FY 2002 RDT&E, N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: June 2001

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 2000 ACTUAL	FY 2001 ESTIMATE	FY 2002 ESTIMATE
R0829 Energy Conservation (ADV)	2,692	2,782	2,843
R0838 Mobility Fuels (ADV)	2,090	2,165	2,182
R2766 Dehumidification Demo	1,945	-	-
R2868 Proton Exchange Membrane (PEM) Fuel Cells	-	2,972	-
TOTAL	6,719	7,869	5,025

FY 2002 RDT&E, N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: June 2001

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U)(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program supports projects to evaluate, adapt, and demonstrate energy related technologies for ship and aircraft operations to: (a) increase fuel-related weapons systems capabilities such as range and time on station; (b) reduce energy costs; (c) reduce dependence on petroleum fuels and apply energy technologies that improve environmental compliance; (d) relax unnecessarily restrictive fuel specification requirements to reduce cost and increase availability worldwide; (e) provide guidance to fleet operators for the safe use of commercial grade or off-specification fuels when military specification fuels are unavailable or in short supply; and (f) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems. Project R2766 is an FY2000 Congressional plus-up to demonstrate dessicant dehumidification in Naval Facilities. Project R2868 is an FY2001 Congressional plus-up to demonstrate Proton Exchange Membrane (PEM) Fuel Cell technology at a Department of Navy site. This program, and the companion PE 0604710N, Navy Energy Program support the achievement of legislated, White House, Department of Defense and Navy Energy Management Goals. It also responds to direction from the Office of the Secretary of Defense, the Secretary of the Navy and the Chief of Naval Operations to make up-front investment in technologies that reduce future cost of operation and ownership of the fleet and supporting infrastructure.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

(U) PROGRAM CHANGE SUMMARY FOR TOTAL PE:

	FY 2000	FY2001	FY2002
(U) FY 2001 President's Budget:	6,945	4,942	5,090
(U) Appropriated Value:			
(U) Adjustments from PRESBUDG:			
(U) FY 2000 SBIR Adjustment	-100		

FY 2002 RDT&E, N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: June 2001

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) PE Rebalance			-7
(U) FY 2001 Congressional Plus-Up		3,000	
(U) NWCF Adjustments			-52
(U) Economic Assumptions	-28	-55	
(U) FY 2002 PRESBUD	6,817	7,887	5,031

(U) CHANGE SUMMARY EXPLANATION:

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

FY 2002 RDT&E, N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: June 2001

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & TITLE	FY 2000 ACTUAL	FY 2001 ESTIMATE	FY 2002 ESTIMATE
R0829 Energy Conservation	2,692	2,732	2,840

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project improves the energy efficiency of Navy ships and aircraft, and thereby contributes to reduced operating costs and improved fleet sustainability and performance. Major efforts include work to increase the efficiency of aircraft engines; and develop improved hull drag reducing technologies and more efficient energy conversion systems for ships.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 2000 ACCOMPLISHMENTS:

- (U) ($1,050) Aircraft: A joint program with General Electric (GE), Navy F414 Engine Development program, Naval Aircraft Propulsion Science and Technology (S&T) program, and Energy R&D program was organized to develop advanced engine components sized for potential upgrade of the F404/F414 family of engines. The GE-23a Demonstrator Engine was chosen as the platform on which to demonstrate the new technology. The fan, high pressure compressor (HPC), high pressure turbine (HPT), low pressure turbine, and control systems will all be upgraded. The Energy R&D program, and GE jointly funded detailed design of the HPT, and preliminary design of the HPC. The Performance Seeking Control (PSC)

software developed by the Energy R&D program was tested on the F/A-18E/F simulator. Also, a contract for detailed design of the HPC was negotiated. Energy program participation incentivizes these efforts and ensures that efficiency, as well as performance gains are pursued.

- (U) ($1,642) Ships: Tow-tank tests of stern flap geometry for LHA-1/LHD-1 classes were conducted. Launched the Hull Design Database System (HDDS) by demonstrating it to all interested major US shipyards. HDDS is an interactive system by which hull form and propulsor trade-off affects on ship performance can be quickly evaluated. The HDDS database of tow tank and ship trials data was greatly expanded. Evaluated self-polishing reduced copper/cobiocide paints for copper release and binder hydrolysis rates. Performed technology trade-off study to identify manufacturer's independent research & development, and commercial technology that could improve LM2500 propulsion gas turbine engine operation and performance. Evaluated exhaust flow turning techniques to reduce back- pressure and improve efficiency of LM2500 engines.

2. (U) FY 2001 PROGRAM:

- (U) ($1,050) Aircraft: Continued participation in development of advanced engine components suitable for growth F414 engine. Contract for HPC detailed design is in place; the HPT is being fabricated by F414 Program. Components will be tested via the FY2004 GE-23a demonstrator engine build. Energy R&D participation incentivizes efficiency improvements. Evaluate fuel efficient component options for application to F404 variants (e.g. F/A-18C/D engine).

- (U) ($1,682) Ships: Evaluate effectiveness and maintenance requirements (application, repair and removal) of self-polishing reduced copper/cobiocide paints. Screen candidate paints by rates of copper release and binder hydrolysis-best paints will undergo large scale testing in PE 0604710N to demonstrate suitability for Navy use. Continue screening and model testing of simple hydrodynamic mods for future ships to improve energy efficiency: complete LSD-41/LSD-49 stern flap design. Complete posting of HDDS hydrodynamic design computer program on INTERNET; develop propeller design guidance for commercial shipyards. Complete technology application study to identify cost effective improvements for 501-K17/34 ship service turbo-generators.

- (U) ($25) Portion of extramural program reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

3. (U) FY 2002 PLAN:
   - (U) ($600) Aircraft: Complete HPC design for GE23a demonstrator engine core, transition to F414 program for fabrication.
   - (U) ($2,243) Ships: Continue screening of self-polishing reduced copper/cobiocde paints (and other advanced antifouling coatings) through laboratory tests of toxicant and binder release rates, and exposure testing on panels to determine application, maintenance and performance characteristics. Select promising candidates for large-scale testing via PE 0604710N. Develop improved correlations between model and full-scale tests for hull drag reducing appendages. Evaluate bow-fins for TA0-187 class ships. Evaluate benefits of digital fuel controls, compressor anti-degradation coatings and other cost-effective improvements for both 501-K34 turbogenerator and LM2500 main propulsion gas turbines.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE 0601153N (Defense Research Sciences)
(U) PE 0602236N (Warfighter Sustainment Applied Research)
(U) PE 0603236N (Warfighter Sustainment Advanced Technology)
(U) PE 0603513N (Shipboard Systems Component Development)

FY 2002 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: MAY 2001

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0829
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Energy Conservation(ADV)

(U) PE 0603573N (Advanced Surface Machinery Systems)
(U) PE 0603721N (Environmental Protection)
(U) PE 0604710N (Navy Energy Program (ENG))

D. (U) SCHEDULE PROFILE: Not applicable.

FY 2002 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: MAY 2001

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0829
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Energy Conservation(ADV)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 2000	FY2001	FY2002
a. System Development and Integration	2,692	2,732	2,843

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: Not applicable.

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: MAY 2001

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) COST: (Dollars in thousands)

PROJECT NUMBER & TITLE	FY 2000 ACTUAL	FY 2001 ESTIMATE	FY 2002 ESTIMATE
R0838 Mobility Fuels (ADV)	2,090	2,165	2,182

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides data through engine and fuel system tests which relate the effects of changes in Navy fuel procurement specification properties to the performance and reliability of Naval ship and aircraft engines and fuel systems. This information is required to: (a) determine the extent to which unnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide; (b) provide guidance to fleet operators for the safe use of off-specification or commercial grade fuels when military specification fuels are unavailable or in short supply; and (c) make needed periodic changes to fuel specifications to ensure fuel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry. Recent problems with fuel quality have adversely affected ship and aircraft system performance and reliability and resulted in degradation of fuel in storage. The resulting readiness impacts, additional maintenance costs, and the cost of lost equipment, although difficult to quantify, are many times the cost of this project. Over the next decade, the potential for fuel quality related problems will increase because of changing industry practices required to comply with new environmental regulations. This project represents the only investment designed to maintain the Navy's ability to operate as a "smart" customer for fuels that cost over $2B per year to procure, transport, store and consume and are essential to fleet operations.

FY 2002 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: MAY 2001

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0838
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Mobility Fuels (ADV)

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 2000 Accomplishments:
   - (U) ($941) Ships: Continued task to determine effects of low-lubricity ship diesel fuels on the durability of Navy gas turbine engines, high-and medium-speed diesel engine fuel injection systems, and shipboard fuel handling systems. Completed bench-scale combustion rig tests to determine the effects of red-dyed commercial distillate marine fuels on Navy gas turbine hot section materials and coatings. Initiated phased tasks to determine the feasibility of specifying JP-5 (Naval jet fuel) as the single fuel for use by all Naval systems (ships, aircraft and ground equipment). Completed a study to determine the available technology and tasks necessary to remove gasoline from ships and replace with higher flashpoint fuels.
   - (U) (1,149) Aircraft: Completed development of prototype copper contamination removal system for jet fuels. Completed evaluation of the impact of +100 jet fuel thermal stability enhancement additive on F404 and F405 engines. Completed detailed cost benefit analysis for Naval use of +100 additives.

2. (U) FY 2001 Program
   - (U) ($990) Ships: Continued gas turbine engine, high-and medium-speed diesel engine fuel injection systems, and shipboard fuel handling systems component tests with low lubricity ship diesel fuels to determine effects on durability. Initiated evaluation of lubricity enhancing additives for use with low-lubricity ship diesel fuels. Completed Phase I task (availability and cost issues for JP-5) to determine the feasibility of specifying JP-5 as the single fuel for use by all Naval systems (ships, aircraft, and ground equipment). Initiated Phase II task (engine and fuel systems hardware maintenance issues, operational and shipboard impacts) to determine the feasibility of specifying JP-5 as the single fuel. Initiated work to quantify effects of low thermal stability Navy distillate fuels on maintenance requirements for navy gas turbine and diesel engines.
   - (U) ($1,175) Aircraft: Initiated evaluation of the impact of copper contaminated fuel and +100 additives on Naval Joint Strike Fighter engine performance and maintenance requirements. Initiated development of improved test devices

for shipboard fuel contamination and water detection. Conducted field testing of prototype copper contamination removal system. Initiated field evaluation of +100 compatible shipboard fuel/water separator elements. Completed evaluation of effects of +100 additive on F/A-18E/F and AV-8B engine systems.

- (U) ($14) Portion of extramural program reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

3. (U) FY 2002 PROGRAM:

- (U) ($976) Ships: Complete testing of Navy gas turbine, high- and medium-speed diesel engine fuel injection systems, and shipboard fuel handling systems with low-lubricity ship diesel fuels. Use results to specify minimum lubricity levels and test methods to be used for fuel acceptance. Complete evaluation of lubricity enhancing additives for use with Navy distillate fuels. Continue component tests to determine effects of low thermal stability Navy distillate fuels on maintenance requirements for Navy gas turbine and diesel engines. Complete assessment of the feasibility of specifying JP-5 as the single fuel for use by all Naval Systems (ships, aircraft. and ground equipment).
- (U) ($1,206) Aircraft: Conduct shipboard evaluation of copper contamination removal system. Complete evaluation of the impact of copper contaminated fuel and +100 additives on Naval Joint Strike Fighter engine performance and maintenance requirements. Initiate JP-5 specification requirements and specification test review to determine and remove unnecessary requirements and increase worldwide availability. Evaluate prototype shipboard contamination and free water detection equipment.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

FY 2002 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: MAY 2001

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0838
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Mobility Fuels (ADV)

(U) PE 0601152N (In-House Laboratory Independent Research)
(U) PE 0205632N (Aviation Improvements)

D. (U) SCHEDULE PROFILE: Not applicable.

FY 2002 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: MAY 2001

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0838
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Mobility Fuels (ADV)

A. (U) PROJECT COST BREAKDOWN: ($ in thousands)

Project Cost Categories	FY 2000	FY2001	FY2002
a. Reliability, Maintainability, and Availability	2,090	2,164	2,182

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: Not applicable.