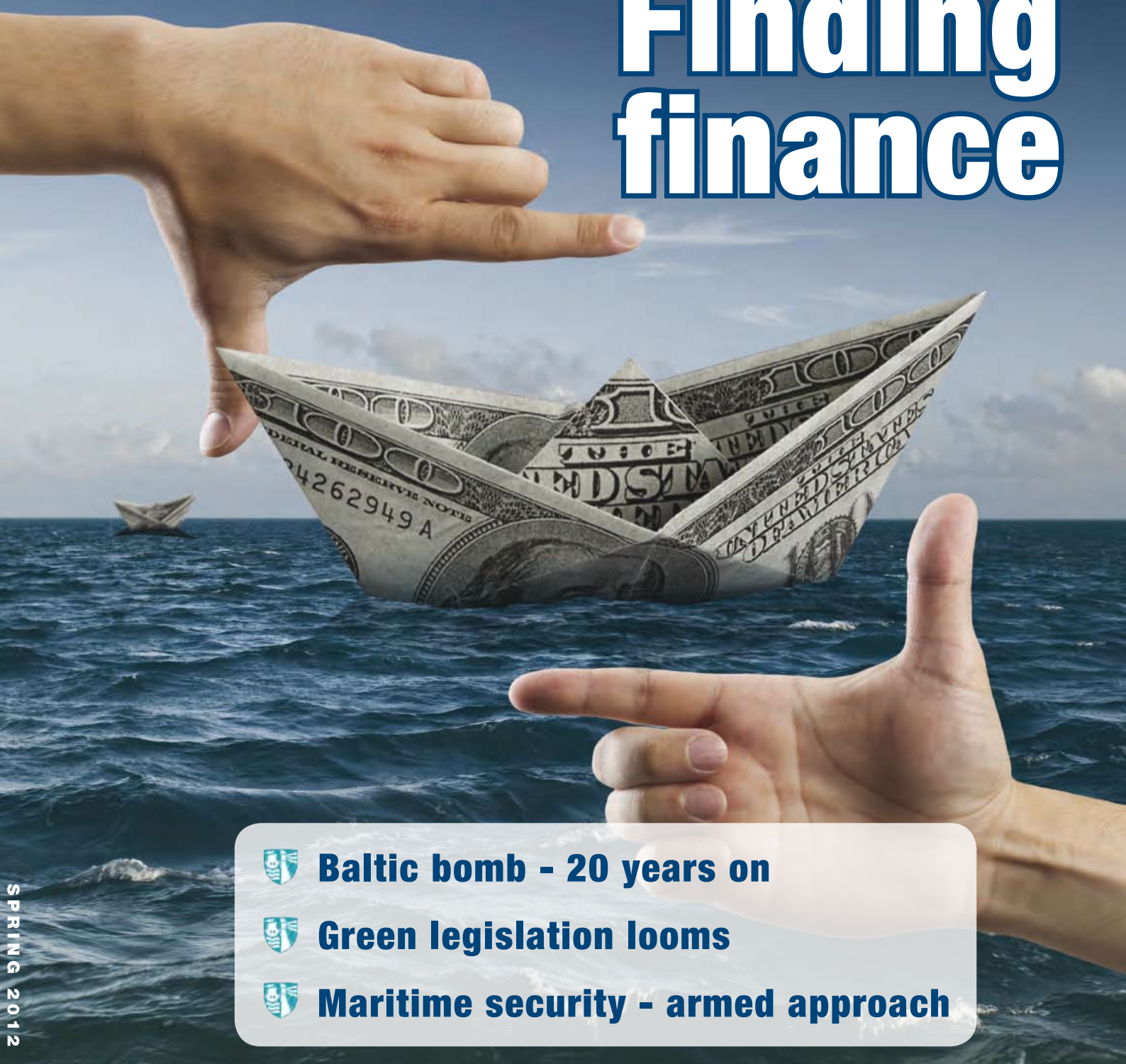


the BALTIC

Finding finance



Baltic bomb - 20 years on



Green legislation looms



Maritime security - armed approach

“As a Biofriendly customer we have been monitoring our fleet since October 2008. In that time, monitored ships have shown an average improvement of 2% to 3% in fuel economy. We have seen the cost of IFO 380 rise significantly recently making the return on investment from *Green Plus* attractive.”

What is Green Plus?

Green Plus® liquid fuel catalyst is an increasingly adopted technology that is garnering attention from marine companies worldwide. Biofriendly Corporation is an environmental company that created *Green Plus* to help fuel users improve air quality.

How does Green Plus work?

Green Plus is a product that improves the performance of fuel. This is a critical concept that Biofriendly Corporation addressed in developing *Green Plus*. When you improve the performance of fuel, it behaves in an engine as if it were a much higher quality fuel.

What is meant by higher quality fuel?

In the United States and Europe, motor vehicle fuel is generally refined to very high specifications; thus we see much lower harmful emissions in those areas. However, that super fuel is considerably more expensive than standard fuels and it is hard to find in less developed countries. The highest quality consumer fuel in the world can be found in California, where residents pay a premium of up to \$0.50 per gallon over what fuel costs in the rest of the country.

How does Green Plus make standard fuels perform like high quality fuels?

Rather than changing the available energy of the fuel itself, as is done in the refining of higher quality fuels, *Green Plus* changes the combustion characteristics to release more of the energy



Arafura emissions testing					
	SOx	NOx	CO	PM	Fuel Sulphur %
Baseline	9.42	18.48	0.43	0.50	2.3
Treated	9.43	14.43	0.40	0.44	3.2
Change	0.01	-4.05	-0.03	-0.06	0.90
% Change	0.1%	-21.9%	-7.0%	-12.0%	39.1%

Baseline and Treated data measured in grams per kilowatt hour

earlier in the combustion cycle. At the same time it smoothes out the combustion. More complete combustion results in a reduction of CO₂, NOx, SOx and the telltale smoke associated with poor combustion.

Can Green Plus prove that it does improve fuel?

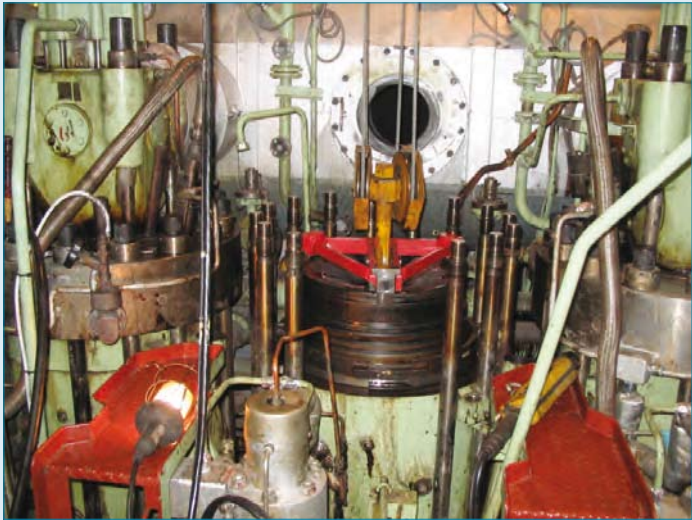
Absolutely – one example is that *Green Plus* is approved by the State Government of Texas for use in diesel fuel sold under its Texas Low

Emission Diesel (TxLED) programme. Here *Green Plus* showed that it significantly improved lower quality Texas diesel to match the performance of California diesel, which is the highest quality consumer diesel in the world. The exhaustive testing was supervised by independent inspectors and the results were reviewed and approved by the Texas Commission on Environmental Quality (TCEQ) after consultation with the US Environmental Protection Agency. The result was that consumers in Texas now enjoy the same quality of diesel fuel that can be found in California for much less money.

How does a government approval for diesel emission reductions apply to heavy fuel oil?

Green Plus has been used in marine applications across the globe and the results have matched what has been proven in diesel applications.

Results summary				
	Baseline	Treated with <i>Green Plus</i>	% Change	% Change
Ship	with other prod.		over other prod.	Total GP effect
Tromso Confidence	6.75	7.00	3.70%	5.70%
Petropavlovsk	8.65	9.09	3.45%	5.45%
Vanguard	12.64	13.19	4.31%	6.31%



BIOFRIENDLY CORPORATION



Accredited testing companies such as Emissions Testing Consultants (ETC) of Victoria, Australia and Scientifics in the UK have been on board ships using *Green Plus* to collect the data that confirms this. Furthermore, it has been proven that using *Green Plus* in marine applications improves fuel economy and reduces maintenance costs.

Are there examples of test results?

Emissions example

Test data on the container ship, *Arafura*, was gathered by ETC (see table, opposite). This data came from its report:

“Note that SOx emissions remained essentially the same yet the vessel was using fuel with sulphur 39.1% higher compared to the Baseline period without *Green Plus*. NOx emissions were down substantially.”

Maintenance example

Man B&W conducted a 4,778-hour test on a 7S50MC Hitachi engine using *Green Plus*. Data from its report says:

“The piston No. 5 was overhauled in connection with end of test with the fuel additive *Green Plus* from the company Biofriendly. This piston was also overhauled at the start of the test and at that time as now the condition was good with low wear rates for all parts.”

The following quote on *Green Plus* comes from a test report written by a technical superintendent:

“Average exhaust cylinder temperature dropped 1.3% or 4.2 degrees Celsius from 332.3 to 328.1. Ratio of cylinder lubricating oil to prop miles fell from 1.17 litres per prop

mile to 1.04 litres per prop mile, a decrease in oil consumption of 0.13 litre per prop mile or 11.1%.

“With the scavenge doors removed, I was afforded an excellent close-up view, and was able to confirm that the scavenge and under-piston spaces were in a comparatively clean state with little combustion residue after almost 400 running hours, certainly the best condition I have witnessed on this type of engine in normal service.

“The same was true of the finned tubes of the exhaust gas boiler on which very little deposition was observed, especially compared with previous inspections. Attached to this message are photographs supporting the above findings.” See photographs below.

Fuel economy

Green Plus has been tested for its effects on fuel economy in several shipping fleets. In those tests, *Green Plus* has shown a 2%-5% improvement. Some of the results that users typically find with varying vessels can be seen in the results summary, opposite.

Why are customers choosing *Green Plus*?

Green Plus will consistently lower greenhouse gas emissions with reductions in CO₂, CO, NOx, SOx, smoke and soot build-up.

Green Plus is easy to implement as it is used at the rate of 1 litre treating 25 tons of fuel.

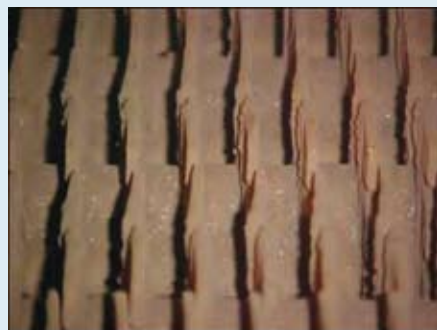
Green Plus is easy to deliver. It can either be added directly into the bunker tanks via the sounding tubes or with a metering pump that treats the fuel as it's transferred to the day tank.

Green Plus has undergone extensive endurance testing to show it reduces maintenance, oil use and overhaul intervals. Wartsila and Man B&W have both written “Letters of No Objection” stating that *Green Plus* does not harm their engines.

Green Plus has been used for billions of kilometres in on-road and on-ocean applications.

Efficiency improvements from using *Green Plus* tend to balance out the effects of hull fouling. This allows a significant increase in the intervals between dry docking.

Green Plus is inexpensive to buy, offering users upwards of a 600% return on investment.



Before *Green Plus*



After *Green Plus*