



# Naval Energy Forum

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# NAVSEA Energy Initiatives

## *Incentivized Energy Conservation (i-ENCON) Program*



*Achieved more than \$99M in fuel cost avoidance in FY09*

## *Underwater Hull Coat Paint*



*USS COLE (DDG 67), projected to save more than \$180K annually in fuel costs.*

## *Propeller Coating*



*USS GUNSTON HALL (LSD 44),  
projected to save up to 1550 bbls  
annually*

## *Fuel-Efficient Stern Flap*



*USS WHIDBEY ISLAND (LSD 41),  
projected to save up to \$450K  
annually in fuel costs*

## *Hybrid Electric Drive*



*USS MAKIN ISLAND (LHD 8)  
projected to save over \$21M in fuel  
costs over lifecycle.*

# Energy Conservation Road Map

**Primary Energy Source**

- Fossil / Alternate Fuels

**Propulsion/Power Plants**

- Integrated Power (hybrid electric)
- Small energy storage

**Ship Machinery**

- Combustion Trim loop
- On-line water wash
- Ship Electrification

**Hull/Hydrodynamics**

- Stern Flaps LSD/LHD
- Coatings (props, hulls)

**Operational**

- i-Encon

**Requirements/standards**

- Energy & supply chain considered in campaign analysis and AoAs
- Energy responsive mission capabilities
- Industry standards participation

**2010 (Quick Wins)**

\$10M per ship / Invst  
8000 bbls/ship/ yr saved

\$133K per ship / Invst  
3000 bbls/ship/yr saved

\$350K per ship / Invst  
1550 bbls/ship/yr saved

Voluntary program  
Investment of \$4.5M per year  
FY07 fuel savings 740K bbls

**Long Term  
Road Map**

**Ship Primary Energy Source**

Fossil / Alternate fuels  
Nuclear surface combatant introduct

**Propulsion/Power Plants**

Next Generation Integrated Power  
Modified simple cycle gas turbines  
Single shaft w/ podded secondary propulsion

**Ship Machinery**

Efficient Ship Electrification  
Remote source lighting

**Hull/Hydrodynamics**

Energy efficient hull forms /  
Propeller shapes  
Integrated motor/propulsor

**S&T Innovative Naval Prototype (INP)**

Advance Electrical systems  
Hull form efficiency & Advanced prop  
Lightweight materials & coatings  
Advanced Cycle Engines

**Operational**

Advanced i-Encon / Energy Efficiency Dash Board  
Complex mission planning with energy savings  
Autonomous Unmanned Surface Vehicles

**Requirements/standards**

**2020 and Beyond**

Energy Source  
and Power  
Plant Selection

More Efficient  
Machinery, Hulls  
& Combat System

Total Ship  
Energy  
Management

USN - Industry  
Energy Standard

**Energy Demand  
Increasing**

# ENERGY INITIATIVES

Name / Description	Cost Avoidance (CA) **			INVESTMENT				STATUS
	Pay Back (yrs)		ROI: (10 YR)	FY09	FY10	FY11	Total *	
<b>R&amp;D and Fleet Implementation</b>								
<b>Online Gas Turbine Waterwash</b> ~ 800 bbls/ship yr	1	DDG51 & CG47	7:1	\$1.0M	\$1.4M	\$1.4M	\$8.2M	Installed on USS PREBLE in Oct 08. MPA onboard advises system is working well.
<b>Advanced Underwater Hull Coating System</b> ~ 5500 bbls/ship yr	< 2	DDG51 & CG47	4:1	\$2.5M	\$2.0M/\$2.1M	\$2.9M	\$31.6M	Applied to USS PORT ROYAL & USS COLE— evaluation beginning Aug 2009
<b>Stern Flaps (LHD, LSD Ship Classes)</b> ~ 5500 bbls/ship yr ~ 3500 bbls/ship yr	< 1 < 2	LHD LSD	6:1 4:1	\$1.3M \$1.3M	\$0.2M/\$0.8M \$0.2M/\$1.6M	\$0.8M \$1.6M	\$6.5M \$12.0M	Install on USS KEARSARGE—evaluation beginning after Nov 09. Installed on USS WHIDBEY ISLAND
<b>Combustion Trim Loop</b> ~ 3060 bbls/ship yr	< 1	LHD & LHA	30:1	\$0.6M	\$0.7M	\$0.3M	\$1.7M	Installed on USS PELEIU in Jun/Jul 09 — evaluations beginning in Aug 09
<b>Propeller Coating</b> ~ 1860 bbls/ship yr	< 1	LHA, LHD & LPD4	13:1	\$1.0M	\$0.4M/\$0.5M	\$0.6M	\$4.2M	Applied to USS GUNSTON HALL — evaluation underway
<b>Directional Stability (L-Ships) ARRA</b> ~ 2900 bbls/ship yr	TBD	LSD 41 & LSD 49	4:1	\$1.0M	\$1.7M	\$1.0M	\$12.3M	Power & Maneuvering model testing completed 13 July
<b>Solid State Lighting ARRA</b> ~ 880 bbls/ship yr]	TBD	LHA 1 & LHD 1	2:1	\$0.6M	\$0.4M	\$1.1M	\$7.6M	Contracting actions are underway
<b>Hybrid Electric Drive ARRA &amp; Adds</b> ~ 8000 bbls/ship yr	5-10	DDG51 Class Goal is at-sea demo 1 shaft in FY11	TBD	\$27.0M	\$5.6M	\$13.6M	TBD	\$13M Contract Award to GA/DRS Team for full scale demonstration
<b>High Energy Efficient HVAC (R-134a) ARRA</b> ~ 2400-6400 bbls/ship yr	N/A 8-12	Future Procurements LPD 17-23, DDG-83+	N/A TBD	\$2.6M	\$0.0M (ARRA will be used in FY10)	\$1.9M	TBD	\$1.9M Contract Awarded & Staffing Commenced at York Navy Systems on 18 May 09.
<b>High Energy Efficient HVAC (R-236fa)</b> ~ 2400 -3500 bbls/ship yr	8-12	DDG 51-82, CG 60-73 LHD-CL	TBD	\$0.0M	\$0.0M	\$1.0M	TBD	New Project Proposal for PR11.
<b>Fleet Scheduler Planning Tool</b> ~ 2-4% fleetwide	< 1	All Ships	110:1	\$0.0M	\$0.0M	\$2.0M	\$5.8M	New Project Proposal for PR11.
<b>Smart Voyage Planning Tool</b> ~ 2-4% fleetwide	TBD	All Ships	22:1	\$0.0M	\$0.0M	\$2.5M	TBD	New Project Proposal for PR11.
<b>Totals (rounded)</b>				<b>\$38.9M</b>	<b>\$5.6M/\$12M</b>	<b>\$30.7M</b>		
<b>Operational Programs</b>								
<b>Incentived Energy Conservation (i-ENCON)</b> ~ 2-6% fleetwide	< 1	All	24:1	\$1.0M	\$1.0M/\$4.1M	\$4.2M	\$61.0M	FY09 3 qtrs exceeds all FY08 (1.043M bbls). On track for record cost avoidance.
<b>Totals (rounded)</b>				<b>\$1.0M</b>	<b>\$1.0M/\$4.1M</b>	<b>\$4.2M</b>	<b>\$61.0M</b>	

ARRA – American Recovery and Reinvestment Act

\* Total Cost Investment from Navy Through 2019

\*\* Based on Fully Burdened Cost of \$170/bbl

\$\$s in Blue are potential FY10 marks

\$\$s in Black are Funded 4

\$\$s in Red are Unfunded