

ENERGY BEHAVIOR CHANGE AND ARMY NET ZERO ENERGY;  
GAPS IN THE ARMY'S APPROACH TO  
CHANGING ENERGY BEHAVIOR

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

## ABSTRACT

ENERGY BEHAVIOR CHANGE AND ARMY NET ZERO ENERGY; GAPS IN THE ARMY'S APPROACH TO CHANGING ENERGY BEHAVIOR, by Major Russell W. Gibson, 109 pages.

In January 2014, the United States Army enacted a policy directing all installations to implement Net Zero energy strategies by reducing energy use and producing renewable energy. The Army will accomplish energy reduction by efficiency improvements and retrofits as well as low-cost energy reduction behavior strategies. Therefore, in order to meet its goals for Net Zero energy, the Army must address energy behavior and culture change. The Army has provided general guidance to commands and installations for changing energy behavior and culture that is nested with Department of Defense (DOD) guidance. This study compares Army energy behavior and culture change effort to Army doctrine, DOD guidance, other government agencies, and civilian organizations, as well as current research in energy behavior change and energy culture. The Army generally follows a well-established process for change. However, installations are currently addressing energy behavior change with a wide array of approaches. The Army may benefit from looking more closely at its own doctrine, the DOD as well as other government agencies, and implementing a more focused, research-based approach.

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Are leaders born or made? I say neither. I believe they are raised. With this in mind, I dedicate this work to my mother, M. Kathleen Gibson, whose guidance and support set the conditions for my success.

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## ACRONYMS

ACSIM	Assistant Chief of Staff, Installation Management
ADRP	Army Doctrine Reference Publication
AESIS	Army Energy Security Implementation Strategy
AEWRS	Army Energy and Water Reporting System
AMC	Army Material Command
ARNG	Army National Guard
ASA (IE&E)	Assistant Secretary of the Army for Installations, Energy and Environment
ASCP	Army Sustainability Campaign Plan
BCT	Brigade Combat Team
BEM	Building Energy Monitor
CGSOC	Command and General Staff Officer Course
CONUS	Inside the continental United States
COP	Combat Outpost
DASA (I&H)	Deputy Assistant Secretary of the Army for Installations and Housing
DOD	Department of Defense
DOE	Department of Energy
DPW	Department of Public Works
EITF	Energy Initiatives Task Force
EMCS	Energy Management Control System
EPA	Environmental Protection Agency
ESPC	Energy Savings Performance Contract
EUL	Enhanced-Use Lease



FEMB	Facilities and Environmental Management Board
FOB	Forward Operating Base
IMCOM	Installation Management Command
MMAS	Masters of Military Arts and Sciences
NZEI	Net Zero Energy Installation
OCONUS	Outside the continental United States
OMD	Oregon Military Department
ORARNG	Oregon Army National Guard
OSD	Office of the Secretary of Defense
PNNL	Pacific Northwest National Laboratory
PPA	Power Purchase Agreement
RCI	Residential Communities Initiative
SAMS	School of Advanced Military Studies
SEC	Senior Energy Council
SESC	Senior Energy and Sustainability Council
SMA	Sergeant Major of the Army
UESC	Utilities Energy Service Contract
USMA	United States Military Academy
VCSA	Vice Chief of Staff of the Army

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## CHAPTER 1

### INTRODUCTION

It's operationally necessary, it's fiscally prudent, and its mission essential for us to make sure that we have energy security and can perform our primary mission for the United States.

— Katherine Hammack, ASA (IE&E)

#### Purpose

The purpose of this study is to identify and recommend best practice approaches for behavior and culture change to assist Army installations in meeting Net Zero energy goals. In that attempt, this study will identify and apply past and current Army policy, models for change, as well as other sources on energy behavior and culture. Ultimately, this study aims to determine if we are we doing the right things and doing things right to meet Army Net Zero energy goals.

#### Background

Net Zero energy is part of the U.S. Army's Net Zero program for energy, water, and waste. The Army's Net Zero programs grew out of its energy efficiency and sustainability programs as well as the recognition that sustainability provides security. The Net Zero strategy is a means for exceeding minimum targets to provide greater energy and water security and increase operating flexibility. As identified by the Army (Assistant Secretary of the Army, Installations, Energy and Environment 2013), Net Zero goals for installations include: (1) producing as much on-site energy as used annually; (2) limiting the consumption of freshwater resources and returning water back to the same watershed so as not to deplete the groundwater or surface water resource of that

region in quantity or quality; and (3) reduce, reuse and recover solid waste streams by converting them to resource values with zero solid waste to landfill.

As part of the Army's overall Net Zero strategy, Net Zero energy for installations provides for energy security for the individual installation, and for the nation. The goals of Net Zero energy support several aspects of the National Security Strategy including energy security, job creation, investment in innovation, and fighting climate change. The Assistant Secretary of the Army for Installations, Energy and Environment (ASA, IE&E), Ms Katherine Hammack, identifies important benefits including providing energy security, reducing vulnerabilities and protecting Soldiers.

According to the most recent Net Zero progress report (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, 6), installations should conduct Net Zero energy strategies in a hierarchy of steps. First, achieve energy usage reduction through conservation, then by energy efficiency. Once an installation reduces energy usage as much as possible and implements cost effective energy efficient technologies, the next step is investigating energy recovery and cogeneration for economic feasibility. Lastly, meet remaining energy loads with the use of on-site renewable energy sources. Integrated into all steps toward Net Zero energy are the concepts of "Increased Energy Security" and "Awareness—Cultural Change." The concept of Awareness—Culture Change is the focus of this paper.

The goal of Net Zero energy for installations, just as the title implies, is for installations to produce as much energy as they use over the course of a year resulting in a net zero energy drain on external power production sources. This means an installation may utilize more energy than it produces during part of the year and produce more

energy than it uses at other times of the year. As long as the net is zero non-renewable energy used over the course of a year, the installation has met the requirement.

Currently, the Army is conducting a pilot program for Net Zero energy at nine installations. Net Zero energy pilot installations include:

1. Parks Reserve Forces Training Area, California
2. Fort Bliss, Texas
3. Fort Carson, Colorado
4. Fort Detrick, Maryland
5. Fort Hunter Liggett, California
6. Kwajalein Atoll, Republic of the Marshall Islands
7. Sierra Army Depot, California
8. United States Military Academy, West Point, New York
9. Oregon National Guard, State-wide.

The Army will study the results from the efforts at the pilot installations and develop best practices to spread to all installations. In 2014, the Army expanded the program to all permanent installations. According to the Net Zero Progress Report, Net Zero Pilot Installation Initiative 2012 (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, v), progress toward meeting the Army's goal of Net Zero energy includes several overarching actions. First was making the Net Zero hierarchy specific for each goal. For energy, this means re-evaluating and defining steps toward Net Zero Energy. Those hierarchy steps, in order, are energy reduction followed by energy efficiency, then energy recovery and cogeneration technologies and last filling the remaining energy requirement with renewable energy production. In addition, Army

installations have developed baseline assessments and roadmaps to identify current energy profiles and a way forward for installations. They have conducted energy assessments to identify energy inefficiencies and wastes and have assessed opportunities for increasing energy security through increased energy efficiency.

### Issues

Energy costs for the Department of Defense (DOD) and Army are extremely high. Total DOD energy expenditures account for approximately 80 percent of all government energy expenditures. Its energy consumption is approximately equal to that of Denmark. In FY 2012, the DOD total energy bill was \$20.4 billion and it spent \$4.0 billion on facility energy, which included \$3.8 billion to power, heat, and cool buildings and \$0.3 billion to supply fuel to the fleet of non-tactical vehicles. Facility energy represented 22 percent of the DODs total energy expenditures. The Army makes up approximately 37 percent of the DOD total, the largest portion of all branches of service (Department of Defense 2013, 16-17).

While the Army has made progress, the limits of what it can accomplish through retrofitting facilities with energy efficient systems and new construction of extremely high efficient buildings are constrained by the actual use of the building; by the behavior of the people who occupy them. Personnel attitudes and resulting behavior or use of the built environment can negatively affect the overall efficiency of that environment. The Army must address this use of buildings and other installation facilities to achieve its Net Zero goals. Consequently, the people who use installation facilities must change their behavior. It is tempting to focus on technological advances, high efficiency buildings, and renewable energy sources and believe people will simply fall in line. “If you build it

they will come” is the quote often used. However, there are considerable obstacles to Net Zero in the form of human behavior and attitudes embedded in an Army and US energy culture that will not be easy to overcome without focused effort.

Changing energy related behavior is even more difficult considering that saving energy is not the Army’s primary mission. It is relatively easy to explain the consequences of using operational energy to Soldiers. They understand that additional energy used on the battlefield means additional convoys and more lives at risk. However, that same pressure is not present back in garrison. The proposed method the Army intends to use to change behavior is to leverage Soldier discipline and incentivize them to model desired behavior by making energy a priority (Assistant Secretary of the Army for Installations, Energy and Environment 2013a, 2-3).

#### Primary Research Question

What gaps exist in the current Army approach to accomplish the behavioral and resulting cultural change required to meet Army Net Zero goals?

#### Secondary Research Questions

What change model should the Army apply and how? How should the Army institute organizational changes that will bring about the required behavioral changes required to meet Net Zero energy goals? What particular changes are required? What lessons can we learn and apply from other government agencies, service branches and the private sector? How can the Army implement this change when it is not the primary mission, therefore not seen as a priority throughout the force?



## Assumptions

As with all research, there are several assumptions made in this thesis. They include the following. Economic constraints will not end the Net Zero Program. This assumption includes the current economic issues broadly in our country as well as economic issues with the procurement of renewable energy technologies and the expected return on investment with their implementation. Energy cost and constraints will remain essentially the same taking into account continued inflation. This includes energy availability and requirements neither unexpectedly increasing nor decreasing dramatically. This assumption includes successes and failures in the Army as well as in other corporate or government sectors instituting similar initiatives.

## Definitions

Energy Behavior: Actions of individuals that affect energy consumption.

Energy Culture: Includes the attitudes and behaviors of an organization as they relate to the use of energy.

Installation Energy: The energy and associated systems, information and processes required to provide power to installations, facilities, and buildings.

Net Zero Initiative: A holistic strategy for managing energy, water, and waste at Army Installations. Under the Army's Net Zero Initiative, every Army installation will evaluate the feasibility of and implement to the maximum extent practicable: producing as much energy on-site as it uses annually; limiting the consumption of freshwater resources and returning water back to the same watershed so as not to deplete the groundwater and surface water resources of that region in quantity or quality; and/or reducing, reusing, and recovering solid waste streams by converting them to resource

values with zero solid waste to landfill (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, 1).

Net Zero Energy Installation (NZEI): An installation that produces as much energy on site as it uses, over the course of a year.

Operational Energy: The energy and associated systems, information and processes required to train, move, and sustain forces and systems for military operations.

### Limitations

Limitations of this thesis include the time available to conduct the research. Also, while there is a great deal of work being done to achieve Net Zero goals, work on changing Army energy culture is emerging. Consequently, there is little available literature on Net Zero energy applied to the Army and less available on changing Army energy culture. I will use literature on change in general and case studies of other cultural change in the Army as well as throughout the military and in the private sector. The researcher was also unable to conduct site visits to any of the Net Zero pilot installations. Therefore, there are many aspects of those installations Net Zero energy, behavior change or awareness programs not directly observed.

### Scope and Delimitations

The focus of this thesis is only on Army Net Zero Energy and does not include Net Zero Water or Waste. Although, energy use to produce and deliver water will be included. This thesis will focus only on Army Net Zero initiatives and not on other branches of service. This thesis will only focus on energy use at the installation level. It will not include energy use in contingency operations, or training operations, nor will it

include the use of fuels for transportation. However, energy culture change in the Army will be broadly applicable to these other types of energy use.

### Significance of Study

The results of this study are significant in many ways. First, it intends to inform decision makers and leaders at all levels on best practices for energy behavior change and resulting culture change in order to meet Army Net Zero energy goals leading to a more secure energy future for the Army and our nation. This research will be applicable as the Army expands the Net Zero program to all installations, active, guard, and reserve as well as to efforts to reduce operational energy use. Second, this research will expand on the small, but growing literature on energy behavior and energy culture. It will apply the most recent research to the Army. Finally, it will lead to additional questions and offer direction for further study of energy behavior and culture in the Army, Department of Defence, and the United States.

### Conclusion

This examination will explore the Army's implementation of Net Zero energy initiatives across several installations and attempt to provide insight to how the Army can address requirements for energy behavior and culture change. It will do that by comparing current efforts in the Army, other services and militaries, and the private sector as well as current research in energy behavior and culture.

## CHAPTER 2

### LITERATURE REVIEW

#### Introduction

The literature review consists of four sections. First, it identifies larger works on organizational and culture change in general. Next, it explores current Army policy and proposals to affect energy behavior and culture change including initiatives at some of the Net Zero pilot installations. Third, it reviews DOD direction and guidance for affecting energy behavior and culture change. Finally, it looks at academic research in the areas of energy behavior and culture change. In terms of Net Zero energy, there have been large amounts of technical information and research generated. However, this thesis will focus on resources specific to energy behavior and culture and their connection to Net Zero Energy goals. Nearly all sources that discuss Net Zero energy, sustainability, or energy efficiency goals, identify energy behavior change as a requirement to achieve Net Zero energy or other energy reduction goals.

#### Organizational and Culture Change

Army Doctrine Reference Publication (ADRP) 6-22, *Army Leadership* identifies leading and inspiring change as part of strategic leadership. While acknowledging leaders at all levels lead change, strategic leaders make the most sweeping changes and are responsible for identifying what and when to change while avoiding distracters. ADRP 6-22 also acknowledges that change normally requires influence grounded in commitment rather than compliance (Department of the Army 2012, 11-4 - 11-5). It uses nearly identical language of the eight stages from Kotter's model for change and acknowledges

such in references. The difference from Kotter is ADRP 6-22 uses words more commonly found in military doctrine. This researcher assumes that by referencing directly and borrowing from the language heavily, the Kotter model for change is the Army model for change.

Because it is the model for the Army's change process found in ADRP 6-22, this paper will include an in-depth review of John Kotter's seminal work, *Leading Change*. Several aspects of organizational and energy behavior change that are pertinent are discussed. The eight stages in Kotter's change model include:

1. Establishing a sense of urgency
2. Creating a guiding coalition
3. Developing a vision and strategy
4. Communicating the change vision
5. Empowering broad-based action
6. Generating short-term wins
7. Consolidating gains and producing more change
8. Anchoring new approaches in the culture (Kotter 1996, 22).

Inside these eight stages Kotter identifies aspects of their implementation success or failure.

In the first stage, Kotter identifies nine reasons for a lack of urgency, many of which are applicable to Army efforts to change energy behavior and culture. First is the absence of a sufficient, highly visible crisis to motivate personnel to change behavior. His example points to business models of losing money, layoffs, or bad press (Kotter 1996, 39). Applying examples in the Army could include pending or current deployments to a

combat theatre and actually conducting combat missions which apply to operational energy. These urgent situations do not generally apply to installation energy use and so the absence of a crisis applies. Second is the visibility of too many resources. Examples include opulent executive areas and other visible indications of resources (Kotter 1996, 42). One can find examples from the Army in both operations and installations. During the most recent conflicts, the Army had a very large budget with additional money for contingency operations. During operations, Soldiers observe never-ending fuel convoys, generators running 24 hours per day, and large operations centers with stadium seating found on large forward operating bases (FOBs) which portray an abundance of resources not found on smaller combat outposts (COPs). Even more far removed, installation facilities, while not opulent, are newer and generally well-kept indicating relative abundance. In addition, energy is relatively abundant in the United States. Soldiers do not see the energy bill, therefore are not aware of their energy use in organizational buildings. The third reason for complacency is internal standards by which an organization measures itself are not very high. Kotter points to profit based examples such as growth compared to recent, short-term internal growth instead of industry wide growth or as measured against competitors. The Army could compare itself to other service components, other government agencies, or private industry. Fourth is a structure that allows functional areas to focus narrowly without accountability across the organization. In terms of Army installation energy, all staffs and functions must account for energy use, not just installation and energy managers. Fifth, internal planning and control systems are set up to ensure all functional areas meet their goals. Examples include setting performance goals that one's organization can easily meet. Sixth, an organization only

receives performance feedback from these internal systems. External stakeholders do not provide any of the feedback. Seventh, when external feedback is collected, leadership sees those who shine a light on negative information as the problem, instead of the information they bring. This kill-the-messenger approach provides only self-reinforcing information. Related is the eighth problem, which is human nature that supports complacency by only wanting to hear good news. For example, if we belong to a moderately successful organization, we might spend too much time patting ourselves on the back and not enough getting to the next problem or project. Finally, even for those not affected by the previous eight issues, management staff often convinces them there is no need for urgency (Kotter 1996, 39-42). With all of this working against an organization to develop a sense of urgency, Kotter sums it up by reminding the reader to “Never underestimate the forces that reinforce complacency and that help maintain the status quo” (Kotter 1996, 44). Along with the nine obstacles to developing a sense of urgency, Kotter offers corresponding recommendations for increasing urgency (Kotter 1996, 46).

The second stage in the Kotter model for change is to create a guiding coalition. Kotter asserts that no single person or leader, regardless of personality or position, has the power to overcome all of the obstacles to change. Additionally, if a team or coalition does not have the support and involvement of key leaders, the initiative will fail. Without key leader buy-in, the team does not have enough credibility to keep members involved and working toward established goals. Soon the team dissolves and the change effort fails (Kotter 1996, 53-55). Kotter recommends four components for a successful guiding coalition. First the team should have position power with enough key players involved that lower level managers cannot derail the effort. Second, the team should have

members with enough expertise as well as the right types or varied types of expertise to keep the initiative moving. Third, the group should consist of those with enough credibility in the organization that people would take the information they deliver seriously. Fourth, and most importantly, the group should include enough proven leaders, not just managers, to drive the change process (Kotter 1996, 58).

The third stage in Kotter's model is developing a vision and strategy. He points out that for the vision and strategy to be successful, organizations must not implement them either by authoritarian decree or through micromanagement. Only when a vision is simple and clear enough for people to understand it, but with enough detail to motivate people in the right direction can it break through forces that support the status quo (Kotter 1996, 69). He identifies six characteristics of an effective vision as imaginable, desirable, feasible, focused, flexible, and communicable. These characteristics first relay a vision that describes an activity or organization as it will be in the future. Second, the vision describes an organization with attributes that are in the best interest of most of the stakeholders. Third, an effective vision is realistic. They also articulate a clear message that inspires action but are broad enough to allow flexibility for initiative. Lastly, effective visions are easy to communicate and understand (Kotter 1996, 72-78).

The fourth stage in Kotter's change model is communicating the change vision. He identifies seven elements closely associated with effective communication of vision. First is simplicity. Keeping the message simple by eliminating jargon or technical words allows the organization to communicate the vision with less time and energy. Second, is to use metaphors, analogies, or examples when communicating vision. This not only allows for a simple message with fewer words, it often communicates ideas more



powerfully. Third is to use many different forums for communication. If an organization communicates the message of the vision, not just multiple times, but through multiple means, the probability of the message getting through to those who need to hear it greatly increases. The fourth element is repetition. The fifth is leadership by example. Actions of the organization should match what they describe in the vision. Those who promote the vision should conduct themselves in a way that is consistent with it. Sixth is explanation of seeming inconsistencies. If there are any, the organization should address them explicitly. Finally, communication should be give-and-take. When communicating the vision, an organization should use dialogue with questions and answers, which is always more powerful than delivering statements in one-way communication (Kotter 1996, 91-95).

The fifth stage in the Kotter Model is empowering employees for broad-based action. Kotter identifies four barriers to empowering employees. First are structural barriers that make it difficult to implement change. Organizational stovepipes or fragmented structures and groups can inhibit employee empowerment. Second is a lack of needed skills, which usually require a major training effort to overcome. Even if they want to, if personnel do not know how to conduct themselves in a newly imagined work environment, change will be stifled. Third, personnel and information systems make it difficult to act. If appraisal systems and accountability do not align with the vision, personnel will not change their behavior. Fourth, bosses discourage actions aimed at implementing the new vision. Occasionally there are personnel in key supervisor positions who do not buy in to the proposed change and discourage implementation

throughout their section. Kotter recommends honest dialogue to confront them and get them on board, or, if necessary, replace them (Kotter 1996, 114-116).

The sixth stage in the Kotter model is; generate short-term wins. Short-term wins are important to maintain momentum for the change effort and demonstrate to the organization the change is working as it should. Short-term wins should be visible, unambiguous, and clearly related to the change effort (Kotter 1996, 124).

The seventh stage of the Kotter change model is consolidating gains and producing more change. Because resistance to change never completely disappears in any organization, consolidating and rolling short-term wins into more gains is important to maintain momentum. It is also important to avoid letting personnel perceive quick wins as the end of the change effort (Kotter 1996, 137). The role of interdependence in change management cannot be understated. In any large, multifaceted, and fast-paced organization, changing one element will affect several, if not all other elements of the organization (Kotter 1996, 142). This will be extremely important when considering changing energy behavior and culture in the Army. It will affect nearly all other aspects of the Army. It is even more important to consolidate gains in highly interdependent organizations, as internal pressures to revert back to old ways of behaving are very strong (Kotter 1996, 144). Producing more change through consolidation requires leadership to delegate increasing numbers of change initiatives as low as possible. However, because managers at lower levels tend to think in shorter terms than leadership, it is important for leaders to sustain change efforts by demonstrating continued benefits (Kotter 1996, 148-152).

The eighth and final stage of the Kotter model is anchoring new approaches in the culture. Successful changes anchored in the culture have key features. First, culture anchoring or culture change comes last, not first. While it is important to understand an organizations culture, changing it begins with behavior. As we will discuss later, behavior is related culture in more ways than immediately obvious. Second, change becomes part of the culture only after it is clear it has produced positive results or is better than the “old way.” Additionally, it requires a great deal of communication. Without constant reinforcement and instruction, personnel will be reluctant to admit the validity of the change. Culture change may ultimately require personnel turnover. Sometimes natural attrition is sufficient. However, often for an organization to embed major change into its organizational culture, leadership must actively remove from the organization those who continue to hold on to the old way of doing or thinking. Finally, and related to the last point, decisions about succession in leadership are crucial. If an organization does not change promotion and key position assignments to align with the new culture, old habits and behavior will re-emerge (Kotter 1996, 165).

Important about Kotter’s approach is his insistence on conducting these phases in order. While he admits one can conduct some of the steps concurrently, skipping a step or getting too far ahead without developing earlier steps sufficiently, usually causes problems in the change effort (Kotter 1996, 25).

As important as Kotter’s work, when discussing culture change is Edgar Schien’s *Organizational Culture and Leadership*. Schein provides a formal definition of culture as:

[A] pattern of shared basic assumptions learned by a group as it solved its problems of external adaptation and internal integration which has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems. (Schein 2010, 18)

His work provides insight to the importance of understanding organizational culture when planning broad change and provides strategies for doing so. Of primary importance is the idea that as we lead organizations and influence its culture, it, in turn, influences us. Therefore, recognizing and understanding both the macro-culture of the organization and the micro-cultures within it and the relationship between them and leadership as it attempts to influence and enact behavior change is of utmost importance (Schein 2010).

#### Army Scholarly Works

Army officers and civilians at the Command and General Staff College, U.S. Army War College and Navy War College have written several articles, pamphlets, booklets, theses, and monograph papers about change in the Army. While many of them narrowly focus on a particular aspect such as Army transformation or sexual assault and harassment issues, they still prove useful for this paper for their insight into change as applied to the uniquely complicated organization and culture of the U.S. Army.

In her MMAS thesis, Major Nielsen describes three aspects of the US Army that have implications on the ability to institute change in such a unique organization. First, it is among the largest of any organizations of any type in the world whose leaders must command, control and coordinate the actions of millions of people. Therefore, they must develop ways of conducting business that are unique. Second, unlike private industry, Army leaders are executives of bureaucracies in the United States who operate inside the

unique constraints imposed by outside entities, most notably, congress. The author quotes noted political scientist James Q. Wilson explaining:

Control over revenues, productive factors, and agency goals is all vested to an important degree in entities external to the organization—legislatures, courts, politicians and interest groups . . . whereas business management focuses on the ‘bottom line’ (that is, profits), government management focuses on the ‘top line’ (that is, constraints). (Nielsen 2003, 8)

Third, military leaders face the unique challenge of preparing for war, with all of the risks and uncertainty inherent. This most unique aspect makes change more difficult. For example, in such a high-stakes environment, it is difficult to change from a proven weapon system that works to a newer, more effective weapon system that is unproven in combat (Nielsen 2003, 8-9). This caution bleeds into the rest of the Army and is manifest in all decisions. Experiences such as this have embedded resistance to change in the culture of the Army. Her thesis also points out the importance of political civilian leadership and their direct influence on changes in the military. Both the interpretations of the country’s national interests and political motivations of political leaders have a direct impact on their direction to the Army (Nielsen 2003, 13).

In a School of Advanced Military Studies (SAMS) monograph, Major Jason Pape provides helpful insights into change resistance in the Army. He highlights potential blocks to changing culture in the Army including the fact that leadership is developed and promoted exclusively internal to the Army. The Army, unlike private business, cannot typically hire from the outside those that display or embody the desired culture or behaviors. Therefore, in contrast to Kotter, he argues the Army, must address culture before can pursue any real change (Pape 2008, 14-15). Another relevant obstacle to change he identifies is the status and success the Army enjoys. This speaks to the issue of

developing a sense of urgency described earlier by Kotter. Even though arguably deserved, if the Army has an overarching sense of greatness embedded in the culture, that by itself is an obstacle to change (Pape 2008, 15). An additional useful insight is the idea that rather than change the overall culture of the Army, it is more important to understand it so as to be able to conduct change within the culture (Pape 2008, 15). Perhaps most importantly, Pape brings up the issue of organizational hypocrisy seen in Army change efforts. He notes this organizational hypocrisy is not intentional but the result of large organizations dealing with competing interests and points out the importance of how a large organization like the Army conduct messaging about the change they propose (Pape 2008, 27-28). This last point relates to the fourth stage in Kotter's change model and the importance of addressing any seeming inconsistencies between an espoused change vision and leader behavior.

#### Army Energy Behavior and Culture

The Secretary of the Army signed a memorandum in January 2014 directing the expansion of the Army's Net Zero program beyond the pilot phase to include all Army installations. It assigns responsibilities at all installations to strive toward Net Zero goals, and applies to all permanent Active, National Guard and Army Reserve installations both in the continental United States (CONUS) and outside the continental United States (OCONUS). It does not change the timeline for pilot installations to meet Net Zero goals, which is currently set for the end of fiscal year 2020. Neither does it provide a date by which non-pilot installations must reach Net Zero goals. It does identify pilot installations to serve as sources of best practices (Secretary of the Army 2014).

The proponent for Army Energy is the Office of the Assistant Secretary of the Army, Installations, Energy and Environment (ASA (IE&E)). That office along with the Deputy Assistant Secretary of the Army (Installations and Housing) (DASA I&H)) have published documents and websites outlining the Army's strategy for Net Zero energy a. The primary strategy document for energy behavior and culture change in the Army, *Army Power and Energy, Changing Energy Culture*, identifies a communication strategy with overarching themes and focus area portfolio talking points as well as challenges and distracters and ways to overcome them. The overview outlines the overarching issue of Army energy culture identifying energy as a critical requirement that makes up a large portion of our logistical needs both operationally and in garrison, and yet it takes this resource for granted. It also identifies energy as a critical vulnerability, outlining energy security issues. According to this document, the Army will address behavior change through several lines of effort. These include holding leaders accountable for energy use, integrating sustainability concepts into all operations, leveraging "Soldier discipline" to accomplish energy discipline, and incentives to Soldiers, Army civilians and families. It also clearly identifies leaders as the drivers of change (Assistant Secretary of the Army for Installations, Energy and Environment 2013a, 1-2).

An important driving document for Net Zero energy, the Army Energy Security Implementation Strategy was published in 2009 and co-signed by then Vice Chief of Staff of the Army (VCSA), GEN Peter Chiarelli, and then Assistant Secretary of the Army for Installations and Environment, (ASA, I&E) Mr. Keith Eastin. While the Army updated this document in 2012 with newer signatures, the importance of the co-signatures at the time, as stated in the strategy, is to demonstrate commitment, not just from offices

in charge of environmental issues, but from the whole Army as represented by the VCSA (Army Senior Energy Council 2009). In the foreword of the document, in addition to five strategic security goals and a broad approach for accomplishing them, it identifies the focus of creating a culture of energy awareness throughout the Army (Army Senior Energy Council 2009). According to the executive summary, “This document presents the Army’s energy security vision, mission, and goals, with the direction of objectives and metrics to gauge progress toward such goals” (Army Senior Energy Council 2009, i). It goes on to describe the Army Energy Security Vision as “An effective and innovative Army energy posture, which enhances and ensures mission success and quality of life for our Soldiers, Civilians and their Families through Leadership, Partnership, and Ownership, and also serves as a model for the nation” (Army Senior Energy Council 2009, i). More importantly, the document identifies the Army Energy Security Mission to “Make energy a consideration for all Army activities to reduce demand, increase efficiency, seek alternative sources, and create a culture of energy accountability while sustaining or enhancing operational capabilities” (Army Senior Energy Council 2009, i). As part of the way ahead, it clearly establishes that energy security is the responsibility of all members of the Army, both Soldier and Civilian (Army Senior Energy Council 2009, ii). Discussion of establishing the Army Senior Energy Council (SEC) which according to its charter includes “senior leadership of the Army’s key energy stakeholder organizations and will oversee the Army’s Energy Enterprise” (Army Senior Energy Council 2009, 1). One can see the most senior Army leadership identified in the structure in figure 1.



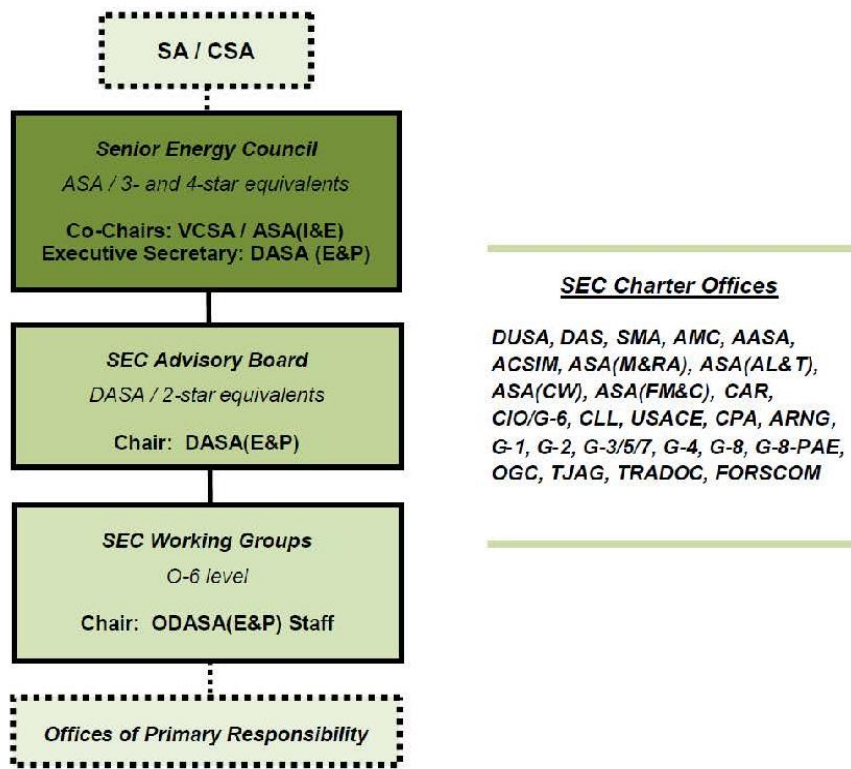


Figure 2. SEC Structure and Membership

Figure 1. Army Senior Environmental Council Members and Structure

Source: Army Senior Energy Council, *Army Energy Security Implementation Strategy* (Washington, DC: United States Army, 2009), 5.

As part of the vision, the SEC structure identifies Leadership as key to successful implementation of the energy security strategy. It aims to change the culture of the Army to “one that prioritizes efficient energy utilization” (Army Senior Energy Council 2009, 2). It proposes to accomplish this by “holding Army commanders, offices, and personnel accountable for their energy programs and by providing incentives for innovative energy solutions” (Army Senior Energy Council 2009, 2). It also identifies Ownership as a foundation of the vision and key to cultural awareness and energy culture change (Army

Senior Energy Council 2009, 3). It identifies five strategic goals which are to reduce energy consumption, increase energy efficiency across platforms and facilities, increase use of renewable—alternative energy, assured access to sufficient energy supplies, and reduced adverse impacts on the environment (Army Senior Energy Council 2009, 4). In order to meet these goals it identifies key enabling factors, which include Organizational Leadership and Institutional Culture (Army Senior Energy Council 2009, 9). The AESIS also provides baseline data on energy use from fiscal year 2008. In that year the Army estimated its total energy consumption at over 180 trillion British thermal units (BTU). This energy consumption cost the Army more than \$4 billion. That total includes 9.1 million megawatt hours (MWh) of electricity for installations (Army Senior Energy Council 2009, 14).

The U.S. Army Sustainability Report 2012 clarifies important updates to the Army's energy structure and approach and identifies where Net Zero fits into overall sustainability goals. According to the report, the Army has signed a memorandum of understanding with the Environmental Protection Agency (EPA) to collaborate on technologies that will help installations meet Net Zero energy goals (Assistant Secretary of the Army for Installations, Energy and Environment 2012, 49). The report also provides data on Army facility energy trends including energy intensity and overall energy use (see figure 2). In the report it identifies that the Senior Energy Council established by directive 2008-04 and discussed earlier in the AESIS is superseded by the Senior Energy and Sustainability Council (SESC) (Assistant Secretary of the Army for Installations, Energy and Environment 2012, 54-55). It identifies the establishment of the Energy Initiatives Task Force (EITF) which coordinates with installations to identify and

access innovative funding vehicles to meet Net Zero goals. It identified the issuance of the Army Sustainability Campaign Plan (ASCP) which formally recognized the national security connection between sustainably and conducting the Army mission (Assistant Secretary of the Army for Installations, Energy and Environment 2012, 11).

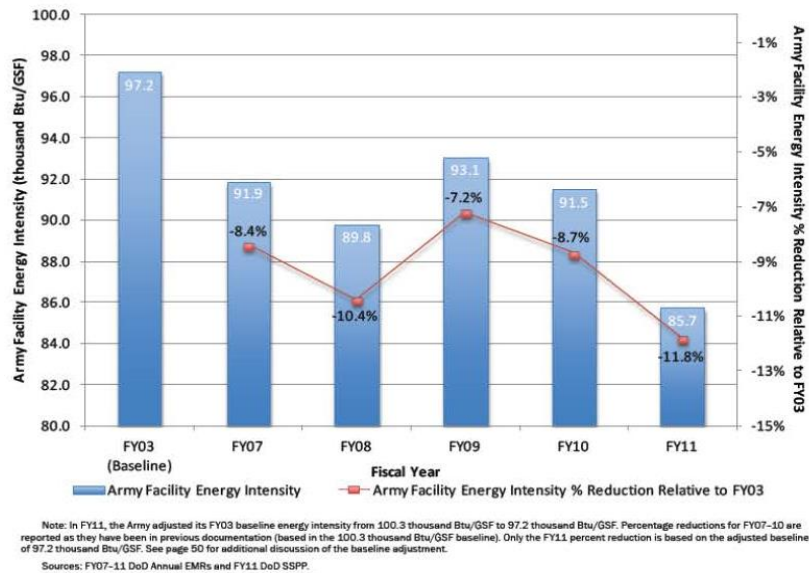


Figure 2. Army Installation Energy Intensity

Source: Assistant Secretary of the Army for Installations, Energy and Environment, *U.S. Army Sustainability Report 2012* (Washington, DC: United States Army, 2012), 51.

Installation Management Command (IMCOM) published and intended *The Building Energy Monitors Guide* to provide assigned personnel information and tools to perform their additional duty as a Building Energy Monitor (U.S. Army Garrison, Wiesbaden 2014). It is one example of many documents published by the Army through various commands and installations intended to provide an individual with information or checklists that enable them to conduct their assigned energy monitor duties. It identifies

the goal of the building energy monitor as assisting the installation energy manager and command in identifying and eliminating energy waste. Additionally it identifies an Army Energy Awards program that provides monetary awards for energy conservation efforts. However, it does not provide details about the awards program (U.S. Army Garrison, Wiesbaden 2014, 3). It also provides suggestions for ways to increase energy awareness and potentially change energy behavior of building occupants. These suggestions include setting up a suggestion box for building occupants to submit energy saving ideas, issuing ‘energy waste tickets’ to personnel who are found wasting energy, and keeping building occupants informed about energy issues, goals and accomplishments through bulletin boards, flyers and tenant meetings (U.S. Army Garrison, Wiesbaden 2014, 18).

The Army Installation Management Campaign Plan 2012-2020 identifies key goals for sustainability and Net Zero that are relevant to this thesis. In the campaign plan line of effort number six, the first key to success is to reduce energy consumption. Within that key to success, the first goal includes changing behavior regarding energy use, establishing energy management accountability as well as establishing training and operational policies intended to achieve long-term energy reduction. Further, the sub-tasks of the goal include institutionalizing energy conservation across all levels through effective communication and instilling an energy-conscious culture (Installation Management Command 2011, 43-44). It also identifies measurement of reduced energy consumption by recording reductions in energy intensity as compared to a baseline year of 2003. Energy intensity is the amount of energy used per square foot. However, it did not identify direct measurement of behavior change (Installation Management Command 2011, Annex D).

The Net Zero Progress Report, Net Zero Pilot Installation Initiative 2012 provides an update on the Net Zero pilot programs begun in April 2011. It also updates definitions of Net Zero, breaking the overall strategy into three subordinate hierarchies, one each for energy, water, and waste (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, V). It provides a concise review of the background, status, and definitions of Net Zero while also identifying plans and actions. It outlines some installations energy behavior change efforts including a social awareness campaign at Fort Riley, KS and other installations that have shifted their outreach efforts from sustainability campaigns to their Net Zero campaign (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, 5). It claims that all Net Zero pilot installations have command buy-in and senior level commitment to achieving Net Zero goals (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, 5). In terms of reducing energy consumption, the report identifies facility-metering efforts to obtain data as the primary means to inform installation managers and commands about how personnel use buildings (Assistant Secretary of the Army for Installations, Energy and Environment 2013, 7-8). One can then use this data to help determine the best course of action for changing energy behavior. Further discussion of energy reduction best practices focuses on using Energy Management Control Systems (EMCS) to control various heating, cooling, or lighting systems (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, 20).

The Army Energy Program website provides a great deal of information and access to resources including all pertinent policies and regulations, program and planning guidance, updates on renewable energy projects, as well serving as Net Zero. It also

provides the Army Energy Security Vision and Army Energy Security Mission (Department of the Army 2014c). Inside the Army Energy Program Website, is the description of the Army Vision for Net Zero as follows:

The Army's vision is to appropriately manage our natural resources with a goal of net zero installations. Today the Army faces significant threats to our energy and water supply requirements both home and abroad. Addressing energy security and sustainability is operationally necessary, financially prudent, and essential to mission accomplishment. The goal is to manage our installations not only on a net zero energy basis, but net zero water and waste as well. We are creating a culture that recognizes the value of sustainability measured not just in terms of financial benefits, but benefits to maintaining mission capability, quality of life, relationships with local communities, and the preservation of options for the Army's future. The Army is leveraging available authorities for private sector investment, including using power purchase agreements (PPA), enhanced-use leases (EUL), energy savings performance contracts (ESPC), and utilities energy service contracts (UESCs) as tools to achieve these objectives. The Army must invest in its installations and improve efficiencies in energy, water and waste for the benefit of our current and future missions. (Department of the Army 2013a)

The website for the Assistant Secretary of the Army for Installations, Energy and Environment (ASA, IE&E) as part of the Army's communication plan provides updates and current events for a wide range of topics within the scope of that office. As the proponent, it is also the repository for the Net Zero web page as well as pages for Army Energy and Sustainability (Office of the Assistant Secretary of the Army 2014). These pages and links provided within to resources help frame Net Zero and energy behavior change efforts for the Army.

The Office of the Secretary of Defense (OSD) and the Department of the Army, as required by Congress have instituted the Residential Communities Initiative (RCI) across all Army installations with privatized housing (Office of the Assistant Chief of Staff for Installation Management 2009). This initiative provides incentives for families living on military installations in privatized housing to save energy and water. It uses a

baseline for utility costs for housing based on the type of home, location, age, and design, installations set benchmarks for utility use and cost. This benchmark includes a buffer above and below the baseline. If residents use energy within the buffer above or below the baseline, they do not incur additional cost nor get a refund. However, if residents use energy above the baseline and above the buffer, the resident incurs a cost billed to them by the installation. If residents use energy below the baseline and buffer, they create a credit paid to them by the installation (Office of the Assistant Chief of Staff for Installation Management 2009, 6).

A few installations in the Net Zero energy pilot program have started energy behavior and culture change initiatives and have been kind enough to share their progress for use in this paper. Fort Carson, Colorado, Fort Bliss, Texas, The United States Military Academy at West Point, New York, and the Oregon Army National Guard all have ongoing efforts that provide insight into how installation personnel receive, interpret, and apply guidance from the Army to institute energy behavior and culture change. The information from Fort Bliss also adds to the academic body of knowledge due to their experimental approach to determining the best way to effect behavior.

The Oregon Military Department, Oregon Army National Guard is one of the Net Zero pilot installations. Their report to Mr. Richard Kidd, the Deputy Assistant Secretary of the Army provides insight to one approach to achieving Net Zero energy goals (Oregon Military Department 2013). The Oregon Army National Guard is unique in the Net Zero pilot initiative. Rather than focusing on Net Zero energy for one facility or installation within the state, it is striving to reach Net Zero energy for all its facilities and installations state-wide. It has determined conservation goals in all areas of energy use as

seen in figure 3. Also in the figure, the Oregon Army National Guard determined that it will realize 8 percent of its reduction goal through culture change. In the conclusion, they identify changing culture and behavior as one of the top priorities (Oregon Military Department 2013, 22).

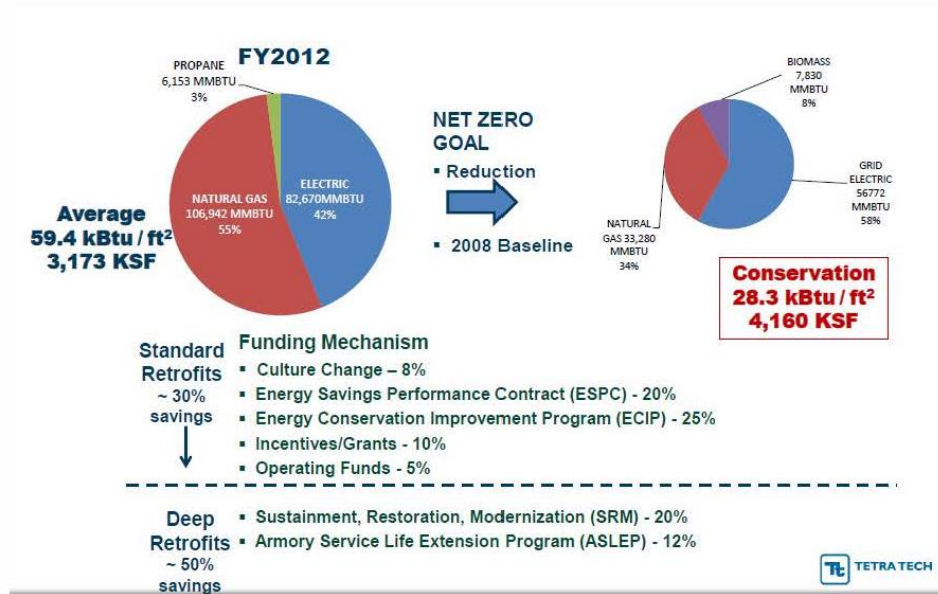


Figure 3. Oregon Army National Guard Net Zero Energy Targets and Goals

Source: Oregon Military Department, “Net Zero Briefing to The Honorable Richard Kidd DASA (E&S)” (Presentation, Salem, Oregon, May 16, 2013), 7.

The Oregon Army National Guard is participating with the Energy Trust of Oregon in a Strategic Energy Management Program where they are identifying strategies to meet Net Zero challenges. In this program, Energy Trust of Oregon provides assistance with strategies on both the technical and human sides of energy conservation. In the human, or behavior change elements, they provide assistance with “behavior based



energy management strategies and activities . . . to engage all employees and building occupants” (Energy Trust of Oregon 2013, 3). During the scheduled workshops that are part of the program participants, including the Oregon Army National Guard work with Energy Trust of Oregon to establish and implement personnel awareness and engagement activities (Energy Trust of Oregon 2013, 3).

Additional assistance strategies from Energy Trust of Oregon are outlined and examples given in a short video from their website. The video claims energy behavior change efforts have achieved up to 25 percent reductions in energy use (Energy Trust of Oregon 2014). The video also provides examples of employee engagement activities including energy fairs held at employer work places that allow employees to see examples of how they can conserve energy and competitions for energy savings between departments within the company (Energy Trust of Oregon 2014).

Energy behavior change efforts at Fort Carson, Colorado are part of a large information campaign and recognition program. Installation leadership and the department of public works (DPW) produce newsletters distributed to all building tenants and housing occupants that outline energy use reduction efforts and identify personnel recognized for energy saving efforts throughout the installation (Fort Carson Department of Public Works 2013b).

While this paper will not address operational energy as part of Net Zero, the Army’s operational energy policy does have an effect on energy behavior and culture at installations. Looking at Army policy and documents about operational energy helps us understand the importance of energy conservation and efficiency in the operational realm, and how it can bleed over into the installations realm. Any increase in energy awareness

by Soldiers is likely to have a positive effect on energy behavior provided they make the connection between operational and installation energy. In fact, it may be easier to change energy behavior in operations as Soldiers see it as more critical to mission accomplishment and can more clearly understand direct benefits of conservation.

Secretary of the Army John McHugh signed the Army Operational Energy Policy in April of 2013. The memorandum defines operational energy as “the energy required for training, moving, and sustaining military forces and weapons platform for military operations. The term includes energy used by tactical power systems and generators and weapons systems” (Secretary of the Army 2013, 1). Items included that are key to this thesis include establishing policy to do the following:

1. Enable energy informed operations by integrating energy considerations into operational planning activities.
2. Integrate operational energy into the Army capability development process by including energy as a key performance parameter in accordance with Joint Capability Integration and Development System guidance.
3. Reduce energy consumption in order to reduce the frequency and vulnerability of energy-related resupply operations.
4. Increase the use of renewable energy, developing operationally viable alternative energy sources, expanding flexibility in system energy use and integrating energy networking capabilities.
5. Establish an energy informed culture through education, training, and awareness programs that values energy as a resource that enables enhanced

capabilities (agility, endurance, flexibility, resilience) and lowers operational risk.

6. Integrate sustainability into the Army operational culture with attention to reducing adverse impacts on the environment (Secretary of the Army 2013, 2).

DOD, other Military Branches, other Government  
Agencies, Civilian Organizations

Guidance for energy efficiency in the executive branch begins with executive orders including the most recent from President Barak Obama, Federal Leadership in Environmental Energy, and Economic Performance, which directs that all new federal buildings programmed after 2020 meet Net Zero energy goals by 2030 (US President 2009, 4). Army efforts are consistent with DOD guidance for energy behavior and culture change. This executive order also established a steering committee on federal sustainability, which is an interagency committee that includes senior sustainability officers from each government agency (US President 2009, 6). The order requires that each federal agency designate a senior sustainability officer which should be a senior management official (US President 2009, 8). It also establishes a council on environmental quality and assigns the chair the duty of administering the Presidential leadership awards program to recognize agencies for outstanding performance in achieving the goals of the executive order (US President 2009, 7).

The DOD publishes annual energy management reports that identify trends and goals that give a broad overview of energy use (Department of Defense 2013). All branches of the U.S. military are actively pursuing energy behavior and culture change

initiatives. The documents outlining those efforts provide additional insight and an ability to compare Army efforts to the other branches of service and federal government.

The Department of Energy (DOE) has been key in implementing requirements to not only itself, but also assisting other government agencies including the Army. DOE conducted independent research and collaborated with Army installations to conduct research into energy behavior change. Pacific Northwest National Laboratory (PNNL), a DOE research facility, conducted research into behavior required to achieve Net Zero goals at Fort Carson, CO. The researchers identified the “need and opportunity to better understand the roles of occupants and the factors that shape their behavior, including default conditions, institutional frameworks, organizational culture, peer pressure and more” (Judd et al. 2013, iii). They also point out the importance to “Understanding the relative impact of technology-based vs. occupant behavior-based strategies—and combinations of the two—is a key to learning how to make high performing green buildings commonplace” (Judd et al. 2013, iii). PNNL conducted a demonstration project in five green buildings on Fort Carson and focused on two occupant behaviors; shutting down computers at night and turning thermostats down five to ten degrees at night during the heating season (Judd et al. 2013, iii). They engaged occupants through several mechanisms corresponding to eight principles associated with behavior change. The eight principles were:

1. Social Network and Communications Principle: Institutions and people change because they see or hear of others (e.g., individuals, groups, institutions) behaving differently.
2. Multiple Motivations Principle: Institutions and people almost always change their ways of doing things for more than one reason.

3. Leadership Principle: Institutions and people change because the workplace rules change and leadership communicates their commitment in a visible way.
4. Commitment Principle: Institutions and people change when they have made definite commitments to change, especially when those commitments relate to future conditions.
5. Information and Feedback Principle: Institutions and people change because they receive actionable information and feedback.
6. Infrastructure Principle: Institutions and people change because a changed infrastructure makes new behaviors easy and/or desirable.
7. Social Empowerment Principle: Institutions and people change when they feel they can reach desirable social goals.
8. Continuous Change Principle: Institutional change is an iterative process and takes time (Judd et al. 2013, 4).

The authors point out that these principles do not work by themselves but must be used together to realize behavior change (Judd et al. 2013, 4). Further, they assert deeper understanding that addresses energy behavior at multiple levels and in multiple ways are now replacing simple views of behavior change (Judd et al. 2013, 5). The key research questions the researchers proposed were:

1. How do occupants of green buildings interact with building features?
2. How do occupants of green buildings perceive their work environment?
3. What behaviors have the greatest potential to save energy?
4. What approaches are most effective at promoting energy saving behaviors in buildings? (Judd et al. 2013, 13).

There were a few issues with the research that were interesting when considering energy behavior and attempts to influence it. First, less time was available to conduct the study because there were “delays in scheduling meetings with senior leadership support for the intervention” (Judd et al. 2013, 15). Additionally, there was a “low response rate

to the baseline survey in three of the five buildings” which kept the research team from conducting direct comparisons of pre and post intervention data (Judd et al. 2013, 15). Soldiers were the primary occupants of the three buildings with extremely low responses. Primarily civilians occupied the two buildings with higher response rates. Of all of the responses, approximately 80 percent were from civilians (Judd et al. 2013, 17). It was noted that the 4/4 Brigade Combat Team (BCT) units “were rotating between deployment and the reset/training phases of the Army Force Generation ARFORGEN cycle” (Judd et al. 2013, 15). The ability to maintain changes in behavior was difficult. As seen in figure 4 below, each building had increases in the numbers of computers shut down at night. However, the number decreased by the end of the study. Also notable is buildings 9420, 94497, and 9472 are those primarily occupied by Soldiers and have the lowest rates of behavior change overall while buildings 1118 and 1219 are primarily occupied by civilians and have much higher rates of change (Judd et al. 2013, 23).

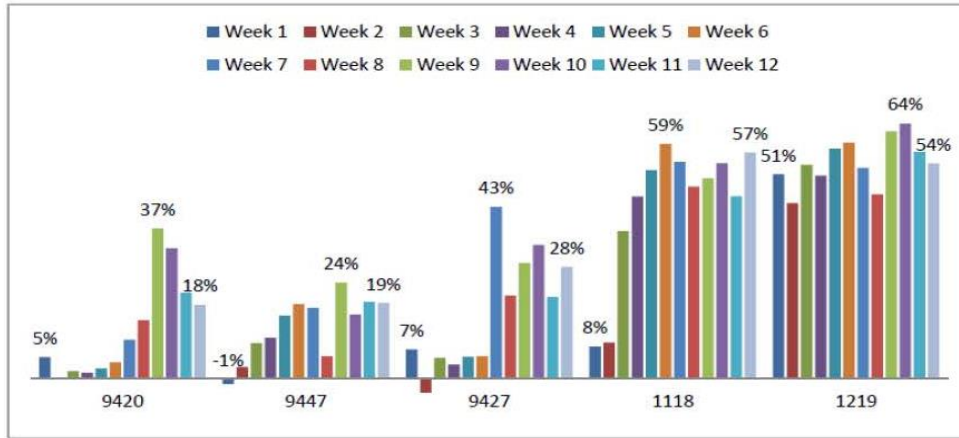


Figure 4. Percent of Computers Shut Down at Night by Building

Source: K. S. Judd, M. Zalesny, T. Sanquist, and N. Fernandez, *The Role of Occupant Behavior in Achieving Net Zero Energy: A Demonstration Project at Fort Carson* (Alexandria, VA: National Technical Information Service, 2013), [http://www.pnnl.gov/main/publications/external/technical\\_reports/PNNL-22824.pdf](http://www.pnnl.gov/main/publications/external/technical_reports/PNNL-22824.pdf) (accessed January 15, 2014), 23.

Note: Percent of Computers Shut Down at Night by Building Based on Computer Network Scans (numbers represent first week, final week and highest compliance rates).

Key findings the researchers noted were that “Behaviors were most likely to change when there was an engaged advocate for energy conservation providing information on specific energy saving actions and feedback on performance at the building level, and also when people in leadership and supervisory positions reinforced the importance of taking these actions” (Judd et al. 2013, 41). Key implications they noted were that change agents must coordinate policies, communication, and communicators to ensure making behavior change possible by effectively communicating the policies with reinforcement by trusted leaders (Judd et al. 2013, 42). It is also important to make desired behaviors specific and relevant. Broad based awareness programs are not as effective as targeted information (Judd et al. 2013, 43). Social

reinforcement is important and organizations must conduct it through trusted sources on a regular basis (Judd et al. 2013, 43). It is also important to provide personnel with resources and information required to implement the desired behavior change (Judd et al. 2013, 44). They went on to suggest general principles to apply when attempting to change energy behavior. They are as follows:

1. Work with the tenant organizations to help define the operating and social reinforcement process.
2. Leadership of the organization and work group levels need to be committed to the social reinforcement process for energy reduction, and demonstrate it through active participation and periodic acknowledgement.
3. A responsible person at the building or work group level must be accountable, knowledgeable, and properly resourced to observe how energy is being used, identify opportunities for conservation, and engage occupants and others in resource conservation behaviors.
4. Accountability requires that encouraging others to conserve energy is part of someone's job, not an add-on responsibility for an already overworked individual (Judd et al. 2013, 44).

When identifying an advocate for energy management, in the case of Fort Carson a Building Energy Monitor (BEM) it is important to ensure an organization identifies the right person. This is not a position an organization should assign to just anyone as an additional duty without regard for their interpersonal and other organizational and coaching skills (Judd et al. 2013, 45).

As part of its overall energy strategy, the Air Force has developed an energy culture change plan. The plan outlines steps the Air Force will take and the end state it intends to reach in terms of energy culture and behavior change (Department of the Air Force 2013). As part of its energy culture change plan, the Air Force instituted the "I am Air Force Energy" campaign.



Civilian organizations, developers, builders, and professional associations all contribute to the body of knowledge for Net Zero energy buildings and development. Most of it focuses on technological and mechanical innovation and application while only a small amount of this work addresses energy behavior and culture change. Much of the work that mentions behavior change does so in an overarching way, simply identifies it as an aspect, or assumes behavior change will occur without providing further details.

### Academic Research

There are volumes of research on behavior, motivation, and culture in general. However, the body of peer reviewed academic research into what motivates energy behavior and strategies for influencing it is surprisingly small. Relatively few periodicals have published peer-reviewed research into the topic and one finds only a handful of articles in them. While the articles available do lend insight, more research is required to identify tested strategies for influencing energy behavior and consequently changing energy cultures in organizations.

In an article on employee electricity saving behavior, Yixiang Zhang came to several pertinent conclusions. The researchers developed a model to study antecedents of employee electricity saving behavior. Most importantly, they concluded that when personnel perceive a high level of awareness of consequences for the energy behavior they are more likely to develop more personal energy saving behaviors especially when combined with a perceived sense of personal responsibility for energy behavior and an overall organizational energy saving climate (Zhang, Wang, and Zhou 2013, 1126).

Ping Jiang looked at the role of individual behavior in building low carbon communities and came to several conclusions that have bearing on this thesis. The

research looked a case study project for Building a Low Carbon Campus at Fudan University. One of the more important conclusions of the study was that in spite of energy conservation policies implemented, carbon emissions increased by 5 percent between 2007 and 2009. Based on this and other findings, the researchers concluded that a “top-down” approach lacked participatory engagement and that simply telling people “what to do” is not effective at promoting behavior change. They found that accurate and useful information provided to students and faculty was more effective in motivating them to make environmentally friendly behavior changes. Information they used included awareness on climate change and energy conservation. The researchers established a website to share information and learning experiences and to capture and create new ideas for conservation. They also used technology to influence individual behavior including a credit card system to track energy use. Researchers used these individual behavior change examples in conjunction with, and derived from sound policies, good infrastructure, and reasonable systems at the university (Jiang et al. 2013, 618-619).

Researcher Janet Stephenson suggests that one must accomplish behavior change within a cultural understanding of the target population and offers an Energy Cultures framework within which to work. This framework attempts to provide a way to understand cultural factors that influence energy consumption behavior and identify opportunities for behavior change. In the study, Stephenson points out that one cannot consistently link energy behavior decisions to rational economic decisions (Stephenson et al. 2010, 6120). There are other cultural factors that influence energy behavior decisions such as perceived lifestyle and material culture. The framework they recommend suggests that energy behavior can be understood “by examining interactions between

cognitive norms, (e.g. beliefs, understandings), material culture (e.g. technologies, building form) and energy practices (e.g. activities, processes)” (Stephenson et al. 2010).

Figure 5 shows these aspects interact with one another.

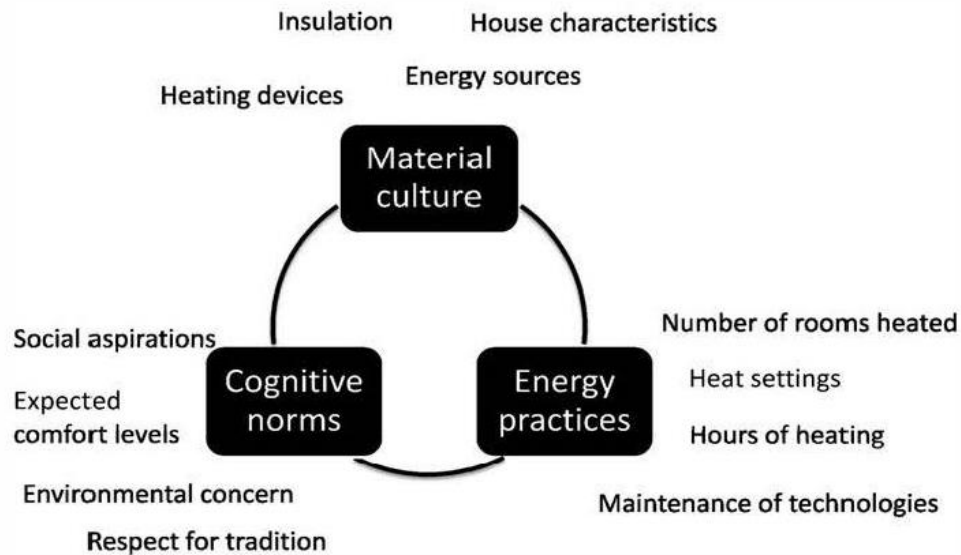


Figure 5. Energy Cultures Framework Interactions

Source: Janet Stephenson, Barry Barton, Gerry Carrington, Daniel Gnoth, Rob Lawson, and Paul Thorsnes, “Energy Cultures: A Framework for Understanding Energy Behaviours,” *Energy Policy* 38, no. 10 (October): 6124.

Also important in energy behavior choices is the interaction of social forces with technology, or what the author refers to as a socio-technical system (STS). This is used to describe the complex interactions and “entrenching cognitive, social, economic, institutional, and technical processes that sustain existing trajectories of development” (Stephenson et al. 2010, 6121). Much research focused on how these interrelated processes build a culture that is then hard to change resulting in difficulties for changing

energy behavior. Therefore, changing behavior is not straightforward and must be understood and conducted within the understanding of the culture (Stephenson et al. 2010, 6121). The author concludes that it is important to bridge the gap between influencing the individual and understanding and influencing the overall culture within which you are attempting to conduct change. They also suggest that culture does not determine an individual's cognitive norms; rather they provide structure for those norms. They also suggest that their method can identify "clusters of energy cultures" with similarities in material culture, practices, and cognitive norms (Stephenson et al. 2010, 6127). Finally, they conclude energy policy and programs can affect energy behavior of the individual and of groups, but the policy must be carefully crafted to take into account the energy culture of the target group or individuals (Stephenson et al. 2010, 6128).

Researcher Jillian Sweeney attempts to build on previous research described above by exploring "how social and cultural factors, such as knowledge, norms, and technologies, and situational factors interact with motivations, barriers, and support to influence energy saving behaviours" (Sweeney et al. 2013, 372). They expand on the framework introduced by Stephenson by including potential barriers and support to each of the factors of cognitive norms, material culture and energy practices as seen in figure 6.

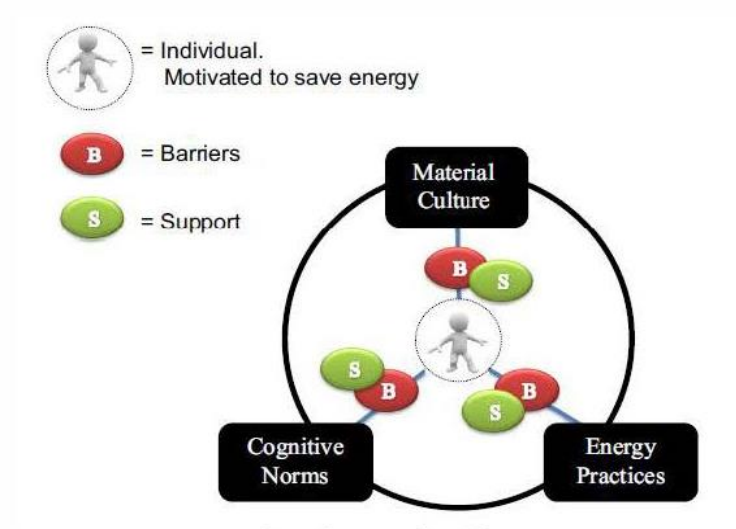


Figure 6. Energy Cultures Framework Barriers and Support

*Source:* Jillian C. Sweeney, Johannes Kresling, Dave Webb, Geoffrey N. Soutar, and Tim Mazzarol, “Energy Saving Behaviours: Development of a Practice-Based Model,” *Energy Policy* 61 (October 2013): 373.

One can generally group and identify barriers and support in association with each aspect in the model. It is important to identify these barriers to support if an organization makes any attempt to change energy behavior (Sweeney et al. 2013, 377). In this paper they point out that increasing awareness through information campaigns has weak and short-lived effects on energy behavior change, especially if the information is not tailored to the individual (Sweeney et al. 2013, 372). Another important finding, from this research, is that attitudes and values are not necessarily sufficient to effect energy behavior (Sweeney et al. 2013, 379). Also important is the idea that implementing correct support mechanisms whether through technology, community and, or government can positively affect energy behavior change (Sweeney et al. 2013, 380).

Researcher Charles Scherbaum points out that while there is significant research on individual energy behavior in the home and in public settings, there is little research on individual energy behavior in organizations or businesses. Consequently, we know little about how to affect energy behavior in the workplace (Scherbaum, Popovich, and Finlinson 2008, 819). He points out that previous research conducted focused on organizational level effects. In other words, research focused on what structures, policies, and interventions organizations put in place to affect energy behavior and much less on individual factors (Scherbaum, Popovich, and Finlinson 2008, 820). Scherbaum identifies five variables that affect what he calls environmental behavior. They are personal values, environmental worldview, awareness of adverse consequences, belief that he or she can initiate action to reduce adverse consequences, and individual personal norms for environmental action (Scherbaum, Popovich, and Finlinson 2008, 821-822). In this research, they found that “environmental personal norms were a statistically significant predictor of self-reported conservation behaviors at work, as well as behavioral intentions” (Scherbaum, Popovich, and Finlinson 2008, 830). Additional findings included “that environmental worldviews were a statistically significant predictor of environmental personal norms, and environmental personal norms mediated the relationship between environmental worldviews and reported conservation behaviors and behavioral intentions” (Scherbaum, Popovich, and Finlinson 2008, 830). When considering what factors they should use to influence individual energy behavior, the researchers identified environmental personal norms and environmental worldviews as potential leverage points. They then suggest, “An organization can also persuade

employees that energy use is an issue to be concerned with to modify their personal norms” (Scherbaum, Popovich, and Finlinson 2008, 831).

Research by Nicola Corradi reminds us that individual cognitive mechanisms are required to make consistent energy saving behavior decisions even for those who have a worldview or cognitive norm that supports making those behavior decisions. They recommend designing and implementing information and training efforts with these requirements in mind (Corradi et al. 2013, 94).

Research conducted by Michael Coleman suggests that providing energy use feedback in the workplace at the individual level has potential to influence energy saving behavior. However, there are limitations due to cultural and contextual use and collection of the information. Therefore, it may be more useful as part of a “broader ‘collective’ strategy” to influence behavior that includes individual energy use information (Coleman et al. 2013, 648). Using this information and applying it to a collective approach may allow organizations to leverage peer competition and may also allow individuals to compare themselves to their past energy use (Coleman et al. 2013, 648). He continues to point out that using individual energy feedback in a larger integrative approach allows organizations to deliver feedback to users either individually or collectively at levels which they can influence. Doing so takes into consideration and leverages the underlying cultural and contextual systems that drive people to use energy in a particular way in the first place (Coleman et al. 2013, 649).

In an article for *Livebetter* magazine online, the authors outline a study at Fort Belvoir comparing four houses. The first house was the control for the study and had no built-in energy efficiency mechanisms. The second house had improved insulation in the

attic. The third house had improved insulation in the attic as well as all exterior walls. The fourth house had all of the improved insulation as well as several other energy efficiency upgrades including rooftop solar, motion sensors, and better windows. Researchers monitored all houses for energy use. At the end of the study, they found the control house had the lowest energy consumption. Additionally, they found the fourth house, with the most energy efficiency upgrades, had the highest energy use. When data was analysed, it became apparent the behavior of the occupants was the determining factor in overall energy use, not energy efficiency upgrades. The occupants in the control house did several things to conserve energy such as turning lights off when leaving rooms, opening windows instead of running air conditioning, and rarely using the automatic dishwasher (Andres and Loudermilk 2011). The article points out that behavior based energy campaigns are relatively new to the military but not to private industry. Private industry has shown that these energy savings campaigns can produce up to 20 percent reductions in energy use. They also point out the difference in motivation for saving energy in private industry where they have significant economic motivations. The military, as a not-for-profit enterprise does not have the same focus on profits (Andres and Loudermilk 2011). Rather than profits, the military focuses on operations and mission accomplishment. They also point out the dis-incentive that the military, like all other government organizations, has for saving money. When a unit saves money, they are decremented in their next year's budget. They go on to propose that the military is in a unique position to change its energy culture by communicating the idea that energy consumption is central to its organizational mission accomplishment (Andres and Loudermilk 2011). They identify two primary ways the military can promote energy



culture change. First, is what they call “message delivery” or communication from the highest levels of the military that conservation is a priority. Second is by appealing to human instincts of competition and incentives. While the military is at a disadvantage to provide financial incentives, it is at an advantage for instituting and making changes stick in the culture. Because it is adept at routinizing behavior, the authors assert that then it is much more likely to become part of the culture. They see three main hurdles remaining for the military to institute energy behavior change. First is the lack of experience in softer sciences involved in behavior change. It is much easier to purchase energy efficiency for \$100,000 than to spend \$10,000 on a behavior change campaign that could achieve the same results. Second is that research has largely developed science for behavior change by and for private institutions. The military must adapt the application of that science to its unique structure and culture. Finally, the same issues that apply to hard science apply to softer science. For example, getting a project from experiment to implementation in the field is extremely difficult. It is just as difficult, if not more to move from a behavior experiment in one building, on one installation to implementation of a strategy across the military (Andres and Loudermilk 2011).

## CHAPTER 3

### RESEARCH METHODOLOGY

#### Introduction

This research study examined current Army energy behavior change effort with three sets of information. It compared Army programs, first to Army doctrine and guidance on change, second to DOD directives and guidance on energy behavior change, and finally to recent applicable academic research on energy behavior change. The researcher went through a process of problem identification, research question development, collection of material and information, organization of facts, and drawing conclusions.

#### Identification and Isolation of the Problem

Initial identification of the problem came when the researcher identified the amount of energy reduction required through behavior change for the Oregon Army National Guard (ORARNG) to meet its Net Zero energy goals. As a member and full-time employee of the ORARNG working in the Installations Division, the researcher is familiar with the organizations participation in the Army Net Zero energy program as one of the pilot installations. With a background in environmental compliance, the researcher has direct experience and understanding of the effort required to change behavior in order to meet environmental compliance objectives. With more than 27 years of service, the researcher is also familiar with the culture of the military and the Army in particular. These observations led to questions about how the Army might attempt to affect energy behavior change in light of these issues.

### Developing the Research Question

As the researcher reviewed material to determine the Army's approach to energy behavior change, it became clear that while the Army was making progress and putting forth a great deal of effort, there were gaps in its approach. These observations led to the research question: What gaps exist in the current Army approach to accomplish the behavioral and resulting cultural change required to meet Army Net Zero energy goals?

### Collecting and Classifying Material

Information collection developed in two major areas. First, the researcher attempted to identify what the Army is currently doing to create energy behavior change. Second, the researcher attempted to identify what the Army should be doing to affect this change. This approach primarily attempts to identify whether the Army is doing the right things. In some cases, it also attempts to identify whether the Army is doing things right.

In an attempt to collect information on what the Army is currently doing to create energy behavior change, the researcher contacted the office of the Assistant Secretary of the Army for Installations, Energy & Environment (ASA (IE&E)). This office is the proponent for Army Energy and the Army's Net Zero programs. They provided several key documents which aided the research greatly. The researcher also mined ASA (IE&E) and other Army energy related websites for information on energy behavior change. The researcher then contacted all of the installations currently participating in the Net Zero energy pilot program. Several installations provided key documents describing their current and planned energy behavior change projects and programs. The researcher also gathered information from these installations' websites.

In order to determine what it should be doing to affect change, the researcher identified three sets of information that would provide guidance to the Army. First, the researcher looked at Army doctrine. ADRP 6-22, *Army Leadership* provides the Army's doctrine for managing change. It briefly outlines and credits the model developed by John Kotter and described in his book, *Leading Change*. The researcher used Kotter's book as an extension of Army doctrine on change. Next, the researcher located documents on DOD energy websites that provide direction and guidance to the Army on energy management including energy use reduction through behavior and awareness campaigns. Finally, in an attempt to identify information that might add value, or updates to Army doctrine and DOD guidance, the researcher collected and used current academic research articles on energy behavior change in large organizations.

### Organizing Facts into Results

In order to answer the primary research question, the researcher qualitatively compared current Army energy behavior change effort to three sets of information. First he compared Army programs to Army doctrine and guidance on change, second to DOD directives and guidance on energy behavior change, and finally to recent applicable academic research on energy behavior change. The researcher compared Army energy behavior change effort on two levels, both at the larger, Army-wide level and at the installation and below.

Army-wide energy behavior change effort includes projects and programs from the Secretary of the Army down to the installation. This includes project and program information found on the Department of the Army websites as well as documents prepared by and for the Army on energy, energy behavior, sustainability, and Net Zero.

Installation and below energy behavior change effort include all related programs and projects executed at the installation level, down to the building, unit or section. The researcher used information from Army Net Zero energy pilot installations in this study. He did not use energy behavior change information from installations not included in the Net Zero pilot program. The researcher used information on Army programs from the highest level of the Army down to buildings and units on installations in order to capture aspects of energy behavior change in one level which may not be apparent in another. This also provides insight to the effect larger Army programs have at the installation level and below.

When comparing Army energy behavior change programs to Army doctrine on change the researcher primarily used information found in *Leading Change*, by John Kotter (Kotter 1996). The Army identifies Kotter's book as the basis for its change model in Army Doctrinal Reference Publication (ADRP) 6-22, *Army Leadership* (Department of the Army 2012). Comparing Army energy behavior change programs to DOD directives and guidance, the researcher used energy change guidance and directives such as the *Department of Defense Energy Managers Handbook* (Intuitive Research and Technology Corporation 2005). Comparing Army energy behavior change programs to current research, the researcher used a collection of recent and relevant research on energy behavior change in large organizations. The researcher used a mixed method of both qualitative and quantitative analysis to conduct this study. He primarily used qualitative analysis and used quantitative analysis in specific instances where data was available.

### Forming Conclusions

Comparing Army energy behavior change effort to the three sets of information described above led the researcher to identify several gaps in the Army's approach. The researcher organized gaps along the lines they were compared. First, the document outlines gaps compared to doctrine and the Kotter model. Second, the document outlines gaps compared to DOD direction and guidance. Third, the document outlines potential gaps as compared to current research. Finally, the researcher offers and discusses potential corrections or improvements in the Army's approach to energy behavior change processes. Chapter 5 outlines and provides these gaps and discussion.

### Summary

Chapter 4 contains comparisons of Army energy behavior change to Army doctrine and the Kotter change model, DOD guidance, and academic research on energy behavior change. The researcher will identify gaps between current Army energy behavior change effort and these three areas. The researcher will outline those gaps in the conclusions and discussion in chapter 5.

## CHAPTER 4

### FINDINGS AND ANALYSIS

#### Introduction

In this chapter, the researcher analyzed current Army energy behavior change effort in three ways as discussed in chapter three. First, he compared current Army energy behavior change effort to Army doctrine and guidance on change. Second, he compared current Army energy behavior change effort to DOD directives and guidance on energy behavior change. Finally, he compared current Army energy behavior change effort to recent applicable academic research on energy behavior and culture change.

#### Army Compared to Doctrine

In order to identify gaps or other issues with the Army approach to energy conservation behavior and culture change, the researcher compared current Army efforts both centrally and at Net Zero pilot installations to Army doctrine. Army Doctrine Reference Publication (ADRP) 6-22 outlines organizational change (Department of the Army 2012). It follows the eight-stage Kotter change model as discussed in chapter 2 (Kotter 1996, 21-24). In order to compare what the Army is doing to affect behavior change to its own doctrine; we must compare its efforts to the eight-stage Kotter model. A comparison of the stages of the Kotter model to Army efforts follows. The eight stages of the Kotter model are:

1. Establishing a sense of urgency
2. Creating the guiding coalition
3. Developing a vision and strategy

4. Communicating the change vision
5. Empowering broad-based action
6. Generating short-term wins
7. Consolidating gains and producing more change
8. Anchoring new approaches in the culture (Kotter 1996, 21-24).

Stage one of the Kotter model is: Establish a sense of urgency. There are several issues identified when comparing Army actions against the nine reasons Kotter points out for lack of urgency. The first issue is the absence of a visible crisis (Kotter 1996, 41). The Army attempts to use energy awareness and associated costs to identify a crisis. For example, IMCOMs Building Energy Monitor (BEM) Guide in the first pages calls out the following facts in bold, highlighted text:

Most of us take energy for granted. But the cost and impact of inefficient energy use is startling:

Americans waste upwards of \$300 billion a year in energy: more than the entire military budget and enough to increase personal wealth by more than \$1,000 per American per year.

Energy production and use account for nearly 80 percent of all pollution and nearly 90 percent of heat-trapping greenhouse gas emissions, and more environmental damage than any other human activity.

Utilities account for an average of 40 percent of your Command's operating support budget. (U.S. Army Garrison, Wiesbaden 2014, 3)

By identifying energy use in this way, the guide intends to give the reader a sense that the amount of energy they use is unacceptable, costs a lot of money and they should attempt to conserve it. One of the issues with this approach is the numbers used are often too large to be relevant to the reader they are trying to influence. When dollars spent on energy enter the billions, the user at an Army installation may have difficulty relating to



the amount or may not believe they can affect the outcome significantly. If the organization wants to influence personnel, they must believe they can initiate action to reduce adverse consequences (Scherbaum, Popovich, and Finlinson 2008, 831). In addition, even though the example above shows the reader they could save up to \$1,000 by conserving energy, it is not tied to anything which indicates a crisis. Simply increasing awareness without tailoring it to individuals and considering their culture provides weak and short-lived results (Sweeney et al. 2013, 377-378).

The second block to developing a sense of urgency is having too many visible resources (Kotter 1996, 41). This issue is highly variable throughout the Army depending on one's location and position or rank. Compared to conditions while deployed, it is easy for Soldiers to get the impression there is no shortage of resources back at their home installation. The ability to obtain leadership involvement in energy conservation behavior change is tied to apparent abundance at higher levels of command. It appears to the casual observer; those in higher-ranking positions do not lack resources. While this is often necessary and reflects the requirements of their position, it provides visual confirmation of abundance not only to Soldiers of lower rank, but also to those actively involved in producing energy change. According to Kotter, apparent abundance affects everyone involved in the change process (Kotter 1996, 45). If leaders' surroundings constantly remind them there is abundance, they will not enthusiastically support the change effort. The effect of being at war over the past twelve years may have had a negative effect on perceptions of resources for the current generation of Soldiers. They understand resources are constrained in a combat environment. However, when they are in the United States preparing for deployment, the most common experience is you get

whatever you need. From rapid fielding and additional items purchased with contingency operations funding to additional ammunition and time on the range, in the United States, all things are seemingly in abundance. Leaders may even discuss energy and conservation during training or briefings, but the actions of the organization speak louder than words.

The third issue is setting internal standards too low (Kotter 1996, 41). The researcher was unable to find specific targets for individual energy behavior programs. There are targets set by many of the Net Zero pilot installations for overall energy reduction through behavior change. However, they have not tied these targets to any particular program or project intended to affect change. For example, the Oregon Army National Guard has set energy reduction goals based on culture change at eight percent (Oregon Military Department 2013, 8). However, it has not yet identified specific behavior change programs with target goals. Energy behavior programs at other facilities are in the beginning stages. Consequently, many of them are still trying to identify what behaviors they should and can affect, and have not yet set targets. For example, the USMA conducted behavior surveys, engaged cadets with posters, playing cards, and has provided a booklet with tips on saving energy, but did not indicate energy saving goals for their behavior change programs (NORESO 2012).

The fourth issue is a lack of accountability across the organization. The Army intends to hold energy users from the individual up to the installation and command accountable for their energy use. For example, the 2009 AESIS states, “Success lies in individual accountability for improved energy security through development and implementation of solutions to each organization’s energy security challenges” (Army

Senior Energy Council 2009, ii). The Army narrative *Changing Army Culture* declares the Army will “hold leaders accountable for energy performance” (Assistant Secretary of the Army for Installations, Energy and Environment 2013a, 1). This accountability, or ‘what gets checked is what gets done’ approach can provide a sense of urgency if the entities are required to report their energy use to a higher command in a meaningful way or energy use is part of their performance appraisal. A memorandum from the Vice Chief of Staff of the Army requires the IMCOM commander to ensure energy conservation responsibilities are part of position descriptions for key personnel. The statement “Ensures compliance with Army Energy and Water Conservation Program policies.” is included in the position description for the IMCOM commander and all region directors, Deputies to the Garrison Commander, Garrison Managers, Deputy Garrison Managers, Directors of Public Works, and the Army Energy Manager (Department of the Army 2014b). This ensures their supervisors can rate them on compliance with energy conservation, which provides direct accountability for those positions. It is notable that none of these are command positions.

The Army uses the Army Energy and Water Reporting System (AEWRS) to report all installation energy which authorized users at higher levels then access for energy data and reports (Department of the Army 2014a). All installations are required to input or upload energy use data into the system. The AEWRS database can generate reports to inform commands at all levels about energy use. Commands are required to submit a report on energy use through the chain of command annually using data from the AEWRS database. However, at the installation level, the researcher was unable to find any documents requiring building managers, directors, or unit commanders to report

through the chain of command in a way that would create accountability. In fact, Pacific Northwest National Laboratory (PNNL) conducted a study of the AEWRS program for the Army in which it posed a question to Army leadership as to whether “it wants to invest in expanding AEWRS capabilities as a web-based, enterprise-wide tool for improving the Army Energy and Water Management Program or simply maintaining a bottom-up reporting tool” (Deprez et al. 2011, iv). The residential communities initiative (RCI) provides some energy accountability for individuals in on-base privatized housing. The initiative which provides rebates for lower energy use and charges tenants for higher energy use is an effective accountability mechanism for residential buildings (Department of the Army 2009).

The Army attempts to link operational energy reduction efforts and installation energy programs to provide a sense of urgency at the installation level. Soldiers can readily link the need to reduce energy consumption on the battlefield to mission accomplishment. Less fuel used in generators leads to fewer fuel trucks on the road which requires fewer assets to conduct convoy security. Units can then use those assets to complete other missions. For example, the AESIS 2009 points out.

The central role of energy security for operational missions was highlighted in 2006 when the commanding general of the multinational force in western Iraq submitted a priority request to reduce the number of fuel logistics convoys. Although necessary, these convoys and the associated logistical fuel tail were increasingly vulnerable to attack and had the potential to jeopardize mission success. (Army Senior Energy Council 2009, 1)

Another example is the Army narrative *Changing Army Culture*, which includes the statement “Soldiers must recognize energy security as an attribute of individual Soldier discipline; waste and inefficiency put other Soldiers at risk” (Assistant Secretary of the Army, Installations, Energy and Environment 2013a, 3). However, the researcher

has not identified any overt statements directly connecting operational energy and installation energy. Making this link and then tying it to energy use in a building can develop a sense of urgency at the user level. Without an overwhelming effort to overcome these barriers to urgency, there will not be enough people motivated to take action. In order for any change to be successful, at least 25 percent of an organizations member's must go well beyond the normal call of duty to implement the change. Seventy five percent of mid-level management must fully embrace and enact the change and nearly one hundred percent of senior leaders must fully and actively support the change in order for it to be successful (Kotter 1996).

Stage two of the Kotter model is: Create a guiding coalition. The Army has created several groups which are part of a guiding coalition. As part of its Army Energy Security Implementation Strategy (AESIS), the army created the Senior Energy Council which is co-chaired by the Vice Chief of Staff of the Army and the Assistant Secretary of the Army (Installations, Energy, and Environment) (Army Senior Energy Council 2009). This leadership provides both positional credibility and expertise to the guiding coalition. The soliciting and establishing of Net Zero pilot installations has had the effect of an Army-wide guiding coalition by creating a group of leaders at installations who are enthusiastic about Net Zero implementation. The Army created a competitive atmosphere when they solicited installations to submit for inclusion in the Net Zero pilot program. Installations had to show significant commitment to receive consideration and acceptance into the pilot program. Consequently, the installations have leaders and teams which serve as a guiding coalition to other Army installations. The Army also created the Army Energy Initiatives Task Force (EITF). The Deputy Assistant Secretary of the Army

(Installations and Housing) (DASA (IH)) heads the EITF. The main purpose of the EITF is to assist installations with funding mechanisms for renewable energy projects (Energy Initiatives Task Force 2014). It has had the effect of a guiding coalition by providing another place for installations to get and share ideas for implementing Net Zero. At the Installation level, guiding coalitions vary. For example, in the Oregon Army National Guard, the Facilities, Environmental Management Board (FEMB) is the primary group managing decisions about Net Zero. The Chief of Staff chairs the FEMB, which consists of representatives from each of the two brigades and a representative from each directorate in the Joint Forces Headquarters (JFHQ). This provides the guiding coalition with credibility based on positions. The Director of Installations is also on the FEMB which gives the coalition expertise. However, Net Zero is not the FEMBs primary focus or concern, but one of many programs they oversee. Consequently, the change effort can get lost in the large amount of information the group considers at each meeting. Other installations have similar committees directed to serve as the guiding coalition for any change process. At the user level and building level, Installations Management Command (IMCOM) has established a program and training for Building Energy Monitors (BEMs). The intent of the BEM program is to have a cadre of personnel at the building level who monitor and evaluate energy use and recommend energy efficiency opportunities to the installation manager. This is an effort to develop a guiding coalition at the building user level.

Guiding coalitions, established at the highest levels of the Army, are necessary to ensure adequate management of energy programs. They include members with sufficient positional power and credibility, such as the VCSA at the highest level and the Deputy to

the Garrison Commander or Chief of Staff at the installation level. Army leadership at all levels normally changes every two to five years. Consequently, the level of buy-in often changes at the same rate. Civilian DPW or installations staff remain much longer, and provide continuity to the guiding coalition. However, they often do not have the positional power to lead the group successfully. When we look at the attempt to establish a coalition of personnel at the user level through the BEM program, there are different issues. Assignment as the BEM is an additional duty. Consequently, it will only get as much attention as the supervisor of the BEM allows. The other issue with the BEM program is ensuring the right person is in the position. Often, units or organizations assign the newest or lowest ranking person this type of additional duty without considering their propensity to promote the program. This leads to low effort, or even antagonizing effort, by the person assigned to promote the program. The Army states there is a high level of commitment from leadership at all Net Zero pilot installations (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, 5-6). However, we must measure leadership commitment, not by signed policy memorandums, but by actions, which reinforce energy conservation measures. Too often large organizations like the Army have competing interests which make it seem as though leadership does not fully support an initiative (Pape 2008, 26-27).

Stage three of the Kotter model is to develop a vision and strategy. The Army Energy Website outlines the vision for Net Zero overall and for Net Zero Energy specifically. According to the website:

The Army's vision is to appropriately manage our natural resources with a goal of net zero installations. Today the Army faces significant threats to our energy and water supply requirements both home and abroad. Addressing energy security and

sustainability is operationally necessary, financially prudent, and essential to mission accomplishment. The goal is to manage our installations not only on a net zero energy basis, but net zero water and waste as well. We are creating a culture that recognizes the value of sustainability measured not just in terms of financial benefits, but benefits to maintaining mission capability, quality of life, relationships with local communities, and the preservation of options for the Army's future. The Army is leveraging available authorities for private sector investment, including using power purchase agreements (PPA), enhanced-use leases (EUL), energy savings performance contracts (ESPC), and utilities energy service contracts (UESCs) as tools to achieve these objectives. The Army must invest in its installations and improve efficiencies in energy, water and waste for the benefit of our current and future missions. (Department of the Army 2013a)

While Army doctrine does discuss the importance of vision statements and gives broad guidance on their purpose and structure, it does not specify how they should be formulated for greatest effect. However, if we look to Kotter, whose change model the Army uses, he identifies three important purposes for a good vision. First, it simplifies multiple implied decisions by clearly stating the general direction of the change. Second, it motivates action that may not be in personnel's short term interests. Third, a good vision aligns individuals and coordinates actions efficiently and effectively (Kotter 1996, 72). Kotter goes on to say successful visions have six characteristics. They must be imaginable, desirable, feasible, focused, flexible, and communicable (Kotter 1996, 73).

When we compare the Army vision for net Zero to the description and requirements presented by Kotter, it should describe an activity or organization as it will be in the future (Kotter 1996, 74). The vision stated above does not directly reference the future, but statements about goals indicate future reference. It should be in the interest of most of the stakeholders (Kotter 1996, 75). Identifying operational necessity, mission capability, quality of life, local communities, and fiscal responsibility as part of the vision captures most of the stakeholders. Based on current technology, one can easily argue the vision is realistic. The vision should be clear and direct enough to inspire action but still



broad enough to allow flexibility and initiative. It should also be easy to communicate and understand (Kotter 1996, 77-78). The vision above outlines specific spending authorities and mechanisms for funding Net Zero investment. While doing so provides more direction, it also runs the risk of being more directive than necessary and narrows the focus of the vision on funding mechanisms. It also makes the vision more difficult to communicate by adding jargon, which only a narrow segment of Soldiers and civilians will understand.

We can also look at courses on vision taught at the Command and General Staff Officer's Course (CGSOC) for guidance on vision statements. A lesson developed by Carey W. Walker and Matthew J. Bonnot boils a vision down to three essential elements, which include what, why, and how (Walker and Bonnot 2012, 2). When comparing the vision statement above against these standards, it appears to fall short in at least one area. In the case of 'what', the first statement identifies the Army as "developing a culture that recognizes the value of sustainability measured not just in terms of financial benefits, but benefits to maintaining mission capability, quality of life, relationships with local communities, and the preservation of options for the Army's future" (Department of the Army 2013a). This statement does identify a desirable end state for the Army but it is not immediately clear to the researcher this identifies a 'what' the Army wants to be in terms of Net Zero. Looking at 'why', this vision identifies "significant threats to our energy and water supply requirements both home and abroad" (Department of the Army 2013a). It also identifies "Addressing energy security and sustainability is operationally necessary, financially prudent, and essential to mission accomplishment" (Department of the Army 2013a). These statements clearly identify reasons for pursuing Net Zero. In terms of

‘how’ the statement details several financial authorities as strategies to leverage government dollars and identifies the need for investment in energy efficiency. These details provide certain means to accomplish Net Zero and therefore meet the definition of “how.”

Stage four of the Kotter model is: Communicating the change vision. The Army provides its vision for Net Zero on two of its websites. However, the researcher was unable to find the vision statement in any other Net Zero related documents published by or for the Army or any of the Net Zero pilot installations. When comparing its efforts to the seven elements identified with effective communication, the Army shows mixed results. The first element is eliminating jargon or technical words to allow communication with less time and energy. As noted above, the inclusion of specific funding and investment vehicles and associated acronyms in the vision narrative betrays this element. Only those involved in funding programs or projects need to be familiar with these terms. The second element is using metaphors, analogies, or examples when communicating the vision. At the highest levels, this element may not be necessary. Therefore, it is understandable if documents intended for higher-ranking members do not use them. Communication tools identified at the installation level use some metaphor, analogy, or examples. For example, Fort Carson uses posters promoting energy conservation asking personnel to “Be a Net Zero Hero” (Fort Carson Department of Public Works 2013a) and reminds them to turn off computers and use natural light whenever possible. The USMA slogan for energy conservation is “Less Waste, More Fight” (NORESO 2012). It uses the slogan on posters and playing cards distributed throughout the installation and to personnel. Third, an organization should communicate

the vision not only multiple times, but also using multiple methods. This may be the largest shortcoming of the Army’s communication campaign. While there are traditional posters and occasionally interesting methods such as playing cards used to communicate the Net Zero vision, most of the Net Zero energy pilot installations do not have information readily available on their public websites. A review of the websites found varying amounts of Net Zero, sustainability, or other environmental information as depicted in table 1.

Table 1. Net Zero Pilot Installations Website References to Net Zero and Sustainability

Installation	Homepage	DPW page	ENV page	Newcomer Info	Base Guide	PA/IO	Other
Parks Reserve Forces Training Area	0	0	1	N/A	N/A	0	N/A
Fort Bliss	0	2	0	0	0	0	N/A
Fort Carson	0	3		0	4	5	6
Fort Detrick	7	8	9	N/A	N/A	10	11
Fort Hunter-Liggett	12	0	0	N/A	N/A	0	13
Kwajalein Atoll	None	0	0	0	N/A	0	0
Sierra Army Depot	14, 15	0	0	N/A	N/A	0	0
United States Military Academy	0	16	N/A	N/A	N/A	0	17
Oregon Army National Guard	0	0	0	N/A	N/A	0	18

*Source:* DPW–Department of Public Works webpage; ENV–Environmental Office webpage; PA/IO–Plans Analysis and Integration Office webpage; N/A–Not Applicable. Page or section does not exist on website; 0–No information related to Net Zero found on webpage; 1–Draft Environmental Assessment Finding of No Significant Impact for Net Zero implementation (U.S. Army Environmental Command 2013b); 2–Energy branch vision includes meeting Net Zero goals. Energy branch vision

is located two web page levels below Department of Public Works page under Energy (Directorate of Public Works, 2014); 3–DPW Mission statement includes a reference to Net Zero Energy (Department of the Army, Fort Carson, 2014b); 4–Net Zero section found in Fort Carson Base Guide provides a basic description of Net Zero at Fort Carson (Department of the Army, 2014a); 5–Sustainable Fort Carson sustainability energy and water goals located under PA/IO webpage (Department of the Army, Fort Carson, 2011); 6–Fort Carson Environmental Battle Book located on DPW webpage provides a brief description of the Net Zero program at Fort Carson (Fort Carson Department of Public Works, 2012); 7–Website homepage title includes the phrase “A Sustainable Community of Excellence” (Department of the Army, Fort Detrick, 2014b); 8–DPW page highlights the Energy Conservation Program which outlines energy saving requirements and the building energy monitor (BEM) program (Department of the Army, Fort Detrick, 2011); 9–Environmental Office webpage refers to the Fort Detrick Energy Management Program and identifies energy reduction as a program focus (Department of the Army, Fort Detrick, 2014a); 10–Reduction in use of utilities and energy efficiency are identified as ways in the Strategy Map for Fort Detrick found on the PA/IO page (Department of the Army, Fort Detrick, 2012); 11–Sustainable Detrick page highlights sustainability and conservation efforts (Department of the Army, Fort Detrick, 2013); 12–Sidebar on Fort Hunter-Liggett homepage features a picture link to the FHL Solar Micro-grid Real-time monitor (U.S. Army Garrison Fort Hunter-Liggett, 2014b); 13–FHL Solar Micro-grid Real-time monitor webpage features real-time readings of solar energy generation with statistics (Fort Hunter-Liggett 2014); 14–Homepage provides a link to the draft finding of no significant impact and environmental assessment for Net Zero (U.S. Army Environmental Command 2013a); 15–The homepage also provides a link to environmental management system (EMS) awareness training (Sierra Army Depot, 2014). The training does not contain any references to Net Zero; 16–DPW Page provides a link to EA for the draft finding of no significant impact and environmental assessment for Net Zero (U.S. Army Garrison, Wiesbaden, 2014); 17–A Green Living Guide is available on the Department of Geography and Environmental Engineering page of the West Point website (Pfluger et al. 2012). 18–The ORARNG publishes an internal Net Zero newsletter located on the ASA (IE&E) website (Oregon Army National Guard, 2013).

As demonstrated in table 1, only one third of Net Zero pilot installations website homepages had any reference to Net Zero, sustainability or any other energy or environmental programs. Approximately 44 percent of installations had references on their department of public works pages and 56 percent had references in other locations on their websites or elsewhere on the internet. Identified in the notes for table 1, three of

the references were links to technical environmental assessment documents. Only two of the 18 references call for action on the part of the Soldier, employee, or tenant. Notably, Fort Detrick has references to conservation, sustainability, and Net Zero throughout their public website. They reference many of their longer standing sustainability efforts which precede establishment of the Net Zero program but now include Net Zero as a way to meet sustainability goals (Department of the Army, Fort Detrick 2014b). Installations may use other means to communicate their vision for Net Zero which are not readily apparent without access to internal web pages or visiting the installation. For example, according to the 2012 Net Zero progress report, “Fort Polk has made a particularly strong effort to bolster their awareness campaign, including Public Service Announcements, posters, articles in the base newspaper, and “providing “tweets” to the manager of the installation Twitter account” (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, 5).

The fourth element of effective communication is repetition. Again, while it is difficult to evaluate installations repetition of the vision without visiting them, looking again at the websites and other information readily available, only Fort Detrick and Fort Carson provide references to energy or environmental programs on more than half of the pages reviewed. The rest of the installations only refer to energy, conservation, or Net Zero in one or two locations anywhere in their websites. The Army website does not have any references to Net Zero on the homepage. However, searching the website or conducting a general web search for Army Net Zero quickly produces several references to Army Net Zero, Sustainability, and energy conservation programs. For example, the Army National Guard maintains a sustainability Facebook page as does the Assistant

Secretary of the Army (Installations, Energy and Environment). Both of these highlight energy and sustainability information.

The fifth, sixth, and seventh elements of effective communication are difficult to measure without visiting the installations. Leadership by example, explanation of seeming inconsistencies, and give-and-take communication are all elements better observed in person and preferably over a sufficient period. However, there are some indicators available in reference documents. According to the 2012 Net Zero Progress Report, “All of the Net Zero pilot installations have command buy-in for and senior level commitment to achieving Net Zero Energy, Water, and Waste goals because leadership buy-in is so important to installation-wide management initiatives” (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, 5). It goes on to state, “Senior leader support for Net Zero has been widespread, providing additional interest in and support for on-going sustainability efforts in other Army program areas” (Assistant Secretary of the Army for Installations, Energy and Environment 2013b, 6). While the progress report indicates leader buy-in, there are other contradictory indications. For example, when the Pacific Northwest National Laboratory was conducting behavior studies at Fort Carson, they had to delay the project several months due, in part, to “delays in scheduling meetings with senior leadership support for the intervention” (Judd et al. 2013, 15).

Stage five of the Kotter model is: Empowering broad based action. From the level of the whole Army, this is evident. Installations are empowered at their level to take necessary steps within guidelines set by the Army. Installations have identified Building Energy Monitors (BEMs) throughout the Army. One of their responsibilities is to identify

energy efficiency opportunities and make recommendations for implementation to the installation energy manager (U.S. Army Garrison, Wiesbaden 2014). While this does not empower BEMs with authority to enact energy-saving strategies at the building level, it does provide a conduit for installations to implement them. We see this type of moderated empowerment throughout Net Zero installations in the BEM program and other forums for feedback and suggestions. For example, the United States Military Academy (USMA) has an energy council which includes faculty, staff, and students. They also assign students as energy and environmental officers, who are a main conduit for feedback on energy conservation measures (NORESO 2012). Another aspect of empowerment is removing obstacles. At the Army-wide level, the Army has been successful. The Army created the Energy Initiatives Task Force (EITF) for just that reason. This office headed by the DASA (I&H) exists to work with installations on innovative funding mechanisms that leverage private sector financing for energy projects and streamline processes for energy projects (Energy Initiatives Task Force 2014). At the installation level, BEMs still must work through their energy manager or DPW for energy retrofits. However, most installations do give them some latitude to determine how best to implement existing energy programs and are encouraged to come up with new ways to motivate energy conservation behavior.

Stage six of the Kotter model is: Generate short-term wins (Kotter 1996, 41). Generating short-term wins provides several benefits to the organization. It allows the organization to demonstrate quickly the benefit of the new direction which keeps supporters motivated to continue the change effort. It also quiets opponents who resist change. Additionally, it typically requires someone assigned to manage the short-term

results which maintains focus on the change effort. The Army intends to use the Net Zero pilot program to not only generate ideas, but also as to provide real-world examples of how the Army can reduce energy use quickly (Assistant Secretary of the Army for Installations, Energy and Environment 2013b). The Army designed the Energy Conservation Incentive Program (ECIP) to do just that by providing funding to projects which demonstrate a relatively short return on investment. ECIP program guidance states “The minimum economic return for inclusion of an ECIP project is a simple investment return (SIR) greater than 1.25 and a simple payback period that is less than 10 years” (Office of the Assistant Secretary of Defense 2014, 4). Additional guidance points out “ECIP projects will be prioritized and ranked for funding approval based on the greatest potential life-cycle payback for dollar invested as indicated by the SIR” (Department of the Army 2009, 5). Additionally, in the researcher’s direct experience, the Army prefers to see a five year return on investment. The relatively short return on investment builds in short-term wins for installations in terms of energy efficiency projects. Quick wins through energy behavior programs are harder to obtain, quantify and demonstrate. However, the return on investment is typically very high as most behavior based energy conservation programs cost much less than technology based energy conservation measures. Most Net Zero pilot installations are just beginning to evaluate energy behavior or culture change programs. The energy behavior study conducted by PNNL at Fort Carson demonstrates the difficulty of influencing behavior and even more, obtaining reliable results.

Stage seven of the Kotter model is: Consolidating gains and producing more change (Kotter 1996, 41). The Army has started this stage by using pilot installations as



test beds, which generate short-term wins. They are consolidating these gains and producing more change. As evidence, the Army recently announced the expansion of Net Zero to all Army installations (Secretary of the Army 2014). This fits Kotter's model at the installation level and above. However, there are two issues with consolidating gains at the installation level and below. First, most of the quick wins the Army points out are energy conservation results based on physical changes to the infrastructure, such as upgrading heating, cooling, and lighting systems. They have not identified any energy reduction wins due to behavior change. Second, at the installation and below, they are still in their beginning stages of implementing energy behavior programs. Consequently, there is not enough information on energy behavior results to identify any quick wins or to consolidate them.

Stage eight of the Kotter model is: Anchoring new approaches in the culture. This is arguably the most difficult step. The Army will be able to analyze anchoring after enough time has passed to determine any real effect. The Army will need to develop measures of performance and measures of effectiveness that accurately indicate whether anchoring has occurred. In order to develop accurate measures of performance and measures of effectiveness criteria, the Army must understand the current energy culture of its organization (Schein 2010). One positive observation is the size of the overall Net Zero and sustainability effort is sufficient, and appears to have enough momentum, that it is not likely to end in the near future.

#### Army Compared to DOD Directives

In order to compare Army behavior change to DOD recommendations and directives, we will use documents prepared for the DOD. The first document, *Net Zero*

*Energy Military Installations: A Guide to Assessment and Planning*, prepared by the Department of Energy (DOE) National Renewable Energy Laboratory (NREL), outlines a strategic planning approach for the DOD to develop Net Zero Energy installations (Booth et al. 2010). Section four is dedicated to reducing energy demand by engaging people. It provides an approach which consists of assessing potential reduction, implementation, and continuous improvement. In order to conduct the assessment, the document recommends creating dedicated cross-functional teams to identify potential energy saving actions. It provides ways of continuously improving energy efficiency behavior through common methods such as instituting an energy awareness campaign, and creating competitions, contests, and incentives for new ideas. It also recommends encouraging leadership and cross-functional teams to continue developing ways to save energy and implementing energy use scoreboards at the individual, building, and organizational levels (Booth et al. 2010, 18-20). It then provides the following planning considerations.

Institute attention to energy use as a normal part of all activities: planning, training, and mission execution.

Make it a point of pride to help increase national energy independence through reducing dependence on energy from imported and/or “dirty” sources: self-sufficiency is a theme that naturally resonates with many military personnel. In deployed situations, energy savings can be tied to reducing convoy casualties.

Consider energy’s connection, beyond obvious electricity or fuel consumption, to water use, food, and other consumables.

Leadership examples: Leading by example is a powerful influence across officer, enlisted, government civilian, and contractor elements of the military team. (Booth et al. 2010, 19)

The Army follows most of these planning recommendations at the highest levels.

Energy is now a significant consideration in Joint Capability Integration and

Development System (JCIDS) and doctrine, organization, training, materiel, leadership and education, personnel and facilities (DOTMLPF) processes indicating attention to energy use as part of all activities (Secretary of the Army 2013). Army documents on energy use and Net Zero identify energy security as one of the main drivers for conservation. Nearly all documents which discuss operational energy point out reducing energy use reduces convoy casualties. Direct leadership examples are harder to identify. Army leaders at all levels sign directives and policy memorandum which communicate support for energy conservation programs. However, memorandums do not necessarily indicate observable leader actions. If members of the organization do not read the memorandums, it is not observable at all. Un-read memorandums also indicate lack of communication as previously discussed. There are other, directly observable leader actions that indicate buy-in. Does the leadership practice energy conservation in their home? Do they utilize fuel-efficient vehicles from the motor pool or do they use less efficient vehicles reserved for them? How do they talk about energy and conservation when addressing Soldiers? Do they speak differently when in meetings with their senior staff? How do they prioritize energy conservation? Is the priority evident in funding decisions? The researcher is not able to assess these factors without direct observation, on-site, with sufficient time.

The NREL Document above references the Federal Energy Management Program document *Creating an Energy Awareness Program, A Handbook for Federal Energy Managers* (U.S. Department of Energy 2007). This provides four steps to creating an awareness program.

1. Plan the effort
2. Design and Implement the Program
3. Evaluate and Report Results
4. Sustain the Effort (U.S. Department of Energy 2007, 3).

It is important to note this document addresses the energy manager, not the DPW director or installation leadership. While most of the information provided in the handbook is basic and easy to follow, it will be difficult to accomplish some of the recommendations. For example, the guide identifies the energy coordinator will lead the effort, but must obtain enthusiastic endorsement from the organizations top leadership (U.S. Department of Energy 2007, 4-5). It outlines the importance of having an energy champion to carry the message of energy conservation. While this is true, it is a lot to expect the energy manager to create enthusiasm in the organizations top leaders. For reasons discussed earlier, the organizations top leaders should in fact be the ones driving the change and developing enthusiasm in the team.

The third document providing guidance on energy conservation is the *Department of Defense Energy Managers Handbook* (Intuitive Reseach and Technology Corporation 2005). The document recommends developing an integrated conservation approach, which includes energy conservation as part of a fiscally responsible organization strategy. It highlights awareness measures as “low-cost or no-cost measures that result from user education” (Intuitive Reseach and Technology Corporation 2005, 29). It provides the following key points for energy awareness programs.

1. Energy and water awareness programs attempt to eliminate waste by changing the attitudes of users and, through those changed attitudes, to change behaviors as well.

2. An effective awareness program targets specific audiences and involves as many energy users as possible.
3. The installation's public affairs office is a useful ally in an awareness program.
4. Publicizing conservation information on a regular basis tends to increase the program's effectiveness by increasing and maintaining participation. (Intuitive Research and Technology Corporation 2005, 35)

Comparing the DOD to Army practices, we notice a couple of inconsistencies.

First, we can compare DOD direction above to Army doctrine for change as described by Kotter. In the first key point, it describes attitude change leading to behavior change. Kotter tells us behavior change comes first. After quick wins, and consolidating those wins, attitudes, and eventually culture, will begin to change (Kotter 1996). Army installations generally follow the second point and target specific audiences. However, it does not always follow the third and fourth points. As previously discussed in this chapter, installations display Net Zero information in varying degrees on installation websites. The public affairs office usually either runs an installation website or is heavily involved in running it. Either the public affairs office is not aware or the installation has not prioritized their energy conservation campaign. The document goes on to recommend the energy manager brief the installation commander once or twice per year, or whenever there is a significant change (Intuitive Research and Technology Corporation 2005, 21). If installations are going to develop programs which significantly change behavior, they must discuss energy accountability and awareness more often. As part of awareness program basics, the handbook identifies “The awareness program must tell users what they can do and how to do it in the most direct way possible” (Intuitive Research and Technology Corporation 2005, 36). Again, the Army follows this guidance intermittently. Of the Net Zero pilot installation websites, only those of Fort Detrick and Fort Carson contained this type of

direct action language. Posters and other energy saving promotional material did have directive language. For example, Fort Carson distributes posters reminding people to turn off lights when not needed, use compact fluorescent lights whenever possible, shut down computers at night, use natural lighting, and adjust thermostat temperatures to save energy (Fort Carson Department of Public Works 2013a; Fort Carson Department of Public Works 2013c).

One subtle issue with the *Department of Defense Energy Managers Handbook* is it identifies the energy manager as the proponent for the awareness campaign and recommends they get other offices such as public affairs and other installation personnel involved (Intuitive Research and Technology Corporation 2005, 37). This guidance contradicts Kotter's recommendations for guiding coalitions. According to Kotter, for an organization to successfully change, it must develop a guiding coalition. However, the coalition should be determined by, and involve, senior management. Kotter outlines a similar scenario where the head of human resources or the quality officer is the champion for a particular change. The organization puts a person, from an ancillary division of the company, in charge of the change effort. Because there are only a few, or none, of the senior officers on the change committee, it lacks sufficient credibility and the effort eventually fails (Kotter 1996, 56). It is worth noting, this document, now almost a decade old, precedes Net Zero energy programs by more than six years, and precedes current Army doctrine on change by seven years (Department of the Army 2012). It appears some installations have updated their procedures for conducting energy awareness campaigns, such as Fort Detrick and Fort Carson. Others are still in the process.

### Army Compared to Research

It is important to compare Army energy behavior change not only DOD direction, but also recent energy behavior research. For example, the findings of researcher Yixiang Zhang provide insight applicable to Army energy programs. First awareness campaigns are more effective if they provide the user with an awareness of consequences for failing to save energy. Additionally, combining an awareness of consequences with a perceived sense of personal responsibility for energy behavior will further increase awareness campaign effectiveness (Zhang, Wang, and Zhou 2013, 1125-1126). None of the Army awareness campaigns or materials observed include both aspects. Research conducted by PNNL at Fort Carson does attempt to identify multiple aspects of energy behavior motivation (Judd et al. 2013).

Researcher Ping Jiang builds on those findings identifying a “top down” approach, or simply telling people what to do lacks participatory engagement and is not effective at promoting behavior change (Jiang et al. 2013, 617-618). This has implications for Army change directives. They found instead, accurate and useful information was more effective in motivating change. The Army’s energy change narrative states we must “instill in Soldiers a sense of ‘energy discipline’” (Assistant Secretary of the Army for Installations, Energy and Environment 2013a, 1). This implies a measure of telling Soldiers what to do and having an expectation, they will do it. On the surface it makes sense to leverage an Army culture of discipline. However, Jiang tells us to use caution implementing this type of approach.

Researcher Janet Stephenson builds on Schein’s work which tells us an organization can only accomplish successful change with a clear understanding of the

culture within which it attempts change (Schein 2010). Stephenson goes on to point out people do not necessarily link energy behavior decisions to rational economic decisions. Therefore we must take into account material culture and cognitive norms along with energy practices. Further, she identifies the importance of bridging the gap between influencing the individual and influencing the culture of the organization (Stephenson et al. 2010, 6127-6128). Individual installations have started programs attempting to change individual behavior such as the PNNL study at Fort Carson and the 3M study at Fort Bliss described earlier. However, to date, the Army has not conducted larger scale ethnographic or culture studies to determine its current energy culture. Both Stephenson and Schein indicate it is important to conduct this type of inquiry to increase chances of a successful change program (Schein 2010; Stephenson et al. 2010, 6128).

Adding to Stephenson's work, researcher Jillian Sweeney comes to conclusions indicating generalized awareness campaigns have both weak and short-lived effects. Sweeney also found attitudes and values are not necessarily sufficient to change energy behavior (Sweeney et al. 2013, 379-380). The DOD *Energy Manager's Handbook* recommendations to target specific audiences and involve as many energy users as possible are in line with this research. The Army should use tailored campaigns which take into account small group and individual dynamics. The Army is currently conducting research on awareness and energy change behavior programs which include many of these variables. Based on reviews of current installation energy change programs such as PNNL at Fort Carson (Judd et al. 2013) and 3M at Fort Bliss as well as guidance provided by DOD (Intuitive Research and Technology Corporation 2005) and DOE (U.S.



Department of Energy 2007) it appears most installations develop awareness programs which include multiple aspects of energy behavior.

Charles Scherbaum reminds us we do not know a lot about influencing individual behavior as researchers have conducted relatively little research on individual factors, which influence energy behavior in the workplace (Scherbaum, Popovich, and Finlinson 2008). To its credit, the Army has been conducting some of this research as described earlier. Scherbaum identifies environmental personal norms and environmental worldviews as potential leverage points to influence individual behavior (Scherbaum, Popovich, and Finlinson 2008, 830-831). Based on materials reviewed, the Army has not focused its efforts in a significant way on these issues. We do find Army guidance for discussing energy behavior in terms of energy security and safety of fellow Soldiers, both of which should resonate with service members (Assistant Secretary of the Army for Installations, Energy and Environment 2013a). However, these do not address environmental personal norms or environmental worldviews specifically. This still may be a better approach for the Army. If the environment and effects of greenhouse gas emissions do not resonate with most service members as much as national security and combat effectiveness, it may not make sense to focus on them.

Research by Nicola Corradi reminds us even those who have a worldview or cognitive norm supporting making energy saving behavior decisions require individual cognitive mechanisms to make those decisions consistently. They recommend designing and implementing information and training efforts with these requirements in mind (Corradi et al. 2013, 93-94). The Army is particularly good at this. The Army has decades

of experience in developing training programs which account for individual cognitive mechanisms.

Researcher Michael Coleman suggests organizations monitor and provide feedback for individual energy use at workstations as part of any broader collective strategy to influence behavior (Coleman et al. 2013, 648-649). While it has not yet gone that far, the Army does provide individual household energy use feedback to those living in privatized housing on bases as noted in the RCI program (Department of the Army 2009). It also began metering individual buildings both as part of the research conducted at Fort Carson and Fort Bliss as well as at other installations in order to gather relevant data for energy management.

Chapter 4 compares Army energy behavior change to requirements, recommendations, guidance, and direction from multiple sources. In this comparison, several gaps begin to emerge. Chapter 5 will clearly identify and outline those gaps.

## CHAPTER 5

### CONCLUSIONS

#### Introduction

Analysis of the information in chapter four enables the researcher to identify several gaps in the Army's approach to energy behavior change. The researcher will present information in this chapter in the same order analyzed in chapter 4. As the researcher presents each gap, he will make recommendations to address each one. First, the researcher will describe and discuss gaps between current Army energy behavior change effort and Army doctrine, including change requirements as described by John Kotter. Second, the researcher will describe and discuss gaps between Army energy behavior change effort and DOD guidance and direction. Third, the researcher will describe gaps between Army energy behavior change effort and current academic research. Finally, the researcher will provide a general discussion and any additional recommendations not identified in the rest of the chapter as well as recommendations for further research. The researcher will also note where Army efforts align with comparative data.

#### Doctrine and Kotter

When comparing Army energy behavior change to doctrine, and by extension, the Kotter model for change, several gaps emerge. First is the lack of a sense of urgency. As identified in chapter four, there are several reasons for a lack of urgency for energy conservation by the Army. The Army does not adequately create a sense of a visible crisis to which members of the organization can respond. The Army attempts to create a

visible crisis by highlighting budget issues. However, the dollar amounts they use are difficult for energy users to relate with and do not provide them with a sense that they can have an impact. Recommendations for addressing this gap include providing the users relevant energy data they can relate to which also identifies the impact the user can have on overall energy use. For example, instead of telling them the total energy Americans use, tell them how much the average American uses at their place of employment. Then tell them how much energy they can save by a particular action and describe how that adds up for the organization when combined with all other energy users. This would also align with Yixiang Zhang's research highlighting the effectiveness of understanding consequences combined with a sense of responsibility to act (Zhang, Wang, and Zhou 2013).

The second factor that weakens a sense of urgency is too many visible resources. As discussed in chapter four, Soldiers clearly understand constrained resources when deployed. However, when they are in garrison, several factors indicate abundance. First is the stark contrast between deployed conditions and those at home station. After more than a decade of war, Soldiers are very aware of the relative abundance at home versus while deployed. That contrast creates an increased perception of abundance at home. Second, when preparing for deployments, the Army provides an abundance of resources to ensure mission success. The researcher is not suggesting the Army withhold resources prior to a deployment only that this situation runs counter to developing a sense of urgency in terms of resources. An apparent abundance of resources affects leaders at even the highest levels. Due to the requirements of their positions, the Army typically provides senior leaders all resources necessary to conduct the business of the Army. While these

leaders are typically acutely aware of budgetary constraints, their surroundings send the message that there are plenty of resources. While it may not make sense for the Army to constrain resources when deploying units or for leaders to go without resources necessary to conduct the business of the Army, it is important to explain these seeming inconsistencies (Kotter 1996, 41). The researcher also recommends communicating resource shortfalls more effectively to counter the appearance of too many resources.

The third factor weakening a sense of urgency is lack of accountability across the organization. The Army has made statements in several documents about the importance of energy accountability. They have even included energy accountability as part of position descriptions for key personnel (Department of the Army 2014b). However, none of the personnel required to have energy accountability as part of their position descriptions are operational force commanders. The personnel who required are the IMCOM commander and regional directors as well as deputies and other program managers. In order to institute accountability, the Army should hold commanders responsible for energy programs and energy use. Their deputies and program managers will still manage energy programs, but raising the level of accountability to the commanders will ensure greater focus. Additionally, the Army will need to determine and implement suitable metrics for energy use to ensure accountability is effective.

One of the accountability programs that is working is the residential communities initiative (RCI) energy conservation program. This program builds in accountability by providing both penalties and incentives to families living in on-base housing for their energy use (Department of the Army 2009).

The Army met most of the conditions for creating a guiding coalition. The Army has several programs in place at higher levels that meet this requirement. However, one potential gap is, unlike in the private sector, Army leadership at all levels changes every two to five years. Consequently, it is difficult to maintain a core group as a guiding coalition through the change process. While it is true Army civilian leadership typically enjoys more stability and can maintain a program through changes in command; new military leadership may have different priorities and shift the focus of the change program or shift focus away from the change program altogether. This issue persists at lower levels. At the unit and building level it is compounded by the need to choose a suitable person to act as the building energy monitor (BEM). As discussed in chapter four, the BEM is an additional duty often assigned to the 'next available person', not necessarily the most suitable. Along with the issue of choosing the correct person to serve as the BEM, if this person is a Soldier, they will not likely be in the unit, building or even on the same installation for more than three years. It is not likely the Army will change command and Soldier rotations. The researcher recommends increasing effort in all of the other areas of the change effort to negate this issue as much as possible. Building the program aggressively may be one way it will persist through changes of command and other key personnel. Another recommendation is to determine who will be the BEM by position and code that position for appropriate training. For example, identifying the unit supply NCO as the BEM. While the potential for having a poor fit as the BEM remains, it will at least provide consistency and training for the position.

There is one main gap associated with the Army vision for Net Zero; it is not very communicable. If one takes apart the statements in the Net Zero vision, they can identify

portions that meet most of Kotter's requirements for a vision. These requirements are that the vision be imaginable, desirable, feasible, focused, flexible, and communicable (Kotter 1996, 73). The issues mostly stem from the structure of the vision statement and the inclusion of technical jargon regarding funding mechanisms for energy projects. Unless one is already familiar with Net Zero, it is difficult to take the vision statement, as written, and describe the goals to someone in plain language. Adding jargon such as "leveraging power purchase agreements (PPA), enhanced use leases (EUL), energy savings performance contracts (ESPC), and utilities energy service contracts (UESCs) as tools" (Department of the Army 2013a) may provide some specifics for those familiar with funding programs, but it makes the vision much more difficult to communicate to the average energy user. The researcher recommends re-writing the vision including removing jargon and clarifying the goals of the program in terms easily understood and communicated.

Because the vision is not easily communicable, it is no surprise that it is communicated ineffectively and inadequately. The gap in effectively communicating the vision is due to using jargon as described above. The gap in adequately communicating the vision is due to the low rate of communication. As identified in chapter 4, only one third of Net Zero pilot installations website homepages had any reference to Net Zero, sustainability or any other energy or environmental programs. When reviewing websites, only two of the pilot installations, Fort Detrick and Fort Carson, had a significant amount of information about Net Zero. Only Fort Detrick had a focused message on sustainability and Net Zero throughout their website. The researcher recommends Army installations make Net Zero, energy sustainability and energy security more prominent on their

webpages. Installations should use Fort Detrick's website as a model. Websites are often the first exposure a newly arriving Soldier or civilian employee has to a new duty station or installation. Installation websites are an ideal way to highlight Net Zero and other sustainability goals. Of note, the researcher did not conduct site visits or have access to internal web pages at the Net Zero pilot installations. There may be additional communication of Net Zero goals available of which the researcher was not aware.

Without the ability to visit the Net Zero pilot installations, the researcher was not able to measure adequately some of the elements of vision communication, such as leadership by example, explanation of seeming inconsistencies, and give-and-take communication. The analysis in chapter 4 did identify one recurring issue related to leading by example; that of continually changing leadership discussed previously.

In terms of energy behavior, the Army has empowered installations, BEMs and individuals to take necessary steps, within guidelines set by the Army, to improve energy efficiency. At Army-wide levels, it created several programs to remove funding obstacles to energy projects (Energy Initiatives Task Force 2014). At the installation and below, it and encourages BEMs and individuals to come up with innovative ways to motivate energy conservation behavior including awards programs for effective ideas (U.S. Army Garrison, Wiesbaden 2014).

The Army has effectively garnered short-term wins through energy saving technology. However, a large gap exists as it has demonstrated relatively few wins from behavior change programs. Generating short-term wins by using energy saving technology and conducting building system retrofits is easy compared to generating wins through behavior change. Energy saving technology does not require the average energy



user to do anything different during their workday and only requires the organization to invest money. Conversely, changing behavior, as described throughout this thesis, requires a great deal of effort both from the organization and from individuals. In addition, in almost all cases, it costs significantly less to change behavior than to install technology. The overriding issue with this gap is that behavior change projects at installations, such as those conducted by PNNL at Fort Carson and NORESKO at the USMA, are in their beginning stages, and do not offer energy savings identifiable as short-term wins (Judd et al. 2013; NORESKO 2012). While one could argue that the Army could identify energy savings from technology as short-term wins with benefits that could inspire behavior change, it is still extremely difficult to change behavior. A lack of short-term wins extends the gap to an inability to consolidate gains and produce more change. Without short-term wins of energy conservation from behavior change, there is nothing to consolidate.

When considering anchoring new approaches in the Army's culture, two gaps present themselves. First, the Army must develop measures of performance and measures of effectiveness in order to determine whether it has created "a culture that recognizes the value of sustainability" (Department of the Army 2013a). It is not necessary to wait until Army culture begins to change to determine the measures. The researcher recommends the Army develop these measures now based on the future end state the Army desires. One benefit of developing these criteria now is it will force the Army to clarify its desired end state. A second gap is the Army attempting to change behavior, and ultimately culture, without first gaining full awareness of the energy culture it is attempting to change. The Army has not conducted a service-wide assessment of energy culture. The

research conducted by PNNL was limited in scope and could not provide conclusions about energy attitudes of Soldiers due to a lack of participation in the buildings used primarily by military members (Judd et al. 2013, 15-16). The researcher recommends the Army conduct organization-wide energy culture assessments as well as at individual installations to determine members' attitudes about energy and conservation. A greater understanding of Army energy culture is essential to ensure a successful behavior change effort (Schein 2010).

### DOD Guidance and Direction

When comparing Army energy behavior change effort to DOD guidance and direction, many of the gaps identified are related to those discussed earlier in this chapter. For example, DOD guidance identifies leading by example as a powerful influence (Booth et al. 2010, 19). As discussed earlier, there are issues with changing leadership and an inability to observe directly leader behavior without installation site visits. It is important to note, and not surprising, the Army generally follows DOD guidance. Any other gaps brought to light by the analysis in chapter four are between DOD guidance and the Kotter model for change referenced in Army doctrine, which we have already discussed. For example, the document *Creating an Energy Awareness Program, A Handbook for Federal Energy Managers* (U.S. Department of Energy 2007). Outlines the importance of having an energy champion and directs the energy manager to enlist someone from senior leadership. As discussed previously, this is a problem with creating a guiding coalition. Senior leadership must be in the lead if change is to be effective. Further, if the change is to be effective, at least twenty-five percent of all members of the organization must be actively involved in the change along with 75 percent of managers

and nearly 100 percent of leadership (Kotter 1996). It is unrealistic for the Army to expect energy managers to enlist that amount of support, even with an “energy champion.”

### Academic Research

It may not be entirely accurate to describe discrepancies between Army energy behavior change effort and current academic research as “gaps.” As this is current and emerging research, it may be more accurate to describe these inconsistencies as “additional information” or “suggested approaches.” For the sake of consistency, we will continue to use the word, gap.

The first gap we identify is in Army energy awareness campaigns. According to researcher Yixiang Zhang, awareness campaigns should combine awareness of consequences with a perceived sense of responsibility (Zhang, Wang, and Zhou 2013, 1125-1126). None of the Army awareness campaigns or materials observed include both aspects. Combined with research from Ping Jiang, which found that including accurate and useful information was more effective than simply telling people what to do, we begin to identify useful additions to the Army’s approach (Jiang et al. 2013, 619-620). We can also add Michael Coleman’s recommendations to monitor and provide feedback for individual energy use at workstations (Coleman et al. 2013, 648-649). This would expand current Army energy metering programs significantly and produce valuable data. Another gap related to earlier findings is the issue of understanding Army energy culture. Charles Scherbaum points out that organization can use environmental personal norms and environmental world views as leverage points. However, as previously stated, the Army has not determined the status of its own energy culture. The researcher

recommends including all of these aspects in future energy awareness and behavior change programs.

While there are gaps, the Army is conducting portions of its energy behavior change effort in accordance with recent research models. For example, the Army follows DOD guidance and attempts to target specific audiences, involve as many energy users as possible, and include multiple aspects of energy behavior as Jillian Sweeney recommends (Sweeney et al. 2013). In addition, the Army is particularly adept at designing and implementing information and training efforts which take into account individual cognitive abilities as recommended by Nicola Corradi (Corradi et al. 2013).

### Discussion

While the researcher identified many gaps in the Army's approach to energy behavior change, it is important to note limitations of this research. The researcher did not conduct site visits to any of the Net Zero pilot installations. Consequently, there are several aspects of energy behavior and energy behavior change effort the researcher could not observe. Some of the gaps may be smaller or greater than identified in this thesis.

### Additional Recommendations

A few overarching recommendations will either benefit from expanding, or were not captured directly in the analysis. First, to expand on an earlier point, the researcher recommends the Army assess its energy culture by conducting assessments organization-wide as well as at individual installations to determine members' attitudes about energy and conservation. Edgar Schein clearly identifies the importance of understanding the

culture within which you are working to affect change (Schein 2010). It is important to know where you are in order to figure out where you are going. Without a clear picture of the current energy culture of the Army, leaders can only make assumptions about what behavior change programs to implement, and how to focus them.

The second recommendation follows from the first. The researcher recommends, with a clearer understanding of its culture, the Army continue to conduct research on energy behavior to the extent practicable. Not only will this contribute to the body of research, which, according to Charles Scherbaum (2008, 819-820) is currently lacking, but will also provide valuable insight and actionable information for installations to share with each other. The Army should continue and expand to other installations, research projects such as those conducted by PNNL at Fort Carson. It is important the Army conduct this research, as it is a unique organization in many ways. It has a unique culture and mission, and is much larger than universities and private business so often profiled in academic research on the subject. If we do not understand what energy behavior change programs work and how to focus them, we will not see the resulting culture change necessary for successful Net Zero programs and eventual energy security.

The final recommendation is for the Army to create a better link between operational energy and installation energy, and both ultimately to energy security for the Army and our nation. Throughout the research process, several Net Zero documents identify operational energy issues and infer a connection to installation energy use. The researcher recommends the Army directly and overtly link operational energy conservation to installation energy conservation. Instead of referencing fuel convoys and the number of personnel required to secure them, make statements that equate operational

energy to installation energy. For example, make statements such as “Energy security on the battlefield is no different than energy security at home” and “Just as saving fuel while deployed provides more combat power for missions; saving electricity at home provides more money for training.” Making statements such as these will provide Soldiers with a direct connection between operational energy and installation energy. The Army can make additional connections between installation energy and operational energy by reminding Soldiers to train as you fight. Practicing conservation at home and on the installation is training those habits for when they are deployed. Saving energy is a full time mission.

### Conclusion

Net Zero energy is a means to an end. Meeting Net Zero energy goals will put the Army in a strong position with the ability to control energy expenditures and ensure sufficient energy resources to accomplish its mission. While the Army is doing many of the right things to change energy behavior and meet its goals, there are gaps in its current approach. By “never wasting a crisis,” the Army has an opportunity, in the current fiscal climate, to create a change in energy behavior and culture. It starts with understanding Army energy culture. It takes a great deal of effort. It finishes with persistence and anchoring successful change in the Army culture.

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