

*MARAD's Vision for a
Low Air Emission
Marine Power Plant Program*



Richard Voelker, Chief
Division of Advanced Technology
Office of Shipbuilding & Marine Technology

November 1, 2000

Objective:

Accelerate the use of economical,
low air emission marine power plants
in the U.S. inland and coastal waters

Ultimate Goal

Promote, in concert with industry,
U.S. shipbuilding capabilities to build
alternate transportation systems that are
responsive to environmental concerns

Achieving this goal results in the development of new niche markets
for the U.S. shipbuilding industry

Year 2005 Goal:

Conduct demonstrations of technologies that can reduce marine air emissions on commercial vessels by at least 50 percent

Potential Joint Industry/Government Shipboard Demonstration Projects

- Best diesel/gas turbine technology
- Dual fuel engine operation
- Conversion of diesel engine to dual fuel operation using LNG & diesel
- Natural gas powered fuel cell used for propulsion power aboard a research platform
- Natural gas powered fuel cell used to supply 400 kW power aboard a commercial vessel for ship service electric load or for propulsion
- Use of other alternative fuels
- Application of emissions monitoring technology
- Application of exhaust treatment systems

Note:

Activities leading to demonstrations may include joint industry/government studies related to

- Transportation economics,
- Air emissions,
- Commercial vessel designs,
- Safety and regulations,
- Training, and
- Issues of particular concern to owners and builders (producability, maintainability, etc.)

Year 2001 Goal

1. Identify consensus low air emission technologies that should be demonstrated
2. Establish partnerships for conducting technology demonstrations
3. Achieve industry outreach and facilitate public information/awareness

1. Identify consensus low air emission technologies that should be demonstrated

- Review existing and pending international, national and regional air emission regulations and their impact on the maritime industry
- Survey diesel engine and gas turbine manufacturers to determine current and estimated future exhaust emissions
- Determine emission reduction potential for new marine power systems, including exhaust treatments, fuel treatments, alternative fuels and fuel cells

1. Identify consensus low air emission technologies that should be demonstrated (cont'd.)

- Evaluate the effect of low air emission power plants on vessel design, construction and operation. Some examples are:
 - Diesel engines and gas turbines with exhaust and fuel treatment
 - Engines using compressed natural gas (CNG) as an alternate fuel
 - Engines using liquid natural gas (LNG) as an alternate fuel
 - Engines using dual fuel (mixture of natural gas and diesel)
 - Fuel cells operating on natural gas providing electric power for propulsion
 - Fuel cells operating on natural gas providing electric power for ship service loads
- Identify national and regional clean air incentive funding programs
- Calculate economics of implementing new and existing technology

2. Establish Industry/Government Partnerships for Conducting Technology Demonstrations

- Establish public and private partnerships to foster demonstration of technologies aboard vessels in commercial service
- Initiate a pilot demonstration to measure air emissions during commercial ferry operations with diesel fuel and natural gas in 2001
- Formulate multiyear strategic implementation plan with government-industry partners

3. Achieve Industry Outreach and Facilitate Public Information/Awareness

- Conduct an international workshop, with industry/government participation, on the challenges and benefits of alternative fuels, and establish as an annual event
- Develop a web site that describes current and planned program activities including access to a technology database

In Conjunction with the Previously Described Activities

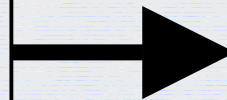
A consensus five year program plan needs to be developed by December 29, 2000, that identifies and links project activities by defining strategic (long term) and operational (short term) objectives, and identifies the resources and schedule needed to achieve them

Current Project Activities

- Developing Five-Year Plan to demonstrate low air emission technologies aboard inland and coastal vessels
- Monitoring exhaust emissions from sister ferries using compressed natural gas and diesel fuel
- Assessing the feasibility of installing and converting a diesel engine to dual fuel operation
- Analyzing an integrated Highway/Ferry system in San Francisco Bay area to reduce greenhouse gases and emissions
- Conducting workshop on alternative fuels for ferries and other marine vessels
- Seeking partners for vessel demonstrations of
 - Best diesel/gas turbine technology
 - LNG dual fuel technology
 - Natural gas fuel cell technology

Teaming Arrangement

MARAD partners
with other
government agencies
to act as sponsors for
demonstration
projects



“Cooperative
Agreements” with
industry result in
their execution of
demonstration
projects

Critical Challenge

Demonstrating that the advances in technology are affordable

Invitation to Participate

We welcome your ideas and thoughts as well as your active participation in formulating the five-year plan.

We also encourage and solicit your involvement in annual activities including demonstrations.