Clean technologies for old vessels and oil rigs infrastructure dismantling

PECC, Busan, April 2016

Part I – Growing needs for dismantling & deconstruction

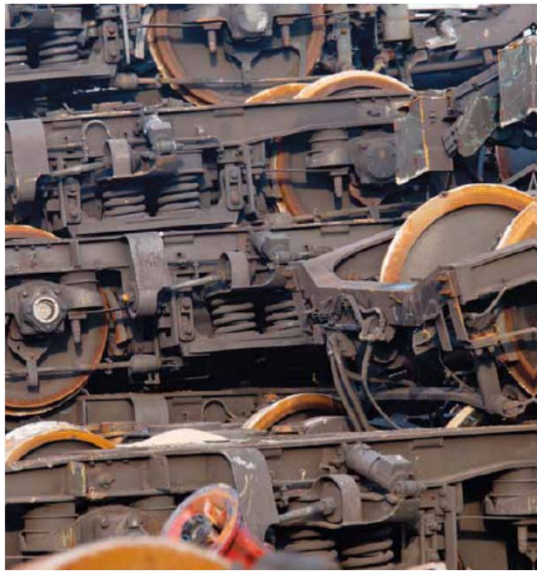
A sharp increase in the number of obsolete installations and equipments

- **They are at the end of their life or have undergone through natural or industrial disasters with a contamination risk.**

- **Heavy mobile equipments:**
  - *Ships: a dynamic market.*
  - *Airplanes: current obsolescence of aircrafts in circulation, rising costs of unserviceable aircrafts storage.*
  - *Trains: market growth in countries where asbestos pollution makes the resale of trains impossible (e.g.: France).*
- **Industrial facilities:**
  - *Oil platforms: a number of important installations have reached the end of their lives or do not meet more stringent environmental regulations.*
  - *Electric power stations: national policies of nuclear energy phase-out (e.g.: Japan); objectives of closure of coal-fired power plants for environmental reasons (e.g.: US)*
  - *Other industrial sites: end of industrial cycle in developed countries (eg: refineries).*

Managing the ends of industrial cycles

- **For the sake of their reputation, blue-chip industrial firms must comply with tough environmental standards: they need high quality services in order to respect these standards, included during decommissioning which is a sensitive operation.**
- **They also need to reduce their safety risks to a minimum during this critical phase.**
- **Therefore, dismantling offshore platforms, ships, tanks, planes, trains… requires a combination of very advanced technical skills, responsiveness, and availability.**
- **Objectives of desmantling:**
  - *Avoiding contamination risks*
  - *Optimizing materials recycling and reuse of equipment (locally and at a lesser cost)*
  - *Soil remediation in order to restart later new activities on the same site.*



Turning noxious substances into resources, and recycling them back into the economy

- **Optimized desmantling requires to assemble a broad array of know-how critical to the treatment and recovery of waste, as either energy or recycled materials:**
  - *cutting edge expertise, ultra-specialized workers and technologies, a carefully designed organization, flawless logistics on a **scale to match the volumes of waste produced and the size of recycling markets, trading expertise***
  - *Manufacturers and buyers of second-generation raw materials want the same guarantees in terms of quality, reliable flows and availability as for virgin raw materials. **Providing those guarantees** is precisely the role of a professional operator like Veolia.*

- **To help businesses control their costs, it is necessary to manage issues such as:**
  - *the traceability of their materials flows;*
  - *the value chain of an item of waste from production to elimination or recycling;*
  - *trading in by-products for recycle / re-use.*

Creating recycling progress for industrial clients

- **Veolia positions itself as a reliable integrator throughout the whole value chain (dismantling, compliance, material recovery)**
- **Veolia's offering:**
  - *Waste treatment, including difficult pollutants*
  - *Recycling to optimize asset value*
  - *Dismantling*
  - *Compliance solutions geared towards minimizing environmental and conformity risks*

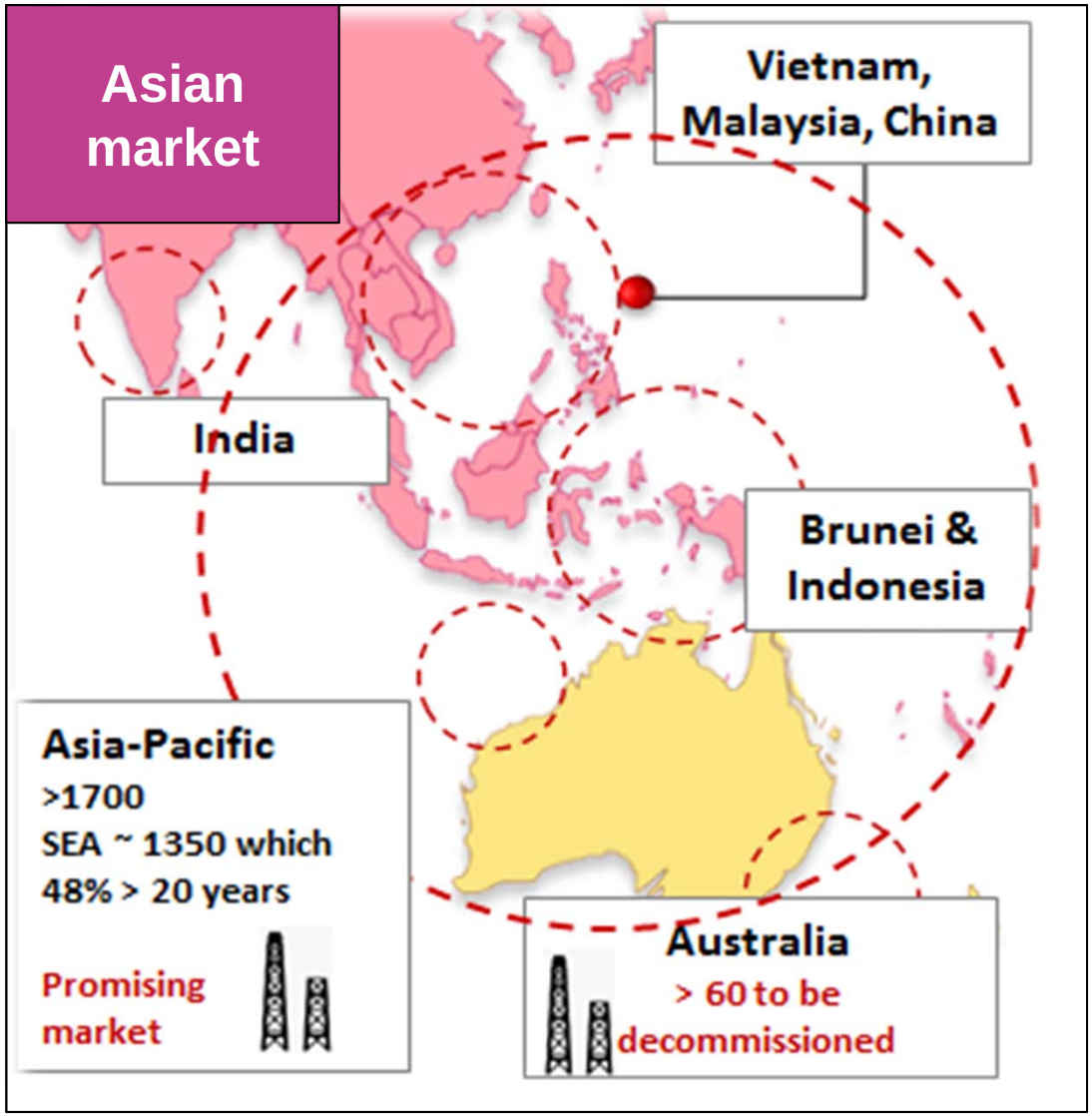
Photothèque Veolia – Rodolphe Escher

- **Veolia's differentiating factors:**
  - *Recognized expertise and technologies in characterization, management, treatment and recycling of waste and management of dangerous pollution (nuclear, asbestos...)*
  - *Project management across the value chain – until total control of downstream: traceability and responsibility on waste*

Part II – Dismantling oil & gas offshore platforms

Dismantling oil rigs: market size

- In the next 10 years, many installations will come to the end of their useful life and will have to be dismantled: it is estimated that there are 2,000 offshore platforms to be dismantled in the North Sea, the Gulf of Mexico and South-East Asia.
- The cost of dismantling can be in the tens of M$ per unit (even > 100 M$)
- The global scrap iron market is estimated at ~€40bn a year: it is a good indicator of the significant potential of this growing market



Oil rigs decommissioning sequences

1. **Permits' attribution and approvals of dismantling plan**
2. **Well abandonment (plugging with grout)**
3. **Preparation of the platform and pipelines for disconnexion**
   - *All hydrocarbons removed, equipment and deck prepared for removal*
4. **Abandoning connected pipelines**
5. **Removing deck and jacket**
   - *The deck (cut from the jacket) is lifted and placed on a material barge, then transported to shore to be recycled, re-used or scrapped.*
   - *The jacket, pilings and well conductors are cut 4 to 5 m below the mudline (using explosives or cutting devices).*
   - *The jacket is transported onshore to be dismantled and sold for scrap, or reefed in place or in a pre-determined location*
6. **Clearing bottom and verifying site**

Veolia and the Oil & Gas industry

The Oil & Gas industry, a priority segment for Veolia

- *Oil and gas companies are subject to severe environmental constraints.*
- *Veolia numbers the world's foremost oil and gas companies among its clients, including Shell, Total, BP, Chevron, Sinopec, Qatar Petroleum, Marafiq...*

Solutions offered by Veolia for oil rigs dismantling:

- *Off-shore planification and pre-decommissioning, in order to reduce waste and optimize recycling*
- *Cleaning platform and pipes*
- *Disconnecting equipment*
- *Managing utilities (water, energy, air) during decommissioning*
- *Recycling waste and treating residuals*

Results:

- *Decommissionning operations are potentially polluting and dangerous, and the solutions we can offer eliminate those risks.*
- *Our solutions also reduce the costs of dismantling, since we can recycle up to 98% of the materials used in the platforms.*

Offshore platforms decommissioning in the North Sea: Shell UK

The contract:

- *Client: Shell UK Ltd*
- *Project completed in 9 months (2011)*
- *Total revenue: €5.6 million*
- *Scope: Decontamination and demolition of the 8 gas field 'jackets' and 8 topside structures with a total tonnage of around 12,000.*

Veolia's means:

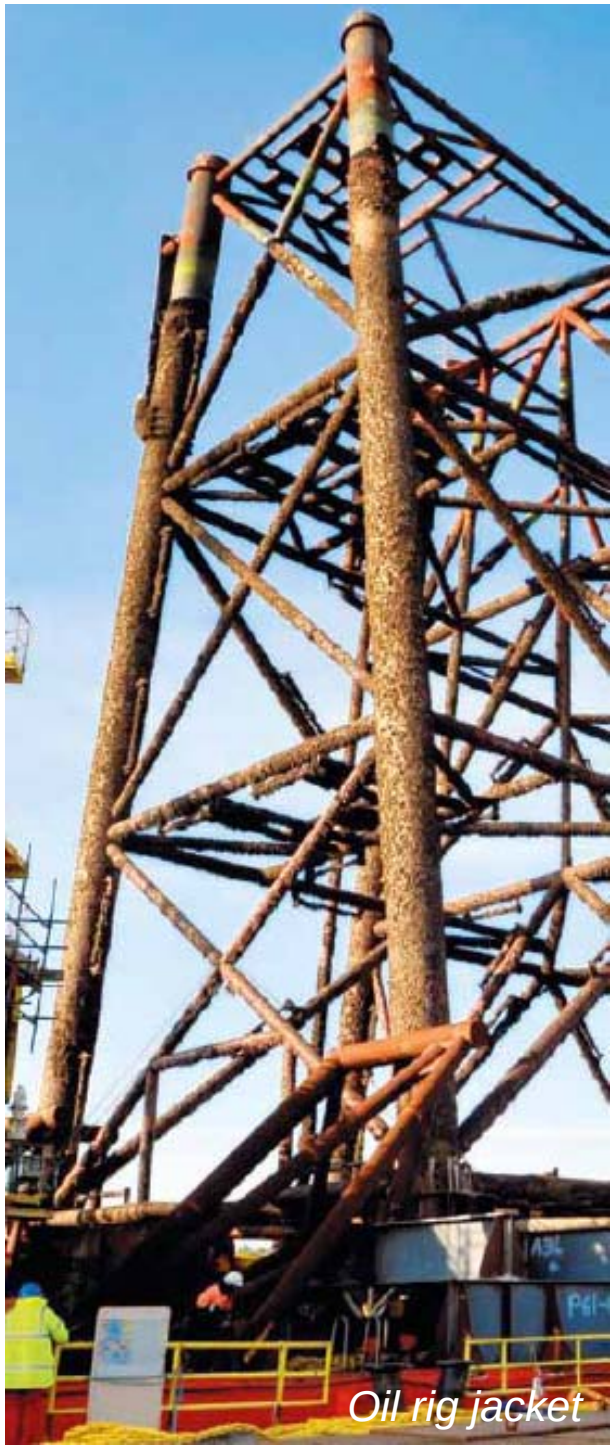
- *The work was carried out at the former Swan Hunter shipyard at Wallsend, near Newcastle. Veolia UK operated the facility under an Environment Agency permit.*
- *In-house capability to manage all waste streams. Veolia assets include landfill and incinerator for NORM (Naturally Occurring Radioactive Materials)*

Clients benefits:

- *Risks and costs reduction*
- *Quick and efficient realization of the project, with maximum material reuse and recycling*
- *Total waste management: materials assessment, deconstruction & dismantling, separation, treatment, removal, valorization / disposal of non-hazardous and hazardous waste including asbestos and NORM.*

Norwegian oil platform decommissioning

- **In 2014, Veolia won the contract to decommission a 14,000-tonne oil platform in the North Sea.**
  - *In a unique feat of engineering and the first of its kind, the YME oil platform, spanning some 72 m in length and 87 m high, has been removed and towed in a single lift from its current North Sea location.*
  - *The offshore structure and equipment will be dismantled and recycled at Lutelandet in South West Norway. It arrived there in mid-2015.*
  - *Veolia intends to recycle 99.7% of the structure. YME contains a range of valuable materials including precious metals, iron, steel and electrical items.*
- **Veolia is entering a long term agreement with its Norwegian partner, Lutelandet Offshore, to develop the deep-water quay and site at Lutelandet.**
  - *The YME platform will be the first in an anticipated pipeline of work for decommissioning platforms that Veolia will undertake here.*



Oil rig jacket

Part III – Old ships' dismantling

Site of the dismantling of the Anna, France

Heterogeneous market, with contrasted actors and contrasted regulatory conditions

- **Ship dismantling, a dynamic market:**
  - *Acceleration of the disposal of ships due to an overcapacity in the shipping market and to aging fleets*
  - *Arbitration between:*
    - *dismantling of unserviceable ships*
    - *extending the life cycle of the ships through meeting new standards and upgrading*

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- **Preliminary decontamination is often required (e.g. : for military ships).**
  - *The objective is to make the obsolete ship safe for unprotected personnel by removing, neutralizing, or destroying any harmful substance, as asbestos, noxious chemicals, radioactive materials, poisonous gas…*

- **Low cost dismantling is often not compatible with good environmental protection:**
  - *In countries like China, Pakistan, Turkey, local players are offering low-cost demolition.*
  - *It is also the case in countries where most of the steel produced comes from scrap iron (electric furnaces): Bangladesh (>50%), India (20 %), China (19%).*

Dismantling operations of the Jeanne d'Arc cruiser, the former French Navy teaching and training ship (1)

Contract:

- *Veolia won the European-wide tender for the full dismantling of the hulks formerly known as the Jeanne d'Arc and the Colbert, on behalf of the Marine Nationale, the French Navy.*
- *All operations will take place at the Atlantic Port of Bordeaux, into Dock 3, which is 240 meters long, 35 meters wide and 15 meters high.*
- *A 32-month contract, worth 11.5 M€*
- *Bartin Recycling Group is the Veolia subsidiary with responsibility for the deconstruction*
- *Weight: Jeanne d'Arc: 9,000 metric tons – Colbert: 8,500 metric tons*

An ecologically sound works cycle :

- *The objective is to guarantee staff safety and to give a second life to over 90% of the materials contained in this well-known ship*
- *Operations will be carried out in compliance with French regulations on Installations Classified for the Protection of the Environment*
- *Veolia approach is to offer full solutions by playing the role of integrator.*

Dismantling operations of the Jeanne d'Arc cruiser, the former French Navy teaching and training ship (2)

JULY 29 2014

Notification of the complete dismantling contract of the former Jeanne d'Arc including the disposal or recovery of all material

SEPT. 8 - OCT. 10 2014

Provision of the ex-Jeanne d'Arc (Brest Naval Base), **maritime expertise,** preparation for sea voyage

OCT. 11 - 14 2014

Towed from Brest to Atlantic Port of Bordeaux

NOV.2014 - SEPT.2015

Pollution & asbestos removal
Installation of two elevators in the structure to facilitate operations

OCT.2015 - AVR.2016

Deconstruction & dismantling
(cutting and extraction), preparation and then recovery of materials (cutting to size, sorting, removal and recovery)

AVRIL 2016

End of the operation

Dismantling operations of the Jeanne d'Arc cruiser, the former French Navy teaching and training ship (3)

DISMANTLING OF THE JEANNE D'ARC
AN 18-MONTH OPERATION

Helicopter cruiser
Commissioned 1964
9000 metric tons

90%
RECOVERY SYSTEMS

1. **Scrap metal** (French & Spanish steel mills)
2. **Non-ferrous metals** (French & other European Union foundries)
3. **Electrical and electronic equipment** (St-Sylvain-d'Anjou, France)
4. **Liquids and fluids** (Bègles, France)

10%
TREATMENT SYSTEMS

5. **Non-hazardous industrial waste** (Bègles & Lapoujade, France)
6. **Asbestos** (St-Cyr-des-Gâts & Bellegarde, France)
7. **Hazardous waste** (Bassens, France)
8. **Liquids & fluids** (Bègles, France)

Dismantling operations of the Jeanne d'Arc cruiser, the former French Navy teaching and training ship (4)

- **Deconstruction and materials recovery:**
  - *Phase 1: 10 months of work will be needed to remove all asbestos from the hulk.*
  - *Phase 2: 6 months to cut up, prepare, recover and dispose materials.*
    - *That includes scrap iron, other scrap metals, waste electrical and electronic equipment (WEEE), cables, wood, and so on.*
    - *Non recoverable waste, such as asbestos and residual wastes, will be sent to appropriate facilities.*

Part IV - Towards new economic models

Recycling oil rigs and ships' components

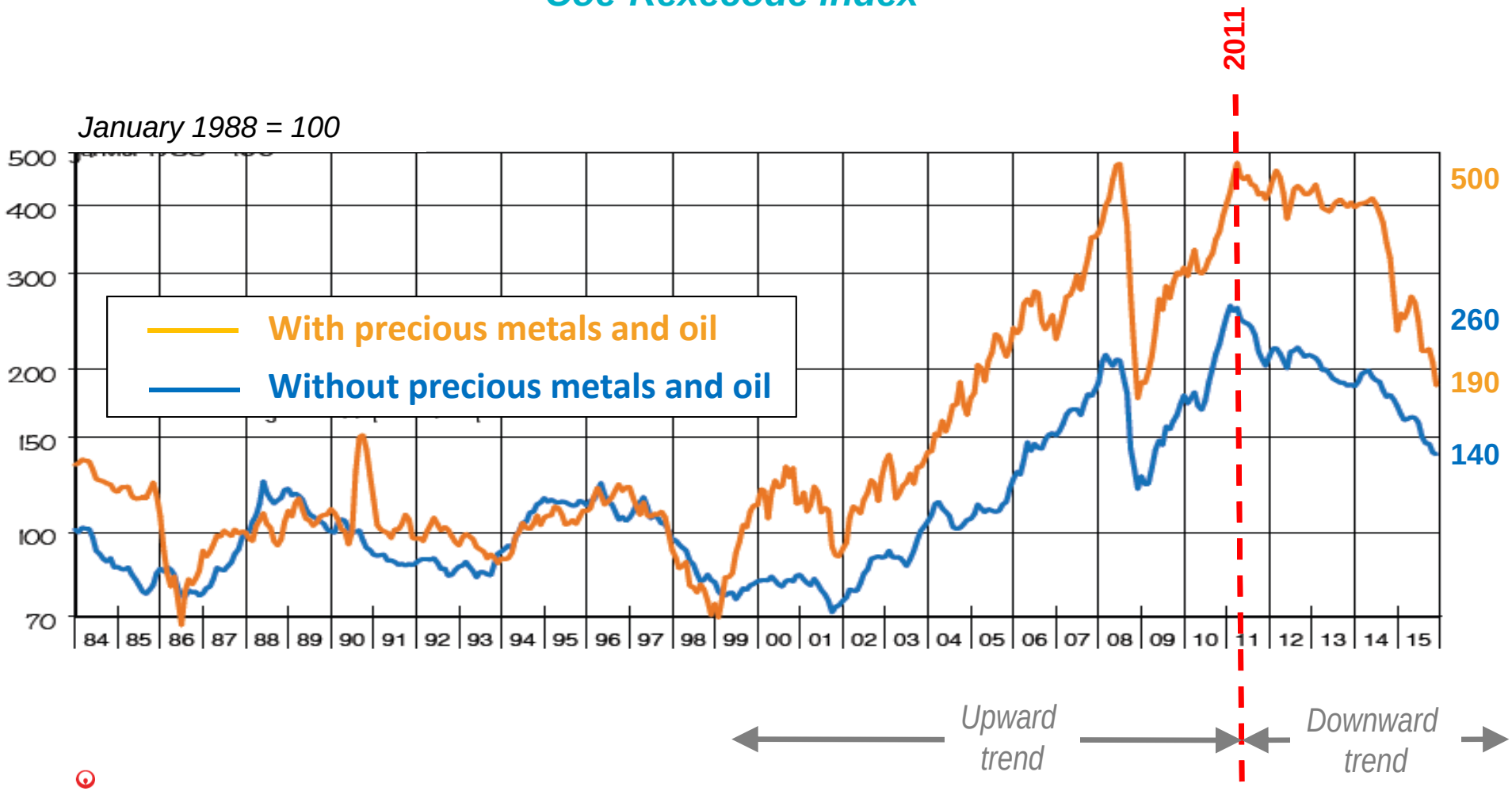
- **Recycling gives "used" materials umpteen additional lives. In so doing, it multiplies the productivity of the resources borrowed from nature.**
- **Recycled products can be used either locally or on the other side of the planet, depending on their nature and the demands, because many recycling markets have gone global.**
- **The waste sector is gradually becoming a raw materials industry: stocks of industrial waste are turning into mines.**
  - *These economic models based on recycling are leading us in the direction of a society where we continually reutilize the same raw materials in an nearly unending cycle.*
  - *They are taking us from an old linear mode of production and consumption characterized as "I take, I use, I throw away" to a society of generalized recycling imitating the way nature works.*

Supporting clean dismantling and recycling through financial incentives

- **A key difference between a “used” product economy and a “new” product one is that, in general, no one is actually asking for the former!**
  - *Therefore incentives are necessary, either financial or standards, to encourage recycling and reuse.*
  - *Up to 2011, steadily rising prices for virgin raw materials were helping this move, making secondary raw materials each year more attractive.*
  - *The recent collapse of the price of raw materials dramatically alleviate incentives for clean reuse and recycling, especially in countries with weak environmental regulation.*

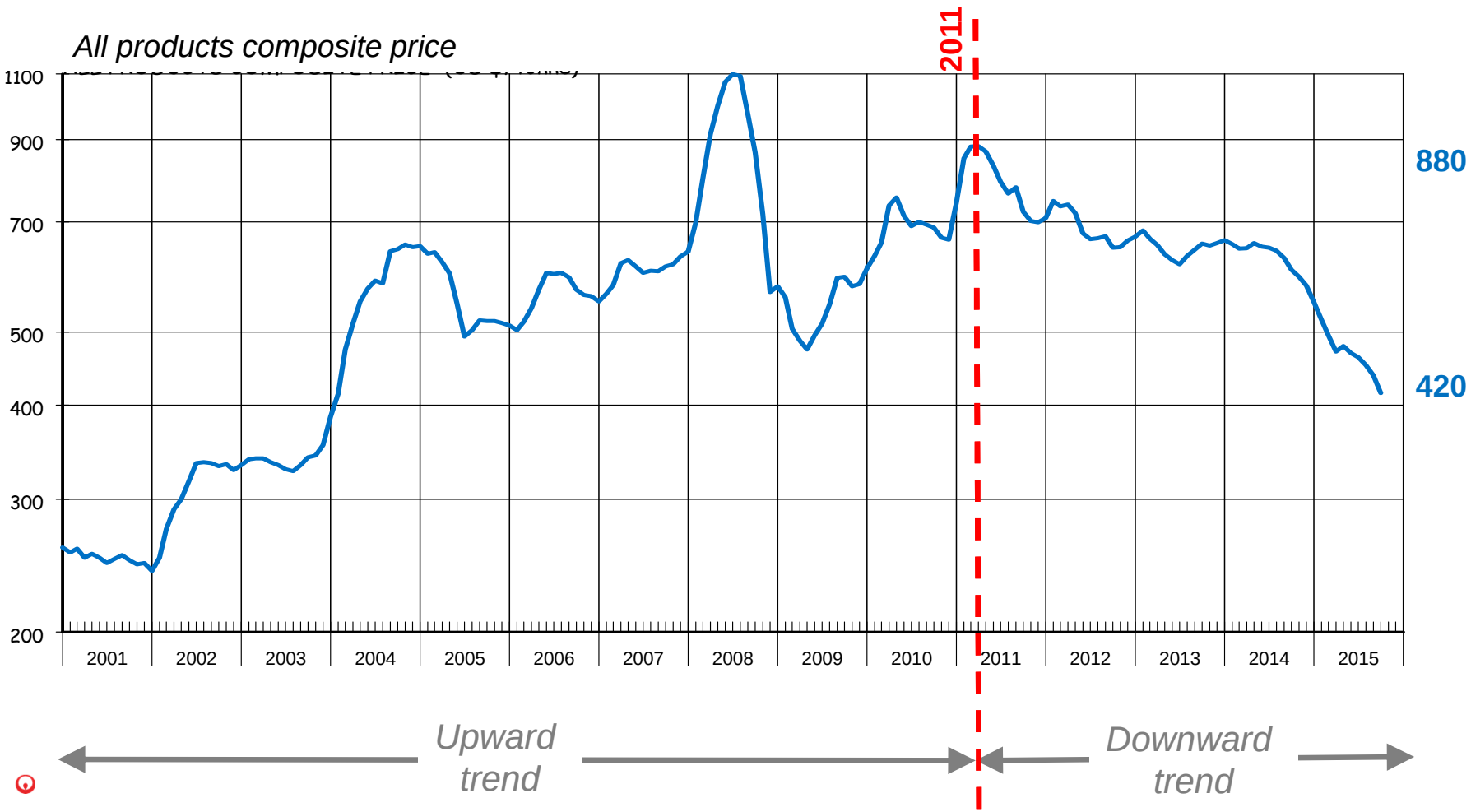
The collapse of raw materials price

Evolution of the prices of raw materials prices in $
Coe-Rexecode index



The collapse of steel price

Evolution of the prices of steel prices in US per ton
Coe-Rexecode index



Supporting clean dismantling and recycling through demanding standards

- **Under-regulated and polluting dismantling in developing or emerging countries (Bangladesh, India, Pakistan,…) compete with high standards environmental dismantling.**
- **Clean decommissioning will not develop up to its promising potential without appropriate policies:**
  - *Too often, clean dismantling turned out too expensive because of competition from weakly regulated countries.*
  - *It makes the bankability of some clean dismantling projects low.*
- **When the price of raw materials and steel fall down, stringent regulation is even more necessary to encourage clean dismantling.**
- **Therefore the issue of regulation is essential to better protects:**
  - *workers' health and safety.*
  - *the public health of neighbors.*
  - *the environment, the seashore and the sea.*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Conclusion

The evolution of our relationships with businesses

- Our mission is no longer just a question of helping industrial firms to protect the environment and comply with regulations; it is also a question of helping them to compete economically, by optimizing waste and water management within their whole processes.
- This linkage between economic and environmental performance is the bedrock of our services to industrial customers.

Offshore platform, United Kingdom

- For the oil and gas and shipping industries, we are no longer merely a subcontractor or a technical provider (called in to tackle a specific problem), but a genuine partner (working with them to study how our solutions can boost their development).

Thank you for your attention