OIL FOR DEVELOPMENT

UN environment

Decommissioning in the oil and gas value chain, steps, challenges and obligations

Module 2

Contents

- Why decommission?
  - Case Study: Brent Spar
  - Orphaned (abandoned) assets
- Definition of decommissioning and goals
- Decommissioning in the oil & gas value chain
- Decommissioning key steps in sustainable decommissioning of oil and gas fields
- Challenges (opportunities) and obligations
- Role of the regulator
- Examples from selected countries

Brent Spar: Case study (1995)

65,000 tonne oil storage and tanker loading buoy and platform

What to do with infrastructure that has reached the end of its working life?
> Follow the law.
e.g. UK Petroleum Act 1998
Where there is no law?

Source: https://www.greenpeace.org/archive-international/en/news/Blogs/makingwaves/brent-spar-deep-green-rex-weyler/blog/57539/

Main points of the Brent Spar case study

- With oil pipeline completed, **BS redundant** (1991) = end of working life
- Shell (operator) proposed deepsea (2.5 km) disposal
- UK Government agreed
- NGO Greenpeace organized world-wide, high-profile media campaign, with team occupying BS for over 3 weeks
- Greenpeace **over-estimated** contaminants and oil on BS
- German Govt publicly opposed deepsea dumping option
- Public opinion supported campaign and boycotted Shell products
- Offshore construction (+ dismantling) sector didn't support Shell's option
- Shell **reversed** its decision and BS was towed to Norway and most metal recycled or used to extend a local port near Stavanger
- 1st chemical analysis confirmed Shell's original estimates of contaminants
- Shell's **ESIA supported offshore dumping**, but under-estimated **global response** and neighboring countries' "clean seas" interests
- Shell's public image significantly negatively affected by whole saga
- That was 30 years ago. Lots of lessons learnt and guidelines developed

Why decommission?

This land is your land
Environment

Who will clean up the 'billion-dollar f abandoned US oilwells?

nies go out of business, they are leaving a legacy of wells that leak huge amounts of greenhouse gases into the atmosphere

Plugging Abandoned Oil Wells Is One 'Green New Deal' Aspect Loved By Both Republicans And Democrats

EDITORS' PICK | Sep 21, 2020, 07:10am EDT | 10,170 views

Energy Innovation: Policy and Technology Contributor

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Will taxpayers bear the cost of cleaning up America's aba

COP26: US to tackle methane leaks from oil and gas wells

2 November

COP26

Then there is the issue of abandoned (or orphan) infrastructure.
Who's responsible?

Direct measurements of methane emissions from abandoned oil and gas wells in Pennsylvania

Mary Kang[a,1,2], Cynthia M. Kanno[a], Matthew C. Reid[a,3], Xin Zhang[b], Denise L. Mauzerall[a,b,1], Michael A. Celia[a], Yuheng Chen[c], and Tullis C. Onstott[c]

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Edited* by Stephen W. Pacala, Princeton University, Princeton, NJ, and approved November 10, 2014 (received for review May 6, 2014)

Abandoned oil and gas wells provide a potential pathway for subsurface migration and emissions of methane and other fluids to the atmosphere. Little is known about methane fluxes from the millions of abandoned oil and gas wells in the United States. Here, we report direct measurements of methane fluxes from abandoned wells that exist in the United States. Here, we report direct measurements of methane fluxes from abandoned wells in Pennsylvania, using static flux chambers. Methane fluxes were made at wells selected, wetland, grassland, and at locations at the crest of the 19 rates flow

There is no regulatory requirement to monitor or account for methane emissions from abandoned wells in the United States. Methane leakage through abandoned wells linked to recent growth in unconventional oil and gas production is being studied as a groundwater contamination issue (10–14), but no direct evidence for leakage through abandoned wells to groundwater aquifers currently exists. Abandoned wells have caused explosions, which are major concerns in urban areas with oil and gas development or natural gas storage reservoirs, as well as in coal [16]. Therefore, existing monitoring is focused on concentrations. The result is a lack of information

Abandoned gas well identified near Ontario explosion that has displaced residents, businesses

EMMA GRANEY > ENERGY REPORTER
COLIN GRAF
WHEATLEY, ONT.
PUBLISHED NOVEMBER 2, 2021

Few climate proposals have been polli
New Deal, although it is essentially a jobs progra
people to work fighting climate change – regardless of the
affiliation. But as oil and gas jobs have shriveled up amid the COVID
19 recession, a green jobs proposal has become incredibly popular
among Republicans and Democrats: plugging abandoned oil and gas
wells.

Who Should Pay To Plug Abandoned Oil Wells?

Editor OilPrice.com
October 7, 2021 · 5 min read

Who should be responsible for plugging abandoned oil and gas wells, Big Oil, or the government and taxpayers? That's the question being raised as the U.S. faces an increasing abandoned oil well problem, with millions of unplugged wells across the country.

ne of Decommissioning Ghana's Offshore Hydrocarbon Facilities

able of contents | In this category | Suggested citation

ndotimi

OGEL 1 (2014), in OGEL Special: Offshore Petroleum Exploration and Production: Challenges and Responses

Introduction

The author notes the fact that decommissioning is a big issues and of interest and concern to both government, industry and communities in view of the environmental issues involved and the economic challenges. The paper argues that there is need for the regulatory regime to strike a balance between

r land in north-ea
in 1889, more than 2,000 aba
groundwater and leaking potent greenhouse gasses.

The problem is getting worse. As the oil and gas industry contracts owing to the pandemic, low prices and the rise o
companies have go

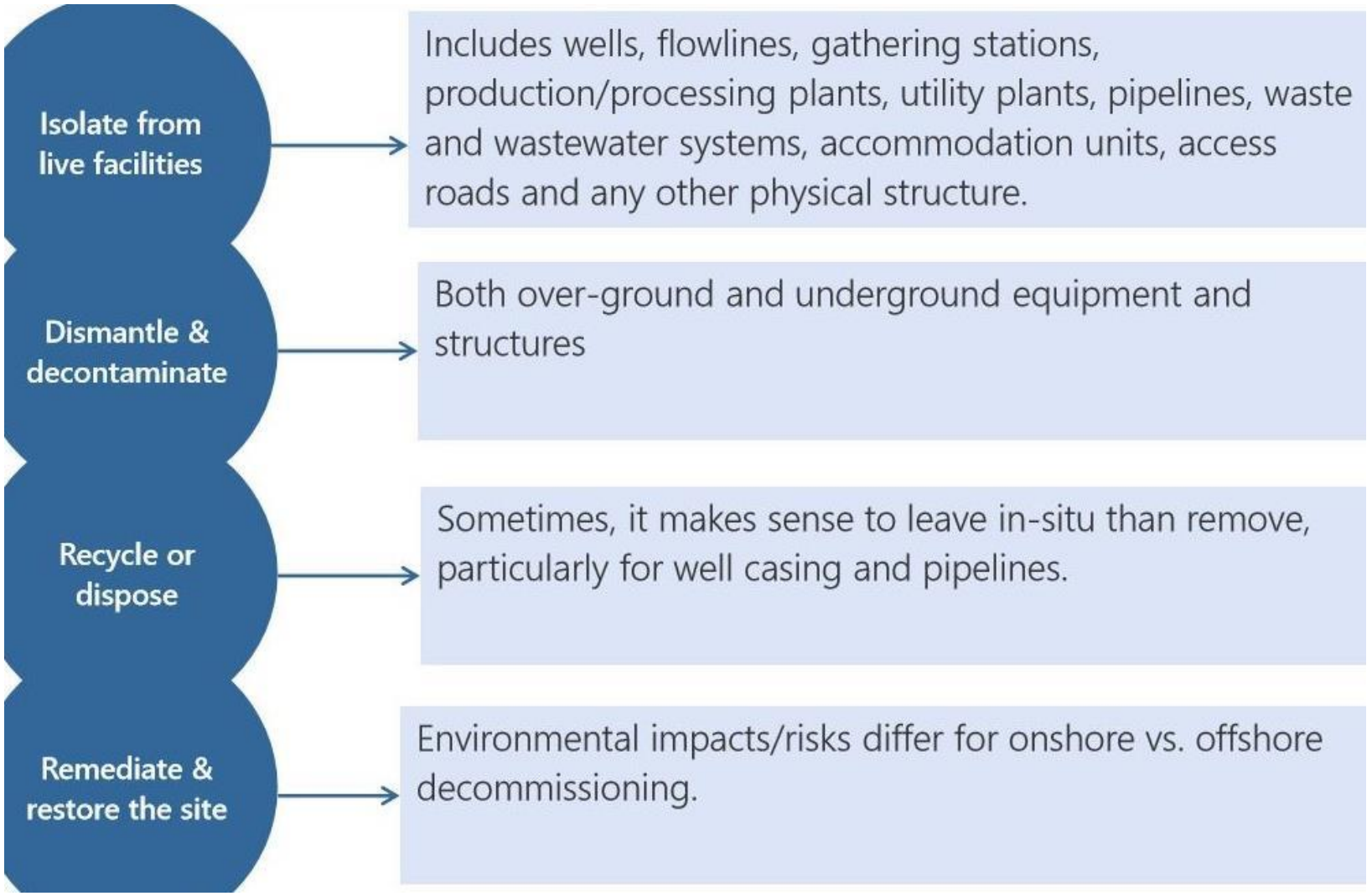
nore than 50 major
len's recent order to
higher. Morrison, a
ce council, said the

Abandoned wells: scale of the problem

- Many more inactive wells than active, of >3.5 million oil/gas wells drilled in N. America[1], only 825,000 currently in production. Remaining **1.2 million** wells presumed inactive.
- Left unplugged or not properly plugged, **inactive wells threaten human/environmental health.**
- Research suggests inactive (or abandoned) wells can **leak NH_3** (a powerful greenhouse gas) into the atmosphere[2].
- Abandoned wells could also provide a **pathway for surface runoff, brine, or hydrocarbon fluids to contaminate surface/groundwater**[3].
- Wells not properly reclaimed can also contribute to **habitat fragmentation**[4] and **soil erosion**; on-site equipment can **interfere with agricultural land use** & **threaten wildlife habitat**[5].

Sources: 1- Brandt et al. 2014; 2 - Kang et al. 2014 ; 3 - King and Valencia 2014 ; 4 - Drohan et al. 2012; 5 – DOI, 2015.

What is decommissioning?



Source: DNV-GL October 2019

Background, history and definitions

- Issues associated with **decommissioning**, or even the term, were not part of early project development and only briefly included in the project cycle. Nowadays, term is widely used.
- Decommissioning is needed for oil and gas installations, when fields are exhausted, many of which are more than **30 years old**.
- It is the process whereby abandoned (or exhausted) oil and gas fields are **made safe** and land or sea are reclaimed as much as possible **to their original state**, so that they can be used for other purposes.
- It is a source of major liability for countries, operators, contractors and the public and it must be understood if it is to be managed cost-effectively. Note: costs can be significant.

Source: https://petrowiki.org/Offshore_decommissioning; https://www.bcg.com/en-mideast/publications/2017/energy-environment-north-sea-decommissioning-challenge.aspx

When? How?

Geographical

HOME PEOPLE PLACES NATURE
EXPEDITIONS PARTNERS COMPETITIO
STUDY GEOGRAPHY PODCASTS

/ Home / Nature / Energy / Gas leaks: America's leaky wells

Gas leaks: America's leaky wells

Written by **Chris Fitch** Published in **Energy**

There are an estimated three million abandoned oil and gas wells across the US

Abandoned oil and gas wells in the US are leaking significant quantities of methane

The Permian Basin is ground zero for a billion-dollar surge of zombie oil wells

Clayton Aldern, Christopher Collins, & Naveena Sadasivam · Uncategorized

How we calculated the size of the Southwest's abandoned oil well problem

Using machine learning, we found that states are grossly undercounting orphan wells.

Clayton Aldern & Naveena Sadasivam · Energy

'No teeth and no funding': How regulators failed to police the oil industry

Thirty years of data show Texas and New Mexico officials struggled to identify and fine violators.

Naveena Sadasivam · Energy

One researcher's quest to quantify the environmental cost of abandoned oil wells

Unplugged wells could be quietly leaking millions of pounds of methane in West Texas.

Source: https://grist.org/series/abandoned-oil-gas-wells-texas-new-mexico/

Challenges ahead for many countries

Example from Tanzania: The natural gas processing plant in Tanzania (gas flowed in 2006), on the nearshore Songo Songo island. In 15-20 years from now, it will probably need to be decommissioned. Is the government ready; able to ensure that happens?

Return the site to the original state or condition – traditional text in ESIAs and development projects; in the Songo Songo example (above), a World Bank funded project, the ESIA states "*[operator] has been advised to ensure that the land is returned into a state that would be usable by others after decommissioning of its facilities*".

Challenges ahead for many countries

Opinions of Saturday, 30 December 2017 **Columnist:** Moses Dotsey Aklorbortu

The headaches of decommissioning oil installations – Is Ghana ready?

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The West Africa coast has undoubtedly a long and rich oil industry history spanning many decades. It is however pitiable that most energies have been trained on just getting the oil out as it yields quick and ready money, while a relatively lucrative undertaking in the same industry - decommissioning - is paid scant attention.

As is usual in many other fields, African oil nations prefer to out-source when it comes to decommissioning as no country within the sub-region has yet developed the needed skills to play lead roles.

That reality must change however, and as Ghana gets ready to retire wo of its oil rigs in two if its offshore basins, it must show leadership

Dates
25.10.16 to 27.10.16

City
Accra

Cooperating Partners
Ministry of Energy Ghana
Reverse Engineering

Workshop: Offshore Decommissioning - West Africa

Petrad provides learning opportunities for management of petroleum resources for a global audience.

Together with our partners, the Ministry of Energy Ghana and Reverse Engineering Services Ltd (RESL), we are pleased to invite you to this West Africa Regional Workshop on Offshore Decommissioning to be held in Accra, Ghana 25-27 October 2016. A review and discussions on best practice thinking, planning & methodologies for decommissioning oil & gas assets.

Site Decommissioning: The Goal

Has the goal changed?

- Is it always sensible, cost-effective, ecologically-appropriate, environmentally prudent, politically-correct or public relations savvy to completely remove all the old oil and gas infrastructure?
- Or, are there alternative approaches?
- Does it depend on the water depth, the local environment, the available technology, and other sea users?
- Environmental authorities, as well as the sector authorities, regularly have discussions with the operators on the use of Best Available Techniques (BAT). More on that (see Module 5).


Abandoned oil well


Rehabilitated site

Source:

Decommissioning Process

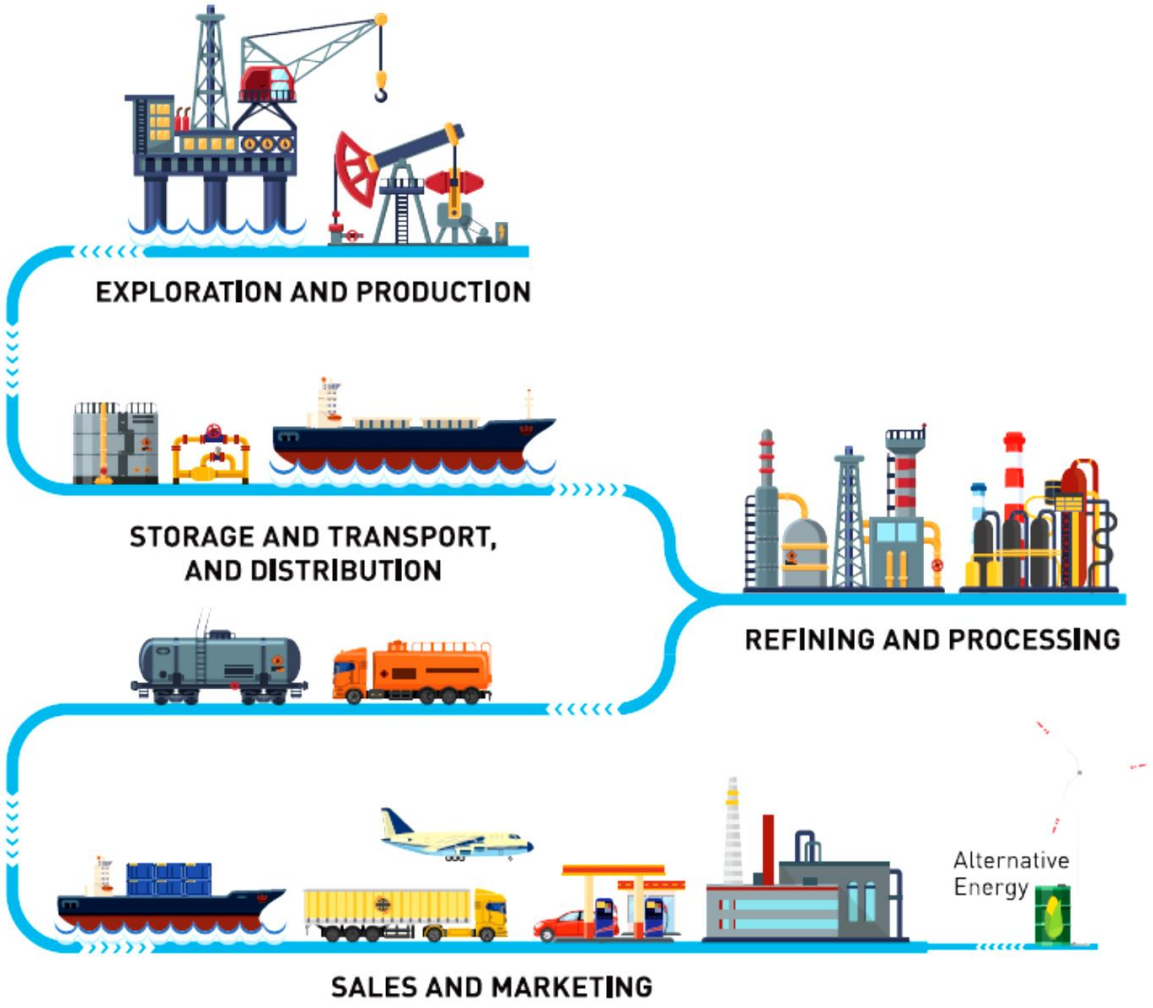
For offshore/onshore infrastructure, following steps:

1. Project management, planning and engineering
2. Permitting and regulatory compliance
3. Conductor removal
4. Platform Preparation*
5. Mobilization/Demobilization of Derrick Barges*
6. Platform Removal*
7. Pipeline and Power Cable Decommissioning
8. Materials Disposal
9. Site Clearance, Close-out Report

*Not all always relevant onshore; see Module 4 for offshore scopes

Industry value chain

Where and what?



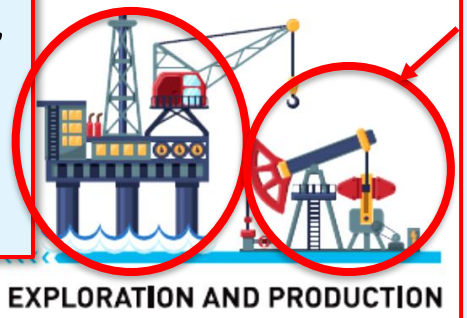
Industry value chain

Where and what?

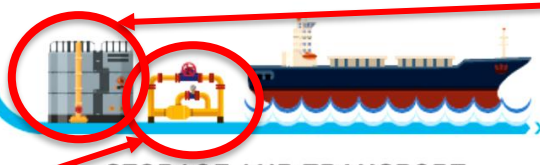
Deep-sea wells, cuttings piles, production platforms, pipelines & protective deposits

Onshore wells, pipelines, production installations & protective deposits

Refineries, processing plants & storage tanks



Export pipelines, LNG & crude oil vessels



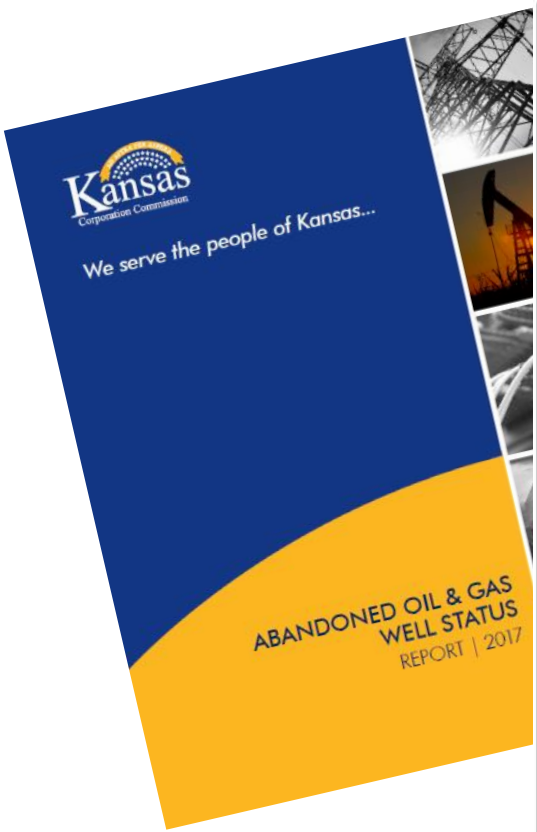
When?

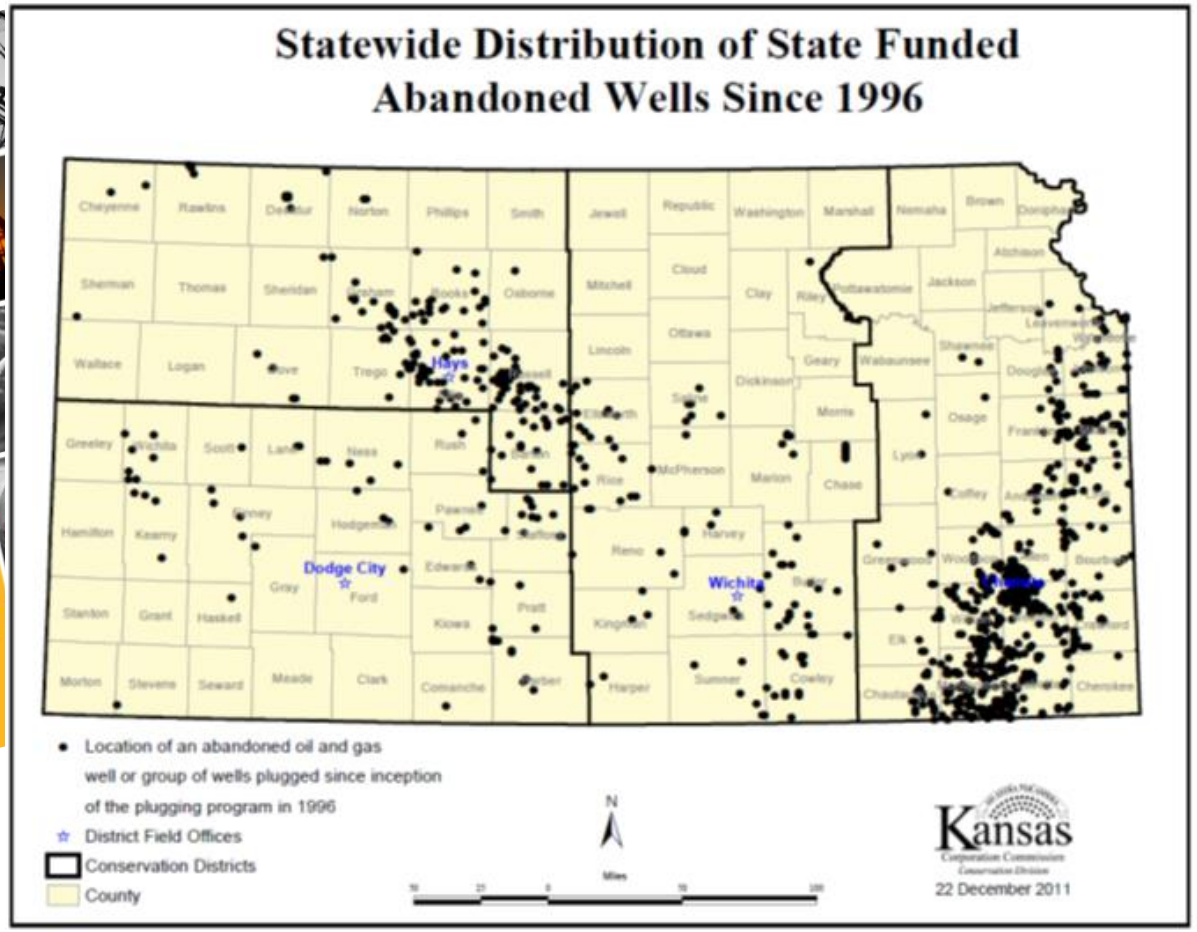
30-40 years after construction or when the oil and gas run out

Petrol stations

Challenge 1: sheer number of sites

e.g. in Kansas (USA): currently 21,648 abandoned wells





Challenge 2: access to sites

e.g. in UK's North Sea area, forecast 927 wells, plus much more

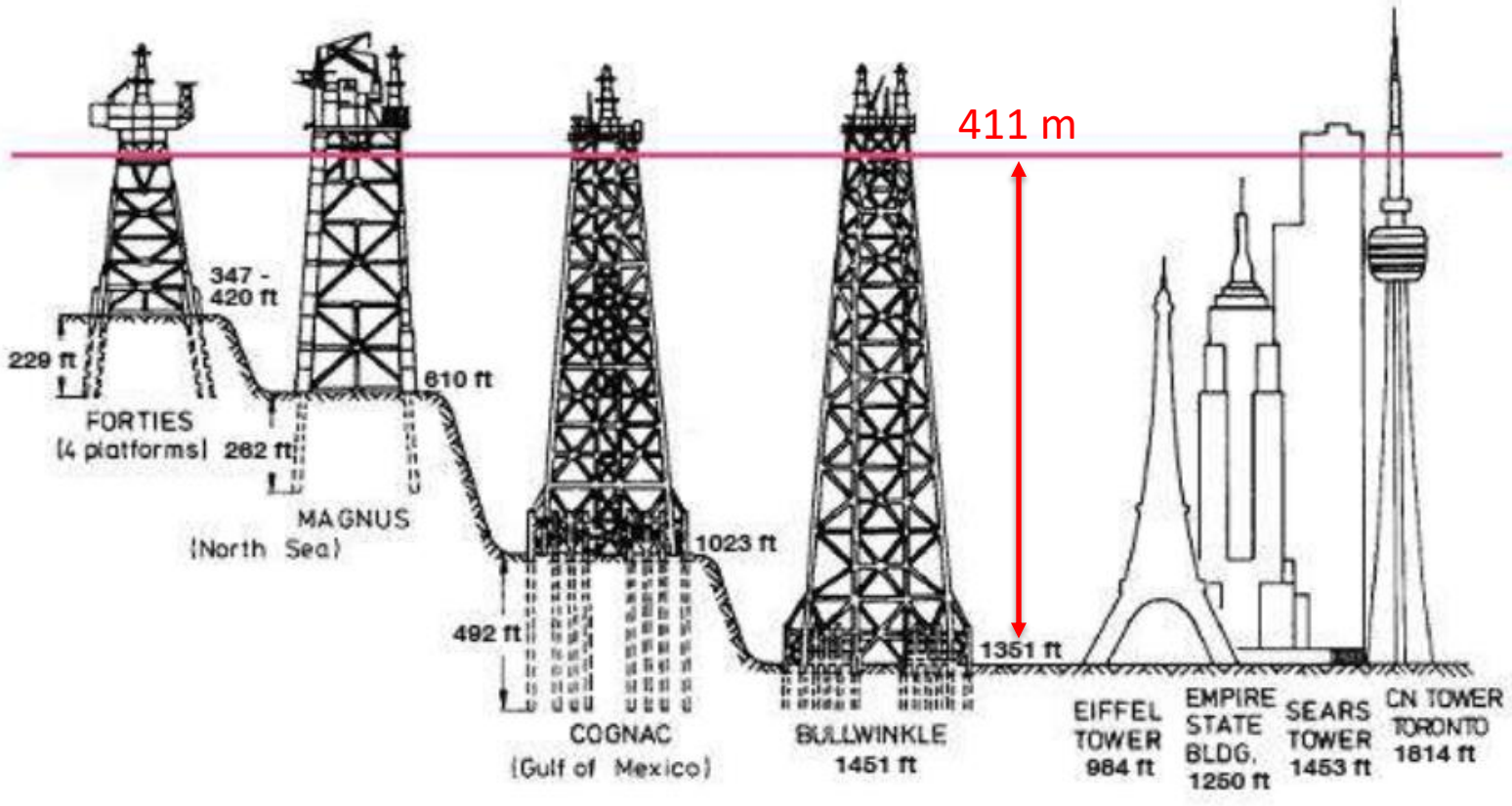
Forecast Activity 2014 to 2023			
Oil & Gas UK the voice of the offshore industry	Central and Northern North Sea	Southern North Sea and Irish Sea	Total UK Continental Shelf
Number of wells for P&A	510	417	927
Platform wells proportion of regional total	58%	80%	-
Topside modules to be removed	146	100	246
Topside weight to be removed	159,600 tonnes	122,000 tonnes	281,600 tonnes
Number of platforms	13	91	104
Substructure weight to be removed	65,000 tonnes	69,000 tonnes	134,000 tonnes
Number of mattresses to be removed	2,800	2,600	5,400
Subsea infrastructure to be removed	54,100 tonnes	1,500 tonnes	55,600 tonnes
Pipelines to be decommissioned	807 kilometres	2,470 kilometres	3,277 kilometres
Total tonnage coming onshore	288,800	192,600	481,400

e.g. USA has 629 platforms eligible for decom

Source: O&GUK 2014

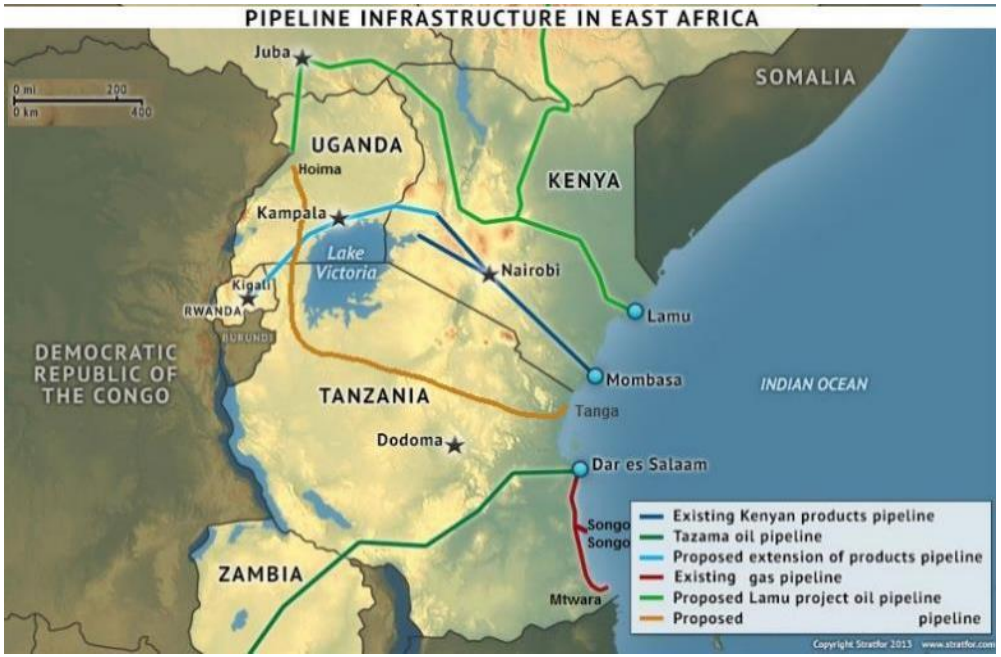
Challenge 3: sheer size of structures

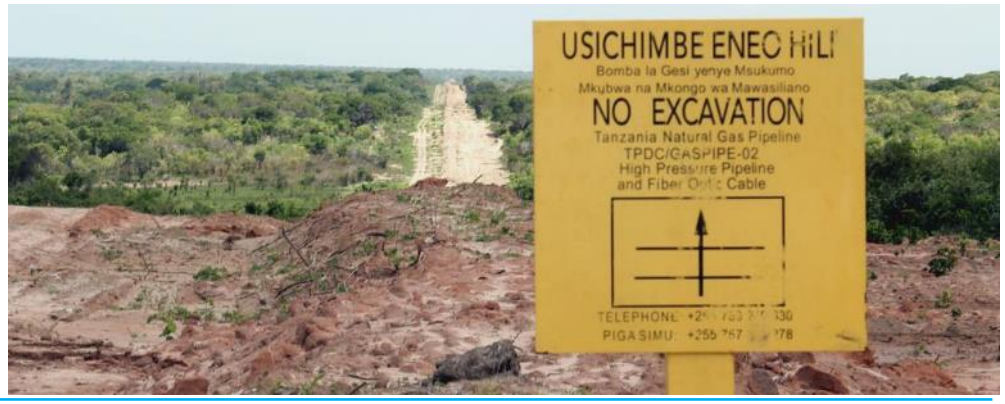
e.g. USA has 629 platforms eligible for decom



Source: http://www.oceansciencetrust.org/projects/oil-and-gas-platform-decommissioning-study/

Onshore pipelines and their wayleaves

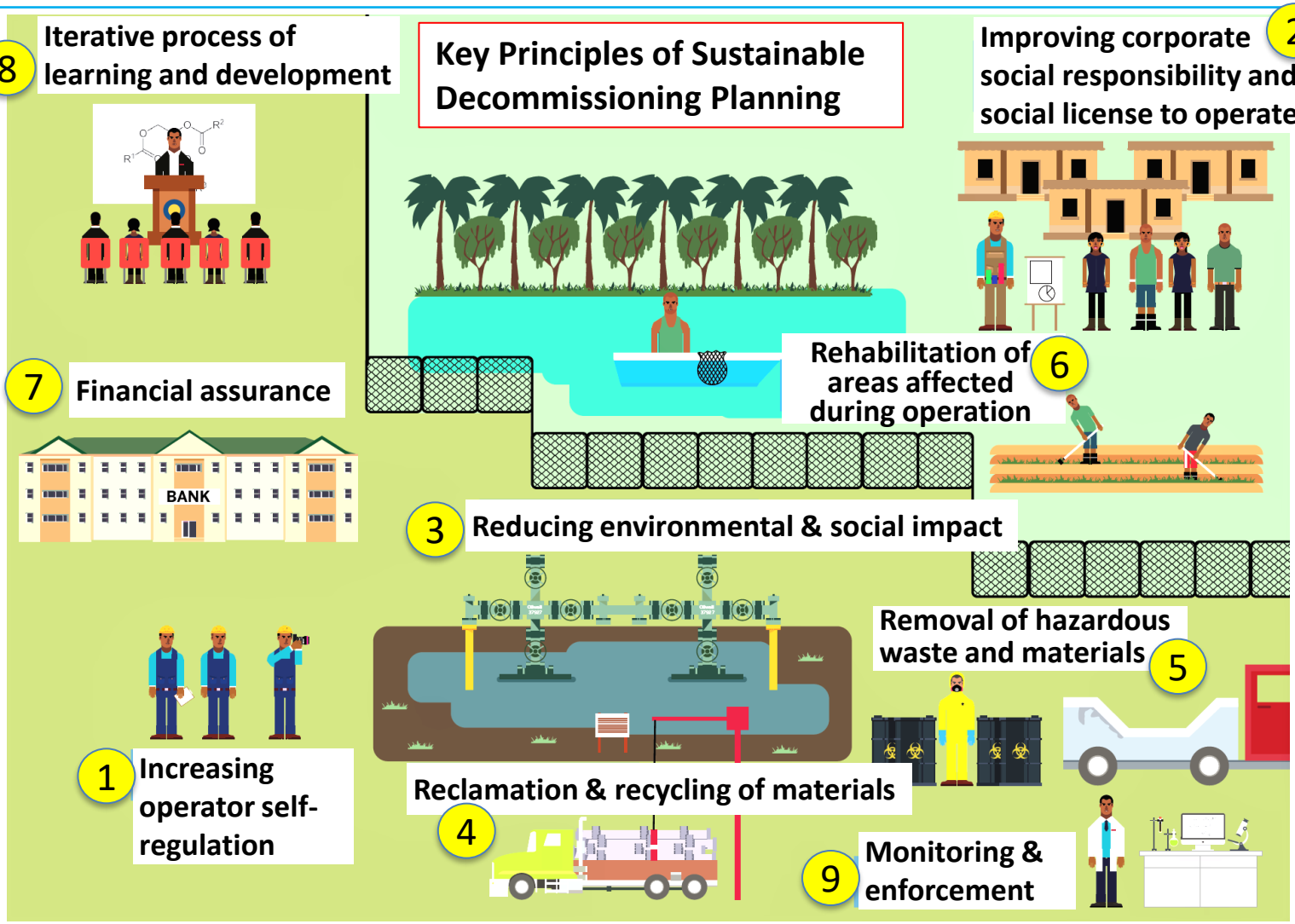




- Complex
- Highly variable
- Site specific
- Alternative uses

Key Principles of Sustainable Decommissioning Planning

The following **9 principles** should be articulated as minimum standards by ESIA departments and regulators

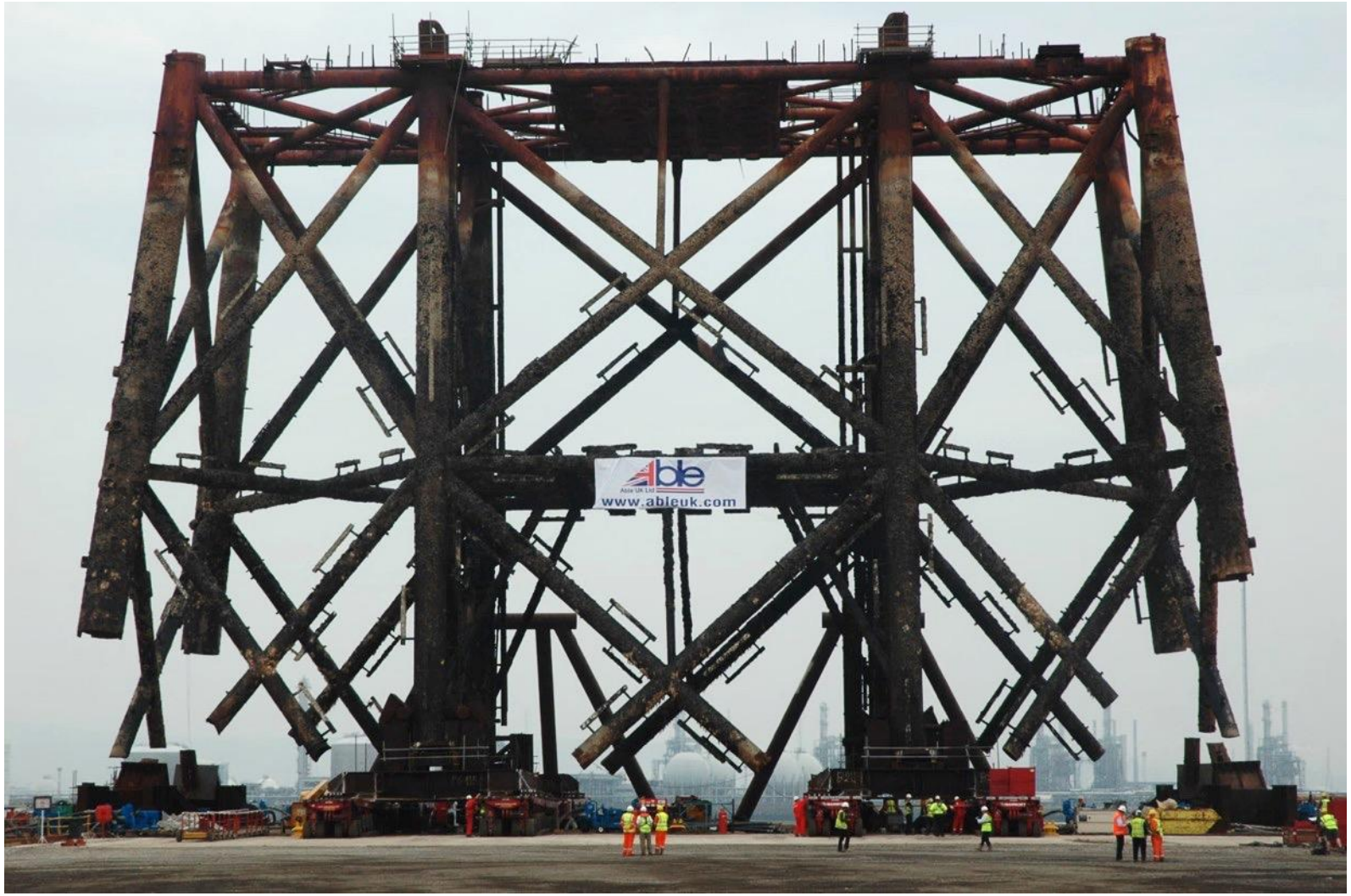


Source: modified from SUSTAINABLE CLOSURE AND DECOMMISSIONING OF ONSHORE AND OFFSHORE OIL AND GAS ASSETS IN NIGERIA 2015- www.stakeholderdemocracy.org

Offshore structures before

Source: https://www.ableuk.com/case-study/bp-north-west-hutton/

And after. Decommissioned! Now what?



Source: https://www.ableuk.com/case-study/bp-north-west-hutton/

Who's talking Decommissioning?

Where and When?

Why is safe decommissioning important?

From an environmental point of view:

- Decommissioned facilities/structures/sites still contain some hazardous inventory.
- After decommissioning, the facilities/structures/sites are uncontrolled and unguarded.
- Who is liable for future environmental damages?
- Environmental impacts/risks may remain for decades if not properly decommissioned.
- The site must be made available for productive use after decommissioning.

Reflection – Death in Abandoned Oil Facilities onshore

https://www.youtube.com/watch?v=CMchZjCbcCk&feature=youtu.be

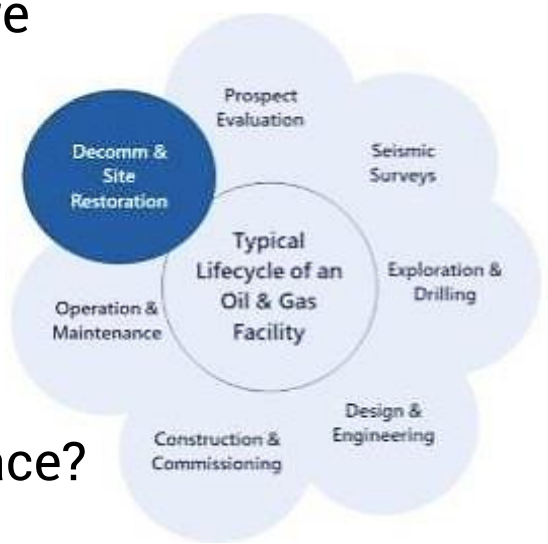
Role of Governmental Regulators for Environmental & Social Sustainability

- Make and update **environmental laws**, regulations and standards.
- Review environmental and social sustainability of developmental projects based on lifecycle impacts from routine operations and risks from accidents as part of permitting.
- Ensure transparency and public consultation during decision-making.
- Enforce compliance through independent monitoring and inspection.
- Promote best practices through incentives, recognition and knowledge sharing.
- Reduce bureaucracy and facilitate inter-governmental coordination.

Source: DNV-GL October 2019

Regulatory focus during decommissioning

Best practice requires a standalone ESIA, since the original ESIA is unlikely to cover impacts from decommissioning activities adequately. Decommissioning of offshore facilities is more challenging compared to onshore, and more expensive.



Some key **concerns for regulators**:

- Demolition versus transfer.
- Removal of subservice services.
- Subsea structures – remove or leave in place?
- Site remediation.
- Post closure environmental monitoring:
  - Whose responsibility?
  - For how long?
  - Funds needed?

Source: DNV-GL October 2019

International summary: UK perspective

- Decommissioning obligations applicable to the UKCS are principally governed by the 1992 OSPAR Convention.
- Although international laws governing decommissioning of offshore installations (creating obligations for States) consist of various norms of different enforceability, they provides at best only a framework within which nations and oil companies conduct their operations.
- The domestic decommissioning legal and regulative frameworks applicable to the UKCS are under a statutory decommissioning regime:
- **Petroleum Act 1998** (“the Act”) (as amended by Energy Act 2008) for offshore (O&G) installations and pipelines.

Around the world on decommissioning

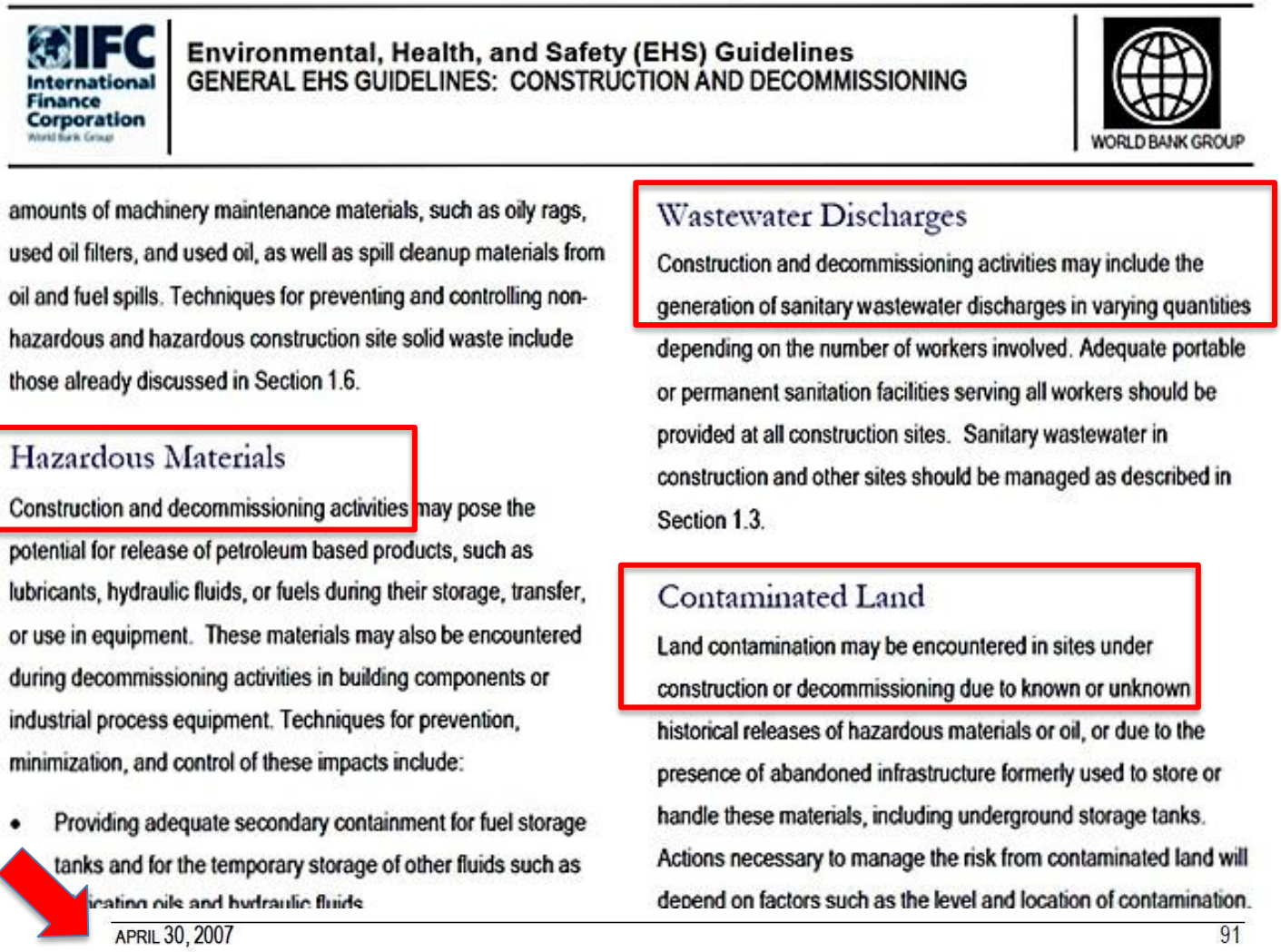
A few main points:

- In most countries, operators of oil or gas installations or pipelines are required to decommission infrastructure at the end of a field's economic life. THAT'S THE LAW.
- But there are differences in the details, even in the USA, it depends on the region.
- Many African countries have legal framework provisions/laws; if not, guidance is taken from other countries' regulations and international best practice.
- But remember, each country is unique, water depth, technology in use, local skills, sensitivity of the environment, and mindful of the existing contracts and licences.

Source:

International Policies & Obligations

e.g. **IFC-World Bank Guidelines**



IFC International Finance Corporation

Environmental, Health, and Safety (EHS) Guidelines
GENERAL EHS GUIDELINES: CONSTRUCTION AND DECOMMISSIONING

WORLD BANK GROUP

amounts of machinery maintenance materials, such as oily rags, used oil filters, and used oil, as well as spill cleanup materials from oil and fuel spills. Techniques for preventing and controlling non-hazardous and hazardous construction site solid waste include those already discussed in Section 1.6.

Hazardous Materials

Construction and decommissioning activities may pose the potential for release of petroleum based products, such as lubricants, hydraulic fluids, or fuels during their storage, transfer, or use in equipment. These materials may also be encountered during decommissioning activities in building components or industrial process equipment. Techniques for prevention, minimization, and control of these impacts include:

- Providing adequate secondary containment for fuel storage tanks and for the temporary storage of other fluids such as lubricating oils and hydraulic fluids

Wastewater Discharges

Construction and decommissioning activities may include the generation of sanitary wastewater discharges in varying quantities depending on the number of workers involved. Adequate portable or permanent sanitation facilities serving all workers should be provided at all construction sites. Sanitary wastewater in construction and other sites should be managed as described in Section 1.3.

Contaminated Land

Land contamination may be encountered in sites under construction or decommissioning due to known or unknown historical releases of hazardous materials or oil, or due to the presence of abandoned infrastructure formerly used to store or handle these materials, including underground storage tanks. Actions necessary to manage the risk from contaminated land will depend on factors such as the level and location of contamination.

APRIL 30, 2007 91

Source:

Country examples: Colombia

General decommissioning regulations require no later than 3 months in advance of decommissioning start, licensee to submit study to ANLA (national environmental licensing agency) to include:

- **environmental impacts** existing at beginning of decommissioning stage;
- **management measures**, final restoration activities, and pending actions;
- maps with the **location of the infrastructure** being decommissioned;
- a **list of environmental obligations** derived from administrative acts, identifying those pending & fulfilled, and further compliance evidence; and
- **estimated expenses** and commitment to comply with obligations pending to be fulfilled.

Within 1 month, ANLA verifies status of project and issues an administrative act declaring start of dismantling stage, acknowledging obligations fulfilled, and determining all pending obligations and restoration activities.

No later than 5 days following starting date of decommissioning stage, the licensee must submit an **insurance policy** in favour of ANLA, to **guarantee** payment of decommissioning plan's costs. Policy must be renewed annually during decommissioning and for 3 years after completion.

Source: https://practiceguides.chambers.com/practice-guides/energy-oil-gas-2021/colombia

Country: Mozambique

- Under Petroleum Operations Reg. Decree 34/2015, a detailed **decommissioning plan** to be prepared in consultation with National Petroleum Institute (INP) >2 years before end of project.
- Plan must include an evaluation of the environmental impact of the activities involved in closing and abandonment.
- Operators to follow **good international practices** and **applicable environmental legislation**. Plans evaluated/approved case by case.
- Concessionaires also to **create a fund** for the closure and decommissioning of infrastructure (Art. 40 Petroleum Law No. 21/2014), whereby those with contract for production of, or a use of infrastructure for, petroleum operations shall open a bank account as a **decommissioning fund** and periodically deposit amounts, covering such costs as per the estimates submitted and annually updated by concessionaires.

Source UN Environment 2018 Capacity Needs Assessment: Strengthening Environmental Management in the O& Sector in Mozambique

Country: Iraq (onshore)

- Decommissioning of oil and gas facilities/pipelines governed by the laws (contracting regulations) issued by Min. of Planning.
- In recently granted service contracts, common contractual obligations provide that on the termination of the contract or relinquishment of part of the contract area, the **IOC or contractor shall remove all equipment and installations** in a manner agreed with the relevant national oil company pursuant to an **abandonment plan**, which is to be agreed.
- The IOC also has to issue preliminary and final acceptance certificates in relation to the completion of projects to the national oil company.
- This process may occasionally involve third parties, including insurers such as SGS or Lloyd's.
- There are **no known statutory or publicly known contractual requirements for the provision of security deposits** in respect of future decommissioning liabilities.


Iraqi Al Basra Oil (export) Terminal

Source: http://www.navy.mil - Photo identified as being free of known restrictions under copyright law, incl. all related and neighboring rights.

Country: Ghana

- Licensee or contractor that operates a petroleum facility is required to **submit a decommissioning plan (DP)** to the Minister for approval not more than 5 years and not less than 2 years **before** date on which the petroleum facility is to permanently cease operation or before the expiry of the licence or relevant petroleum agreement.
- The Petroleum (Exploration & Production) Act 2016 also requires a licensee or contractor to **establish a decommissioning fund**.
- Contractor must treat and plug the abandoned well with the prior written approval of the Commission and in a manner consistent with **international best practices** and as approved by the Commission.
- A contractor or licensee under an obligation to implement an approved DP is **strictly liable for any loss or damage caused** in connection with the decommissioning of the facility or the implementation of the DP.
- The E&P Act requires Ghana Nat. Petroleum Corp. (GNPC) and contractors to **restore affected areas** and remove items with the potential to damage the environment at end of petroleum operation.
- The obligation for decommissioning is **placed on the contractor**, who must submit annual reports to the EPA for reviews and monitoring.

Source: The Oil and Gas Law Review: Ghana AB & David Law Affiliates, 03 November 2021

Case Study: How was it decommissioned?

https://www.youtube.com/watch?v=n1GcO6w5PZQ

18 min

https://www.bbc.com/news/uk-scotland-north-east-orkney-shetland-31096983

2 min

Source:

Key messages

- Two types of oil & gas infrastructure requiring decommissioning are abandoned (or orphan) structures and those related to expired oil or gas fields, or that have reached the end of their working life.
- Decommissioning is the process whereby abandoned (or exhausted) oil/gas fields are made safe and land/sea are reclaimed as much as possible to original state, to be used for other purposes.
- Decommissioning is relevant to all parts of the oil and gas value chain, from exploration to production and sales.
- There are 9 guiding principles that should be articulated as minimum standards by ESIA departments and regulators of decommissioning.
- In most countries, operators of oil or gas installations/pipelines are responsible for decommissioning infrastructure, but in some countries the government plays a major role.