



Calhoun: The NPS Institutional Archive
DSpace Repository

Faculty and Researchers

Faculty and Researchers' Publications

2021

A Cost Benefit Analysis of Transitioning the USN to a Single Fuel Type

Sullivan, Ryan S.; Aros, Susan K.; Véronneau, Simon

Monterey, California: Naval Postgraduate School

<http://hdl.handle.net/10945/69749>

This publication is a work of the U.S. Government as defined in Title 17, United States Code, Section 101. Copyright protection is not available for this work in the United States.

Downloaded from NPS Archive: Calhoun



Calhoun is the Naval Postgraduate School's public access digital repository for research materials and institutional publications created by the NPS community. Calhoun is named for Professor of Mathematics Guy K. Calhoun, NPS's first appointed -- and published -- scholarly author.

Dudley Knox Library / Naval Postgraduate School
411 Dyer Road / 1 University Circle
Monterey, California USA 93943

<http://www.nps.edu/library>

Cost Benefits Analysis: Single Type of Naval Fuel



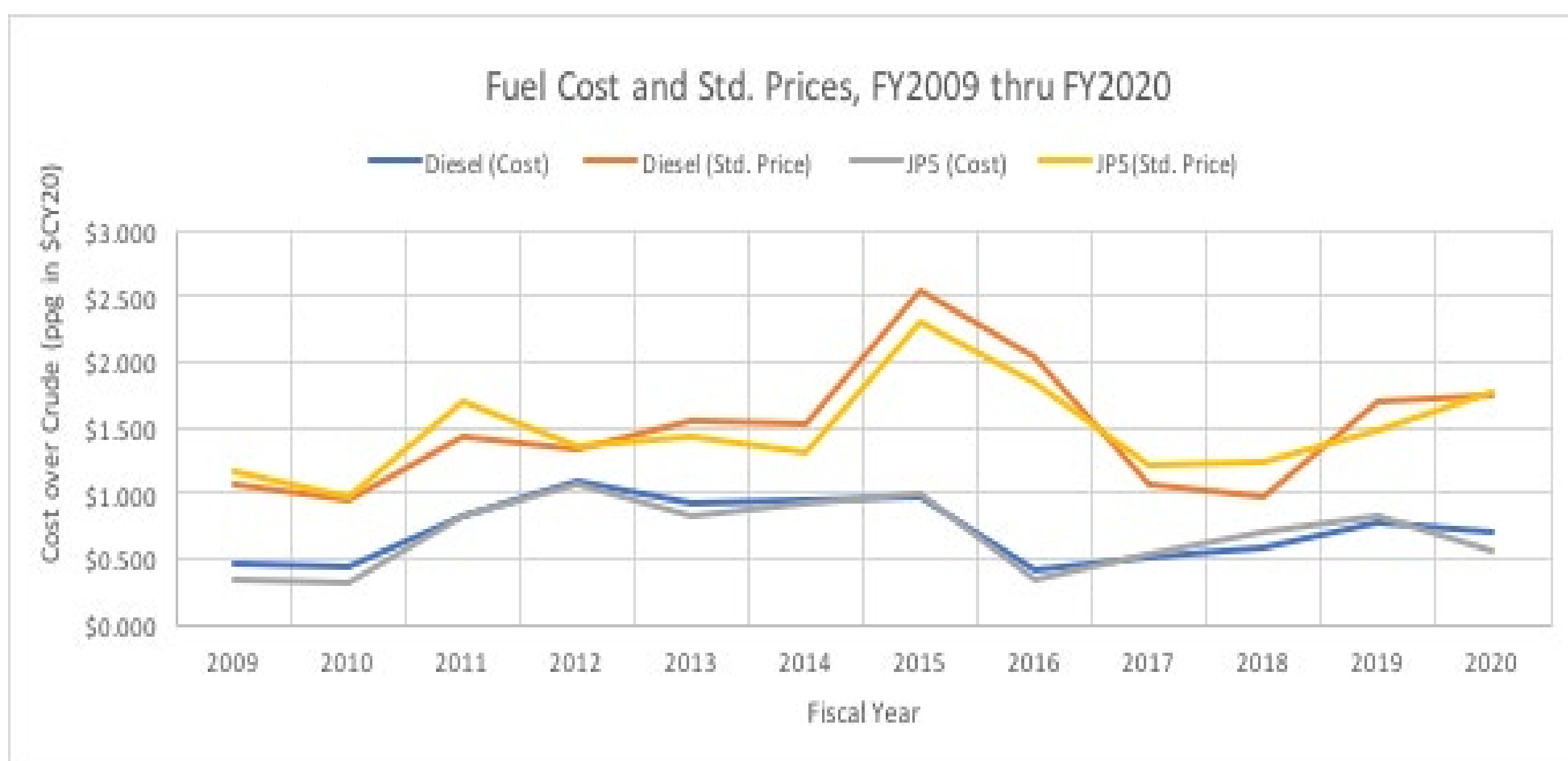
NAVAL
POSTGRADUATE
SCHOOL

Background

Fuel distribution and its availability is key to maintain force posture during all phases of a conflict. Given the great power competition (GPC) increasing between the U.S., China, and Russia, and a shift to distributed maritime operations, it is important to assess the cost benefit of changing the fuel distribution to a single fuel type. This report analyzes the feasibility of switching entirely to JP-5 fuel as opposed to the current multiple fuel types used on ships, aircrafts and vehicles. This work is the culmination of two student theses.



Empire State Petroleum Tanker Source: "NavSource online" (2010)



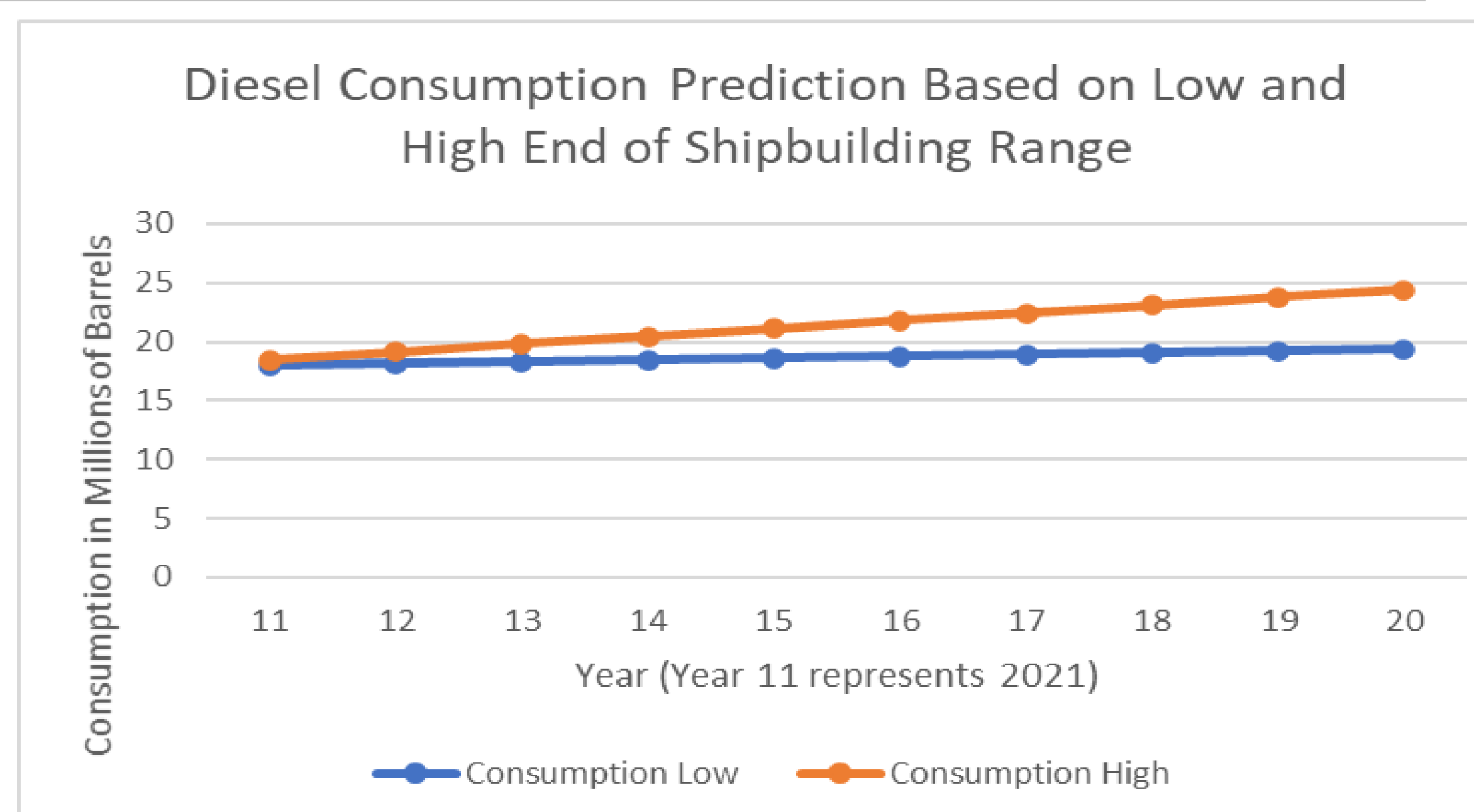
Fuel Cost and Std. Prices, FY2009 thru FY2020

Cost Analysis

- Cost Over Crude for each type of fuel was compared against the unadjusted fuel volumes for 2009-2020 data.
- If the purchase and sales prices of JP-5 remain the same as in 2020 upon implementation of the single fuel concept (SFC), there is potential for substantial savings for the government.
- Regression analysis showed that the price volatility of JP-5 is not explained by changed in DOD volume demand which suggests that any future changes in demand won't affect prices.

Projected Fuel Usage

- Regression was used on historical fuel consumption data to project fuel consumption into the future, and these projections were then adjusted based on the low and high future numbers of ships specified by the 30-year shipbuilding plan to determine a projected range of future fuel consumption
- Based on this, the shift to a SFC would require an increase of over three times the current refinery production of JP-5 for the fleet.
- To allow time for the supply chain to increase production, a phased rollout plan is proposed.



Diesel Consumption Projection under 30-year Shipbuilding Plan

Proposed Rollout Plan Phases

1. Work with refineries to determine timeline to convert F-76 production capacity to JP-5 and begin ramp-up on JP-5 production; begin using portion of F-76 reserves as JP-5 supply ramps up
2. Initially convert a few Military Sealift Command tankers' F-76 fuel tanks to JP-5; identify and address roadblocks; assess and mitigate risks
3. Introduce the SFC to a limited number of DDGs and CGs, that are nearing their end of life, across the fleet for a two years period; assess and mitigate any unintended consequences; continue converting tankers.
4. Begin introducing the SFC to all other diesel-operated ships commissioned in the fleet to include: DDGs, CGs, LHDs, LHAs, LPDs, LSDs, LCS, and all logistics support ships; monitor each ship for negative effects for two years following implementation and examine thoroughly upon scheduled maintenance periods.
5. Complete all existing ship conversions as full-scale production of JP-5 is achieved; replace remaining F-76 reserves with JP-5; ensure all new ships are designed to use JP-5



Researchers: Dr. Ryan Sullivan, Dr. Susan Aros, and Dr. Simon Veronneau
 Department of Defense Management
Topic Sponsor: N4 – Fleet Readiness and Logistics

NRP Project ID:
NPS-21-N030-A