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Strategies for Improving Energy Conservation on a Military Installation

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This is to certify that the doctoral dissertation by

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Abstract

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Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Management

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Abstract

Energy is an essential component required to execute missions throughout military organizations. Failing to sustain energy efficiency in military units could cause mission failures throughout the Department of Defense. As a result, efficient energy management has become a major priority for Air National Guard units as well as other military organizations around the globe. The purpose of this qualitative single case study was to gain an understanding of strategies used by front-line military supervisors to reduce energy consumption through behavioral change on a military installation located in Maryland. The central question explored strategies that front-line military supervisors use to change behaviors to reduce energy consumption on a military installation. The conceptual frameworks included the energy cultures framework, Hersey and Blanchard's situational leadership theory, Adam's equity theory, Herzberg's two-factor theory, and Vroom's expectancy theory. Research data were obtained during a 7-day period from 15 front-line military supervisors in a military unit. Participants were required to have a satisfactory evaluation performance report and be a front-line military supervisor in the Air National Guard unit being studied. Braun and Clarke's 6-phase thematic analysis technique was administered to analyze the data. There were 6 emergent themes identified from the focus group data: (a) environmental preservation, (b) sustainable practices, (c) funds, (d) proactive leadership, (e) workplace management, and (f) policy and regulations. The findings from the study could be used by front-line military supervisors to become proactive leaders that use practical, sustainable practices effectively to manage energy conservation in military installations. The implications for positive social change include the potential to reduce energy usage in the Federal government.

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Dedication

I dedicate this research study to my beautiful wife Kathleen, who has been there for me during this amazing journey. She motivated and supported me throughout the entire process, especially when I lacked focus to stay on track. I also want to thank all my family for encouraging me to strive to obtain my PhD. Without the support I received over the last couple of years, I would never have reached this milestone in my life. Thank you so much for your love and support.

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I thank God for giving me the strength and energy to get through the process of getting a doctoral degree. I am so appreciative of my committee chair, Dr. Sheryl Kristensen, who stepped in when I needed a mentor with a similar vision I had for my research study. She pushed and challenged me to produce the best quality research study and I am truly grateful for that. I also want to thank my second committee member, Dr. David Banner, who ensured I was thinking outside the box when developing my research study. I want to thank Dr. Richard Schuttler for filling in as my URR and Dr. Sandy Kolberg, my program director, for getting me through this process with very few obstacles. Lastly, I want to thank my friends and co-workers, who believed I could reach this lifetime achievement.

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Chapter 1: Introduction to the Study

During the first decade in the 21st century, there has been a movement toward the more efficient use of energy on military installations, but these positive signs have barely scratched the surface of the problem (Defense Science Board, 2016). Over 25 major energy renovation projects have been completed to update facilities throughout an Air National Guard unit campus in Maryland that consumed larger percentages of energy, but the need for behavioral change in personnel facilitated by front-line military supervisors is unavoidable in order to provide a long-term solution for sustainability. A change in workplace behavior will not only benefit the Air National Guard unit, but it will also assist in transforming our society. Men and women from the organization could take the conservation practices they learn at work and apply them to all facets of their everyday lives.

Currently, some front-line military supervisors in the Air National Guard lack strategies for changing behavior to reduce energy consumption. I identified potential effective energy conservation strategies by utilizing the conceptual foundation of this study, which consists of the energy cultures framework, Hersey and Blanchard's situational leadership theory, Adam's equity theory, Herzberg's two-factor theory, and Vroom's expectancy theory. I administered a qualitative single case study to gain an understanding of common strategies Air National Guard front-line military supervisors have used to reduce energy consumption through behavioral change. The results of the study may assist front-line military supervisors striving to reduce energy consumption

through behavior change while significantly reducing the energy usage in the United States due to the significant amount of energy the military consumes. In Chapter 1, I provide a brief overview of the background of the research, problem statement, purpose, research question, assumptions, delimitations, and limitations.

Background of the Study

The primary reason for this study is the careless energy behavior of military personnel in the Air National Guard, which parallels the mindset and actions of many military organizations across the U.S. Department of Defense (DoD) when it comes to energy consumption and expenditure. Energy is a crucial asset in military operations, so effective energy management is vital to ensure no wasted energy in organizations across the military. Front-line military supervisors in these organizations should comprehend various intervention techniques to manage energy consumption effectively.

The Army, Navy and Air Force are the three central military departments that fall under the DoD, and the Air National Guard is a component of the Air Force. The senior leaders in DoD acknowledge the potential benefits of changed behavior on diurnal energy use; however, a significant barrier to improving tactics, techniques, and procedures is a limited understanding of the DoD's use of energy and the operational implications of that energy use on the war-fighter (*DoD*, 2015). Developing effective energy efficient behaviors in military personnel through the efforts of front-line military supervisors is essential to operating more effectively and efficiently as an organization. The military could make a tremendous impact on reducing energy demand in our society.

In the early 2000s, driven by the demands of combat in Iraq and Afghanistan as well as looming budgetary stress, senior leaders in the DoD have increasingly focused on the ways in which energy affects its operations and the opportunities to improve its performance through the development and adoption of innovative energy technologies and practices (Sarewitz, Thernstrom, Alic, & Doom, 2012). As a result, efficient energy management has become more of a focus for all military organizations.

I studied an Air National Guard unit because of the organization's energy consumption data from fiscal year (FY) 2012-2014 increased by over 18% annually. The Energy Independence and Security Act of 2007 required federal agencies to reduce energy consumption by 30% by 2015 based on FY 2003 energy consumption. In July 2015, the Federal Government established new requirements in Executive Order No. 13693, and all federal organizations were expected to reduce energy consumption by 25% by FY 2025 with a baseline starting in FY 2015. Over 25 major energy renovation projects have been programmed and executed by the Air National Guard unit to upgrade facilities that consume higher amounts of energy, but more is needed to achieve the federal energy goal.

Energy behavior is a variable often overlooked by supervisors when considering methods to reduce energy in military organizations. Vidmar (2012) suggested people are both the strongest and weakest links in the energy reduction chain, and they can often decide whether an organization does or doesn't meet an energy reduction goal. Front-line military supervisors could establish effective energy management in organizations by

using appropriate energy conservation strategies and avoiding potential barriers to change. This could impact behavior change for their personnel that could reduce energy consumption. Front-line military supervisors typically struggle because of the gap between energy management theory and current implementation practices in military organizations. This study was imperative to gain an understanding of common effective strategies front-line military supervisors could use to facilitate long-term solutions for energy savings.

Problem Statement

The general management problem is that behaviors in military organizations are not directed towards saving energy in daily operations. Military members use energy in every part of the military's mission, and failure to maintain energy efficiency within military units could cause mission failures throughout the DoD (Browning & Powers, 2017). The DoD stands as the world's single largest consumer of energy, and domestic consumption alone amounts to nearly 1% of the United States' total energy consumption and nearly 80% of the energy consumed by the Federal Government (Tommey, 2015). Regardless of the increase of attention to energy management, a gap continues to remain between energy management theory and current implementation practices in military organizations (Antunes, Carreira, & Silva, 2014). For the DoD, while technology is critical to energy management in operations, user behavior and energy awareness also significantly impact the amount of energy used (Baskin, 2014).

The specific management problem is some front-line military supervisors in the Air National Guard lack strategies for changing behavior to reduce energy consumption on military installations they are assigned to manage. Current standard operating procedures make it far easier for the DoD to spend $10 million to buy a more efficient generator than to spend $10 thousand in a campaign to reduce energy use (Andres & Loudermilk, 2011). Not only does ineffective energy management represent a significant expenditure for our nation's defense budget, but it also highlights a possible opportunity to alter energy management and conservation on a mass scale in the United States (Tommey, 2015).

Purpose of the Study

The purpose of this qualitative single case study was to gain an understanding of common strategies front-line military supervisors have used to reduce energy consumption through behavioral change on a military installation. The target population was front-line military supervisors in an Air National Guard unit located on a military installation. Online asynchronous focus groups were used to identify effective strategies front-line military supervisors can use to reduce energy consumption. The information from the asynchronous online focus groups and the conceptual framework was used to develop effective practical strategies to change behavior in the organization to reduce energy consumption, which could potentially bring positive social change to the organization.

Research Question

The purpose of this qualitative single case study was to gain an understanding of common strategies front-line military supervisors could utilize to reduce energy consumption throughout organizational facilities in an Air National Guard unit. The central question for the study was:

RQ: What strategies do front-line military supervisors utilize to change behaviors to reduce energy consumption on a military installation?

Conceptual Framework

The conceptual framework for this study was the energy cultures framework, Hersey and Blanchard's situational leadership theory, Adam's equity theory, Herzberg's two-factor theory, and Vroom's expectancy theory. The conceptual framework was critical for this research study because it was the blueprint for how I managed the study, which I outline in detail in Chapter 2. This conceptual framework could assist front-line military supervisors to understand behaviors that affect energy consumption and could also assist with identifying effective strategies to improve energy conservation.

The primary objective of the energy cultures framework is to focus on the behavior of individuals within a system that most strongly influences behavior, and from there to consider what interventions might be successful in achieving behavior change (Ishak, Sipan, Sapri, Iman, & Martin, 2016). I employed the energy cultures framework because it is a simple model for front-line military supervisors to use to develop strategies

to reduce energy consumption by looking at cognitive norms, material culture, and energy practices in their respective shops.

Depending on the situation, leaders can select from four leadership styles, which are directing, selling, participating, and delegating. I used the situational leadership theory to assist front-line military supervisors to become more familiar with leadership styles to provide effective guidance to subordinates to reduce energy consumption. I employed Hersey and Blanchard's situational leadership theory in the online focus group questions to assist front-line military supervisors to become more familiar with leadership styles to provide effective guidance to subordinates to reduce energy consumption.

Motivated personnel are essential for supervisors to maintain productivity and retention in organizations successfully. Motivating personnel may be challenging for some supervisors, but several theories could be used as a starting point to develop effective practices. I applied Adam’s equity theory, Herzberg’s two-factor theory of motivation, and Vroom’s expectancy theory in the online focus group questions to assist front-line military supervisors to become more familiar with how to effectively galvanize their subordinates so they are more receptive to interventions.

I incorporated this conceptual framework into online focus group questions to develop effective, realistic best management practices that could be used by front-line military supervisors in the Air National Guard and other similar military organizations to reduce energy consumption through behavioral change. I discuss the conceptual framework in further detail in Chapter 2.

Nature of the Study

The study was a qualitative single case study. Case studies explore and investigate contemporary real-life phenomena through detailed contextual analysis of a limited number of events or conditions and their relationships (Zainal, 2007). This approach is valuable for research to evaluate programs and develop interventions because of its flexibility and rigor (Baxter & Jack, 2008). Single case studies can describe the existence of phenomenon, and it is better to make a single case study than a multiple case study when, for example, the researcher wants to study a person or a group of people (Gustafsson, 2017). Yin (2003) also stated single case studies are the best choice when a researcher wants to study a specific group such as front-line military supervisors in a military organization.

In this study, I analyzed a group of front-line military supervisors in one military organization, not multiple military organizations. In cases where there are no other cases available for replication, the researcher can adopt the single-case design (Zainal, 2007). I was able to locate only one publicized case study focused on understanding common strategies front-line military supervisors use to reduce energy consumption through behavioral change in a military organization.

I e-mailed study invitations to departments in the Air National Guard unit to inquire about interest in participating in the research study after I received Institutional Review Board (IRB) approval from Walden University and the U.S. Air Force HRPO. Potential participants had to have a satisfactory rating on their most recent evaluation

performance report, be a military member of the Air National Guard unit, and be a front-line military supervisor to participate in the online focus groups. Potential participants who met the requirements were asked to e-mail me back with the demographic questionnaire to ensure they met all the requirements to participate. I divided the selected participants into three asynchronous online focus groups that were conducted concurrently for a 7-day period. The identities of the online focus group participants remained confidential throughout the study with the use of randomly generated usernames created in FocusGroupIt.

I used online focus groups to gain an understanding of common strategies front-line military supervisors have had with reducing energy consumption through behavioral change. Unconstrained by place and time, online participants can contribute to the group discussion at their convenience, and by it being asynchronous group discussions, participants can choose their time in answering questions, allowing more time to reflect (Tates et al., 2009).

Definitions

Energy: Any usable power, including but not limited to, electricity and power produced from coal, petroleum products, steam, natural gas, propane, military operational fuels and propellants, alternative fuels, and alternative and renewable energy sources such as solar, wind, geothermal, and nuclear. (U.S. Air Force [USAF], 2017).

Energy behavior: All human actions that affect the way that fuels (electricity, gas, petroleum, coal, etc.) are used to achieve desired services, including the acquisition or

disposal of energy-related technologies and materials, the ways in which these are used, and the mental processes that relate to these actions (IEA Demand Side Management Energy Efficiency Technology Collaboration Program [IEA], 2012).

Energy conservation: The implementation of technological or behavioral energy conservation measures to reduce energy consumption (Van Doren, Giezen, Drieseen, & Runhaar, 2016).

Energy culture: The combination of all aspects influencing the energy behavior of the members of an organization (Bevernage, 2011).

Energy efficiency: The use of technology that requires less energy to perform the same function (EIA, 2012).

Energy intensity use: The standard metric for measuring the energy efficiency of buildings is energy consumed per square foot (Marqusee, Schultz, & Robyn, 2017).

Energy management: The process of developing, executing, and overseeing plans, programs, and initiatives to achieve energy goals and objectives across all functional areas (USAF, 2013).

Fiscal year: A 12-month period that an organization uses to report its finances and starts at the beginning of a quarter, such as January 1, April 1, July 1 or October 1 (Amadeo, 2017).

Installation energy: The energy used to power all facilities located on military installations and enduring locations, as well as fuel for the nontactical fleet vehicles used

at those locations and the energy consumed in manufacturing, maintenance, and other processes (USAF, 2017).

Assumptions

Assumptions are thoughts, concepts, and ideas generally taken for granted as true but not proved that are typically out of the control of the researcher (Gallop, 2011). Researchers use assumptions to shape the research endeavor, from the methodology employed to the type of questions asked (Hathaway, 1995). The assumptions for this research study were made based on my experience as an Air National Guard energy manager.

First, I assumed some front-line military supervisors in the Air National Guard lack strategies for changing behavior to reduce energy consumption. Second, I assumed some front-line military supervisors in the Air National Guard do use effective strategies for changing behavior to reduce energy consumption. Third, I assumed the online focus group volunteers would be honest and open when answering online focus group questions. Finally, I assumed the information from the online focus groups would assist front-line military supervisors with developing effective strategies that could be used to potentially reduce energy consumption in daily operations.

Scope and Delimitations

I confined the scope of the study to front-line military supervisors in the Air National Guard located on a military installation; however, I hoped to provide effective energy reduction strategies that are relevant to any type of organization interested in

reducing energy consumption through behavior change. Delimitations in a study define the boundaries for the scope of a study (Suri, 2011). In this study, I focused solely on electrical energy use on an installation. The study did not include energy used for domestic operation or training operations. Fuel for aircraft or military vehicles was not be included either. Even though these other types of energy uses were not in the study, energy efficient strategies can also be applied to these other areas by front-line military supervisors.

I conducted the study virtually, so I could not observe the body language of the participants. Participants used emoji characters in the discussion as a substitute. I conducted three asynchronous online focus groups concurrently, with five participants in each group. The online focus group took place during 7 consecutive days, giving the participants the flexibility to provide valuable input. The total time for a participant participating in the online focus group was less than 2 hours.

I am a military officer so that could have influenced the comments of online focus group participants. Front-line military supervisors are typically enlisted members of the organization. I did not use my rank when communicating with participants. I still considered bias even though the participants were not part of my military organization. I used a bracketing memo to keep track of potential bias in the study.

Limitations

Limitations of a study show probable weaknesses in a study and an understanding of where the results of the study will not be relevant (Anosike, Ehrich, & Ahmed, 2012).

There is currently only a modest amount of literature available on reducing energy consumption in military organizations. I utilized literature from civilian organizations that focused on various strategies to reduce energy consumption through behavior change. Single case study research is considered unreliable by some researchers because of the inability to acquire generalized conclusions (Zainal, 2007). I administered alternative methods such data triangulation and peer reviews to validate the data collected in the research study.

Significance of the Study

In this section, I describe the contributions to business practice, contributions to energy management, and the implications for social change. I also elucidate the importance of reducing energy consumption beyond military organizations. In the text below, I explain how the study could potentially promote the success of front-line military supervisors in developing effective energy efficient strategies to reduce energy consumption through behavioral change.

Significance to Practice

This single case study could be valuable to management because effective energy management is becoming a major focus area in organizations around the world. Young et al. (2015) stated that there is an increasing focus on decreasing energy usage through improving behavior and habits of individuals in the workplace. This research could fill a gap in understanding how to reduce energy consumption in military organizations by understanding strategies front-line military supervisors use to reduce energy consumption

through behavioral change in an Air National Guard unit. This project is unique because there is a lack of research for strategically improving energy conservation in military organizations through behavioral change.

I directed this research study towards personnel in military organizations, but leaders in other types of federal organizations interested in decreasing energy consumption through behavioral change could apply the research findings. The contributions to the professional application are realistic energy management strategies for changing behaviors to reduce energy consumption. Wising, Chirez, and Adams (2014) stated that in recent years there have been several studies showing behavioral change can contribute to savings of 5%–15 % of the energy consumption for an industrial site. This study could be used to prove the effectiveness of front-line supervisors using behavioral change interventions to effectively reduce energy consumption in organizations.

Significance to Theory

The focus of this qualitative single case study was on gaining a common understanding of strategies for improving energy conservation through behavioral change on a military installation. The findings and identified best management practices could introduce policy changes for supervisors in other military organizations. Results from the study may also motivate military policymakers to use the conceptual foundation to effectively reduce energy consumption through behavioral change in the effort to achieve federal energy reduction goals. Ehrhardt-Martinez, Laitner, and Keating (2009) suggested

a technique to encourage policymakers to pursue behavior change strategies is to develop the space and conditions needed for a more flexible environment in which people can respond to problems in more innovative ways. This study could illustrate the effectiveness of incorporating the conceptual framework into organizational policies to improve energy behavior.

Significance to Social Change

The implications for positive social change include the potential to reduce the energy usage of the Federal Government due to the higher amounts of energy the military utilizes compared to other organizations in the Federal Government. The DoD has been an enormous engine of innovation in America and energy innovation is an area of activity that can have tremendous benefits to the United States military and the country (Sarewitz et al., 2012). Military personnel could also take newly established behaviors home and influence family members to become more energy conservative.

Summary and Transition

Over 25 major energy renovation projects have been completed to update facilities throughout an Air National Guard campus that consumes larger percentages of energy, but the behavioral change in personnel facilitated by front-line military supervisors is necessary to provide a long-term solution for sustainability. In Chapter 1, I provided the problem and the nature and significance of the study surrounding the importance of behavioral change to decrease energy consumption in military organizations through front-line military supervisors. The RQ was aligned with the

problem statement and purpose to guide the research. I discussed the conceptual foundation and how it could be used by front-line military supervisors to develop effective interventions to reduce energy consumption. I also presented a brief overview of the background of the research, problem statement, purpose, RQ, assumptions, delimitations, and limitations.

Chapter 2 includes the literature review, which I focused on the conceptual framework, energy management in the military, energy conservation strategies, energy conservation barriers, and behavior change. I reviewed past literature and publications relevant to reducing energy consumption in organizations to broaden the understanding of the energy management practices currently used in various industries and organizations around the world.

Chapter 2: Literature Review

Personnel of military organizations do not direct their behaviors towards saving energy in daily operations. Some of the front-line military supervisors in the Air National Guard lack strategies for changing behavior to reduce energy consumption on a military installation. The purpose of the qualitative single case study was to gain an understanding of common strategies front-line military supervisors have used to reducing energy consumption through behavioral change.

Over 25 major energy renovation projects have been completed to update facilities throughout the Air National Guard campus that consumes large percentages of energy, but behavioral change with personnel facilitated by front-line military supervisors is necessary to provide a long-term solution for sustainability. The sizeable variation in building energy use can be attributed to an occupant's interaction with building systems, so it becomes vital that solutions in both energy efficient behavior and technology robustness collectively contribute toward achieving low energy buildings (Hong, Taylor-Lange, D'Oca, Yan, & Corgnati, 2016).

In this chapter I review the currently available literature on topics about and related to this qualitative single case study. I was able to locate and review over 200 research articles on reducing energy consumption through behavioral change available on organizations such as universities, nonprofits, private sector companies, and residential communities. With more information, military personnel can make more informed choices for reducing energy in military organizations because of the impact the U.S.

military has on U.S. society. In this chapter, I describe the conceptual framework and current literature relevant to the research problem. The conceptual framework is composed of the energy cultures framework, Hersey and Blanchard's situational leadership theory, Adam's equity theory, Herzberg's two-factor theory, and Vroom's expectancy theory. In the literature review, I focus on energy management in the military, energy conservation strategies in practice, barriers preventing energy conservation, and behavior change in organizations.

Literature Search Strategy

I conducted a systematic search of a variety of databases using different search engines for articles published in the English language primarily from 2013 to 2017. These databases included: Academic Search Complete, ProQuest Central, Sage Journals, Science Direct, and Google Scholar. Under peer-reviewed journals, my research included the following journals: *Energy Policy, Applied Energy, Energy, Energy Research & Social Science, Sustainable Cities and Society, Services Engineering Research and Technology, Management, Business Strategy and the Environment, Building Services Engineering Research & Technology, Technological Forecasting & Social Change, Procedia Engineering,* and *Energy Conversion and Management*. The primary focus of my research was in the currently available peer-reviewed literature, military policies, and Ph.D. dissertations where researchers focused on energy reduction through behavioral change.

The keywords used (alone or in combination) included: *military, energy reduction, sustainable energy, energy barriers, energy, sustainable energy management, energy management, energy efficiency, energy conservation, conservation strategies, energy consumption, behavior change, workplace behavior, installation energy, energy culture framework, Hersey and Blanchard's situational leadership theory, Adam's equity theory, Herzberg's two-factor theory,* and *Vroom's expectancy theory.*

Conceptual Framework

The conceptual framework consisted of various interconnected principles and ideas employed to guide the research study. These principles and ideas were applied to procure a potential solution for the RQ and were used to develop questions asked in the online asynchronous focus groups. The conceptual foundation for this study encompasses the energy cultures framework, Hersey and Blanchard's situational leadership theory, Adam's equity theory, Herzberg's two-factor theory, and Vroom's expectancy theory.

Energy Cultures Framework

The energy cultures framework could promote front-line military supervisors to change the energy behavior of their personnel successfully. New Zealand researchers crafted the energy cultures framework to integrate various disciplines to understand energy drivers and improve energy behaviors (Stephenson et al., 2015). The framework illustrated that energy culture of a given issue could be studied by investigating the interrelationships between norms, practices, and material culture, and how these, sequentially, are shaped by external influences (Stephenson et al., 2015). I applied the

energy cultures framework in the online focus group questions because it is a simple model for front-line military supervisors to use to develop strategies to reduce energy consumption. The energy cultures framework can be administered as a guide for front-line military supervisors to gain a better understanding of the numerous factors that impact energy behaviors of personnel to potentially develop effective energy conservation strategies.

Cognitive norms, material culture, and energy practices are the primary constructs of the energy cultures framework. Cognitive norms are individual and group expectations on what is considered normal behavior for material culture and energy practices (Stephenson et al., 2015). Some examples of cognitive norms are motivation to save energy, energy knowledge, and drivers of energy use (Ford, Karlin, & Frantz, 2016). Material culture encompasses the technologies, structures, and other resources that play a factor in how energy is used (Stephenson et al., 2015). Energy practices include both regular and irregular actions, and in the military would include maintenance of technologies and monitoring energy consumption with smart meters (Stephenson, Hopkins, & Doering, 2014).

The primary objective of the energy cultures framework is to focus on the behavior of individuals within a system that most strongly influences behavior, and from there to consider what interventions might be successful in achieving behavior change (Ishak et al., 2016). Ishak et al. (2016) applied the energy cultures framework in a research study and utilized a centrographic method to determine the effectiveness of the

framework in many higher education institutes. Even though the researchers successfully applied it in educational organizations, there is potential the method could also be effective in military organizations.

Front-line military supervisors should be mindful of energy consumption patterns occurring in their shop. Ishak et al. (2016) utilized a two-phase mythology that consisted of collecting data from a survey and then determining energy consumption patterns. A total of 1,348 volunteers from four universities in Malaysia participated in the self-administered survey. The researchers were able to identify four types of energy uses, high, medium, low, and conserve. After comparing the information obtained from the survey, the researchers concluded there was immense potential for energy savings with over 55-kilowatt hours per day between all the students who participated (Ishak et al., 2016). Front-line military supervisors could relay the mythology to properly manage energy consumption behaviors and determine effective energy intervention strategies.

The energy cultures framework could be disseminated for more than just analyzing an organization's energy culture. Ford et al. (2016) employed the energy cultures framework to develop measurement instruments to gauge the changes in energy culture with various interventions. They surveyed 348 participants recruited from Amazon's Mechanical Turk to analyze four fundamental constructs consisting of context, material culture, practices, and norms in various households. Amazon's Mechanical Turk is a website that contains the major elements required to conduct research: an integrated participant compensation system; a large participant pool; and a streamlined process of

study design, participant recruitment, and data collection (Buhrmester, Kwang, & Gosling, 2011). Ford et al. (2016) tested the instruments to evaluate household energy culture before and after interventions were implemented and determined if the tools were reliable. The researchers conclusively proved that by incorporating the energy cultures framework there was an opportunity for reliable and effective intervention strategies that organizational leaders could apply to lower energy consumption. Front-line military supervisors could develop innovative intervention tools to engage and empower their personnel to become more energy conservative.

Hersey and Blanchard's Situational Leadership Theory

Military leaders should comprehend Hersey and Blanchard's situational leadership theory to recognize when to use leadership styles to lead their organizations successfully. Military services have administered Hersey and Blanchard's situational leadership theory for years in leader training and development (Yeakey, 2002). Hersey and Blanchard (1969) challenged other researchers by asserting successful leadership by choosing a style based on follower readiness. Depending on the situation, leaders can select from four leadership styles, which are directing, selling, participating, and delegating. I applied Hersey and Blanchard's situational leadership theory in the online focus group questions to promote front-line military supervisors to become more familiar with leadership styles to provide practical guidance to subordinates to reduce energy consumption.

The directing style includes the leader giving direction on tasks and keeping track of progress. The selling style involves suggestions from follower and leader coaching the

follower to complete tasks. The participating style encompasses the leader and follower deciding together to complete tasks. The delegating style is when the leader enables the follower to make independent decisions to complete tasks. The four styles are used to match the followers' development level, in which leaders are then able to put more or less focus on the task being assigned to complete. When leaders utilize the situational leadership theory, they could empower personnel in an organization to develop the necessary confidence and commitment to efficiently complete various assigned tasks.

This theory not only applies to front-line military supervisors on land bound installations but also on vessels at sea. Earnhardt (2007) conducted a systematic literature review to determine the practical application of five leadership theories on a U.S. naval vessel. On a naval vessel, the situational approach is applicable in several situations, including the role of work center supervisors because of the candid nature of situational leadership (Earnhardt, 2007). Work center supervisors are front-line military supervisors who work with diverse crews on vessels, so it is essential for the work center supervisors to identify the leadership style necessary to lead each subordinate and to apply several styles and methods to a variety of situations (Earnhardt, 2007). There are many leadership theories used on a naval vessel, but the situational leadership theory is a large part of front-line military supervisor success based on the information Earnhardt collected through the literature review.

Military leaders should have insight on how prepared followers are to be led with one of the styles to use it effectively. Cairns, Hollenback, Preziosi, and Snow (1998)

conducted a study that tested the effectiveness of Hersey and Blanchard's situational leadership theory utilizing 151 senior executives in a Fortune 100 company. Based on the situational leadership theory, the researchers suggested the suitable level of task and relationship behavior is the one that matches the level of follower readiness (Cairns et al., 1998). Various statistical methods were used to test the theory in the organization, and the study resulted in 18 matches and 126 mismatches. Matches and mismatches were based on appropriate level of task and relationship behavior matching with the followers' readiness level (Cairns et al., 1998). Although there were a lower number of matches, the researchers concluded the situational leadership theory remains an appealing method to lead personnel in an organization.

Not all research has proven the situational leadership theory to be an appropriate theory to apply to lead personnel in a military organization. In a replicated study, Vecchio, Bullis, and Brazil (2006) conducted follow-up research of previous comprehensive tests of the situational leader theory. A total of 860 cadets from the U.S. Military Academy participated in the investigation. Cadets provided data on leader consideration, leader structuring, follower readiness/maturity, follower satisfaction, follower performance, and leader-member exchange (Vecchio et al., 2006). Based on the results from the study, the researchers determined the situational leadership theory had insignificant value in organizations.

Military personnel may have more confidence in following one of the leadership styles, especially if they know it is a valid option. Yeakey (2002) advocated that Hersey

and Blanchard's 1969 theory is practical and easy to understand, but its widespread use calls for in-depth empirical testing to determine its validity as a tool for leaders to impact an organization and people in the organization. Hambleton and Gumpert (1982) examined the validity of Hersey and Blanchard's situational leadership theory. Based on the surveys of 65 managers, 189 subordinates, and 56 supervisors, the results supported the validity of the situational leadership theory when used correctly by leaders (Hambleton & Gumpert, 1982). Front-line military supervisors should prime personnel on the reasoning for a leadership style and the potential success that can result from it.

Adam's Equity Theory

The acuity of being treated fairly or unfairly by their front-line military supervisors can influence the motivation of personnel. Adams's equity theory is the perception of equitability and in-equitability that motivates people to work (Al-Zawahreh & Al-Madi, 2012). In the equity theory, motivation is affected by the individual perception of being treated fairly in comparison to others (Al-Zawahreh & Al-Madi, 2012). An evaluation of "unfair" leads to conflict that creates an internal psychological struggle and motivates the individual to resolve the inequity, which may occur as increased input, reduced expected output, withdraws, and so forth (O'Mara, Heacox, Gwynne, & Smillie, 2000). Equity occurs when subordinates have a balance between inputs and outputs. Some inputs to be examined are effort, commitment, and adaptability, while typical outputs consist of praise and thanks, sense of achievement, and responsibility. I applied Adam's equity theory in the online focus group questions to

assist front-line military supervisors in recognizing how to effectively motivate their subordinates to reduce energy consumption.

The motivation of personnel impacts the willingness of and quality of work they produced. Lawler and O'Gara (1967) conducted a study to test Adam's equity theory by dividing 40 undergraduate students from Yale University that into two equal groups. One group was paid an equitable amount to conduct interviews, and the other group a lower amount. The underpaid group produced more, but lower quality interviews then the equitably paid group. When confronted with the perception that people are inequitably treated, based on prior research, researchers suggested that people restore equity but altering inputs and outputs or changing their view of the situation to make the situation equitable (Bolino & Turnley, 2008). The results of the study effectively support Adam's equity theory and demonstrate how fairness impacts motivation to complete tasks comparable to positively changing energy consumption behaviors. Front-line military supervisors should recognize the balance between the inputs and outputs of personnel to maintain motivation towards changing energy behaviors.

Equity could motivate military personnel by comparing treatment with peers or with other people around the world. Austin and Walster (1975) observed a relationship between person-specific equity and equity with the world. They conducted a study with two scenarios that utilized 135 undergraduate women from the University of Wisconsin. In scenario 1, participants were over-rewarded, equitably rewarded, and under-rewarded comparatively to a partner (Austin et al., 1975). Scenario 2 allowed for the participants to

have more freedom and they were able to distribute their awards throughout the group. Based on the results from both scenarios the women were more likely to put their equity aside for the equity of the group. Allen and White (2002) conducted a similar study utilizing 203 undergraduate students with two scenarios and produced equivalent results, demonstrating the effectiveness of the theory in application. Front-line military supervisors should strive to comprehend how personnel view equity, so they can effectively motivate them to change energy behaviors.

Military personnel could improve their energy behavior with a high-quality workplace environment. To test Adam's equity theory, Greenberg (1988) conducted a field study using an underwriting department in a large insurance company. There were 198 participants randomly assigned to offices of higher, lower, and equal status. Individuals assigned to higher status offices raised their performance while people in lower status offices lowered their performances. Personnel in equal status offices continued to produce an average performance. Greenberg (1998) was effective at exemplifying the success of the theory to increase motivation based on the equity of office sizes. Front-line military supervisors should foster a positive work environment for personnel to be empowered and motivated to develop innovative methods to reduce energy consumption.

Herzberg's Two-Factor Theory

Herzberg's two-factor theory consists of motivational factors that motivate personnel and hygiene factors that cause demotivation if not met (Civre, Lovec, &

Fabjan, 2013). Motivational factors include pay, unit policies, benefits, working environments, interpersonal relations, and job security. Hygiene factors consist of recognition, sense of achievement, growth opportunity, responsibility, and meaningfulness of the work. Motivators are associated with long-term positive effects on job performance while the hygiene factors consistently produce short-term changes in job attitudes and performance (Gawel, 1997). I applied Herzberg's two-factor theory in the online focus group questions to assist front-line military supervisors in developing effective award systems to motivate their personnel to reduce energy consumption.

Innumerable factors motivate personnel in the workplace and supervisors should recognize them. Aydin (2012) conducted a survey to test Herzberg's two-factor theory on staff members at a foundational Turkish university. There were 150 staff members from the university in Istanbul that completed a questionnaire with 19 questions to determine the effectiveness of motivational factors. The researcher confirmed the motivational and hygiene factors, identified by Herzberg, successfully motivated university personnel to perform at higher levels. Aydin (2012) was effective at demonstrating the influence motivational and hygiene factors have on the motivation of personnel. Front-line military supervisors should comprehend which motivational and hygiene factors effectively motivate personnel to ensure organizational success.

Military personnel are influenced by the same factors that affect people in other industries. McConville, Swanson, and Zobisch (2017) conducted a research study to identify factors that contribute to active duty military personnel job satisfaction and

dissatisfaction. The researchers administered U.S. active duty military personnel attending Hawaii Pacific University as participates in a week-long online survey. McConville, Swanson, and Zobisch (2017) concluded the results of the survey supported Herzberg's two-factor theory. The motivational and hygiene factors identified in the study were common factors that impacted employee motivation in organizations outside of the military. Macovei and Argintaru (2016) conducted a similar study using active duty officers in the Romanian Army and concluded with similar results. Front-line military supervisors should recognize which factors generate satisfaction and prevent dissatisfaction to maintain a motivated workforce.

Vroom's Expectancy Theory

Vroom's expectancy theory is from the concept that subordinate performance depends on the relationship between valence, instrumentality, and expectancy. Valence is the value personnel place on a specific reward or outcome (Dininni, 2017). Instrumentality is the degree to which personnel believe that performing at a certain level will lead to an outcome (Tanner, 2018). Expectancy represents each military members' confidence in their capability when it comes to possessing the work skills needed to perform well enough to achieve the reward (Gaffney, 2018). I applied Vroom's expectancy theory to the online focus group questions to assist front-line military supervisors to recognize what they need to offer subordinates to motivate them to reduce energy consumption effectively.

Military supervisors should comprehend Vroom's expectancy theory, so they are more prepared to meet the needs of their personnel. Simone (2015) conducted an empirical study in three Italian hospitals. Approximately 492 health care professionals participated in the study by filling out an anonymous survey which focused on valence, expectancy, and instrumentality. Based on the results, the researcher confirmed the effectiveness of Vroom's expectancy theory. When management understands the expectancy theory principles, they can employ the concepts to assemble more effective work teams to accomplish their business goals (Gaffney, 2018). Front-line military supervisors should recognize the workplace needs of their personnel and understand that their goals and ambitions may differ.

Supervisors should perceive intrinsic or extrinsic motivators that influence personnel. Chiang and Jang (2008) conducted a research study to validate Vroom's expectancy theory in a hotel setting. The researchers employed 289 hotel employees from 56 hotels in Midwestern states. They distributed 1,450 surveys, but only 289 returned completed. The results of the study supported the expectancy theory, but the researcher identified intrinsic motivation factors as being more influential in motivating hotel employees. Rawoot, Van Heerden, and Parker (2017) conducted a research study on career success for South African military members and identified participants that were all already successful members used intrinsic factors as motivation for career success. Front-line military supervisors should strive to implement factors that promote intrinsic motivation to improve conservational energy behaviors.

Alignment is significant to ensure a research study is complete and understandable. I ensured there was alignment with the RQ, management problem, conceptual framework, focus group questions and literature review sections by developing a detailed table (see Appendix A). The energy cultures framework, Hersey and Blanchard's situational leadership theory, Adam's equity theory, Herzberg's two-factor theory, and Vroom's expectancy theory were used to guide this dissertation study. These principles and ideas were used to find a potential solution for the RQ and identify effective, realistic best management practices front-line military supervisors could use to reduce energy consumption through behavior change on a military installation. The online focus group questions were developed based on the conceptual framework and directed towards answering the RQ. I used the conceptual foundation to answer the RQ while solving the problem and purpose of this study.

Literature Review

The review of related literature encompasses the systematic identification, location, and examination of documents containing information related to the research problem to determine what has already examined by researchers relating to the particular topic (Shi, 2006). This literature review focuses on the following four areas:

1. energy management in the military,
2. energy conservation strategies in practice,
3. barriers preventing energy conservation, and
4. behavior change in organizations.

Energy Management in the Military

Throughout the DoD, there are now increased opportunities for training, improved guidance, and amplified support to achieve energy management goals. Although less than several of its federal agency counterparts, in the last decade the DoD has made progress in reducing the organization's energy consumption (George, 2015). While these improvements have led to an overall reduction in the DoD's wasted energy expenditure, there are still military units that falter slowing the progress of the organization as a whole. Front-line military supervisors in these units seem not to be taking full advantage of the opportunities and tools available to them to impact subordinates' behavior regarding energy consumption positively.

Installation Energy Usage

Energy use on installation has become a priority for military units across the globe. From 2005 to 2015, the DoD reduced its energy intensity use by less than one percent on average per year, which was the worst record of the ten federal agencies that consume the largest amounts of facility energy (Marqusee et al., 2017). Although sometimes overlooked, the military is a large consumer of installation energy due to the power the DoD uses to heat and cool its facilities and to power critical operations (Holland, Cunningham, Huppmann, & Joyce, 2013).

The DoD occupies 284,000 buildings and 2 billion square feet of space, consumed 1 percent of the total electric energy consumed in the United States, at the cost of almost $4 billion. (Marqusee et al., 2017). Of that large number of buildings and structures,

many are past their life expectancy and need to be upgraded to improve energy efficiency. Architects did not design military bases with energy efficiency in mind, so even if they were operating at optimal specifications, they would be wasteful by today's standards (Weinschenk, 2016). Energy behavior becomes even more significant since there was lack of consideration to energy efficiency in the construction of older military installations.

The energy behavior of personnel on military installations needs to be adjusted to create meaningful and long-lasting improvement in energy consumption. Baack (2014) extrapolated that despite the millions of dollars of energy-saving enhancements rolled into Military Construction Program work completed in the last five to six years, old habits have undermined these technological leaps. Typically, personnel established habits when behaviors are repeated continuously over time. Many times, personnel pursue an easy method to complete a task to save on time instead of employing the most efficient method. Human behavior is an essential and frequently unnoticed element in achieving aggressive Federal building performance goals, especially for reducing consumption of energy, water, and materials (Wolfe, Malone, Heerwagen, & Dion, 2014). Front-line military supervisors should recognize of the energy consumption behavior the personnel in their shop to reduce energy waste.

The energy behavior of personnel is crucial in each facility for setting the rate of energy consumption on an installation. Schakib-Ekbatan, Çakıcı, Schweiker, and Wagner (2014) analyzed several studies and extracted that occupant behaviors significantly affect

the energy demand of buildings (ranging from 1.2 to 2.84 times when comparing identical buildings). Personnel in each facility are essential in lowering energy consumption because they directly influence the energy consumption for quotidian operations. Front-line military supervisors should confirm personnel recognize the amounts of energy consumed, so they develop shop level goals to lower usage.

Front-line military supervisors should craft processes to keep personnel on course with changing energy behavior. Judd, Sanquist, Zalesny, and Fernandez (2013) conducted an 18-month energy study on a military installation located at Fort Carson, Colorado. They focused their efforts on changing the behavior of personnel within five buildings. The researchers implemented a five-step process developed by the Department of Energy-Federal Energy Management Program (FEMP). These steps consisted of determining a goal, identifying context – rules, roles, and tolls, developing action plans, implementing the plan, and measuring and evaluating progress. Upon completing the study, the researchers discovered many of the intervention measures were effective. The researchers determined one of the more highly effective interventions from the study was instruction from supervisors on energy conservation behaviors. It is essential that front-line military supervisors communicate the importance of effective energy usage for personnel to cogitate on its importance.

With the advancement in military technology on installations, energy consumption has become an imperative aspect of military operations. Saritas & Burmaoglu (2016) conducted a thorough study analyzing the increase of energy within

military operations. They evaluated the various trends in military energy usage to develop future scenarios of energy in military operations. Saritas and Burmaoglu (2016) developed a three-stage process for energy transformation, which takes place at the installation and individual levels. Future research is required to determine if this process is feasible in lowering energy consumption in the military using these platforms. Saritas and Burmaoglu (2016) argued the importance of energy independence by focusing more on using renewable energy but failed to mention that a different source of energy will still be wasted with inefficient energy consumption habits by military personnel. Improvements in energy behaviors in the DoD can increase warfighter efficiency and cut installation and operational energy costs (Homeland Defense and Security Information Analysis Center, 2015).

Front-line military supervisors should be able to recognize various patterns in energy consumption for their respective shop to develop effective strategies and positively transform energy behaviors. The identification of energy consumption patterns on military installations could contribute to the development of energy efficiency interventions (Pombeiro, Pina, & Silva, 2012). Gul and Patidar (2015) conducted a pilot study to analyze the relationship between electrical consumption and occupant behavior for an academic building at Heriot-Watt University located in Scotland. Participants within the facility participated in semi-structured interviews and an online survey so that the researchers could obtain information on electricity used for diurnal operations of the facility. The researchers assessed the occupancy patterns could promote the management

team in reconfiguring energy controls in the facility to improve energy performance. Their goal would be to implement these new methods in other facilities throughout the campus to improve overall energy efficiency for the entire university. Front-line military supervisors could employ a similar approach on a military installation.

The ability of the DoD to efficiently manage energy on an installation is an essential element of mission assurance, and comprehensive measurement of facility energy could help the department maintain an aggressive pace toward its larger energy objective (U.S. Government Accountability Office, 2016). Front-line military supervisors should emphasis this to personnel routinely, so there is a constant transformation in energy behaviors. For front-line military supervisors to meet energy objectives, they need to use fathomable guidance for their personnel.

Department of Defense Energy Guidance

Several Acts and Executive Orders have been implemented in recent years to guarantee government agencies participate in lowering energy consumption. The Energy Independence and Security Act of 2007 required federal agencies to reduce energy consumption by 30% based on FY 2003 energy consumption by 2015. In July 2015, the Federal Government established Executive Order No. 13693 and all federal organizations were required to reduce energy consumption by 25% by FY 2025 with a baseline starting in FY 2015.

The military is currently one of the most salient domestic entities in the development of new and existing technologies to reduce energy use. It is essential

organizations have effective guidance regarding energy consumption because it creates an opportunity for policymakers to see the potentially substantial benefits for the environment (Light, 2014). Front-line military supervisors should enforce organizational energy guidance but also craft shop level guidance that is more relatable to shop personnel.

There could be organizational energy guidance, but that should not stop personnel from developing new and innovative shop practices. Strakos, Quintanilla, and Huscroft (2016) discussed the background of energy management in the DoD from 1973-2014. There have been many governmental policies and executive orders to promote decreasing energy usage in the U.S. government. Strakos et al. (2016) conducted a historical review of various policies, legislation, and energy research from military schools in which they identified gaps between strategy and research in the DoD. Strakos et al. (2016) argued that there is a need for a framework that adequately unifies research efforts to support the DoD's energy strategy to decrease energy consumption. Front-line military supervisors should recognize the opportunities for better practices then stated in organizational energy guidance. They should motivate shop personnel to develop new methods to complete quotidian tasks more efficiently.

Guidance is crucial for personnel in an organization to comprehend the various standards established by leadership. Karatas, Menassa, and Stoiko (2015) conducted a literature review and developed a framework in two-steps based on what they learned from their analysis that could promote leaders to design effective policies. They created a

four-level intervention strategy (education, persuasion, penalties, & technology) and justified the approach with supporting data and information for each level. Karatas et al. (2015) determined the various intervention levels could be utilized effectively with occupants with varying energy consumption habits. Front-line military supervisors could also participate in developing unit level guidance by suggesting innovative methods to reduce energy consumption to senior leadership.

Front-line military supervisors should embrace being critical thinkers and develop new energy conservation frameworks to create more efficient methods for reducing energy consumption. Zierler, Wehrmeyer, and Murphy (2017) investigated a large infrastructure operator to determine how to improve the behavior of individuals to save energy. They administered a survey, analyzed the survey results, clustered the data and proposed a new framework for new energy-saving behavior. The theories of planned behavior and interpersonal behavior were both referenced, and the final integrated framework had features from both. Zierler et al. (2017) developed a new framework from three inter-related frameworks in which future researchers could develop further studies on energy consumption attitudes and behaviors in large organizations based on the results of the study. New frameworks give organizational leaders the opportunity to integrate innovative interventions focused on reducing energy consumption.

Energy Conservation Strategies in Practice

Energy conservation methods are essential to energy consumption reduction strategies. Strategies for providing information about the environmental impact of

activities are increasingly seen as effective to encourage conservation behavior (Delmas, Fischlein & Asensio, 2013). While many strategies have been used to introduce new occupant use behaviors that promote sustainability and reduced resource consumption, few have been verified in the scientific literature or have properly documented case study results (Wolfe et al., 2014). Some of the interventions have not yet been verified, but they could still potentially support front-line military supervisors to develop effective energy conservation strategies to put into practice in their shops.

Rewards

Rewards and incentives have frequently been used to motivate and sustain behavioral change. Rewards can range from tokens for bus ridership to coupons for purchasing green products, and there have several recent projects illustrating the significance of incentives (Wolfe et al., 2014). It is essential front-line military supervisors be conversant with awards that are most suitable for their subordinates to motivate them to modify their behavior effectively.

Social rewards in private or public settings are effective techniques that could be employed by front-line military supervisors to promote behavioral change. Lossin, Kozlovskiy, Sodenkamp, and Staake (2016) managed an energy conservation research study on the impact of using monetary and non-monetary incentives to reduce energy consumption with Swedish utility customers. A total of 2,355 energy customers participated in the study to test the effectiveness of various size incentives to motivate efficient energy usage. Lossin et al. (2016) determined that using incentives resulted in a

reduction in energy usage, but there was a difference between the effectiveness of using monetary incentives compared to non-monetary incentives. Wolfe et al. (2014) suggested offering people money places the relationship on a business level, in which case, compensation can seem inadequate and demotivating. Monetary awards may not be the best fit for military organizations but could be used annually through gift cards to provoke personnel to reduce energy consumption.

Front-line military supervisors could effectively reduce energy consumption by combining the use of incentives with other types of energy conservation interventions. Yu and Bhatti (2014) conducted a 2-year research study to determine the effectiveness of incentives to persuade 83 students from the University of St. Andrews in Scotland to become more energy efficient. The integrated feedback, competitions, and rewards in four stages to the participants to reduce energy use. Group use decreased by 16%, and individual energy use declined by 56%. Yu and Bhatti (2014) changed student behavior to be more energy efficient by incorporating appropriate incentives such as rewards to reduce energy consumption through behavior change. Front-line military supervisors could record effective intervention combinations and share those with their peers to support with the effort to create long-term change in energy consumption throughout the organization.

Front-line military supervisors could successfully incorporate incentives with into a well-structured energy policy to reduce energy consumption. Elinder, Escobar, and Petré (2017) evidenced that implementing simple monetary incentives could effectively

reduce electric energy consumption. They applied a policy experiment in an apartment complex, where 800 tenants were the treatment group and 1,000 tenants were the control group. The treatment group was charged based on their actual usage, but the control group was charged based on the apartment rate and did not have to worry about the excessive energy used. The treatment groups reduced energy usage immediately after being informed of the policy change. Elinder et al. (2017) proved that implementing the incentive policy effectively decreased energy consumption by 25% per year in the apartment complex. Personnel should comprehend energy policies and be informed when policies are updated to maintain an effective energy culture within the organization. Various incentives could be applied in shops by front-line military supervisors to encourage personnel to adhere to energy policies.

Front-line military supervisors should distinguish when to use certain types of rewards to reduce energy consumption. Handgraaf (2013) suggested that social rewards are more effective than financial incentives because they fall in line with social norms. He conducted a 13-week study on employees at a Dutch firm. Employees received rewards for saving energy with either monetary or social rewards. The rewards were given publicly and in private. Public social rewards were the most effective in ensuring employees continued to reduce energy consumption. Handgraaf (2013) surmised that policymakers and critical leaders should consider using public social rewards more than financial incentives in interventions to effectively reduce energy consumption in organizations. Public social rewards could be a sufficient incentive for military

organizations because it is a simple method to integrate and there is no additional cost to integrate this type of incentive.

Feedback

Feedback is analyzed by front-line military supervisors to view links between specific behaviors and progress toward achieving goals in real time, highlighting the integration of new technologies with social systems to provide highly accessible and immediate feedback, e.g., on a dashboard display in front of the viewer (Wolfe et al., 2014). Front-line military supervisors should determine effective methods for incorporating feedback to be more than just displayed information and use it to motivate personnel to want to reform their energy behavior.

Feedback could be an effective instrument for front-line military supervisors to lower energy consumption in their shop by displaying energy usage in a manner that motivates personnel to prefer energy efficient behaviors. Shen, Young, and Cui (2016) conducted a study on Joint Base Andrews, Maryland to evaluate the impact of normative feedback in a military community. The researchers had two hypotheses that were well framed and significant in ensuring a reduction in energy consumption. The four-month study was composed of 601 homes. The researchers divided the households into a control group and three treatment groups. The experiment was conducted to test the variation of normative feedback in households to achieve the best savings through utilizing feedback to impact human behaviors. Based on the results of the study, the researchers were able to confirm the energy savings from normative feedback and proximity level. Normative

feedback could be used by front-line military supervisors to keep personnel cognizant of energy usage compared to others and motivate them to change their behavior to reduce energy consumption.

Front-line military supervisors should determine the method of communication for feedback when developing interventions to reduce energy consumption. Barron and Sinnott (2013) focused their research efforts on energy behavior by analyzing energy consumption patterns. They conducted an ethnographic study to investigate the behavioral energy patterns of six residences in Ireland. Barron and Sinnott (2013) revealed that older households with older occupants managed to use less energy than households with younger occupants and more energy efficient technology. The researchers advocated the younger more energy efficient occupants were more receptive towards feedback presented as monetary units saved rather than energy units saved. Barron and Sinnott (2013) proposed a new framework from the lessons learned, which could be utilized to conduct more research similar to this ethnographic study. Front-line military supervisors should recognize feedback may have to be displayed differently for some personnel for them to comprehend energy usage.

Online feedback tools are becoming more accessible for front-line military supervisors to use in their shops to change energy consumption behavior due to increases in technology. Attari and Rajagopal (2015) explored various online energy conservation tools, which could support users with changing their behavior to become more conservative with energy usage. They analyzed the strengths and weaknesses of EPA's

Energy Star Program, the Lawrence Berkeley National Laboratory's (LBNL) Home Energy Saver tool, and DOE's EERE calculator. Occupants used the tools to gauge the amount of energy used in each monitored building. Attari and Rajagopal (2015) conducted a thorough investigation of the three tools and found enhancements were necessary for the online tools to be effective for occupants. Front-line military supervisors could use these tools as templates for developing feedback products they could use within their shops to keep personnel attentive of energy consumption.

Social media use is increasing in several organizations, so it could be an alternative online tool administered to inform personnel in military organizations about energy patterns and usage. Lehrer, Vasudev, and Kaam (2014) highlighted the importance of using social media to engage commercial building occupants in energy conservation, and to improve communications between occupants and building management around issues related to building operations. In our rising technological society, front-line military supervisors could utilize online energy conservation tools potentially as an aid to develop effective strategies to lower energy consumption.

Energy reduction through feedback can hypothetically be more successful when used in combination with other techniques. Piccolo, Baranauskas, Fernez, Alani, and De Liddo (2014) focused their efforts on utilizing a combination of feedback from smart monitors, debate tools and tangible motivational devices to advance energy awareness in the workplace. These energy saving tools were analyzed utilizing interviews, assessments and online discussions. They identified advantages and disadvantages for each tool and

possible applications in an organization. Piccolo et al. (2014) conveyed the intervention combination was effective, but a dialogue between leaders and subordinates needed to occur within an organization to ensure energy consumption could be reduced through behavioral change using this combination. Front-line military supervisors should use a combination of interventions, so personnel remain engaged in the effort to reduce energy consumption.

Occasionally, combinations of interventions are ineffective in reducing energy consumption in an organization. Lokhorst, Staats, and Van Iterson (2015) surveyed to test out feedback and commitment-making interventions within an office setting. In the study, 146 employees from an organization participated. The researchers surveyed the effectiveness for behavioral change by breaking the participants into four categories (Commitment and Feedback (CF), Commitment Only (CO), Feedback Only (FO), and Control (Ctrl). Lokhorst et al. (2015) attributed some success in behavioral change with the experiment, but overall the combined interventions did not successfully reduce energy consumption. Front-line military supervisors should adopt the best approach for the shop to effectively reduce energy consumption.

Organizational traits can influence the type of feedback that could successfully lower energy for an organization. Karlin et al. (2014) explored how particular dimensions of psychology and feedback could improve energy consumption by modifying energy consumption behaviors. The researchers completed a thorough literature review of 28 research articles and identified that curtailment and efficiency were two highly

reoccurring dimensions. The researchers concluded their research reinforced organizational leaders could effectively promote energy efficiency in organizations through feedback and energy conservative policies geared toward these two dimensions. Front-line military supervisors should discuss the effectiveness of the combination of interventions with personnel to determine the most efficient combination for the shop.

Front-line military supervisors could communicate feedback in a group consumption format, so each member can work towards the success of the team to reduce energy consumption. Gulbinas and Taylor (2014) conducted a nine-week study to explore how real-time feedback and network dynamics in an organization affects occupant energy behavior in a 40,000 square foot commercial facility located in Denver, Colorado. There were 98 participants divided into three groups: the individual feedback group, organizational feedback group, and control group. The researchers revealed that individual feedback was not as effective as organizational feedback in reducing energy consumption.

Dixon, Deline, McComas, Chambliss, and Hoffmann (2014) promoted comparative feedback-based campaigns as effective pro-environmental interventions within organizations and provided direction for future research and practice. Siero, Bakker, Dekker, and Van Den Burg (1996) conducted a study that illustrated employees in a comparative feedback condition saved more energy than employees who only obtained information about their performance, even half a year after the intervention. Front-line military supervisors could use comparative group feedback to motivate

personnel to reduce energy consumption by competitively comparing them to other shops within the organization.

Prompts

Front-line military supervisors can contribute to personnel from overlooking energy conservation behaviors and establishing new routines through use of prompts. Prompts are memory aids presented close to the repetitive behavior (McKenzie-Mohr & Schultz, 2014). A prompt can be available in different forms such as a verbal prompt or a visual prompt (Chui, Wai & Ahmad, 2015). Front-line military supervisors could integrate shop related prompts throughout workplace environments to maintain energy conservation alertness within their shops.

Prompts tailored to an organization can be an effective method to support personnel to change energy consumption behaviors. Tetlow, Beaman, Elmualim, and Couling (2014) investigated using prompts to reduce energy consumption through lighting systems in two office buildings. Simple prompts and reminders can increase a range of pro-environmental behaviors (Fredericks et al., 2015). The researchers conducted an experiment in each building, where they used two types of single prompts. One prompt was generic, and the other was related towards the organization. Tetlow et al. (2014) specified both types of prompts were effective, but the prompt that associated with the organization was more effective at motivating personnel to turn off the lights. Front-line military supervisors should incorporate shop personnel in creating shop specific prompts to empower and motivate personnel to participate in saving energy.

Similarly, Bator, Tabanico, Walton, and Schultz (2014) conducted two experimental studies to test the impact of messages on social norms in computer laboratories in two upstate New York universities. Messages tend to work best for behaviors that are simple, easy, effortless and repetitive, and for people who are already motivated to engage in the desired action (Fredericks et al., 2015). The first study was a 4-day study involving 308 participants with 28 desktop computers at a computer laboratory in public university. The second study built upon study 1 and was a 5-day study in five computer laboratories at a private college in New York. The research design involved computers be left all on or off, and business card size messages with the school logo being present or not present on the computer monitor. The researchers concluded that both studies demonstrated that socially align signs are effective to reduce energy consumption in an organization. Front-line military supervisors could use shop specific prompts to motivate personnel to change their behavior to reduce energy consumption.

E-mails can be a useful platform for reducing energy consumption using prompts to change behavior. Pandey, Diller, and Miller (2016) conducted a research study at a green university to comprehend the influence of e-mailed prompts to reduce energy consumption at a green university. The research was completed in 12 weeks and involved 500 occupants from five campus facilities. The researcher sent weekly e-mails through a university e-mail address with examples on how to reduce energy to occupants in each facility. The researchers were not able to prove e-mail prompts reduce energy

consumption but were able to develop best management practices for organizational leaders to use to craft an energy conscious workforce.

Prompts should be tested before integrating them into an organization to gauge the effectiveness of the prompt on a sample size of the organization to reduce energy consumption. Delmas and Aragon-Correa (2016) conducted three experimental studies, where they examined the effectiveness of interventions for energy conservation. The first experiment compared private and public feedback of energy conservation and the second and third tested the effectiveness of monetary messaging and environmental and health messaging on conservation behavior. The researchers concluded the field experiments are essential for determining the effectiveness of various interventions prior to implementation. All the experiments effectively reduced energy consumption and saved on average of 10-20% of energy. Front-line military supervisors should test prompts to avoid wasted time and effort before implementing the intervention into their shop and eventually the organization.

Social Norms

Social norms guide behavior in organizations and have been increasingly used in the environmental field in interventions designed to reduce energy consumption (Wolfe et al., 2014). In the last decade, there has been an increasing number of interventions that rely on social norms to leverage support for changes in behavior (Liu, Veríssimo, & Farhidi, 2016). Military members have embedded energy consumption habits in military

cultural norms, so front-line military supervisors should acknowledge them when developing methods to change behaviors in their shops to reduce energy consumption.

Front-line military supervisors should recognize social norms that impact energy conservation in their shop. Dwyer, Maki, and Rothman (2015) conducted two separate studies in university public bathrooms to focus on decreasing energy consumption by influencing descriptive norms and personal responsibility. The researchers had different scenarios to obtain the most accurate information as possible in each study. They demonstrated the linkage between social norms and personal responsibility. The two studies resulted in evidence supporting the hypothesis that the light status when a person enters a bathroom will affect the decision to turn off or leave on when exiting. The studies are simple examples of a strategy that could be applied by front-line military supervisors to reduce energy consumption through behavior change.

Social norms in an organization can lead to the success or failure of certain interventions employed. Delmas, Fischlein, and Asensio (2013) reviewed published field trials from 1975 to 2012 to review various strategies to reduce energy consumption. The participants from the studies reduced energy consumption by approximately 7.5% each. The researchers noticed that individual audits are more effective than using historical data or peer feedback. Incentives and financial feedback usually led to an increase in energy usage rather than reducing consumption. The researchers summarized that additional research is necessary to refine the effectiveness of the multiple strategies that can be used to reduce energy consumption. Front-line military supervisors should recognize all

interventions will not be effective in reducing energy consumption in their shop, so multiple attempts of various interventions may be necessary to change the behavior of personnel successfully.

Working as a group to reduce energy consumption is more effective than reducing energy individually in an organization. Fisher and Irvine (2016) analyzed four group intervention techniques to determine the effectiveness of each for long-term energy reduction. The researchers tested the interventions by creating four groups of volunteers from a workplace, faith group, and a neighborhood. The groups used different techniques, like monthly meetings and informative sessions, to communicate with each member. All the groups managed to reduce energy consumption by at least 20% annually noticeably. The researchers advocated based on the results of the test that small groups provide a positive environment to reduce energy consumption successfully. Shops in the Air National Guard unit are small groups, so front-line military supervisors should ensure that all members motivate each other to change their energy behavior.

Group interventions are typically effective techniques to reduce energy, but front-line military supervisors may experience challenges with behaviors. Hatzl, Brudermann, Reinsberger, and Posch (2014) analyzed the impact of regional and municipal energy conservation techniques to encourage citizens to have positive energy conservation attitudes and behaviors. The researchers compared two towns, where Town A implemented energy conservation program and the Town B did not apply any energy conservation plan. A survey was administered to obtain information about awareness and

behavior from 98 participants from Town A and 61 participants from Town B. The researchers found that the energy program implemented in Town A had minimal impact on the citizens' attitudes and behaviors. The researcher illustrated the challenges in changing attitudes and behaviors among people. Front-line military supervisors should remain committed to convincing shop personnel to shift energy behavior to save energy.

Convincing building occupants to commit to energy reduction is an effective method to encourage conservative energy behaviors. Lockhorst, Staats, van Dijk, and Gale (2013) conducted a study to evaluate the effectiveness of commitment as a strategy to reduce energy consumption. The researchers analyzed 19 studies published between 1976 and 2010. The researchers concluded that commitment leads to behavior change for short and long durations. Occupants feel committed to saving energy once they see everyone around striving for energy reduction in their organization. The researchers viewed commitment as an advantageous method for lowering energy consumption, but additional research could improve the effectiveness of this method to reduce energy usage.

Long-term interventions should be the focus of organizational leaders to reduce energy consumption. Kemp-Hesterman, Glick, and Cross (2014) conducted a mixed method design to analyze the influence of improving energy behavior at two high schools located in Fort Collins, Colorado. The researchers administered interviews and reviewed historical electrical data to determine the effectiveness of the two interventions implemented at the schools. They employed an awareness campaign and a charrette. The

researchers were able to reduce energy consumption in both schools, but over time energy consumption regressed to its original level. They advocated to have long-term savings individuals in the high schools needed to focus their efforts on communication, motivation, and leadership. Front-line military supervisors could use either of two interventions initially but should also develop long-term interventions to ensure complete behavior change.

Not all social norm interventions will work for organizations to effectively reduce energy consumption, so supervisors will need to incorporate trial periods to determine the best methods. Sorrell (2015) conducted a review of issues about reducing energy demand. He performed multiple comparisons of energy demand to system scale, economic growth, energy efficiency, energy markets, energy policy, and sociotechnical systems. The researcher concluded that reducing energy demand will be harder than many researchers claim in their research and current approaches are not effective enough to provide the transformation needed to reduce energy demand. Front-line military supervisors should understand that not all social norm interventions will reduce energy in their shop and might need to modify their method to work effectively with their personnel continuously.

Barriers Preventing Energy Conservation

Military organizations have given continuous effort to reduce energy consumption, but energy conservation interventions can be ineffective due to various barriers. Barriers that impede implementing energy conservative behaviors fall into the categories of economic, financial, regulatory, or informational (U.S. Department of

Energy [USDOE], 2015). Front-line military supervisors should be able to identify potential barriers, so they can incorporate preventative measures in energy conservation interventions to ensure an effective reduction in energy consumption.

Front-line military supervisors should recognize potential barriers that could affect their shop. Backman (2017) conducted an exploratory case study on 60 micro- and small-sized Swedish companies to understand how the Swedish government could increase energy efficiency within smaller companies. All the companies that participated were also involved in a local energy program. He administered semi-structured interviews and a questionnaire to collect information about the energy conservation barriers these companies encountered. Some of the primary barriers identified were lack of time, split incentives, and deficient information. Beckman (2017) conveyed more research is necessary for incorporating effective energy policies and improving knowledge transfer to prevail over energy barriers. Front-line military supervisors should adjust strategies to improve energy management processes when barriers are identified.

Organizational leaders should periodically coordinate energy self-assessments to identify potential barriers preventing them from saving energy. Johnson, Johansson, and Andersson (2014) conducted an action research case study on a short sea shipping company to gain a better understanding of efficient energy management practices within the shipping industry. The researchers divided the case study into three phases, which consisted of a pre-study, Energy Management System (EnMS) implementation and external audit. Johnson et al. (2014) explored various barriers identified in the shipping

industry and were able to categorize five: project management capabilities, ship-shore communication, a division of responsibilities, access to performance measurements, and competence in energy efficiency. Johnson et al. (2014) revealed that more action research was necessary to surmount traditional barriers like the one identified in the study. To recognize their obstacles, front-line military supervisors should conduct internal assessments to decrease potential barriers in their shops.

Front-line military supervisors should recognize energy conservative barriers at all levels in the organization to facilitate long-term behavior change in their organization. Van Doren et al. (2016) believed that current energy reduction initiatives need to be scaled up to reach a broader audience to ensure energy reduction occurs worldwide. The researchers also stressed the importance of understanding local strategies and barriers to overcoming energy waste. Van Doren et al. (2016) concluded with three general findings, which were the examination of barriers to scaling up energy conservation initiatives, strategies to overcome barriers, and identifying the local environment as being promising to address energy conservation barriers within an organization struggling to reduce energy consumption. Identifying shop barriers not only advantageous for the shop but more importantly the entire organization to change energy behavior.

Organizations could encounter social barriers preventing energy behavior change. Moezzi and Janda (2014) discussed the potential of energy savings by motivating people to save energy for the global good. The researchers suggested that social potential should be considered because social science could contribute to improving building energy use

with effective policies. Through past research, the researchers identified three key problems keeping an organization from effectively saving energy: “if only they knew”, “if only they could be made to care”, and “if only they stayed home”. The researchers recommended organizational leaders should consider the social potential in conjunction with technical and behavioral methods to further reduce energy consumption. Front-line military supervisors should comprehend prevailing energy conservation barriers is not just to improve their organization, but rather to bring social change in energy consumption to all military organizations in the DoD.

Behavior Change in Organizations

Front-line military supervisors could effectively achieve behavioral change by establishing energy efficient changes throughout the organization. Institutions or agencies working to promote energy efficiency benefits should incorporate a behavioral perspective to improve the reach and impact of their programs (American Council for an Energy-Efficient Economy [AEEE], 2016). Making a change throughout the entire organization is more effective than attempting to focus solely on individual energy behaviors. Many research articles illustrate the effectiveness of the behavioral change in organizations to decrease energy usage. Four areas promote behavior change in personnel, and they are leadership, infrastructure, training, and processes.

Leadership

For an organization to successfully reduce energy consumption through behavioral change, leaders should have confidence in organizational objectives that guide

the organization in the direction of positive change. Abrell-Vogel and Rowold (2014) conducted a study to examine transformation leadership behaviors influence the commitment of subordinates. The researchers analyzed 177 participants from 38 teams from different organizations. Individual support and providing an appropriate model were two behaviors that showed a significant effect on subordinate commitment. Front-line military supervisors should be able to provide individual leadership to ensure long-term behavioral change while maintaining a positive model for subordinates to emulate.

Behavior change campaigns will undoubtedly be unproductive if there is no support from leadership at all levels in an organization. Andre and Loudermilk (2011) stated that military leaders should lead by example and offer a visible commitment that reinforces their verbal statements. Higher level commitment can take a variety of symbolic forms, such as driving hybrid vehicles, signing pledge cards committing to energy reduction goals, and other personal activities. Zhenxing, Yong, Baizhan, and Yafeng (2009) purported the lack of effective management measures is a major reason for the need for energy efficiency supervision within facilities. Front-line military supervisors should lead by example in their effort to change energy behavior.

Infrastructure

Installation infrastructures can support military personnel to improve energy behaviors. Creutzig et al. (2016) discussed how both hard infrastructures, such as the built environment, and soft infrastructures, such as habits and norms, shape behavior and consequently offer significant potential for reducing overall energy demand. The Federal

Government has spent billions of dollars on a sensing infrastructure that can provide relevant data, but less attention has gone toward making energy information attractive and relevant (Reeves, Cummings, Scarborough, & Yeykelis, 2015). Front-line military supervisors should recognize weaknesses in installation infrastructures to develop measures to encourage positive energy behaviors in their shop.

A military member's interaction with building infrastructures and the available systems plays a vital role in determining the total amount of energy used within facilities on a military installation. Behaviors conducted by personnel effects a building's overall performance and the ability of its hardware and mechanical infrastructure to achieve resource and environmental objectives through the decisions people make and how they select, use, and maintain the building and its infrastructure (Wolfe et al., 2014). Front-line military supervisors should recognize simple energy-related occupant behavior interventions, which include adjusting thermostat settings, opening/closing windows, dimming/switching lights, pulling up/down blinds, turning on/off HVAC systems, and movement between spaces (Hong et al., 2016).

Training

Effective energy management training could promote military personnel to properly use and maintain equipment. Many participants of a military energy reduction workshop declared that it is essential personnel at all levels of management and responsibility know the value of taking care of energy security/surety and costs, and that, at times, improving efficiency and reliability can result in the enhancement to the mission

(Eyring, 2013). Personnel in the Air National Guard should receive training annually to ensure they are cognizant of the most up to date information for improving energy conservation in the organization.

Training is essential in the military to ensure personnel are ready for various missions, so energy management should be incorporated to ensure personnel are attentive to the importance of saving energy. Khan and Halder (2016) conducted a study analyzing the current conditions of electricity consumption in Bangladesh. In the case study, the researchers executed the study on a student hostel in which they could successfully prove the effectiveness of behavioral change. The researchers noted various intervention techniques being used but focused their efforts on public awareness and motivation. The case study illustrates the possibility of saving 3%-20% though behavior change in a building or organization. Front-line military supervisors should generate annual energy training or workshops, to ensure military members are conscious of the importance of energy conservation in the organization.

Processes

Due to the overall mission of military personnel, many high-energy processes occur in quotidian operations. In Air National Guard units, there are some facilities with energy-intensive processes such as engine testing, painting, nondestructive inspections, and metalworking. Eyring (2013) promulgated that although industrial process energy (IPE) is not a significant fraction of overall Air Force energy use (approximately 1 percent) and has received relatively little attention, investments in IPE efficiency are

expected to yield high rates of return. Front-line military supervisors should ensure personnel are using more effective processes in shops to create a sustainable environment for behavioral change and ultimately reduce process energy usage in the organization.

Summary and Conclusions

Front-line military supervisors have the potential to alter energy behaviors by employing the conceptual foundation from this research study. They could reasonably incorporate efficient energy management by applying effective energy conservation strategies and policies to shops in the organization. All military members should recognize potential barriers to prevent energy interventions from being ineffective. Front-line military supervisors could promote behavioral change by improving leadership, infrastructure, training, and processes in their shops.

This study may add to the literature on energy management practices in military organizations. Although there is research available for energy management practices in private sector organizations, there is insufficient research on reducing energy consumption through behavior change in military organizations. A gap continues to remain between energy management theory and current implementation practices in military organizations (Antunes et al., 2014). Through the research articles examined in the literature review, I gained an understanding of how front-line supervisors in other industries get their employees to change their energy behaviors.

The literature review for this qualitative single case study consists of the conceptual framework that I used to guide the research and the integration of literature

about reducing energy consumption through behavior change in various universities and businesses around the world. The RQ guided the topics for the literature review for the research study. This literature review focuses on the energy management in the military, energy conservation strategies in practice, barriers preventing energy conservation, and behavior change in organizations. Chapter 3 includes the methodology, rationale for the research design, participant selection, instruments, data sample and analysis, and ethical measures.

Chapter 3: Research Method

The purpose of the qualitative single case study was to gain an understanding of common strategies front-line military supervisors have used to reduce energy consumption through behavioral change on a military installation. I used online asynchronous focus groups to identify strategies front-line military supervisors have used to reduce energy consumption in a high tempo work environment. The information from the online focus groups and the conceptual framework can be used by front-line military supervisors to promote effective, practical strategies to change behaviors in their organization to reduce energy consumption, which could generate social change.

In Chapter 3, I provide the methodology for the study. The chapter starts with the research design and approach. I also state my role as the researcher. I thoroughly present details of the selection of participants, instrumentation, data collection and analysis, and trustworthiness. Lastly, I describe my ethical procedures and provide a summary of the chapter.

Research Design and Rationale

The purpose of this qualitative single case study was to gain a common understanding of strategies front-line military supervisors have used to reduce energy consumption throughout organizational facilities in the Air National Guard. In the study, the central question for the study was: What strategies do front-line military supervisors utilize to change behaviors to reduce energy consumption on a military installation?

I used a qualitative single case study approach to identify strategies front-line military supervisors can utilize to reduce energy consumption in the Air National Guard. Case studies, in their essence, explore and investigate contemporary real-life phenomenon through detailed contextual analysis of a limited number of events or conditions, and their relationships (Zainal, 2007). Xia, Zhang, and Cass (2012) determined that the case study demonstrates that a conceptual foundation cannot only cover all major energy management activities, but it can also identify further energy efficiency improvement opportunities. This approach is valuable for research to evaluate programs and develop interventions because of its flexibility and rigor (Baxter & Jack, 2008).

The study of a single real case has been widely used as a source of knowledge in several areas, whether as an example to be followed, a sample of what can happen, or a reference of vicarious experience (Mariotto, Zanni, & Moraes, 2014). Through single case studies, researchers can describe the existence of a phenomenon, and it is better to make a single case study than a multiple case study when the researcher wants to study, for example, a person or a group of people (Gustafsson, 2017). Therefore, the qualitative single case study design was appropriate to gain an understanding of common strategies to reduce energy consumption.

I used online asynchronous focus groups because front-line military supervisors in the Air National Guard work in a high tempo military environment, and it is challenging to schedule participants to conduct face to face focus groups. Busy professionals who

might otherwise be unavailable for a face-to-face meeting can often be reached using information technologies (Stewart & Shamdasani, 2017). I used open-ended questions in the online focus groups to gain an understanding of energy conservation strategies front-line military supervisors used to change behavior to reduce energy consumption. I did not use closed-ended questions because I would have received simple answers to complex questions. An online focus group protocol was developed to guide the process of managing effective online focus group discussions; is the protocol appears in Appendix B.

This study was developed to gain an understanding of common strategies front-line military supervisors could use to reduce energy consumption through behavior change on a military installation. The focus of the study was not on making predictions or testing hypotheses for possible methods that could reduce energy consumption. Therefore, I used a qualitative approach instead of a quantitative approach. Other qualitative research designs were considered, but each had some limitation. Those designs were narrative research, phenomenology, ethnography, and grounded theory.

Researchers apply the narrative research approach to weave together a sequence of events, usually from just a couple of individuals, to form a cohesive story (Sauro, 2015). The narrative design examines the ways humans experience the world (Elçi & Devran, 2014). This research approach was applicable but constructing stories from one or two front-line military supervisors would not have been as useful in gaining an

understanding of practical strategies to reduce energy consumption for an entire organization because the stories may be subjective and lack necessary information.

Phenomenological research approaches are often characterized and differentiated by the degree to which it is accepted that an investigator can achieve objective descriptions of, or interpret, lived experience (Wilson, 2015). Phenomenology may be the method of choice for researchers who want to study what an experience means to a group of people (Grossoehme, 2014). The researcher aims to describe as accurately as possible the phenomenon, refraining from any pregiven framework while remaining true to the facts (Groenewald, 2004). This research approach is applicable because the research problem is structured, but there is limited current research on reducing energy consumption through behavior change in a military organization.

The ethnography research approach involves analyzing the culture of an organization and typically includes a full immersion of the researcher in the day-to-day lives of the research participants (Sangasubana, 2011). Its roots can be traced back to anthropological studies of small, rural societies that were undertaken in the early 1900s (Reeves, 2008). This approach would not apply to this study because it is not necessary to directly observe and interact with front-line military supervisors in their operating environments to develop strategies to reduce energy consumption for the organization.

Strauss and Corbin (1990) promulgated the grounded theory approach is a qualitative research method that uses a systematic set of procedures to develop an inductively derived grounded theory about a phenomenon. Heydarian (2016) surmised

the grounded theory approach is useful when the area of study is new. This approach would not be applicable to this study because the goal for this study was not to develop a theory, but rather to gain an understanding of strategies that focus on behavior changes front-line military supervisors can promote to reduce energy consumption.

Role of the Researcher

Because the researcher's perceptual acuity in observation and finely developed capacity for eliciting detail from respondents are paramount, the concept of the researcher as an instrument is prevalent in the qualitative literature (Barrett, 2007). The researcher as an instrument provides an opportunity for researchers to enter the unknown world of an individual in regard to the phenomena in question (Bahrami, Soleimani, Yaghoobzadeh, & Ranjbar, 2015). I was the instrument in this study, so I virtually observed and interpreted the knowledge and information provided by online focus group participants. I am a trained and experienced energy manager for multiple military organizations. I used my experience as an energy manager to efficiently develop and facilitate online focus groups to gain an understanding of strategies front-line military supervisors could use to reduce energy consumption through behavioral change.

I strived to be fair when conducting this study. To avoid bias, I developed script e-mails that I used for all online focus group participants. There was no need to transcribe information from the online focus groups as with a standard qualitative study because the participants directly entered data into FocusGroupIt, so human error from transcribing the information was be eliminated. With FocusGroupIt, responses can be transferred directly

to a database where they are immediately accessible for analysis, without the need for transcription or editing, enhancing the accuracy of collected data and eliminating transcriber bias (Tates et al., 2009). FocusGroupIt is a low-cost online platform that links users together to gather qualitative feedback. I used this online platform to conduct the online focus groups.

Participants were anonymous and assigned a random username when they created their user account on FocusGroupIt. Participants were not able to view other posts until they submitted their initial post to prevent groupthink. Anonymous feedback often provides some of the most honest and innovative ideas while avoiding groupthink (Ayers, 2017). I also submitted a copy of the summary of themes to the participants so they could review and verify the information. Member checking, also known as participant or respondent validation, is a technique for exploring the credibility of results (Birt, Scott, Cavers, Campbell, & Walter, 2016). I used data triangulation and compared the unit's Energy Intensity Reduction memorandum and field notes to verify information from the summary of themes obtained from the study. Comparing themes could assist policy makers and senior leaders in the organization to incorporate effective interventions noted by front-line military supervisors.

Methodology

Participant Selection Logic

The target population for this study was front-line military supervisors in the Air National Guard located on a military installation. Supervisors and the attitudes that they

hold are central to creating opportunities to reduce energy use (Staddon, Cycil, Goulden, Leygue, & Spence, 2016). Participants were purposefully sampled based on their most recent evaluation performance report, being a military member in the Air National Guard, and being a front-line military supervisor. An invitation was sent out to departments throughout the Air National Guard unit, and the participants were asked to e-mail back if they consented to participate. Potential participants who were interested were also asked to fill out and send back the demographic questionnaire to make sure they met all the requirements to participate in the study (see Appendix C).

Purposeful sampling is commonly used in qualitative research for the identification and selection of information-rich cases related to the phenomenon of interest (Palinkas et al., 2015). Participants were only selected to participate in an online focus group if they had a satisfactory rating or higher on their evaluation performance report to ensure data was from quality front-line military supervisors. I gained approval from the unit commander before sending out electronic invitations (see Appendix D). I e-mailed various departments in the Air National Guard unit to inquire with front-line military supervisors about participating. The identity of all participants remained confidential throughout the study because each participant had a randomly generated username that was used throughout the study.

The rise of Web 2.0, the advent of greater bandwidth, and new technology platforms have made it possible to extend the range of focus-group research to the online environment (Stewart & Shamdasani, 2017). Recent studies on the potential benefits of

the use of online focus groups indicated they were remarkably similar to face to face focus groups, drawing attention to recruitment issues, participant convenience, researcher benefits, and the quality of the data obtained (Tates et al., 2009). This study consisted of three concurrent asynchronous online focus group with five participants in each. Brüggen and Willems (2008) stated the optimal number of people in an online focus group is between 3-5 participants. After I acquired a group of feasible participants, I e-mailed each one to confirm participation and availability to conduct the online focus group. I gave each participant the timeframe for conducting the online focus group in the "Welcome" e-mail.

I decided to conduct three online focus groups based on previous research studies that were similar. Stewart, Shamdasani, and Rook (2007) stated that rarely in the social sciences research studies are there more than 3-4 focus groups conducted. I focused on conducting three focus groups concurrently to begin the study but would have conducted additional online focus groups if the data did not reach a point of saturation. Data saturation is reached when there is enough information to replicate the study when the inability to obtain additional new information has been reached, and when further coding is no longer feasible (Fusch & Ness, 2015). I presented the themes of all focus groups in a chart format to provide a visible approach to data analysis and saturation (Hancock, Amankwaa, Revell, & Mueller, 2016). The themes were considered saturated when 80% or more of the 15 participants made comments that fell within the themes identified. I set data saturation at 12 (80%) participants mentioning the theme because Hancock et al.

(2016) conducted a similar study using online focus groups, and they used 75% of participants as their data point of saturation.

Instrumentation

In qualitative research, the researcher as an instrument is an accepted stance, and it is imperative that the qualitative researcher be fully aware of their ontological and epistemological position underpins the research (Xu & Storr, 2012). The data collection tools I used for this study is an online asynchronous focus group platform developed by FocusGroupIt and the focus group questions. Online focus groups were used to gain an understanding of strategies front-line military supervisors can use to reduce energy consumption. The information from the online focus groups assisted in identifying effective practical strategies to change behavior in the organization to reduce energy consumption, which could bring social change to the organization.

Focus groups ascended in the early 1940s as social science researchers were looking for alternatives to interviewer-dominated methods and one of the first uses of focus groups was to explore morale of U.S. troops during World War II (Rennekamp & Nall, 2003). Online focus groups are an extension of traditional focus groups, which have been utilized in qualitative research for decades and, for the most part, the principles are consistent with traditional focus groups (Stancanelli, 2010). Zwaanswijk and Van Dulmen (2014) suggested that the anonymity of online focus groups may cause participants to feel more comfortable to express their views. Busy people, such as military professionals, are more accessible to target with online qualitative techniques

because they can participate from their workplace or home, and do not have to travel to the research location (Brüggen & Willems, 2008).

I developed the online focus group questions from the principles and ideas of the conceptual framework. Each open-ended question is aligned with a component in the conceptual framework to maintain proper alignment throughout the study. Aligned probing questions were also developed to increase depth in discussion during the online focus group sessions. I used an expert panel review, consisting of two University of Maryland management professors and one DoD energy management expert, to review the online focus group protocol to ensure the online focus group questions aligned with the objectives of this research study.

I required all online focus group participants to respond back that they consent and a completed demographic questionnaire to ensure they met all the requirements to participate in the study (see Appendix C). I managed three asynchronous online focus groups for 7 consecutive days. Tates et al. 2009 and Brüggen and Willems (2008) conducted effective asynchronous online focus groups that lasted a week. I sent each participant a "Welcome" email two weeks before the start of the online focus groups.

After I completed the online focus groups, I sent participants an email thanking them for participating and asked them to member check a copy of the summary of themes to ensure accurate information was being captured in the study (see Appendix E). I analyzed the feedback I received from all participants and reviewed the data from Nvivo to determine if the member checking input changes results from the software. I modified

the summary of themes based on the feedback I got from the member checking results. I resent the updated summary of themes to participants for them to reevaluate for accuracy. I repeated this process until all participants agreed on the summary of themes.

The Air National Guard unit developed an Energy Intensity Reduction (EIR) memorandum to improve energy efficiency and reduce energy consumption. The EIR memorandum has recommended behaviors and actions personnel can utilize to reduce energy consumption. I used this document to compare to the summary of themes and field notes from the online focus group discussions. I suggested improvements to the EIR memorandum based on the analysis I conducted.

Procedures for Recruitment, Participation, and Data Collection

I recruited full-time front-line military supervisors serving in an Air National Guard unit. I emailed the Wing Commander to obtain permission and attached the letter of cooperation to conduct online focus groups with personnel in the Air National Guard unit (see Appendix D). Once I received IRB approval from Walden University (Walden IRB approval no. 01-25-18-0658144) and the U.S. Air Force HRPO, I e-mailed study invitations to departments in the Air National Guard unit to inquire about interest in participating in the research study. The invitation included the purpose of the study, requirements to participate, and potential benefits from participating in the study.

Potential participants had to have a satisfactory rating on their most recent evaluation performance report, be a military member in the Air National Guard unit being studied and be a front-line military supervisor to participate in the online focus groups.

Potential participants that met the requirements were asked to e-mail me back they consent and attach a completed demographic questionnaire to ensure they met all the requirements to participate. I included my contact information to address any questions or concerns about the research study. The identities of the online focus group participants remained confidential throughout the study.

After I acquired 15 participants, I scheduled three concurrent online focus groups. If I did not obtain 15 participants that met the participant requirements, I was going to resubmit the study invitation to gain additional potential participants. I ensured there were no scheduling conflicts with any of the participants partaking in the online focus groups. I ensured all participants had e-mailed me back that they consented a week before conducting the online focus groups. After completing the focus groups, I e-mailed each participant thanking them for participating in the study and had the participants review the summary of themes to ensure accuracy.

I spent approximately one week conducting the asynchronous online focus groups. FocusGroupIt was the online platform I used to perform the focus groups. The findings were dependent on my interpretation of the data collected from all the online focus groups. I was responsible for conducting the whole study, organizing the online focus groups, and selecting the potential participants. I developed the online focus group questions (see Appendix A) and procedures (see Appendix B), coordinated logistics with participants, answered any questions participants had about the study and transcribed field notes from the online focus groups.

I sent participants a thank you and member checking email upon completing the online focus groups (see Appendix E). They were asked to review the summary of themes from the study. After they sent back any comments, I resent the updated summary of themes to participants for them to reevaluate for accuracy. I repeated this process until all participants agreed on the summary of themes and thanked them again for their participation in the study.

Data Analysis Plan

The process of qualitative analysis aims to bring meaning to a situation rather than the search for truth focused on by quantitative research (Rabiee, 2004). I used Braun and Clarke's six-phase thematic analysis technique to analyze the data obtained from the online focus groups. Thematic analysis is a method for identifying, analyzing, and reporting patterns or themes within data (Braun & Clarke, 2006). I began data analysis after I completed the asynchronous online focus groups. I generated the transcripts for the online focus groups directly from FocusGroupIt.

In phase one, I thoroughly read each online focus group transcript and highlighted keywords and phrases I could use for coding. In phase two, I developed initial codes from the highlighted words and phrases. In the third phase, I developed themes based on the initial codes identified. In the fourth phase, I reviewed the themes and made modifications to the themes when necessary. In the fifth phase, I analyzed each theme in detail and develop the "story" for the themes identified. In the last phase, I finalized all the themes and discussed why the themes were relevant to the research study.

I used the management problem, conceptual framework, and RQ as a guide to compare themes developed from this research. I utilized NVivo throughout the entire process to organize data and identify potential themes I did not consider initially. I took detailed field notes and used a bracket memo throughout the online focus groups. Bracketing is a method used in qualitative research to mitigate the potentially deleterious effects of preconceptions that may taint the research process (Tufford & Newman, 2010). Field notes written during data collection and memos recorded during data analysis can help researchers to recognize discrepancies in collected data early in the study, priming researchers to consider ambivalence or contradiction as a salient theme rather than as a threat to validity (Antin, Constantine, & Hunt, 2015). If I did not reach a point of saturation with the initial online focus groups, then I would have resent invitations to obtain more qualified participants to conduct additional online focus groups until I reach a point of saturation.

I used data triangulation and compared the unit's Energy Intensity Reduction memorandum and field notes to verify information from the summary of themes obtained from the study. If the data is of poor quality, the data triangulation process is likely to identify it in the form of data inconsistencies (Lindgren, 2015). I developed a data triangulation chart to compare the themes and information identified from each source to validate information collected from the sources.

Issues of Trustworthiness

Credibility

An important criterion addressed by positivist researchers is that of internal validity, in which they seek to ensure that their study measures or tests what is intended (Shenton, 2004). I conducted member checking by submitting a copy of the summary of themes to the participants so that they could review and verify the information from their online focus group. I used data triangulation and compare the unit's Energy Intensity Reduction memorandum and field notes to verify information from the summary of themes obtained from the study. Triangulation has been viewed as a qualitative research strategy to test validity through the convergence of data from different sources (Carter et al., 2014).

I presented the themes of the online focus groups in a chart format to provide a visible approach to data analysis and saturation (Hancock et al., 2016). I would have conducted additional online focus groups if the data has not reached a point of saturation. Research data is saturated when there is enough information to replicate the study, and further coding is no longer feasible (Fusch & Ness, 2015).

Transferability

Transferability refers to the degree to which the results of qualitative research can be generalized or transferred to other contexts or settings (William, 2006). I ensured transferability by administering effective probing questions, detailed field notes, and the

proper use of the instrumentation. I used research aligned probing questions to increase depth in discussion during the online focus group sessions.

Dependability

To address the dependability issue more directly, the processes within the study should be reported in detail, thereby enabling a future researcher to repeat the work, if not necessarily to gain the same results (Shenton, 2004). I conducted an external audit by engaging with military energy managers that have graduate-level research experience to serve as external auditors. I used this method to create alternative perspectives of the trustworthiness of the study and build relationships with other military energy managers.

Confirmability

Confirmability refers to the degree to which the results could be confirmed or corroborated by others (William, 2004). Confirmability depends on the perspective that the integrity of findings lies in the data and that the researcher can adequately tie together the data, analytic processes, and findings in such a way that the reader can confirm the adequacy of the findings (Morrow, 2005). I used a bracketing memo during online focus groups to record any potential bias that I may have been thinking while reading the online focus group discussions.

Ethical Procedures

The relationship and intimacy established between the researchers and participants in qualitative studies can raise a range of different ethical concerns, and qualitative researchers face dilemmas such as respect for privacy, the establishment of

honest and open interactions, and avoiding misrepresentations (Sanjari, Bahramnezhad, Fomani, Shoghi, & Cheraghi, 2014). I ensured ethical treatment of all online focus group participants. I obtained approval to complete the study from Walden's IRB and the U.S. Air Force's HRPO. I obtained written permission from the D.C Air National Guard Commander to conduct the study with volunteers within the organization (see Appendix D).

Participation in the research study was voluntary, and participants could stop participating in the study at any time. If more participants were needed, I would have resubmitted the research invitation to departments in the organization to gain additional participants. Participants had the opportunity to ask questions about the research study before conducting the online focus groups. I had each participant send back a reply of consent before participating in the online focus groups. The identities of the online focus group participants remained confidential during and after the research study was completed. All participants were given a random username and remained anonymous during the online focus groups.

The researcher being a military officer could have influenced the online focus group participants. Front-line military supervisors are typically enlisted members of the organization. I did not use my rank when communicating with participants. The participants were not a part of my military organization, so that eliminated some potential ethical concerns. FocusGroupIt has multiple security infrastructures and policies in place to protect information obtained from the online focus groups. I was the only person with

access to focus group data, including online discussion posts, transcripts, field notes, and the bracketing memo. I stored these items on a password protected flash drive, where I was the only person with access. After obtaining my Ph.D., I will erase the content on the flash drive and maintain it in a personal lockbox for five years. After five years, I will destroy the flash drive to ensure the security of the research data.

Summary

The purpose of the qualitative single case study is to gain an understanding of common strategies front-line military supervisors have had with reducing energy consumption through behavioral change. I managed three concurrent online focus groups to capture effective energy conservation strategies used by front-line military supervisors in the Air National Guard. I purposeful sampled participants by e-mailing research email invitations to departments in the Air National Guard unit.

Potential participants had to have a satisfactory rating on their most recent evaluation performance report, be a military member in the Air National Guard, and be a front-line military supervisor to participate in the research study. I employed Braun and Clarke's six-phase thematic analysis technique to analyze the data obtained from the online focus groups. I ensured trustworthiness throughout the research study by implementing various ethical measures. I started collecting research data after I received approval from U.S. Air Force's HRPO and Walden's IRB. In next chapter, I presented the results from the asynchronous online focus groups.

Chapter 4: Results

The purpose of the qualitative single case study was to gain an understanding of common strategies front-line military supervisors use to reducing energy consumption through behavioral change. I answered the central question for the study using three asynchronous online focus groups. The RQ was: What strategies do front-line military supervisors utilize to change behaviors to reduce energy consumption on a military installation? In Chapter 4, I report the findings from the online focus groups. The chapter also consists of details about the research setting, demographics, data collection, data analysis, and evidence of trustworthiness. Finally, I conclude with an overall summary of the chapter and transition into Chapter 5.

Research Setting

I conducted this study virtually using three concurrent, asynchronous online focus groups. FocusGroupIt was the platform used to perform the anonymous online focus group discussion among the 15 participants. All participants were volunteers, and each one e-mailed me their consent before participating in the study. All the participants were relatively flexible in scheduling a 7-day period to conduct the online focus groups.

Demographics

The composition of the participants for this research study included 15 front-line military supervisors with different levels of supervised experience and importance of energy management (Table 1). The demographic questionnaire data indicated the participants' gender; participants included 5 women and 10 men (Figure 1). The

participants were in the age range of 21 and 60 years (Figure 2). The participants had 1 to over 10 years of experience supervising personnel (Figure 3). The level of importance for energy management included 0 low, 5 moderate, and 10 high (Figure 4).

Table 1.

Demographic Data of Sample

Reference	Gender	Age	Supervising experience	Importance of energy mgmt.
1	Male	31-40	4-5	Moderate
2	Male	31-40	6-9	High
3	Female	51-60	10+	High
4	Female	31-40	4-5	Moderate
5	Male	31-40	1-3	Moderate
6	Male	31-40	6-9	High
7	Male	41-50	6-9	High
8	Male	41-50	6-9	High
9	Male	31-40	10+	High
10	Male	41-50	1-3	High
11	Male	31-40	1-3	High
12	Male	31-40	10+	High
13	Female	21-30	1-3	Moderate
14	Female	41-50	10+	Moderate
15	Female	31-40	1-3	High

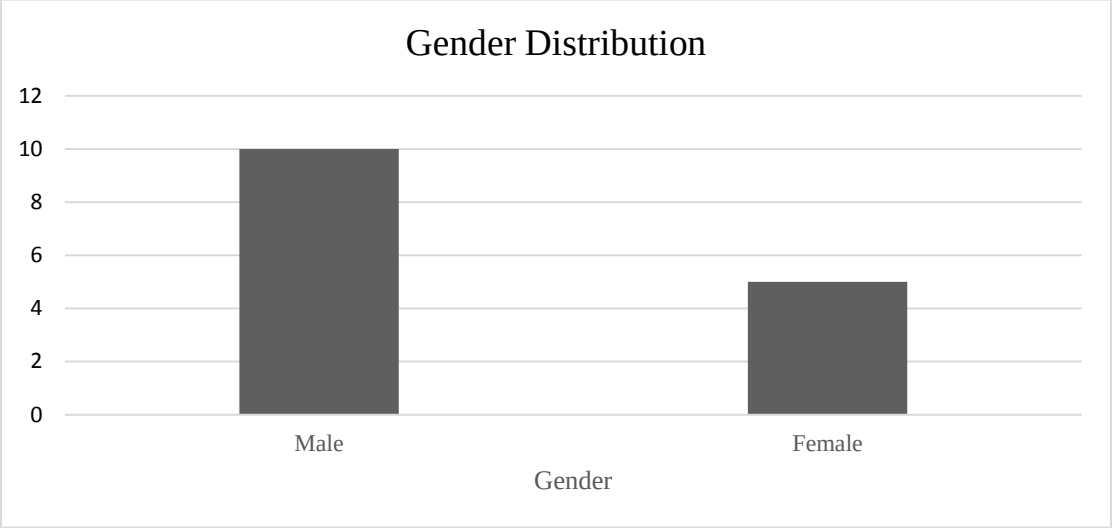

Figure 1. Demographic data: Population gender distribution.

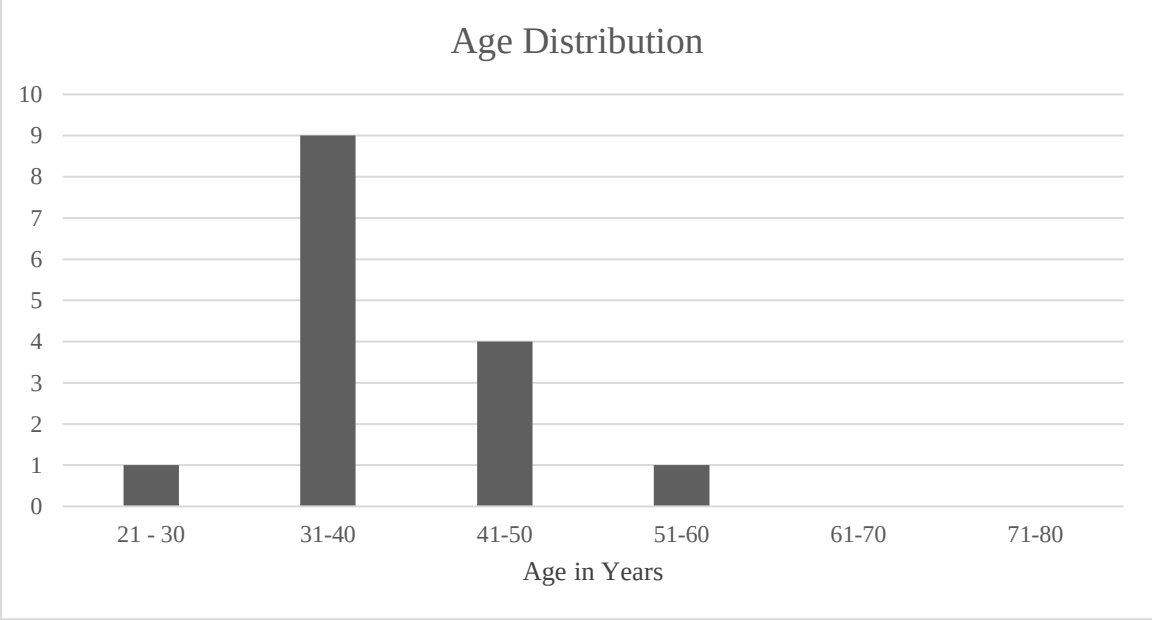

Figure 2. Demographic data: Population age distribution.

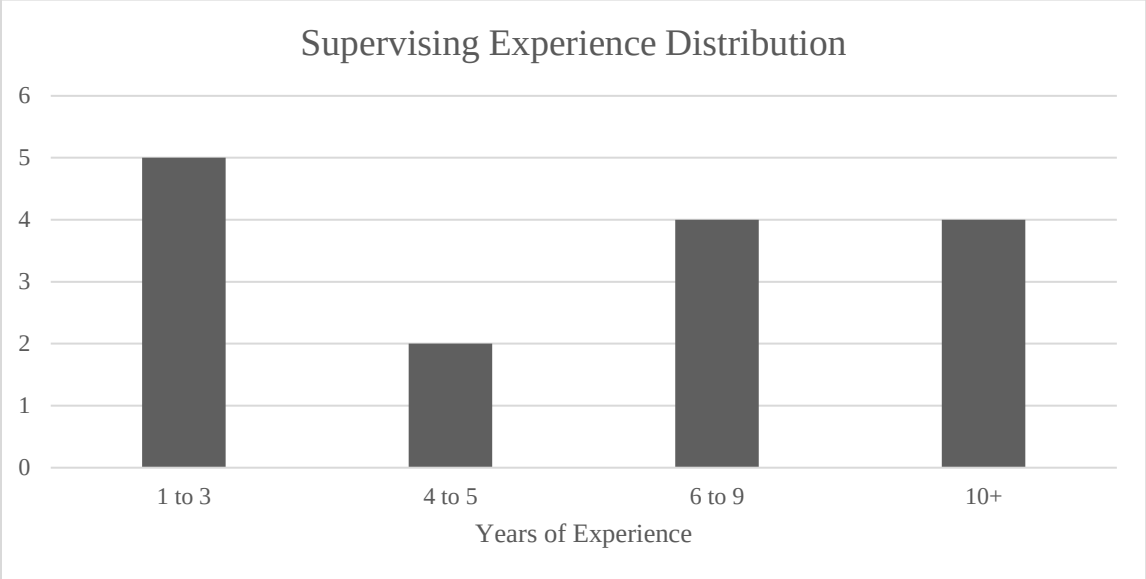

Figure 3. Demographic data: Population supervising experience distribution.

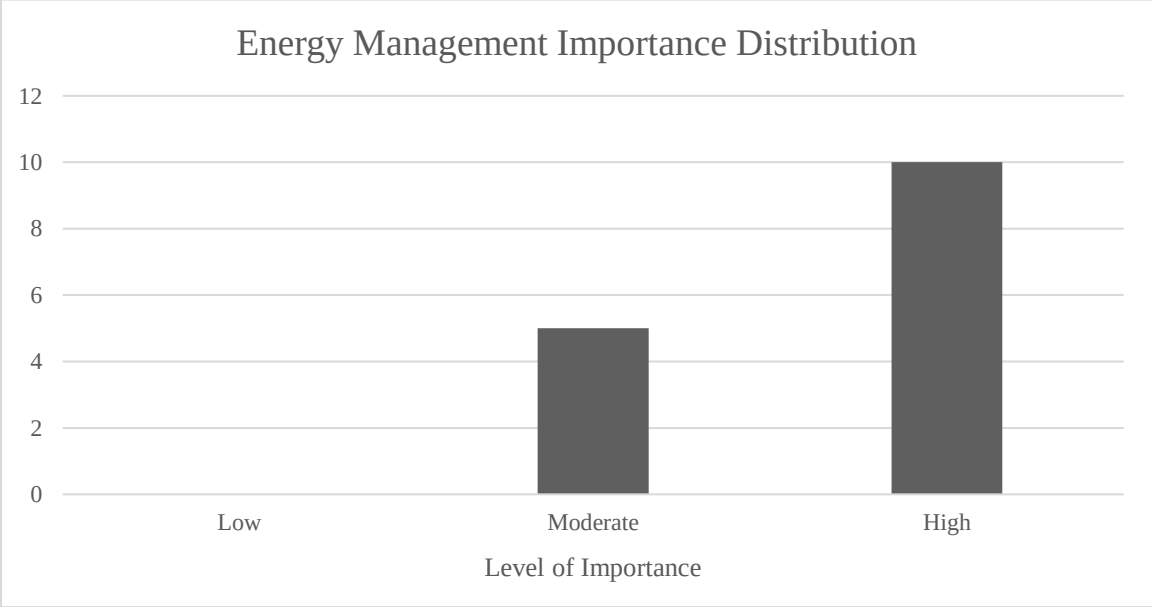

Figure 4. Demographic data: Population energy management importance distribution.

Data Collection

The online, asynchronous focus groups consisted of 15 male and female military front-line supervisors. The focus groups were conducted virtually, which allowed spatiotemporally separated participants to join the discussion at a time that was convenient from their home or office (Zwaanswijk & Van Dulmen, 2014). There were three online focus groups, and each contained five participants. I e-mailed study invitations to 10 departments in the Air National Guard unit to inquire about interest in participating in the research study.

I purposefully sampled participants on April 30, 2018. I asked potential participants to e-mail me back their consent and attach a completed demographic questionnaire to ensure they met all requirements to participate. After I acquired 15 participants, I coordinated with them to conduct three online focus groups from May 1, 2018 to May 7, 2018. I e-mailed the remaining individuals who showed interest in participating in the study and appreciatively informed them I had acquired all participants needed for the study.

I sent the 15 participants a “Welcome” e-mail containing the FocusGroupIt link for their online focus group and the dates the focus group would be conducted. Some of the participants struggled to register, but I assisted them to set up their accounts correctly. Participants focused their discussion on the first four focus group questions during the first 4 days of the online focus groups. During the last 3 days, they focused on the last four questions. I used probing questions throughout the 7-day period to add more depth to

the online focus group discussions. Periodically, I sent participants a reminder e-mail encouraging them to comment on focus group questions and respond to posts submitted by other participants in their respective online focus groups.

Participants directly entered their comments into FocusGroupIt. I generated transcripts from FocusGroupIt, eliminating the potential for errors from transcribing. I sent the "Thank You/Member Checking" e-mail to participants on May 8, 2018, to ensure the summary of themes was accurate (see Appendix E). Participants submitted no changes during member checking. I collected the research data as described in Chapter 3 with no changes. There appeared to be no organizational or personal conditions that could have influenced participants enough to impact the results of the study.

Data Analysis

I conducted the data analysis using Braun and Clarke's six-phase thematic analysis technique. It provided an easily interpretable and concise description of the emergent themes and patterns in a dataset (Wigdorowitz, 2016). Braun and Clarke's six-phase thematic analysis included summarizing each online focus group, creating initial codes, searching for themes, reviewing themes & interpreting the results, defining & naming themes, and producing a report. I used NVivo software to identify possible codes and themes not considered initially. I also used field notes and a bracketing memo throughout the online focus groups to analyze the data.

Data Familiarization

In phase one, I thoroughly read each online focus group transcript and highlighted keywords and phrases I could use for initial coding. I read each online focus group transcript a minimum of 15 iterations, so I was comfortable and familiar with all data collected from the online focus groups. I wrote daily summaries of initial impressions from the data into my field notes and reviewed my bracketing memo to maintain an accurate analysis. I used the bracketing memo to help with self-reflection about previous experiences so that I could analyze the research data through an unbiased lens.

Generate Initial Codes

I transitioned into phase two after I became familiar with the words and phrases I highlighted during the data familiarization phase. In phase two, I developed initial codes from highlighted words and phrases. I used a simple table in a Microsoft Word document to track initial codes from transcripts, field notes, and daily focus group summaries. I conducted five iterations of identifying initial codes and made some modifications to initial codes during this phase. I inputted the online focus group transcripts into NVivo to use later to identify potential themes.

Search for Themes

In the third phase, I developed preliminary themes based on the initial codes identified in the transcripts, field notes, and daily focus group summaries. Relevant codes were combined and divided to identify themes from the online focus group data. I used NVivo 11 to identify other codes not considered and made additional adjustments based

on recommendations from the software. I developed the preliminary themes after numerous coding iterations and searches for relevant codes. The six themes I identified were based on an 80% frequency of related comments from the research data. The themes were environmental preservation, sustainable practices, funds, proactive leadership, workplace management, and policy and regulations. I discuss each emergent theme and its impact on the RQ in more detail in the Study Results section.

Review Themes

In the fourth phase, I reviewed the preliminary themes and made modifications where necessary. I made modifications to themes to ensure they were relevant to the RQ. I ensured the themes formed consistent patterns and were valid to the research study. I used the summary of themes to ensure themes were relevant to each other and the RQ. Some potential themes were considered but not mentioned by 80% or more of the online focus group participants. Typically, two or three participants mentioned potential themes, and I entered those into my field notes for later consideration. The data presented in Figure 5 displays key codes that make up the emergent themes. I developed recommendations for leaders in the Air National Guard unit based on the initial emergent themes.

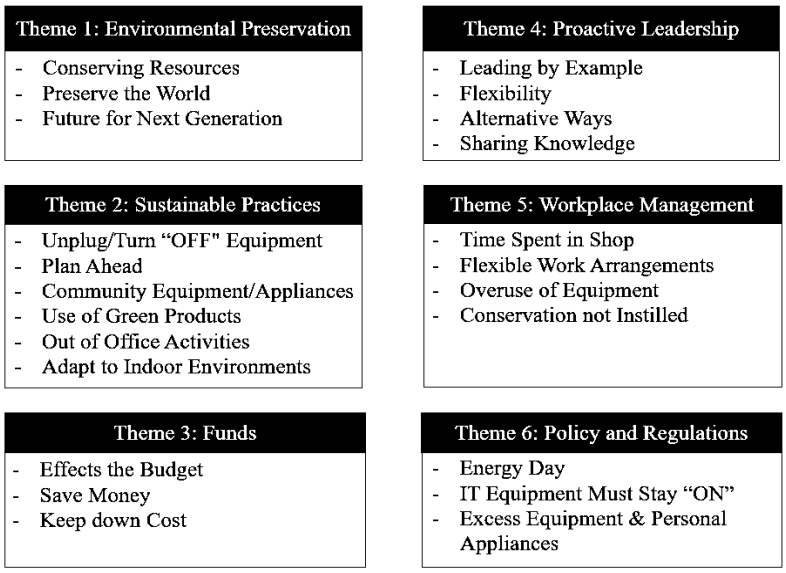

Figure 5. Themes and key codes.

Define Themes

In the fifth phase, I finalized the themes and created a summary of themes. I analyzed and developed the "story" for each theme identified. The summary of themes allowed me to illustrate how each was relevant to the RQ and other identified themes. The data presented in Figure 6 displays data saturation by each theme and the focus group questions that correlate with each theme identified. I set data saturation at 12 (80%) participants mentioning the theme because Hancock et al. (2016) conducted a similar study using online focus groups and they were effective with using 75% of participants as their point of data saturation. I did not set my threshold at 75% because I wanted to add more restrictions on themes to potentially improve data accuracy. I conducted member checking by e-mailing the summary of themes to each participant to review for accuracy, and all participants e-mailed back that no changes were necessary.

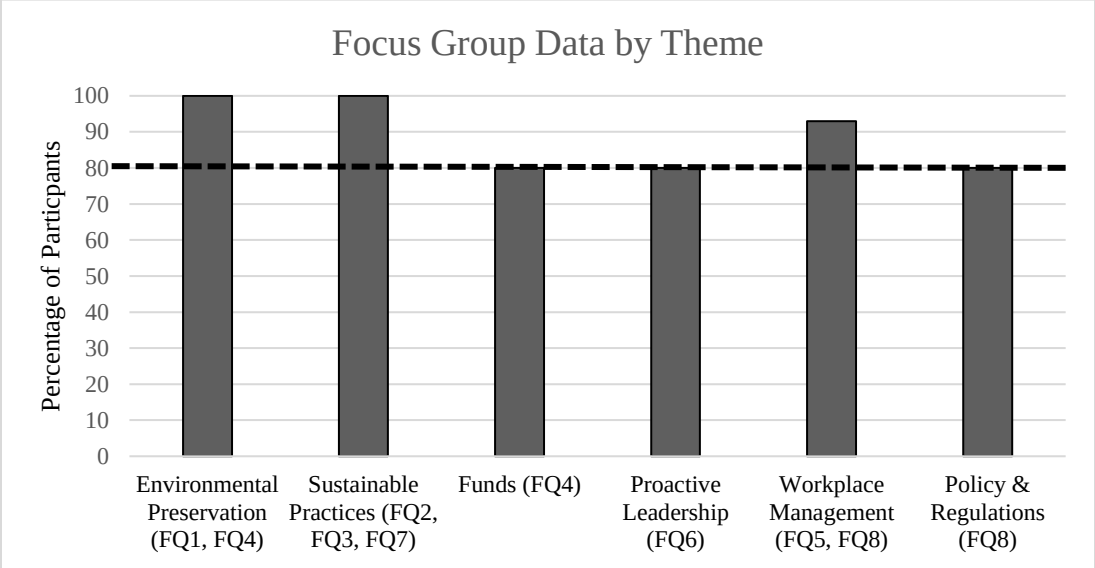

Figure 6. Data saturation by theme.

Produce Report

In the last phase, I expanded off the summary of themes to develop the final report. I triangulated the research data based on the summary of themes, field notes, and EIR memorandum to ensure there were no data inconsistencies. I finalized my recommended action plans for the Air National Guard unit's leaders to consider implementing into the organization to change the energy conservation culture in the organization potentially successfully. I identified no discrepant cases in the research study.

Evidence of Trustworthiness

Credibility

I established credibility through member checking, data triangulation, and the use of a chart to display data saturation. I e-mailed each online participant a copy of the

summary of themes to review for accuracy. Participants confirmed data was accurate in an e-mail response. I accomplished data triangulation through a cogent analysis of the summary of themes, field notes, and the unit's EIR memorandum. At least 80% of online focus group participants had to mention the theme in their input to establish it as a critical theme in the research study. I presented the themes in a chart that displayed each theme reaching the data saturation point.

Transferability

I ensured transferability using aligned probing questions, field notes, and an organized online focus group protocol. I used an aligned probing question for each online focus group question to increase depth in the online focus group discussions. I took daily field notes that can be easily interpreted by another researcher interested in completing a similar study. The online focus group protocol was well organized and goes into detail about preparing, conducting, and interpreting the online focus groups.

Dependability

I attained dependability by conducting external audits with a military energy manager with graduate level experience and management professors from the University of Maryland. The energy manager and management professors reviewed the online focus group protocol and focus group questions. All the reviewers gave recommendations on how to improve both based on their perspectives. Initially, I was only going to have energy managers review the protocol and questions but thought it would be beneficial to gain the input of management professors as well.

Confirmability

I obtained confirmability through the daily use of a bracketing memorandum during the online focus groups and open-ended online focus group questions. I recorded any potential personal bias and considered my previous relevant experience to maintain the authenticity of the research analysis. I added three peer reviews of the summary of themes to establish more confidence in the data collected from the study.

Study Results

I revealed strategies front-line military supervisors could use to change their subordinates' behavior to reduce energy consumption on military installations based on research the research data. I developed all eight online focus group questions from the RQ: What strategies do front-line military supervisors utilize to change behaviors to reduce energy consumption on a military installation? There were six themes identified from the online focus group data that were relevant to the research question and purpose of the study.

Focus Group Question 1

What does energy management mean to you? The purpose of this question was to understand participants' perception of energy management. Personnel comprehended the concept of energy management, but suggested supervisors tend to lack effort in reinforcing energy efficient behaviors to reduce energy consumption. I identified only one theme for this focus group question.

Theme 1: Environmental preservation. All 15 participants (100%) believed energy management was effectively conserving natural resources to ensure future generations have a sustainable world to live in. The 15 participants' responses demonstrated how there is a social concern with energy management in our society, especially in the workplace. The following comments provide support for Theme 1:

- "It means formulating a plan to utilize energy judiciously and efficiently to be able to accomplish the mission while saving valuable resources." (Participant-5A)
- "Energy management is basically making a conscious effort to ensure the optimal use of energy to minimize over all costs while maximizing productivity and reducing global emissions." (Participant-1B)
- "Energy management to me means being responsible. Using my fair share of energy and not being wasteful because it's not necessarily always about money, its about a resource that may not always be around weather you have money or not. If the resources is used up and not available that's the end." (Participant-5C)

Focus Group Question 2

How do personnel in your shop efficiently use equipment to conserve energy? The purpose of this question was to explore current energy conservative behaviors of shop personnel. I identified only one theme for this focus group question.

Theme 2: Sustainable practices. There were 12 participants (80%) who identified energy conservative practices currently employed in their shop. The other three participants commented only on technology needed to change behaviors. The 12

participants' responses demonstrated how their personnel have a fundamental understanding of conserving energy by turning off and properly using shop equipment. They identified simple behaviors personnel perform daily, but a lack of recognition and incentives decreases motivation to be energy conservative. The following comments provide support for Theme 2:

- "The shop personnel only use electrical power when need to complete their tasks. The rest of the time the equipment is powered off. They are also conserving water and not using overhead lights when they are not in the office space." (Participant-3A)
- "We all turn off as much as we can when we leave the office for the day. Examples are office and hangar lights and small appliances such as coffee pots. We also turn off our monitors and the rest usually sleep when not in use anyways." (Participant-4B)
- "Energy is conserved through turning off equipment that can be turned off at the end of day and that's not affected by powering down." (Participant-5B)

Focus Group Question 3

What are some best management practices you utilize to be conservative in your shop? The purpose of this question was to explore shop level energy conservative practices. I identified only one theme for this focus group question.

Theme 2: Sustainable practices. All 15 participants (100%) identified best management practices applied in their shop to be conservative. The 15 participants'

responses demonstrated how energy conservation could be part of culture in a military workplace environment. Participants suggested military personnel can execute their jobs effectively, while still conserving energy. They also agreed that effective energy conservative best management practices are not being shared between front-line military supervisors to ensure the entire organization benefits. The following comments provide support for Theme 2:

- "I like to keep my blinds open to allow bright light in the office instead of having to use the lights." (Participant-2A)
- "From a managerial stand point we try to direct the repair and replacement of all things with energy conservative devices when we are allowed and or money is available. Currently in my shop we preserve energy by turning off light when we leave the room, unplugging appliances that aren't used and turning off computer monitors." (Participant-1B)
- "I push myself to stay away from the computer as much as possible and tend to ignore emails to make people come and see me in person. This helps reduce energy expended from reading and sending emails. Also, I use less energy as I force myself to walk around the shop and socialize." (Participant-4C)

Focus Group Question 4

Why should personnel in the shop be motivated to save energy? The purpose of this question was to understand participants' perception of their subordinates' motivation to save energy. I identified two themes for this focus group question.

Theme 1: Environmental preservation. There were 12 participants (80%) who considered the environment as a major reason for personnel to be motivated to save energy. Three participants commented strictly on the importance of funding. The 12 participants' responses demonstrated how front-line military supervisors believe personnel should consider the environment when making workplace decisions dealing with energy usage. Participants recognized that the environment is usually an afterthought for personnel, especially when they have limited time to complete their job. They also determined that personnel are not typically held accountable for the negative impact their energy consumption behavior has on the environment. The following comments provide support for Theme 1:

- "It helps to conserve resources, establish accountability and give sense of ownership to the members in the shop." (Participant-3A)
- "There is a direct correlation to utilizing energy conservative devices and building sustainability. So with the conscience decision to utilize energy saving devices shop personnel are less likely to have to return to a repair already performed previously, therefore saving time and aggravation. And simply put it is everyone's responsibility to save energy during a time when energy usage is at the highest it ever been worldwide." (Participant-1B)
- "Besides it being a requirement federally, Green Product programs meet all of the requirements and guidelines of the Federal procurement preference program. Even though its is regulated federally, sharing this info with the states and private

sector is great. It creates an atmosphere of sharing and educating on knowing the environmental benefits, sustainability, and compliance of Green Products." (Participant-2C)

Theme 3: Funds. There were 12 participants (80%) who considered potential cost savings as a significant reason for personnel to be motivated to save energy. Three remaining participants commented strictly on the importance of environmental preservation. The 12 participants' responses demonstrated how front-line military supervisors believe personnel should consider expenditures when making workplace decisions dealing with energy usage. Participants reasoned that shop personnel desire to spend funds on tools and equipment to assist them in efficiently completing their jobs, not the cost of wasted energy. The following comments provide support for Theme 3:

- "Because saving energy is the responsibility of all personnel in the shop. Saving energy saves on costs and the funds could be directed into other shop needs to benefit all personnel." (Participant-5A)
- "We should practice being energy efficient and saving the government money annually. Most important is it important to be able to sustain in case the budget decreases next year or resources run out." (Participant-3B)
- "The amount of energy used determines the amount of money spent, which effects the budget." (Participant-5B)

Focus Group Question 5

How does your work schedule impact energy usage in your shop? The purpose of this question was to understand participants' perception of the impact of their work schedule on energy conservation. I identified only one theme for this focus group question.

Theme 5: Workplace management. There were 14 participants (93%) who identified how their work schedules impacted energy conservation. One participant only commented that technology is used to decrease energy consumption. The 14 participants' responses demonstrated the influence work schedules have on energy consumption and the need for efficient daily operational management in each shop to maintain a sustainable, energy-efficient workplace. The following comments provide support for Theme 5:

- "The amount of time that me and my airmen spend in the shop has an affect on the amount of energy that is used. Whenever we are out of the shop on a job or training, we need to take the steps to eliminate energy usage." (Participant-1A)
- "If a shop is on 24/7 schedule, obviously more energy is used. A fully staffed shop will use more energy vs a skeleton crew, however, same amount of energy is needed for lighting and to run basic/standard equipment regardless of number of staff, so some could argue this is wasteful." (Participant-5B)
- "Encouraging a flexible work arrangement decreases traffic congestion, eliminates energy consumption, and air pollution. At the office by having

individuals telework the equipment energy consumption rate is greatly reduced. Telework has also assisted in reducing the amount of facilities needed, which assisted and showed a reduction in office energy consumption is critical since there has been a decrease lowered utilization of office space and equipment." (Participant-2C)

Focus Group Question 6

How does your leadership style overcome energy conservation barriers? The purpose of this question was to explore strategies participants used to overcome energy conservative barriers in their shops. I identified only one theme for this focus group question.

Theme 4: Proactive leadership. There were 12 participants (80%) who identified techniques in their leadership style to overcome energy conservation obstacles. Three participants simply commented training would be an effective way to overcome energy conservation barriers. The 12 participants' responses demonstrated the need for front-line military supervisors to be proactive leaders. They believed that proactive leaders facilitate positive results with greater ease and create positive workplace environments. The following comments provide support for Theme 4:

- "Leading by example. Turning off electronics that are not in use, turning off lights when no one is occupying a workspace/center and by reminding personnel to turn off lights and electronics when they depart a workspace." (Participant-5A)

- "My leadership style is one that comes with a lot of planning. What I mean by this is that I have been able to overcome most of those issues by planning projects even ordering parts way in advance." (Participant-1B)
- "I encourage my officer personnel to "reach-out and touch someone" or "practice in-person face-time". Just sending emails wont cut-it anymore. Sometimes you have to get away from your desk and visit people to get your message across to others." (Participant-4C)

Focus Group Question 7

What are some innovative methods you can have your personnel do to save energy in your shop? The purpose of this question was to explore creative methods participants used to facilitate energy conservation in their shops. I identified only one theme for this focus group question.

Theme 2: Sustainable practices. There were 13 participants (87%) who identified innovative methods to save energy. One participant commented on using more power strips and the other mentioned using a non-renewable energy source on the military installation. Neither of the two were creative methods to save energy in their shop. The 13 participants' responses demonstrated the need for front-line military supervisors to use creative methods for saving energy. They conveyed that providing a creative environment keeps personnel engaged and willing to develop more ideas to potentially save energy. The following comments provide support for Theme 2:

- "Using energy conservative power strips. Group office exercises to warm up i.e. Challenge push-ups or pull-up instead of cranking the heat up. Encouraging personnel to wear authorized cold gear to warm up in the office or removing extra clothing to cool off and drinking plenty of water." (Participant-5A)
- "I don't know I would call it so much as being innovative as I would call it being open to all ideas. The most important thing is to keep an open mind to shop ideas and foster an open yet respectful environment. This way people get used to the idea of energy conservation and will always have it on their mind because they know management will always listen to great ideas." (Participant-1B)
- "An early release, or an extended lunch seem to be the preferred rewards." (Participant-3C)

Focus Group Question 8

What are some current workplace norms that impact energy conservation in your shop? The purpose of this question was to explore workplace norms that have an impact on energy conservation in the organization. I identified two themes for this focus group question.

Theme 5: Workplace management. There were 12 participants (80%) who commented that inefficiency is a workplace norm that negatively impacts energy conservation. Three participants commented on the need to update energy policy for the organization. The 12 participants' responses demonstrated how there is a need to adjust how personnel are managed daily in the workplace to change energy consumption

behaviors. They advocated that some front-line military supervisors have failed to address negative energy behaviors in the organization and those behaviors have now become norms. The following comments provide support for Theme 5:

- "People leaving small appliances like space heater plugin while they are not there to use." (Participant-2A)
- "Charging of personal electronics." (Participant-5B)
- "Having copiers and printers. Too many people use these products for personal use instead of professional. By eliminating paper and relying more on technology the same work can be done, eliminating on people using workplace products for personal use." (Participant-2C)

Theme 6: Policy and regulations. There were 12 participants (80%) who also considered outdated policy and regulations as a workplace norm that negatively impacts energy conservation. Three participants commented strictly on the importance of workplace management. The 12 participants' responses demonstrated how the current energy policy is not effective and needs to be updated to facilitate a change in the energy culture. They revealed that effective policies and regulations set the standard and establish a specific culture in an organization. The following comments provide support for Theme 6:

- "Currently, the culture of conserving is not instilled in everyone. I would like to see if there was an energy day where all the participants would use only the

minimum energy needed to conduct their work and not dependent on the overhead lights or the HVAC systems." (Participant-3A)

- "To many people have their own person version of the same items. Example, small person fridge and Keurig machines. Another example is most desks have power strips with random devices plugged in that are rarely used if at all, or just not essential items." (Participant-4B)
- "One of the current norms that impact energy conservation is not being able to leave computers in shutdown mode when not in use. Mainly because if the computer is shutdown the updates/downloads that get pushed down from the Communications section can't take place unless the computer is on." (Participant-5B)

Summary

The feedback from the eight online focus group questions was used to answer the RQ: What strategies do front-line military supervisors utilize to change behaviors to reduce energy consumption on a military installation? The findings from the study highlighted the importance of front-line military supervisors being proactive leaders and using practical, sustainable practices to manage energy conservation in their shops properly. Furthermore, energy policies must be updated and reinforced for personnel to maintain sustainable behaviors and have the capability to make the best decisions with consideration to the environment and funding. In Chapter 5, I discussed the findings from

the study and recommendations for improving energy management for the Air National Guard unit.

Chapter 5: Discussion, Conclusions, and Recommendations

The purpose of this qualitative single case study was to gain an understanding of common strategies front-line military supervisors could administer to reduce energy consumption throughout organizational facilities in an Air National Guard unit. The primary reason for this study was the careless energy behavior of military personnel in the Air National Guard, which parallel the mindset and action of many military organizations across the DoD when it comes to energy consumption and expenditure. Front-line military supervisors in these organizations should comprehend and integrate various behavioral change interventions to effectively manage energy consumption.

I used a qualitative single case design for the study and eight open-ended focus group questions to amass data from 15 participants divided into three asynchronous online focus groups. The participants revealed that some front-line military supervisors have deficiencies in environmental considerations, implementing sustainable practices, funding considerations, proactive leadership, effective workplace management, and enforcing energy policy. In Chapter 5, I present my recommendations to enhance energy management in the Air National Guard unit. I also provide the interpretation of my findings, study limitations, and implications for social change.

Interpretation of Findings

The central RQ addressed in this study was: What strategies do front-line military supervisors utilize to change behaviors to reduce energy consumption on a military installation? I identified six themes based on an 80% frequency of related comments from

the research data. The themes identified from the findings of this study were related to this research question and helped to fill the gap in research.

Theme 1: Environmental Preservation

All 15 participants (100%) identified environmental preservation as an essential reason to conserve energy. Environmental concern is a cognitive norm in the energy culture framework and participants recommended that it should be remediated by leaders in the organization. Participants indicated that supervisors should motivate personnel to continuously consider the impact of their workplace decisions on the environment at global and local levels.

The online focus group participants confirmed that environmental problems associated with energy use span a growing spectrum of pollutants, hazards, and accidents and degradation of environmental quality and natural ecosystems (Dincer, 1998). Participants believed when personnel consume less power, they reduce the number of toxic fumes released from shop areas, conserve the earth's natural resources, and protect ecosystems from destruction, and by taking steps to reduce their energy intake, they will contribute to a healthier environment for future generations (Robertson, 2015).

In the study, participants unveiled that behavioral change towards energy consumption is necessary to minimize the organizational impact on the environment. They suggested personnel will intentionally change their energy behavior if they become aware of their energy use, pay attention to it, notice its environmental impact, and be informed about the consequences of not being energy efficient (Emeakaroha, Ang, &

Yan, 2012). The participants also corroborated that front-line military supervisors should facilitate an energy efficient culture and hold personnel accountable for their energy usage behavior to successfully preserve the environment, which associates tightly with the proactive leadership theme.

Theme 2: Sustainable Practices

All 15 participants (100%) identified numerous sustainable best management practices that front-line military supervisors could realistically implement into shops throughout the Air National Guard unit. They suggested that front-line supervisors tailor sustainable practices discovered in the study based on the mission of their shops. Shop energy practices are significant in the energy culture framework and participants proposed continuous energy assessments should be managed by front-line military supervisors to improve energy consumption behaviors.

Participants recommended that front-line military supervisors should unceasingly expand and communicate sustainable practices with their peers to ensure the most efficient methods are being used to save energy in shops. Based on the data collected, participants believed the DoD and the private sector should create more platforms for sharing best practices, experiences with new technology, and information regarding potential opportunities for private firms to invest in innovation (Light, 2014). All three focus groups emphasized the importance of front-line military supervisors in developing and sharing innovative interventions with other supervisors from other organizations at conferences or training events to disseminate best management practices.

Based on study findings, participants advocated that to achieve a high degree of organizational commitment and to remove obstacles to changes of attitude and involvement, well-defined training and communication plans are critical factors in promoting a clear understanding of the role and importance of sustainable practices for organizational strategy and goals (Stone, 2006). Participants proposed military organizations should effectively incorporate sustainable practices for the DoD to become a truly sustainable powerhouse. Based on data from the online focus groups, front-line military supervisors should continuously search for training opportunities and energy efficient resources to maintain motivation towards the use of sustainable practices.

Theme 3: Funds

There were 12 participants (80%) who identified organizational funding as another significant reason to conserve energy. Participants advised that personnel typically do not think about funding when they misuse energy, but more realistically they generally think about the convenience of their wasteful behaviors. Online focus group participants derived that when there is an increase in wasted energy, then there will be an increase in unnecessary costs to the organization. Online participants recognized excess energy usage also decreases the life expectancy of shop equipment. They acknowledged increasing energy efficiency often costs money up-front, but in many cases, this capital outlay could return in the form of reduced energy costs within a short time period (Clark, 2012).

Participants divulged that the use of energy efficient-equipment would save money on maintenance and labor costs from outdated or misused pieces of equipment. Energy efficient-equipment is part of the material culture in the energy culture framework and is a prime component in maintaining conservative behaviors. Participants also recognized that technology had been a primary strategy used by society in its quest to achieve energy efficiency (Malama, Makashini, Abanda, Ng'ombe, & Mudenda, 2015). They substantiated that money front-line military supervisors save through energy conservation behaviors could be used to purchase other coveted equipment throughout the organization.

Participants revealed that personnel in military organizations should become more conscious of the importance of energy conservation, and senior leaders should push supervisors to lead the effort to control energy budgets efficiently through behavioral change. Online focus group contributors also believed that front-line military supervisors should be mindful of the motivational and hygiene factors that motivate their personnel and how those factors could affect organizational funding. They recognized the DoD budget continues to shrink, so military leaders must continue to generate more sustainable alternative methods to ensure military missions are completed successfully with the reduced funding received each fiscal year.

From the data collected in the study, participants confirmed front-line military supervisors could attain behavioral change savings with little to no initial cost faster than energy conservation measures requiring significant policy changes or renovations to

facilities (Quaglione, Cassetta, Crociatac, & Sarra, 2017). Participants believed that front-line military supervisors must incorporate behavioral change interventions into their shops to control funds. They proposed effective interventions could prevent wasteful energy usage influencing organizational funding.

Theme 4: Proactive Leadership

There were 12 (80%) participants who identified proactive leadership as a type of leadership necessary to overcome energy conservation barriers. They suggested that proactive leaders pursue potential problems and effectively present solutions to senior leaders to successfully meet organizational energy goals. From the research data, participants determined proactive leaders use the four leadership styles from Hersey and Blanchard's situational leadership theory to lead personnel to change energy behaviors.

Through the results of the study, participants confirmed that as work becomes more dynamic and decentralized, leaders with proactive behaviors and initiatives become even more critical determinants of organizational success (Crant, 2000). Participants identified that in Air National Guard units, there are typically heavy workloads and high tempo work environments with the minimum workforce to execute the mission compared to typical active duty units. They underlined that front-line military supervisors should pursue what personnel value to motivate them to use energy efficient behaviors. Participants also believed that proactive leaders are necessary for efficient energy management because they provide effective forward thinking and prioritizing to achieve energy reduction goals in organizations.

Participants identified front-line military supervisors who struggle to reduce energy consumption in their shops tend to be more reactive leaders and should attempt to become more proactive. They believed front-line military supervisors could avoid many of the energy behavior issues through proactive leadership. Participants corroborated that proactive leaders prepare their personnel for success by coaching them to follow the most effective processes in their job roles (Kokemuller, 2017). They recommended front-line military supervisors empower personnel and use their energy consumption behaviors to set the example for maintaining a sustainable culture in their shop.

Theme 5: Workplace Management

There were 14 participants (93%) who identified workplace management as a significant factor that had a substantial impact on the energy culture in the Air National Guard unit. They recognized that front-line military supervisors manage shops with a wide range of energy consumption intensities throughout the Air National Guard unit. Participants reported the way supervisors succeed or fail to maintain personnel and processes in their shop effects the organization's ability to reduce energy consumption.

Participants endorsed front-line military supervisors exerting corrective actions when there are energy management deficiencies identified. They suggested that sustainable behaviors must be recognized by supervisors to motivate personnel to continue giving effort and to show others the importance of efficient energy management practices in the workplace. They emphasized the importance of front-line military

supervisors maintaining a balance between the inputs and outputs of subordinates to keep them motivated to change their energy behaviors.

From the findings of the study, participants confirmed a lack of energy management in the workplace often leads to inefficient use of energy and improper allocation of energy resource (Shi et al., 2012). Participants believed front-line military supervisors should establish a best practice to organize work schedules efficiently, spend funding, and communicate with personnel in their shop to properly manage energy consumption. They identified that effective workplace management sets the tone for an organization's culture. Participants advocated that front-line military supervisors must effectively manage their shops, so the Air National Guard unit can maintain a long-term sustainable culture.

Theme 6: Policy and Regulations

There were 12 participants (80%) who identified policy and regulations as a salient factor that had a significant influence on the energy culture in the Air National Guard unit. Participants determined an effective energy policy provides the foundation for successful energy management and formalizes senior management's support for ongoing energy management (Crittenden, Grant, & Dessi, 2016). They believed front-line military supervisors should use the unit energy policy as a cornerstone to build shop goals and objectives so that they can maintain a sustainable workplace. Participants recommended that front-line military supervisors should ensure personnel understand the

content of the unit energy policy, so they are educated and willing to comply with the policy established.

Participants revealed that the staleness of the policy dialogue reflects a failure to recognize the importance of energy to the issues it affects such as the mission, budget, and the environment (Wirth, Gray, & Podesta, 2003). They suggested that updated energy policy could improve inefficient cognitive norms currently instilled throughout the organization. They believed that senior leaders in the Air National Guard unit should consider updates to the energy policy developed by the unit energy manager to create more restrictions on wasteful energy behaviors.

Focus group participants identified a need for an update to the energy policy that addresses computer updates. They believed computer updates should be conducted on a consistent schedule to stop forcing personnel to leave equipment on continuously. They suggested that front-line military supervisors should incorporate an annual energy day into the energy policy, which could add additional sustainable activities to focus the efforts of personnel on conserving energy throughout the organization. Lastly, participants recommended that senior leaders address excess equipment by setting a maximum number of standard office equipment and appliances in each shop to prevent developing wasteful workplace environments.

Limitations of the Study

In Chapter 1, I asserted the limitations identified in the research study. The first limitation of the study was the lack of research focused on reducing energy consumption

through behavioral change in a military organization. I was able to locate, review, and incorporate relevant information from over 200 research articles on reducing energy consumption through behavioral change on other types of organizations such as universities, non-profits, private sector companies, and residential communities.

The second limitation was the research study being a single case study. Single case study research is considered unreliable by some researchers because of the inability to acquire generalized conclusions (Zainal, 2007). Multiple case studies are administered to compare results for expected reasons, so a researcher can verify if the findings are valuable or not (Gustafsson, 2007). I compared cases in multiple shops within the organization. I employed a data triangulation chart and external audits with a military energy manager with graduate level experience and management professors to validate the data collected in the research study.

Recommendations

I developed multiple recommendations based on the results of this study. The recommendations for future practice should be applied by front-line military supervisors to change energy behaviors and meet energy reduction goals. I identified daily, monthly, and annual energy conservation strategies that could realistically be implemented by supervisors in military organizations. Potential researchers could administer these recommendations to study organizations interested in improving energy management through behavioral change. Researchers could use the recommendations to recreate the

study to gain information that lacked from this research study and possibly identify new gaps.

Recommendations for Future Practice

I developed recommendations for future practice based on the data collected from the online focus groups. All the online focus group participants identified numerous interventions that could be employed to positively transform energy consumption behaviors in the Air National Guard unit. Supervisors in other organization could apply these recommendations in other military organizations striving to save energy through behavioral change. In Figure 7, I illustrated the recommended daily, monthly, and annual energy conservation strategies identified in the research study.

Daily interventions. I developed daily interventions from environmental preservation, sustainable practices, funding and proactive leadership themes. All 15 participants shared daily energy conservation interventions for facilitating a sustainable culture within their respective shops. Front-line military supervisors should consistently acknowledge effective energy conservation behaviors displayed by shop personnel to recognize their efforts to motivate them to do more potentially. Supervisors should also hold personnel accountable for their workplace decisions towards energy usage to reinforce the importance of sustainable behaviors. When front-line military supervisors encourage face to face interactions instead of electronic communications forces personnel out of the shop area to interact with others to save energy. Finally, front-line military

supervisors should set the example every day, to demonstrate first hand to personnel that energy conservation is essential at all levels in the organization.

Monthly interventions. I developed monthly interventions from the workplace management theme. All 15 participants shared monthly interventions that could be used by front-line military supervisors throughout the Air National Guard unit. Front-line military supervisors should emphasize shop energy objectives to maintain energy conservation awareness in the shop. Supervisors should share energy consumption data from the unit energy manager with shop personnel to provide feedback and keep personnel attentive of consumption rates. Front-line military supervisors should have personnel report potential facility infrastructure issues to the facility managers to ensure the facilities are maintained and building envelopes are kept tight to maintain an energy efficient working environment. Finally, front-line military supervisors should use incentives and rewards to keep personnel motivated to maintain sustainable behaviors. An example could be a supervisor issuing a one-hour pass that could for an extended lunch or an early release from work.

Annual interventions. I developed annual interventions from workplace management and policy and regulation themes. All 15 participants agreed that annual interventions could be implemented in October because that is Energy Awareness month. Front-line military supervisors should coordinate annual meetings, where they focus on how their energy usage impacts the environment. They should establish internal shop

energy goals and objectives and have them displayed throughout shop areas to prompt personnel to change their energy behaviors constantly.

Front-line military supervisors could also use the annual meeting as an annual training event to maintain energy conservation awareness and keep personnel educated to reduce excess energy usage through behavioral change in energy consumption. Front-line military supervisors should conduct internal energy audits in their shop to update shop processes and equipment, so they maintain an energy efficient culture. Finally, supervisors should empower shop personnel to develop shop specific energy prompts to motivate personnel and keep them engaged in reducing energy consumption.

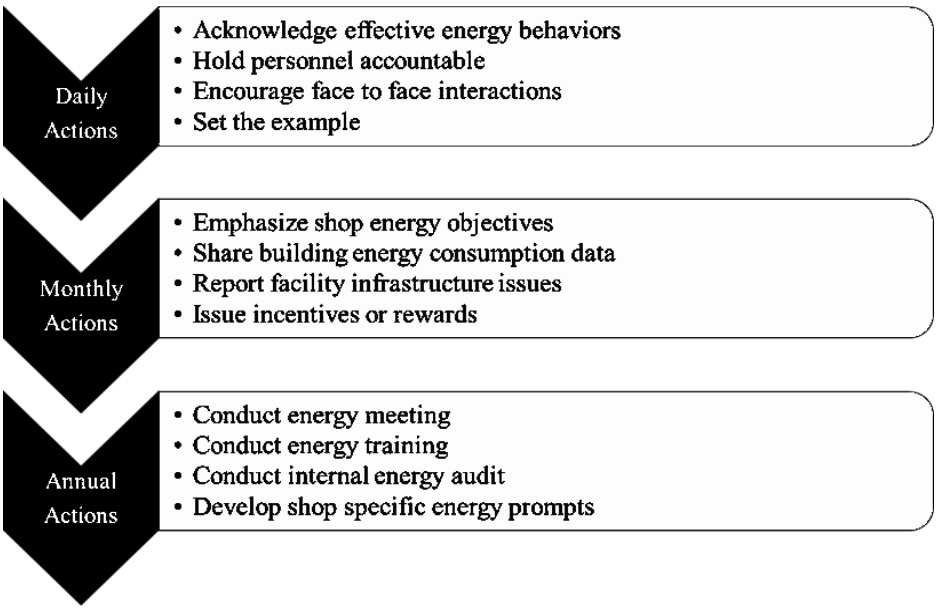

Figure 7. Recommended energy management strategies.

Recommendations for Future Study

In this qualitative single case study, I gained an understanding of common strategies front-line military supervisors could utilize to reduce energy consumption

through behavioral change. Participants suggested that further research is conducted to obtain direct feedback from military and civilian subordinates in military organizations. I focused this study solely on front-line military supervisors, but future researchers could identify more useful energy conservation strategies from the comments provided by personnel working directly with equipment and appliances in shops.

Participants recommended future research be conducted on other military branches because there are no branches in the DoD that consume energy at the same rate because each branch has a different mission to support the DoD. The Army, the most populous branch of the military, consumes less energy than the Navy or Air Force because of the Army's reliance on the Air Force and the Military Sealift Command for transportation (Homeland Defense and Security Information Analysis Center, 2015). Participants believed that potential researchers could identify branch specific energy saving interventions that could be used by military or civilian supervisors.

Participants commented that future researchers could investigate improving energy consumption behaviors for other utilities such as natural gas, water, and wastewater. In this study, I focused strictly on electrical usage on a military installation. Stress on water and energy utilities, including natural resource depletion, infrastructure deterioration, and growing populations, threatens the ability to provide reliable and sustainable service (Chini, Schreiber, Barker, & Stillwell, 2016). Participants concurred that other utilities are also important and could impact the amount of funding military organizations plan for energy use.

Participants emphasized the importance of improving behaviors towards fuel usage. The DoD organizations use fuel to power numerous military vehicles, sea vessels, and aircraft for various missions in the DoD. At a burn rate of 300,000 barrels of oil per day, the DoD consumes 1.5% of total national consumption and is the most significant user of energy in America (Chemi, 2014). Participants underlined that the annual DoD budget would continue to shrink, so military organizations must effectively change fuel consumption behaviors to keep military aircraft in the air, ships at sea and vehicles moving on the ground to complete missions.

Implications

Maintaining an energy efficient culture has been a significant challenge for many front-line military supervisors throughout the DoD. The online focus group questions and the conceptual framework helped participants to identify effective practical strategies to change behavior in the Air National Guard unit to reduce energy consumption, which could potentially bring positive social change. The implications of positive social change occur at multiple levels for this research study. The results of this study could have an impact on the individual, family, organizational, and societal levels.

At the individual level, front-line military supervisors exposed to effective energy conservation strategies can transform into sustainable leaders regardless of the daily obstacles faced in their shops. The transformation could create improved relationships with subordinates, raise the morale of shop personnel and increase productivity in their

shop. Supervisors could empower subordinates with these sustainable leadership traits to maintain a long-term sustainable culture within their shop.

At the family level, military personnel could take the newly established behaviors home and influence family members to become more energy conservative. Household energy consumption is vital in building a low-carbon society, especially in U.S (Yue, Longa, Chen, Khan, & Qi, 2016). It is essential that military personnel practice energy conservation at home with their family and not only in the workplace because energy efficient behaviors should become part of their everyday lives.

At the organizational level, there is potential to reduce the energy usage in the Federal Government due to the higher amounts of energy the military utilizes compared to other organizations in the Federal Government. Organizations in the DoD could save money through simple changes in energy consumption behaviors instead of spending money on expensive upgrades to building automation and facilities retrofits. DoD organizations could gain a positive public image through the efforts of personnel in the military to reduce their energy use and impact on the environment (Leygue, Ferguson, & Spence, 2017).

At the societal level, energy efficiency in the DoD could improve the economy. Money saved from the behavioral change of military personnel could be used to fund more jobs needed throughout the DoD and other government agencies. Military personnel could improve the environment through the behavioral change by emitting fewer toxins into ecosystems and reducing natural resource waste. National security could be

reinforced through the behavioral change of military personnel because there would be a reduction in the demand for imported fossil fuels from foreign countries.

Conclusions

The purpose of this qualitative single case study was to gain an understanding of common strategies front-line military supervisors could utilize to reduce energy consumption throughout organizational facilities in an Air National Guard unit. The focus group participants revealed some front-line military supervisors have deficiencies in environmental considerations, implementing sustainable practices, funding considerations, proactive leadership, effective workplace management, and enforcing energy policy.

In conclusion, front-line military supervisors should strive to be proactive leaders and use effective, sustainable practices to properly manage energy conservation in their shops. They could use the daily, monthly, and annual interventions from this study to do so. Organizational energy policies need to be updated and reinforced for personnel to maintain sustainable behaviors, so that they can make the best decisions based on environmental and funding considerations.

Front-line military supervisors are vital in ensuring the DoD is an energy efficient organization. When energy efficiency fires on all cylinders, it is one of the most potent and cost-effective options to achieve a variety of benefits, from the creation of U.S. jobs to the reduction of carbon emissions, from enhancing U.S. national security to reducing waste in the federal government (Vidangos, 2017).

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Appendix A: Dissertation Alignment

Research Question	Conceptual Framework	Focus Group Questions	Probe Questions	Literature Review Sections
What strategies do military front-line supervisors utilize to change behaviors in order reduce energy consumption?	**Cognitive norms:** social aspirations, expected comfort levels, environmental concern, respect for tradition (FQ8) **Material culture:** insulation, energy sources, HVAC equipment, workplace characteristics (FQ2) **Energy practices:** technology use, hours of HVAC used, temperature settings (FQ1, FQ3, FQ5, FQ7)	FQ1. What does energy management mean to you?	What gaps do you notice in energy management for your shop?	Energy Management in the Military
		FQ2. How do personnel in your shop efficiently use equipment to conserve energy?	What is the role of subordinates in maintaining shop equipment?	Energy Conservation Strategies in Practice
		FQ3. What are some best management practices you utilize to be conservative in your shop?	How could your best management practices be integrated throughout the unit?	Energy Conservation Strategies in Practice
Management Problem		FQ4. Why should personnel in the shop be motivated to save energy?	How would you ensure subordinates stay committed to saving energy?	Energy Management in the Military
The specific management problem is assumed that some front-line military supervisors in the Air National Guard lack strategies for changing behavior to reduce energy consumption on a military installation.	**Situational leadership theory:** telling leaders, selling, participating, delegating (FQ6)	FQ5. How does your work schedule impact energy usage in your shop?	How could you modify your work schedule to improve energy conservation?	Barriers Preventing Energy Conservation
		FQ6. How does your leadership style overcome energy conservation barriers?	- How do you identify potential energy conservation barriers? - How do your subordinates identify potential energy conservation barriers?	Barriers Preventing Energy Conservation
	Equity theory: input & output **Two-Factor theory:** motivational & hygiene factors **Expectancy theory:** valence, instrumentality, expectancy (FQ4)	FQ7. What are some innovative methods you can have your personnel do to save energy in your shop?	How are those innovative ideas praised?	Behavior Change in Organizations
		FQ8. What are some current workplace norms that impact energy conservation in your shop?	What actions could influence subordinates to change workplace norms?	Behavior Change in Organizations

Appendix B: Online Focus Group Protocol

Online focus groups are an excellent way to gather qualitative data on the issue or problem a researcher is exploring. This protocol was developed to provide consistent guidance for conducting asynchronous online focus groups to obtain research information.

There are three phases in conducting the online focus groups and these phases are explained below:

PHASE 1: BEFORE THE ONLINE FOCUS GROUP

1. Determine how many focus groups the researcher wants to run.
    a. Multiple online focus groups will enable the researcher to compare and identify themes, which emerge from each discussion. In this study, three focus groups will be the target, but additional online focus groups will be conducted if data has not reached saturation.
    b. The online focus groups for this study will be conducted during 7 concurrent days to give participants an adequate amount of time to discuss each question.
2. Identify your participants:
    a. Determine how many participants you want in each group. Each online focus group should have between three and five participants based on

previous research studies using online focus groups. Fewer than three participants may limit the conversation and yield poor data while more than ten can be unwieldy.

b. Develop a list of key attributes to seek in participants based on the purpose you have identified.

c. Send invitation/consent via email to departments in the D.C. Air National Guard and use the demographic questionnaire to confirm that potential participants meet requirements to participate in the study (Appendix C).

3. Generate your questions.

    a. Based on the management problem, purpose, and research question, identify no more than 8 questions.

    b. Revisit the questions to make sure that they will yield the kind of information you are seeking. Questions should also be aligned with the literature review topics.

    c. Order the questions from general to specific.

4. Develop script

    a. *Part one:* welcome participants, explain purpose and context. Explain that information is confidential, and no names will be used.

    b. *Part two*: post the questions; remember to use probes and follow up questions to explore the key concepts more deeply.

   c. *Part three*: close the online focus groups – thank participants, give them contact information for further follow up if requested, explain how you will analyze and share the data (Appendix E).

5. A Week before online focus groups
   a. Ensure all participants receive the consent form and email back "I consent" and keep copy for their record.
   b. Remind participants of the timeframe for conducting the online focus groups and restate the expectations for the research.

PHASE 2: CONDUCT THE ONLINE FOCUS GROUPS

1. Days 1-4
   a. Welcome participants and initiate the concurrent asynchronous online focus groups.
   b. Participants will focus their discussions on questions 1-4 (Appendix A).
   c. Encourage participants to reply to other comments by either making additional comments, liking comments or using emoji characters.
   d. Probing questions will be used to gain more detailed responses.
   e. Participants will be encouraged participate more if there is a lack discussion.
2. Days 5-7
   a. Participants will focus their discussion on questions 5-8 (Appendix A).

   b. Probing questions will continue to be used.
   c. Peer interaction will continuously be encouraged to obtain a depth of research information.
   d. The concurrent asynchronous online focus group will be closed out on day 7.

3. While conducting the sessions, be mindful of the following:
   a. Set a positive tone.
   b. Make sure everyone is heard; draw out quieter group members.
   c. Probe for more complete answers.
   d. Monitor your questions and the time closely – it is your job to make sure you are on track.
   e. Don't argue a point with a participant, even if they are wrong. Address it later if you must.
   f. Thank participants and tell them what your next steps are with the information.

PHASE 3: INTERPRETING AND REPORTING THE RESULTS (Braun and Clarke's six phase thematic analyze)

1. Summarize each online focus group
   a. Closing out each day, write up a quick summary of impressions from each online focus group.

   b. Highlight key words and phrases from the online discussions.
   c. Transcribe the notes of the online focus groups. This should be done as soon as possible after the online focus groups have been completed.

2. Create Initial Codes
   a. Use the highlighted words and phrases to create initial codes.
   b. Continuously re-evaluate codes to develop consistent themes.
   c. Input transcripts into NVivo to organize data.

3. Search for Themes
   a. Read the notes and look for themes/trends from the codes. Write down any themes, which occur more than once.
   b. Context and tone are just as important as words. If comments are phrased negatively or triggered an emotional response, this should be noted in the analysis.
   c. Use NVivo to identify potential themes I do not consider initially.

4. Review Themes & Interpret the results
   a. Review themes created and recommended in NVivo.
   b. Develop recommendations based on themes.

5. Define and Name Themes
   a. Highlight the main themes, issues, or problems that arose in the online focus groups. Discuss how the organization can address them.
   b. Create theme saturation chart.

   c. Member checking with the summary of themes.

6. Produce Report

   a. Modify summary of themes based on member checking feedback.

   b. Triangulate data from summary of themes, field notes and EIR memo.

   c. Prioritize the results and make action plans for the most important priorities.

Appendix C: Demographic Questionnaire

Completion of the demographic questionnaire is essential to ensure you meet all the requirements to participate in the research study. All responses to these choices will remain confidential. Any published accounts of the research will not include any information that could identify any study participants. Data will be kept for a period of at least 5 years, as required by the university. Please check the line for the choice that applies to you currently:

Age Range: ____21–30 ____31–40 ____41–50 ____ 51–60 ____61–70 ____70–80

Gender

____M ____F

Rating on your last Evaluation Performance Report

____Unsatisfactory ____Satisfactory

Are you a front-line supervisor in the D.C. Air National Guard?

____N ____Y

Years of supervising experience

____1-3 ____4-5 ____6-9 ____10+

Number of personnel you are currently supervising

____1-3 ____4-5 ____6+

Level of importance for energy management in your shop

____Low ____Moderate ____High

Appendix D: Letter of Cooperation

DEPARTMENT OF THE AIR FORCE
113TH WING (ANG)
JOINT BASE ANDREWS MD

07 May 2017

MEMORANDUM FOR RECORD

FROM: 113 WG/CC
3252 Eest Perimter Road
Joint Base Andrews, MD 20762

SUBJECT: Letter of Cooperation for Captain Samuel Richardson's Doctoral Research

1. Based on my review of Captain Samuel Richardson's research proposal, I give permission for him to conduct the study entitled "Strategies for Improving Energy Conservation through Behavioral Change on a Military Installation" within the District of Columbia Air National Guard. As part of this study, I authorize him to conduct online focus groups within the organization to obtain qualitative information, use member checking, and to conduct a final brief with senior leaders in the organization about the results of the study. Personnel will be selected based on them having a satisfactory rating on their most recent evaluation performance report, being a military member in the D.C. Air National Guard, and being a front-line military supervisor. Individuals' participation will be voluntary and at their own discretion.

2. We understand that our organization's responsibility is to assist with conducting the on-line focus groups in the organization. We reserve the right to withdraw from the study at any time.

3. I confirm that I am authorized to approve research in this setting and that this plan complies with the organization's policies. I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the student's supervising faculty/ staff without permission from the Walden University IRB.

4. If you have any questions, please feel free to contact me at (240) 857-2811 or email jeffrey.c.bozard.mil@mail.mil.

BOZARD.JEFFREY.CRAIG.1061323097
Digitally signed by BOZARD.JEFFREY.CRAIG.1061323097
DN: c=US, o=U.S. Government, ou=DoD, ou=PKI, ou=USAF, cn=BOZARD.JEFFREY.CRAIG.1061323097
Date: 2017.05.16 12:37:52-04'00'

JEFFREY C. BOZARD, Brig Gen, ANG
Commander

Appendix E: Thank You/Member Checking E-mail

Dear Participant,

Thank you again for your willingness to participate in my study to gain an understanding of common strategies front-line military supervisors have had with reducing energy consumption through behavioral change on a military installation. I greatly appreciate your alacrity to participate in the online focus group and to share your thoughts about your experiences, which were extremely informative and useful.

Based upon the input from the online focus group participants, I have attached a summary of themes from the inputs obtained from all the online focus groups. Would you please review this summary and verify if this accurately reflects your experience? Please feel free to respond with any necessary corrections or additions. If you are willing to do this, it will help to guarantee that I am accurately understanding and recapping what you have shared. Your comments will be extremely helpful.

I have greatly valued your participation in this research study and your willingness to share about your experience. If you have any questions or concerns, please contact me. Again, thank you so very much for your time and effort that made this research study possible.

Sincerely,

Samuel F. Richardson II

PhD in Management Student

Walden University

Minneapolis, Minnesota 55402