THE GREEN LIFECYCLE OF PIPELINE DECOMMISSIONING

Best Practice - Supply Chain innovation and advancement – new models and new techniques

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THE OPPORTUNITY

Certain pipelines will be recovered and either recycled or re-purposed.

Net Zero targeting - Opportunity to gain significant energy benefits from re-purposing of pipeline sections.

- Established industry in re-purposing pipe in the civil piling industry

Focus is on removal techniques, with onshore processing less influential in decisions made - Offshore recovery is often a different tender cycle to onshore recycling.

Lack of coating removal and material repurposing knowledge skews the focus.

The entire lifecycle of the removal and recycling process needs to be considered, to achieve best practice in cost and carbon/energy.

THE SCALE & IMPACT

Surface laid pipelines to be recovered in North Sea and globally.

- Asia Pacific (recent Thailand Erawan project), where pipelines are not trenched.
- Clean cut for access to clean contaminates

Even 500,000 tonnes of this being removed & re-used or recycled represents over £250m of steel value and a CO2e saving of over 1million tonnes – that's 7.5 billion miles in an average car!

Re-use would give civil infrastructure a boost through access to cheaper, lower carbon footprint and more readily available steel pipe stock compared with new orders from steel mills

CURRENT APPROACHES

If trenched, then typically being left in-situ……

Topic:- Surface laid pipelines (excluding Bundles)

Recent maturity of solutions to support Regulatory regime.

Lack of technical/cost assurances with trenching, rock placement is environmentally and regulatory challenging.

Early days in pipeline recovery, but cut and lift method is becoming the favoured solution……

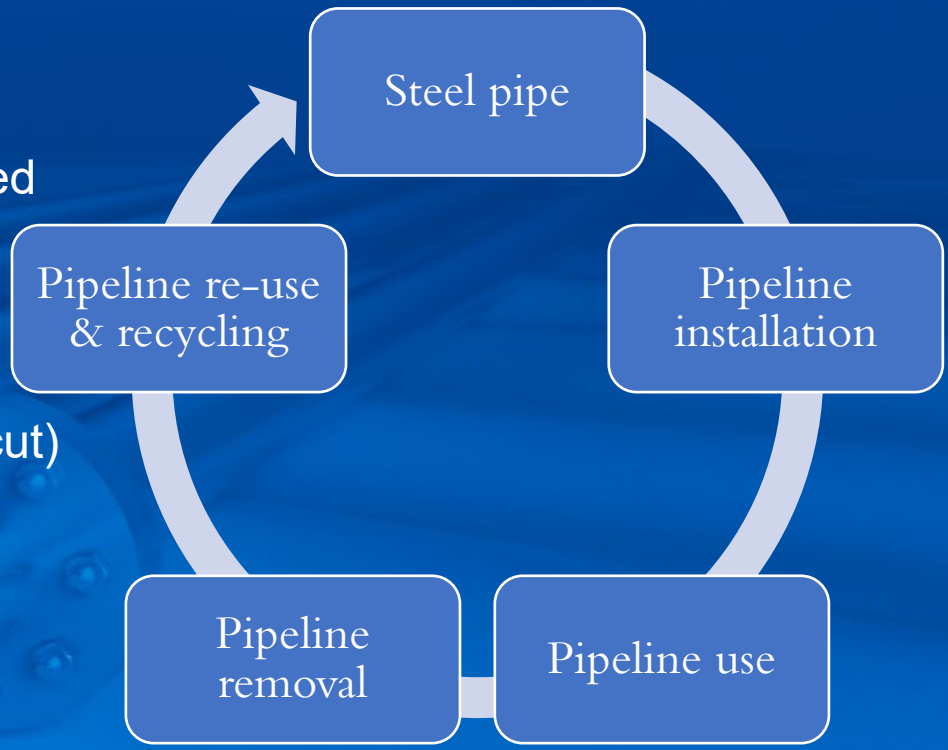
PROPOSAL

If removal is considered in isolation to repurposing/re-use then market will move towards the development of innovative shear designs to simply remove and recycle rather than re-use

Opportunity is to bring sections of pipeline back to shore, undamaged (uncrimped) for repurposing.

Proposed Process;

1. Clean cut (chop saws are the most efficient solution for clean cut)
2. Handle with care – twin grabs and back deck corrals
3. Coating removal (and cleaning)
4. Sell on into the civil industry to use as piling (typically 12m sections, as are removed offshore)



WORKED EXAMPLE

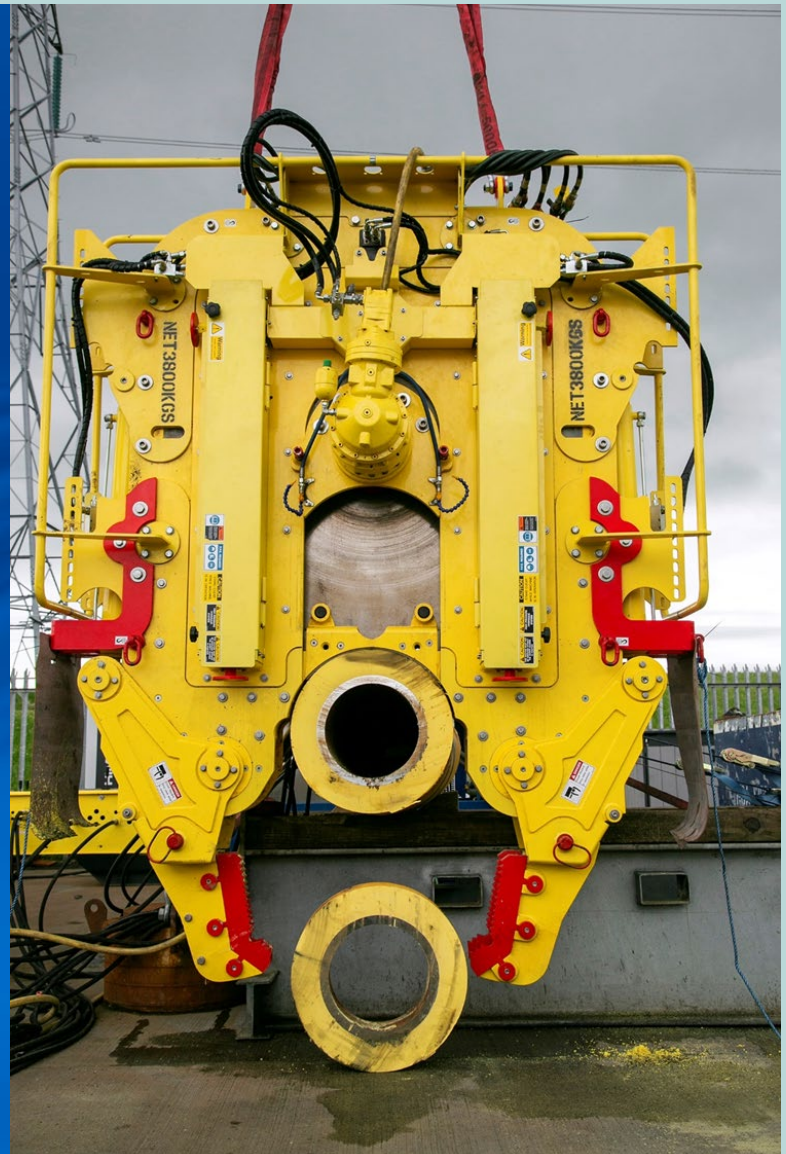
Pipeline needing to be removed and is clean cut

Length (km)	No of cuts (12m sections)	Diameter (inches)	Wall thickness (mm)	Steel grade	Coating	Steel (Tonnes)
35.9	2992	30	20	x60	26.5mm 4 LPP	12,819

Additional value beyond scrap if used for piling (£150 a ton 2022 prices)	Total CO2e saving in T if used as re-purposed piling
£1,922,850	27,740

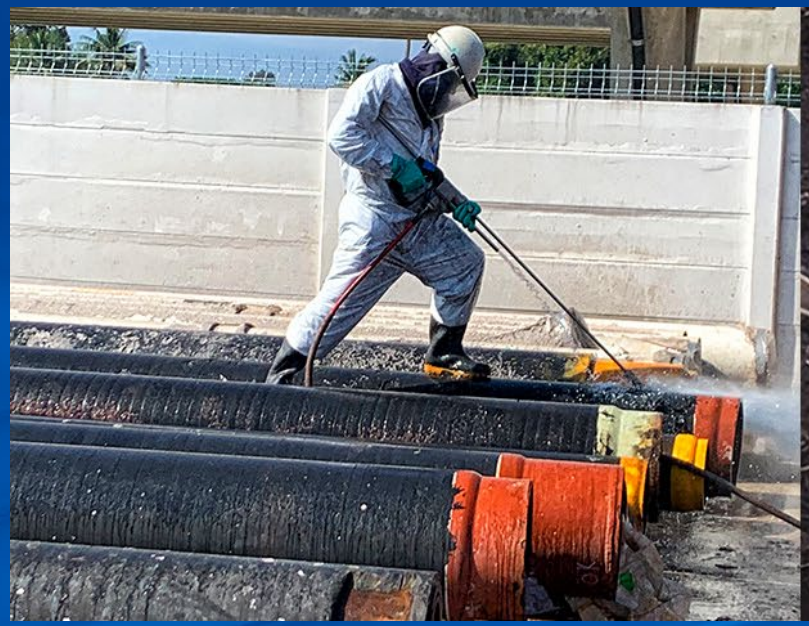
1. CLEAN CUT – CHOP SAWS

- 20 to 50 cuts per blade on standard pipelines
- Lower consumable costs, less downtime and lower cost per cut
- **Market-leading cutting times: 8 minutes on 16” OD,** 12mm WT, L80 grade material
- Modular clamping system: move between cut sizes with no tooling change
- Comparatives;
- Far quicker, more reliable and robust than Diamond wire saws. Limit is presently 30”.
- Comparable with timings for shears with added bonus of clean cut.



2. COATING REMOVAL EXISTING SOLUTIONS

Once pipe is onshore existing removal methods are slow, costly and environmentally unfriendly



WATER JETS

Slow • Operator hazards
Poor waste capture • Pipe damage

BY HAND

Slow • Operator hazards
Poor waste capture • Pipe damage

HEAT INDUCTION

Slow • Costly manpower and heat
PE only

3. COATING REMOVAL
THE DECOM ENGINEERING SOLUTION

UNLOCK COATED OIL & GAS TUBULARS FOR REUSE

To unlock the value of the steel pipe,
we must remove three layers of coating:

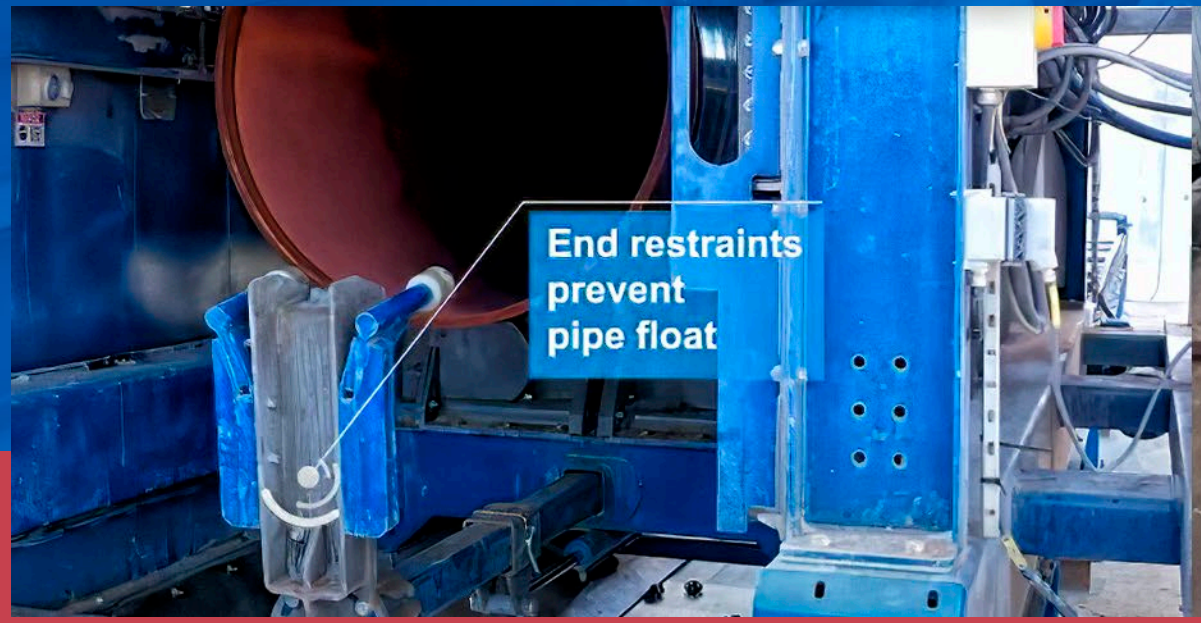
- Fusion bonded epoxy
- Adhesive
- Polyethylene

STEP ONE: LOADING

THE PIPE IS LOADED ONTO V-BLOCKS USING A FORKLIFT

THE V-BLOCKS ARE THEN LOWERED TO PLACE THE PIPE ONTO ROTATORS

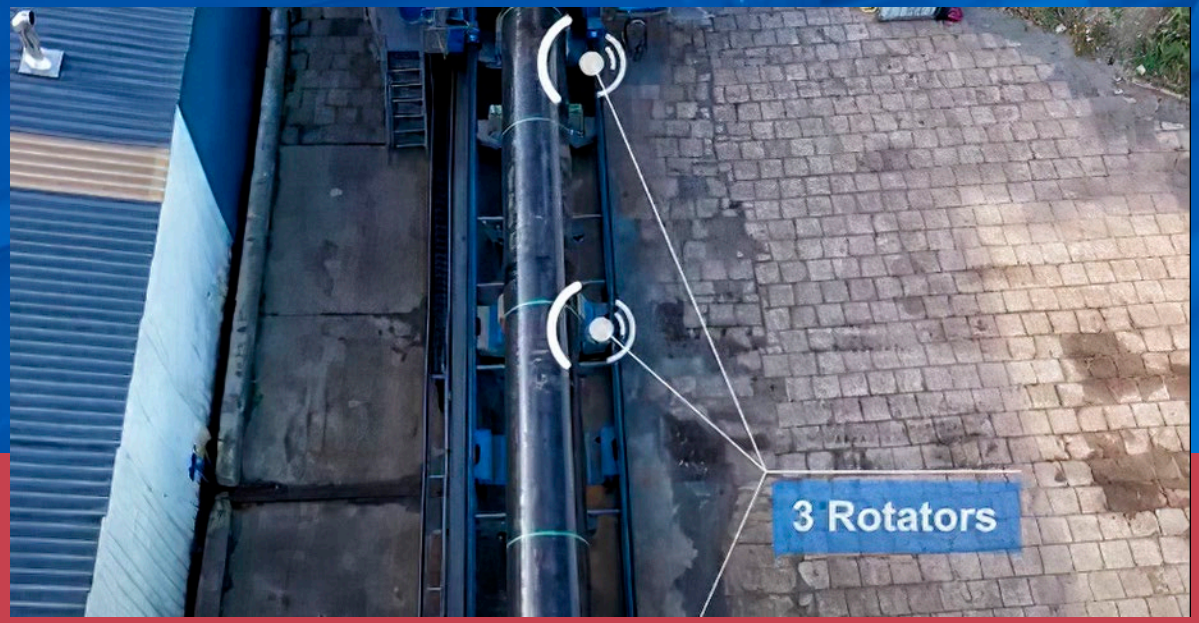
STEP TWO: SECURE AND CUT



THE PIPE IS SECURED USING END RESTRAINTS TO PREVENT PIPE FLOAT

WE MAKE A LONGITUDINAL CUT ALONG THE LENGTH OF THE PIPE TO ENABLE EASY WASTE CAPTURE

STEP THREE: ROTATE AND CLEAN



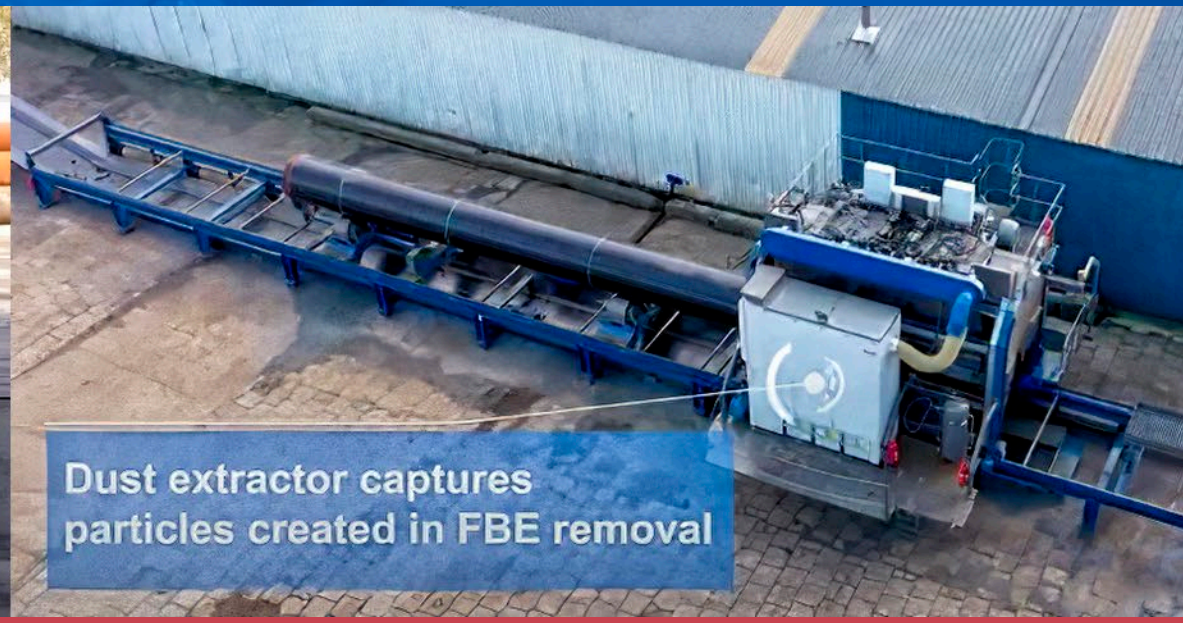
THE PIPE IS ROTATED TO ENABLE THE CLEANING PROCESS TO BEGIN

WE BEGIN TO PEEL THE PE LAYER USING AN ANGLED SCRAPER TOOL IN A LATHE-LIKE PROCESS WITH A HYDRAULIC ACCUMULATOR TO ENSURE NO PIPE DAMAGE

A NUMBER OF WIREBRUSH TOOLS ARE UTILISED TO REMOVE ANY REMAINING PE AND RESIN, AND BEGIN REMOVING THE FBE

IF A FINISH OF <50 MICRONS FBE IS NEEDED THEN ABRASIVE FLAPWHEELS ARE UTILISED AS REQUIRED TO GIVE A CUSTOM FINISH

STEP FOUR: WASTE CAPTURE



THE PE COATINGS ARE CAPTURED FOR RECYCLING INTO THE MANUFACTURE OF HDPP AND HDPE PRODUCTS

THE FBE IS CAPTURED USING A STATE OF THE ART DUST CAPTURE MACHINE: THIS CAN BE SAFELY DISPOSED OF AND EVEN UTILISED AS A FURNACE FEED

STEP FIVE:
ENJOY CLEANED PIPE!

THE PIPE IS UNLOADED CLEAN OF ALL VISIBLE COATINGS

SIZES

4” TO 72” PIPES

6M TO 24M LENGTH

A NEW BEST PRACTICE

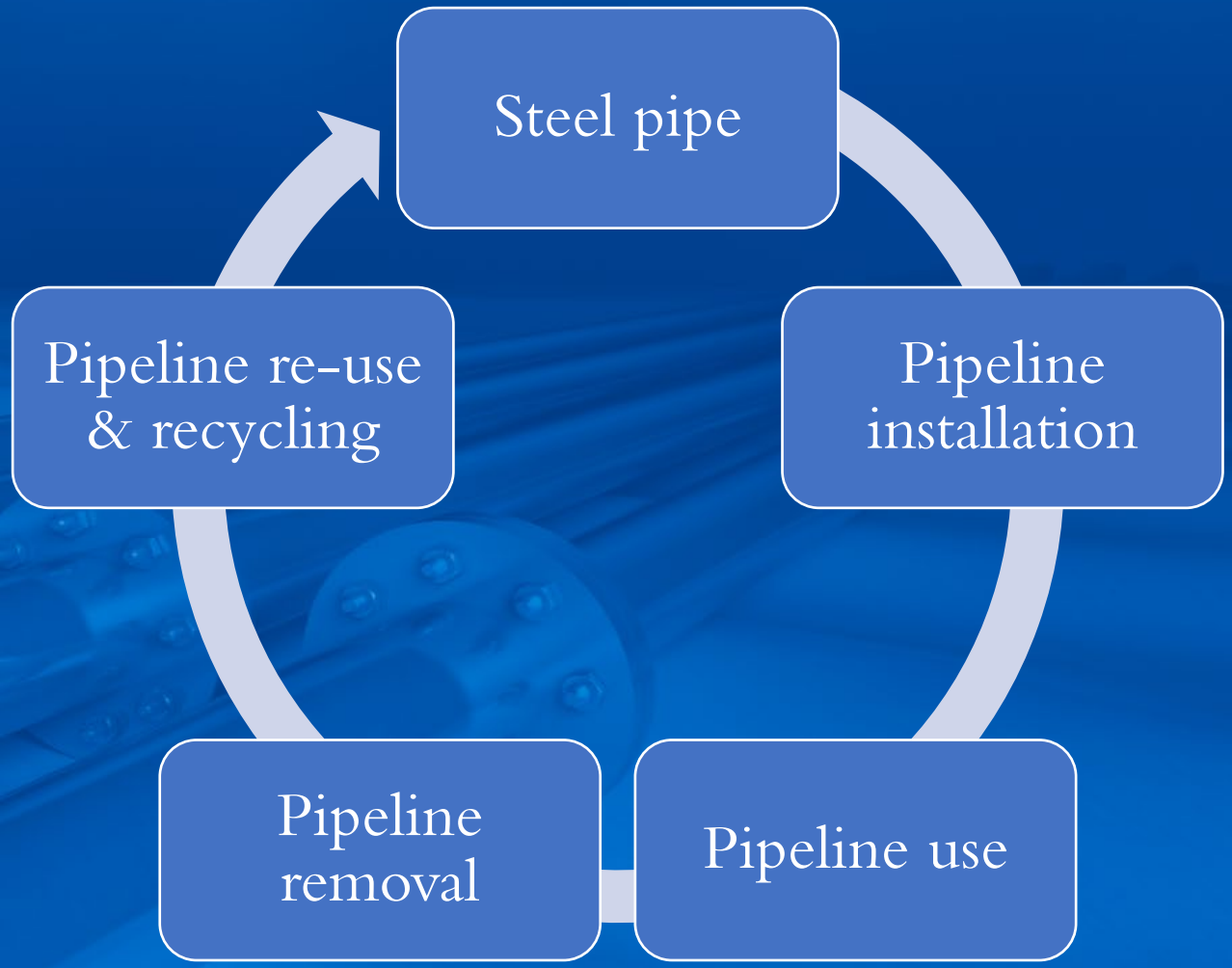
- Fastest process globally to remove multiple coating types – 3LPE, FBE, Tar, Bitumen
- Safe for operators
- No damage to pipe and works on all weld types
- Varied finishes to suit client needs
- 4” to 72” pipes of 6m to 24m length
- Capture all waste – recycling the PE coatings and FBE dust
- Mobile solution – can be taken to the pipe, reducing logistics costs & CO_2 emissions

4. RE-USE AS CIVIL PILING

- The European steel piles market was worth over £7bn in 2020
- Benefits of increased recycled piling stock:
  - Decreased leadtime vs. new orders
  - Lower cost
  - Lower carbon footprint

THE RECOMMENDATION

- Plan for clean cut and careful handling and
- Clean with re-use as a primary goal
- ……Thus achieving significant re-use carbon and cost benefits



THANK YOU

GET IN TOUCH

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