LNG as Fuel Business Case
Stress Test- Robust or Fragile

Marine Money Offshore
Houston Offshore Finance Forum
St. Regis Hotel
Houston, TX
31 March 2015

John Hatley PE
LNG Initiatives (MBA, MSE)
Americas VP Ship Power
Wartsila North America
Cell 281 221 4209
john.hatley@wartsila.com
Americas Shale Gale in Gas & Oil, robust / fragile?

Global Energy Policies, market gamesmanship?

Feast & Famine preservation?

Future Ahead, structural shifts?
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<td><strong>Why ?</strong></td>
<td>5 Drivers Set Investment Clock</td>
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| **Oil Price Shock !** | Business Case: Robust or Fragile ? |}
<p>| <strong>Sustainability</strong> | Feast &amp; Famine                                                  |
|             | Cash Preservation                                                |
| <strong>Conclusions</strong> | Recent Market Signals                                           |
|             | The Future Decade for Gas                                       |</p>
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Cash Preservation |
| **Conclusions** | Recent Market Signals  
The Future Decade for Gas |
Proven LNG systems... reduce risk for yard, owner, & banker... extends LNG value proposition to end customer
Natural gas a mixture of hydrocarbon gases associated with petroleum deposits, principally methane.

Methane has the highest hydrogen to carbon ratio = lowest CO2.

- Methane: $\text{[CH}_4\text{]}$ 4:1 (400%)
- Ethane: $\text{[C}_2\text{H}_6\text{]}$ 6:2 (300%)
- Propane: $\text{[C}_3\text{H}_8\text{]}$ 8:3 (267%)
- Butane: $\text{[C}_4\text{H}_{10}\text{]}$ 10:4 (250%)

Natural gas... lowest carbon = cleanest burning fuel
How clean?

LNG provides significant emission reductions compared to traditional diesel engines.

<table>
<thead>
<tr>
<th>Emission</th>
<th>DF Natural Gas Engine</th>
<th>Diesel Engine</th>
</tr>
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<tbody>
<tr>
<td>CO₂</td>
<td>-25%</td>
<td>-99%</td>
</tr>
<tr>
<td>NOₓ</td>
<td>-85%</td>
<td>-99%</td>
</tr>
<tr>
<td>SOₓ</td>
<td>-99%</td>
<td>-99%</td>
</tr>
<tr>
<td>Particulates</td>
<td>-99%</td>
<td>-99%</td>
</tr>
</tbody>
</table>
LNG provides compelling savings...
Business Cases demonstrate
Payback screen short term … <4 years...
Strong cash flows… Higher ROIC & EBITDA
Competitive Advantage
How much does LNG cost?

Why is WSF exploring LNG?

To save money -- the delivered price of LNG to the vessel by tank truck has been quoted as $1.05 to $1.32 per gallon. As of Aug.15, the current price of ultra low sulfur diesel is $3.37 per gallon. The fuel cost savings is approximately 40-50% at today’s pricing.

Source: Zeus LNG Fuel Seminar, August 31, 2011 Houston; Fleet Operators Perspective: Issues the LNG Industry Must Address, David Moseley, Assist Secretary Washington State DOT

The Math  \[ \text{LNG} \times 1.7 = \text{Diesel Gallon Equivalent} \]

\[ = \; \$1.05 \times 1.7 = \; \$1.78 \text{ gallon diesel equivalent} \]

\[ = \text{savings} \left( \$3.37 - \$1.78 \right) = \; \$1.58 \text{ per gallon} \]

August 2011 ...LNG captures compelling fuel savings .... nearly half cost of diesel
How much does LNG cost?

The LNG Decision (Operating Benefit)

- At the RFPQ stage, Shipyards were asked to quote diesel and LNG options:
  - Responses indicated that the difference in pricing was negligible; LNG business case is on fuel costs saved

<table>
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<tr>
<th>Diesel</th>
<th>LNG (In &quot;Diesel Litre Equivalent&quot;)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Cost of diesel fuel delivered</td>
<td>Unit Cost of LNG delivered</td>
</tr>
<tr>
<td>Reference Consumption</td>
<td>$0.37/DLE</td>
</tr>
<tr>
<td>Annual Fuel Cost with diesel (ULSD)</td>
<td>LNG Consumption (SFC, Stowage)</td>
</tr>
<tr>
<td></td>
<td>3,400,000 L/year</td>
</tr>
<tr>
<td></td>
<td>5,400,000 L/year</td>
</tr>
<tr>
<td></td>
<td>$3,298,000</td>
</tr>
<tr>
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<td>$1,176,000</td>
</tr>
</tbody>
</table>

**Savings**

- Annual fuel savings: $2,122,000/year
- Maintenance + L.O. savings: N/a
- Total: $2,122,000/year

June 2014... LNG captures compelling fuel savings .... nearly half cost of diesel
Europe’s decade LNG experience began offshore North Sea vessels… proven path for technology transfer to Americas
USA is world’s #1 gas producer…
US Shale gas production, by itself, exceeds all nations except Russia

Source: LNG for Marine Transportation USA, Houston TX, June 12, 2013; David Sweet President Natural Gas Roundtable
Emission Control Areas

More Emission Control Areas “ECA” likely soon
ECA Vessel Owner Choices

1. Consume compliant Ultra Low Sulfur Distillate… expensive champagne fuel

2. Switch to alternative fuel: safe, clean, abundant, affordable, & available natural gas as LNG

3. Alternative Compliance… install new technology scrubber … CAPEX, OPEX, space, weight, complexity, & operational tradeoffs

4. Abort the Port

ECA and SECA mandates force timely choices…
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Shale gas plays are vast and contain huge reserves of natural gas, nearly a century's supply.
Abundant Gas Supply

Paradigm shift to shale gas; now 42% of supply... future @ half

Source: http://www.eia.gov/forecasts/aeo/mt_naturalgas.cfm
US Shale Gas Production

Shale production surge... 2006 frantic... 2010 strong

- Eagle Ford TX
- Marcellus PA
- Haynesville LA
- Woodford OK
- Fayetteville AR
- Barnett TX
- Antrim MI, IN

Other US
Bakken ND

24% CAGR
41% CAGR
17% CAGR
Emission Control Area “ECA” US & Canada

ECA bubble encapsulates… any flag ships.. 200 nautical miles… low sulfur fuel (equivalence)… August 2012

Source: US EPA, Designation of North American Emission Control Area to Reduce Emissions from Ships
In Resolution MEPC.190(60), the IMO Marine Environment Protection Committee (MEPC) adopted amendments to MARPOL Annex VI to extend the Emission Control Area (ECA). This is intended to reduce emissions of sulphur oxides (SOx), nitrogen oxides (NOx), and particulate matter (PM) than the limits that apply globally.

Compliance with the emissions regulations is mandatory as from 1 January 2015.

The new appendix VII to MARPOL Annex VI contains the definition of the North American Emission Control Area (ECA), which is based on the 1983/World Geodetic System 1984 (NAD83/WGS84) (reference coordinate system). The new ECA does not come into force until 2014.

**Fuel sulphur limit**

When vessels are operating within the North American ECA established for SOx and particulate matter control, the sulphur content of fuel oil used on board must not exceed the following limits:

- 1.00% on or after 1 August 2012;
- 0.10% on or after 1 January 2015; or
- an equivalent method as approved (MARPOL Annex VI, Regulation 4).

Source: http://www.dnvusa.com/industry/maritime/publicationsanddownloads/publications/newsletters/technical_regulatory/2012/north_american_emission_control_area.asp
5 US Game Changers

US centuries shale gas supply

Emissions Control Area 2012

EPA Fuel Standards

2015

5 gas drivers … shale supply + bargain prices + 3 EPA mandates = set Investment Clock

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Recall Shale Gas

US Shale Gas Production

- Eagle Ford TX
- Marcellus PA
- Haynesville LA
- Woodford OK
- Fayetteville AR
- Barnett TX
- Antrim MI, IN

Shale production surge... 2006 frantic... 2010 strong

Shale .... huge reserves natural gas; nearly century supply

North American Shale Gas

(as of May...)

© Wärtsilä
Shale Oil Plays

US shale crude revolution; reserves exceed 120 billion BBL

US Shale Crude Production

Shale crude surging... 2006 growth strong; 2010 frantic

Exert Discipline in the Marketplace amongst OPEC and Non OPEC countries... Key market share focus

Saudi Arabia's $750 Billion Bet Drives Brent Oil Below $54

With Brent crude oil falling on Monday below $54 a barrel for the first time in more than five years, it is clear that Saudi Arabia is making a massive $750 billion bet in 2015 that the oil kingdom can endure lower oil prices longer than other major oil producing countries both within and outside OPEC, even including American shale.

A flood of new oil from U.S. shale producers and Canadian tar sands companies coupled with softening demand from China may have set the stage, but Saudi Arabia is now firmly driving the process that has seen oil prices plunge in a matter of months. Starting in October, Saudi Arabia indicated to global markets that it would not materially cut production alone and would restrain itself from cutting production unless other major oil producing countries also joined in such an effort.

“The most important thing for the Saudis is market share,” says Prof. F. Gregory Gause, a Saudi expert at Texas A&M University. “They are not going to sacrifice it, they will play chicken with other producers, whether Iranian or American shale producers, in order not to lose market share and the

Source: http://www.forbes.com/sites/nathanvardi/2015/01/05/saudi-arabias-750-billion-bet-drives-brent-oil-below-54/
Crude severe price drop since June as abundant supplies face weak demand
Oil Prices Dropping

Oil Slides to Near 6-Year Low; Saudi Arabia Holds Firm Despite Supply Glut

By Jake Rudn

26 January 2015

Oil fell from the lowest closing price in almost six years amid signs that Saudi Arabia’s new king will maintain its production policy, bolstering speculation that a global glut will persist.

Futures dropped as much as 2.7 percent in New York, extending last week’s 6.4 percent slide. King Salman, who took the Saudi throne on January 23, is reported to be in the closing stages of a plan. US crude sank toward $50, its lowest level since November 2009, according to Bloomberg.

Strong Supply : US shale boom + Libya restarts large oilfield…& Saudi Arabia not reducing supply

Soft Demand: China strong but tapering & EU slight recession…

Russia suffering double whammy:

Oil rich Ukraine and Black Sea burdened by politics under imposed sanctions as oil takes severe price slide...

Ruble plunges down 50% against USD


Source: http://online.wsj.com/articles/ruble-hits-new-low-as-oil-prices-drop-1417441184
Crude oil settles down 44 cents, at $45.15 a barrel

U.S. oil prices ended lower Monday, ahead of the first big snowstorm this year in the country’s Northeast, while benchmark Brent crude fell after pledges of no policy change by the top oil exporter Saudi Arabia after King Abdullah’s death.

An 11-year high in the U.S. dollar against other major currencies, and fears of fresh instability in the euro zone after a decisive Greek election victory by the Syriza party also limited any potential rebound in oil, traders said.

Source: http://www.cnbc.com/id/102366561#.
Key Oil Production Cost

Saudia Arabia Won't Win This Oil-Price Standoff

Crude Cost of Production Rises as Demand Grows

November 6, 2014

Profits negative...
Severe Pain

Profits squeezed..
Manageable Pain

Brent Breakeven Price

45 $/BBL

Total Liquids Production

<table>
<thead>
<tr>
<th>Country</th>
<th>Production (bbl/day)</th>
<th>Share of World %</th>
<th>Date of Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>10,590,000</td>
<td>14.05%</td>
<td>2014 est.</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>9,693,200</td>
<td>13.09%</td>
<td>2013 est.</td>
</tr>
<tr>
<td>United States</td>
<td>7,441,200</td>
<td>12.23%</td>
<td>2013 est.</td>
</tr>
<tr>
<td>China</td>
<td>4,372,000</td>
<td>5.15%</td>
<td>2014 est.</td>
</tr>
<tr>
<td>Canada</td>
<td>3,856,000</td>
<td>4.54%</td>
<td>2014 est.</td>
</tr>
<tr>
<td>Iran</td>
<td>3,518,000</td>
<td>4.14%</td>
<td>2014 est.</td>
</tr>
<tr>
<td>Iraq</td>
<td>3,400,000</td>
<td>3.75%</td>
<td>2013 est.</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>3,087,000</td>
<td>3.32%</td>
<td>2013 est.</td>
</tr>
<tr>
<td>Venezuela</td>
<td>3,023,000</td>
<td>3.56%</td>
<td>2013 est.</td>
</tr>
<tr>
<td>Mexico</td>
<td>2,934,000</td>
<td>3.56%</td>
<td>2013 est.</td>
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<tr>
<td>Kuwait</td>
<td>2,682,000</td>
<td>2.96%</td>
<td>2013 est.</td>
</tr>
<tr>
<td>Brazil</td>
<td>2,633,000</td>
<td>3.05%</td>
<td>2013 est.</td>
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<tr>
<td>Nigeria</td>
<td>2,525,000</td>
<td>2.62%</td>
<td>2013 est.</td>
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<tr>
<td>European Union</td>
<td>2,107,001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Norway</td>
<td>1,998,000</td>
<td>2.79%</td>
<td>2013 est.</td>
</tr>
<tr>
<td>Algeria</td>
<td>1,885,000</td>
<td>2.52%</td>
<td>2013 est.</td>
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<tr>
<td>Angola</td>
<td>1,840,000</td>
<td>2.31%</td>
<td>2013 est.</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>1,635,000</td>
<td>1.83%</td>
<td>2013 est.</td>
</tr>
<tr>
<td>Qatar</td>
<td>1,631,000</td>
<td>1.44%</td>
<td>2013 est.</td>
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Severe shortfalls @ prices under 100$/BBL, present oil glut & soft prices challenge sustainability beyond short run
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Traditional View Sustainable Growth

% Sales Growth

% Return on Assets ROA

CASH DEFICITS:
Consuming CASH

CASH SURPLUS:
Generating CASH

Balanced Growth
$g^* = R \times T \times ROA$
Sustainable Growth Curve  $g^*$ Insights

New sales require new assets

- $g^* = \frac{\text{Change in Equity}}{\text{Equity begin of period}}$

- $g^* = \frac{R \times \text{Earnings}}{\text{Equity bop}}$

- Balanced Growth
  $g^* = R \times \text{ROE bop}$

- $g^* = P \times R \times A \times T$

- Balanced Growth
  $g^* = R_T \times \text{ROA}$

$g^* = \text{Sustainable Growth}$

ROE = return on equity

Financial Policy

R = retained earnings
  = 1 – dividend ratio

T = Leverage

Operating Performance

P = Profitability

A = Asset Turnover
Offshore Cyclical Turns

**FEAST**

I have so much work, can’t stand it any more.
I’m so good that clients keep coming.
I must raise my rates!

**FAMINE**

No work in one week! Is it the economic crisis?
I must reduce my rates!

Feast or Famine…

Source: http://mox.ingenierotraductor.com/2012/11/feast-or-famine.html
Famine Market: Poor Sales & Utilization, Profits Challenged

Actions...

- Sell new equity… dilutes existing shareholders… lowers stock price
- Increase financial leverage… if banks allow at reasonable terms which increases costs of borrowing and raises risk, expand credit revolvers.
- Ease financial covenants… if banks allow… to allow challenging time to pass and resume more normal market operations.
- Reduce CAPEX commitments; either delay or outright suspend
- Reduce , suspend dividend payout… defers shareholders returns of today until tomorrow
- Prune marginal activities… focus on core competencies
- Outsource some or all production… mfg control passed onto others
- Reduce operational costs and SG&A where feasible
- Improve efficiencies of inventory utilization to lower support costs.
- Merge with a cash cow

Consuming cash… firm must over time restore cash
Whiting Petroleum Corporation Announces Completion Of Offering Of Common Stock

By Business Wire | 03/27/15 - 08:10 PM EDT

Whiting Petroleum Corporation (NYSE: WLL) today announced that it completed its previously announced registered public offering of 35,000,000 shares of its common stock for total net proceeds of approximately $1.0 billion, after deducting underwriter's discounts and commissions.

Whiting also announced by separate press release that it has completed its previously announced private unregistered offering of $1.25 billion aggregate principal amount of 1.25% convertible senior notes due 2020. This amount includes the sale of $250 million aggregate principal amount of convertible senior notes pursuant to the exercise of the initial purchasers' option in full to purchase additional convertible senior notes.

Whiting also announced that it has completed its previously announced private unregistered offering of $750 million aggregate principal amount of 6.25% senior notes due 2023.

Whiting received approximately $3.0 billion in aggregate net proceeds from the offerings. Whiting used the net proceeds from the offerings to repay all of the amounts outstanding under its credit agreement and will use the remainder for its general corporate purposes.

27 March … $1.0 billion equity proceeds
$21 billion backlog provides solid cash-generation foundation
$5.6 billion total liquidity at December 31, 2014
- $2.6 billion cash
- $3.0 billion undrawn revolving credit facility
Transocean Partners LLC
Continue to take actions to strengthen balance sheet
- Completed accelerated debt retirement
- 80% reduction in dividend frees approximately $870 million annually
- Competitive 4% yield

2015 March Scotia Howard Weil Energy Conference…
cash and revolver… dividend reduction
Ease Financial Covenants

Proactive Action

Revolveing Credit Facility - Amendment

### Multicurrency Revolver Credit Facility - Existing vs. New

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<tr>
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<th>Current Structure</th>
<th>Amended</th>
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<tbody>
<tr>
<td><strong>Size</strong></td>
<td>USD 300MM</td>
<td>USD 300MM</td>
</tr>
<tr>
<td><strong>Accordian</strong></td>
<td>USD 100MM</td>
<td>USD 100MM</td>
</tr>
<tr>
<td><strong>Swing Line</strong></td>
<td>USD 25MM</td>
<td>USD 25MM</td>
</tr>
<tr>
<td><strong>LC Sublimit</strong></td>
<td>USD 25MM</td>
<td>USD 25MM</td>
</tr>
<tr>
<td><strong>Tenor</strong></td>
<td>5 years</td>
<td>5 years</td>
</tr>
</tbody>
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<tr>
<th>Financial Covenants</th>
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<tr>
<td><strong>Quarter ended</strong></td>
<td><strong>Interest Coverage Ratio</strong></td>
</tr>
<tr>
<td>December 31, 2014</td>
<td>4.0x</td>
</tr>
<tr>
<td>March 31, 2015</td>
<td>4.0x</td>
</tr>
<tr>
<td>June 30, 2015</td>
<td>4.0x</td>
</tr>
<tr>
<td>September 30, 2015 - June 30, 2016</td>
<td>4.0x</td>
</tr>
<tr>
<td>September 30, 2016 - December 31, 2016</td>
<td>2.0x</td>
</tr>
<tr>
<td>March 31, 2017 - June 30, 2018</td>
<td>3.0x</td>
</tr>
<tr>
<td>Thereafter</td>
<td>4.0x</td>
</tr>
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2015 March Scotia Howard Weil Energy Conference… amended interest coverage ratio relief going forward
Reduce CAPEX Commitments: Delay, Suspend

Proactive Action Views

2015 March Scotia Howard Weil Energy Conference... global new build delivery delays

Uncontracted Newbuild Deliveries Pushing to the Right

Drillships and Semi-Submersibles
- 39 uncontracted floaters on order
- 33% have delayed delivery by > 6 months

BUYER PROFILE
Most buyers are established drilling contractors intending to operate the rigs
- Most ordered at established shipyards in S. Korea and Singapore
- 20/80 financing typical

DELAY MOTIVATIONS
- Avoiding large payment due upon delivery
- Hoping for better 2016 market
- Takeout financing may become more difficult and/or expensive to execute

Uncontracted jack-ups on order
- 117 uncontracted jack-ups on order
- 20% have delayed delivery by > 6 months

BUYER PROFILE
Many buyers are investors not intending to operate the rigs
- Ordered with intent to sell rig before delivery
- Difficult to market rigs without supporting infrastructure
- 10/90 financing typical in China

DELAY MOTIVATIONS
- Risk to shipyard that buyers walk away
- Few buyers of assets have surfaced to date
  > Bid/ask gap still wide
  > Asset quality concerns

Includes data supplied by ODS-Petroleum, Inc. Rowan competitive intelligence. Copyright 2015 (as of 8/1/15)
Reduce Dividend Payout

Proactive Action

Capital Management and Financial Position

- Reduced quarterly dividend to $0.15 from $0.75
- Investment-grade credit ratings from Moody’s/S&P
- $9.7 billion of contracted revenue backlog
- 42% total debt-to-capital ratio
- $1.4 billion of cash and short-term investments
- $2.25 billion available revolving credit facility
- No debt maturities through 1Q19
  - Raised $1.1 billion of 10-year and 30-year notes and completed tender offer

2015 March Scotia Howard Weil Energy Conference...
quarterly dividend reduced to $0.15 from $0.75
Prune Marginal Activities

Proactive Action

Pending Sale of Military Vessels

Recently announced agreement to sell four 250EDF class OSVs currently chartered to the U.S. Navy.

These vessels have supported the U.S. submarine fleet on the east and west coast of the U.S. since 2008 and 2009.

HOS plans to enter an O&M contract containing an initial one-year term and nine annual renewable options.

Anticipated to close by late February 2015 with O&M contract commencing immediately upon closing.

2015 March Scotia Howard Weil Energy Conference...
four vessels to be sold to US Navy
GulfMark Response to Downturn

- Preserve capital
  - Suspend dividend for now
  - Suspend share repurchases for now

- Reduce costs
  - Compared to 2014:
    - Reduce OpEx by ~15% or $35 million
    - Reduce G&A by ~15% or $10 million

- Improve flexibility
  - Amended revolving credit facilities
  - Loosen financial covenants

2015 March Scotia Howard Weil Energy Conference...
15% OPEX reduction, 15% G&A reduction
Improve Efficiencies

Proactive Action


Value Drivers

Key Enablers
- Centralized maintenance and technical support
- Consistent standards and institutionalizing lessons learned
- Common equipment across rigs and supplier consolidation
- Organic growth with proven rig designs and world-class shipyards
- Early capital project scoping and detailed

Revenue Efficiency

Cost Control

Project Management

Best-in-class Operating and Net Margins (33%)*

Average for Peer Group: 17%*

Consistent, Superior Shareholder Return

2015 March Scotia Howard Weil Energy Conference… drive supporting efficiencies
Stay tuned
**Feast Market: High Sales & Utilization, Profits Strong**

- Sell new equity… dilutes existing shareholders

  - **Buyback shares… returns capital to stockholders… raises stock price**

- Increase financial leverage… if banks allow at reasonable terms which increases borrowing costs & raises risk

  - **Pay-down loans… which reduces borrowing costs & reduces risk**

- Reduce dividend payout… defers shareholders returns of today until tomorrow

  - **Increase dividend payout or have special one time cash dividend**

- Prune marginal activities… focus on core competencies

  - **Buy complimentary activities… leverage core competencies**

- Outsource some or all production… mfg control passed onto others

  - **Bring in more production… retain greater mfg control in-house**

- Increase prices… tempers demand & reduces market share growth

  - **Reduce prices… increase demand and gain market share growth**

- Merge with a cash cow

  - **Buy a cash strapped high growth company than compliments or fills a strategic portfolio need.**

**Producing too much cash… firm must over time better utilize cash**
Agenda

What ?
- 3 Pillars LNG Fuel
- Shale Gas Paradigm Shift
- ECA Expansion & Vessel Choices

Why ?
- 5 Drivers Set Investment Clock

Oil Price Shock !
- Business Case: Robust or Fragile?

Sustainability
- Feast & Famine
- Cash Preservation

Conclusions
- Recent Market Signals
- The Future Decade for Gas
7 January 2014

More than 40 LNG-Fueled Ships Planned in North America, World LNG Fuels Conference to Examine

HOUSTON, Jan. 7, 2014: Consistent low-priced natural gas is encouraging marine fleets to consider fueling with LNG. A recent survey identified 42 vessels under development or evaluation.

“LNG in North America is leapfrogging past Europe,” says Zeus Development Corporation LNG fuel analyst Siyu Chen. The world’s largest offshore service vessel, the Harvey Energy, has already ordering more, larger vessels than almost anywhere else.

The 42 projects include a broad range of applications: car carriers (12), offshore service vessels (6), container vessels (6), and a call for purchasing new ships designed from the beginning for LNG. However, twelve projects are for existing ships to convert or bunker-fueled vessels to LNG. However, twelve projects are for existing ships to convert or bunker-fueled vessels to LNG.

LNG Fuel SCORECARD

17 Ferries
12 Tankers & Bulkers
6 Offshore Vessels
6 Container Ships
1 Articulated Tug Barge

North America’s marine LNG fuel launch… eclipses Europe!

3 LNG players pursue Jacksonville: Pivotal LNG + WesPac Midstream, Clean Energy, and SEMPRA US Power & Gas

Pivotal LNG Inc. and WesPac Midstream LLC will supply LNG to fuel two container ships for Jacksonville-based Sea Star that are expected to be delivered in late 2015 and early 2016.
FEBRUARY 14, 2014 — New Orleans-based Harvey Gulf International Marine (HGIM) reports the ground breaking for construction at its Port Fourchon, LA terminal of its $25 million Phase 1, Slip B, LNG (Liquefied Natural Gas) fueling facility.

When operational later this year, the facility will be the first of its kind in the United States. The technologically-advanced, environmentally-safe, clean energy facility will be a significant addition to the growing national LNG supply infrastructure, supporting operations of both the oil and gas industry’s offshore fleet as well as over-the-road vehicles operating on clean LNG.

"Today’s milestone represents another significant step in the path for Harvey Gulf to establish itself as the nation’s leader in utilizing LNG as a marine fuel," said CEO Shane Guidry. "HGIM is investing $350 million in the construction of an LNG-operated fleet. The dual fuel vessels and our LNG facility further expand HGIM’s commitment to develop and utilize the safest, most environmentally-friendly vessels and fuel technology available today. This fleet and facility signify a strong partnership between the State of Louisiana, the U.S. Department of Energy, the U.S. Coast Guard, and Harvey Gulf with a common goal of leading our nation down the path of clean energy use and strengthening America’s future of energy independence.

Harvey Gulf selected Lockheed Martin, Michoud Facility for the construction of the facility’s LNG storage tanks further expanding on its participation in the dual fuel vessel construction program. HGIM contracted CH-IV as the FEED and EPC contractor and Matrix PDM Engineering of Pittsburgh, PA for services are being provided by Carubba Engineering of Metairie, LA. The LNG tanks will consist of two storage tanks. Each facility will be...
TOTE goes with Wärtsilä four-strokes for LNG conversions

Wärtsilä says that it has been contracted by US shipowner Totem Ocean Trailer Express (Totem Ocean) to supply equipment for what is said to be the largest LNG conversions to be undertaken in the US.

The company will provide main engines, generators and LNGPac integrated LNG storage and fuel gas handling systems for conversion of Totem Ocean’s two Orca Class ro-ro cargo ships, Midnight Sun and North Star. According to Wärtsilä, as a result of the conversion, the Totem Ocean vessels will set new standards for environmental responsibility by reducing SOx emission by 100%, PM by 91%, NOx by 90% and CO2 by 35%. The two ships are responsible for transporting essential items such as food, household goods, vehicles, construction materials and military supply support to Alaska.

Each of the vessels will be equipped with four 12-cylinder Wärtsilä 50DF dual-fuel engines and generator sets that can run on LNG, HFO or MGO, and two 1100 m³ LNGPac fuel storage tanks with associated automaton and fuel gas handling systems. In addition to the equipment, Wärtsilä is taking responsibility for the design, engineering and integration of the system, and project and site management for its scope of supply.

Rigm Rosengren, president & CEO of Wärtsilä Corporation, said: “It is an unprecedentedly exciting time to have the opportunity to once again work with Totem Ocean. Economic constraints and the need to comply with environmental legislation are driving industry to look for cleaner power technologies. Wärtsilä is uniquely positioned to enable this transition and we are delighted that they can use our know-how.”

2 Vessels... total 94mW = North America’s largest LNG conversion undertaken!

MARAD Title 11 program expands economic criteria to include environmental technology... LNG fuel!

Title 11: US Government Loan Guarantee... term 25 years, 12.5% equity... provides Ship Owners US Treasury Borrowing Rates + premium
TOTE cuts steel for LNG fueled containership

FEBRUARY 25, 2014 — Fireworks marked the first cut of steel in a ceremony last night as construction of TOTE, Inc.’s new Marlin Class, the first liquefied natural gas (LNG)-powered containerships in the world, began at the General Dynamics NASSCO shipyard in San Diego, Calif.

"These ships, will be the most advanced, environmentally progressive vessels of their kind," state Representative Duncan Hunter (R-CA), Chairman of the House Subcommittee on Coast Guard and Maritime Transportation said, "but they also represent $350 million in U.S. investment, 600 American shipyard jobs, and the bright future of the indispensable domestic maritime industry."

TOTE says that the Marlin class vessels mark a new age in American shipbuilding and that its back to back announcements in 2012 - converting its existing RO/RO fleet in Alaska and investing in new containerships for the Puerto Rico trade, "began what can only be described as a change of tide in the U.S. maritime industry toward LNG as the new maritime fuel."

The new Marlin class will achieve reductions in sulfur dioxide (SOx) emissions by 98 percent, particulate matter (PM) by 99 percent, nitrous oxide (NOx) and carbon dioxide (CO2) by 71 percent over TOTE’s ships currently
MARCH 11, 2014 — Seattle-based naval architecture and marine engineering firm Elliott Bay Design Group (EBDG) has obtained approval in principle from ABS for the design of a 2,000 cubic meter liquefied natural gas (LNG) combination bunkering barge.

"At ABS our goal is to help designers, shipyards, and operators bring new and novel concepts to the marketplace in a safe and effective manner," said ABS Director of Global Gas Solutions Roy Bleiberg. "The EBDG combination bunkering barge takes an innovative approach to meeting the challenges of LNG bunkering, a hurdle that must be crossed for LNG fueled operations to become truly effective in the United States."

"We are excited to obtain ABS approval in principal on our bunkering barge design," said EBDG Project Manager Curt Leffers. "Our 2,000 cubic meter design is the basic platform that can be customized to meet our customer’s operational and cargo capacity requirements."

The EB-2000 LNG is one of several LNG barge designs developed by EBDG for clients to meet growing demand for efficient and cost-effective refueling of LNG powered vessels.

Lockheed Martin delivers LNG tank for Harvey Gulf newbuild

APRIL 16, 2014 — Lockheed Martin [NYSE: LMT] has leveraged technology and experience from the manufacturing of NASA’s space shuttle external tanks to deliver the LNG tank for the first of the series of LNG-fueled offshore support vessels building for Harvey Gulf International Marine at Gulf Coast Shipyard Group, Gulfport, MS.

Weighing in at 250,000 pounds, the LNG tank was built with U.S. steel under contract to Wärtsilä. It is the first in a series of cryogenic tanks Lockheed Martin will produce in support of expanding use of LNG tanks for marine applications and land-based storage. Lockheed Martin expects interest for cryogenic tanks to increase the LNG market segments continue to mature and the infrastructure is placed to support the safety of operating, transporting and bunkering of cryogenic fuels.

Americas industrial base expanding supply of key LNG enablers
Crowley ‘extremely positive’ about LNG unit’s growth prospects

Safe, clean, low cost LNG fuel from US shipments may lower power costs...
American Petroleum Tankers “APT” orders another LNG ready tanker from NASSCO

Crowley seeks Title XI guarantees for LNG fueled ConRo pair

JUNE 25, 2014 — Crowley is looking for a Title XI ship financing guarantee for the two LNG fueled ConRo ships it has ordered from shipbuilder VT Halter Marine.

The latest listing of Title XI applications released by the U.S. Maritime Administration shows that on May 30, Crowley ConRo, LLC filed an application for Title XI loan guarantee support for a requested loan amount of $362,700,000 over 25 years on an actual cost of $414,600,000.

That makes the Crowley application the largest on Marad's current list, the next largest being an application filed May 14 by TOTE Shipholdings, Inc. for a $320 million guarantee over 25 years on the two LNG fueled containerships it has on order at NASSCO, San Diego.

The actual cost to the applicant for those two ships is shown as $366 million.
BC FERRIES AWARDS $165 MILLION IN CONTRACTS FOR THREE NEW LIQUEFIED NATURAL GAS FUELLED INTERMEDIATE CLASS FERRIES

VICTORIA – Following the completion of an extensive competitive bidding process, BC Ferries has awarded Remontowa Shipbuilding S.A. of Gdansk, Poland contracts totaling $165 million to build three new intermediate class vessels.

The contracts have been approved by BC Ferries’ Board of Directors, as well as a total project budget of $252 million that includes financing and project management costs that would have incurred regardless of where the vessels were built. The budget also includes capita. The total project budget is within the company's capital expenditure expectations.

Now 6 LNG fuel ferries for Canada as BC Ferries (3) follows STQ

Source: https://www.bcferrries.com/bcferrries/faces/attachments?id=856428
Maersk warns sulphur regulation will cost US$250 million annually


Prohibitively expensive compliant diesel inside ECA in 2015!

More Traditional Pain = More LNG Gain
SeaSpan orders two LNG fueled ferries

November 19, 2014 — SeaSpan Ferries Corporation (SFC), Delta, B.C., Canada, has awarded Sedef Shipyard of Istanbul, Turkey a contract for the construction of two new dual-fueled (diesel and liquefied natural gas) ferries.

The 148.9 m ferries, both expected to be in operation by late 2016, will accommodate up to 59 trailers. Construction is scheduled to start in early 2015.

SeaSpan Ferries Corporation (SFC) operates a drop trailer service between British Columbia’s Lower Mainland and Vancouver Island. Currently SFC operates a fleet of short haul, near coastal vessels consisting of three roll-on/roll-off self-propelled vessels and four articulated tug and barge units. The current SFC fleet operates on two different routes, one reaches north from the Fraser River in Delta to Nanaimo, BC, the other reaches south to Swartz Bay. These routes are approximately 40 nautical miles long and require the vessel to transit between fresh water and salt water. SFC vessels are loaded and discharged through one of six ramps operated by the company.

"SeaSpan is pleased to partner with Sedef Shipyard to build two new state-of-the-art ferries," said Steve Roth, Vice President, SeaSpan Ferries Corporation. "Today’s announcement demonstrates a clear commitment to our drop-trailer customers through the modernization of an aging fleet."

"One of SeaSpan’s Core Values is care for the environment and we are committed to ensuring the conservation of Canadian oceans and waterways," said M. Roth. "These new, technologically advanced ferries will reduce our efficiency, performance and reliability.

SFC’s contract award follows an extensive and competitive procurement process that included more than 40

Now 8 LNG fuel ferries for Canada
FortisBC grants C$5 million incentives for LNG ferries

DECEMBER 1, 2014 — Energy utility FortisBC announced today that it will provide Canadian $5 million in incentive funding toward two new vessels for Seaspan Ferries that will be able to run on liquefied natural gas (LNG).

Seaspan Ferries reported last month that it had awarded Sedef Shipyards of Istanbul, Turkey a contract for the construction of the two new dual-fueled (diesel and liquefied natural gas) ferries. The 148.9 m ferries, both expected to be in operation by late 2016, will accommodate up to 59 trailers. Construction is scheduled to start in early 2015 (see earlier story).

Fortis BC says the incentives were made possible following the creation of the British Columbia Government's Greenhouse Gas Reduction regulation in 2012 when FortisBC announced a $62 million program for fleet operators to offset part of the cost for a natural gas engine over a diesel engine.

"Our government supports these incentives which decrease operating costs, support the province's growing LNG sector and reduce greenhouse gas emissions," said Energy and Mines Minister Bill Bennett. "With the expansion of FortisBC's Tilbury LNG facility now underway, I look forward to seeing more agreements like this in the months and years ahead."
River towboats 100% ECA bound consider LNG fuel.

ABS approves LNG fueled Z-drive towboat design

DECEMBER 2, 2014 — Morgan City, LA, headquartered Conrad Shipyard, L.L.C. and the Seabrook, TX, based Shearer Group, Inc. (TSGI) have developed the design of a 4,200 hp liquefied natural gas (LNG) fueled towboat utilizing a proven design from TSGI. The design has gained "Approval in Principle" (AIP) from ABS.

The towboat is based on TSGI’s proven azimuth drive (Z-drive) towboat design that debuted in 2008 with the Frank T. Stegbauer. To date, eight of these towboats have been built for Southern Towing Company. The original Southern Towing boats helped pioneer the use of Z-drives for brown water operations and have shown significant fuel savings relative to conventional towboats.

The new LNG fueled towboat design capitalizes on Wärtsilä’s proven dual fuel technology, but, according to TSGI, "is not wedded to it."

TSGI says the Wärtsilä technology is the most widely accepted dual fuel technology currently in use in the domestic U.S. market. While Wärtsilä’s existing dual fuel engines are medium speed diesels, it is anticipated that future engine developments will result in lighter and smaller high speed units. The design is flexible enough to allow for the use of either engine option as determined by the operator.

"By combining two widely accepted technologies: Z-drives and Wärtsilä’s dual fuel engines and fuel system, we believe, " says Ted Stegbauer, President. "By incorporating proven technologies, we have minimized the risks that first movers will be taking with the switch to utilizing LNG as a fuel."
Harvey Gulf makes LNG fueling history

FEBRUARY 6, 2015 — Harvey Gulf International Marine, LLC reports that it made North American maritime history today, becoming the first owner/operator of a dual fuel offshore support vessel to bunker LNG as a marine fuel and the first to also successfully complete the first truck to vessel transfer of LNG when it bunkered the M/V Harvey Energy on LNG.

The historic bunkering took place at a shore-based terminal owned by a subsidiary of Martin Midstream Partners L.P. in Pascagoula, MS.

Participating in the activities alongside the crew of the Harvey Energy were the U.S. Coast Guard, ABS, Wärtsilä, Martin Energy Services LLC, state and local agencies and Gulf Coast Shipbuilding Group.

The cool-down process took approximately 12 hours to achieve the desired tank temperature and pressure utilizing 3,800 gallons of nitrogen. The LNG bunkering was successfully completed within a few hours of cool-down. The Harvey Energy will now proceed to LNG trials before delivery.

Mr. Shane Guidry, Chairman and CEO of Harvey Gulf, commented. "today’s historic event is an example of Harvey Gulf’s commitment to their customers and the environment to provide the most affordable, innovative, environmentally friendly technology solutions to meet their business demands."

The Harvey Energy, built at Gulf Coast Shipbuilding Group’s Gulfport, MS, shipyard is based on the Vard Marine 1 311 design and is a 310 ft x64 ft x 24.5ft PSV powered by three Wärtsilä 6L34DF dual fuel gensets providing 7.5
Martin Midstream Partners cryogenic truck loading LNG fuel to Harvey Energy at Pascagoula Mississippi
Shell LNG bunkering vessel to have Wärtsilä DF engines

FEBRUARY 9, 2015 — The 6,500 cu.m LNG (liquefied natural gas) bunkering vessel ordered by Shell from South Korean shipbuilder STX Offshore & Shipbuilding in December (see earlier story) will be powered by Wärtsilä DF dual-fuel engines.

The ship will be used to deliver gas to LNG fueled vessels in Northwest Europe. The newbuild contract is in direct response to the increasing acceptance by the shipping industry of LNG as a marine fuel. The engine order was placed with Wärtsilä in December 2014.

The new Shell vessel will be based at the port of Rotterdam in the Netherlands, and will load from the new break bulk terminal and jetty to be constructed by the Gas Access to Europe (Gate) terminal. It will also be seagoing and able, therefore, to bunker customers at other locations. It will be powered by three 8-cylinder Wärtsilä 20DF dual-fuel engines capable of operating on either gas or diesel fuels. The engines are scheduled for delivery in spring 2016.

"This new specialized vessel is an important step towards LNG becoming the fuel of choice for shipping in Europe, and Wärtsilä is pleased and honored to cooperate with Shell and STX in this project. LNG eases compliance with both the new and anticipated future IMO environmental regulations, and we are proud that our development of technologies throughout the gas chain is of increasing value to the marine sector," said Mr. Aaron Bresnahan,
Harvey Energy starts working for Shell

MARCH 5, 2015 — Harvey Gulf's PSV Harvey Energy, the first LNG fueled vessel to enter service in North America, today began working on charter for Shell's deep water operations in the Gulf of Mexico.

"Shell is delighted to be the customer of this innovative vessel," said John Hollowell, Executive Vice-President, Deep Water, Shell Upstream Americas. "It is a pleasure to partner with Harvey Gulf on this pioneering project. Shell's investment underlines our confidence in LNG becoming a bigger part of the global fuel mix."

Christian Buelow, General Manager Downstream LNG Americas, added, "I'm pleased to see this first-of-its-kind vessel operating in North America. Shell continues to look into the commercial opportunity of supplying LNG fuel to customers in the region – both marine and road transport customers."

"Harvey Gulf is excited to share these historical maritime events with Shell," said Harvey Gulf International Marine's CEO and Chairman, Shane Guidry. "The Harvey Energy and her sister ships exemplify Harvey Gulf's

Maritime History: 1\textsuperscript{st} Offshore LNG fuel Vessel for North America enters service
STQ Ferry F. A. Gauthier on sea Trials, 1st LNG Fuel Ferry North America soon to enter service

Drivers = Decade Shift to Gas

Mandated Emissions & Fuel Restrictions

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Source: US EPA web sites, Hatley capture various sources

Paradigm shift to gas 1st on economics 2nd on emissions

Early adopters moving ahead... soon early followers!

2015 Fuel Sulfur 1/10% = Stress

Mid decade market tipping point

09 April 2015
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