

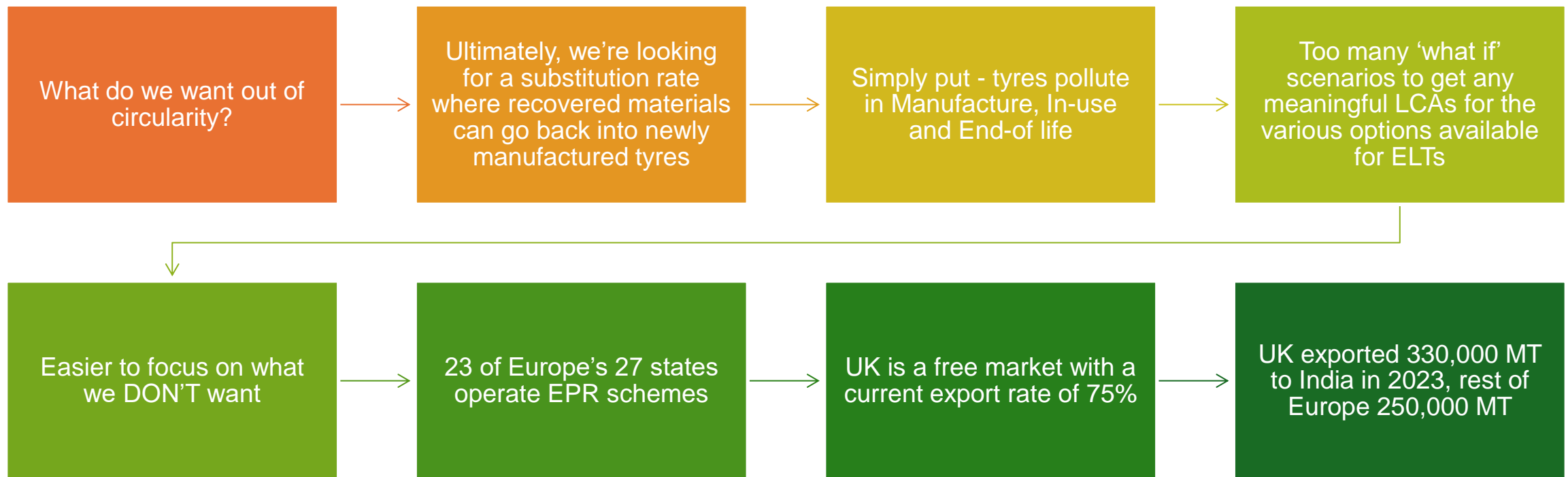
Managing the Transition to true Circularity

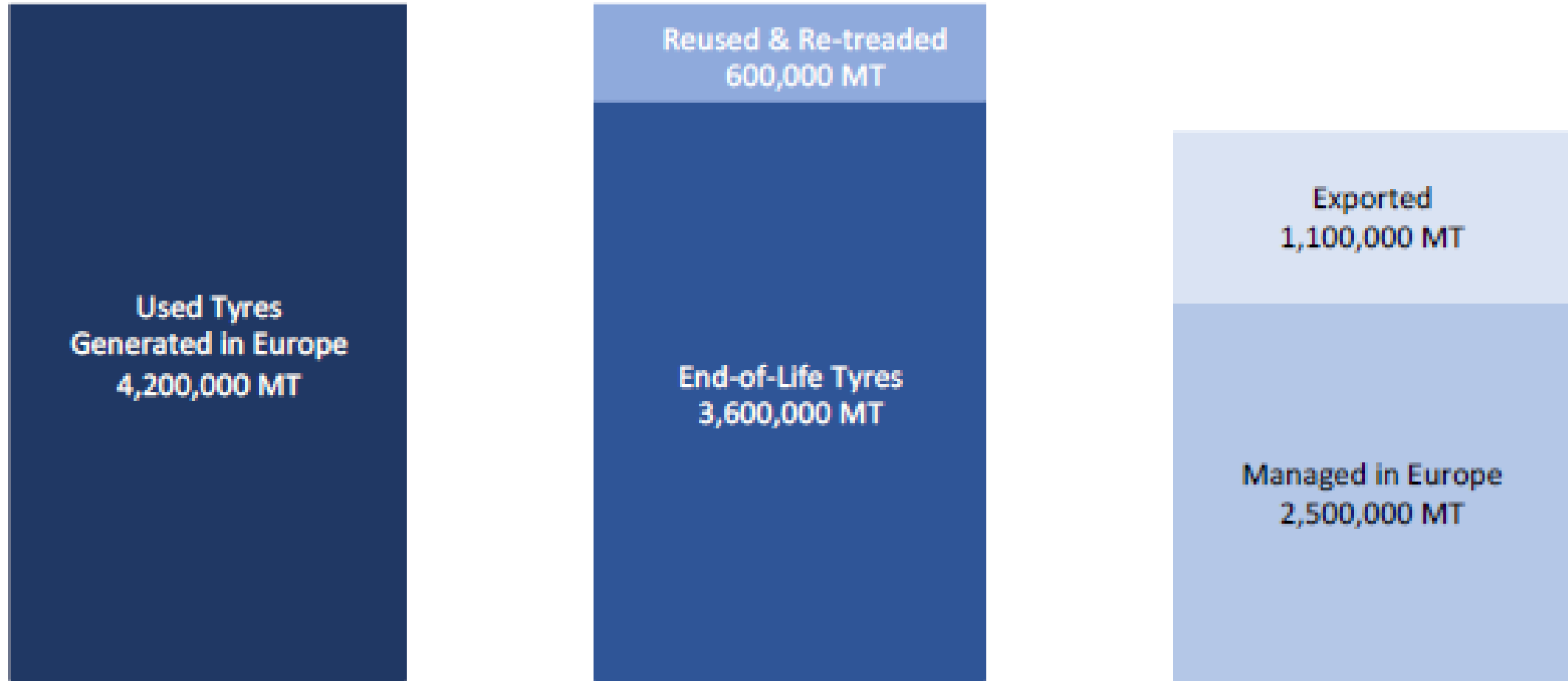
Henry Hodge, Black-Ram Recycling Ltd.



Henry Hodge stands under a pile of used tyres at a pyrolysis unit in Jokhabad industrial area, India, 2019. REUTERS/Adnan Abidi/File Photo

'Managing the transition to true circularity'





*Figure 6. EU management of ELTs in 2021.
Extracted from (Astutus Research, 2022).*



Obstacles in our way

- Whilst substandard pyrolysis plants exist, advancements in chemical recycling will stall
- Market reward for high quality product – or gate fee driven model?

The Indian Elephant in the room

- India generates 1 million tons of domestic used tyres per annum
- India has a fragmented market of 1,200 batch pyrolysis reactors, scattered across their nation
- These have a demand of 2.4 million tons of tyres per annum $40 \times 1200 \times 50$
- India imported 1.3 million tons of tyres in 2023 (Tendata)
- The maths stack up perfectly **HOWEVER** it is illegal to import tyres into India for pyrolysis!



WHAT ARE THE NUMBERS?

1 x MT imported tyre bales cost \$100 at Port

TPO from 1 MT generates \$200 (₹50/ltr)

Wire from 1MT generates \$50 (₹25/kg)

Pyrolysis Char – \$0

Regardless of transport and processing costs there's still \$50-\$100 profit per ton



What's the route?

UK tyres are baled and loaded, 33 x bales into 40ft shipping container

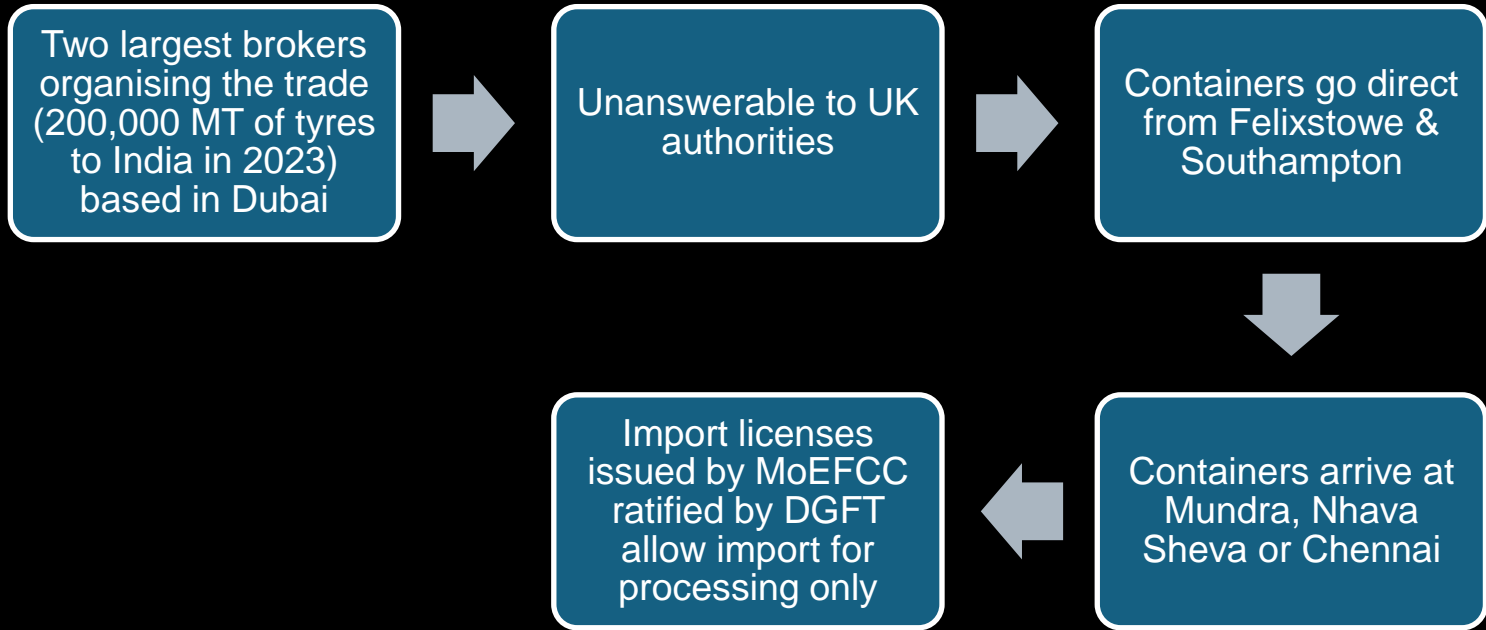
Fragmented UK market mirrors the Indian Batch Pyrolysis market

Majority of tyres come from unlicensed UK yards, gaming the regulations that are not being enforced by UK authorities

Why? Because it's the perfect crime with **'NO BODY'**

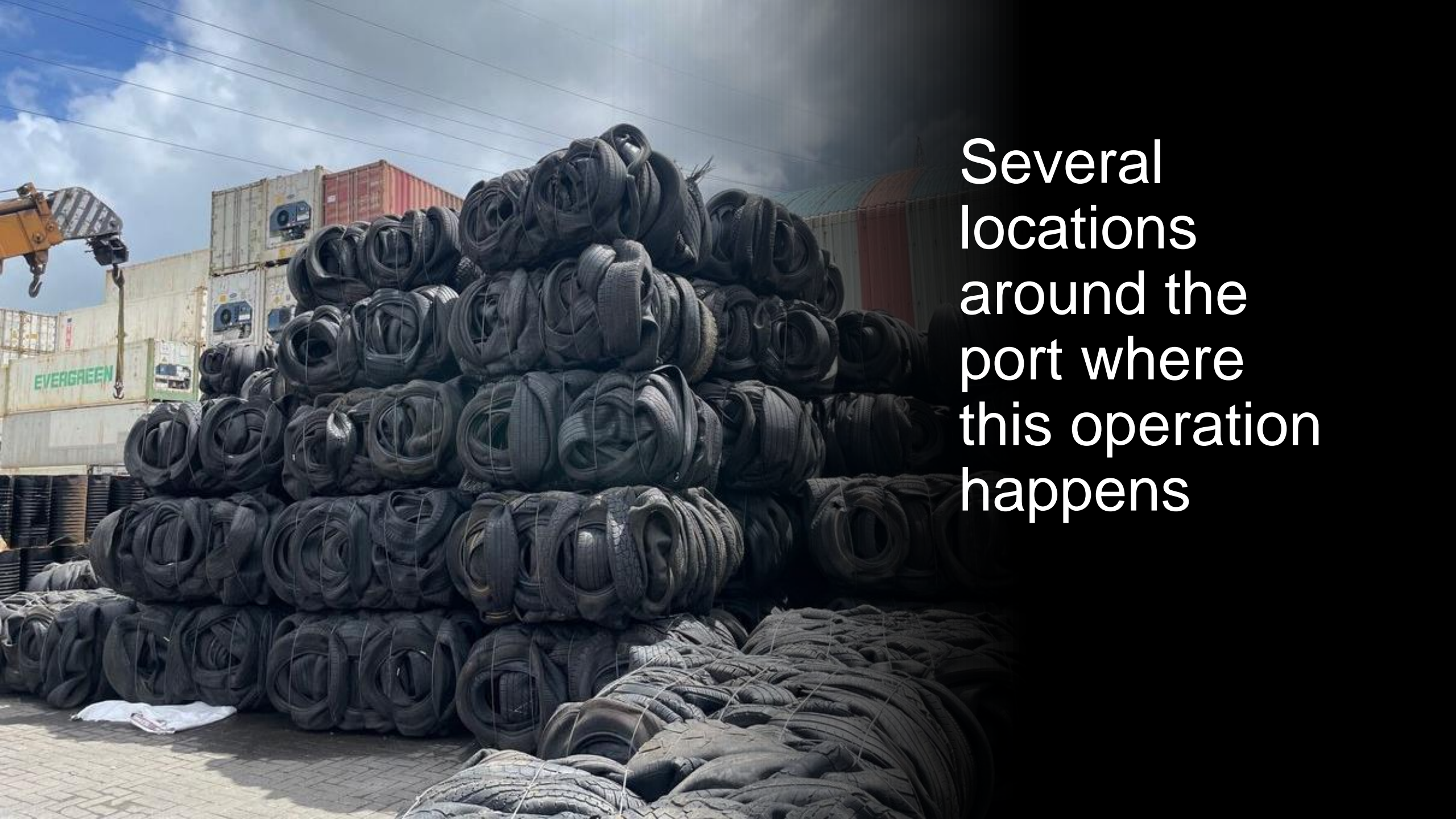


Shipping





Tyre bales emptied from shipping containers within the Mundra Port compound



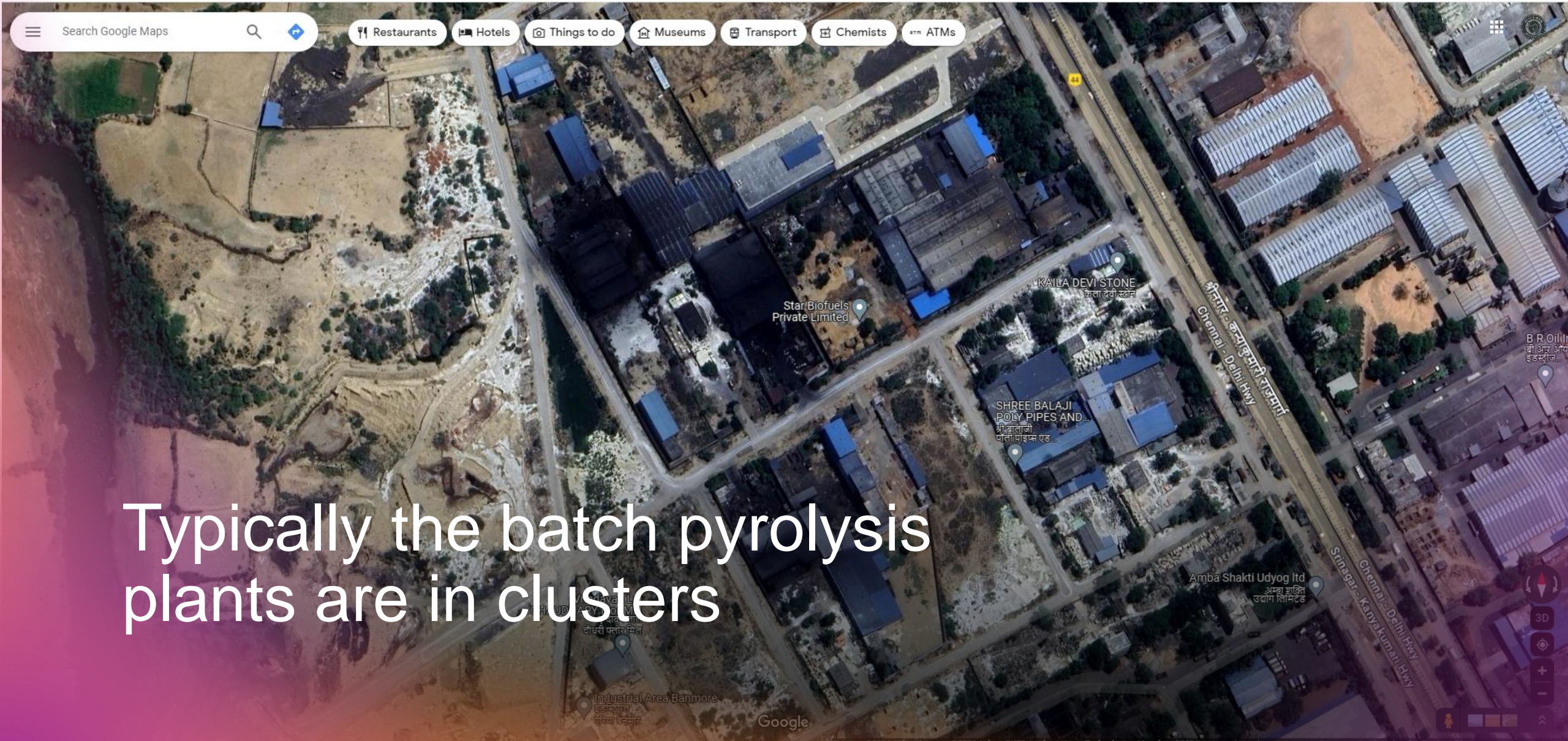
Several locations around the port where this operation happens



Tyre bales are 'onsold' at the port in direct contravention to their import license



Loaded onto trucks, these bales then set off on journeys of up to 1,500 kms to unregulated batch pyrolysis plants all over India



Typically the batch pyrolysis plants are in clusters



Green Rubber
Granules Pvt
ग्रीन रबर
ग्रनुलेस पर्वत लि

Google





Star Biofuels Private Limited

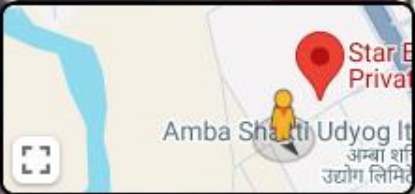


Seva, Madhya Pradesh



Google Street View

Feb 2023



Google





At what cost?

A worker moves a bale of tyres past steel wires and bags of char at a tyre pyrolysis plant in Kulai, Johor, Malaysia

7, 2019. Picture taken August 7, 2019. REUTERS/Edgar Su



Environmental



Char is emptied into a bag from a furnace at a tyre pyrolysis plant in Kulai, Johor, Malaysia August 7, 2019.

Human health Risks from Unregulated Batch Pyrolysis plants

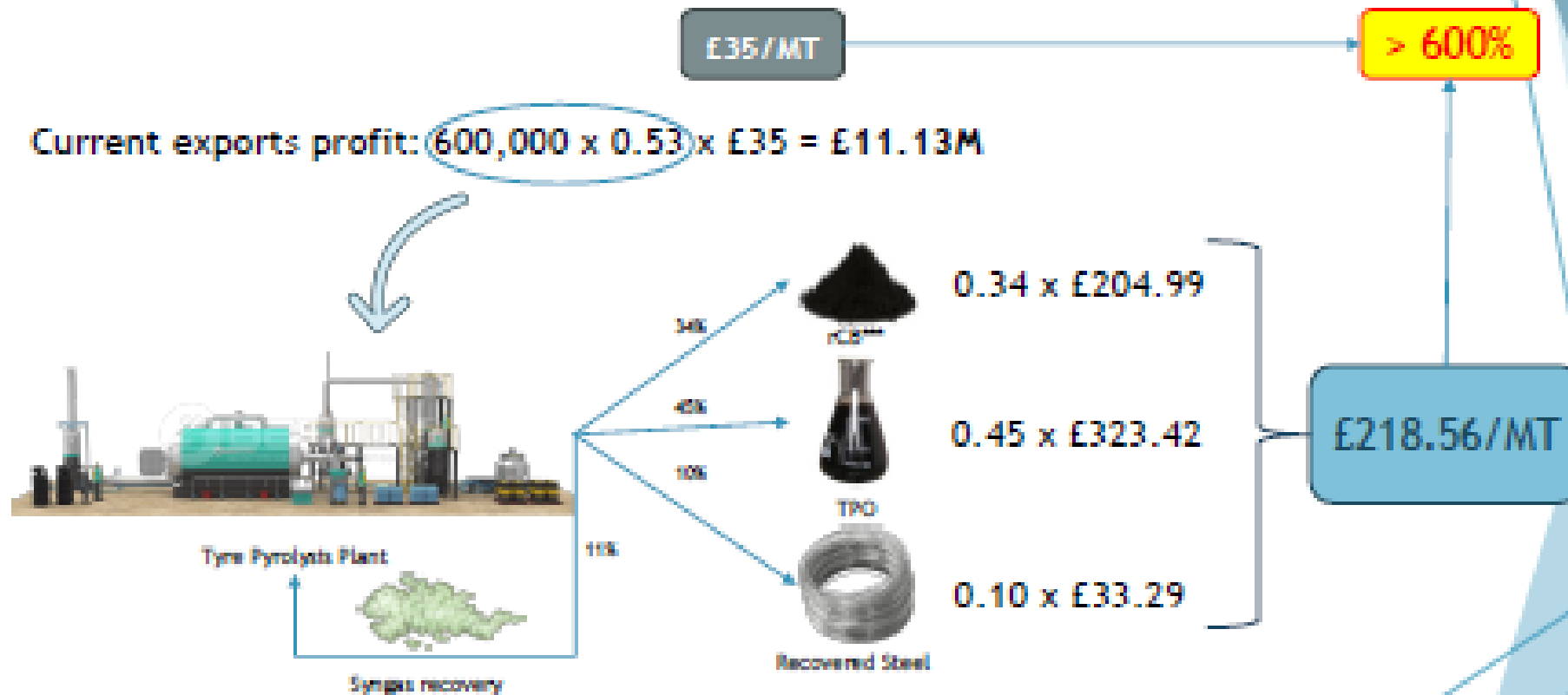
- **Respiratory Irritation**
- **Toxic Chemical Exposure**
- **Cardiovascular Effects**
- **Cancer Risk**
- **Eye and Skin Irritation**
- **Nervous System Effects**



Opportunity Cost

The value of ELT exports

Comparison between current ELT exports profit and potential economic impact of indigenous management.



ELTs as a resource - Mariano Gomez, for Fluid Ice Ltd.

rCBTM : recovered Carbon Black

Data provided from collaboration with Fluid Ice Ltd. (September 2023).

13/03/2024

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Overlap in Manufacture/ In-use/ End-of-life

MANUFACTURE

Lower impact sources of energy

More sustainably sourced raw materials

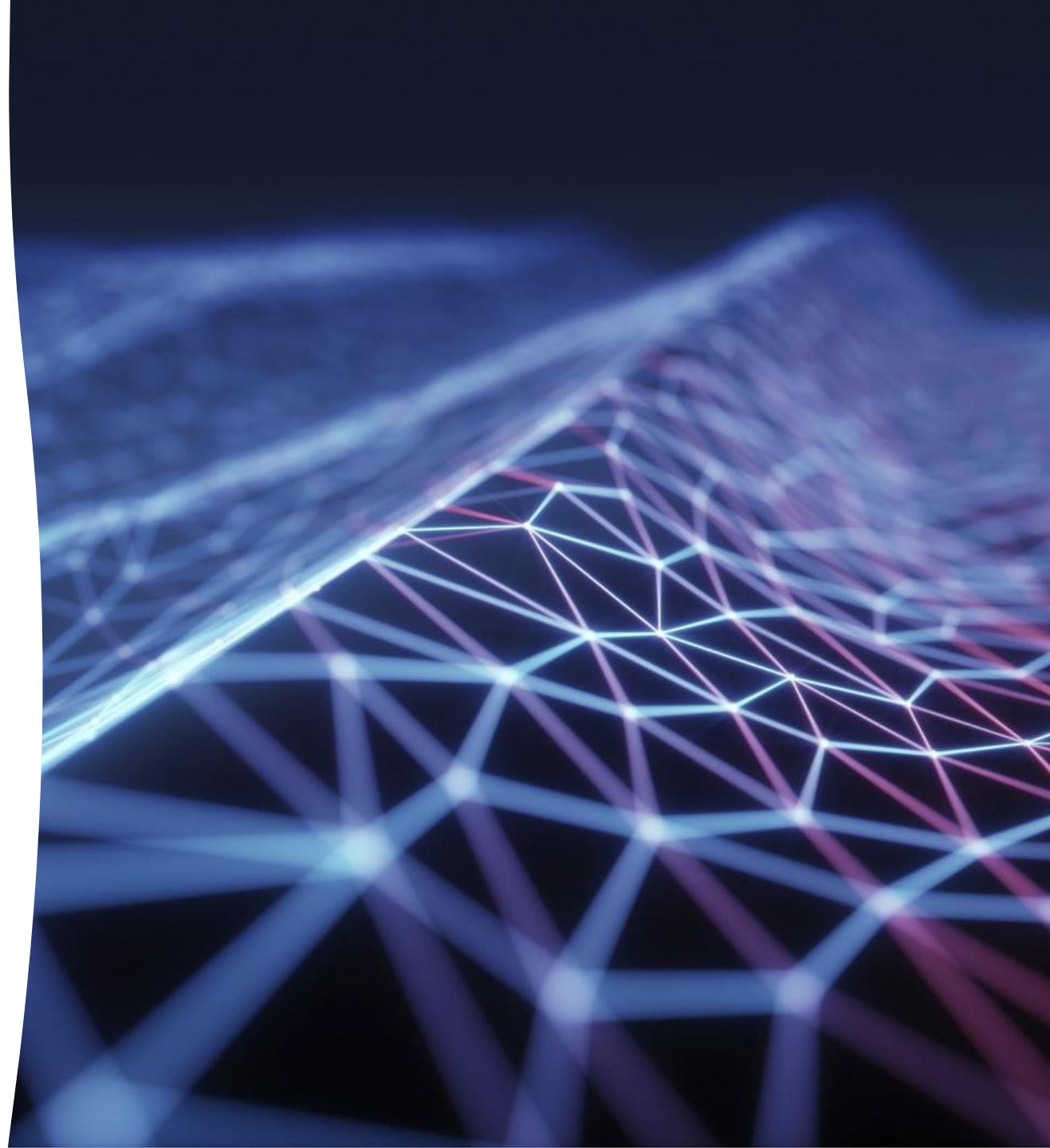
Sensitively located manufacturing plants

Higher substitution rates of recycled material

IN-USE

Managing the Pirelli - Sunfull divide

Considerations with the electrification of vehicles



Overlap in Manufacture/ In-use/ End-of-life

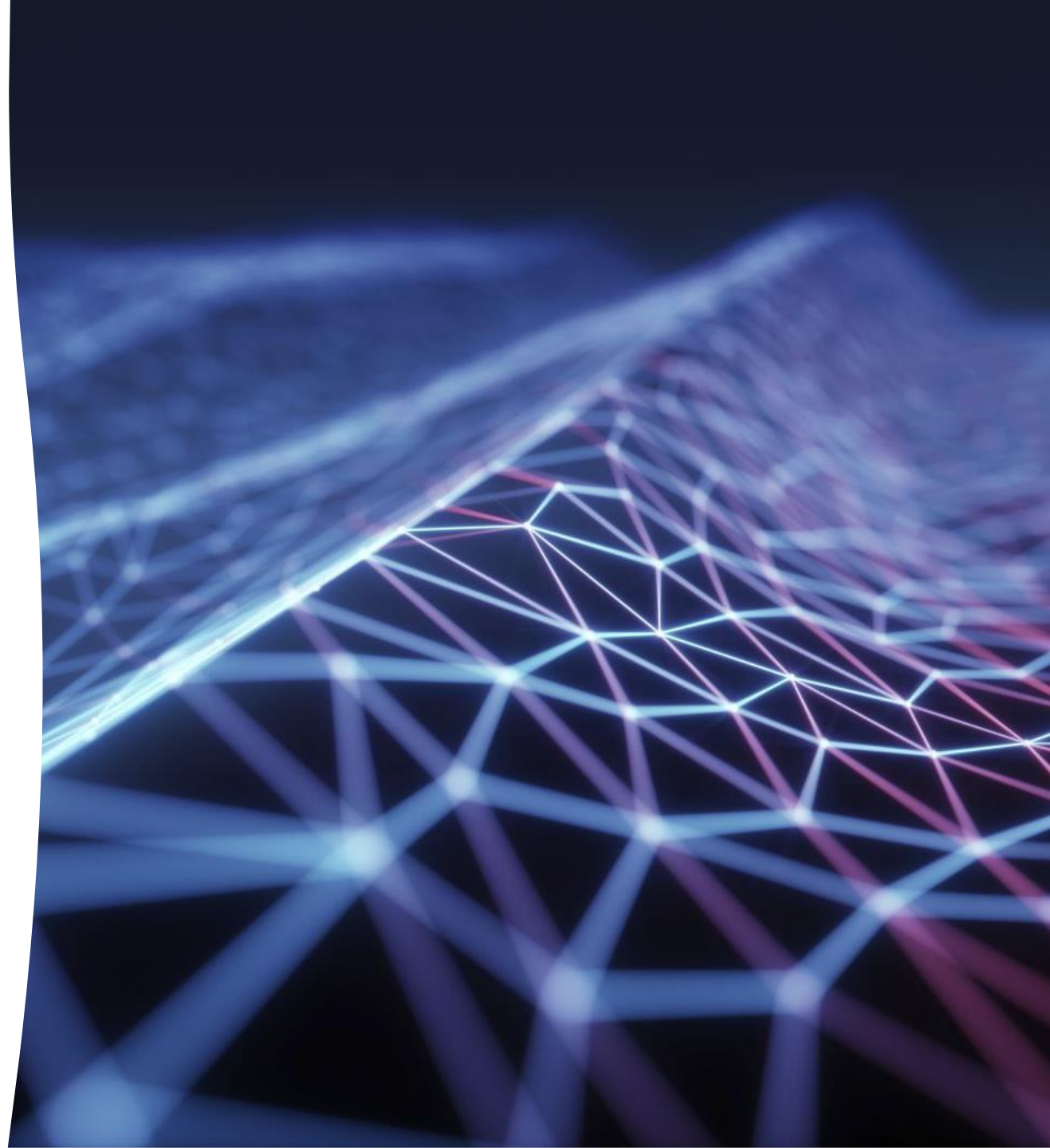
END OF LIFE

What are the technologies to achieve substitution rates?

What are the hurdles for each technology?

Every time you halve the particle size you double the energy requirement

There is always waste



Roadmap – who cares?

- **UK Authorities**



- **Indian Government**



- **NGOs**



- **Trade associations**



'The solution' and the significance of 'shred only exports'

