted Army Directive (AD) 2008-04, Army Energy Enterprise which was promulgated by the SECARMY on 20 October 2008. This directive is viewed as the Army's cornerstone in addressing the DSB and GAO report findings by: establishing the senior leadership's governing framework for energy security – the SEC, with the responsibility to collaboratively develop and submit for SECARMY approval an Energy Enterprise Strategic Plan (Plan) and associated investment strategies to be executed in a manner that is synchronized with the DoD budget formulation process; establishing the Assistant Secretary of the Army (Installations, Energy and Environment) as the lead agent; and within the ASA(I,E&E), creating the new office, the Deputy Assistant Secretary of the Army for Energy and Partnerships (DASA (E&P))[ii] to serve as the SEC Executive Secretary and additionally serve as the Army's Senior Energy Executive (SEE) responsible for monitoring and reporting the Army's progress in achieving the goals and objectives established as part of the approved Plan to the SEC.

It was during this formulation period for the Army's energy security strategic way ahead, the genesis for MAESMO was shaped and influenced by the deliberations between the AESTF and the senior Army leaderships' desire to better understand how the Army currently planned operations (the

analytical process) for its world-wide contingencies, and more importantly how could energy security key performance parameters be introduced as one of its pre-decisional planning factors to help mitigate growing battle-space fuel demand; risk for support operations; increased life cycle operations. To that end, the AESTF Deputy formulated the MAESMO study proposal which was presented to the Deputy Chief of Staff/G-8, HQDA Study Program for approval, funding and implementation in FY 09. Key policy memoranda, briefings, and reports which led to the initiation of the MAESMO Project are shown in Appendix K of this report.

MAESMO Project:

The MAESMO study team was headed up by the AESTF Deputy, Mr. Joseph Vallone from the Office, Assistant Secretary of the Army for Installations, Energy and Environment – Army Environmental Policy Institute. The MAESMO project was designed to investigate tools, models, and databases that are currently used or could be used in the Army to analyze energy alternatives in support of operational missions. It was also intended to recommend modifications to existing capabilities and identify new analytic capabilities that should be developed.

Study Objectives

1. Specify and assess a baseline architecture of existing energy-related processes and models in the Army analytical community.
2. Identify areas in the baseline architecture that should be sustained and expanded, and identify where new capabilities should be developed to support operational mission and energy policy requirements.
3. Develop and illustrate a cost-benefit methodology for evaluating energy choices in support of operational missions.

Technical Approach

1. MAESMO project activities encompassed a literature review of studies, processes, policies, tools, models, and databases related to analyzing the costs and benefits of weapon systems and support systems (and units) in Army operations that could be used to evaluate energy choices. As part of this review, the MAESMO study team contacted and met with representatives from Army analytical offices, such as the Center for Army Analysis (CAA), Combined Arms Support Command (CASCOM), Army Test and Evaluation Command (ATEC), G4 - Logistics Innovation Agency (LIA), the Army Training and Doctrine Command (TRADOC) Analysis Center (TRAC), the Army Materiel Systems Analysis Activity (AMSAA), and the Office of the Deputy Assistant of the Army for Cost and Economics (ODASA-CE). Based upon Army stakeholder input from the review and meetings, the MAESMO study team developed a baseline architecture of existing energy-related models in the Army analytical community.
2. Evaluated the feasibility of using existing capabilities in the baseline architecture (see Figure 1) to analyze the costs and benefits of energy choices in support of Army operations. The MAESMO team recommended modifications to the baseline architecture and new capabilities that should be added to enable the Army to more comprehensively analyze the costs and benefits of its energy choices.

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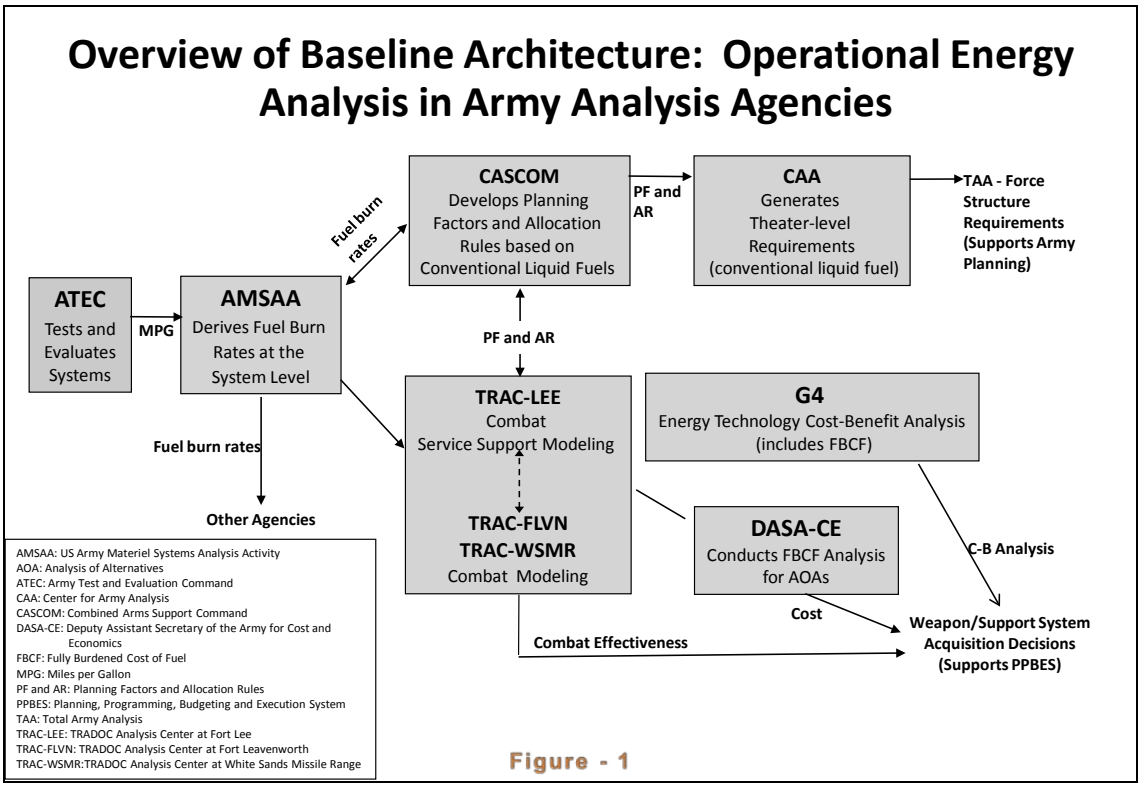
3. Developed a proposed cost-benefit methodology for evaluating energy choices in support of Army operations. To the extent practicable, the methodology was demonstrated for eight emerging energy technologies that could be used in Army brigade combat teams (BCTs) and at forward operating bases (FOBs). Cost and benefit data on the illustrative case study energy technologies being examined were obtained from the Army G4 Sustain the Mission Project (SMP).
4. Assessed existing Planning, Programming, Budgeting, and Execution System (PPBES) process capabilities to incorporate the energy cost-benefit analysis methodology developed through this effort.



Key Findings and Recommendations

This study found that:

- Army analysis agencies have substantive existing and prospective capabilities for:
  - evaluating energy efficiency as a Key Performance Parameter (KPP)
  - calculating and applying the fully burdened cost of fuel (FBCF) for Analysis of Alternatives (AoA) and other cost-benefit analyses
  - modeling energy in combat/combat service support models (to be part of cost-benefit analysis).
- Standardization in development and application of these capabilities is necessary to effectively implement recently enacted energy policies.

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- Proposed enhanced architecture provides a reusable methodology for evaluating the costs and benefits of energy technologies (and technologies which impact energy production and use) in support of Army operational missions.

Recommendations include:

- Expand the AMSAA initiative for collecting actual fuel consumption data (from theaters of operations) to all major energy consuming systems
- CASCOM should develop planning factors and allocation rules for alternative/renewable energy (RE) and energy efficiency (EE) technologies
- Expand TRAC Logistics Battle Command Model to integrate energy logistics and technologies with combat/operations modeling and analysis – model energy as an independent variable
- Standardize Fully Burdened Cost of Fuel (FBCF) development and Army-wide implementation.

Benefits

The principal recommendations of this study leverage existing Army Analytical Hierarchy processes, models, and data (see Figure 2 for summary of recommendations by agency). If implemented, the recommendations would significantly expand the Army's analytic capabilities in support of strategic and tactical missions, and enable the Army to make better informed energy decisions/investments to support meeting recently enacted DoD energy policy requirements.

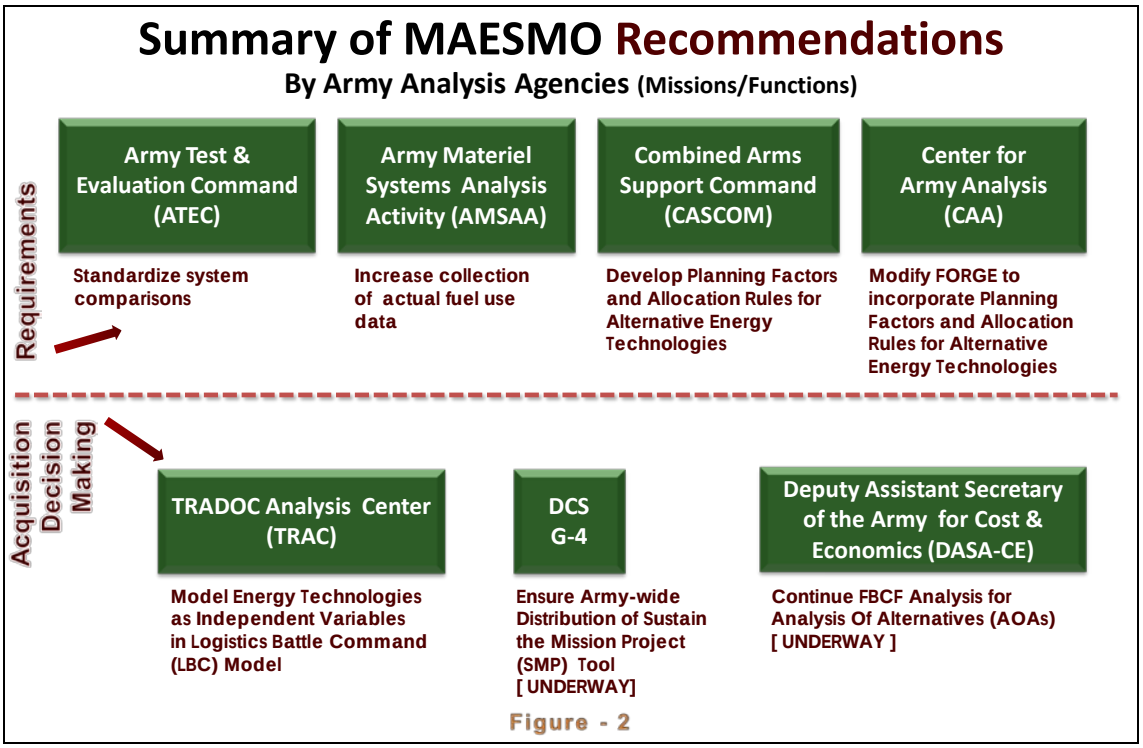

Figure - 2

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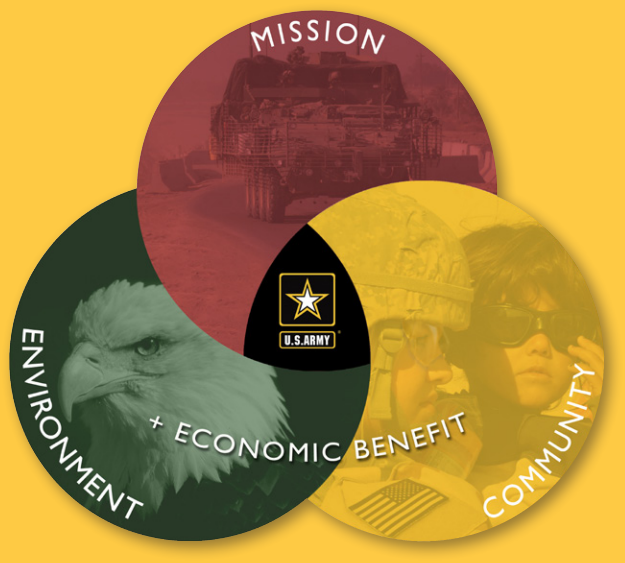
Endnotes:

[i] Senior Energy Council (SEC) became the Senior Energy and Sustainability Council (SESC), effective 11 February 2011

[ii] DASA-EP (Energy and Partnerships) became DASA-ES (Energy and Sustainability) in December 2010



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