Weather Routing for Wind Propulsion Vessels
Key Ingredient for Decarbonization

ZESTA28 @LISW 2023

Jori Poikola  Sales Director

napa.fi
Agenda

• NAPA introduction
• Weather Routing - a must for Wind propulsion ships
• Sumitomo-Norsepower-NAPA study
• Solutions to Challenges of Veer
• Solutions to Challenges of Wah Kwong
• Conclusion
NAPA – for efficient and safe ship designs and operations

World-leading Software, Services and Data Analysis for Ship Design and Operation

- 95% of newbuilds yearly built by NAPA customers
- 12,000 active users for NAPA applications
- 200 employees
- Over 30 years of experience
Weather Routing - a must for Wind propulsion ships

VOYAGE SIMULATION INPUTS:

- Ship’s performance model (Digital Twin)
- Operational conditions
- Voyage plan
- Wind-propulsion device characteristics

Optimizing for profit, CII score or fuel consumption might yield very different results

Understanding the sensitivity of the outcome to the different decisions is crucial
Weather Routing - a must for Wind propulsion ships

**CONCEPT / DESIGN PHASE:**
Support for commercial and technical decision making

**VESSEL IN OPERATION:**
Verifying performance and further Improvement by Voyage Optimization software
**Simulation method – NAPA Fleet Intelligence**
- Optimized voyages to have minimum fuel cost by using NAPA Voyage Optimization technology
- Weather data: Nowcast in 2022
- Fixed ETA/ETD

**Ship model – Tanker**
- Ship specific configuration was provided by Sumitomo

**Wind assisted device**
- Norsepower rotor sails
- 30 m (H) * 5 m (D) * 4 pcs

---

**6 Routes**

**4 Cases**

**SHIP:** Conventional or wind assisted ship

**ROUTE:** Base or optimal route
Results – Norsepower / Sumitomo / NAPA study

Route: Amsterdam ⇔ New York (Total 48 voyages in 2022)

<table>
<thead>
<tr>
<th>Case</th>
<th>CO₂ emission</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CONVENTIONAL</td>
<td>Base</td>
</tr>
<tr>
<td>2</td>
<td>Optimal</td>
</tr>
<tr>
<td>3 WIND ASSISTED</td>
<td>Base</td>
</tr>
<tr>
<td>4</td>
<td>Optimal</td>
</tr>
</tbody>
</table>

**Average CO₂ saving**

Wind assisted + optimal route 28%

Optimal route contribution 12%

---

**Apparent wind comparison (2 ⇔ 4)**

- Base route
- Wind assisted ship / optimal route
- Conventional ship / optimal route

Amsterdam to New York route
Solutions to Challenges of Veer

1. **CHALLENGE: Stakeholder confidence – Long-term contracts**
   Collaborative studies with key stakeholders using e.g. voyage simulation technology brings critical insight to inform commercial and operational decisions at the design stage.

2. **CHALLENGE: Business model**
   Although the vessel is primarily wind powered there is times when wind is mild and hydrogen will be used as auxiliary power. Then impact of Operational optimization through Weather routing is even bigger due to Green hydrogen being premium priced compared to traditional fuels.

3. **CHALLENGE: Crew training**
   The complexity of optimal weather routing for wind propulsion ships is beyond human capabilities, thus it’s of very essence that the weather routing software is easy to use and requires no lengthy training courses for crew.
Solutions to Challenges of Wah Kwong

RECOMMENDED SOLUTION IS COMBINATION OF

• Low/Zero Carbon fuels
• Carbon Capture Systems (CCS)
• Wind propulsion devices
• Weather routing software
Conclusion

Optimal weather routing
A must for Wind propulsion ships

Data driven ship design
Crucial step for Business model and technical verification

Understanding the vessel's technical and naval architectural aspects
Key to Operational Optimization and Competitiveness of your fleet

MAKE SURE YOU HAVE THE BEST WEATHER ON YOUR ROUTE FOR DECARBONIZATION!