

# Transport, Mobile Plant and Powered Equipment – EIP112

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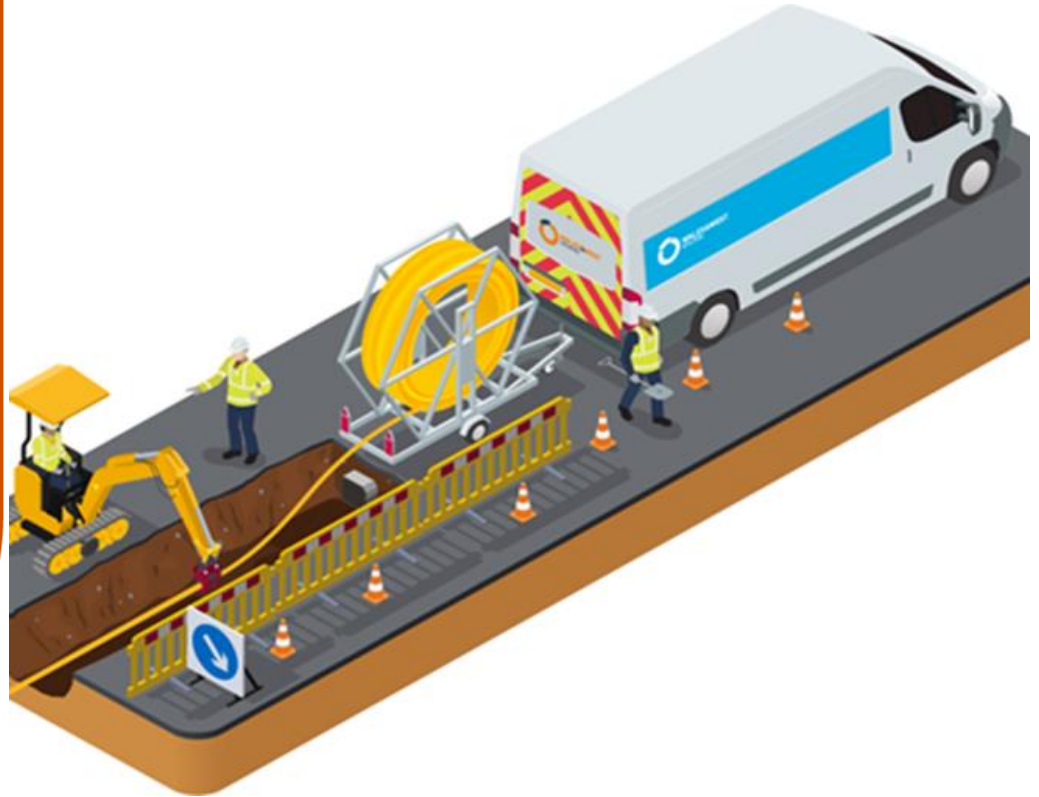


# What's the Problem?

The ICE vehicles and equipment assets we use to support 'Below ground' activity....

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All our current 'Transport' assets – not just vehicles - operate on hydrocarbon fuels....

On '**below ground**' activity – multiple ICE-engined asset types work together effectively and efficiently....

By 2035 they **all** need to be zero-emission at tailpipe –

So, we need a **zero-emissions, modular solution** that offers **the same or better operational efficiency** – and we need to start testing it **as soon as practicable**



# Our ICE - engined fleet composition

- Light commercial vehicles – nearly 1400 of them – mainly vans, light tippers
- 60 HGV's – mostly rigid 8-wheelers – 32 tonnes GVW – 'tipper/grabs'
- 150+ Mini-diggers (and specialised trailers to carry them)
- 68 trailer-mounted compressor/generators
- 100 Welfare cabins
- 500+ vibrating trench rammers
- 500+ tarmac saws
- Water pumps, portable generators...

....All these types operate together on 'below ground' activity



# Below-ground maintenance, repair & connections

These are smaller projects - with work on site being completed on a same-day or short-term basis, depending on circumstances

The following asset types are used for virtually every task in this category:

- Vans with on-board power
- Light tippers
- Mini-diggers
- Petrol-fuelled tarmac saws, trench rammers
- Pneumatic tools – road breakers, rock drills, ‘moles’, air lances
- Electric pipe fusion equipment, water pumps, floodlights

# Light commercial vehicles (LCV)

The 'below ground' fleet of c. 700 comprises just over half the LCV fleet

- LCVs operate at 3.5 tonnes GVW to stay clear of Goods Vehicle Operator Licensing constraints
- 'Below ground' operations for repair, maintenance and connection activity is organised in two-person teams – qualified team leader plus operative
- Each two-person team is provided with two vehicles
- Two vehicles are required to ensure the payload and load space is sufficient
- For operational efficiency and to minimise driven mileage, each team member takes their vehicle home and goes straight to first job and directly back home from last job
- BEV's are unlikely to be suitable for these duties – more on this later...

# Below ground team vehicles - 1

'Team van' – 3.5 tonne GVW, 6.5 tonne GTW 'L2 H3' van – 35% of LCV fleet - high energy consumer....

- Short wheelbase (L2) minimises risk of overloading by limiting load space
- High roof (H3) provides comfortable standing headroom – manual handling
- Van carries wide range of hand tools, standard materials and equipment
- Rear-wheel drive to facilitate provision of full on-board power via split-shaft power take-off – **keeps towbar free to tow digger** (or another type of trailer)
- Air compressor (c. 21kW) – powers pneumatic equipment items
- 110V AC generator – 8.5 kVA (c. 9kW) – pipe fusion, water pumping, floodlighting
- Auxiliary diesel combustion heater for drying wet-weather PPE



# Below ground team vehicles - 2

**'Light tipper' – 3.5 tonne GVW, 6.5 tonne GTW 'L2' chassis – 17% of LCV fleet**

- Short wheelbase (L2) to minimise risk of overloading
- Equipment pod provides basic welfare equipment, stowage for specific heavy equipment items, jerry cans for diesel fuel (mobile plant), wet weather gear etc.
- Simple drop-sided rear-tipping body for carrying signs, lights, guarding (SLG), components and/or granular load
- Light tipper and Team van have standardised towing capability for maximum operational flexibility
- Rear-wheel drive optimises traction when towing heavy trailers

# Battery Electric Vans

For high energy usage duty cycles, a battery electric van isn't ideal....

- Very short vehicle range compared to diesel – further reduced in winter by HVAC energy requirements = 'range anxiety'
- Few industrial staff can accommodate a home charger
- Staff on standby for call-out need to be able to just get in the van and go – if charge incomplete, may not have enough range to attend the emergency
- Need to pay external agency to separate van charging costs from domestic electricity bill; additional expenses reimbursement process
- Potential loss of productivity if 'rapid charge' needed during working day
- Increase in unladen weight – typical loss of 25% payload capability
- We have a small number of BEV's on order for long-term trial



# Previous work - LCV duty cycles

In 2021 Cenex completed a detailed study of our commercial vehicle fleet journeys (joint study with Northern Gas Networks)

- 26 vehicle sample, operating for > 6 months on wide range of duty cycles
- Journeys data-logged at 1-sec intervals: richer data than tracking system
- **Main findings:**
- < **50%** of journeys could be completed by a BEV (assuming overnight recharging)
- > **95%** of journeys could be completed by a hydrogen FCEV (assuming daily refuelling)
- Results for Northern Gas Networks were very similar
- **Last month** we ran a 4-week trial with a **hydrogen Fuel Cell LCV**



# The Alternatively Fuelled Vehicle derogation

DfT has recently revised the UK Derogation which allows AFV's to operate at 4.25 tonnes GVW

- 4.25 tonnes GVW helpful, as it will largely overcome the significant unladen weight and **payload penalties** associated with BEV and hydrogen FCEV
- Removal of requirement for **5 hours' driver training** (welcome, as not required for AFV's  $\leq 3500\text{kg}$ )
- **Towing** is now permitted – up to a GTW of 7000kg (so we would need to limit van to 4 tonnes GVW when towing loaded mini-digger trailer at 3000kg)
- Requirement for tachograph and EU Drivers' Hours if operated  $< 100\text{km}$  from base has not been relaxed - remains **the most significant barrier**
- Requirement for 56mph speed limiter has not been relaxed

# Pneumatic equipment and its uses

## Operatives may be working in a gas-laden atmosphere

- Road-breakers – no potential ignition source within tool
- Rock drills – as above; used to drill pilot holes in carriageway for gas readings
- Thrust-boring – or ‘moling’: ‘trenchless excavation’ to allow pipe insertion
- ‘Air lance’ – simple tool essential for carefully removing soil to expose underground services without risk of contact and subsequent damage
- All the above are usually powered by the team van on maintenance activity
- Are there more effective alternatives to air compression in future?
- We have tried electric breakers - but trials found them less effective



# Electrical equipment and its uses

## 110v AC electric tools cover a range of tasks:

- ‘Fusion box’ – high current user, essential for joining plastic pipe (components have internal heating element which melts plastic under tightly controlled parameters)
- Water pumping – submersible water pump is essential to empty rainwater out of excavations
- Drilling machines for core drilling, large pipe diameters etc.
- Basic 110v drills for smaller tasks (installing meter boxes, riser clips)
- Scene lighting
- Electric tools & equipment should integrate well with an electric vehicle – no need to change?



# Mini-diggers

**These are fuelled by diesel and used extensively - to minimise H&S risks associated with manual excavation and hand-arm vibration syndrome (HAVS)**

- 1.5 tonne 'canopy' type machine to minimise weight (van GTW)
- Operates with 3 x digging buckets and hydraulic breaker
- Specialised 3-tonne trailer incorporates stowage & security for buckets and breaker and provides mechanical load security for digger (no need for straps)
- Total weight c.1900kg + trailer c.900kg
- Refuelled on site via jerry can
- In future, mini-diggers will be electrified (and weigh more)
- How will we accommodate charging at-depot, or on site?



# Previous work – vehicle charging

**We have installed a total of 67 x 7.2kW vehicle chargers at 17 owned premises; will increase to > 90 within 18 months as we open 2 new depots**

- 2020 – specialist survey of incoming power supply to all depot premises
- Company-wide programme to install vehicle chargers late 2020
- In all cases, number of chargers installed is maximised – limited only by the surplus capacity of incoming power supply
- Some quite significant depots have limited charger numbers
- We have a company car fleet of 300+ units; of which > 80% is Job Requirement; 93% of the whole car fleet is already plug-in
- Chargers only going to be enough to partially support electrified car fleet
- But – **chargers are not used at night** – potential opportunity?





# Petrol-fuelled equipment and its uses

## Tarmac saw and trench rammer, including previous work

- Tarmac saw – two-stroke fuel - is used for cutting neat edge to excavation in road and/or pavement surface – essential for high-quality permanent reinstatement; offers HAVS reduction and quicker surface removal
- Trench rammer – two-stroke fuel – used for effective compaction of base reinstatement layers – **we have experimented with electric variants, but battery life is very short**

**Summary: all the vehicle and equipment types mentioned up to this point are used every day as our standard methodology for repairs, maintenance and connections**



# Mains replacement - 1

**These are larger projects; cumulatively absorb a significant part of the total 'below ground' workforce**

- Teams are typically larger, e.g. 6 people
- Site occupation from several days to weeks, depending on scale
- Work site may be moved one or more times within locality to minimise impact
- On-site electrical power connection not generally available
- A shipping container may be located on site to store materials and equipment securely
- We may re-consider our vehicle strategy for 'mains replacement' activity – what price standardisation?



## Mains replacement - 2

In addition to some or all the asset types previously described – other ICE equipment types are used to support this activity:

- Main outputs for each are covered in the Problem Statement
- **Welfare units** (trailer type)
- **Trailer compressor/generators**
- **Dumpers** (3t) – must be road-registered as a ‘Works Truck’
- **3-tonne digger** – used to operate a hydraulic pipe pushing machine to insert plastic pipe
- **Generators and water pumps** – where the standard WWU-owned item doesn’t have adequate capacity for the task
- **What fuel type/s could offer zero emissions for these in future?**



# Summary/Recap

By 2035 all assets utilised on ‘below ground’ activities need to be zero-emission at tailpipe

We need a zero-emissions, modular solution that offers the **same or better operational efficiency** – and we need to start testing it **as soon as practicable**



# Thank you – any questions?

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