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BUDGET SAVINGS THROUGH THE RESPONSIBLE USE OF ENERGY IN NAVY PRIVATIZED HOUSING COMMUNITIES

December 2014

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NAVY PRIVATIZED HOUSING COMMUNITIES**

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BUDGET SAVINGS THROUGH THE RESPONSIBLE USE OF ENERGY IN NAVY PRIVATIZED HOUSING COMMUNITIES

ABSTRACT

In 1996, Congress authorized the Military Housing Privatization Initiative, which led to the increase in basic allowance for housing (BAH) for active duty members to achieve zero out of pocket housing expenses while living in military privatized housing. Privatized housing residents are not fully incentivized to conserve energy. Average energy costs, taken over like sized groups, are used as a baseline to justify the amount paid to the actual energy provider out of BAH proceeds collected from the service member. Water baselines do not exist in privatized housing, resulting in zero incentive to conserve water.

We propose that the responsible use of energy incentive options can be promoted using a different system. Our approach pays members a direct subsidy equal to a fair market value of the rental property, coupled with a utilities model which is based on baseline utility costs and family size. This approach will effectively and efficiently utilize the Navy BAH system while reducing overall costs to the Navy. Future research could be conducted on the feasibility of expanding our recommendations to encompass all services.

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LIST OF ACRONYMS AND ABBREVIATIONS

BAH	basic allowance for housing
BAQ	basic allowance for quarters
CNIC	Commander, Navy Installations Command
DMDC	defense manpower data center
DOD	Department of Defense
FHA	Federal Housing Administration
FMR	Fair Market Rent
GAO	General Accounting Office; Government Accountability Office
HUD	Department of Housing and Urban Development
LCC	life cycle cost
MFH	military family housing
MHPI	military housing privatization initiative
MILCON	military construction
OMB	Office of Management and Budget
OSD	Office of the Secretary of Defense
RECP	Resident Energy Conservation Program
VHA	variable housing allowance

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I. INTRODUCTION

A. BACKGROUND

Energy prices are remaining fairly constant while the federal budget is decreasing, which puts a larger burden on paying for energy costs out of a smaller BAH budgetary line item. Responsible use of energy incentive options are needed in privatized housing to effectively and efficiently utilize the Navy basic allowance for housing (BAH) system. The basic allowance for quarters / variable housing allowance (BAQ/VHA) system was modified in the National Defense Authorization Act for fiscal year 1998 due to out of pocket expenses exceeding 40 percent. The BAH system was further modified in 2005 to ensure zero percent out of pocket expense. The current system is now under fire to reduce costs. The 2015 Department of Defense (DOD) proposed budget targets BAH with a six percent decrease, equal to \$448.8M. (Tilghman, 2014)

The military is faced with a perception that our use of energy is excessive and not responsible when compared to the civilian sector and the current fiscal reality. As the military engagements around the world come to a close we will be faced with even tighter defense budget controls. The DOD must position itself to protect our core allowances while minimizing the impact on our operational readiness.

B. RESEARCH OBJECTIVES

As a team, we collected Navy personnel data from Defense Manpower Data Center Reporting System on privatized housing from 2007–2014 with rank info, number of bedrooms and location (Washington State, Norfolk, Jacksonville, and San Diego). We conducted an analysis of these data to identify any trends in the use of privatized housing to help forecast future Navy personnel utilization of privatized housing and to conduct a cost benefit analysis on both past and future aspects of the responsible use of energy in the Navy privatized housing BAH program.

C. RESEARCH QUESTIONS

Currently, privatized housing residents are not fully incentivized to conserve energy. The baseline policy which is governed by the Resident Energy Conservation Program (RECP) groups like-size homes together, which does not give the individual household the autonomy of conserving energy to the fullest extent. Energy averages for homes of the same size are used as a baseline by the contractors to justify the amount paid to the actual energy provider. These funds are taken out of BAH proceeds collected from the service member. Households that use more energy than the calculated baseline must pay the difference out of their own pocket.

Water baselines in Navy privatized housing do not exist, therefore providing zero incentive to conserve water.

1. Primary Research Question

Null hypothesis: Military privatized housing communities conserve energy at a lower dollar amount per household member than their civilian counterparts in neighboring communities.

Alternative hypothesis: Military privatized housing communities do not conserve energy at a lower dollar amount per household member than their civilian counterparts in neighboring communities.

Utilizing our hypotheses we want to know:

- How can cost reductions for DOD energy be realized though motivated, efficient energy usage among DOD personnel?
- How might policy be changed to enable these savings?

2. Secondary Research Question

Our secondary research question is, “What are the realized savings between the two communities?” We then collected the relevant data from the civilian side and Navy privatized housing communities for statistical comparisons, computed and compared the percent of savings realized in the two communities to make our recommendations.

D. SCOPE, LIMITATIONS, AND ASSUMPTIONS

Our original research scope was to cover the period from the inception of the new BAH program in 1996 until 2013. Unfortunately, the variables that we wanted to include into our research were not accurately collected or kept until 2007. Therefore, the scope was narrowed to span from 2007 through 2014. We also had to narrow the scope of Navy military concentration areas from five down to four. Monterey, California had to be cut from our research because housing responsibilities and reporting for Monterey belongs to the U.S. Army and not the Navy. This limitation may affect the outcome of certain ranks within the study, since Monterey, California is a heavily populated area for naval officers.

Our first assumption is that qualified prior enlisted officers (>4 years active service) are paid more in BAH than their peers in the same grade. (Ex. Monterey, CA O-3E personnel are paid \$2,946 per month with dependents while the O-3 peer receives \$2,835 per month with dependents. We used the average of the two BAH rates in our calculations.)

We assumed that household utility costs for electricity are the same for the entire household while water usage is allocated by number of bedrooms in the family's home.

The utility providers' reported data were standardized into a single reporting period accordingly (e.g., Utility Company A reports data on a monthly basis while Utility Company B reports data on a quarterly basis). Also, it is assumed that the reader is familiar with standard DOD BAH policies and terminology. Further information is available at the Navy Personnel Command website: <http://www.public.navy.mil/bupers-npc/support/distribution/Pages/BasicAllowanceForHousing.aspx>.

E. METHODOLOGY

The research was performed using two research strategies. The first strategy is based on an extensive literature review, including other theses, congressional testimony, Defense Department and Navy internal regulations, reports, policies and plans, articles, and web searches. Other sources of information involved communication with representatives at the Defense Manpower Data Center (DMDC) and Commander, Navy Installations Command (CNIC) N93. The second strategy was to conduct a statistical

analysis on data collected and provided to us by CNIC N93 in Washington D.C. These two strategies provided sufficient data to come to our conclusions and recommendations.

Definitions and Abbreviations

F. ORGANIZATION OF THE STUDY

This thesis is organized into six chapters. Chapter II provides the reader with a historical context for how military housing came about, DOD's World War II policies pertaining to housing and how these policies evolved up until the mid-nineties. It also includes an overview of the military construction (MILCON) funded housing program and three previous military funded privatized housing community projects. Chapter III explains how the current BAH came about in 1996, the two methods used to provide a military family with housing, how they function, the pros and cons associated with these methods, and service members' housing preferences. Chapter IV outlines policy considerations that must be addressed in accordance with our findings. Chapter V presents the data, analysis and findings from this thesis. Chapter VI provides a brief summary, our conclusions and recommendations from this study.

II. BACKGROUND

A. OVERVIEW

In the current climate of budget reduction and spending cuts, it is of utmost importance for military members and leadership to make effective and efficient use of resources. One of these vital resources is a BAH that all military members are entitled to. Military members rely on BAH to cover most, if not all, of their housing expenses. Moreover, military family housing was designed so members would not need to spend more than their BAH allotment. That is, that their full entitlement would cover all rental and utilities costs associated with their place of residence in military housing.

B. HISTORY

Military housing has a history that traces its roots from the various economic hardships and conflicts in American landscape. In particular, Army military housing that was constructed during peacetimes were born out of necessity to keep the United States protected, specifically along its coastlines and slowly pushing west as that territory became developed by settlers. Military housing projects were initiated during peacetime when funding and resources were more readily available. When peacetimes turned to conflicts, funding and resources were diverted to support the war efforts. The amount of housing that could be built before or after conflicts was never fully able to address all housing needs for officers and enlisted. Various cycles of peacetime and conflict created a shortage in military housing for troops. Moreover, the existing housing near military installations were in a state of disrepair and continued to deteriorate.

Twiss and Martin state that shortages in military housing were not new issues to the military (1998). The Army in particular experienced more housing shortages than the other services, mainly by virtue of their mission and land footprint the Army required. The authors noted one particular example at Fort Monroe that is indicative of the Army's housing predicament from early on:

Quarters One at Fort Monroe, probably the oldest housing now in the Army, was completed soon after the construction of the fortress began in

1819, but the construction of adequate quarters for officers and barracks for soldiers never kept up with the need. Inadequate money for maintenance and repair mean that over the years facilities deteriorated. Assignment to a permanent fortification on the coast did not guarantee good living conditions for officers, soldiers, or their families. (Twiss & Martin, 1998, p. 3)

As the nineteenth century turned to the twentieth century, the Army created the military communities that are common on bases today. Amenities like gyms, libraries, and exchanges and school facilities were added to improve Army post quality of life for officers and soldiers. However, World War I curtailed any military community enrichment construction that had started in the early 1900s, and instead poured the nation's resources into the war effort. Another cycle of prosperity and peacetime followed WWI, when military construction efforts picked up momentum again.

As military construction projects picked up, the nation's economy did too, which meant it was harder to retain military members when the job prospects were better during this period of peacetime. The Joint Service Pay Act of 1922 was enacted to help military retention efforts. The act provided military members with not only a base pay but provided allowances with their base pay. This Act deemed only officers worthy of such allowances, while enlisted would not receive any allowances until much later. One of the allowances paid to

Warrant officers and officers during this time was a rental allowance for quarters when quarters were not available. This allowance was based on grade and the presence or absence of family members and based upon national monthly costs associated with renting one room. Larger families were authorized more rooms. (Twiss & Martin, 1998, p. 5)

Enlisted had to wait until 1949 with the introduction of the Career Compensation System to receive a housing allowance, known at that time as BAQ.

By 1949, Army ranks had grown so much that military housing available to troops was not enough to house all personnel who requested it. The Army experienced another lull in housing construction again when the U.S. entered WWII as resources and funds were needed for the war effort. Much of the existing housing for military members and their families had deteriorated to substandard level. The housing issue was so bad for

military families that it gained national attention in 1949 when Life magazine exposed the horrific conditions of the private rental housing they lived in when no government quarters were available. According to Baldwin,

According to the Secretary of Defense, ‘rather than be separated from their families because of lack of Government quarters and scarcity of adequate rental housing at their places of assignment, many of the service personnel have accepted disgraceful living conditions in shacks, trailer camps and overcrowded buildings, many at exorbitant rents.’ Concerned about morale and reenlistment and resigned to the fact that Congress would not appropriate sufficient funds to solve the problem, the Defense Department sought new ways to address the housing crisis. (Baldwin, 1996, p. 9)

In 1948, the Defense Department explored measures to address this issue since receiving sufficient funding from Congress to reduce the shortage or upgrade existing housing was unlikely. The Army reached out to the private sector, specifically insurance companies and businessmen in each localized post area, to produce viable solutions to the military housing shortage. The private sector voiced concerns over possible post closures and subsequent drawdown in troops as a business risk they may not be willing to take in building housing close to military bases. It was becoming clear that more would be needed to entice and attract private businesses to build rental housing for military families and for insurance companies to insure these projects for private business ventures (Baldwin, 1996).

C. SENATOR KENNETH S. WHERRY

Proposals to build more military housing got the boost it needed from Senator Kenneth S. Wherry (R-NE, 1943–1951), when many air bases closed in his home state because not enough housing was available to military personnel and their families. Baldwin states,

During WWII, according to the senator, Nebraska had more than twenty air bases, all of which were closed after the war except for one installation at Kearney. ‘Then came an order that the base at Kearney was to be closed.’ The primary reason for closing the base was lack of adequate family housing. That experience led the senator to a better appreciation of the importance of family housing to the military services. (Baldwin, 1996, p. 1342)

Wherry's bill had several components to entice private businessmen, otherwise known as private sponsors, to build rental housing near government installations. One component, known as Title VIII of The National Housing Act, set favorable conditions that made it suitable for the Federal Housing Administration (FHA) to grant mortgage insurance to private sponsors who used loans to build housing projects in the amount each military service quantified. (Baldwin, 1996) The private sponsored housing projects were considered rental housing and could be rented to military or civilians, despite the fact the housing was built near military installations on government owned land. The requirement was the rental housing must first rent to military members that wanted to rent in the Wherry housing, but then they could be rented out to anyone. Military members could pay for their rent by using their BAQ. Rental rates were not established solely on the amount a member received for BAQ. Rather, the "FHA established rental schedules for the units based on its estimate of the income private sponsors would need to operate and maintain the housing, repay the mortgage, and make a profit" (Baldwin, 1996). This is unlike rental schedules in military privatized housing today, which are based on a service member's BAH. Moreover, since some of the rental housing locations were too far from regular utility company coverage, the Wherry bill allowed the Defense Department to take charge of utilities provided to these far removed locations. The utility management on behalf of the Defense Department was done in the interest of keeping rental rates low for service members.

The Wherry bill became the Wherry Program and unfortunately the program was problematic in a few areas, ultimately leading to termination because of FHA and private sponsored builders' scandals. Baldwin (1996) notes:

The Department of Defense Housing Commission's investigation confirmed the problems with the design and bidding processes and also discovered in the first few months of the Wherry program the flaw that would ultimately lead to its termination. Prospective sponsors, the investigation noted, appeared to be calculating their bids so that they built their projects for the amount of the mortgage they could obtain. Sponsors could thus avoid putting any of their own money into the project. In May 1950, Congress passed legislation that authorized the services to hire architect-engineer firms to draw up plans and specifications upon which potential sponsors would bid. The winning bidder would then reimburse

the government for design services. Congress did not, however, address the more serious problem of what would later be excoriated as ‘windfall profits’ gained from building the projects for less than the amount of the FHA-insured mortgage. (Baldwin, 1996, p. 95)

One of the major issues faced by builders was bid submissions for proposed housing designs did not have uniform architectural guidelines established by the government. Because there were no uniform guidelines bidders up designed their own structures, which left the services with a wide array of “proposals with designs and prices that were difficult to compare. In some cases the services picked proposals that the FHA later rejected because the schedule of rents was too low or the designs failed to meet FHA requirements” (Baldwin, 1996). To mitigate this problem the Defense Department provided military services the ability to use architectural firms to draw up designs that each bidder could use to base their own plans on and prevent FHA rejection.

Another issue the Wherry Program had to contend with was the windfalls builders were trying to reap by building projects for much less than the mortgage amount. The issue became a full-blown scandal when a congressional investigation discovered that “unscrupulous builders aided by corrupt FHA officials had reaped enormous profits at the expense of the taxpayers” (Baldwin, 1996). As a result, a cost certification component was added to the program to ensure builders were not trying to build rental housing projects on the cheap and pocket the rest of the government funding to build these units as profit. This scandal was part of the reason the Wherry Program was terminated in 1954. It was replaced by a new housing program, known as the Capehart Program. (Baldwin, 1996)

D. CAPEHART WHERRY PROGRAM

The Capehart Program was implemented to avoid the failings in the Wherry Program. The key differences between the programs, as noted by Baldwin (1996), are listed below:

- FHA provided mortgage insurance for private sponsors who built, but did not operate, family housing units on government-owned or leased land. Typically the private sponsors operated the units, renting out and collecting rent from military members which they did so under the Wherry

Program. However in the Capehart Program the units would be turned over to the military services to operate and collect rent from service members. At this point the services used the service members' entire housing allowance to operate and maintain the projects using appropriated funds.

- The Secretary of Defense had to certify the need for family housing at an installation in order to initiate a project. If the FHA disagreed with the secretary's determination, it could require the Defense Department to guarantee the new mortgage insurance fund against loss. The Wherry Program did not require such certifications and guarantees.
- The military services retained architect-engineer firms to design the projects, which were advertised for bids. The Wherry Program allowed bidders to submit their own plans based on generic architectural guidelines from the military services specifications without employing the use of an architect-engineer firm.

To deal with the fallout from the Wherry program windfall profit scandal, Congress implemented the Renegotiation Act of 1951. While this act did not make builders certify their costs, as they had to do in the Wherry program, it did allow the government to collect from builders who tried to reap excessive profits of taxpayer funds by building projects well short of the mortgage amount for the rental housing.

The Capehart program experienced its fair share of problems, albeit different problems than Wherry's issues. Congress reviewed the military housing program in 1962 and heard from Defense Department testimony that neither Congress nor the Defense Department "have been satisfied with private financing since it is the most costly method of acquiring housing and proven difficult to administer". Congress did not extend the Capehart program and voted to build family housing exclusively with appropriated funds" (Baldwin, 1996). A General Accounting Office (GAO) report provided more ammunition to this belief when in 1960 the GAO cited several concerns over the program. While Capehart units were given a specific cost ceiling that builders should only use in designated high cost areas, builders instead used this estimate for all project areas, not just the high cost ones. Another issue cited in the report was that builders overestimated the need for housing at military installations. Sponsors built too many units because they underestimated the amount of housing outside of military installations and the number of service members that would rather live off military installations. Finally,

the Capehart program experienced issues with private sponsors that steered Congress in the direction to discontinue the Capehart program. The administrative oversight was too cumbersome and not effective at preventing waste, fraud, and abuse and instead deemed future housing projects to be built with appropriated funds. Utilizing the private industry to build the units was too costly. (Baldwin, 1996)

E. SECTION 801 AND 802 HOUSING

Despite the scandals and problems that riddled the Wherry and Capehart programs, they did still manage to get the military services out of major housing crises during the 1940s to 1960s. But because both programs were susceptible to waste, fraud, and abuse of government funds on the part of private sponsors, they were cancelled, which left Congress with an understandable reluctance to do any further business with private sponsors that could lead to misuse of funds and future scandals. Not until 1984, when the Military Construction Authorization Act was enacted, did Congress and the president decide to allow private industry into building military family housing again. (Baldwin, 1996)

The housing programs born from the 1984 Military Construction Authorization Act became known as the Section 801 and Section 802 programs. Section 801 program was a long-term lease program that “competitively bid leases and provide housing built to Defense Department specifications on either military or privately owned land” (Baldwin, 1996) from contracted private builders. With this program the government had the option to perform the operations and maintenance on the housing units or allow the contractor to do it, whichever cost the government less. The contractors were not too particularly keen on taking on the maintenance of the units as this added cost made it difficult for them to secure funding to finance their projects. As with previous housing programs, the Section 801 program had its share of problems. According to Baldwin, “Congress believed the Section 801 housing was overpriced, it was suspiciously popular with the Defense Department, and after 20 years of payments, the government got nothing” (1996).

The Section 802 program was a rental guarantee program that provided housing in which rental rates were set at a level that service members could afford, essentially their

entire housing allowance amount. Contractors were not particularly enticed to want to build units for the Section 802 program, because rental rates were frozen for the life of the agreement and rental rates were set at a service members' ability to pay for rent, essentially their BAQ amount. Contractors were also experiencing the same issues with financing that the Section 801 contractors had. To make the contract agreements more appealing to contractors, Congress made two changes to the law: They unfroze rental rates, allowing them to rise with inflation; and they allowed the government or a third party assume maintenance of the units to ease contractors' financing difficulties. Despite these changes, the Section 802 program did not produce many housing units for rent. What eventually halted the Section 802 program and kept it from realizing its full potential was the cost of housing. Housing costs increased steadily and outpaced what service members were entitled to for BAQ. Since builders relied on BAQ to pay for rental rates, it was a loss builders were not willing to accept, as evident from the low rate of builder participation in the Section 802 program (Baldwin, 1996).

III. MILITARY FAMILY HOUSING (1996–PRESENT)

In 1996, Congress authorized the Military Housing Privatization Initiative (MHPI), which led to the increase in basic allowance for housing for active duty members to achieve zero out of pocket housing expenses while living in off base privatized housing.

A. MILITARY HOUSING PRIVATIZATION INITIATIVE

As reviewed in the Wherry and Capehart programs, there remained an insufficiency of housing units that was not satisfactory to the DOD. As a result, Congress implemented the MHPI in conjunction with the 1996 Defense Authorization Act. (GAO, 1998) This initiative sought to include the private sector in the development of military housing. More specifically, Congress authorized the DOD to lease its property to the private sector, offer private businesses loans as needed in support of the initiative, and let private businesses build the military housing units with design similarities in the civilian markets. (GAO, 1998) By empowering the DOD to utilize private sectors, MHPI legislation afforded the DOD the flexibility to construct housing units comparable to civilian communities and stay free of the bureaucratic guidelines of Wherry and Capehart programs. (Else, 2001) MHPI allowed the DOD to assist in bringing quality and affordable military housing to the military family, thereby increasing morale and assisting in retention.

B. THE MHPI PROCESS

Before there can be any military housing, funds must be allocated to support its use. The MHPI process is an established procedure by Congress that authorizes the construction of these units through the Family Housing Improvement Fund under the annual Defense Authorization Act (Appendix B, Public Law 104-106, § 2883). The funding supports all MHPI projects that involve all contracting aspects to plan, solicit, award, administer and monetary injections required by the government for the initial phase (consult Appendix B, Public Law 104-106, § 2883).

1. Budget Scoring

Before there can be any military housing, funds must be allocated to support its use. The MHPI process is an established procedure by Congress that authorizes the construction of these units through the Family Housing Improvement Fund under the annual Defense Authorization Act (Appendix B, Public Law 104-106, § 2883). The funding supports all MHPI projects that involve all contracting aspects to plan, solicit, award, administer and provide monetary injections required by the government for the initial phase (Appendix B, Public Law 104-106, § 2883).

2. Budget Scoring

MHPI has assigned a “budget score” to each of its projects. Conger writes,

Budget scoring is the percentage of dollar value (from 0% to 100%) of a project’s cost that must be allocated to an agency’s budget in a given fiscal year. For example, if a project cost of \$1 million is scored at 10%, then \$100,000 of the agency’s budget authority for that year must be used to cover the assessment. According to OMB scoring guidelines, a project must be fully funded with sufficient budget authority in its first year to cover the government’s long-term financial commitment to the project. (Conger, n.d.)

The scoring used for the MHPI was drafted to comply with the Federal Credit Reform Act of 1990 and the Budget Enforcement Act of 1990, as interpreted by Office of Management and Budget (OMB) Circular A-11 and specific MHPI guidelines issued by the OMB on June 25, 1997. These guidelines remained in effect for the first 20 projects using MHPI authorities, and will then be adjusted to incorporate lessons learned. The budget scoring is statistically derived from the probability that a private contractor would default on a project and the effect of the project’s default on the federal deficit (Else, 2001).

The Secretary of Defense delegated responsibility of operations for MHPI in October 1998 to the separate services. However, he gave oversight and final approval authority to the Office of the Secretary of Defense (OSD) Office of Competitive Sourcing and Privatization (Else, 2001). Congress approves all projects and has oversight authority. On 9 October 1998, John B. Goodman, the Deputy Under Secretary for

Industrial Affairs and Installations, outlined in his memo on MHPI policies and procedures, the important steps and requirements throughout the housing project process to include post contract award management (Goodman, 1998). The memo also provided procedures and policies as guidelines to follow for privatization projects as well as supporting tools needed to accomplish these tasks (Goodman, 1998). MHPI projects should have a life cycle cost (LCC) savings that is beneficial to the military family housing (MFH) in order to be approved.

C. OSD MHPI UTILITIES POLICY

The Service components, through their OSD offices, released memos on policy guidance to ensure that all services are following the same MHPI process, to prevent unnecessary confusion, and to avoid delays that could slow down the process, as experienced in the previous years of the housing privatization projects. Also, John B. Goodman distributed a memo that covered the policy requirements for services involving utilities of MHPI projects. According to Mr. Goodman:

Projects under this program must define the amount of rent available to the developer by subtracting from the BAH a predetermined amount set aside for utilities. This allowance for utilities would permit payment of utilities from within the BAH, either directly by the member or passed through the developer. This method will ensure that developers can appropriately estimate the amount of cash flow used to finance housing privatization projects. Service members who conserve utilities would be able to keep the difference between the allowance and the actual cost, whereas those who exceed the allowance would pay out-of-pocket for excessive usage. (Goodman, 1998)

D. PRESENT

This section will discuss whether or not unaccompanied housing is beneficial to the military as well as how the needs of junior enlisted personnel and their family's needs are met in military family housing. Finally, the responsibilities of the service members to pay for utilities will be discussed.

1. Unaccompanied Housing

Since the enactment of the MHPI, several analyses have been performed, from 1997 through 2011, by the different military services to decide if it is beneficial to keep the privatized housing for unaccompanied personnel. The Army's and the Navy's analyses differed by either using either privatization or the funding from traditional military construction for better housing quality. They utilized many installations for their analyses. On the other hand, the Air Force and Marine Corps used only a few installations to analyze the cost savings of privatizing unaccompanied housing. As such, the Air Force used two locations whereas the Marine Corps use one location for its 2008 analysis. However, the Army and Navy focused their analyses to specific installations in which their unaccompanied service members were in receipt of BAH. The Air Force and Marine Corps came to the conclusion that privatization did not meet their housing needs. The Air Force released a memorandum in April 2000 stating that privatization was detrimental to unit cohesion. Also, other factors influencing the military services' decision on privatized housing include junior personnel lacking sufficient BAH to pay rent, timeliness of unit deployments affecting the rates of occupancy in these privatized housing units, and uncertainty of what the military numbers would look like in the future, thereby leading to a possibility of lower demand for privatized housing. Between 1996 and 2013, the Army and Navy implemented seven privatized unaccompanied personnel housing projects, whereas the Air Force and Marine Corps is using military construction funds to replace or renovate housing by the end of the fiscal year 2014. Based upon information from the Office of the Secretary of Defense and officials overseeing military housing, no services are planning to seek privatized housing projects for unaccompanied personnel in the future. (GAO, 2014)

2. Military Family Housing

According to DOD 4165.63-M for "Guidance," housing privatization projects must specifically identify how the needs of junior enlisted personnel and their families are met at the particular installation. If a proposed project is not specifically targeted for junior enlisted personnel and their families, the Military Department must identify and

explain how alternative housing addresses their needs. Leverage ratios measure the advantage of using privatization versus traditional MILCON techniques in terms of upfront budget costs. This leverage calculation requires estimating the cost of a MILCON project that is equivalent in scope and duration to the proposed privatization project. That MILCON cost is then divided by the scored cost of the privatization project. Housing privatization projects should leverage appropriations by at least two to one, meaning a project or project phase should generate twice the amount of housing construction as would be generated using MILCON. Overall long-term costs should be less than or equal to MILCON. For the purposes of this program, this analysis compares the cost to the Government of a MILCON project that is equivalent in scope and duration to the cost of the proposed privatization project. (DOD, 2010)

a. Utilities

Tenants residing in privatized housing are responsible for paying both their rent and their utility bills. The housing owners may set rents at an amount equal to the tenants' BAH, reduced by an amount that allows the tenants to pay for their utility usage and renters' insurance. The rent reduction should be calculated based on a reasonable estimate of average consumption levels for the specific housing condition and type. (DOD, 2010)

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IV. POLICY CONSIDERATIONS

A. POLICY CONSIDERATIONS

MFH energy consumption has historically been higher than their civilian counterparts in neighboring communities. The federal budget has been decreasing. Therefore, a reduction in energy consumption is vital for DOD to stay within the confines of a reduced budget. Service members' BAH, which they use to pay for utilities and rent, has been targeted for a reduction in 2015 by the DOD. Therefore, energy conservation efforts and accurate energy baselines should be established to help service members minimize the impact of the reduction to their BAH.

Energy savings will be easier to identify once utility baselines have been established. "Protocols to estimate annual community energy consumption baselines for single-family detached homes can be used to make direct comparisons of individual households' energy consumption and evaluate the energy impacts of programs used to affect change in consumer energy consumption" (Jones, Taylor, Kipp, and Knowles, 2010). Utility baselines could be and should be constructed from the following data (Jones et al., 2010) and (Sonderegger, 1998):

- Actual metered monthly energy consumption
- property appraiser data that provides basic building characteristics of individual homes
- correlation of past utility bills with past weather
- past usage variables such as hours of occupancy and when units are unoccupied
- number of occupants

Compiled data collection that spans one to two years of actual data is preferable to an estimate when creating a utility baseline. Estimates should not be used if actual data is present. One to two years of data should provide adequate basis to help determine any existence of correlation between variables. Collection of more than two years of data may become problematic since "spanning several years may inadvertently capture the effects of past events and trends irrelevant to current usage patterns" (Sonderegger, 1998).

After a baseline has been constructed from the relevant data, an energy conservation program should be implemented. Two opportunities to create energy conservation by military housing residents are physical improvements installed in existing housing and inducing changes in residents' energy usage behaviors. In order to physically implement measures to create energy conservation for MFH residents, Jones, Taylor, Kipp and Knowles (2010) recommend using the Department of Energy's Weatherization Assistance Program (WAP) model to update and retrofit existing housing with efficient energy equipment. WAP upgrades "include a wide variety of energy efficiency measures that encompass the building envelope, its heating and cooling systems, its electrical system, and electricity consuming appliances" (DOE, n.d.).

The second strategy to produce energy conservation is to induce residential behavior that results in conserving energy. Allcott (2009) states that to effect behavioral changes on psychological cues a home energy report detailing the residents' historical energy usage is needed for each family living in MFH. According to Allcott, the *Home Energy Report* contains two principal features:

The first feature is an Action Steps Module that provides information, specifically targeted to each household, on strategies to conserve energy. The second feature is a Social Comparison Module that details the household's electricity consumption and compares it to that of its one hundred nearest geographical neighbors in houses of comparable size. (Allcott, 2009)

Showing residents how they compare with respect to their neighbors in energy consumption can induce residents to conserve more through social norming behavior. The residents who are not conserving as much as their neighbors may feel the psychological cue to conform their behavior with the social norm and alter their behavior to bring it more in line with their neighbors' energy conservation behavior. However, according to Allcott (2009) there is a time limit to how much residents will continue to normalize their behavior with their neighbors before this norming behavior starts to decay. Research cited by Allcott suggests residents who received a monthly versus a quarterly report maintained their norming behavior consistently month to month due to improved feedback frequency (2009).

Residents who received only a quarterly report demonstrated a strong norming behavior at the beginning of the reporting period. However, as the quarter progressed, their energy conservation levels worsened. Upon receipt of the new *Home Energy Report*, the residents' behavior improved again. Allcott cautions that residents who had strong energy conservation behavior to begin with may experience a reverse or regression in their behavior when comparing their behavior with less energy conservation behavior norms of their neighbors (2009).

After picking an energy conservation program or programs to implement in existing military housing, the next step could be to develop a means of tracking the performance of the program. Sonderegger (1998) recommends completing a timeline with three phases to evaluate an energy conservation program. Three separate time periods would be utilized:

- *Tuning* Period which is used to establish a reliable correlation of past utility bills;
- *Installation* Period during which the physical improvements would be implemented or home energy reports initiated or both measures.
- *Performance* Period during which utility savings resulting from the measures are monitored.

In order for the tuning period to be effective, at least one year's worth of bills should be used. Sonderegger (1998) recommends excluding bills from the baseline only in extreme circumstances where a bill may be higher because of an anomaly like "an equipment malfunction that was subsequently repaired. However, eliminating bills that contain periods of non-occupancy too often can result in a chronic over-estimate of future baselines during the same period."

After the tuning and installations periods have been established, it is important to periodically review the program throughout the performance period. Ideally, the performance period can provide program reviewers with insight into whether the psychological cues from the home energy reports or physical improvements installed in housing are having the intended effect on military housing resident behavior.

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V. RESEARCH METHODOLOGY, DATA PRESENTATION, AND ANALYSIS

A. OVERVIEW

This chapter discusses the research methodology and data used to calculate and study the monetary benefits of energy conservation to service members living in Navy privatized housing communities and to the DOD and taxpayers.

B. RESEARCH METHODOLOGY

It is the goal of our study to collect and use the most relevant and up to date data as possible. The data sources evaluated and used included CNIC N93 database information on Navy privatized housing projects, government publicized BAH rates from 2007–2014, geographic specific energy providers for the four areas of interest, the Department of Housing, and Urban Development (HUD), and the internet. Unfortunately, data for the civilian counterparts in the same geographical area are not as readily available as we hoped. With this in mind, historic averages of electricity and water from the energy providers were used in our analysis.

Collecting data on the Navy privatized housing project was relatively straightforward. A request for data was input into the DMDC website. We were contacted by DMDC to advise us that the data we requested would be provided by CNIC N93. CNIC N93 contacted us to clarify our request. We received data on the Navy privatized housing projects from 2007–2014.

In collecting energy rate data, the internet was used to obtain the current rates for electricity and water from the geographic specific energy providers.

Data on rental prices was collected using the HUD annual Fair Market Rent (FMR) data. The HUD basis for setting fair market FMRs are estimates of rent plus the cost of utilities, except telephone. FMRs are housing market-wide estimates of rents that provide opportunities to rent standard quality housing throughout the geographic area in which rental housing units are in competition. The level at which FMRs are set is expressed as a percentile point within the rent distribution of standard quality rental

housing units in the FMR area. FMRs are set at either the 40th or 50th percentile rent—the dollar amount below which the rent for 40 or 50 percent of standard quality rental housing units falls. The 40th or 50th percentile rent is drawn from the distribution of rents of all units that are occupied by recent residents. Adjustments are made to exclude public housing units, newly built units and substandard units (ECFR, 2014).

Based on its surveys, HUD publishes fair market rents for zero, one, two, three, and four or more bedroom units at the 40th percentile. The data received from HUD appears to be a weighted average of the five possible scenarios. Although their reasoning is not explained, HUD estimates that their RDD telephone surveys are within three to four percent of the actual rent value. (ECFR, 2014)

C. DATA PRESENTATION

All data was entered into Excel spreadsheets for ease of processing. Separate spreadsheet tabs were created for each of the four Navy privatized housing project that was analyzed. All relevant data pertaining to each geographic location (e.g. Rank specifics, household size, FMR rates, energy rates, and local BAH rates) were entered into the appropriate tab. We conducted trend analysis to see which ranks were utilizing MFH at the highest rate and to project the MFH utilization in future years. This analysis would also provide leadership with an insight into which service members that should be counseled on a more frequent basis on energy conservation and its benefits to the service member, the government, and society as a whole. The data was then used to calculate the potential savings to the DOD and taxpayers by utilizing our recommended FMR program, which uses the FMR rate coupled with a baseline allowance for utilities for the geographic area. Table 1 shows an example of the rank breakdown and residency data for San Diego, CA that was provided by CNIC N93.

Table 1. Sample of CNIC N93 data for San Diego, CA (from V. Greene, personal communication, September 17, 2014)

FISCAL YEAR	BEDROOMS	E-1	E-2	E-3	E-4	E-5
2014	TWO BDRM	89	228	653	698	620
2014	THREE BDRM	24	84	325	544	1,094
2014	FOUR BDRM	7	14	55	160	490
2014		130	343	1,073	1,428	2,243
		Number of residents in MFH				

Table 2 shows the FMR in each of the naval concentration areas that are a part of the study. The FMR used for our study is from the HUD annual FMR.

Table 2. HUD annual FMR values (after HUD, 2014)

Fair Market Rent Value 2014			
	2 Bedroom	3 Bedroom	4 Bedroom
Everett, WA	\$1123	\$1655	\$1989
Bremerton, WA	\$951	\$1366	\$1628
Whidbey Island, WA	\$896	\$1320	\$1381
San Diego, CA	\$1354	\$1969	\$2398
Jacksonville, FL	\$935	\$1233	\$1509
Norfolk, VA	\$1130	\$1562	\$1966

Tables 3 shows the Puget Sound Energy rates for the three naval concentration areas in the state of Washington. Table 4 shows the Washington Suburban Sanitary Commission water rates for the three naval concentration areas in the state of Washington. Tables 5 and 6 show the energy and water rates for San Diego, CA. Tables 7 and 8 show the energy and water rates for Jacksonville, FL. Tables 9 and 10 show the energy and water rates for the Hampton Roads area in Virginia. Table 11 shows the 2014 approved BAH rates for E-1 through E-9 in the cities of our study.

Table 3. Puget Sound Energy electricity rates for 2014 (after Johnson, 2013)

Puget Sound Energy		
Average kWh/customer in 2013 (903 kWh)		
\$0.085578	per kWh for the first 600 kWh	\$51.35
\$0.104157	per kWh after first 600 kWh	\$31.56
Total Cost	903 kWh	\$82.91

Table 4. Washington Suburban Sanitary Commission water rates for 2014 (after “Water Usage,” 2014)

Washington Suburban Sanitary Commission		
Number of family members (70 gallons of water per person per day)	Gallons per month	Total Cost
3	6300	\$53.36
4	8400	\$71.15
5	10500	\$88.94
Average Daily Consumption by Customer Unit During Billing Period (Gallons per Day)	Combined Water & Sewer Rate Per 1000 gallons	
50 – 99	\$8.47	

Table 5. San Diego Gas & Electric electricity rates for 2014 (after “Schedule DR Residential Service,” 2014)

San Diego Gas & Electric		
Average kWh/customer in 2013 (573 kWh)		
\$0.164740	per kWh Summer	\$94.40
\$0.164740	per kWh Winter	-
Total Cost	903 kWh	\$94.40

Table 6. San Diego County Water Authority water rates for 2014 (after “Water Rates,” 2014)

San Diego County Water Authority		
Number of family members (156.45 gallons of water per person per day)	Gallons per month	Total Cost
3	14080.5	\$71.51
4	18774	\$97.11
5	23467.5	\$122.71
Service price:		
Water (\$3.64 per CCF 0 to 8 CCF)		
Water (\$4.08 per CCF 9 to 24 CCF)		

Table 7. Jacksonville Electric Authority electricity rates for 2014 (after “Rates,” 2012)

Jacksonville Electric Authority		
Average kWh/customer in 2013 (1076 kWh)		
\$0.11	per kWh	\$118.36
\$5.00	Customer Charge	\$5.00
Total Cost	1076 kWh	\$123.36

Table 8. Jacksonville Electric Authority water rates for 2014 (after “Rates,” 2012)

Jacksonville Electric Authority		
Number of family members (200 gallons of water per person per day)	Gallons per month	Total Cost
3	18,000	\$151.98
4	24,000	\$191.82
5	30,000	\$227.64
Service price:		
Water and Environmental (\$1.30 per CCF 1 to 6 CCF)		
Water and Environmental (\$2.97 per CCF 7 to 20 CCF)		
Water and Environmental (\$5.97 per CCF >20)		

Table 9. Dominion Virginia Power electricity rates for 2014 (after “Schedule 1 Residential Service,” 2013)

Dominion Virginia Power		
Average kWh/customer in 2013 (1117 kWh)		
\$0.022580	per kWh for the first 800 kWh	\$18.06
\$0.012850	per kWh after first 800 kWh	\$4.07
Total Cost	1117 kWh	\$22.14

Table 10. Hampton Roads Sanitation District water rates for 2014 (after “Water and Sewer Rates,” 2014)

Hampton Roads Sanitation District		
Number of family members (60 gallons of water per person per day)	Gallons per month	Total Cost
3	5400	\$32.13
4	7200	\$116.03
5	9000	\$144.78
Service price:		
Water (\$4.45 per CCF)		
Sewer (\$3.67 per CCF)		
Wastewater (\$3.83 per CCF)		
Service Charge (\$1.00 per month)		

Table 11. Sample of approved 2014 BAH rates for the geographical areas of the study (after “2014 BAH Rates with Dependents,” 2014)

2014 BAH rates						
Location	E-1-E-4	E-5	E-6	E-7	E-8	E-9
WA307—Everett	\$1,473	\$1,599	\$1,638	\$1,767	\$1,911	\$2,055
WA306—Bremerton	\$1,134	\$1,212	\$1,269	\$1,434	\$1,614	\$1,779
WA312—Whidbey Island	\$1,035	\$1,110	\$1,392	\$1,476	\$1,569	\$1,659
CA038—San Diego	\$1,971	\$2,052	\$2,226	\$2,331	\$2,448	\$2,598
FL058—Jacksonville	\$1,359	\$1,467	\$1,593	\$1,623	\$1,656	\$1,734
VA298—Norfolk/Portsmouth	\$1,380	\$1,497	\$1,770	\$1,815	\$1,863	\$1,974

D. ANALYSIS

This section analyzes the trends in MFH utilization and discusses and presents the total yearly savings for 2014 in the Navy MFH communities of our study.

1. Trend Analysis

When analyzing the trends of MFH utilization, four instances stood out from the rest of the study. Table 12 shows the trend in MFH utilization for the ranks of E-1 through E-4 in Bremerton, WA. This demographic was the group that had the highest rate of change in MFH utilization between the years of 2007 and 2014. E-1s had a 100 percent increase of MFH utilization over the seven year period. E-2s had a 62 percent increase, E-3s had a 105 percent increase and E-4s had a 38 percent increase from 2007-2014. All other ranks in Bremerton and the rest of Washington State stayed relatively the same or decreased slightly in tenancy for that time period.

Table 13 shows that the E-1 to E-5 demographic in San Diego is utilizing privatized housing. While the E-1 to E-4 ranks are residing in MFH at an increasing rate, it is noteworthy to show that E-5 families are not living in MFH as much in 2014 compared to 2007.

The naval base at Mayport Florida has a much smaller population of navy families compared to San Diego, but the same negative trend is apparent in E-5 MFH tenancy. The only rank having a positive trend is E-7. These trends may stem from the decommissioning of the Oliver Hazard Perry class guided missile frigates. Eight out of eleven frigates that were in active service in 2007 are now decommissioned, and the final three frigates are set to be decommissioned in 2015.

Table 15 shows that Norfolk junior enlisted sailors are choosing to reside in MFH much more in 2014 compared to 2007 with the E-3 demographic having a 130 percent increase of utilization over the seven year span.

Table 12. Trend Analysis of E-1 through E-4 FMH utilization in Bremerton, WA

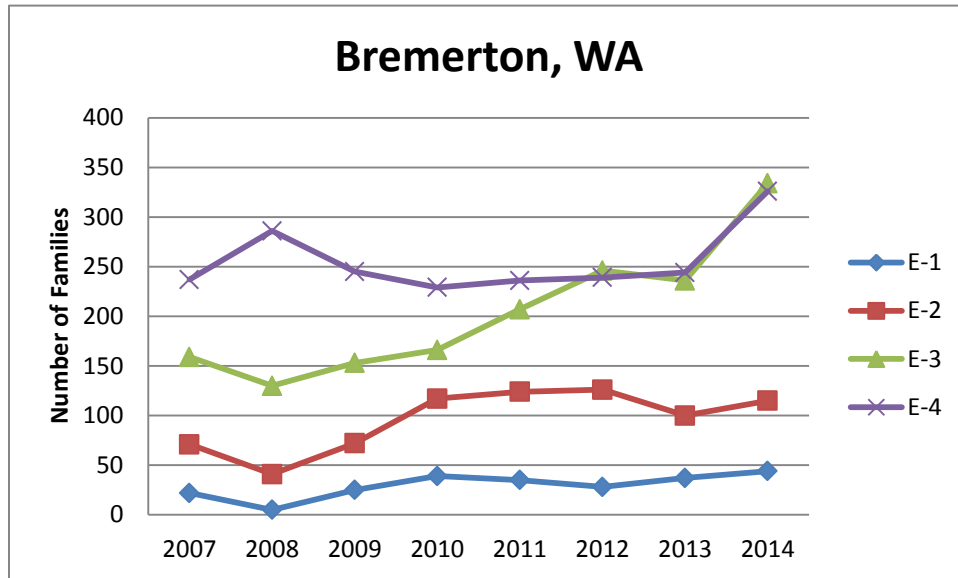


Table 13. Trend Analysis of E-1 through E-5 FMH utilization in San Diego, CA

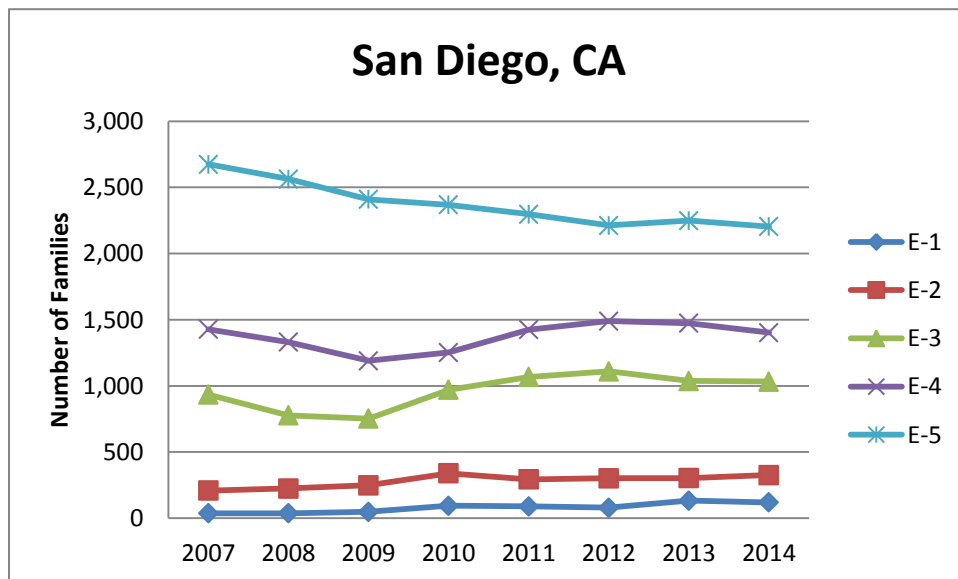


Table 14. Trend Analysis of E-3 through E-7 FMH utilization in Mayport, FL

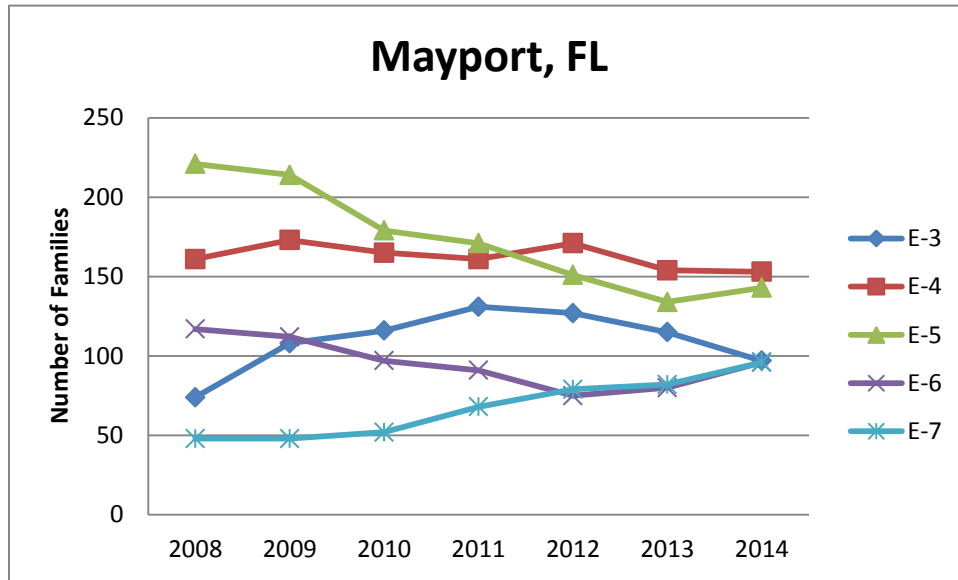
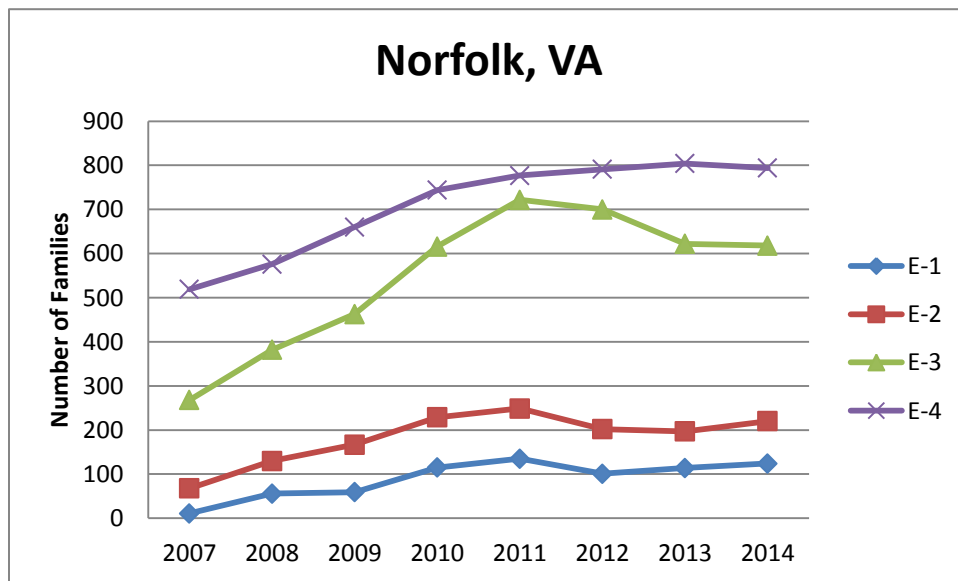


Table 15. Trend Analysis of E-1 through E-4 FMH utilization in Norfolk, VA



With the exception of Mayport, FL, the trend analysis shows that the junior enlisted personnel (E-1 through E-4) are residing in MFH at a higher percentage now than 2007. The analysis of the senior enlisted and officer personnel is inconclusive, due to the smaller population of their ranks as well as those demographics low actual use of MFH.

2. Total Yearly Savings for 2014

The total yearly savings of each naval concentration area in our study was calculated utilizing 2014 information. Table 16 below is a sample of a two bedroom home in San Diego, CA for the ranks of E-1 to E-5 with the total savings being that of all ranks, E-1 to O-7. There was no data on the actual number of dependents living in MFH units in the CNIC N93 database. Therefore, we assumed that three people will live in a two bedroom home, four people will live in a three bedroom home, and five people will live in a four bedroom home. 2014 BAH and FMV rates were used to calculate the ability of the service member to pay for his/her MFH unit. The baseline energy costs were calculated using the historical averages for monthly electricity consumption as well as the amount of water used per day per person and then subtracted from the difference in BAH and FMV. If the calculation is positive, that number was multiplied by 12 to get the yearly savings per service member. This number was then multiplied by the number of service members who resided in the same location and same size home for a total yearly savings of that demographic. These steps were replicated for all ranks, locations, and house size to calculate the overall realized savings for the study.

Table 16. 2 Bedroom total yearly savings for E-1 through O-7 in San Diego, CA

San Diego 2 Bedroom	Rank				
	E-1	E-2	E-3	E-4	E-5
Family Size	3	3	3	3	3
BAH (As of January 2014)	\$1,971	\$1,971	\$1,971	\$1,971	\$2,052
Fair Market Value (San Diego, CA)	\$1,354	\$1,354	\$1,354	\$1,354	\$1,354
Baseline Utilities (San Diego Gas & Electric)					
Electricity (\$0.16474 per kWh)	\$94.40	\$94.40	\$94.40	\$94.40	\$94.40
Water (156.45 gallons per day per person)	\$71.51	\$71.51	\$71.51	\$71.51	\$71.51
Yearly Budget Savings per Service member	\$5,413	\$5,413	\$5,413	\$5,413	\$6,385
Yearly Budget Savings per Rank	\$481,769	\$1,234,195	\$3,534,779	\$3,778,370	\$3,958,785
Total Savings for San Diego 2 BR (2014)	\$15,405,880				

Using the approach above, the overall realized savings for the three naval bases in Washington, San Diego, Jacksonville and neighboring Mayport, as well as Norfolk, were totaled, for a saving to the Navy of \$22.6M. This number is far from the 2015 DOD proposed budget cut of \$448.8M, but our study only encompasses a fraction of CONUS naval bases that would contribute savings if a different BAH program like ours was used.

Table 17. Overall realized savings for the study

Total Savings for Washington (2014)	\$1,276,347
Total Savings for San Diego (2014)	\$19,257,900
Total Savings for Greater Jacksonville (2014)	\$488,228
Total Savings for Norfolk (2014)	\$1,557,583
Overall Realized Savings for the Study	\$22,580,058

VI. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

During Congressional testimony on 13 March 2002, Raymond F. DuBois, DUSD for Installations and Environment, explained the urgent need to improve military family housing conditions saying,

We're competing with the private sector for the best young people in our country. We can't simply count on their patriotism and their willingness to sacrifice alone. Sustaining the quality of life of our people is crucial to recruiting, crucial to retention, and especially crucial to our readiness to fight. (DuBois, 2002)

This chapter addresses our thesis primary and secondary research questions, based upon the researchers' literature review and analysis. This chapter also provides our recommendations and areas for further research.

B. RESEARCH QUESTION ANSWERS

According to VADM Cullom's NAVADMIN released in 2012 announcing the Navy's Resident Energy Conservation Program, "Research confirms that service members (And their families) currently use more utilities than their private sector counterparts" (Cullom, 2012). Therefore, we are able to reject our null hypothesis that military privatized housing communities conserve energy at a lower dollar amount per household member than their civilian counterparts in neighboring communities. Conversely, we would not reject our alternative hypothesis that military privatized housing communities do not conserve energy at a lower dollar amount per household member than their civilian counterparts in neighboring communities. In support of ongoing DOD budget cuts, future research should retest our null and alternative hypotheses to validate our analysis. The following two questions are answered in our BAH and Utilities conclusions and recommendations below.

- How can cost reductions for DOD energy be realized though motivated, efficient energy usage among DOD personnel?
- How might policy be changed to enable these savings?

1. BAH

The following section discusses the BAH conclusions and recommendations from our study.

a. Conclusions

Due to perceptions and current fiscal realities and ongoing budgetary reviews of our allowances, the goal of protecting these allowances while conserving and using energy responsibly can be achieved by modifying relevant U.S. Code and Public Law on this issue, thereby saving money for the US government. This modification would result in \$22.6 million in savings for the U.S. Navy for FY 2014.

b. Recommendations

We recommend the Congressional Liaison Office engage members of the House and Senate Armed Services committees to put forth legislation to modify 37 U.S.C. § 403: U.S. Code -Section 403 to change the amount of BAH authorized from “Adequate housing” to “Fair Market Value of housing” and subsequently modify PUBLIC LAW 104–106—FEB. 10, 1996, 110 Stat 186 Section 2801, revoking the authority of the Secretary to pay money to the lessor in addition to that already paid by the members.

2. Utilities

The following section discusses the utilities conclusions and recommendations from our study.

a. Conclusions

The amount of utilities consumed has historically been higher in MFH units compared to their civilian counterparts living in the same geographical area. MFH tenants had little regard for conservation of energy and consumed more utilities since they were provided with no *out of pocket* cost to the tenant until the DOD adopted the Resident Energy Conservation Program (RECP). In September 2010, RECP was initiated as a pilot program in Hawaii, resulting in a 10 percent reduction in utility usage. While this is a certainly a good start, the full realization of savings to the DOD and service member will

not be realized until a program is put into place where the tenant is fully responsible for their own household's use of energy.

b. Recommendations

We recommend the Congressional Liaison Office engage members of the House and Senate Armed Services committee's to put forth legislation to modify 37 U.S.C. § 403: U.S. Code -Section 403 to change the amount of BAH authorized from "Adequate housing" to "Fair Market Value of housing" and subsequently modify PUBLIC LAW 104-106—FEB. 10, 1996, 110 Stat 186 Section 2801, revoking the authority of the secretary to pay money to the lessor in addition to that already paid by the members. These actions would allow for a new program to be adopted where each MFH would pay for their own household's use of energy utilizing a baseline allowance for utilities. The baseline allowance for utilities would be constructed for each geographical area based on that regions energy provider's historical average.

C. AREAS FOR FURTHER STUDY

- What is the net impact of lower BAH rates. Will it increase demand for MFH?
- Will civilian landlords decrease their prices as BAH decreases?
- What is the effect on Navy retention of service members as BAH decreases?
- What are the MFH potential realized savings if the same study as this one was done for the rest of the DOD?
- What kind of ROI could be realized if the DOD were to invest in solar cities to power the MFH projects?

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