Reciclagem de navios: caminhos para a economia circular no Brasil

Painel: Descomissionamento e Desmantelamento (Reciclagem) de Ativos Offshore no Brasil

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05/novembro/2025

Descomissionamento de instalações

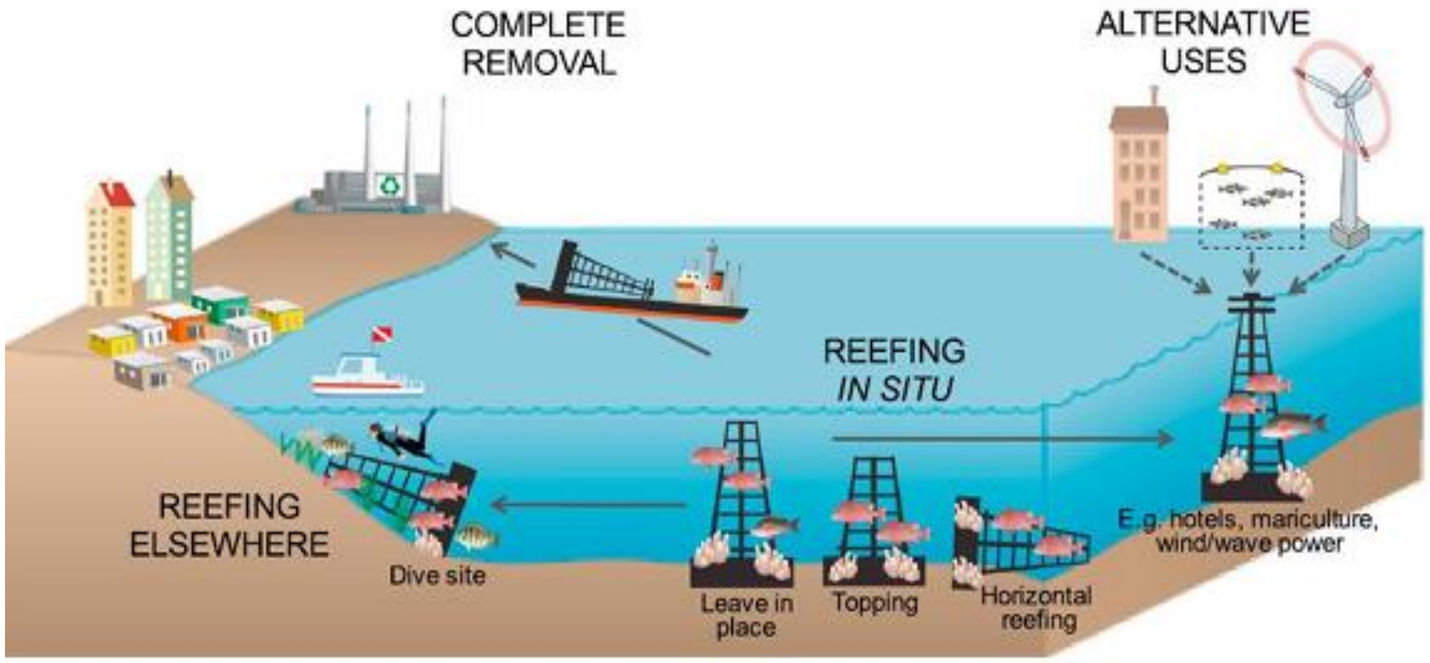
Universidade Federal Fluminense

Descomissionamento Offshore

Operações onshore

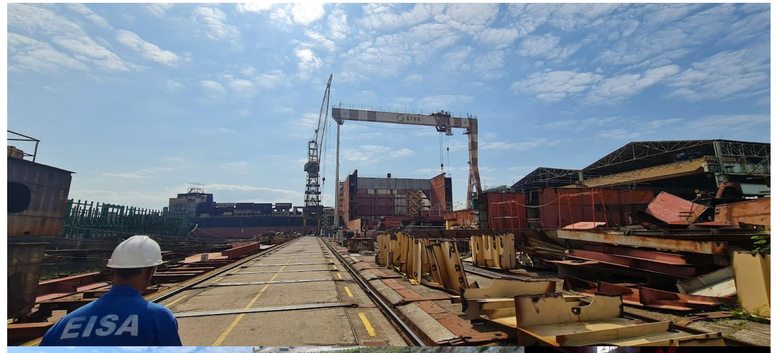
O que é descomissionar e reciclar?

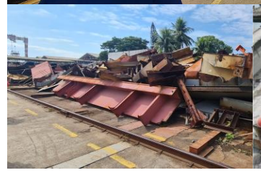
- **Descomissionar:** Desativar, remover, destinar corretamente os ativos offshore e devolver o ambiente próximo às condições naturais!







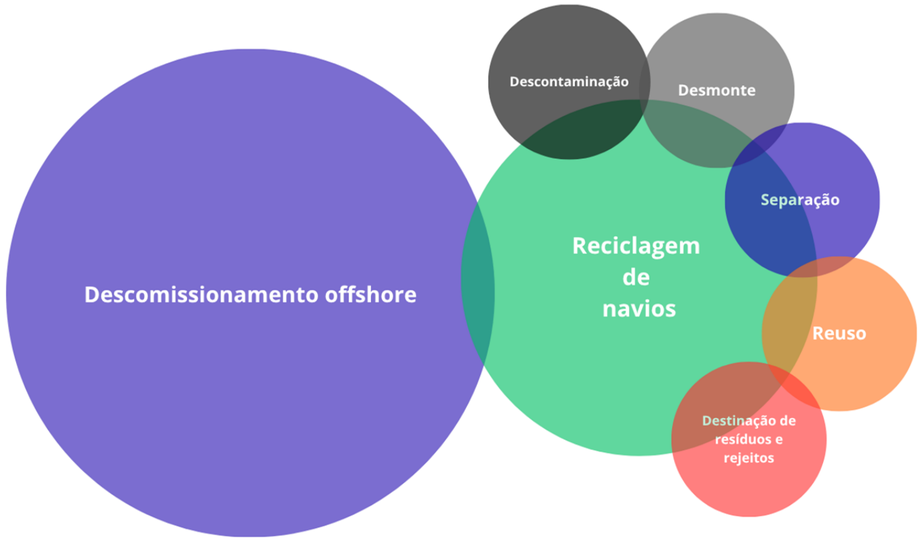




- **Reciclagem:** Recuperar o valor econômico destas estruturas, reuso, transformação e destinação dos materiais perigosos adequadamente, promovendo a economia circular!

Impacto da etimologia da palavra

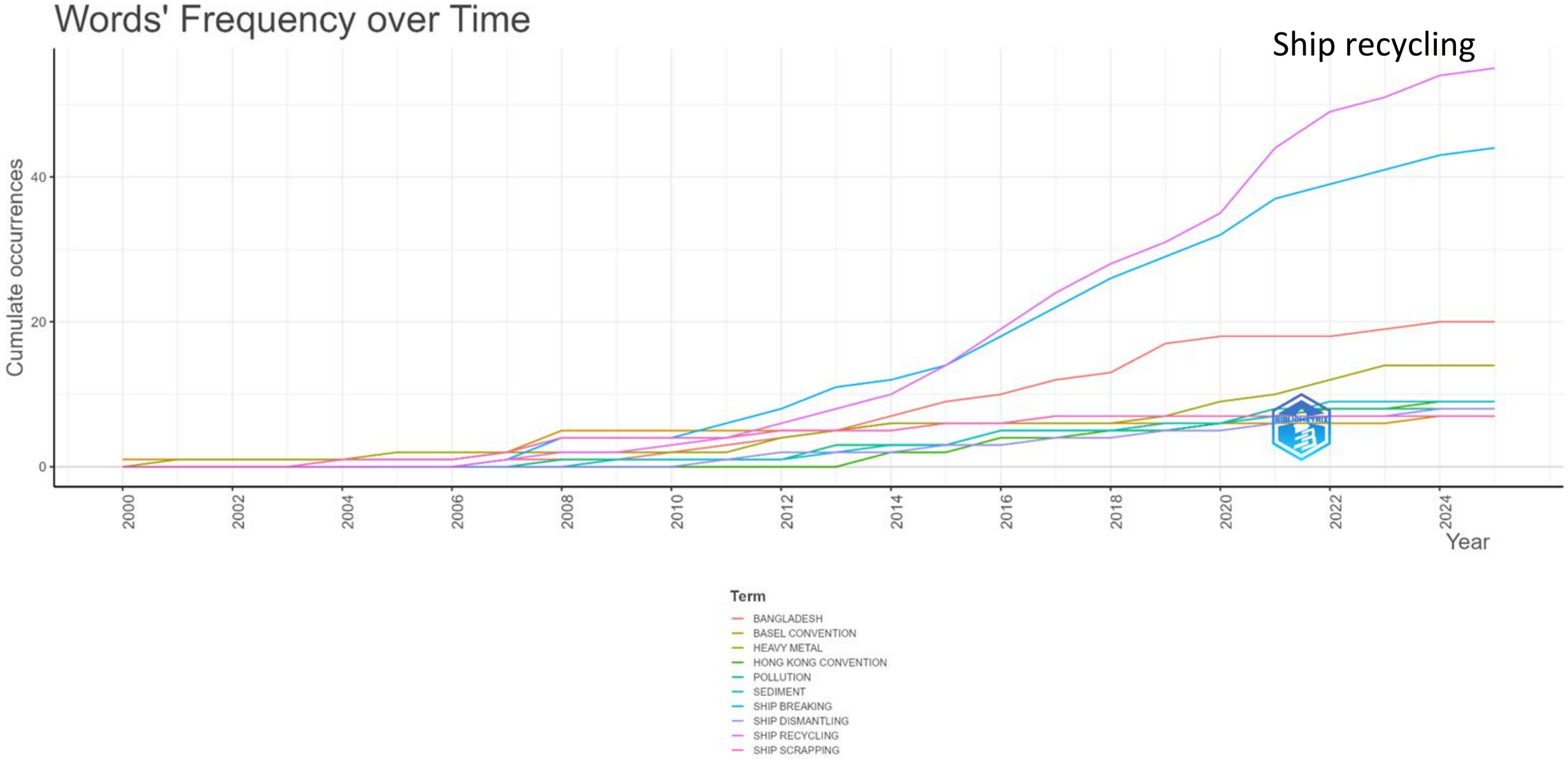
- **Atenção:** O termo adequado para este segmento no país é **Reciclagem de Navios** e não **Desmantelamento**!
- HKC (2009); SRR (2012); PL 1584/2021; Lei 10028/2023 = **Reciclagem!**
- **Internacionalmente - Desmantelamento está em desuso!**



Ship recycling - Ship dismantling (desmantelamento)

Fonte: Google Trends (2025)

Impacto da etimologia da palavra



Fonte: Web of Science (2025)

Experiência de descomissionamento no Brasil

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Cação

P-32

P-26

FPSO 'Fluminense', da Shell, será sucateado na Dinamarca

Da Redação 09/05/2023 - 20:30

Fluminense

Home > Fossil Energy >

Shell on the verge of doling out contract to M.A.R.S. for recycling of Brazilian FPSO

PROJECT & TENDERS

May 9, 2023, by Melisa Čavčić

Shell Brasil, a subsidiary of the UK-headquartered energy giant Shell, has awarded a green recycling limited notice to proceed (LNTP) agreement to Modern American Recycling Services, Europe (M.A.R.S.) for a floating production storage and offloading (FPSO) vessel working off the coast of Rio de Janeiro.

FPSO Capixaba inicia viagem rumo ao estaleiro Mars, na Dinamarca

A unidade da SBM Offshore será submetida a um processo de reciclagem sustentável. Outras partes do processo de descomissionamento serão realizadas pela Petrobras

Por Ana Luisa Egues
22/04/2024

Compartilhe

Capixaba

upstream

End of life FPSO to land on MARS

Capixaba floating production, storage and offloading vessel currently working offshore Brazil

P-33

MV-18

O que vem pela frente?

Plataformas fixas em Sergipe, para onde serão enviadas para a reciclagem?

Algumas plataformas fixas da Bacia de Sergipe.

Onde fazer?

Petrobras planeja contratar 48 embarcações com 40% de conteúdo nacional até 2026

Em evento, presidente da Petrobras ressaltou a necessidade da empresa de apoiar a indústria nacional

Eduardo Laguna e Daniela Amorim

28 mai 2025 - 10h39 Compartilhar Exibir comentários

Ouvir texto 0:00

ANTAQ moderniza regras para uso de áreas portuárias com nova resolução

Norma passa a valer em 1º de maio e substitui regulação anterior, de 2016

+80% dos estaleiros e instalações portuárias no país não tem qualquer experiência com NORM

Onde fazer?

Container Shipping Faces Demolition Dilemma

London | 8th September

A asdf The container shipping industry is staring at an uncomfortable reality. With newbuildings set to flood the market through the remainder of the decade, shipowners will need to demolish as much as 4.5 million twenty-foot equivalent units (teu) of capacity by 2030 to restore balance. Yet, the ability of global shipbreaking yards to meet that demand is increasingly in doubt.

Consultancy Linerlytica, in its latest weekly report, said the challenge facing the sector is stark. To keep the market in equilibrium, the industry will have to match in just four years the same level of demolition it achieved over the past quarter of a century. "The rapidly swelling orderbook will need to be balanced by a sharp increase in scrapping, with at least 4.5 million teu to be removed by 2030, equivalent to the cumulative capacity demolished in the last 25 years," the firm warned.

The problem is that scrapping volumes have been exceptionally weak. So far this year, only 12 container ships, totaling just 8,465 teu, have been dismantled—hardly a dent in a global fleet that has grown relentlessly. Analysts are increasingly pointing out that the industry is ignoring the need for timely demolitions, and that the longer it delays, the more disruptive the correction will be.

Jonathan Roach, researcher at Braemar, noted in his latest market update that container ship demolition has "all but collapsed" in 2025. "The sale of a vessel for recycling has become such a rarity that each transaction is now an event in itself," he said. Braemar data shows that the average age of vessels being sent for recycling has risen to 28 years, compared with a more typical 23 to 24 years in earlier periods. At this pace, removals amount to only 0.09% of the fleet this year, a fraction of the five-year average of 1.6%.

Such depressed levels were last seen during the Covid-era demand boom of 2021–22, when carriers were reluctant to retire older tonnage. In more typical years since 2010—excluding the pandemic boom and the current slump—annual container ship scrapping has averaged around 210,000 teu, or about 150 vessels. By contrast, Roach highlighted that as recently as 2016 demolitions reached 670,000 teu, while between 2012 and 2017 the average was 410,000 teu.

Even if demand for demolition surges, the world's shipbreaking yards may struggle to cope. A major factor is the entry into force of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (HKC) in June this year. The convention introduces stricter standards for safety and environmental protection, requiring major upgrades at many yards, especially in South Asia where the majority of shipbreaking occurs. Roach cautioned that the HKC will act as a restraint, as shipbreaking nations adapt to compliance at varying speeds. "HKC compliance is likely to reduce immediate capacity, but the expected surge in box ship demolition demand should spur investment in compliant yards, enabling global recyclers to scale up over the next five years," he said.

The industry's dilemma is magnified by the widening gap between fleet growth and cargo growth. According to Dynamar data, container trades expanded by an average of just 2.2% between 2014 and 2024, while capacity surged at a far faster 5.6%. Dynamar analyst Darron Wadey noted that if fleet growth had kept pace with demand, the global fleet would stand at 23.4 million teu at the end of 2024. Instead, it has ballooned to 32.4 million teu, leaving a 9 million teu surplus.

In simple terms, this means nearly 9 million teu would need to be removed to maintain a "mathematical equilibrium." But as Wadey pointed out, the equation is complicated by real-world distortions. "Trade imbalances have grown substantially, an imbalanced trade can require more capacity (and bigger ships) than a balanced one that might actually be worth more cargoes. We have diversions around the Cape of Good Hope, delays caused by extreme weather and congestion at key points all along the supply chain."

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Where can all these vessels end up?

It´s not only the number of ships, ships have grown a lot in size as well and not all existing facilities can accommodate them. In addition, a huge part of global ship recycling capacity had disappeared with entry into force of Hong Kong Convention. How many of them will come back ince they´ll be able to proof to meet the requirements?

Some question the need for more ship recycling facilities,some are planned to be much bigger than what we´ve seen so far. This article is only about one segment of shipping, what about the others?

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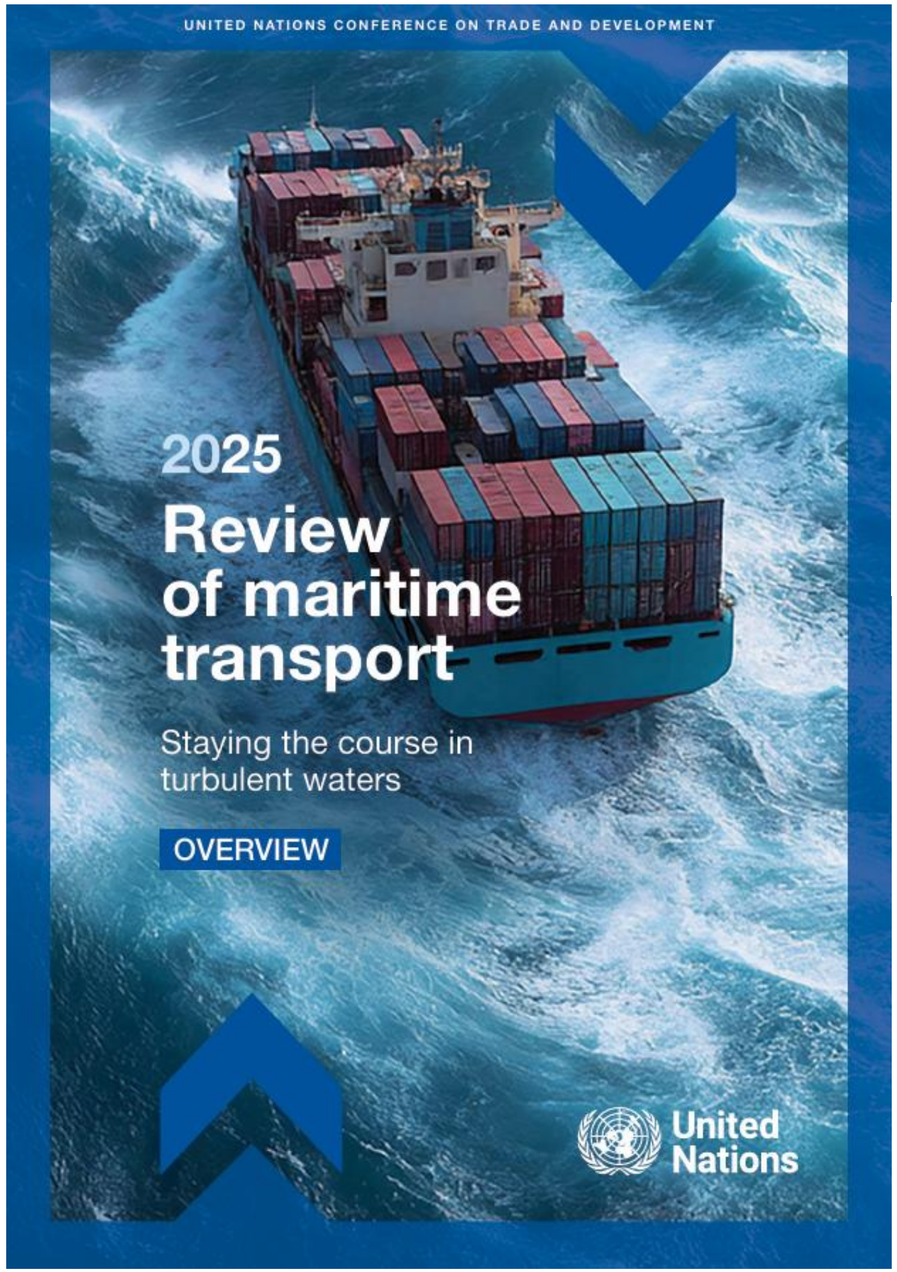
Onde fazer?

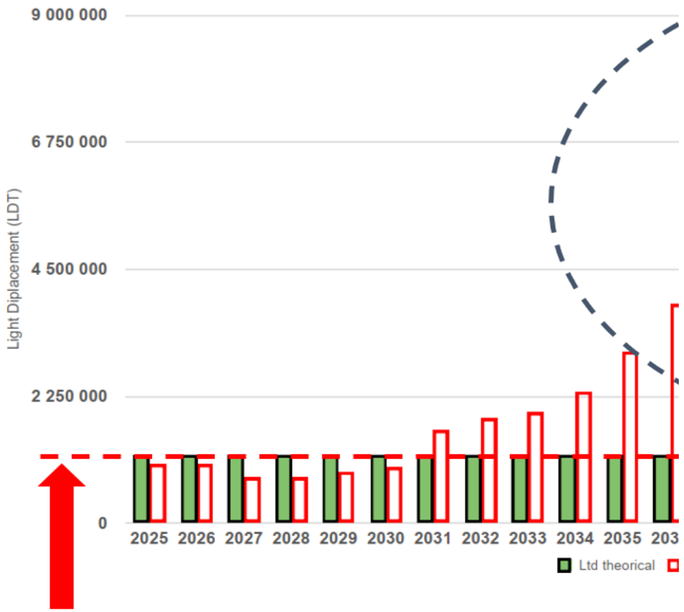


Entry into force of new global rules on sustainable ship recycling

The entry into force, in June 2025, of the Hong Kong Convention for the Safe and Environmentally Sound Recycling of Ships, 2009, is expected to make a major contribution to enhancing the safety of workers and render ship-recycling operations more environmentally friendly. The importance of ship recycling is set to grow as the global fleet is renewed and replaced by ships running on low- or zero-carbon fuels. While the four major recycling countries, as well as some major flag States, are already among the Con
Member States are encouraged to consider a
application at the international level.

Promote fleet modernization and sustai
active fleet renewal and boost ship recycling w
safety and sustainability of the latter. This de
with the Hong Kong Convention for the Saf
Required actions involve Governments, regu
finance and ship scrappers. United Nations M
to the Convention to support application on

Onde fazer?



Capacidade interna na Europa para reciclag

Instalações capazes de reciclar navios contaminado

		PARTE A - Países Capa
Nome do Estaleiro	**País**	
Modern American Recycling Services Europe (M.A.R.S)	Dinamarca	
Damen Verolme Rotterdam B.V.	Paises Baixos	
ADRS Decom Gulen	Noruega	
AF Offshore Decom	Noruega	

FPSO	Insta
FPSO Curlew	AF DI
FPSO Banff	MA
FPSO Petrojarl Foinaven	MA
FPSO Zafiro Producer	MA

Fonte : Elaborado pelo autor (2024).

Marine Systems & Ocean Technology (2025) 20:19
https://doi.org/10.1007/s40868-025-00163-2

RESEARCH

Occurrence of NORM in FPSO oil production units: impacts and decision-making factors for recycling destination after decommissioning

Guilherme Coltri Peres Ramos[1] · Newton Narciso Pereira[2]

Received: 25 October 2024 / Accepted: 8 January 2025

Abstract
The Brazilian oil and gas industry is undergoing significant transformations, with new production units emerging and older platforms being decommissioned. The Brazilian National Agency of Petroleum, Natural Gas, and Biofuels (ANP) anticipates substantial investments in decommissioning activities by 2026. This study focuses on the decommissioning of Floating Production Storage and Offloading units (FPSOs) in Brazil, examining economic, environmental, technical, and safety considerations. It references guidelines from the Basel Convention, the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (HKC), and the European Ship Recycling Regulation (SRR 1257/2013), emphasizing the importance of adhering to international standards for safe and sustainable ship recycling. A key aspect of the research is the impact of Naturally Occurring Radioactive Materials (NORM) on the disposal of FPSOs operating in Brazil. The study evaluates the capabilities of facilities to recycle these units and highlights a limited number of facilities equipped to manage NORM-contaminated FPSOs. This limitation often forces shipowners to recycle FPSOs abroad in selected locations, exposing them to significant financial risks, unforeseen costs, and uncertainties in waste disposal processes. The findings underscore an urgent need for improvements in infrastructure and processing techniques at Brazilian shipyards to ensure the responsible management of NORM and to enhance the country's capacity to handle the decommissioning of NORM-contaminated FPSOs sustainably.

Keywords Oil and gas · Naturally occurring radioactive materials · Decommissioning · Recycling · Sustainability

1 Introduction

The oil and gas industry in Brazil is undergoing a transformation with new production units coming into operation and the initiation of the decommissioning phase for old platforms. According to the National Agency of Petroleum, Natural Gas, and Biofuels (ANP), 33 Decommissioning Programs of Installations (PDI) have been approved, with four more under review. This reflects an estimated investment of 1.11 billion USD from 2022 to 2026 for offshore exploration unit removal [1, 2]. The aging of these structures necessitates decommissioning, which involves managing waste generated and addressing technical, environmental, and economic challenges.

Decommissioning will become increasingly prevalent as many offshore oil production installations reach the end of their useful lives [3]. This aligns with [4], which highlights the global importance of decommissioning, primarily due to reservoir depletion. Financial challenges faced by countries or shipowners in decommissioning offshore installations are relevant and involve balancing operational costs and investment incentives, especially in mature fields [5]. This financial dilemma can yield financial gains, socioeconomic benefits, and environmental preservation [6].

Due to the considerable number of stakeholders, it is crucial to evaluate multiple criteria economic, environmental, technical, social, and safety considerations for

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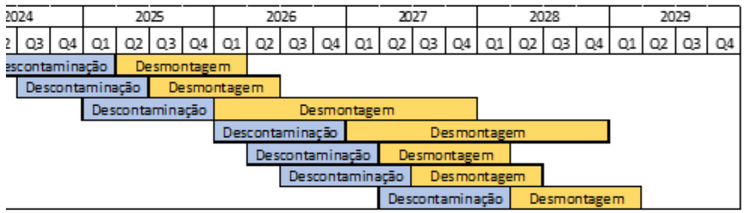
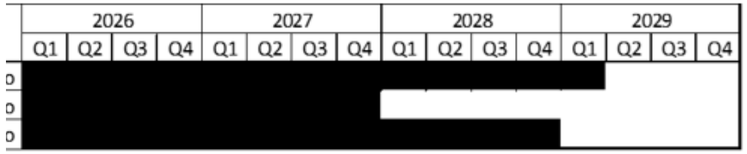
Published online: 10 February 2025

navios com PDI aprovado para descomissionamento





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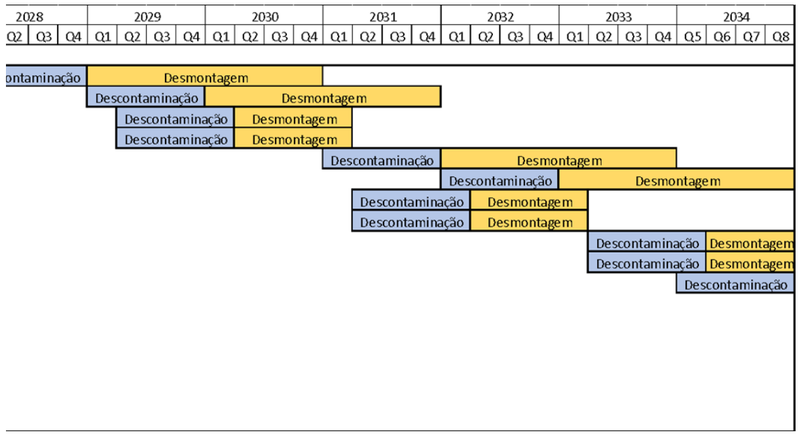


Reciclagem de plataformas - Forth Ports Ltd - UK

Fonte: Cesscon Decom (2024)

Reciclagem de plataformas - Forth Ports Ltd - UK

Fonte: Cesscon Decom (2024)

Reciclagem de plataformas - Forth Ports Ltd - UK

Fonte: Cesscon Decom (2024)

Reciclagem de plataformas - Forth Ports Ltd - UK



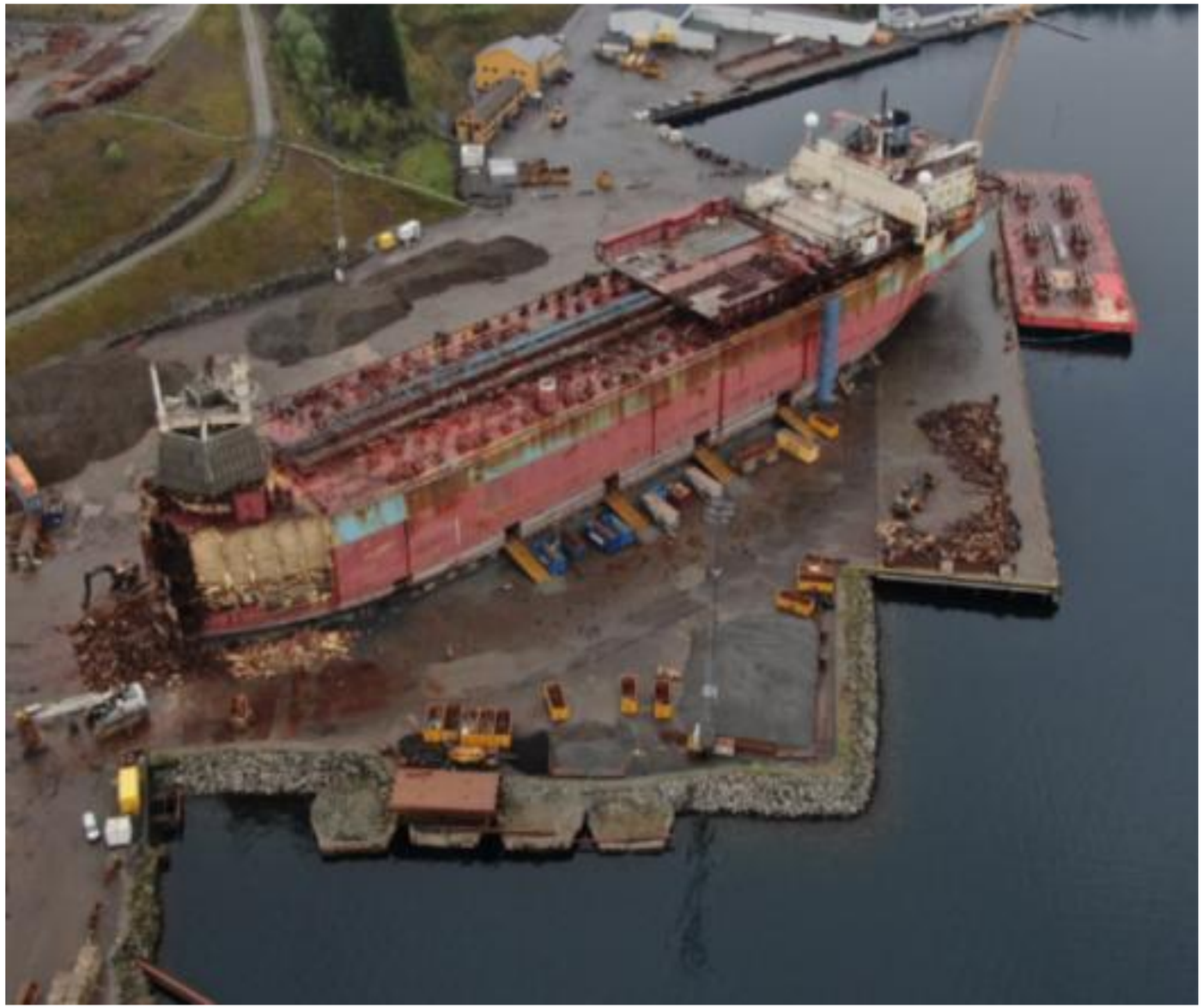


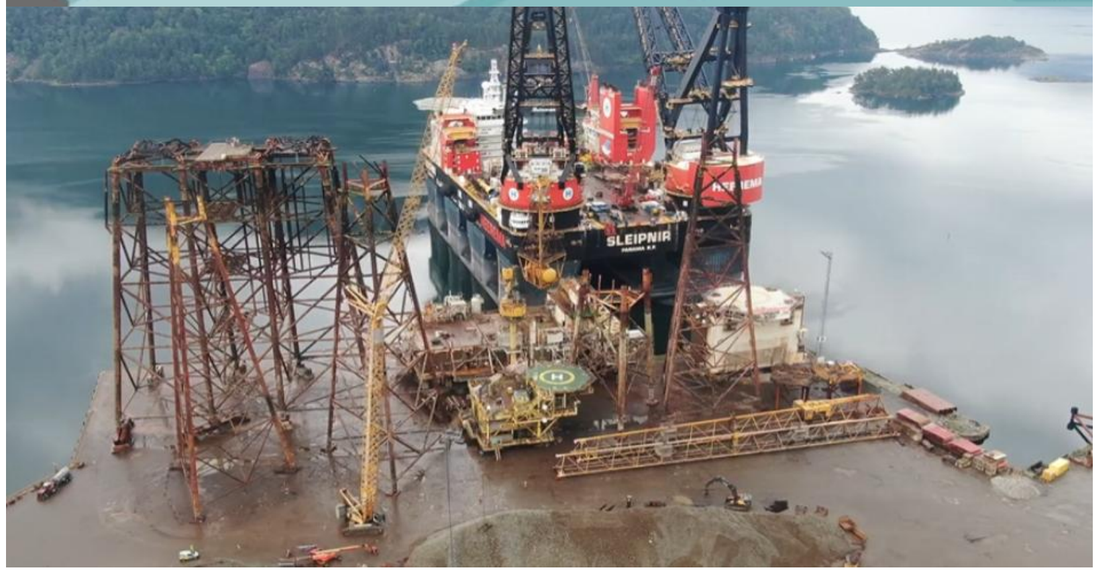

Fonte: Cesscon Decom (2024)

Onde outros países também fazem? - Portos!

Brownsville Texas – 2025

Onde outros países também fazem?



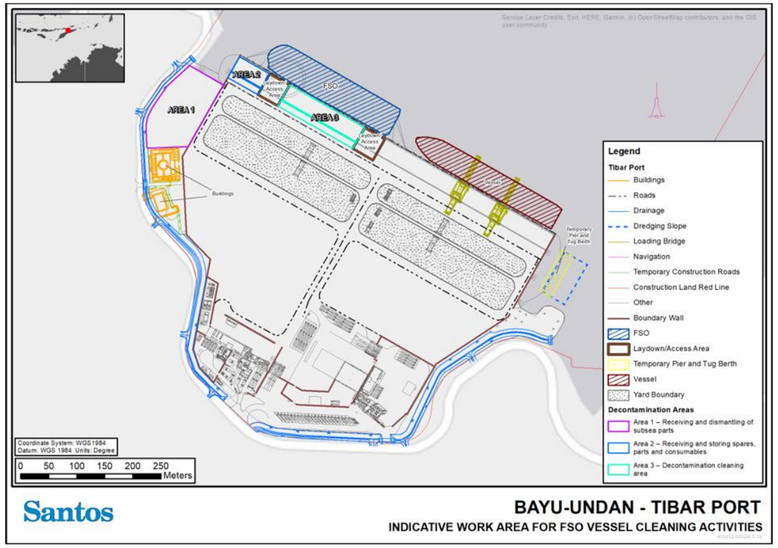


Fonte: II Thrane, Ship Recycling Lab (2024) - Noruega

Onde outros países também fazem?

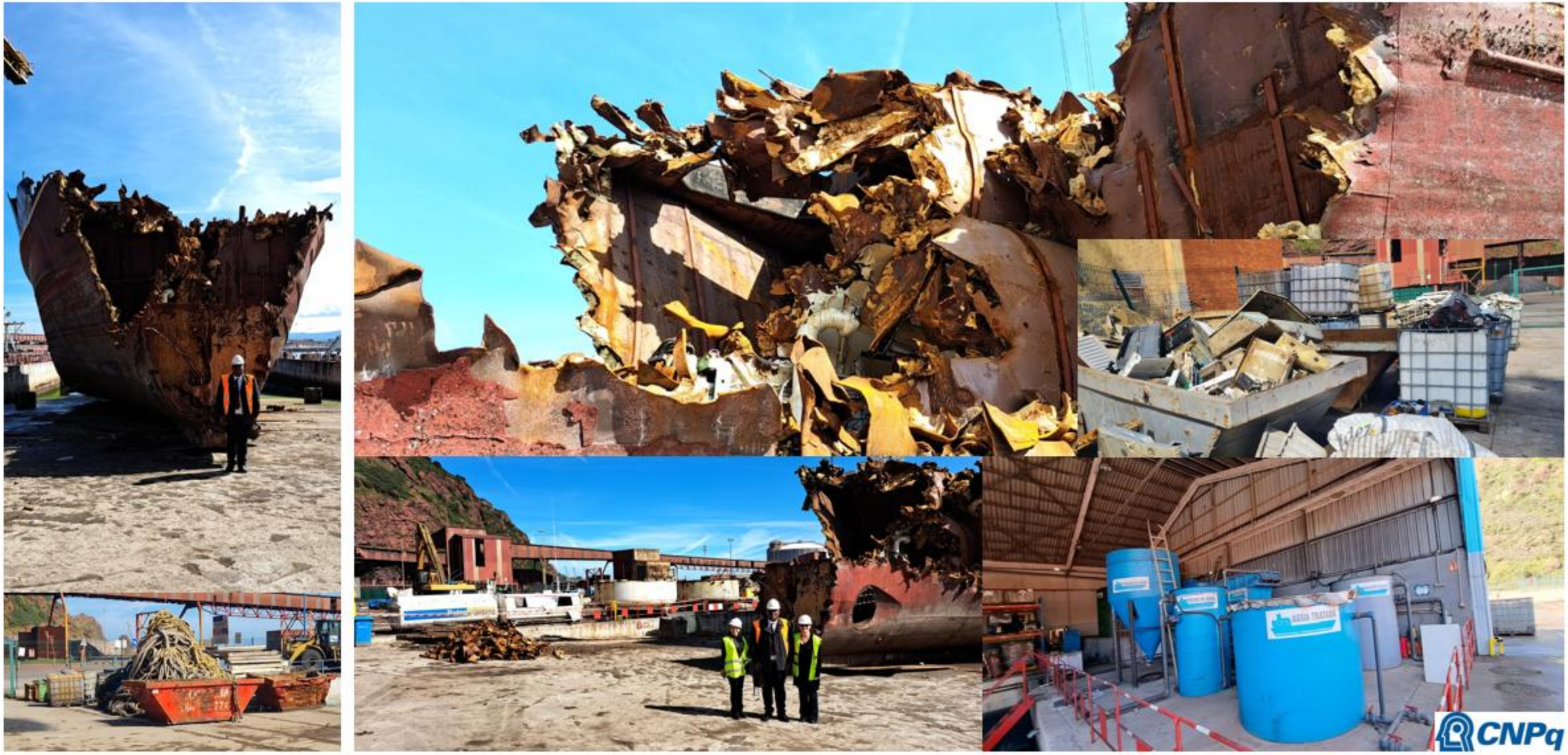
Instalação de reciclagem especializada e desenvolvida para a atividade para evitar conflitos operacionais (Shetland - UK)!

Onde outros países também fazem?



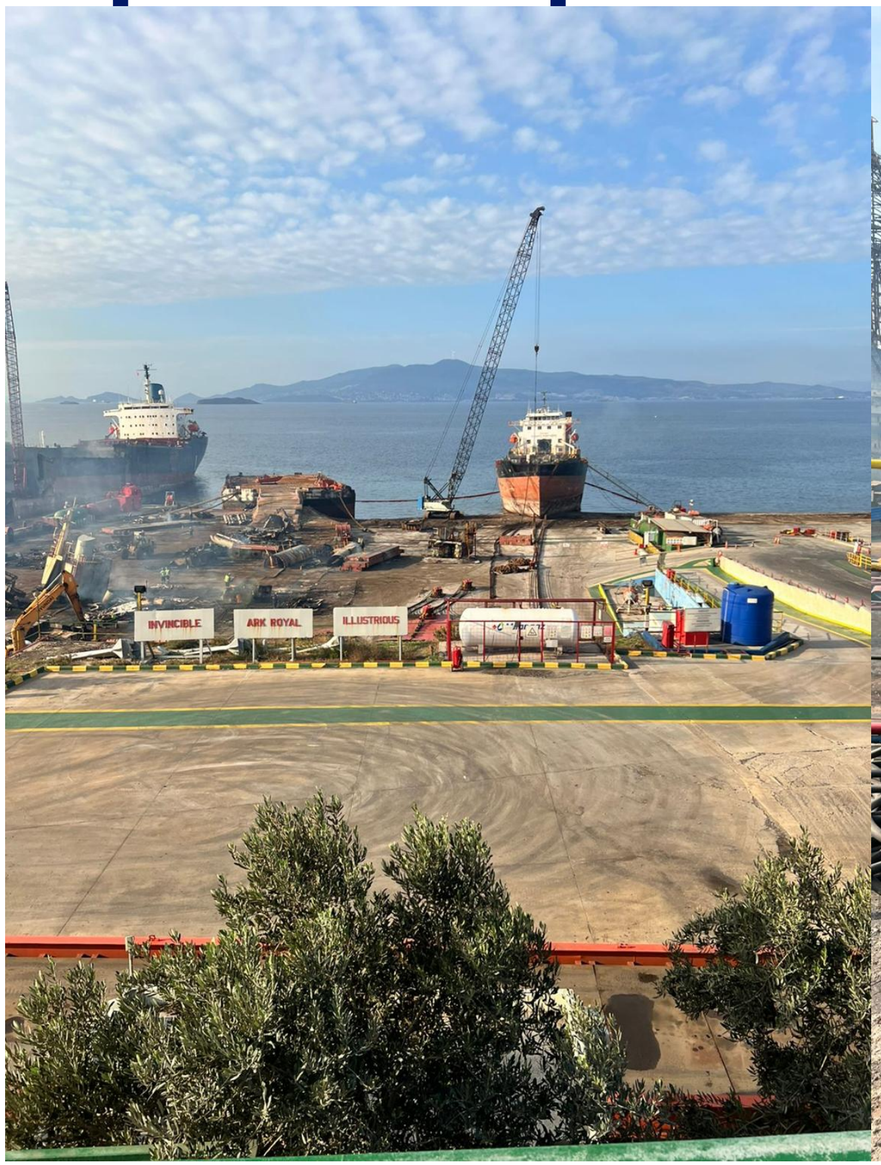
Descontaminação e limpeza do FSO Liberdade - Timor Port - Timor-Leste**!**

Exemplos de boas práticas para o Brasil!



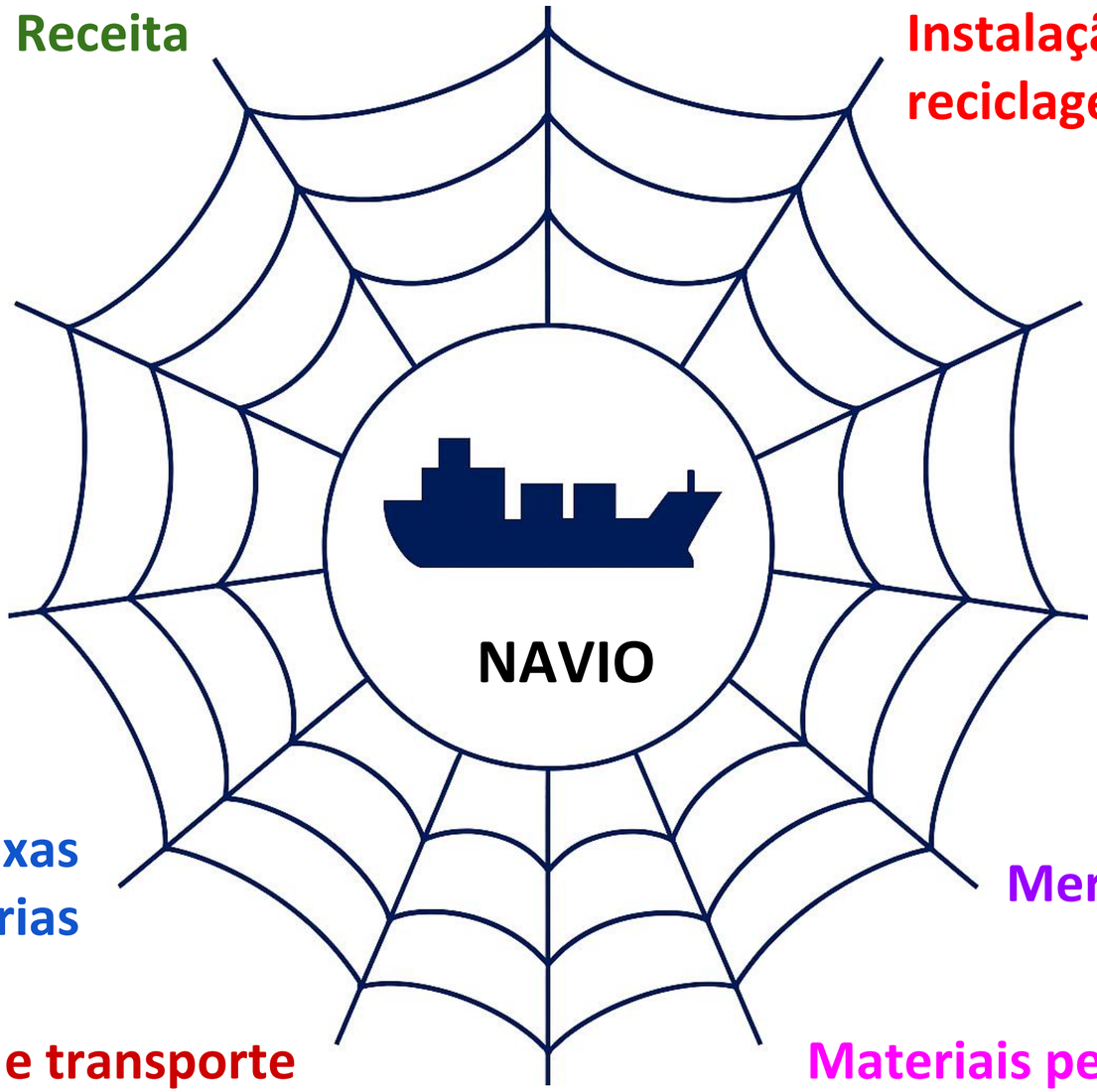
Instalação de reciclagem de navios - DDR Vessels – Porto de Gijon – Espanha

Exemplos de boas práticas para o Brasil!



Reciclagem de navios na Turquia - Aliaga

Vamos entender a teia da reciclagem



Quanto o país perde com isso?

Possíveis impactos diretos:

- Perda de circulação econômica local: cerca de **R$ 60 milhões - R$ 108 milhões** (valor de cotação internacional ($250/t - $450/t)).
- Perda potencial de arrecadação tributária direta/indireta: na ordem de R$ 5–12 milhões.
- Perda de massa salarial/empregos e valor adicionado local (incluído nos R$ 60 milhões): significativa, dependendo do arranjo contratual e duração do projeto.

Componentes típicos dentro desses R$ 60 milhões (ordens de grandeza):

- Custos operacionais (mão de obra, corte, movimentação, logística): de 40–60% = R$ 24–36 milhões
- Tributos e encargos sobre a cadeia (ISS/ICMS/PIS/COFINS, contribuições sobre folha, taxas portuárias/licenças): de 8–20% =R$ 5–12 milhões
- Margem/resultado industrial dos prestadores: de 10–20% = R$ 6–12 milhões
- Serviços locais (terceiros, materiais, transporte): de 15–25% = R$ 9–15 milhões

Quanto o país perde com isso?

Possíveis impactos diretos ou serviços adicionais envolvidos:

- Outros custos oriundos da atividade de preparação para reciclagem:
  - Planejamento e engenharia de descomissionamento: R$ 2,0 – 5,0 milhões
  - Descontaminação e limpeza industrial: R$ 10,0 – 15,0 milhões
  - Remoção de Coral-sol: R$ 4,0 – 6,0 milhões
  - Gestão de materiais perigosos (HazMat/IHM): R$ 4,0 – 12,0 milhões
  - Preparação de infraestrutura e acesso: R$ 3,0 – 8,0 milhões
  - Remoção de resíduos de sistemas e utilidades: R$ 3,0 – 7,0 milhões
  - Logística portuária e operações de acostamento (12 meses): R$ ~33 milhões
  - Inspeções, certificações e conformidade: R$ 1,5 – 4,0 milhões

Quanto podemos reduzir as emissões - ESG?

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Technical Paper

CRÉDITO DE CARBONO E SEU POTENCIAL DE ALAVANCAGEM DA INDÚSTRIA DE DESCOMISSIONAMENTO DE ATIVOS OFFSHORE, VISANDO A RECICLAGEM DE EMBARCAÇÕES NO BRASIL

CARBON CREDIT AND ITS POTENTIAL FOR LEVERAGING THE OFFSHORE ASSET DECOMMISSIONING INDUSTRY, AIMING AT THE RECYCLING OF VESSELS IN BRAZIL

Newton Narciso Pereira[1] | André Gabriel Sochaczewski[2] | Guilherme Coltri Peres Ramos[3] | José Mauro Moraes Junior[4] | Guilherme Ciriaco Ribeiro[5].

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Resumo

O processo de descomissionamento das instalações de produção e exploração de petróleo e gás offshore tornou-se uma realidade no Brasil, após o primeiro leilão da plataforma P-32 para reciclagem em território nacional. A reciclagem de embarcações traz contribuições para a reutilização de materiais, principalmente o aço no processo siderúrgico, é possível então considerar que tal atividade pode auxiliar tanto estaleiros como as empresas siderúrgicas no processo de redução de emissões de gases de efeito estufa (GEE), bem como na produção do "aço verde" com a maximização da utilização da sucata ferrosa no processo. Esta pesquisa teve como objetivo explorar, no cenário brasileiro, a intersecção entre o crédito de carbono e o descomissionamento de ativos offshore destinado à reciclagem. Abordou-se como esses dois temas podem se complementar, promovendo práticas mais sustentáveis e contribuindo para metas globais de redução de emissões de gases de efeito estufa (GEE). Para este artigo exploratório está sendo realizada uma análise comparativa da possibilidade de haver crédito de carbono na operação de reciclagem da P32 no Brasil, considerando o fato da mudança em relação ao envio da instalação para reciclagem no exterior. Deste modo, evidenciou-se o impacto da redução de emissão de GEE no transporte marítimo, como elemento compensador das possíveis emissões geradas na atividade no Brasil.

Palavras-chave:

Abstract

The decommissioning process of offshore oil and gas production facilities has become a reality in Brazil, following the first auction of the P-32 platform for recycling within the national territory (Petrobras Agency, 2023). The ship recycling industry in the country, the question arises related to the benefits that such operations can bring from an environmental and financial point of view to the companies or consortiums involved in this activity. Considering the fact that vessel recycling contributes to the reuse of materials, primarily steel in the steelmaking process, it is possible to consider that this activity can assist both shipyards and steel companies in the process of reducing greenhouse gas emissions, as well as in the production of "green steel" by maximizing the use of ferrous scrap in the process. This research aimed to explore, within the Brazilian context, the intersection between carbon credits and the decommissioning of offshore assets destined for recycling. It addressed how these two topics can complement each other, promoting more sustainable practices and contributing to global goals for reducing greenhouse gas emissions (GHGs). For this exploratory article, a comparative analysis is being conducted on the possibility of carbon credit in the recycling operation of P32 in Brazil, considering the shift from sending the installation for recycling abroad. Thus, the impact of reducing greenhouse gas emissions in maritime transportation has been highlighted as a compensatory element for potential emissions generated in the activity in Brazil.

Keywords: Ship recycling; Carbon credit; Shipyard; Decommissioning; Regulation.

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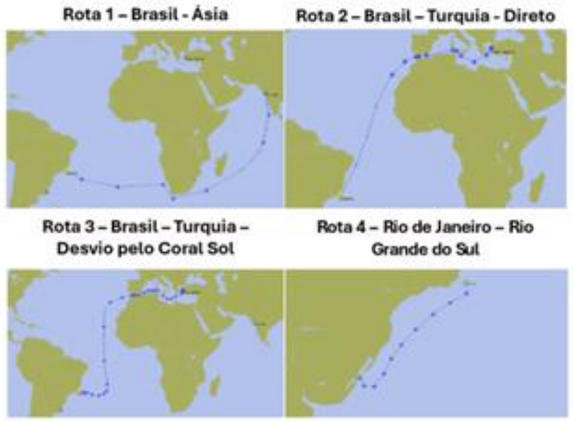


O saldo de redução de emissões em todo o processo de reciclagem é de 77.268,72 t CO_2e, possíveis para geração de créditos de carbono.

Rota	Destino	Distância média (milhas náuticas)	Tempo de viagem (dias)	Emissões tCO_2E Eco Trânsito
1	Brasil - Índia	8530,0	50	4.161,30
2	Brasil - Turquia	5881,6	35	2.869,30
3	Brasil - Turquia	6978,4	41	3.404,40
4	Brasil - Rio Grande do Sul	1008,3	6	458,3 ★

Fonte: Produzido pelo autor

Tabela 2 - Emissões totais de tCO_2e para as alternativas de local de reciclagem analisados

Rota	Destino	Transporte marítimo (tCO_2e)	Estaleiro (tCO_2e)	Transporte Terrestre (tCO_2e)	Total de emissões tCO_2e
1	Brasil - Índia	4161,3	231,56	0,15	4393,01
2	Brasil - Turquia	2869,3	231,56	0,04	3100,9
3	Brasil - Turquia	3404,4	231,56	0,04	3636
4	Brasil - Rio Grande do Sul	458,3	231,56	0,802	690,66 ★

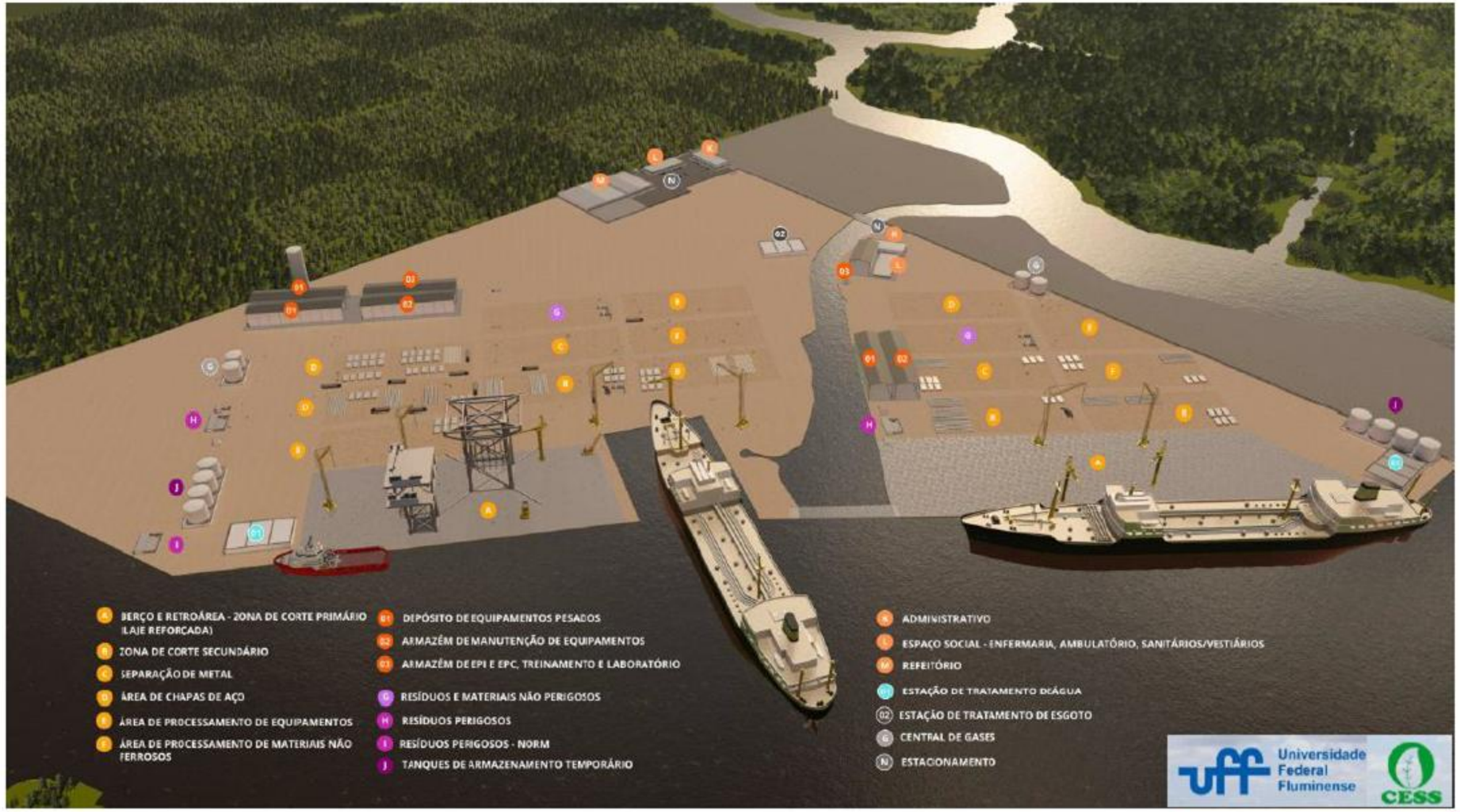
Fonte: Produzido pelo autor

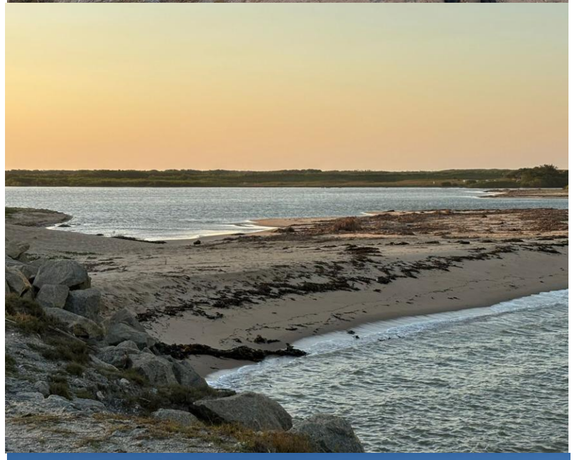
Pontos de atenção!

- Instalação de reciclagem deve auxiliar a promover a descarbonização da indústria siderúrgica;
- O que esta atividade impacta o país?
- Qual é o impacto do Brasil não ratificar a HKC?
- Qual é o impacto de não termos um regulamento próprio?
- Como o Brasil pode ser competitivo com IRNs em outras partes do mundo?

Brasil está se preparando

A Instalação de Reciclagem de Embarcações em Barra do Furado





O que podemos fazer no curto prazo!

- Desenvolver uma instalação enxuta, eficiente e mecanizada para a reciclagem;
- Atender os requisitos do Regulamento Europeu 1257/2013 e constar na lista EU;
- Dispor do *Ship Recycling Facility Plan* (SRFP);
- Ter capacidade para atender as características das plataformas fixas e flutuantes;
- Ter habilidade para realizar o processo de limpeza completa da instalação (NORM, resíduos oleosos, amianto, água oleosa, lastro etc.);
- Gerenciamento de materiais perigosos e destinação adequada;
- Limpeza de casco para evitar espalhamento de espécies exóticas.

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