

**For ships and ship operators**

**Key business drivers:** greater fuel efficiency – reduction of costs and CO<sub>2</sub> emissions. Compliance with international and regional air pollution regulation.

**Increasing amounts of data:** what does it mean? Does the ship / charterer / owner have the capacity to utilize it?

**Practical need for clarity:** solutions needed to transform large amounts of data to useful information to enable management decisions and planning. Improving marine operational efficiency. Ensuring environmental emission compliance. Informing cost and risk reduction.

**Solutions:** Azurtane provides integrated fuel and emissions monitoring hardware and data-to-information services dedicated to marine operations, regionally & globally

**Azurtane delivering information of value**



Delivering **information** of value

For ships & ship operators

management information  
efficiency action plans  
compliance assurance



## Technology Solutions

### FUEL MASS FLOW METERING

- Mass flow - residual & distillate fuels
- Flow rate & cumulative
- Density
- Viscosity
- Simple installation
- Two phase flow capability
- Single cable connection
- Robust
- No moving parts, no maintenance
- Highly accurate

## data collection & transmission

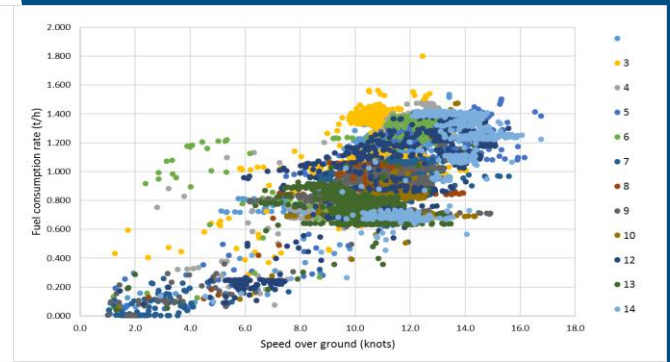
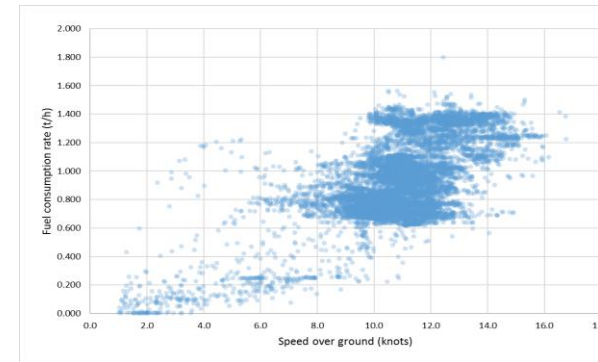
### EMISSIONS MONITORING

- Unique technology
- Use of SO<sub>2</sub>/CO<sub>2</sub> method
- Detection below 10ppm SO<sub>2</sub>
- In-line in gas path
- Simple flange mounting
- Plug & Play
- No compressed air



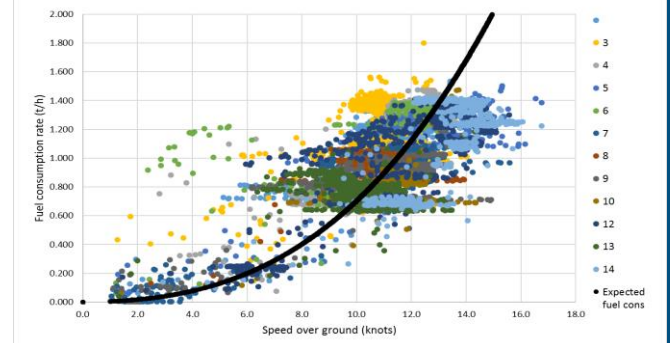
### AZT CONTROL BOX & SHIP DISPLAY

Data from instruments is polled by the central system computer every 10 seconds and logged with ship position, speed and heading. All records are stored for a minimum of 18 months. Data can be downloaded via satellite communications in small packets, as required, to provide up to near real-time reporting of the vessel's performance. Typically mounted in the engine room control console or on the bridge, the computer housing is compact and provided with a screen suitable for panel mounting. The onboard interface includes straightforward reporting of parameters and graphics to guide ship's crew on optimum vessel operation and emissions compliance.



## Data to Action

The ongoing challenge for ship operators is how to effectively utilize 'big-data' to bring clarity when making decisions. These charts illustrate fuel consumption versus speed over the ground collected by Azurtane from a bulk carrier. We split the mass of data points into voyages from which performance curves for the ship can be derived. Not removing large amounts of data enables the discounting of external factors such as weather and sea-state to gain a true assessment of vessel performance.

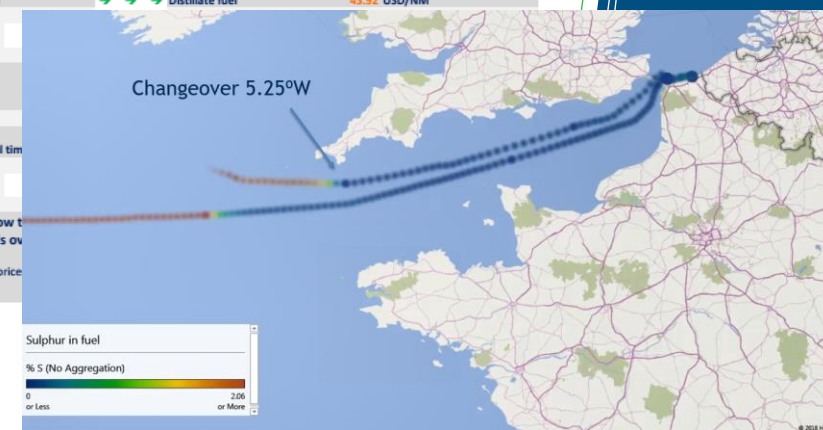


### MV MONTHLY PERFORMANCE REPORT

Key performance indicators from this monthly report are summarised on the left of this page. Where shown by the arrows, these can be compared with the vessel's overall performance (on the right). Green arrows indicate performance better than expected. Red arrows indicate performance worse than expected. Performance can also be compared with sister vessels in order to compare vessel operation and hull, propeller and machinery condition.

Sep-18 From noon 01/09/2018 to noon 30/09/2018		All From 10/08/2016 to 30/09/2018		
<b>VESSEL PERFORMANCE</b>				
<b>Fuel consumed in month</b>		<b>Fuel consumed, all to date</b>		
Residual fuel	114.9 tonnes	Residual fuel	3594.2 tonnes	
Distillate fuel	117.9 tonnes	Distillate fuel	1573.5 tonnes	
<b>Actual fuel expenditure vs expected fuel expenditure **</b>				
Residual fuel	-5625.43 USD: BELOW EXPECTED	← ← ←		
Distillate fuel	-1341.20 USD: BELOW EXPECTED	← ← ←		
Total	-6966.63 USD: BELOW EXPECTED	← ← ←		
<b>VESSEL UTILIZATION</b>				
<b>Time sailing &amp; stationary vs. total time monitored in month</b>		<b>Time sailing &amp; stationary vs. total time monitored, all to date</b>		
Sailing ≥ 1 knot	43.5 %	→ → →	59.2 %	
Stationary < 1 knot	56.5 %	→ → →	40.8 %	
<b>VESSEL OPERATING PROFILE</b>				
<b>Distance sailed &gt; 1 knot in month</b>		<b>Distance sailed &gt; 1 knot, all to date</b>		
Residual fuel	1461 NM	Residual fuel	39638 NM	
Distillate fuel	1905 NM	Distillate fuel	22323 NM	
Total	3366 NM	Total	61961 NM	
<b>Average cost of fuel per hour &gt; 1 knot in month**</b>		<b>Average cost of fuel per hour &gt; 1 knot, all to date**</b>		
Residual fuel	318.63 USD/h	→ → →	Residual fuel	395.54 USD/h
Distillate fuel	418.87 USD/h	→ → →	Distillate fuel	474.18 USD/h
<b>Average cost of fuel per nautical mile &gt; 1 knot in month**</b>		<b>Average cost of fuel per nautical mile &gt; 1 knot, all to date**</b>		
Residual fuel	29.84 USD/NM	→ → →	Residual fuel	34.23 USD/NM
Distillate fuel	38.60 USD/NM	→ → →	Distillate fuel	43.92 USD/NM
<b>Operating data availability in month</b>				
Residual fuel	137 hours			
Distillate fuel	582 hours			
<b>Instrument uptime in month</b>				
Data recorded	100.00 % of total time			
While expenditure for the month was below the vessel's overall expenditure for the month, it was lower than the vessel's overall expenditure for the month.				
** Costings based on <a href="https://shipandbunker.com/prices">https://shipandbunker.com/prices</a>				

### DATA VISUALIZATION



From the apparent complexity of data Azurtane monitors the vessel's operation against the performance curves and provides regular management reporting and information the ship operator needs.

Azurtane works with the ship operator to develop efficiency action plans focusing on areas of operation where data shows savings can be made.

Azurtane's data-to-information services enable benchmarking and inter-comparison of sister ships or vessels with similar trading patterns.

Azurtane can also assist with the human element; monitoring and comparing the performance of ship's staff in terms of efficient vessel operation.

delivering practical information