The Great Grid Upgrade

Grain to Tilbury

Introducing Caroline - our Tunnel Boring Machine

She'll work quietly beneath the River Thames, creating a new tunnel for vital electricity cables as part of The Great Grid Upgrade. By strengthening the energy network and increasing capacity, this work will help keep the lights on, homes warm and communities powered — today and for years to come.

What is a Tunnel Boring Machine?

A Tunnel Boring Machine, also known as a TBM, is a powerful piece of equipment used to dig tunnels deep underground.

As it moves forward, it smoothly cuts through soil or rock while placing tunnel segment building rings behind it. This keeps the ground stable, meaning the surface above stays just as it is — so roads, homes and railways are not disturbed.

Did you know?

A TBM is often known as a mole!

1 Cutting wheel

Cutting knives and disc cutters remove the soil from the tunnel face.

2 Forward bulkhead

Separates the excavation chamber into a working chamber and a pressure chamber - the submerged wall opening connects both chambers.

3 Jaw crusher

Positioned in front of the intake screen; breaks stones or boulders mechanically into a conveyable grain size.

4 Air bubble

Automatically controlled air cushion enabling precise control of the face support pressure in the excavation chamber.

5 Bulkhead

Divides the excavation chamber into a front area and a rear working chamber; the bulkhead opening connects the two together.

6 Air lock

Allows entry of specially trained personnel into the pressurized excavation chamber.

7 Slurry circuit

Conveys the supporting slurry to the excavation chamber and the muck slurry mixture back to the separation plant.

8 Thrust cylinders

Hydraulic cylinders are positioned around the circumference and push the shield forward from the previously built tunnel ring.

9 Erector

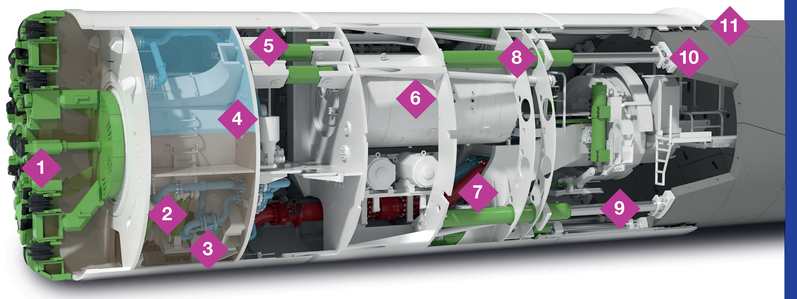
Remote-controlled, movable vacuum manipulator to position the segments during ring building.

10 Tailskin

Several rows of steel brushed and the filling of the gaps with sealing compound provide a seal between the atmospheric tunnel and the annular gap.

11 Backfilling

The annullar gap between excavated surface of the ground and the outside of the tunnel lining is filled continuously with grout.



Engineering on a massive scale

- **proven powerhouse -** used on world-class projects like High Speed 2 and the Elizabeth Line
- **wide enough to wow -** it is 4.7 metres wide - about the width of two cars
- **heavyweight hero -** it weighs 271 tonnes – as heavy as 45 African elephants
- **long by design -** it is 13 metres long – longer than a London bus
- **built to go big** - the tunnel will be 2,200 metres long – that's 22 football pitches end to end

Dame Caroline Haslett

Named after the pioneering electrical engineer Dame Caroline Haslett, a leading advocate for women's involvement in engineering and domestic electrification.

She was the first secretary of the Women's Engineering Society and Co-founded the Electrical Association for Women in 1924, promoting the use of electricity in the home to improve women's lives.

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