

# THE TIG RIG RETROFIT SAIL SYSTEM: CARBON AND SHIPPING

Alistair Johnson

Designer of

THE TIG RIG RETROFIT SAIL SYSTEM



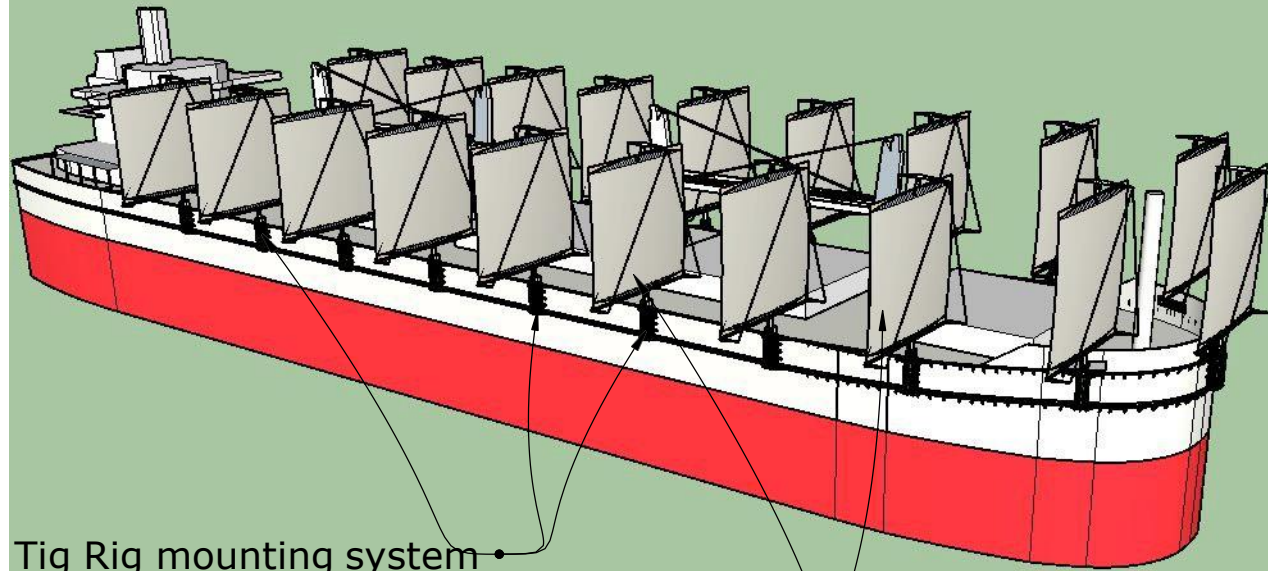
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# THE TIG RIG RETROFIT SAIL SYSTEM

REINVENTING THE SAIL

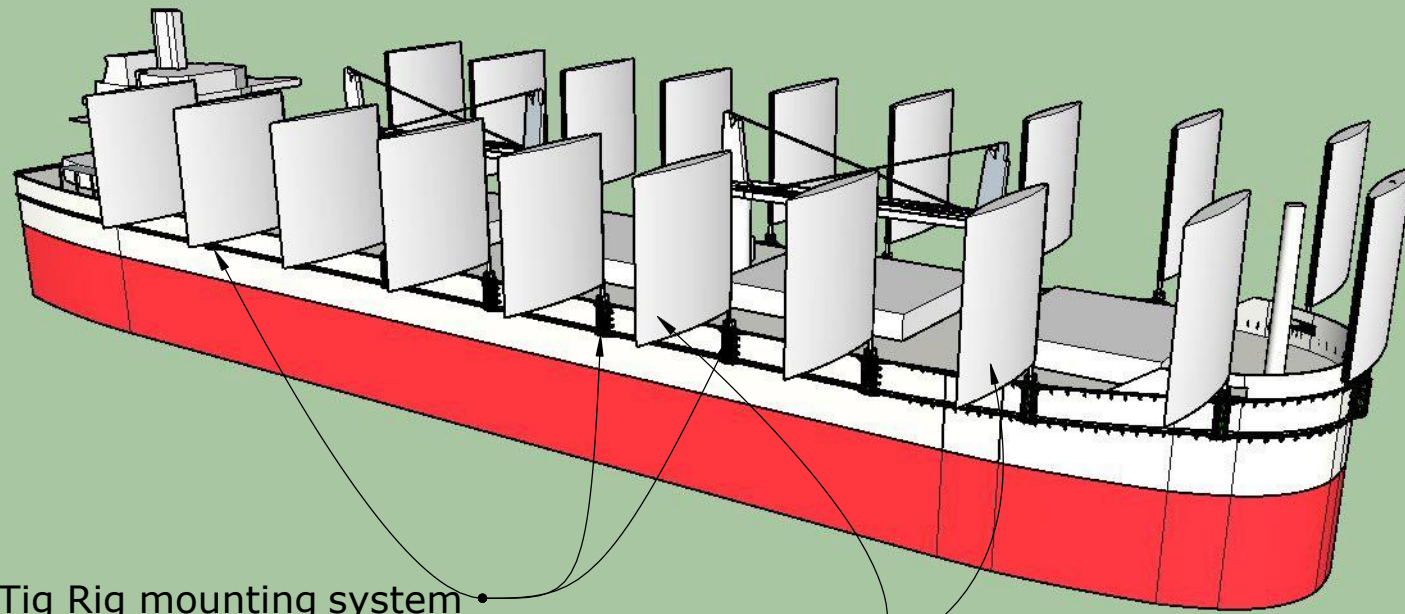
# STANDARDISED MOUNTING SYSTEM



Tig Rig mounting system

Tig Rig sail units

**TIG RIG UNITS ON 60,000DWT FREIGHTER**

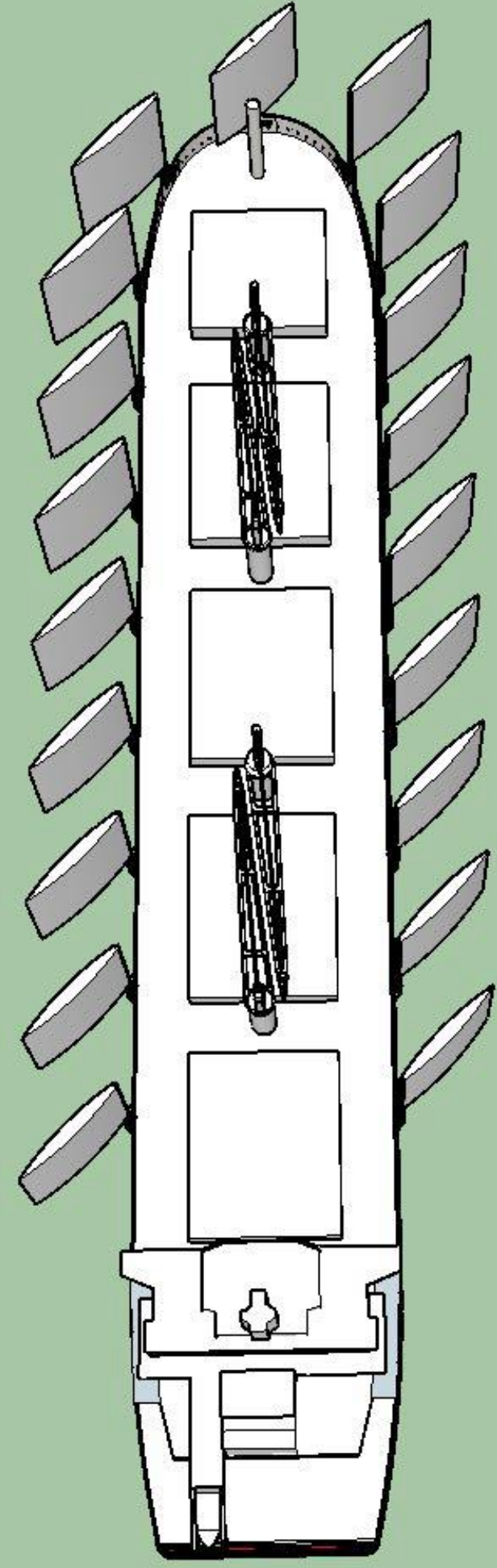
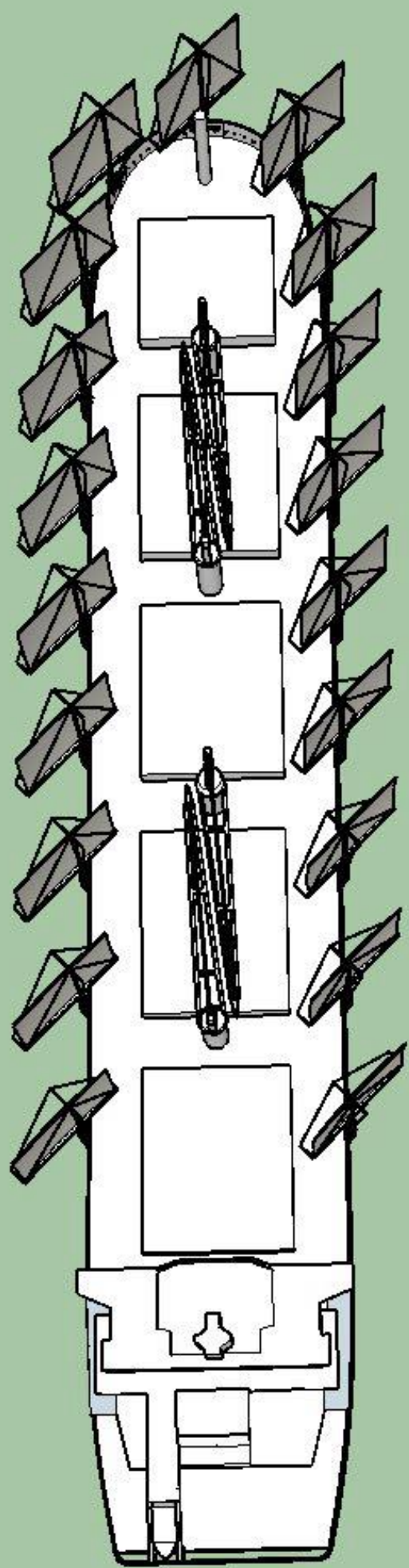


Tig Rig mounting system

Wingsails

**WINGSAIL UNITS ON 60,000DWT FREIGHTER**

# STANDARDISED MOUNTING SYSTEM TIG RIG AND WINDSAIL AT BEAM WIND SETTING



# **CONTEXT**

## **weekly climate news**

**1 April 2019**

**CANADA IS WARMING TWICE AS FAST AS GLOBAL AVERAGE:  
RISE SINCE 1948 OF 1.7C cf 0.8C DUE TO ARCTIC 2.3C**

**Environment and Climate Change Canada report:**

**Drastic action required.**

**CANADA THE G7 NATION WITH THE BIGGEST STAKE IN THIS  
CHALLENGE**

**17 April 2019**

**CENTRAL BANKERS OF UK AND FRANCE WARN OF CATASTROPHIC  
LOSSES FROM CLIMATE CHANGE**

**Heads of Bank of France and Bank of England warn global banks not to ignore  
climate change dangers**

**Financial sector risks existential level losses from climate change via  
extreme weather and stakes in polluting firms**

**'Financial regulators, banks and insurers around the world have to “raise the  
bar” to avoid catastrophe.**

**FINANCIAL SECTOR FACES CATASTROPHIC/EXISTENTIAL LEVEL LOSSES  
FROM WEATHER/INSURANCE AND DIRECT INVESTMENT IN POLLUTING  
BUSINESSES - SHIPPING**

**22 April 2019**

**METHANE RELEASE FROM THAWING PERMAFROST TO COST BUSINESS  
\$70tn**

**1<sup>st</sup> detailed analysis of economic impact of release of GHG methane from  
thawing permafrost**

**A serious tipping point created by CO2 warming**

**METHANE 10-20x MORE POWERFUL GHG THAN CO2**

**CANADA THE G7 NATION WITH THE BIGGEST PERMAFROST STORE**

# PARIS AGREEMENT

“All ships designed and built today must operate in a net zero emissions world at the end of their service life”

*‘GHG emissions from international shipping to peak as soon as possible and to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008’* **Initial IMO Strategy on GHG Emissions** [April 2018]

**Global SOx Directive** [01 Jan 2020] – current fuel difference €150/ton+

**Carbon Price** - EU ETS, which has seen a huge increase in price, from €7/ton to €20/ton of CO<sub>2</sub> in 2018, [€62/ton fuel] and predicted average €35-40/ton between 2020-21 [€115-125/ton of fuel]

**MAERSK Announcement** [Dec 2018] – Fleet Carbon Neutrality by 2050

Wind Propulsion Role in Decarbonizing Shipping - Port of Vancouver, 27 Mar 2019



## INTERNATIONAL WINDSHIP ASSOCIATION (IWSA) SLIDES

IMO directive April 2018: Shipping GHG emissions to be 50% lower in 2050 than 2008 figure

SOx directive in place from Jan 2020 – affecting fuel prices

Maersk announcement December 2018 that their fleet will be carbon neutral by 2050  
all other fleets will have to match or exceed that high bar





## What can Wind Propulsion deliver ?

"In 2030, the market potential could amount to 3,700–10,700 installed systems on bulkers, tankers & container vessels, associated with approx. 3.5–7.5 Mt CO<sub>2</sub> savings & 6,500–8,000 direct + 8,500–10,000 indirect jobs." EUReport 2017

EU estimates from 2017 – before those 2018 commitments made  
'BY 2030' 3,700-10,700 installations  
3.5-7.5Mt CO<sub>2</sub> savings  
14,000-18,000 jobs created  
These are now low figures

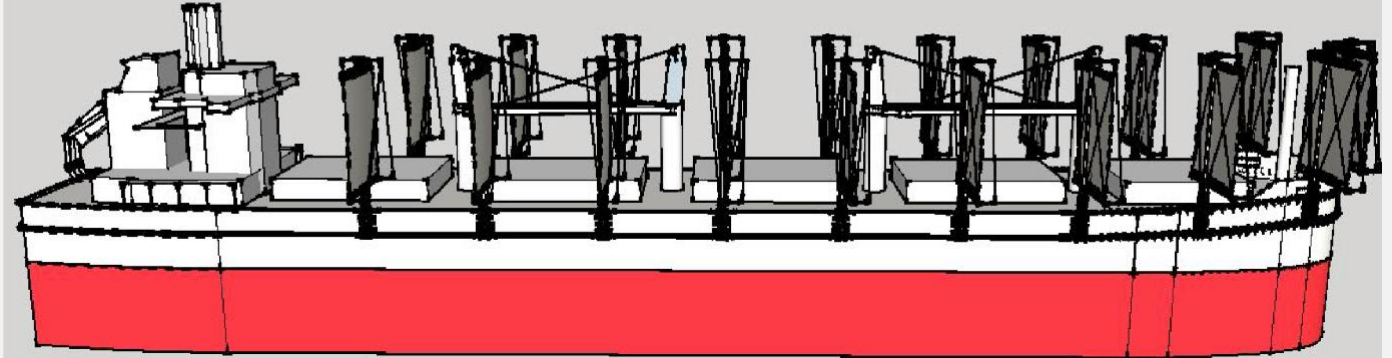


**RANGE OF WIND ASSIST DEVICES: NEW BUILD AND RETROFIT**

## THE TIG RIG RETROFIT SAIL SYSTEM

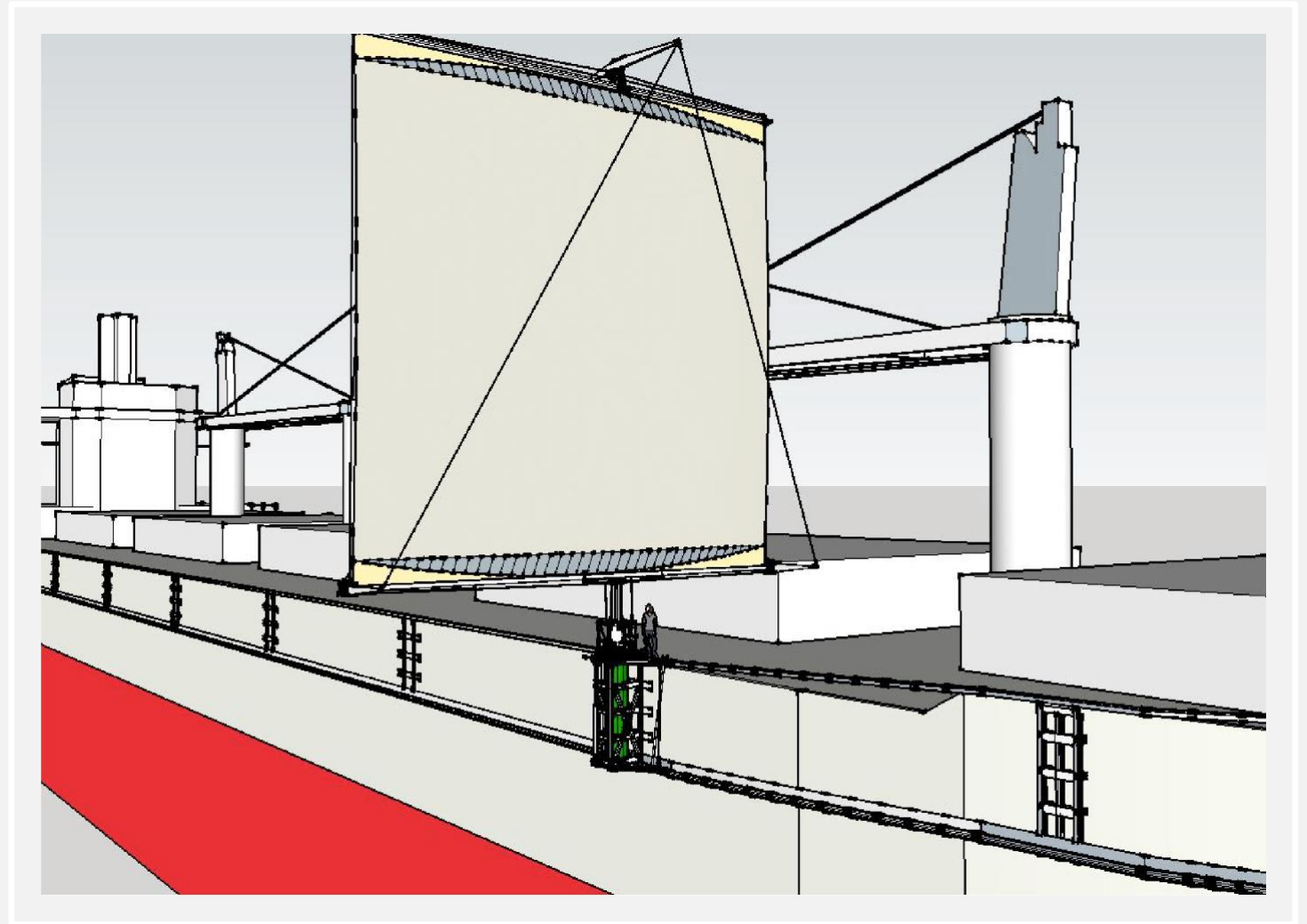
- **Self contained units**
- Fixed mounting points – interconnecting rails
- 360 deg rotation, reefing in 10ths
- Key automated mechanical safety overrides – reefing & mast release
- Out of way in port
- Universal mounting for masted wind assist devices

Tig Rig array on Green Dolphin 575 Handymax



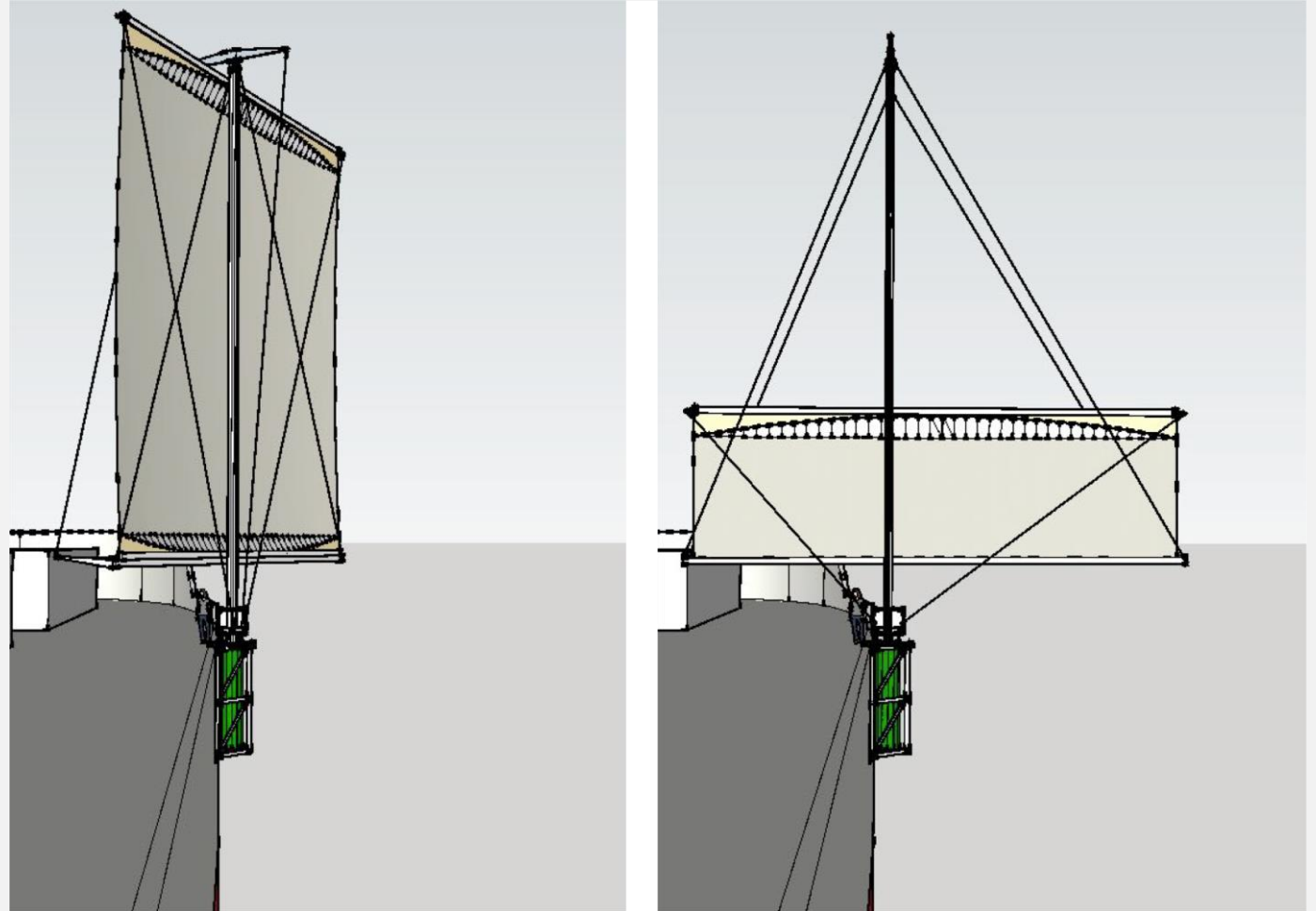
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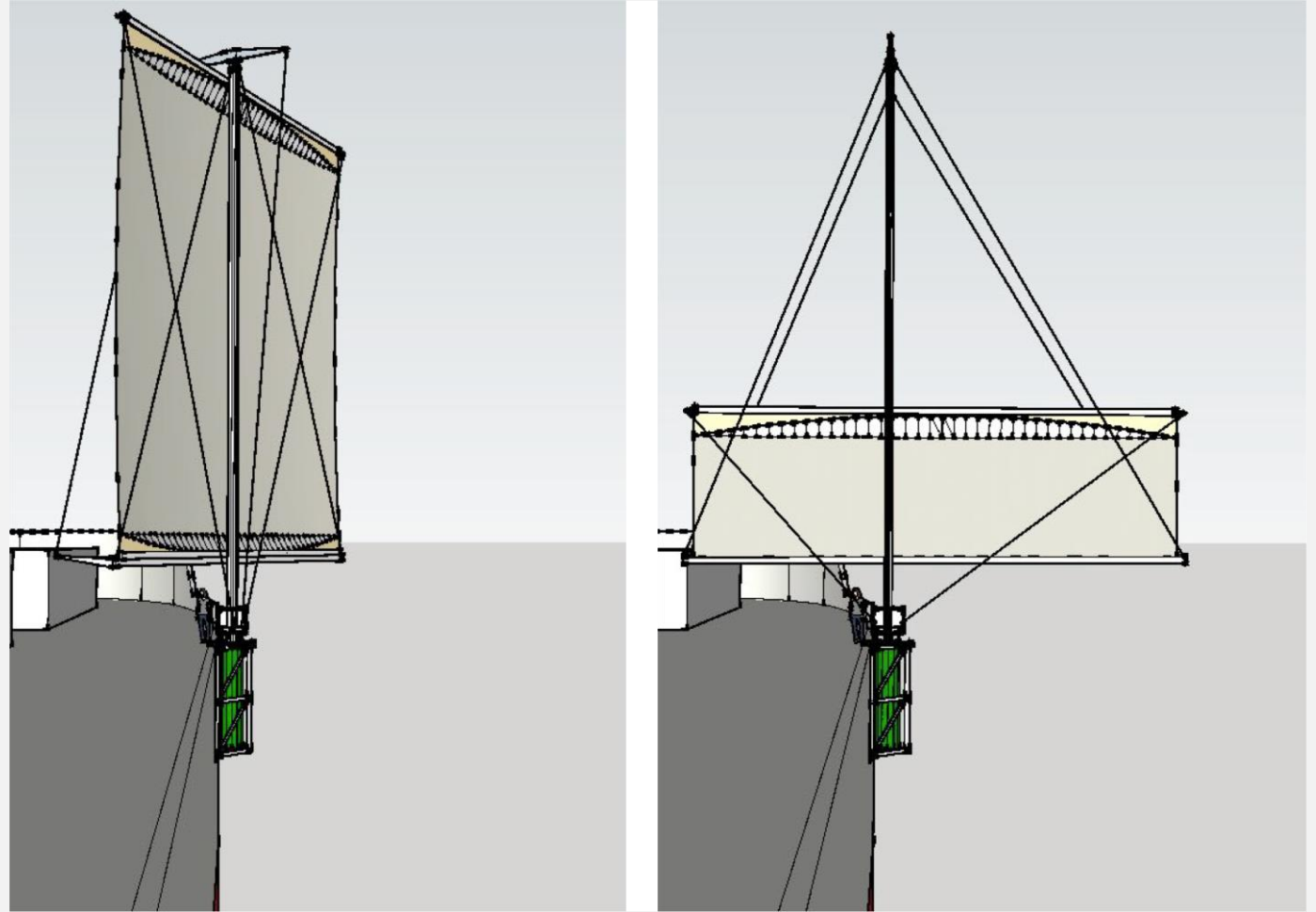
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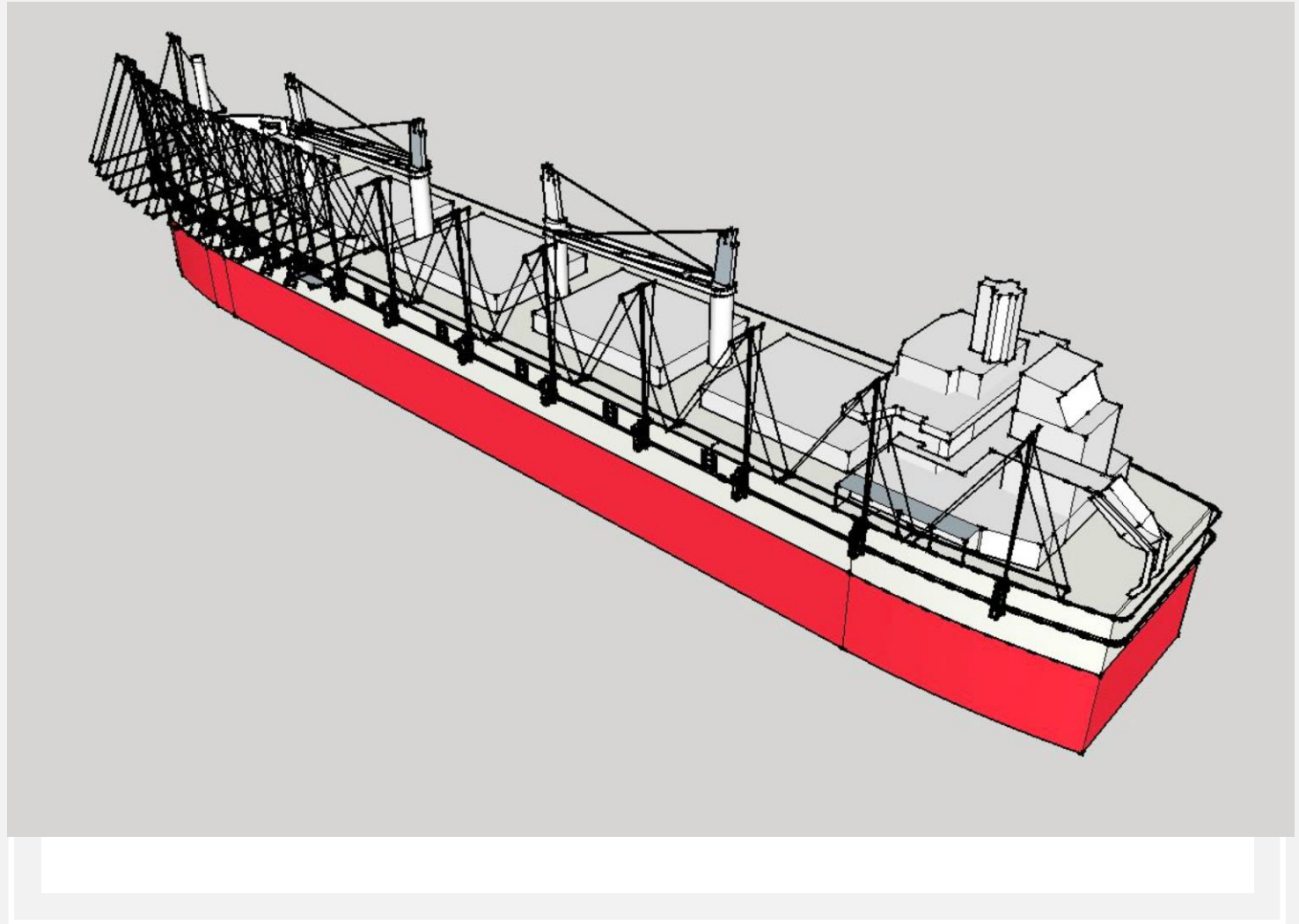
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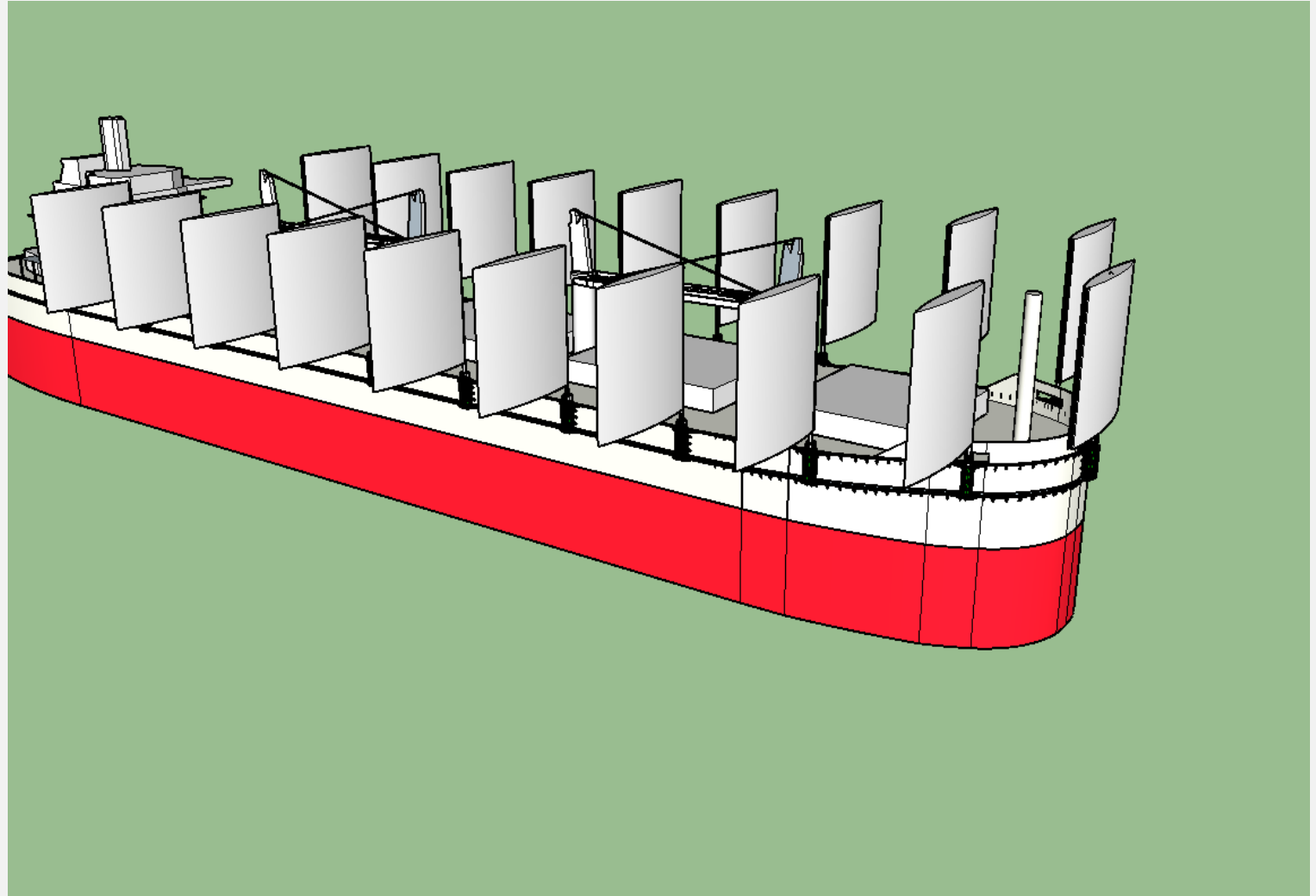
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# AND SO TO MARKET

## WIND TUNNEL TESTING AND ROUTING ANALYSIS FOR 60KDWT SHIP

- Wind tunnel tests conducted at Kiel in Germany – raw figures
- Specific routing analysis done by Marin – national maritime institute of Netherlands

# SUMMARY OF EIV SAVINGS FROM MARIN

Expanded Summary EIV savings from Marin							
10	11	12	13	14	15	16	Ship speed in knots
7.0%	5.5%	4.0%	3.0%	2.0%	1.5%	1.0%	MEPC 62/INF.34
7.0%	5.0%	3.0%	2.0%	1.0%	0.5%	0.0%	English Channel to New York Great Circle
21.0%	17.0%	13.0%	10.0%	7.0%	5.5%	4.0%	New York to English Channel Great Circle
14.0%	11.0%	8.0%	6.0%	4.0%	3.0%		Average
9.0%	7.0%	5.0%	3.5%	2.0%	1.5%	1.0%	San Francisco to Taiwan Strait Great Circle
19.0%	15.0%	11.0%	9.0%	7.0%	5.0%	3.0%	Taiwan Strait to San Francisco Great Circle
14.0%	11.0%	8.0%	6.3%	4.5%	3.3%	2.0%	Average

## **COSTINGS AND PAYBACK: STRAIGHT SALES**

- Cost of installation of rails and computer hardware about \$250,000
- Cost of units – must come to around \$30,000 - \$43,050 to customer
- Cost of complete installation to owner of 60,000 DWT tanker \$1m
- Fuel savings with \$600/mt fuel x 17t/day @ 8%= \$850/day

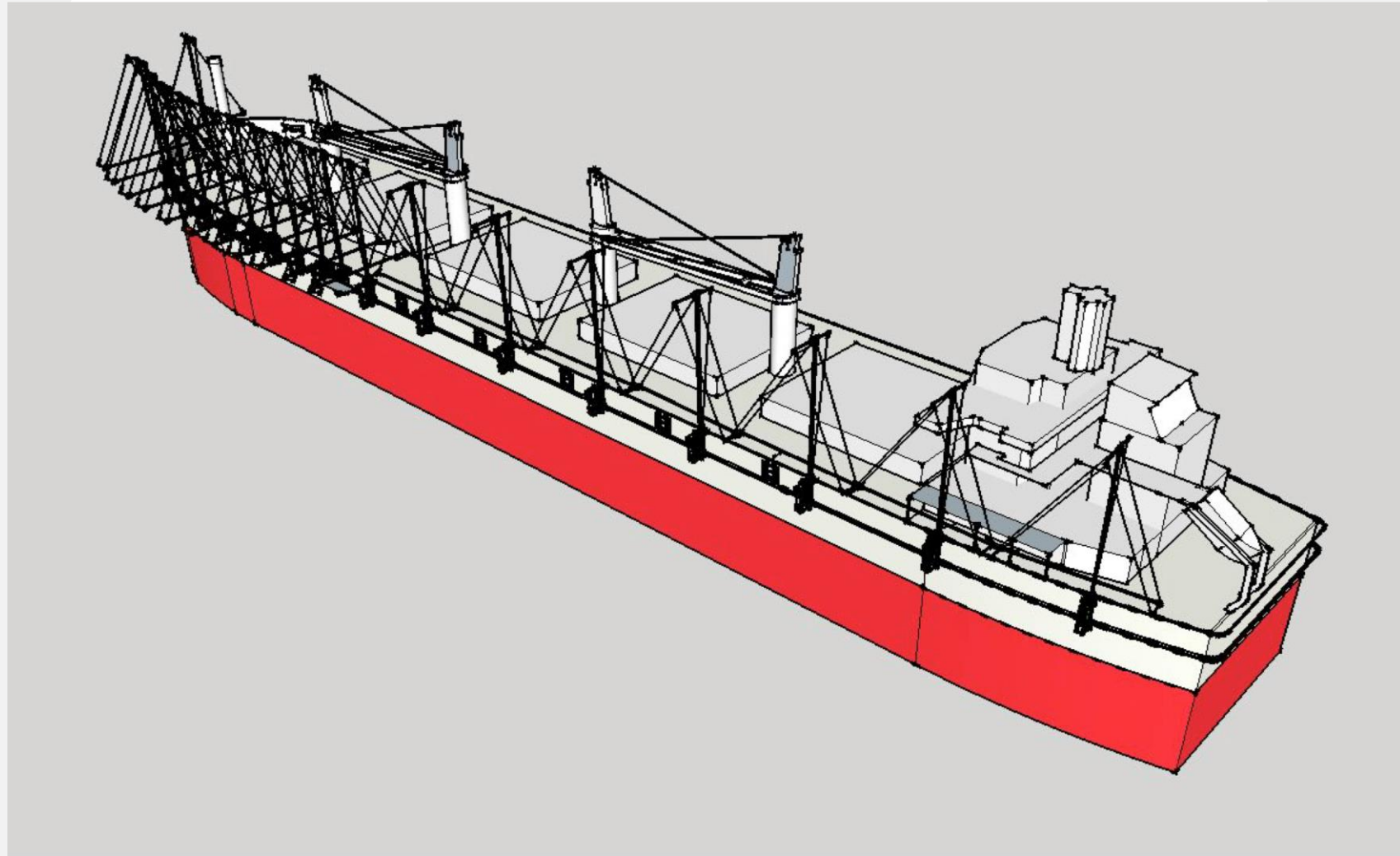
**ROI 3.5 years**

On current carbon pricing regime it is marginal:  
If fuel was \$1,200/mt it would be a no brainer

# PROFIT SHARE RENTAL PLAN

## THE TIG RIG RETROFIT SAIL SYSTEM

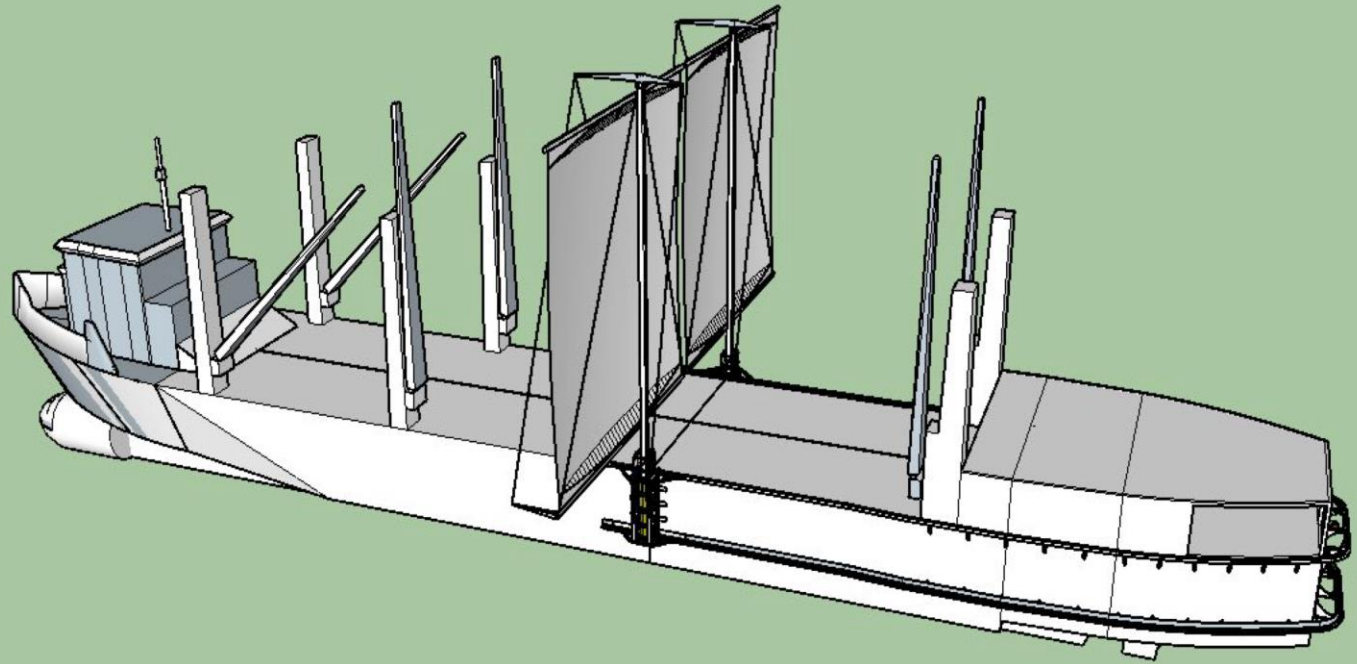
- **Solution to problem of split incentive in lease market**
- Ship owner installs mounting and rails for \$200k-\$300k
- Charterers rent units on a profit share basis – cash flow positive from day 1
- Investors need deep pockets but gain from depreciation on units still charging the same rents
- Half of 1% of market/year with good rental renewal B/E Y4
- Y6 \$150m in bank WITHOUT reckoning depreciation or carbon trading credits



## THE TIG RIG: FIRST CLIENT

- Working with innovative ship designer committed to Tig Rig system
- Cargo on deck – not suitable for Flettners
- 2 units to be controlled from bridge/manually by crew
- Crew get fuel savings bonus
- Fuel savings of 24%
- Software writers able to de risk writing of array software

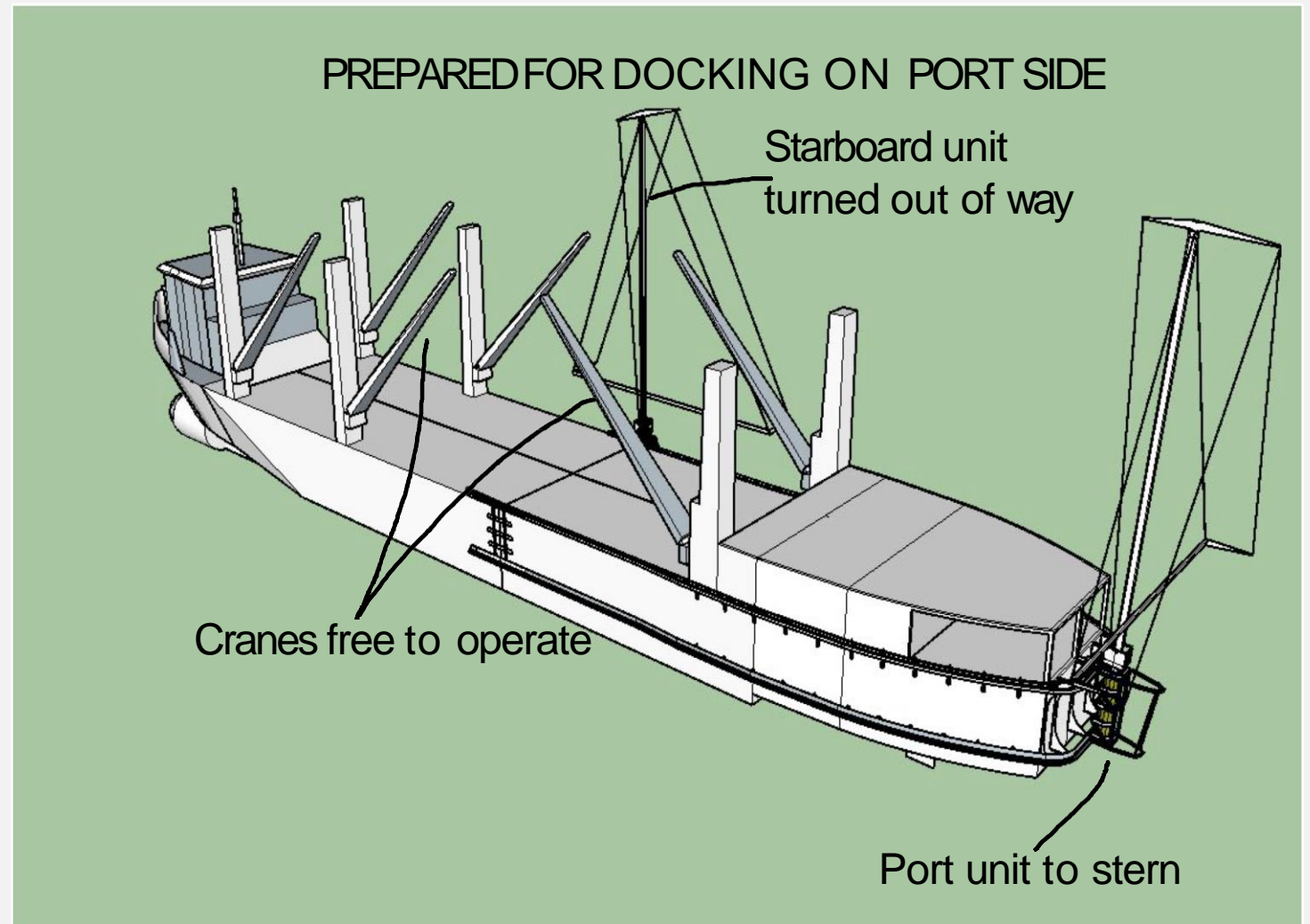
## MY FIRST CLIENT?



2,000 DWT ship 12 knots max speed

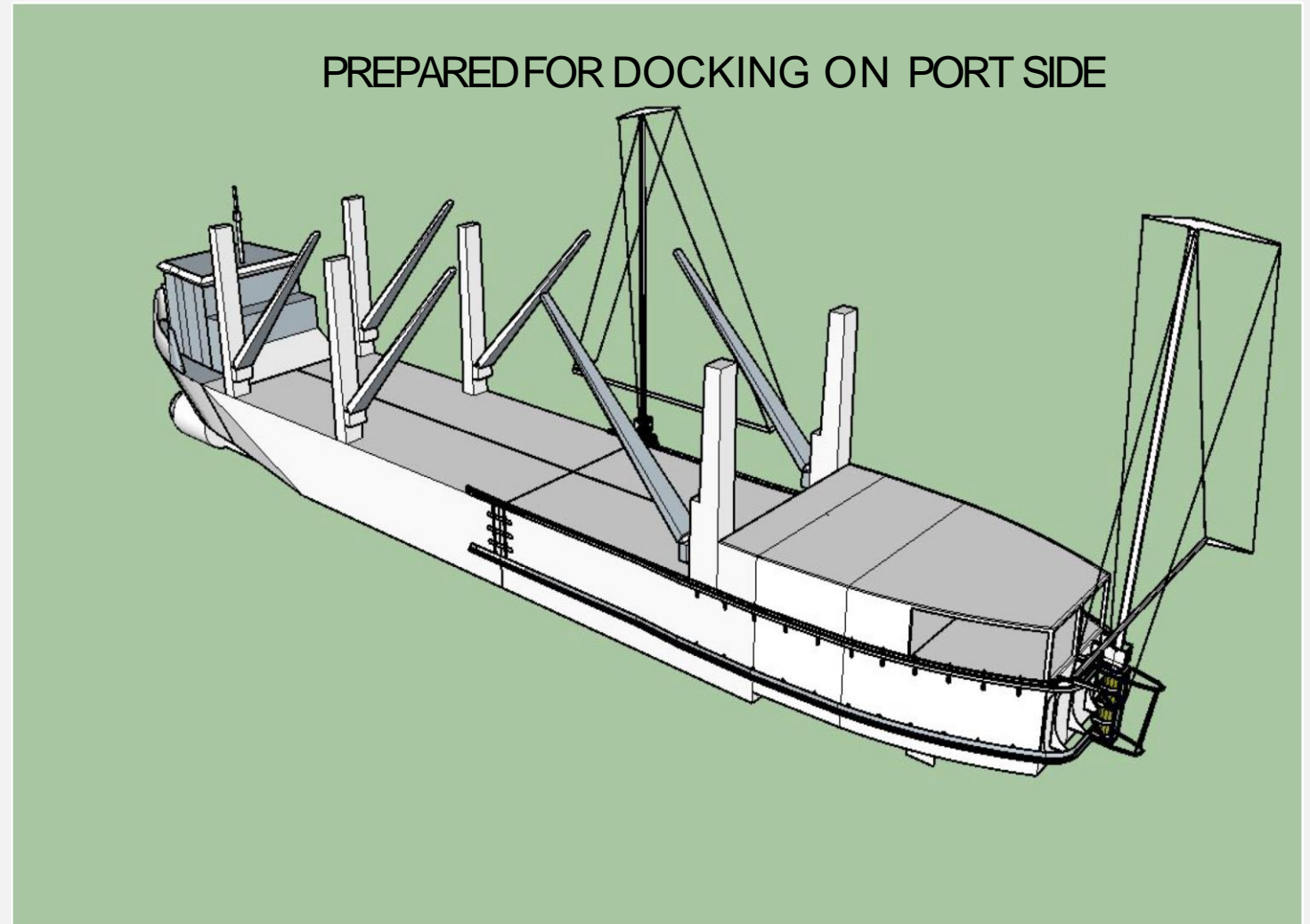
## THE TIG RIG: FIRST CLIENT

- Port unit moved round to stern
- Stbd unit reefed down and turned in line of deck out of the way
- Rails add 460mm - 18" to hull – easily fendered

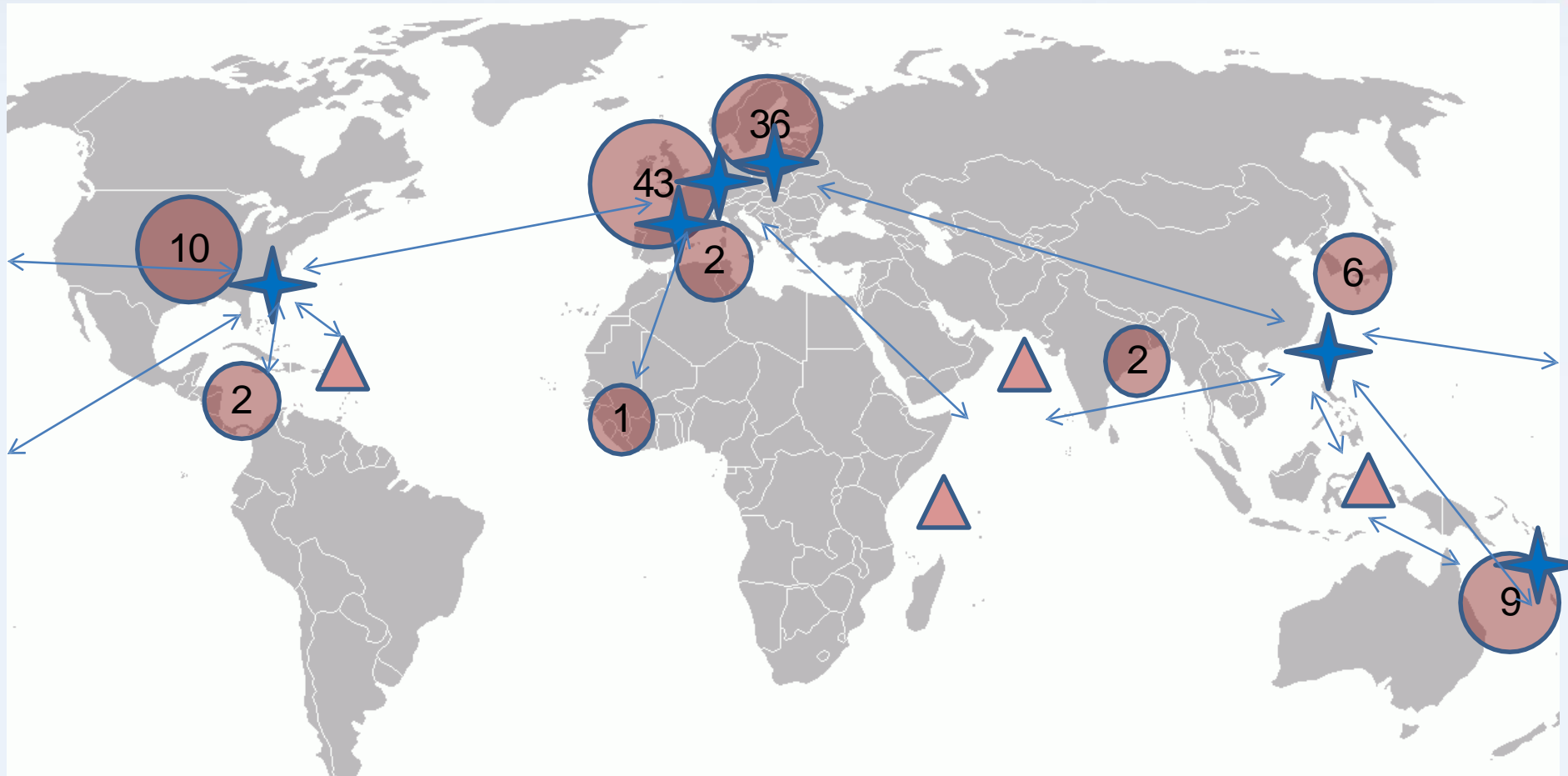


THE TIG RIG:  
PRETTIEST BABY  
COMPETITION

- Standardised mounting system
- This ship ideal test bed to compare masted wind assist
- Issues around that which we can discuss



# International Wind Propulsion Hub Network



Wind Propulsion Role in Decarbonizing Shipping - Port of Vancouver, 27 Mar 2019



ANOTHER IWSA SLIDE:

PLANS FOR WIND ASSIST HUB NETWORK

IN DISCUSSION TO ESTABLISH VANCOUVER AS A GLOBAL CENTRE OF EXCELLENCE  
IN THE NEW LOW/ZERO CARBON SHIPPING TECHNOLOGIES



## Requirements for HUB Selection

1 – active port city

2 – centre of shipbuilding

3- centre for renewables/green energy/innovation

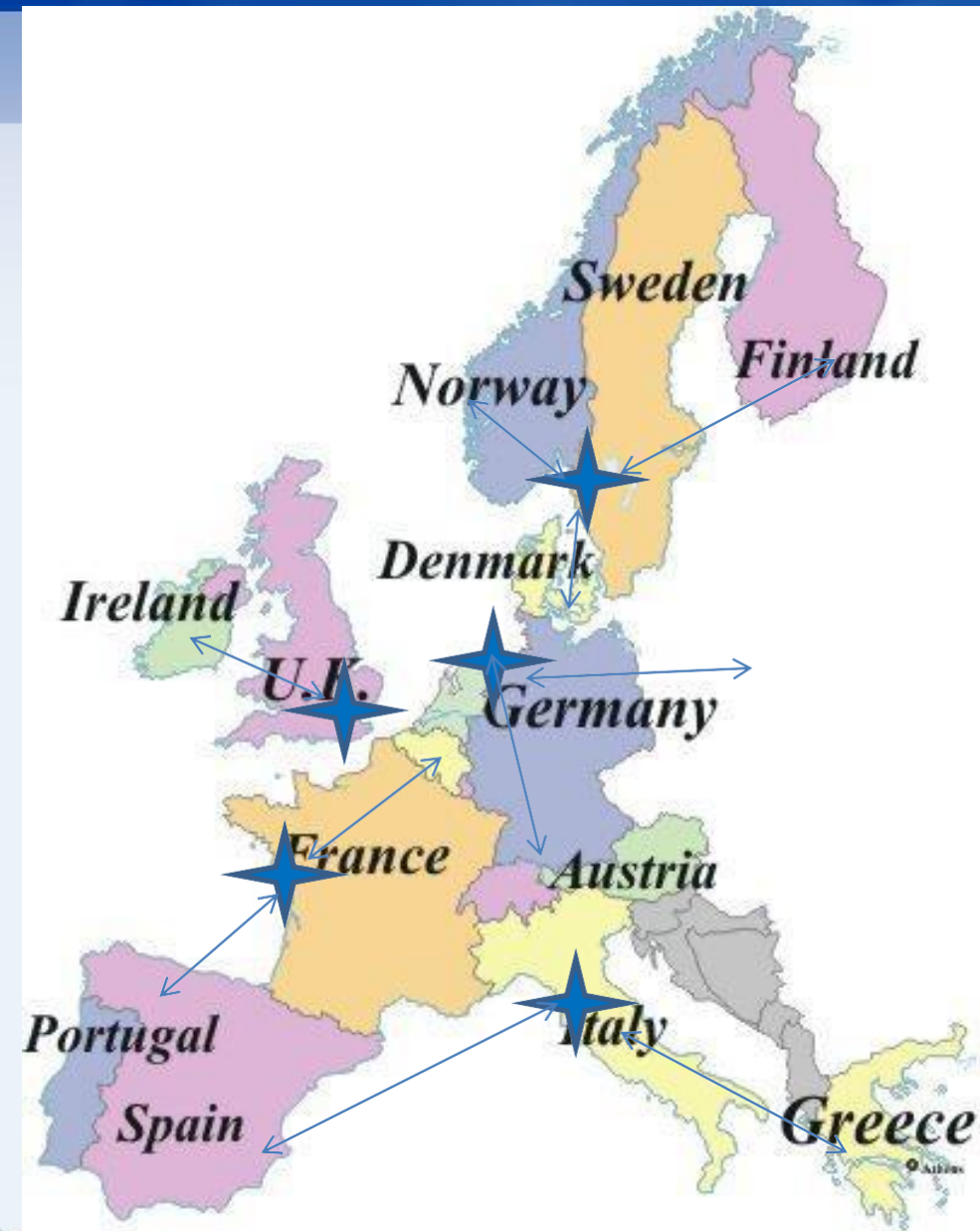
4– tradition of sail/wind propulsion + current commercial wind propulsion projects nearby.

5 – engineering base

6– maritime university/academic centre

7 – pro-active local & regional govt.

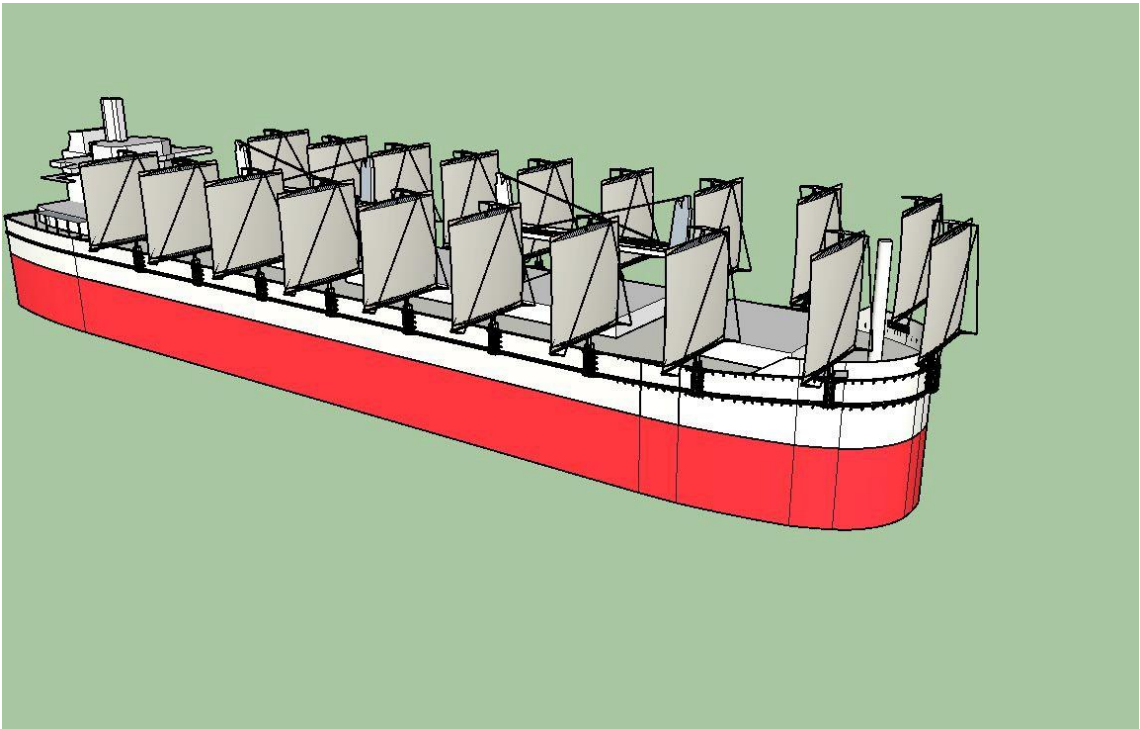
8 – progressive civil society



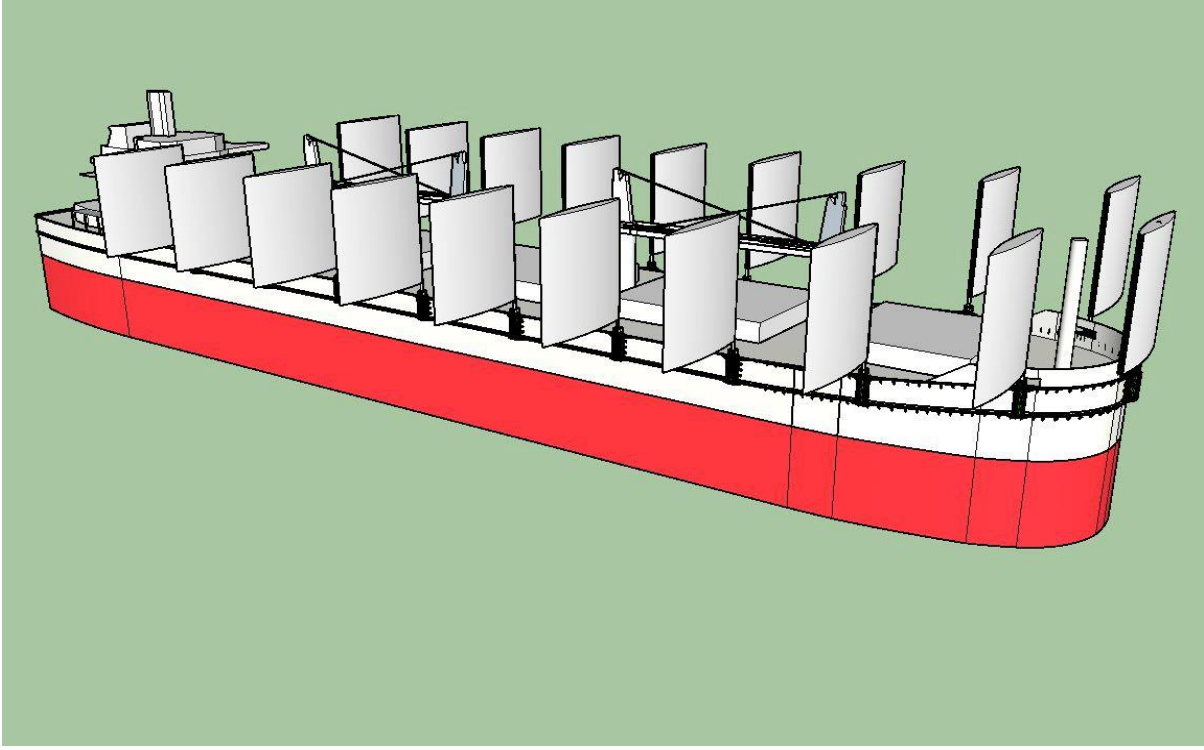
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**CANADA HAS MORE DIRECT INCENTIVE THAN ANY OTHER G7 NATION  
TO TAKE A LEAD IN THIS NEW TECHNOLOGY/BUSINESS**



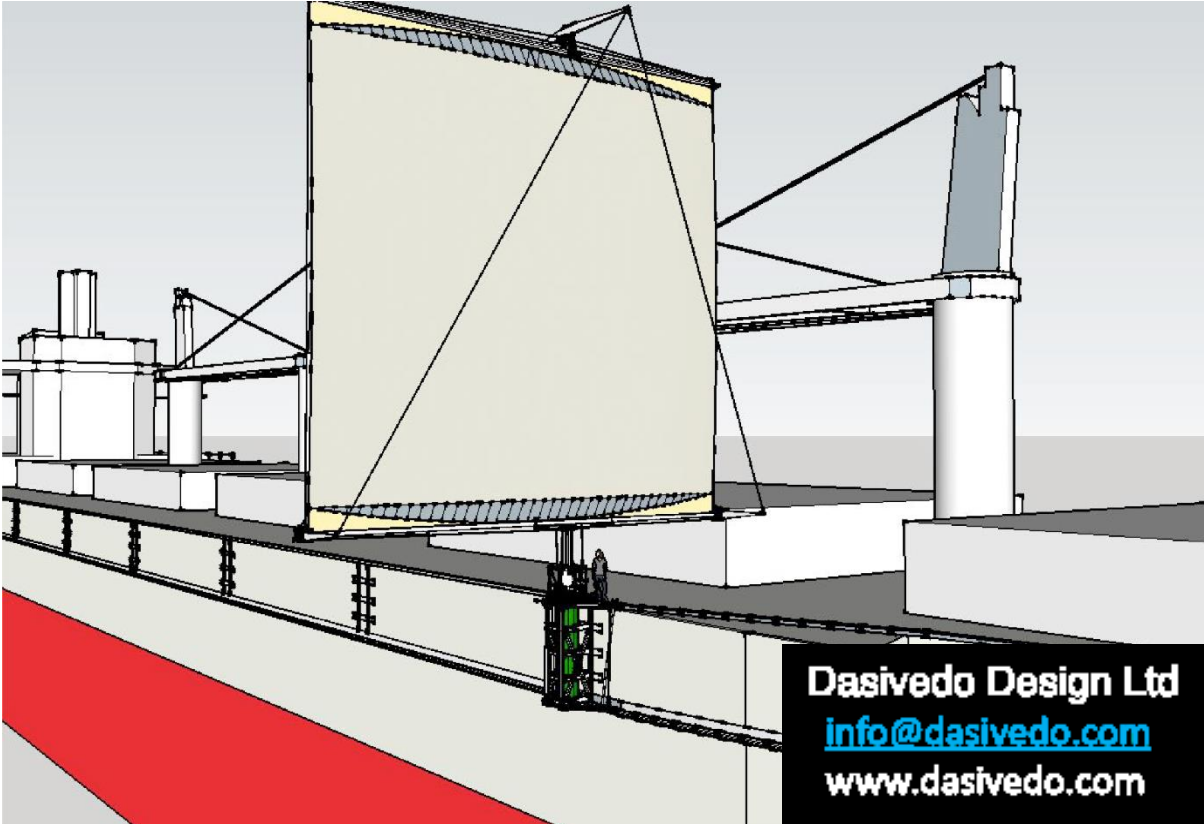
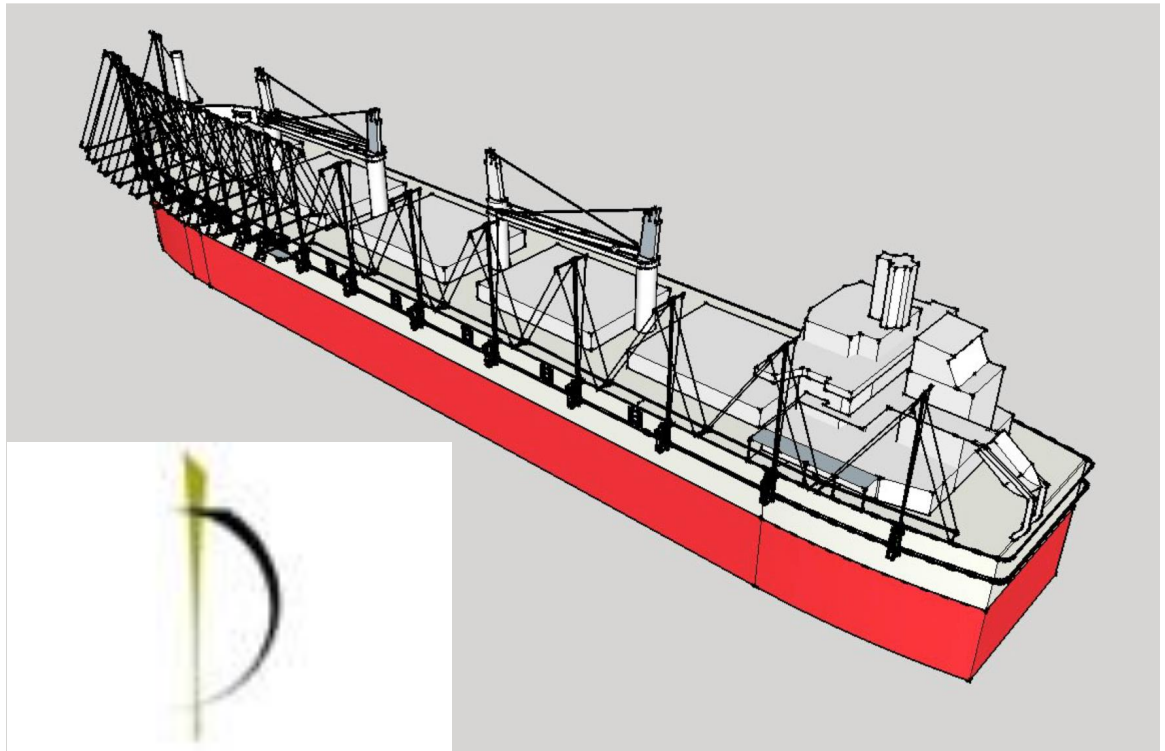
THE TIG RIG RETROFIT SAIL SYSTEM:  
SYSTEM:  
FUTURE PROOF YOUR SHIP FOR A  
WINDASSISTED FUTURE



ENGAGING

ENABLING

EMPOWERING



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