The next big thing...

Chevron Shipping Company
Chevron Shipping Company
Mission

Mission
Chevron Shipping Company is the Marine Center of Expertise for Chevron. We provide safe, reliable and cost-competitive marine transportation, manage marine risk, and add value to the enterprise through our operations, technical, project, and commercial support to our customers.
Chevron Shipping Company Summary
by the numbers

- 1 billion barrels transported annually
- 123 years since first ship launched
- 15 years zero cargo spills
- $2 billion annual freight spend
- 2,000 employees from 20 countries
- 30 operated vessels

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Global Support of Chevron Operations
Enhancing value across the enterprise

Technical, construction, operational, commercial and legal support for:
- Ongoing Chevron operations (including joint ventures and affiliates)
- New major capital projects
- New business development
Under regulated?
### Regulations Timeline

<table>
<thead>
<tr>
<th>Year</th>
<th>NOx</th>
<th>SOx</th>
<th>CO₂</th>
<th>Other Regulations</th>
</tr>
</thead>
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<tr>
<td>2013</td>
<td>Tier III NOx N America ECA</td>
<td>0.1% LSFO ECA</td>
<td>Phase 0 EEDI</td>
<td>USCG BWDS 1500-5000 m³</td>
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<td>2020</td>
<td>0.5% LSFO worldwide</td>
<td>Tier III NOx Baltic/North Sea</td>
<td>Phase 2 EEDI</td>
<td>USCG BWDS &lt;1500 m³</td>
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<td>2025</td>
<td>Phase 3 EEDI</td>
<td>Possible Future Regulations</td>
<td></td>
<td>EU IHM Existing &amp; Non-EU</td>
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</tbody>
</table>

#### Tier III NOx
- **N America ECA** (2013)
- **Baltic/North Sea** (2020)

#### Other Regulations
- **USCG BWDS**
  - 1500-5000 m³
  - <1500 m³

- **US EPA VGP2**
- **US EPA VGP3**
- **VGP4**
- **BWMC 08 Sept 2017**
- **Polar Code Jan 2017**
- **Revised IGC Code**
- **EU MRV**
- **BWMC 08 Sept 2017**
- **EU IHM**
- **MBM**
- **Underwater Noise**
- **Bio-fouling**
- **Ship Recycling**
- **Black Carbon**
- **EU IHM Existing & Non-EU**

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1. **Tier III NOx**
2. **CO₂**
3. **SOx**
4. **USCG BWDS**
5. **US EPA VGP2**
6. **US EPA VGP3**
7. **VGP4**
8. **BWMC 08 Sept 2017**
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11. **EU MRV**
12. **EU IHM**
13. **MBM**
14. **Underwater Noise**
15. **Bio-fouling**
16. **Ship Recycling**
17. **Black Carbon**
18. **EU IHM Existing & Non-EU**
The International Chamber of Shipping (ICS) fears ‘chaos and confusion’ unless the International Maritime Organization (IMO) urgently resolves issues concerning the successful implementation of the 0.5 percent sulfur cap. – World Maritime News

2020 Sulfur Cap - Panic And Shock Ahead? – Seeking Alpha

IMO 2020 poses ‘big risks’ – Tradewinds

Will IMO 2020 Introduce Mayhem Or Opportunity To The Refining And Marine Sectors? – Forbes
Chevron Shipping Company
Operated Fleet

Operated Fleet
9 Very Large Crude Carriers
3 Aframax Tankers
3 Lightering/Shuttle Ships
10 Liquefied Natural Gas Carriers
4 U.S. Flag Tankers

Operated Fleet provides
• A core component of Chevron’s marine transportation requirements
• World-class safety and environmental performance
• Transferable experience

Size and scale
Operated Fleet Upgrades Through Modernization

VLCC
- Scrubber (85% SOx reduction)
- Tier III engine (75% NOx reduction)
- Ballast water treatment system
- Fuel efficient design (20% lower fuel consumption)

Aframax
- Scrubber (85% SOx reduction)
- Tier III engine (75% NOx reduction)
- Ballast water treatment system
- Fuel efficient design (20% lower fuel consumption)

Suezmax
- Scrubber (85% SOx reduction)
- Tier III engine (75% NOx reduction)
- Ballast water treatment system (BWTS)
- Fuel efficient design (30% fuel savings)
Fleet Upgrade Highlights

New hull design
2%+ efficiency increase in calm water
10%+ efficiency increase in sea state 6
due to sharper bow with less resistance
from wave reflection

Propulsive Energy Saving Devices
Wake Equalizing duct combined with a
rudder bulb give ~4% efficiency increase

Main Engine Fuel Consumption
Current 12yrs old VLCC: 113 mt/day vs
New VLCCs: 82mt/day

Sulfur Scrubber
Meets or exceeds worldwide sulfur
emissions standards
**NOx Reduction Technology**
Main Engine: Exhaust Gas Recirculation
Auxiliary Generators: Selective Catalytic Reduction

**SW Cooling System and E/R Ventilation System Energy Saving Device Variable**
Frequency Drive controlled motors match motor speed with cooling and ventilation demands instead of running 100% power all the time

**Variable Frequency Drives on Ballast Pump Motors**
Allows for control of ballast rate by reducing pump output instead of throttling discharge valve on pump that is always running 100% power

**Waste Heat Recovery Device on 2 Auxiliary generators**
Our first ships to recover energy (in the form of steam) from generator exhaust. 600kg/hr of steam made for heating purposes with no additional fuel burned. (Always standard on main engines.)
Commercial Operations
Managing Chevron’s marine transportation requirements

One of the largest tanker charterers in the world

- Transports crude, products, LNG, LPG, and chemicals for Chevron operating companies and affiliates
- Charters quality third-party tonnage to supplement the operated fleet
- Worldwide commercial staff manages more than 2,000 voyages per year
- Handles voyage operations, demurrage and other claims management
- Co-located with key Chevron partners in five offices around the world
• VLGC – 2 Ships, 5 year agreement

  Scrubber (85% SOx reduction)
  Tier III engine (75% NOx reduction)
  Ballast water treatment system (BWTS)
  “Green” fuel efficient design
How are we doing?

VLCC Fuel Consumption through 1997-2018

YEAR


FUEL CONSUMPTION (MT)

50 60 70 80 90 100

Shrontz Maria Aries Arcturus HNS441s (New VLCCs)
Fleet Emission Reduction from 2000 to 2018

- **CO₂**: Base (pre 2000) - 37%, VLCC - 33%, Suezmax - 20%, Aframax - 13%
- **SOx**: Base (pre 2000) - 9%, VLCC - 1%, Suezmax - 1%, Aframax - 1%
- **NOx**: Base (pre 2000) - 61%, VLCC - 8%, Suezmax - 8%, Aframax - 11%
What’s Next?

At Berth
Cold Ironing, Capture and Control

GHG
IMO Strategy
40% reduction in carbon intensity by 2030, 70% by 2050

Short Term
Modifications, On-time arrivals

Longer Term
Alternative Fuels
Biofuels, wind, battery, ammonia, hydrogen, nuclear

VOC, Underwater Noise, Bio-fouling, Black Carbon

MBM – Carbon trading, carbon tax, bunker tariffs
the next big thing!

No surprise… Green House Gases -- We’re moving towards zero carbon.

It may seem like a long time from now, but we need to be planning today if we’re going to surf the wave.

Todays vessels will be operating in 2030.

It’s time to design ships that meet \textit{post 2030} requirements to be ready for 2050.