Dead in the water: an analysis of industry practices and perceptions on vessel efficiency and stranded ship assets

James Mitchell[1] & Nishatabbas Rehmatulla[2]

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[1] Carbon War room, jmitchell@carbonwarroom.com;
[2] UCL Energy Institute, Central House, 14 Upper Woburn place, WC1H 0NN, London, UK, n.rehmatulla@ucl.ac.uk

Abstract

This paper presents an analysis of the concept of stranded assets in the context of shipping. It presents the findings of a series of semi-structured interviews with the industry's leading debt and equity financiers as well as a variety of financial intermediaries on the topics of energy efficiency, efficiency retrofits and stranded assets. The results show differentiation amongst financial actors and by entities that finance assets and those that finance balance sheets. Amongst debt players that finance assets, competitive advantage is a consistent rationale for the use of vessel efficiency information. Actors that view vessel efficiency as a competitive advantage typically either finance efficiency retrofits or have considered doing so. There is mixed awareness of stranded assets and perceptions of the risks they pose to vessel financiers. The case for the inclusion of vessel efficiency information in vessel financing decisions is building, yet further work is needed. While some financial actors connect efficiency-derived competitive advantage to financial risk mitigation, there is a strong case for broader consideration in the context of market cyclicality and the associated increase in probability of vessel stranding. Such considerations may also have a positive impact on operational cashflow and thus investment returns. This research concludes that, should this link be analogous to other industries, vessel efficiency may be a good determinant of the vulnerability of portfolios to climate constraints on the industry that force the stranding of some assets.

Keywords: Stranded assets, shipping, energy efficiency, banks

INTRODUCTION

There is a significant disconnect between projected business-as-usual emissions from shipping and the sector-wide emissions reductions that would be necessary to contribute a global target of 1.5°C or 2°C warming (Smith, Traut, et al. 2015). Given this, it is necessary to understand the potential impacts of policy-induced stranded assets on shipping and ship finance. However, the concept of stranded assets is entirely new to shipping. This research builds on literature from other sectors to inform expert interviews and identify future work. Analogous to literature that has developed around stranded assets in the E&P (extraction and production) industry and coal-fired power generation, this research focuses on a potential link between vessel energy efficiency and financial risk to identify future scope for work on supply-side stranded assets in shipping.

In the Copenhagen Accord (2009) and the Cancun Agreement (2010) governments agreed that emissions should be reduced to avoid a rise in global average temperature of more than 2°C above pre-industrial levels, with the possibility of revising this down to 1.5°C in the Paris COP21 (2015). The shipping and aviation sectors have been left to their respective UN designated bodies, the International Maritime Organisation (IMO) and International Civil Aviation Organisation (ICAO), on the subject of GHG's. (Smith, Jalkanen, et al. 2014) show that under currently implemented IMO policies, targeting supply side efficiency coupled with a backdrop rising demand (for container and bulk shipping under 2°C scenarios), shipping's GHG emissions are expected to rise three folds, with the best case scenario seeing a stabilisation of emissions by 2050 on 2012 levels. This growth of target that is being promulgated by the UNFCCC and if shipping was to maintain a similar share of global anthropogenic CO_2 emissions as it did in 2012 (i.e. 2-3% or around 1Gt CO_2e per annum).

Given that there is a disconnect between where the shipping industry's emissions are heading and potential regulations that could come, any regulation that would put the shipping sector on a track to contributing emission reductions in line with the UNFCCC's desire to limit warming to 2°C would have truly significant impacts on the industry and its assets (Jordan, et al. 2015). One of these impacts will

undoubtedly be the rendering of some vessels as stranded assets, which are “assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities” (Caldecott, Tilbury and Ma 2013, 2). Market, regulatory, or socio-political forces can also strand assets.

It is financially prudent to investigate the potential impacts of stranded assets on portfolios because the policy sphere is publicly working towards GHG measures for the industry. In April 2015, the registry of the Republic of the Marshall Islands submitted a proposal to MEPC 68 to limit GHG emissions of the sector in line with a 1.5°C expected rise in global temperatures. While the proposal was unsuccessful and while shipping was not included in the Paris Agreement reached at COP 21, the International Maritime Organisation MEPC is publicly moving to address GHG emissions. Furthermore, the European Union Monitor, Report, Verify (EU MRV) will come into effect in 2018, which will make operational emissions of all vessels in EU waters public for the first time, which may serve as the basis for a European shipping market-based measure (MBM).

It is not the purpose of this research to discuss the materiality of such risks. Instead, this research draws from analogous literature in the E&P industry and coal-fired power generation to identify relevant interview foci for financial stakeholders and necessary future work. These foci are the role of energy efficiency in vessel competitiveness, financial risk, and financial decision-making; involvement in efficiency retrofits; and perceptions of stranded assets.

1. LITERATURE REVIEW

Whilst the topics of stranded assets and stranded capital played significant roles in previous regulatory debates around the deregulation of the United States power generation sector in the 1990s (Caldecott and Mitchell, Premature retirement of sub-critical coal assets: the potential role of compensation and the implications for international climate policy), resurgence in its use has occurred since 2008. This primary focus of this literature is on coal, oil, and power generation assets. Because of the young age of this field, a significant amount of the literature is either grey or industry literature. This literature is reviewed, which is followed by relevant shipping-related academic literature.

The most commonly referenced stranded assets are arguably those pertaining to the ‘carbon bubble.’ In the 50% probability of staying below 2°C scenario, the cumulative CO_2 emissions budget for the period 2011 to 2100 is estimated to be 1075 $GtCO_2$ (Meinshausen, Wigley and Raper 2011). Today, there are an estimated 1541 $GtCO_2$ of proven and probably reserves listed on global stock markets. Investors would be exposed to significant risks if policy aligned with a 2°C scenario (Carbon Tracker & Grantham Research Institute 2013).

Alongside carbon bubble-focused literature, other stranded assets literature has developed to understand specific risks capable of asset stranding and to quantify these risks. Stranded assets are defined as “assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities” (Caldecott, Tilbury and Ma 2013, p. 2). There are three categories of risks with potential to strand assets.

First, market factors are risks to the economic viability of assets, such as the impact of burgeoning shale gas markets and increased competitiveness of renewables on coal-fired power generation in the United States (Caldecott, Tilbury and Ma 2013).

Second, regulatory factors are risks that include direct carbon regulation, such as carbon taxes; indirect regulation, such as water use limitations (e.g. for coal power generation) and increased pollution controls; mandates for renewable energy and energy efficiency; and impending regulation, which creates long-term uncertainty, especially for capital-intensive assets (Generation Foundation 2013).

Third, socio-political factors are risks that “evolving social norms and consumer behaviour” pose to asset owners or users (Caldecott, Tilbury and Ma 2013, p. 2). These risks, such as the fossil fuel divestment campaign, are typically reputational, not financial (Ansar, Caldecott and Tilbury 2013).

Early literature focuses on the impact of hypothetical, strict climate policies on the cost competitiveness of extraction and production (E&P) companies’ oil reserves and coal miners’ coal

production costs. “Coal and Carbon” (Robins, Keen and Knight 2012) and “Oil and Carbon” (HSBC Global Research 2008) use average break-even production costs for major E&P majors and the big four companies[1], respectively. (Spedding, Mehta and Robins 2013) vastly improve this methodology by creating crude production cost curves for E&P majors by aggregating their production costs at the project level. This is used to estimate the impact on market capitalisation of hypothetical low-demand scenarios.

(Redmond and Wilkins 2013) examine the impact of low-demand scenarios on traditional and non-traditional North American E&P companies and find that “The financial models that use past performance and creditworthiness may be insufficient to guide investors looking to understand the possible effects of future carbon constraints on the oil sector” (Redmond and Wilkins 2013, p. 2).

(Caldecott and Mitchell 2014) analyse potential regulatory-driven financial risks to owners of subcritical[2] coal-fired power stations in the United States and India. Their findings indicate that that in competitive markets, the potential for significant financial losses in the case of rapidly changing regulatory environments is significant and exacerbated by the ownership of relatively inefficient assets.

The literature is now developing to focus on current risks and how those can be used to inform current investment portfolios while also being used as a proxy for future investment portfolio risks. (Caldecott, Dericks and Mitchell 2015) identify significant financial risks through analysis of market forces as well as national and regional regulatory environments for subcritical coal-fired power stations in the seven largest national markets. They aggregate this data and rank asset owners by risk exposure. Key findings of this work are as follows. First, efficiency is likely to be a significant factor in financial risk and should be included in financial decision-making. Second, regulations or other factors that force asset owners to make large capital expenditures late in an asset’s useful life are key moments of asset stranding.

Literature relevant to stranded assets in shipping is limited to that on market factors. (Stopford 2009) characterises shipping as a highly cyclical industry, having undergone roughly 22 cycles since 1740. During market troughs, rates typically approach or undercut operational and voyage costs, which multiplies the financial advantages of vessel efficiency and leads to the acceleration of scrapping of inefficient vessels.

The importance of efficiency in vessel competitiveness is evinced by current industry conditions. Since the market peak and corresponding fiscal crisis of 2007-2008, the industry has been forced to cope with a tremendous overcapacity of vessels as well as low rates (Reuters 2015). This has fostered the development of a two-tier market, in which more efficient vessels earn higher rates (Agnolucci, Smith and Rehmatulla 2014). Further evidence of the current importance of vessel efficiency includes the widespread practice of slow steaming to reduce voyage costs (Corbett, Wang and Winebrake 2009)

(Smith, Bracewell and Mulley 2015) identify other demand- and supply-side factors that could be drivers of asset stranding in shipping. In addition to vessel efficiency and market factors, other supply-side factors include vessel size, fuel-type, CO_2 intensity, and other regulatory changes that could require high capital expenditure, such as SO_x, NO_x, or ballast water regulations. Demand-side factors are characterised mostly by changes in commodity demand.

METHOD

Semi-structured interviews (Bryman 2008) were conducted to answer the above research questions in through an inductive approach (de Vaus 1995) and to gain the respondents point of view. In total, 12 semi-structured interviews with 16 expert stakeholders from the maritime finance community. These stakeholders included six representatives from four major European banks active in ship finance, two representatives of equity firms active in acquiring vessels and ship owning companies, one representative of a major classification society that has advised on the use of vessel efficiency in financial decision-making, three representatives of two UK-based shipbrokers, three representatives

[1] Big four companies refers to Anglo American, Rio Tinto, BHP Billiton, and Xstrata

[2] Subcritical refers to a power station’s boiler type, with subcritical being the least efficient type.

of the shipping analyst team from a major credit rating agency, and one ship manager. This research focused on bankers, financiers, and broader stakeholders because of the relevance of stranded assets to ship financiers and the necessity of understanding maritime financing decisions within the context of the financial community at large.

The interviews focus on identifying the extent of use of vessel efficiency information in financial decision-making around the purchase of newbuild and second-hand vessels; the rationale for the inclusion/exclusion of vessel efficiency amongst financial actors; the extent of financial actors willing to finance efficiency retrofits; and industry perceptions of 'stranded assets' and the risks they pose to industry finance. A full list of questions and an index of interviews can be found in the appendix.

FINDINGS

With regard to the explicit use of vessel efficiency in financial decision-making, the results are as follows. Three of four banks explicitly include vessel efficiency in their assessment of lending decisions because of perceived direct financial benefits to their business or considering it good business practice. Banker 1 stated, "I can confirm that assets with higher energy efficiency have a higher likeliness that the loan will perform. We see this with certainty in our portfolio." Despite this, banker 2 responded that his institution does not explicitly consider assets (vessels) when providing debt, but instead bases their balance sheet-based lending decisions on corporate reputation and credit. Financiers 1 and 2 (raise debt and equity for purchase of new and second-hand vessels) as well as ship brokers 1, 2 (chartering, newbuilding and second-hand brokers) and 3 (newbuilding broker) do not explicitly consider vessel efficiency in financing decisions but state that efficiency is priced by the market. The credit analysts do not consider vessel efficiency because they have not been shown that it has a significant impact on the profitability of shipowning companies.

With regard to perceived financial benefits of efficient vessels, most interviewees saw financial benefit to financing or chartering more efficient vessels, except for banker 2 and the credit analysts. The financial benefits were perceived for both the sale and purchase market as well as the chartering market (time charter), although the full extent of the benefits were difficult to capture due to the qualitative nature of the methods and other markets such as the demolition markets were harder to elicit. In terms of the charter market all respondents unanimously felt that a two-tier market had formed, where there were clear differences between efficient ships and inefficient ships, although their respective financial rewards may not be so clear. Banker 2 stated that vessel efficiency was not applicable to his institution's lending model. The credit analysts stated that there may be some financial advantages to efficient vessels but they are likely too small to consider.

The broking firm of shipbrokers 1 and 2 has developed an internal analytical tool that uses operational data from approximately 80% of the bulk market (gathered directly from shipowners) to assess the competitiveness of 'eco' newbuilds against less-efficient pre-EEDI vessels. While it is not used in decision-making and while the researchers could not have access to the tool to verify their claims, their initial findings, which were presented to the authors, suggest that efficient vessels are more competitive throughout a wide range of market scenarios.

With regard to financing efficiency retrofits, bankers 1, 3, 4, 5, and 6, who represent three of four banks interviewed, said that their institutions had financed efficiency retrofits. Bankers 1, 3, and 4, who represent two of four shipping banks interviewed, said that their institutions had financed fleet-wide efficiency retrofits. Financier 1 stated that he was considering financing efficiency retrofits, while financier 2 had financed smaller retrofits to make vessels more employable. Bankers 1, 3, 4, 5, and 6 also stated that it offered a way to increase the competitiveness of vessels. Banker 1 stated that his institution also retrofitted vessels as a way to increase their employment prospects and reduce their burden of non-performing loans. When further questioned, all the bankers concurred that they would mainly consider fleet-wide retrofits and a large capital outlay due to the economies of scale or the financing costs involved. Banker 1 stated that they would only consider retrofit financing in the range of $30-40m and Banker 4 stated that the minimum retrofit finance package would have to be $25m for a single shipowner with no mortgage lien on the assets.

Before discussing the topic of 'stranded assets' with the researchers, only bankers 3, 5 and 6 and ship manager 1 were familiar with the topic. Banker 3 had investigated the topic of stranded assets in other sectors but had not considered its relevance to shipping. Ship manger 1 had direct experience

with stranded assets caused by the fiscal crisis 2007-2008. He said, "When working at [European shipowner], we went from 90 to 28 vessels and sold only 5-6 of those. The rest were scrapped because of major operational expenses."

Banker 2 was the only interviewee that found the topic of stranded assets irrelevant to his institution's lending model, which is balance sheet, not asset-based. All other interviewees were aware of the stranded assets at least conceptually. After describing the concept to financier 1, he replied, "For example, German KGs. The money has been ripped out of them and paid back to shareholders. Some have been left without enough capital to operate."

On their perception of vessel values and energy efficiency, Banker 1 and 4 and Ship broker 1 and 2 (though they don't explicitly use vessel energy efficiency with the exception of Banker 1) use third parties/agents to value the vessel, which includes physical surveys. Further work could explore these agents/stakeholders (possibly independent surveyors and class societies) and their methods for evaluating energy efficiency and it's relationship with overall vessel values.

Bankers 3, 5, and 6 make explicit use of the Rightship EVDI database to evaluate energy efficiency of vessels within their portfolio and Banker 1 has an in-house tool to evaluate the energy efficiency, which is applied to all ships, both existing and newbuilds, using the EEDI as a proxy for existing ships. All brokers mentioned that they use the speed and fuel consumption curve as the primary means to assess or compare the energy efficiency of ships.

From the interviews it was clear that there were key investment parameters at play in the financial stakeholder's decisions and perceptions of energy efficiency of ships. For example, Banker 4 reaffirmed the common perception that their typical financing term would be around 10-12 years and Financier 1 suggested a payback period of five years. Interestingly, the banker that explicitly incorporates vessel efficiency suggested that when assessing investment in energy efficiency retrofits they do not explicitly use quantitative investment methods such as Net Present Value (NPV), Internal Rate of Return (IRR) nor payback, which are the most common methods employed with high stringency in shipping (Rehmatulla 2015) (Parker 2015) (HSH Nordbank 2014) (Lloyds List 2011).

DISCUSSION AND CONCLUSION

The first significant finding of this research is the likely differentiation between asset and balance sheet financiers with regards to the inclusion of vessel efficiency information in financing decisions. While this research cannot draw a final conclusion on whether this holds true throughout the industry because of the limited number of banks interviewed, significant support for this notion was given in an interview with Class Representative 1. Having engaged directly with "many major shipping banks" on the use of vessel efficiency in financing decisions because of the impact of a two-tier market on vessel competitiveness, he had observed this distinction throughout the industry.

If the interview with Banker 2 is remotely representative of the sentiment of other lenders, whether they are asset or balance sheet-focused, there is a need for further assessment of lending policies that do not account for vessel efficiency. This is due to the potential vulnerability of these lending policies to market cyclicality through the finance of assets that are only competitive at peak market conditions.

In the run up to the fiscal crisis of 2007-2008, mark-to-market valuation, which values assets based on the sale of other similar assets, was the industry's preferred method of valuation. When the market crashed, vessel values plummeted. Because vessels typically serve as collateral for loans, this collapse of the collateral value triggered serious concerns around minimum value constraints[3] (Duru 2014).

The Hamburg Ship Evaluation Standard (HSES) was enacted under German law on 6 May 2008. This bases vessel value on the discounted cash flow of expected future profits. It has enabled German banks to forego large foreclosures due to revised vessel valuations (Duru 2014). The

[3] Such constraints stipulate that if a vessel's value falls below 120% of the remaining debt, the lender forecloses on the asset

European Central Bank has expressed concerns about the use of HSES dues to the high sensitivity of cash flows to assumptions (European Central bank 2014).[4]

Both mark-to-market and HSES are vulnerable to market cyclicality because both depend on past conditions[5] to determine present vessel value. For example, in strong market conditions with high rates, like those of 2007, fuel spend has a relatively low impact on profitability (TC rates – OPEX). When market conditions fall, as they did in 2008, fuel spend becomes a much more significant part of the vessel competitiveness and profitability equation.

This suggests that the explicit consideration of vessel efficiency outside of vessel valuation may offer a way to protect against poor investment decisions, regardless of market conditions. When questioned about the need for such an efficiency review process in financial institutions, brokers 1, 2, and 3 all suggested that the market priced vessel efficiency effectively.

As is demonstrated here, such thinking, which relies on openly contested valuation models, has the potential to lead to investments in vessels that are only competitive at peak market conditions.

Whilst a range of policies may be necessary to protect against lending for vessels of limited competitiveness, the inclusion of vessel efficiency in asset finance decisions may be one effective method to reduce the vulnerability of asset portfolios to market cyclicality.

The second significant finding of this research is that, outside of a simple profit motive, shipping bankers and financiers hold two rationales for financing efficiency retrofits on vessels. The first is to increase the competitiveness of vessels already on the books of vessels' financier. The second is to increase the attractiveness of inefficient vessels that have non-performing loans by retrofitting them.

The significance of both rationales is that bankers and financiers interviewed have confidence in a market that rewards efficiency improvements on vessels. While this is the case, Bankers 1, 3, and 4 each stipulated that there are constraints to their financing of retrofits to increase the competitiveness of vessels. The main constraint is that their minimum project sizes range between $25 - $30 million, which limits them to financing fleet-wide retrofits. The implication of this is that efficiency retrofits financed with bank debt are limited to fleet-scale retrofits. This effectively bars smaller shipowners from directly accessing bank debt for retrofits. However, this may represent an opportunity for boutique investment firms to provide debt/equity for single ship retrofits with smaller minimum project sizes.

In conclusion, while the concept of stranded assets is a conceptually new to shipping, ship finance institutions have first-hand experience with managing such assets post-fiscal crisis.

There is a need for further work to quantitatively investigate the correlation between vessel efficiency with vessel employment, operation speed, vessel value, vessel life span, and charter rates. This work would provide support for the inclusion of vessel efficiency in financing decisions by building the case for the role of vessel efficiency in increasing portfolio returns and decreasing portfolio risk.

There is a need for the combination of this further work with 2°C scenario analysis to determine whether shipping may be analogous to the E&P and coal-fired power generation industries, where efficiency is likely to be a key determinant of asset survival in a climate-constrained world.

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[4] ECB report

[5] HSES uses an average value of past profitability to project future profits. See Bockmann (2011)

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APPENDIX

Interview List:

Interview Number	Interviewee	Relevance to Research
1	Banker 1	Major European shipping bank
2	Financier 1	Botique firm that raises debt and equity for purchase of new and second-hand vessels.
3	Banker 2	Major European shipping bank
4	Class Representative 1	Class society that has advised banks on vessel efficiency
5	Shipbrokers 1 and 2	Broker of vessel sales and charters
6	Ship Manager 1	German equity-backed shipowner and charterer
7	Banker 3	Major European shipping bank
8	Banker 4	Major European shipping bank
9	Credit Analysts	Major credit rating agency
10	Financier 2	European equity firm that buys shipowning companies
11	Shipbroker 3	Brokers of sales and charters and shipping advisor to major European bank
12	Bankers 5 and 6	Major European shipping bank

Sample Interview Questions:
Who are you and what do you do in the shipping sector?

- What is the size of your shipping portfolio? How does this compare with your total portfolio?

If you are asked to provide a loan for the purchase of a second-hand vessel…

- What is the general process from application for finance to approval of the loan?

- What are the three most important factors that you consider when deciding whether or not to provide financing for a vessel?
- What are typical interest rates on your loans?
    - Who would typically get a preferential cost of capital?
- What investment criterion do you use to value a second-hand vessel?
    - Do you consider a vessel's energy efficiency when valuing it?
    - Why or Why not?
    - What efficiency data do you use (i.e. In-house information or external sources such as EEDI, EVDI, EIV)?
    - How is it used?
    - What quality of information is necessary to use it in such decisions?
- Do more efficient vessels obtain a premium over less efficient vessels in their market resale value?
- Does energy efficiency play a role in the competitiveness of some vessels over others in the market?
    - How specifically?
    - Through impacting charter rates or employment rates? / Why not?
    - Do you track charter rates and the utilization (employment) rates of different vessels that you finance?

- Do you finance or are you considering financing energy efficiency retrofits for vessels?
    - Why or why not?
- Do you talk to owners about retrofits to increase the energy efficiency of vessels?
    - If so, what do you recommend to owners with regard to retrofits?
    - If you do finance energy efficiency retrofits, do you consider financing retrofits on ships that are not in your portfolio?
    - What investment criteria do you use, i.e., payback, NPV, IRR etc
    - If payback, what payback period do you require?

Stranded Assets are defined as "assets that have suffered from unanticipated or premature write-downs, devaluations or conversion to liabilities."

- Are you familiar with the concept of stranded assets?
    - Does your business consider stranded assets a risk factor?
    - Does your business consider regulations (such as efficiency or Sulfur regulations), changing social norms (such as labeling reporting of GHG emissions) or capable of stranding assets in your shipping portfolio?
- Do you consider the energy efficiency of vessels a factor in stranded assets risk?
    - Please provide suggestions on how you would pre-emptively manage and monitor risk of stranded assets.
    - If energy efficiency were shown to be a significant factor in the operating cash flow and market value of vessels, what would be the most effective way to communicate that information to the ship finance community?

Other industries, such as power generation, are currently managing significant stranded assets-related write-downs and asset closures.

- Would you find case studies of how these risks have been managed helpful?
- If relevant to your business, how likely would the adoption of some risk-management practices be?

Who else should I be talking to?