



Reducing Exhaust Emissions With
An On Demand System For
Water in Fuel Emulsification

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Sea to Sky
POLLUTION SOLUTIONS

BREATHE EASY - THE COAST IS CLEAR

Our Mission: Reduce Effluents and Emissions

Our Core Belief: Environmentalism and
Entrepreneurialism are not opposing values

Our Approach: Develop Pollution Solutions with
Innovative Applications of Proven Technology

Adopt & Adapt using Clever Convergence



WiFE is a proven technology and has been Manufactured for 100 Years

- Water suspended in fuel is defined as **Water in Fuel Emulsions “**WiFE****
- Adding water to diesel fuel began in early 1900's with hundreds of patents issued on water-diesel blends

He Said... She Said...I'm available

- *"If you can't be with the one you love, love the one you're with."*
Stephen Stills
- *"I've stopped looking for Mr. Right now I would settle for Mr. Close."*
Rhoda (Mary Tyler Moore Show)

WiFE on Demand with HDO



Water

+



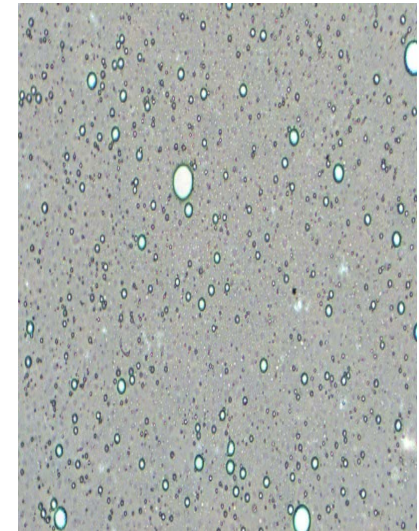
Heavy Fuel Oil



Emulsifier



Water in Fuel
Emulsion
Microscopic View



WiFE on Demand with MDO



Water

+



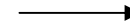
Surfactant

+

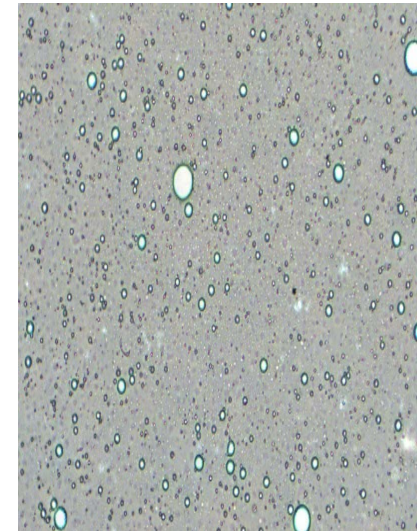


Marine Fuel Oil

Emulsifier




Water in Fuel
Emulsion
Microscopic View



WiFE Unit Size Has Been Reduced Cost also Reduced to as low as \$5kw/h





WiFE Reduces NO_x by Reducing the Combustion Temperature

- The combustion temperature peaks are lowered when the water in WiFE is evaporated in combustion chamber.
- Lower temperature peaks during combustion mean lower NO_x production during combustion.



WiFE produces Micro Explosions that Increase Fuel Efficiency offsetting Fuel used to vaporize water

- Increased fuel dispersion increases the contact surface between the fuel and the air during combustion
- Increasing the contact surface area between the fuel and air increases the efficiency of the combustion.
- Increased combustion efficiency increases thermal efficiency which results in reduced fuel requirements



WiFE Reduces Soot/PM Emissions

- WiFE increases oxygen during the pre-mix period of combustion where soot forms from partial combustion
- Increased oxygen reduces soot by reducing the formation of polycyclic aromatic hydrocarbons (PAHs)
- Reduced PAH formation means that less soot is produced by oxidization & less soot means less PM emissions

WiFE Reduces NOx 1 to 1 PM 3 to 1

- Water typically represents 10-20% of the total volume in the water-diesel blends manufactured & tested.
- NOx reduction equals water content
i.e. 10-20% water = 10-20% less NOx
- PM reduction is 2-3 times % of water
i.e. 10-20% water = 30-60% less PM

Tests on Various WiFE Manufacturers Produced Almost Identical Test Results

- In January 2001, CARB verified that PuriNOx (WiFE) reduced NOx by 14% and reduced PM by 62.9%
- In August 2002 CARB verified that Aquazole (WiFE) reduced NOx by 16% and reduced PM by 60%
- In September 2003 CARB verified that Aquadyn (WiFE) reduced NOx by 15% and reduced PM by 58%

**IF WIFE REDUCES
EMMISSIONS AND
DOES NOT INCREASE
FUEL CONSUMPTION,
THEN WHY IS ALMOST
NOBODY USING IT?**

- Cost of watered down fuel more expensive than “real fuel” Would you pay more for watered down booze?
- No second chance for failure i.e. free replacement for any artificial heart
- Always On not Always Appropriate

Christian Barnard's first 17 patients died;



- Manufacturers of WiFE use MDO and MDO is more expensive than HFO which is used by Most Vessels.
- WiFE costs more than MDO even though it has 10-20% less energy
The water in WiFE takes up space in fuel tank, reducing the vessel's range
- The Availability of WiFE is Limited
- WiFE was "Always On," affecting safety

The solution to overcoming these barriers to using WiFE is to produce WiFE on a demand basis when it is required so the vessel is not required to use it all the time because it is "Always On".

In other words, the solution is



WiFE ON DEMAND
BREATHE EASY - THE COAST IS CLEAR

- Always On WiFE is made NO. 2 Diesel Fuel while most ocean going vessels use heavy fuel
- Always On WiFE is more expensive than MDO even though it includes up to 20% water .
- Always on WiFE reduces a ship's range in direct proportion to the water content
- Always on WiFE has limited availability.
- Always on WiFE has a tendency to separate after 30 days and can dislodge PM from fuel storage tank damaging fuel injectors.
- Always on WiFE only allows one level of water content regardless of operation conditions
- Always on WiFE delivers less power & torque at docking which can be unsafe
- WiFE on Demand can be made with any fuel.
- There is no surcharge for WiFE on Demand
- WiFE on Demand never reduces a vessel's range as it does not use space in the fuel tank
- WiFE on Demand is always available as it is only produced on demand.
- WiFE on Demand is produced just before combustion and never separates as there is never any fuel in the tank to separate and dislodge residue.
- WiFE on Demand allows any variation of water content up to 50%
- WiFE on Demand can be suspended when more power and torque are required.

FOR RELIEF FROM NO_x, PM and CO₂ EMISSIONS
JUST ADD WATER



WiFE  **ON DEMAND**

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THANK YOU FOR ATTENTION

Eric Hutchingame, Chairman and CEO

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