



# Understanding and improving your GHG footprint and operational efficiency

Kevin Wilson  
OpDAQ Systems

# About Us

- Founded in 2008
- Located in Rimouski, QC
- Design and integration of sensors and systems for measuring vessel performance
- Distributor and integrator for KRAL
- Distributor and integrator for Binsfeld Engineering (BEI)

**“Optimisation through Data AcQuisition”**



# Harbour Towing Optimisation

- Context
- Transit optimisation
- Feedback to crew



# Harbour Towing Optimisation

## CONTEXT

Tugboats are designed to be powerful, not fast

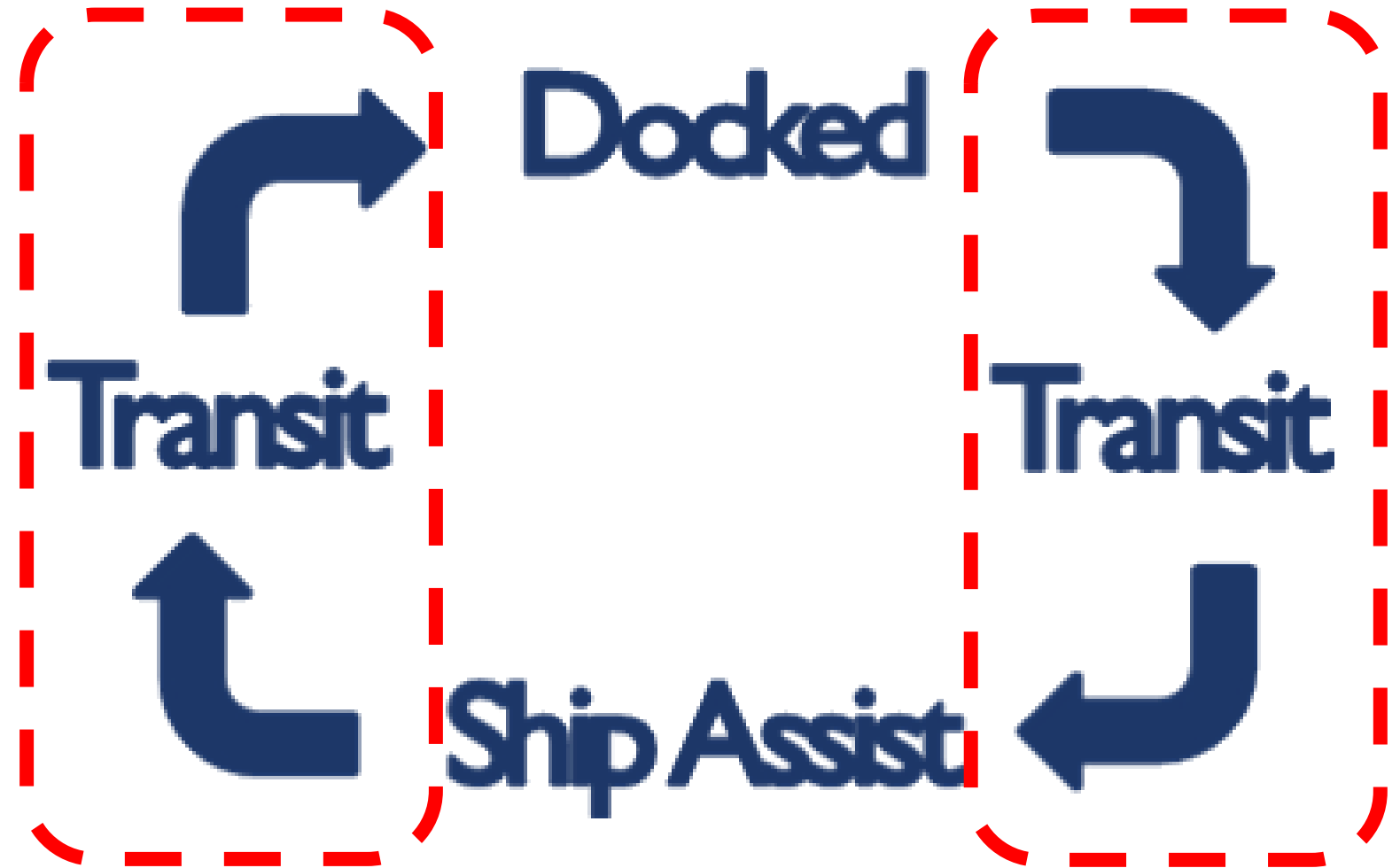




# Harbour Towing Optimisation

## CONTEXT

Basic ship assist operation



# Harbour Towing Optimisation

## CONTEXT

The goal: Slowing down during transits

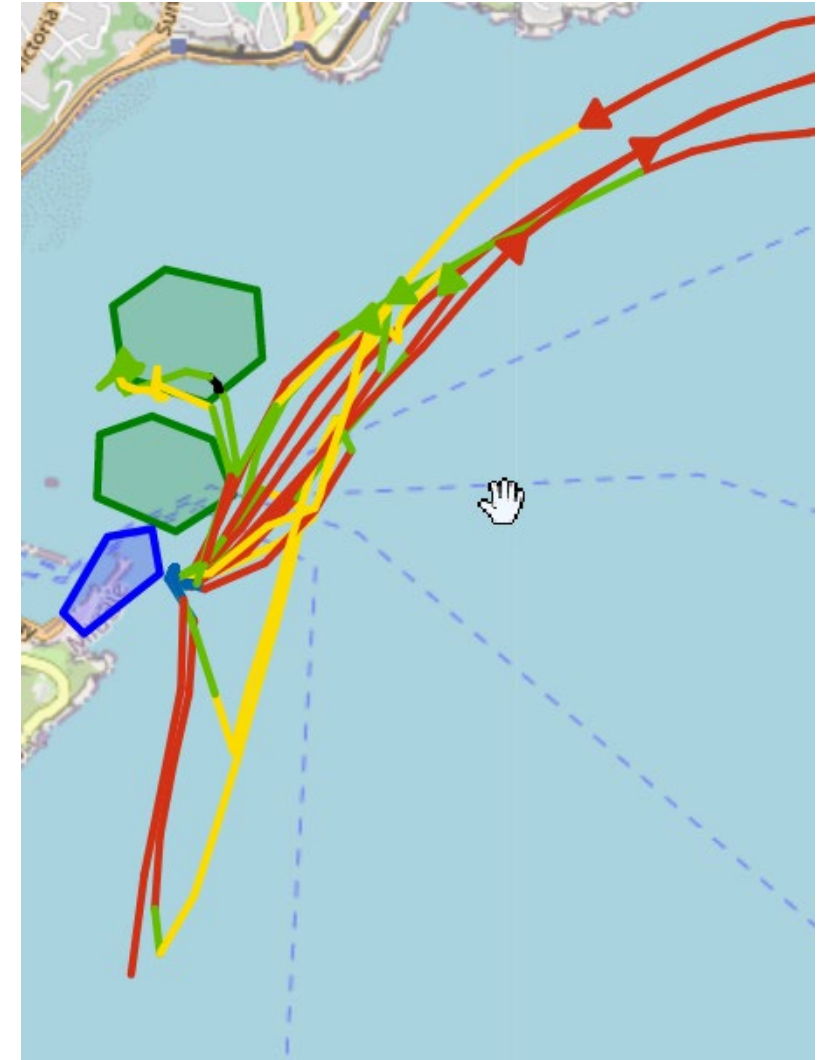


# Harbour Towing Optimisation

## OPERATION MODE DETECTION

The key: detecting transits

Need to detect all types of operation



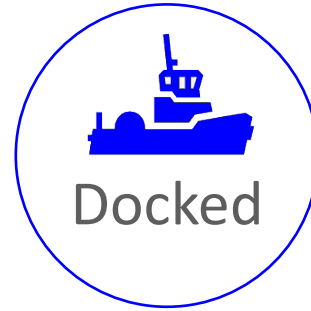
# Harbour Towing Optimisation

## OPERATION MODE DETECTION

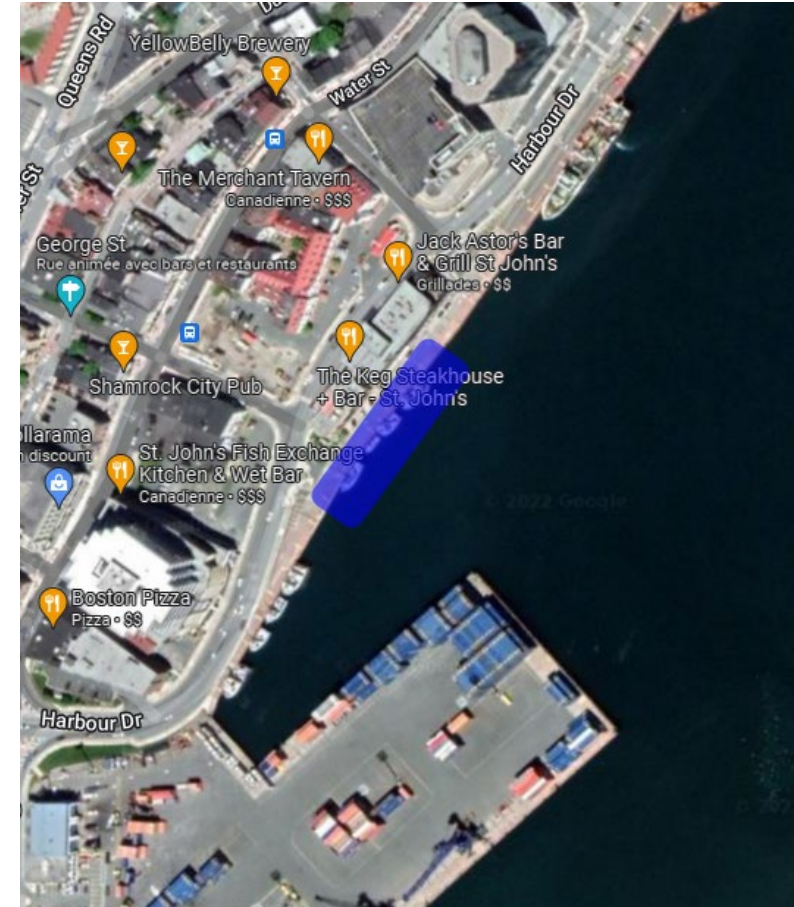
The key: detecting transits

Need to detect all types of operation

- **Docked**



## GEOFENCES





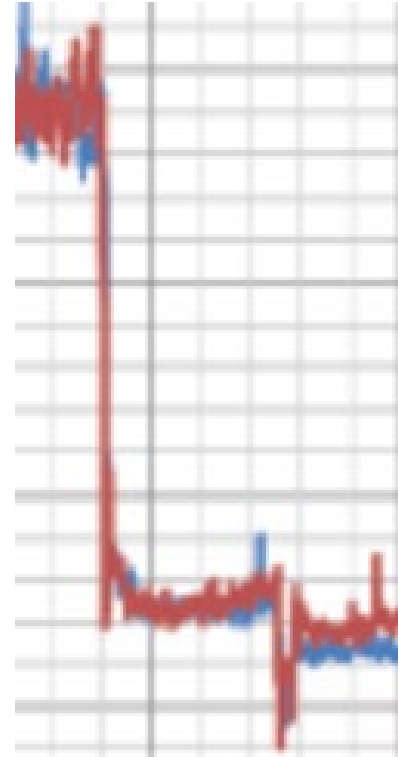
# Harbour Towing Optimisation

## OPERATION MODE DETECTION

The key: detecting transits

Need to detect all types of operation

- Docked
- Loitering



**RPM and Speed  
over ground below  
threshold**

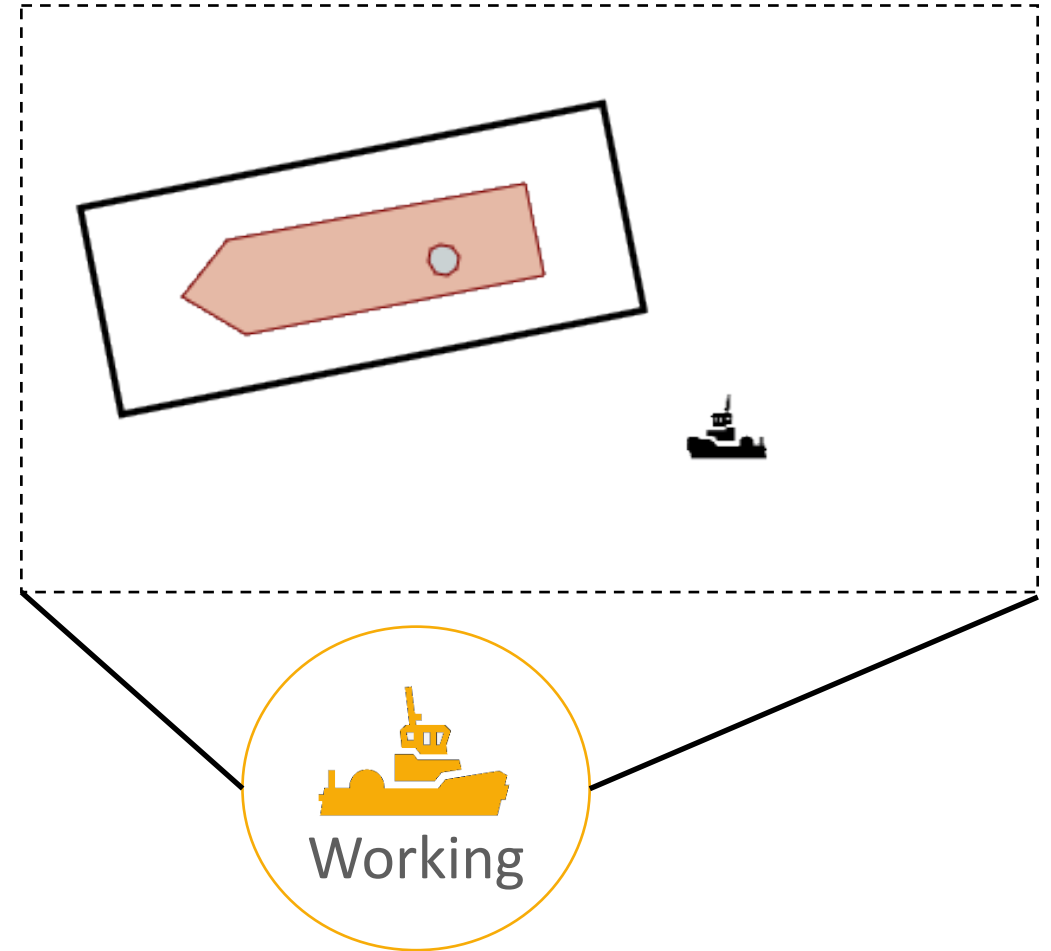
# Harbour Towing Optimisation

## OPERATION MODE DETECTION

The key: detecting transits

Need to detect all types of operation

- Docked
- Loitering
- Working



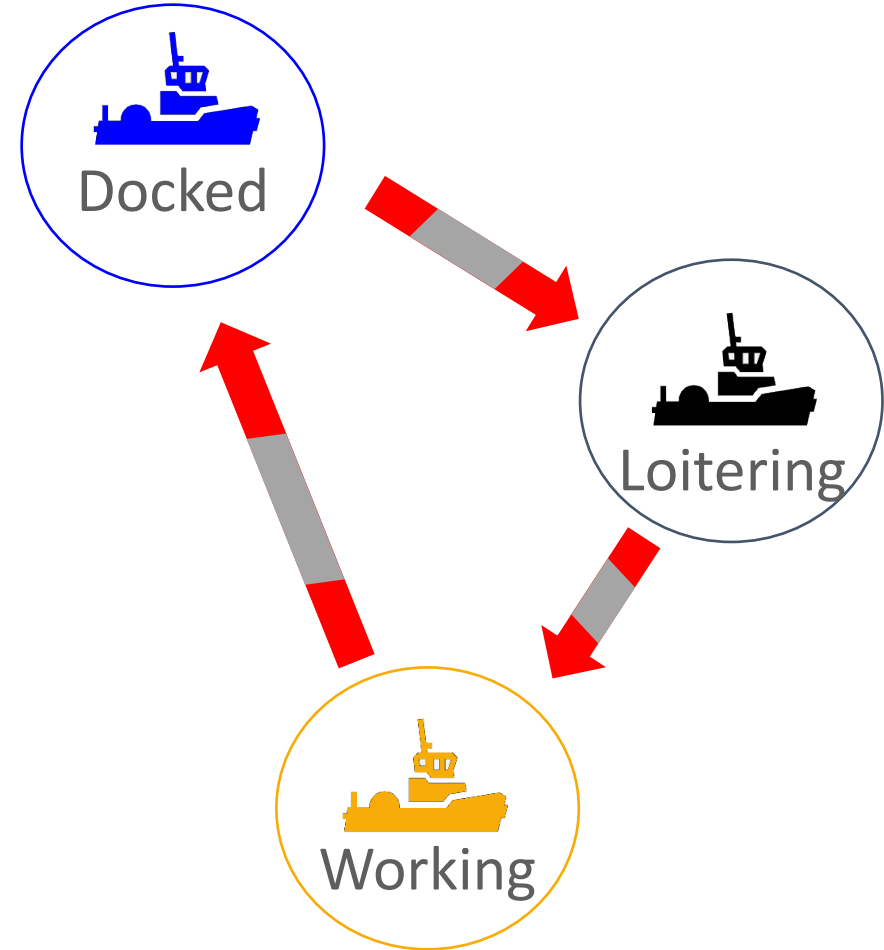
# Harbour Towing Optimisation

## OPERATION MODE DETECTION

The key: detecting transits

Need to detect all types of operation

- Docked
- Loitering
- Working
- **Transiting**



# Harbour Towing Optimisation

## OPERATION MODE DETECTION

Mapping the operational modes



# Harbour Towing Optimisation

## TRANSIT OPTIMIZATION

- System components
- Performance curves
- Guidelines
- Feedback to operating crews





# Harbour Towing Optimisation

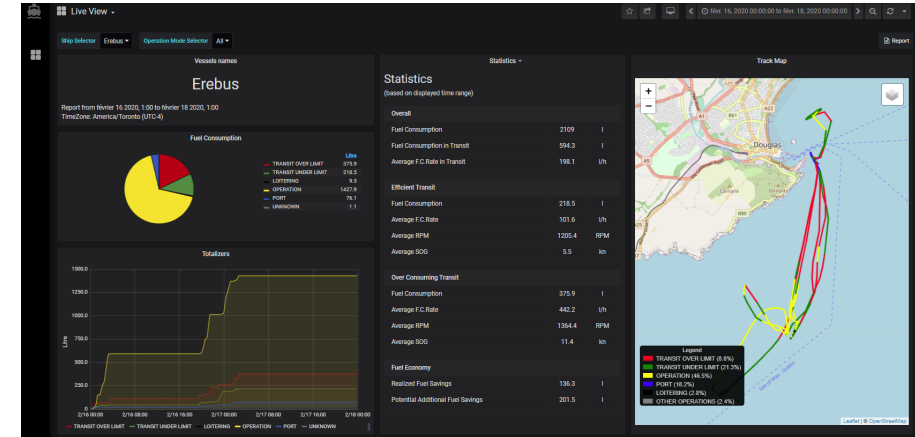
## OPFLEET COMPONENTS

### OpHMI: Embedded System

- Sensors
- Real-Time Display
- Operational mode detection
- Transmission to Op-Fleet online dashboards

### OpFleet: Online Dashboard

- Fleet efficiency monitoring
- Feedback to crew



# Harbour Towing Optimisation

## SENSORS

- **GPS/AIS**



# Harbour Towing Optimisation

## SENSORS

- Flowmeters



# Harbour Towing Optimisation

## SENSORS

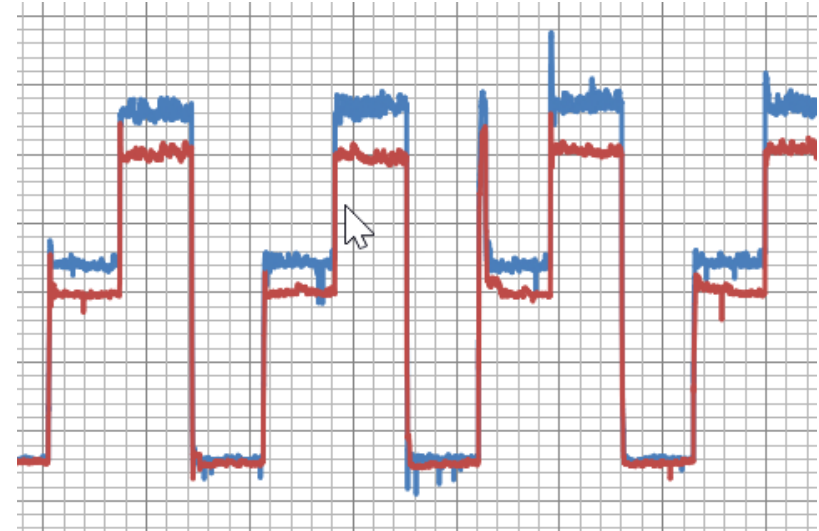
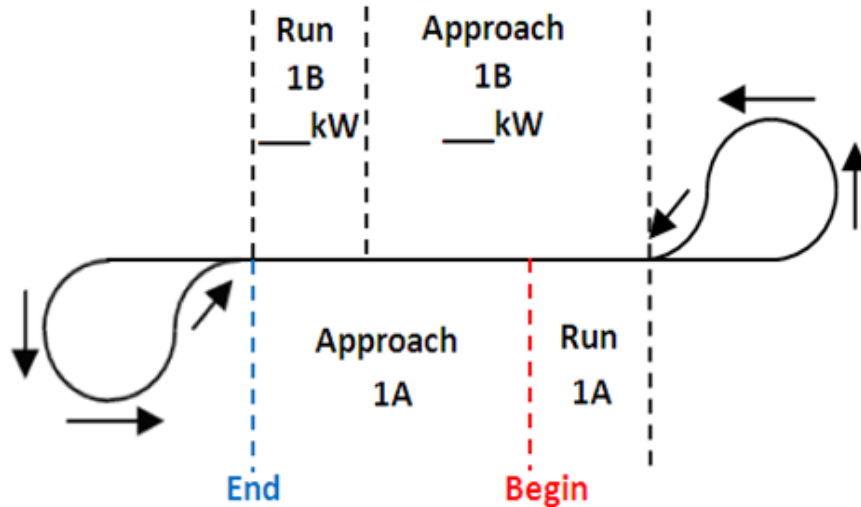
- Shaft Power meter
- SFC calculation  
(In conjunction with flowmeter)
- Fuel estimation  
(Instead of flowmeter)



# Harbour Towing Optimisation

## TRANSIT OPTIMIZATION

- Determining Speed/FC curves

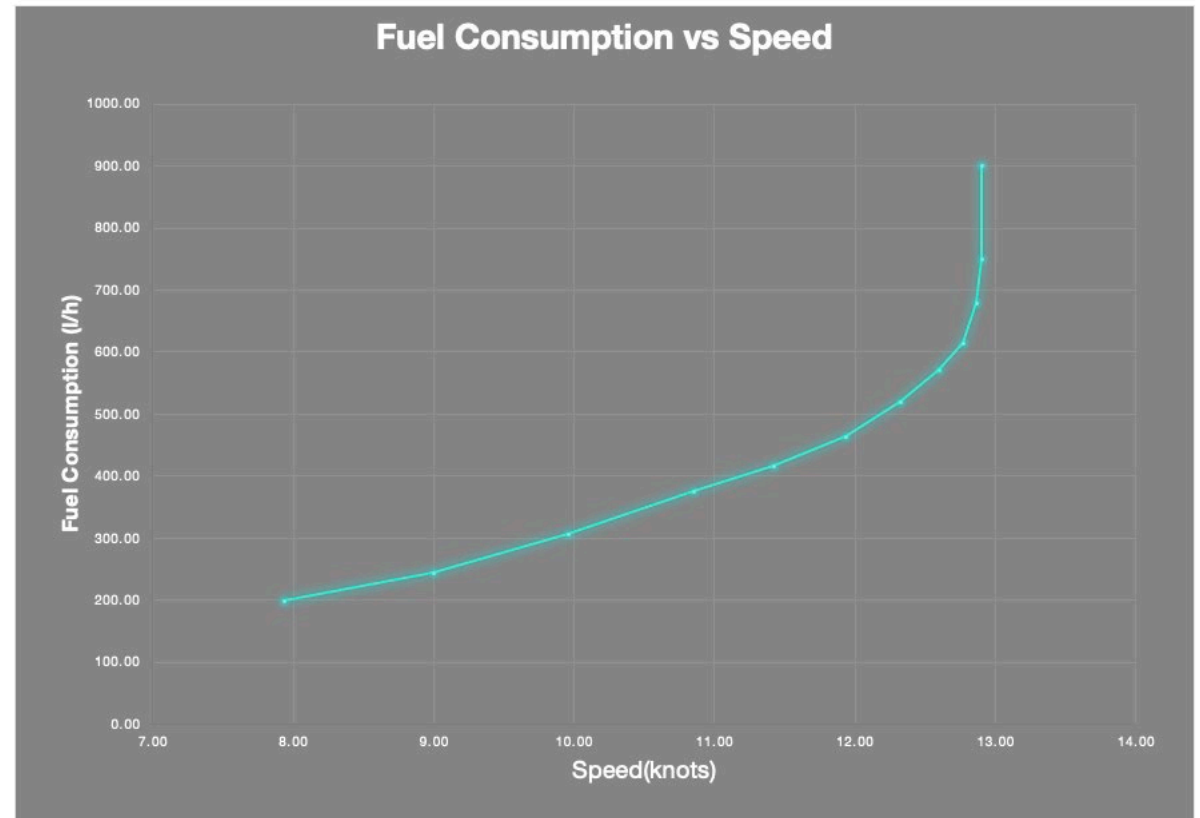




# Harbour Towing Optimisation

## TRANSIT OPTIMIZATION

- Fuel consumption in transit

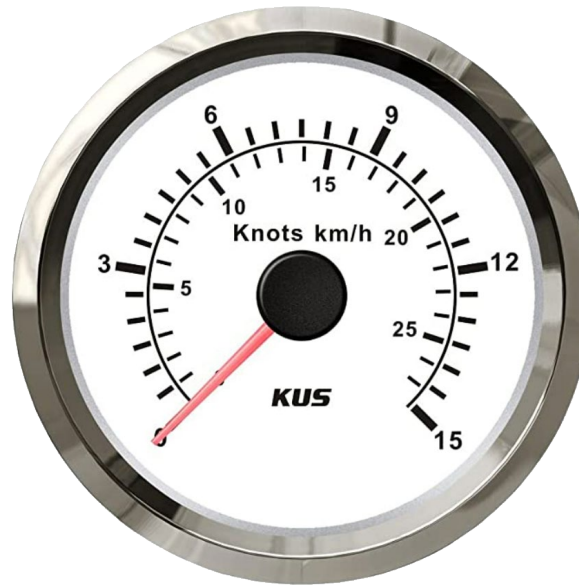


# Harbour Towing Optimisation

## DETERMINING GUIDELINES

**MUST** be simple to follow

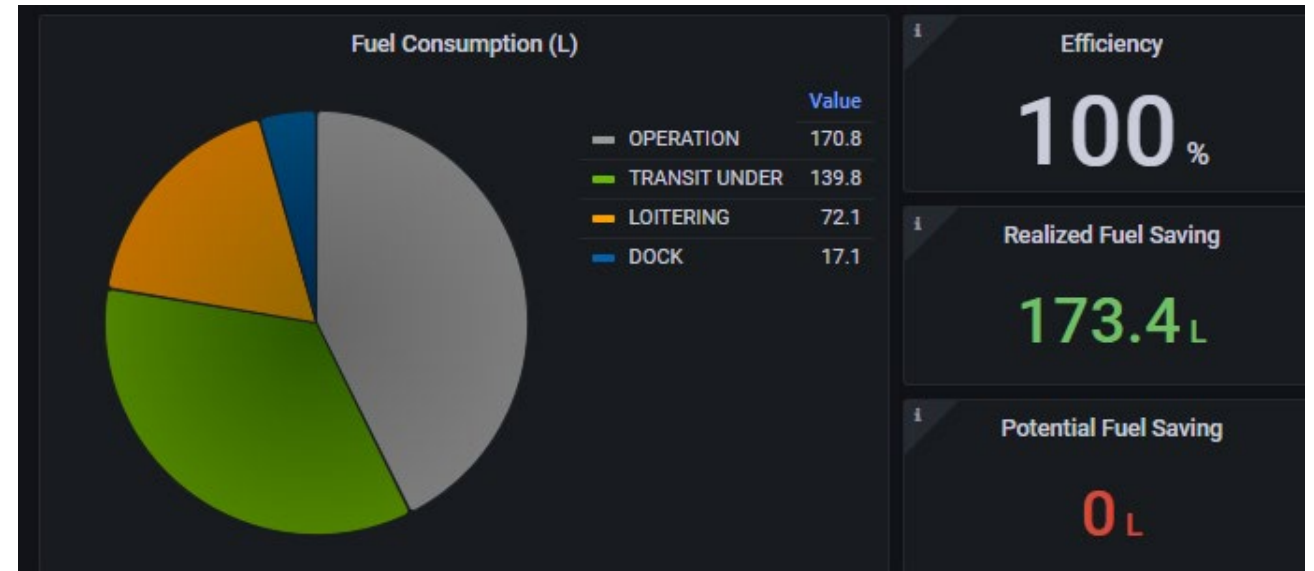
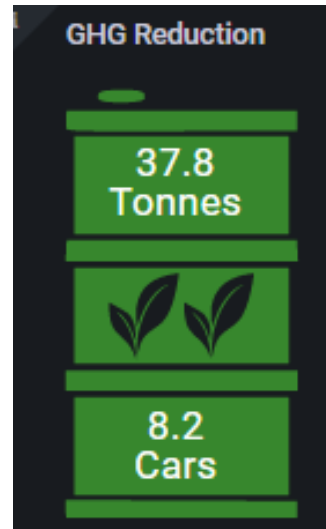
- **2 factor guideline**
  - Speed over ground
  - RPM



# Harbour Towing Optimisation

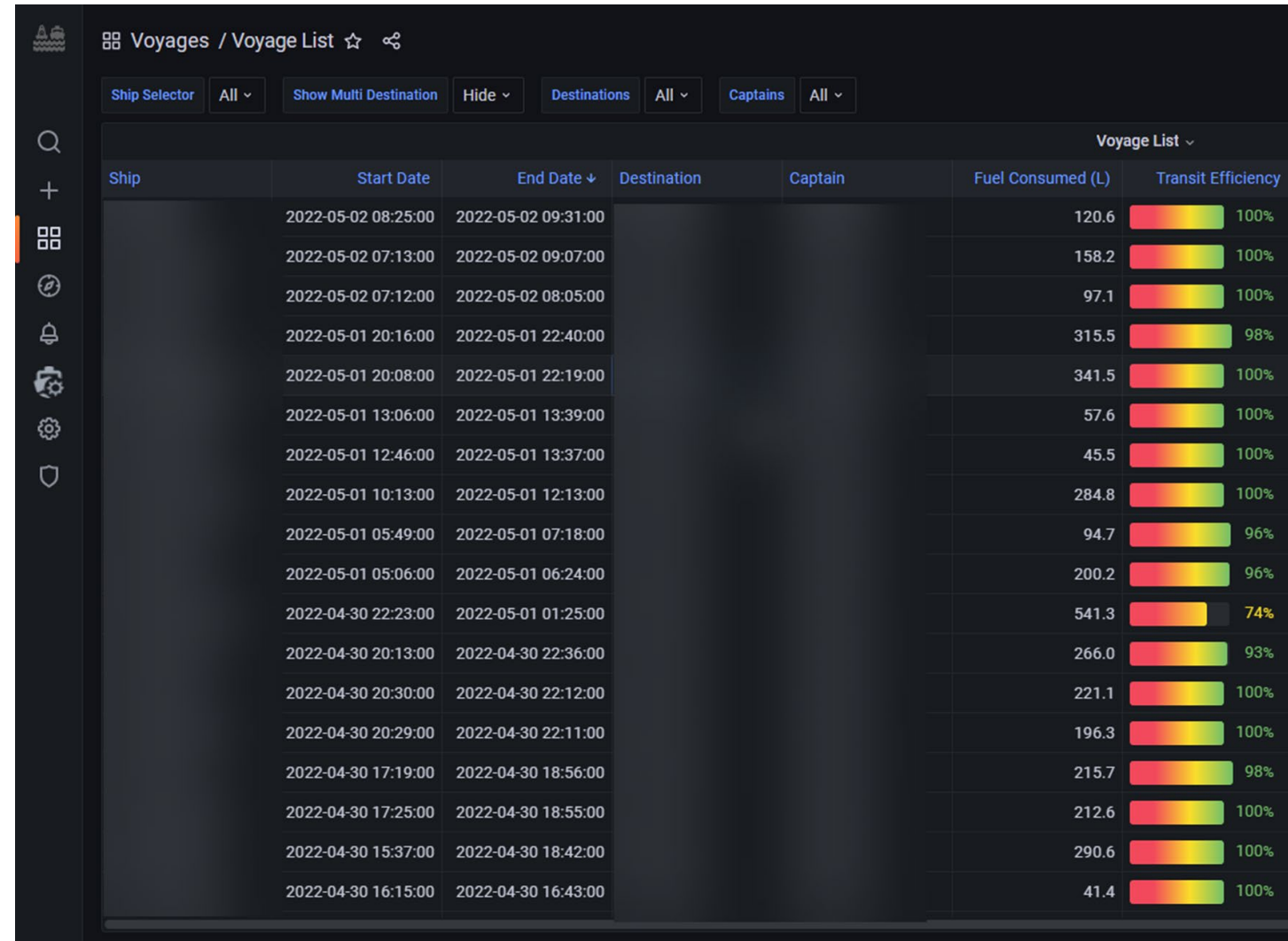
## FEEDBACK TO OPERATING CREWS

- Simple to understand
- Efficiency scores



# Harbour Towing Optimisation

## ANALYSIS



Voyages / Voyage List

Ship Selector All Show Multi Destination Hide Destinations All Captains All

Ship	Start Date	End Date	Destination	Captain	Fuel Consumed (L)	Transit Efficiency
	2022-05-02 08:25:00	2022-05-02 09:31:00			120.6	100%
	2022-05-02 07:13:00	2022-05-02 09:07:00			158.2	100%
	2022-05-02 07:12:00	2022-05-02 08:05:00			97.1	100%
	2022-05-01 20:16:00	2022-05-01 22:40:00			315.5	98%
	2022-05-01 20:08:00	2022-05-01 22:19:00			341.5	100%
	2022-05-01 13:06:00	2022-05-01 13:39:00			57.6	100%
	2022-05-01 12:46:00	2022-05-01 13:37:00			45.5	100%
	2022-05-01 10:13:00	2022-05-01 12:13:00			284.8	100%
	2022-05-01 05:49:00	2022-05-01 07:18:00			94.7	96%
	2022-05-01 05:06:00	2022-05-01 06:24:00			200.2	96%
	2022-04-30 22:23:00	2022-05-01 01:25:00			541.3	74%
	2022-04-30 20:13:00	2022-04-30 22:36:00			266.0	93%
	2022-04-30 20:30:00	2022-04-30 22:12:00			221.1	100%
	2022-04-30 20:29:00	2022-04-30 22:11:00			196.3	100%
	2022-04-30 17:19:00	2022-04-30 18:56:00			215.7	98%
	2022-04-30 17:25:00	2022-04-30 18:55:00			212.6	100%
	2022-04-30 15:37:00	2022-04-30 18:42:00			290.6	100%
	2022-04-30 16:15:00	2022-04-30 16:43:00			41.4	100%

# Harbour Towing Optimisation

## FLEET OVERVIEW





# Sea Trial Kit

BEI's Sea Trial Kit provides everything needed to measure shaft torque, speed, and power on a vessel during sea trials.

The all-in-one system recording data simultaneously for up to 2 shafts, at a rate of up to 2400 Hz for torsional vibration testing.

Components are packaged in an easily transportable, robust, and compact case, allowing for easy set-up and transport of the system between jobs.

**BINSFELD ENGINEERING INC.**

## TorqueTrak Sea Trial Kit

Shaft Torque and Power Testing System

**Engine Power Validation Made Easy.**

The TorqueTrak Sea Trial Kit provides everything needed to measure shaft torque, speed, and power on a vessel during sea trials. The all-in-one system is capable of measuring and recording data simultaneously for up to 2 shafts, at a rate of up to 2400 Hz for torsional vibration testing. Components are packaged in an easily transportable, robust, and compact case, allowing for easy set-up and transport of the system between jobs.

### FEATURES

- Robust**  
The hard carry case houses all system components. Stationary components are integrated into the case and extra storage space is included for easy transport of accessory items. Includes retractable handle and wheels. Dimensions 12"D x 18.5"W x 22.5"L.
- Multiplexing**  
A single receiver can work with up to two shaft transmitters, helping reduce install complexity and overall cost.
- Integrated RPM**  
Two channels of shaft speed measurement. Includes shaft magnets and a pair of rpm pickups on magnetically-mounted adjustable arms. Pick-ups include 30' (9 m) of cable that lies directly to the Field Test 2 integrated in the carrying case.
- Low Maintenance**  
Highly optimized electronics ensure minimal electricity consumption for the Transmitters, with battery autonomy of up to 24hrs. Sleep mode is also available when the shaft is not turning, extending the battery life even longer. Battery replacements take minutes.
- High Accuracy**  
The use of a strain gage sensor and a 14-bit ADC ensure the most accurate measurements possible.
- OpDAQ Field Test 2**  
Logs the data from the TorqueTrak 10K units and speed pick-ups. Software automatically calculates power and outputs data in csv/xls format. USB data cable connection to user-supplied laptop.
- TorqueTrak 10K Telemetry**  
Measure the torque on the shaft and transmit the torque signal to receivers integrated into the carrying case. A pair of TorqueTrak 10K's are included for simultaneous measurement of two shafts. Includes 2 standard +/- 10VDC analog outputs.



**System Components**



TT10K Transmitter

818-BEI-Sea Trial Kit-1 Rev A

**BINSFELD.COM | 1.231.334.4383 | Maple City, MI, USA**

# B.C. TUGBOAT Magazine

Spring 2022 Issue

“Our customers reported convincing results following a two-year trial period of our system. Two ship-owners with whom we conducted trials had tried in the past to introduce speed limits while in transit, but without success. Through our approach, they quickly observed **savings on the order of 15-25% for the transit segments of their operations.** This corresponds to **over 30,000 litres of diesel saved per year per tugboat!**”

## ARE YOUR TUGBOATS OPERATING AT PEAK FUEL EFFICIENCY?

Tugboats are designed to be powerful, not fast. Their fuel consumption becomes very inefficient when they transit faster than necessary.

To analyze tugboat operations effectively, it is critical to monitor their fuel consumption during transit operations, this is where the most savings can be realized.

OpFleet is a cloud-based dashboard designed to provide fleet managers with an overview of their fleet's fuel consumption statistics and to monitor transit speed guidelines. This dashboard also allows operating crews to evaluate their specific performance with the fleet.

- Reduce fuel consumption through the optimization of transit speed.
- Analyze each vessel's performance in real time.
- Provide crews with feedback on their operational performance.



Our customers reported convincing results following a two-year trial period of our system. Two ship-owners with whom we conducted trials had tried in the past to introduce speed limits while in transit, but without success. Through our approach, they quickly observed savings on the order of 15-25% for the transit segments of their operations. This corresponds to over 30,000 litres of diesel saved per year per tugboat!

Additional components contributing to the complete OpDAQ solution...



OpTS

- Measure torque, RPM, and power on rotating shafts with an innovative wireless design.
- Ideal for long-term installations in confined spaces.



OpHMI

- Automatically determine the vessel's operational status.
- Inform the captain of speed guidelines.



KRAL

- Measure fuel consumption using flowmeters equipped OpDAQ modules.

Reach out to us at [info@opdaq.com](mailto:info@opdaq.com) or visit [www.opdaq.com](http://www.opdaq.com)

OpDAQ  
systems

# Thank You

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