Setting Conditions to Solve Problems

Making a Marine Corps that can build resilient energy chains

by Maj Andrew C. Eckert

The MEU of 2025 is estimated to consume over one million gallons of fuel over five days of combat operations.* That is the same amount of energy consumed by an American city of 500,000 residents during the same amount of time.[1] With energy as a driving force behind the MAGTF's speed, range, and lethality, the criticality of the energy chain cannot be understated. The future operating environment, which includes a contested maritime domain, presents considerable challenges to the survivability of the MAGTF's energy chain.[2] In order to ensure that materiel, organizational, and conceptual solutions are created and implemented to address energy chain vulnerabilities, the Marine Corps must integrate holistic energy planning into operational planning teams, establish dedicated energy assurance officers, and incorporate energy planning considerations when teaching the Marine Corps Planning Process (MCPP).

The energy chain is more than just the supply chain, and it incorporates all aspects of energy, such as engine efficiency or energy transmission methodology. The energy chain should be understood as the interrelation of the generation, transmission, transport, storage, and usage of energy in all forms. Disruption of the energy chain can prevent the effective employment of the Marine Corps' capabilities.

*Calculations made using updated MAGTF Power and Energy Model v5.0.1 Beta with Maritime Expeditionary Warfare Integration Division's original 2024 MEU, 24 January 2019.

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Because of years of optimizing energy chain efficiency, the challenge is that the current concept for fulfilling energy needs was not developed to mitigate the vulnerabilities inherent in the contested maritime environment. Adversaries have a greater ability to interrupt the flow of energy from point of origin to point of execution. The concept for ensuring energy chain integrity, specifically through global supply chain management, has not been designed for the future operating environment. The Marine Corps' expeditionary nature, and its reliance on the joint force for operational logistics, makes its energy chain especially vulnerable to interruption. Therefore, it requires tailored materiel, organizational, and conceptual solutions to the energy chain vulnerabilities in order to win in a future contested maritime environment.

Instead of focusing on individual technical or conceptual changes in an attempt to solve specific energy chain vulnerabilities, the Marine Corps needs to focus on making targeted modifications within the organization that will facilitate planners and leaders to identify and overcome the problems. The following sections will demonstrate why similar modifications in different situations as well as for different problems have been successful and how they could be applied to energy chain planning. Additions to the format and execution of the planning process offer the greatest opportunity to reduce energy chain risk for the Marine Corps in the future operating environment.

Consider the Energy Chain Up Front

Using a model similar to the Green Cell's creation in the early 2000s to account for civilian considerations, the Marine Corps needs to establish an energy assurance cell within the MCPP to provide a doctrinally reinforced structure and model to ensure the energy chain is prioritized from the outset. Currently, the planning process fails to focus on energy chain vulnerabilities during problem framing and lacks the tools to holistically analyze and assess risk, then communicate it to commanders.[3] This cell would be established inside of the operational planning team (OPT) and be required to holistically address the energy chain for all entities of the MAGTF and integrate these considerations through conceptual, functional, and detailed planning. As opposed to simply considering supply chain management and planning to meet requirements generated after the establishment of the concept of operations, the energy assurance cell would examine the problems up front, from multiple perspectives.

During initial design and problem framing, the cell would identify unique contextual considerations, how different operational approaches may impact expected energy requirements, and required capabilities within the allocated forces. The cell would further identify vulnerabilities throughout the entire energy chain and present efficiency and effectiveness considerations as part of course of action generation, wargam-

ing, comparison, and decision making (see Figure 1). Through risk analysis methodology, the energy assurance cell would look across all echelons within the energy chain, from end usage through theater logistics to Defense Logistics Agency support, in order to understand how those aspects of the chain affect the situation.** By focusing on energy chain–related information, the cell increases the commander's awareness of critical vulnerabilities, decision points, and risk to energy and mission accomplishment.

The energy assurance cell could be as robust or lean as necessary based on the given situation (see Figure 2). Not every situation would require significant investment of personnel and resources, but simply making it a doctrinal tool, like the green cell, increases the likelihood that even a single planner assigned to the billet will identify energy chain vulnerabilities early in the planning process and more effectively mitigate.

Opponents to adding an energy assurance cell to the OPT would argue that the current OPT construction is sufficient to identify and mitigate energy chain concerns. While every aspect of the energy chain is considered by various members of the OPT, these considerations are initially done in isolation of one another. For example, a maneuver representative may consider the platform requirements while the logistics representative thinks about storage and distribution and the force protection representative thinks about protecting fuel dumps and lines of communication. There is not, however, any codified part of the OPT structure that thinks about all of these aspects holistically from the beginning of planning or investigates their interrelated nature as they affect the plan. Civilian considerations needed the replacement of *ad hoc* attention with doctrinal support tools within the OPT to ensure a complete appreciation of the problem from the beginning. So too does the energy chain need dedicated structure within the planning process to avoid the failure to anticipate issues in respect to energy.

**For risk analysis methodology, see *CJCSM 3105.01 Joint Risk Analysis.*

MCPP Step	Energy Assurance Cell Action
Problem Framing	The purpose of the energy assurance cell is to consider the entire energy chain in order to promote a better understanding of how the problem and course of action influence and are influenced by the energy context of the environment. This may include friendly, enemy, and civilian capabilities and limitations. At a minimum, the energy assurance cell estimates the vulnerabilities and possible conceptual or technical solutions to energy problems in the courses of action.
Course of Action Development	Energy assurance cell integrates Blue, Red, and Green energy chain considerations, advising all three about opportunities, vulnerabilities, and mmitigations that can be incorporated into the courses of action.
Course of Action Wargaming	Energy assurance cell provides an assessment on each turn as to whether Blue and Red actions are feasible given the energy chain considerations or if additional mitigations are necessary.
Course of Action Comparison and Decision	Energy assurance cell provides input as to the opportunities, vulnerabilities, and risks associated with each course of action as it relates to the energy chain.
Orders Development	Energy assurance cell provides input to Annexes B, C, D, G, V, and W to ensure the energy chain concept is integrated across all warfighting functions.
Transition	Energy assurance cell liaisons with higher, adjacent, and subordinate headquarters for purposes of integrating energy chain planning.

Figure 1: Proposed energy assurance cell actions during the MCPP.

The Right People in the Room

Making the energy chain an added focus in the planning process will only be partially successful in mitigating vulnerabilities if the necessary personnel with the appropriate characteristics are not part of the team. In his book *Good to Great*, business researcher and author Jim Collins writes about getting the right people on the bus in order to ensure that an organization is more capable of adapting and innovating.[4] The natural inverse of this argument is that

Energy Assurance Cell Organization	Energy Assurance Cell Outputs
Temporary or Permanent Scalable Reachback Ability Optimal Membership - Energy Assurance Officer - G-2 Representative - G-4 Representative - GCE Representative - LCE Representative - ACE Representative - Army Liaison - Navy Liaison - Airforce Liaison - DLA Liaison	Energy Chain Vulnerability Assessment Energy Chain Shortfalls and Limitations COA Energy Comparison Concept for Energy Assurance

Figure 2. Proposed energy assurance cell organization.

lacking the correct people decreases the organization's likelihood of successfully addressing changing circumstances. Getting the right people is more than just including high-quality professionals. It necessitates having representatives with the appropriate experience and standing within the organization who can effectively advocate for a particular issue within the planning effort and help develop solutions.

Experience brings information to the table, but in order to ensure it is incorporated, these people must have a high enough standing within the group. Research done by psychologists at the University of Neuchatel, Switzerland, suggests that in any group attempting to execute a task, an informal hierarchy emerges automatically. More importantly, the psychologists were able to demonstrate that the stronger the link between the perceived power of the task-competence individuals in the group and the task to be completed, the better the group's performance.[5] Within the U.S. military, this human propensity to form hierarchies is further reinforced by the rank structure. This means that the level of positive influence a planning team member has is related to his rank relative to the other members of the team. Therefore, to ensure the planning member who has experience tackling a particular problem is appropriately influential within the group, he must hold the appropriate rank.

To address the energy chain problem, given the necessity of experience and appropriate rank, the Marine Corps must establish energy assurance limited duty officers. These officers would come from the chief warrant officers within the bulk fuel MOS. Though other MOSs such as supply and logistics are tangentially related to the energy chain, no other group focuses more on understanding the entirety of the energy chain than bulk fuel officers. They are required to comprehend the technical requirements and the conceptual strengths and weaknesses of procurement, transportation, storage, and usage. The issue is that, though these subject matter experts already exist, there are not enough to ensure their upfront and in-depth involvement in all levels of MAGTF operational planning. When they are involved, their standing within the operational planning teams is potentially compromised by their position in the group hierarchy because of their lower rank.[6] In most cases, plans have already been built before the bulk fuel officer is brought in to flush out the energy chain coordination.[7] It is important to note that the Marine Corps has established limited duty company- and field-grade officers in other communities, like combat cargo, to guarantee that considerations related to their field are advocated for appropriately.[8] Energy assurance officers would provide that same advocacy for energy chain concerns, leaving bulk fuel officers to focus primarily on technical planning and coordination.*** In order to support the proposed concept, the MOS would require an expansion, ensuring the availability of enough CWOs to become limited duty officers (LDO). There should be sufficient LDOs to fill billets on all MEF, MEB, and MEU staffs, at planning schools, and at Headquarters Marine Corps. Because of the low density of bulk fuel enlisted Marines, the MOS could be combined with the utilities occupational field in order to increase the SNCO ranks before accession into the CWO and LDO ranks. Like bulk fuel Marines, the utilities occupational field is more involved in energy chain planning than any other part of the Marine Corps and could augment energy assurance officers' expertise.

Some additional training would be necessary to round out the complete understanding of the energy chain, such as a more thorough comprehension of non-petroleum-based energy generation and storage, but this would be additive to the expertise they already possess.****

***There are 41 CWO Fuels Officers in the Marine Corps at any given time.

****Using a model similar to the civil affairs officers, three to four weeks of additional training would be necessary to ensure any gaps in experience are filled and to introduce current technological and conceptual operational energy initiatives that were not directly related to the bulk fuel MOS.

A counterargument to adding an energy assurance officer is that the Marine Corps already has the right people at the right rank to plan for energy. However, this argument is invalid because these two characteristics do not exist in a single person. Bulk fuel officers, who already have the technical expertise, do not have sufficient rank to guarantee that their advocacy is effective in OPTs or when advocating for materiel and conceptual changes to the Marine Corps. Logisticians, who have the rank, lack the same holistic experience and training that would make them most effective. Additionally, logisticians are generalists, changing their focus multiple times over the course of their careers, from motor transport to maintenance to medical planning.[9] The broad array of different functions they are required to know does not lend itself to the same depth of knowledge and focus an energy assurance officer would have about nuances and requirements of the entire energy chain. The contested maritime environment demands that energy assurance officers are Marines with expertise in energy chain components as well as career-length experience in planning energy chain operations, from conception through detailed planning, and the necessary rank to appropriately influence the planning process.

Getting Sets and Repetitions

Planning process changes and subject matter experts are not enough to ensure that future energy chain vulnerabilities will be mitigated. How officers are trained and educated is directly connected to their ability to solve problems. If the desire is to impart planners with the ability to apply different concepts to different situations, then the curriculum during their education must reinforce this by giving them multiple opportunities to practice.

Effectively leveraging the energy assurance cell and officers against the energy chain vulnerabilities requires the Marine Corps to incorporate energy chain considerations where it teaches MCPP, specifically at Expeditionary Warfare School, Command and Staff College, and the MAGTF Staff Training Program. As the principal institu-

tions within the Marine Corps that teach and educate on Marine Corps planning methodology, these are natural hubs for investing in subjects the Service wishes to tackle, and historically the Service has done so.

The Marine Corps has used its officer schools in the past to grapple with emerging problems and concepts. In the 1920s and 1930s, as the Service attempted to work through concepts like amphibious operations and small wars, one of its primary actions was to include these subjects in the Marine Corps Schools. This was for two reasons. First, it allowed the introduction of organizational lessons learned to the leaders and planners who were to return to the Operating Forces. Secondly, and more importantly, it familiarized the officers with the unique concerns associated with the matter and afforded them opportunities to attempt to solve problems that potentially had not yet been solved. In 1940, before the Marine Corps had any combat experience in fighting forces ashore against a peer adversary to draw upon, it already devoted 635 hours of instruction to amphibious operations.[10] When the war in the Pacific commenced a year later, the officers were more familiar with the concepts and considerations associated with amphibious operations, even if they were not necessarily masters, and thus more capable of solving specific problems as they arose. The Marine Corps takes similar steps today. When the institution desires its planners to have increased familiarity with such things as civil-military planning or operations in the information environment, it includes them as items of focus during planning exercises, or even as more detailed periods of instruction.[11]

The same concept should be applied to energy chain planning, including it within the programs of instruction for the planning schools. The current curricula at Expeditionary Warfare School and Command and Staff College include over ten planning exercises, in which students are expected to develop solutions to real-world scenarios.[12] Students are exposed to various capabilities and considerations so that they are afforded multiple opportunities to explore different ways to adapt to problems. Yet nowhere in the programs of instruction are students exposed to the energy chain or forced to think holistically about the trade-offs necessary in energy planning. These student captains and majors will become the primary problem solvers in OPTs in the operational forces after graduation, and the best way to prepare them to identify and mitigate energy chain concerns is to expose them to these considerations while at school. After graduation, reinforcement through the MAGTF Staff Training Program planning exercises will ensure even greater familiarity—and ensure that staffs are capable of mitigating future energy chain vulnerabilities. ***** The Energy and Innovation Chair for Marine Corps University should be the central point for coordination of curriculum development, with the Bulk Fuels School director and the expeditionary energy officer having responsibility over content across the three planning institutions. Subject matter experts would need to build the information packages, much like the civil affairs school does currently for civil considerations, and one instructor within each institution would need to be the point of contact for ensuring the inclusion of energy in the planning exercises. A period of instruction, of similar length to Green Cell instruction, will need to be included into each curriculum, but the real experience will come during the planning exercises.

Not every consideration can be covered in great detail at the planning schools, and so opponents to dedicating any focus at the schools would argue that this is just one more distraction from the primary mission of developing general MAGTF planners. However, that does not account for the fact that the steps of MCPP are never applied without context. Every planning exercise has context, and the inclusion of one focus area or another does not detract from the overall execution of the steps within the process. Even if the other recommendations are not implemented, limited inclusion within the planning schools means that MAGTF officers will have had some previous experience addressing vulnerabilities to the energy chain in the planning process, which will make them more capable of developing solutions. The risk to mission failure for the Marine Corps in contested maritime environments is too great not to include energy planning considerations within planner education.

*****The addition of energy chain considerations to the planning schools needs to be centralized to ensure that the changing nature of energy chains is incorporated.

Conclusion

The loss of any component of the MAGTF would make a mission difficult. In order to provide sufficient capabilities across all domains, the Marine Corps is going to need a resilient energy chain. In order to ensure this resiliency, the Marine Corps must integrate holistic energy planning into OPTs, establish dedicated energy assurance officers, and incorporate energy planning curricula into its formal schools. Though any of the above recommendations in isolation have the potential of ensuring leaders and planners are capable of identifying vulnerabilities in the energy chain and developing mitigations, they are most effective when taken all together. The doctrinal formation of energy assurance cells within OPTs will need to be taught at the planning school and will thus increase other officers' awareness of energy chain considerations. With the creation of energy assurance officers, the MAGTF will have experts who can advocate for materiel or conceptual solutions within the OPTs, in the schools as either instructors or adjacent students, and across the organization as a whole. In this way, each recommendation reinforces the contributions of the others and leads to better organizational conditions for adapting and overcoming energy chain issues. By implementing these recommendations, the Marine Corps ensures its leaders and planners will be capable of identifying vulnerabilities and developing mitigations as adversary capabilities propagate and the energy needs of Marine Corps aviation expands. When the future contested maritime environment becomes a re-

ality, the Marine Corps must not find itself in the next conflict dependent on an energy chain forged during a time of relative supremacy, only to have it snap when the MAGTF needs it most.

Notes

1. "Frequently Asked Questions," *U.S. Energy Information Administration*, available at https://www.eia.gov.

2. Headquarters Marine Corps, *Marine Corps Operating Concept: How an Expeditionary Force Operates in the 21st Century*, (Washington, DC: September 2016).

3. Headquarters Marine Corps, *Initial Capabilities Document for United States Marine Corps Expeditionary Energy, Water and Waste,* (Washington, DC: August 2011).

4. Jim Collins, *Good to Great: Why Some Companies Make the Leap and Other Don't*, (New York, NY: Harper Business, October 2001).

5. Denise Frauendorfer, Marianne Schmid Mast, Dairazalia Sanchez-Cortez, and Daniel Gatica-Perez, "Emergent Power Hierarchies and Group Performance," *International Journal of Psychology*, (October 2014), available at https://onlinelibrary.wiley.com.

6. Personal discussion between author and CWO 4 Danilo A McCabe, Bulk Fuel School Director, in December 2018.

7. Ibid.

8. Secretary of the Navy, *SECNAVINST 1412.9B, Marine Corps Limited Duty Officer and Warrant Officer Programs, Promotions and Continuation Procedures*, (Washington, DC: February 2006).

9. Interviews with various logisticians during the Marine Corps University Energy & Innovation Scholars Program in November 2019.

10. Victor H. Krulak, *First to Fight: An Inside View of the U.S. Marine Corps,* (Annapolis, MD: Naval Institute Press, 1984).

11. Personal discussion between author and Anthony Terlizzi, a retired Marine involved with the establishment of the Marine Corps Civil-Military School, on 2 December 2018.

12. Personal discussion between author and Maj Dennis Katolin, former instructor, Expeditionary Warfare School, and student, Command and Staff College, on 10 December 2018.