

Modular CAES with thermal storage

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Medium Duration Energy Storage 2024

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IMechE, London



Civic, commercial and industrial customers are facing high energy bills, pressure to decarbonise and long delays for new grid connections



THE CEL SYSTEM



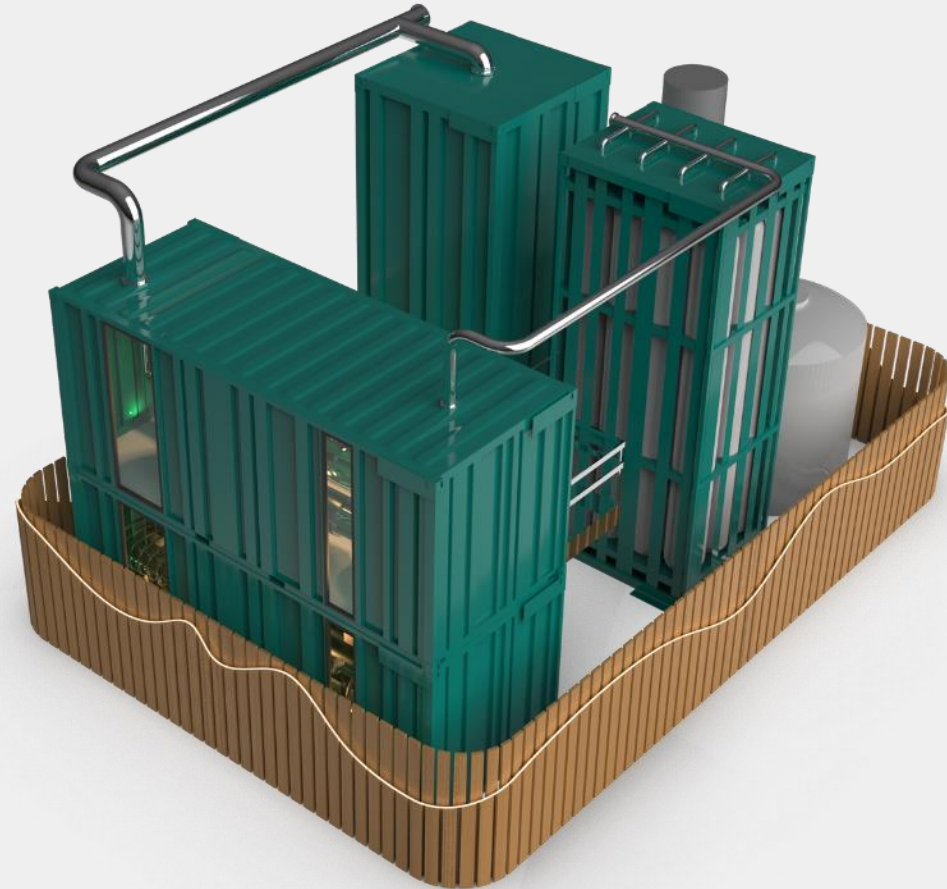
Modular

Systems built up from 200kW power modules and 1MWh energy modules



Lifetime

Long-lasting system based on proven industrial hardware – targeting 25 -year service life



Containerised

The system is transportable and does not require any specific geography other than firm flat land



Sustainable

Extensive adoption of circular economy principles, no rare or hazardous materials required

Delivering on-demand power for commercial and industrial customers who need **200kW - 50MW** for **4 - 24 hours**

HOW IT WORKS



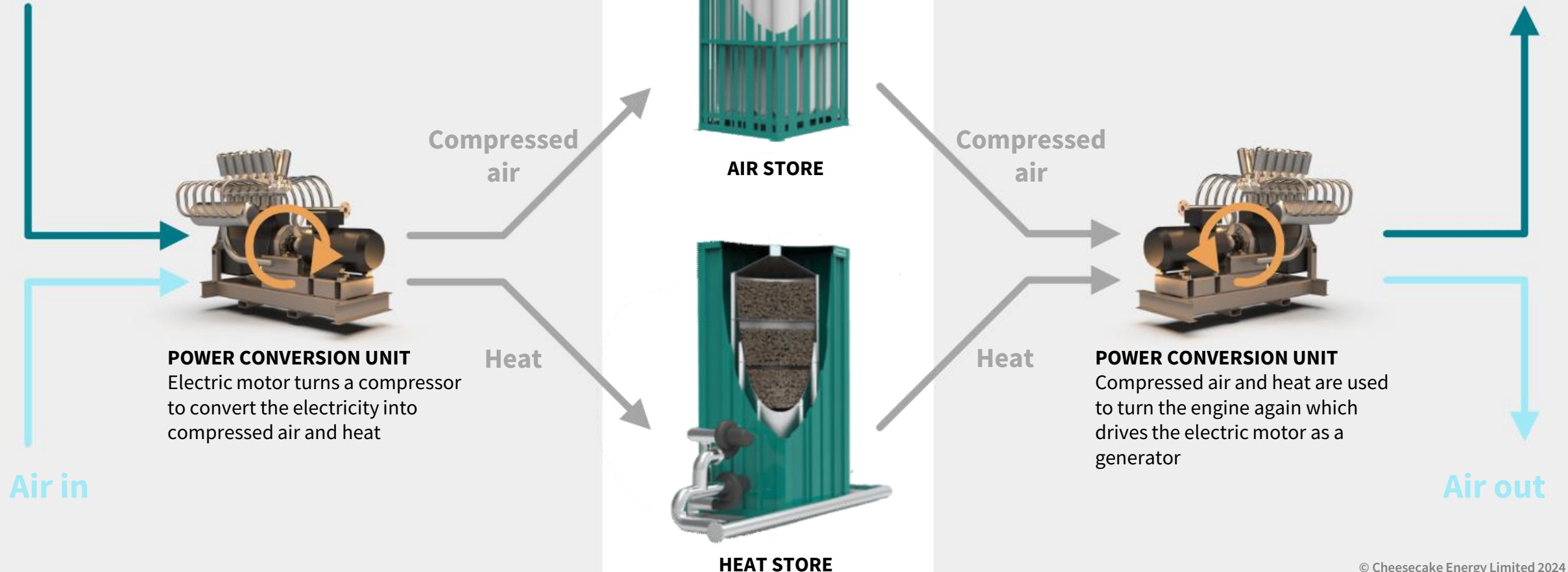
CHARGE

Electricity from the grid or from renewable generation drives an electric motor

DISCHARGE
The reversed process creates electricity which can be used for EV charging, industry and microgrids

Power in

Power out



REUSING EXISTING INDUSTRIAL HARDWARE

Heat store

Heat is stored in **sand** or gravel at very low cost, at up to 500 °C

Air store

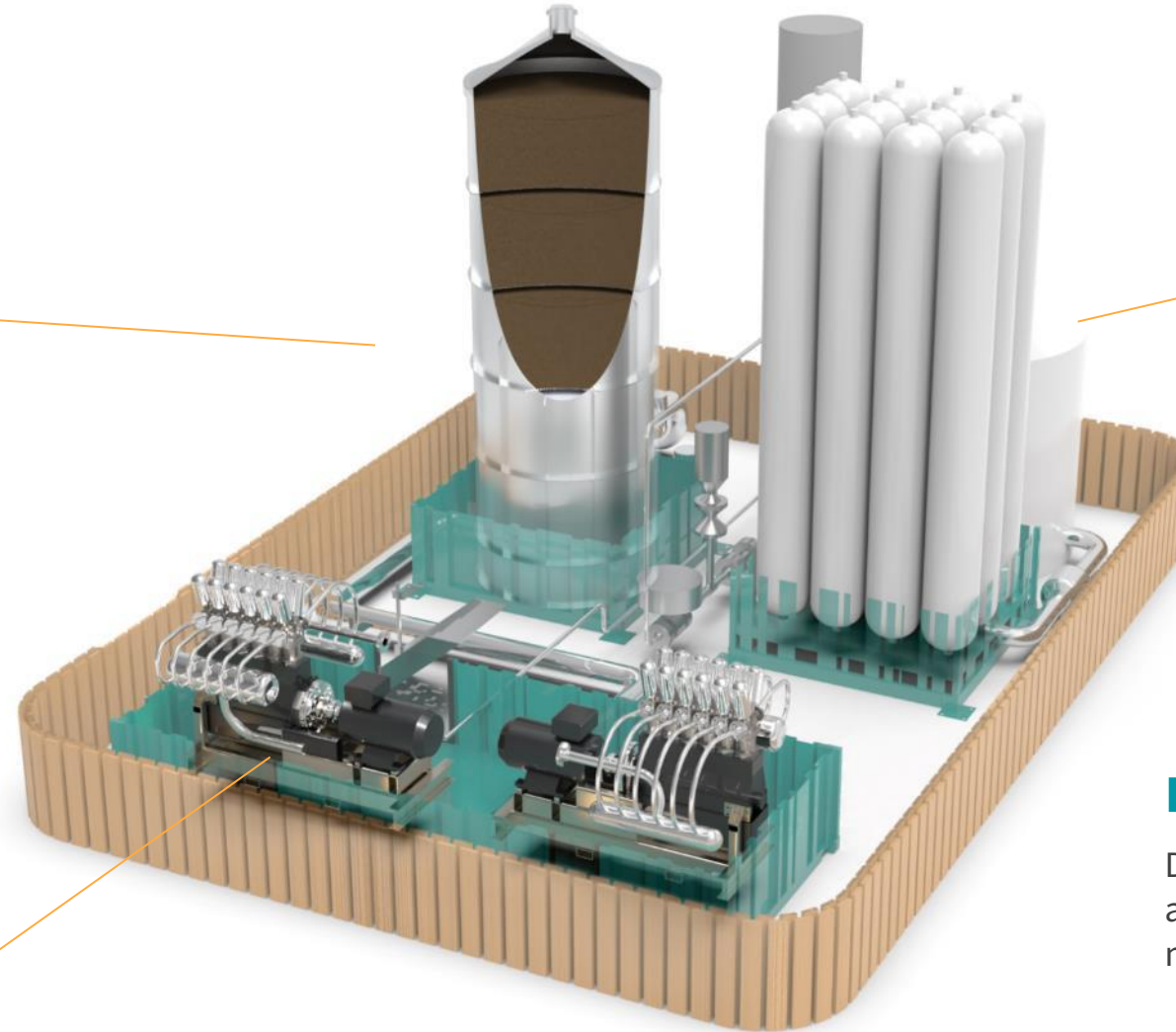
Air stored at 230 bar in **pressure vessels** repurposed from the compressed natural gas industry

Power conversion

The compressors are made from **ex-service truck engines**

People and skills




Drawing on existing automotive and mechanical workforce for manufacture and maintenance

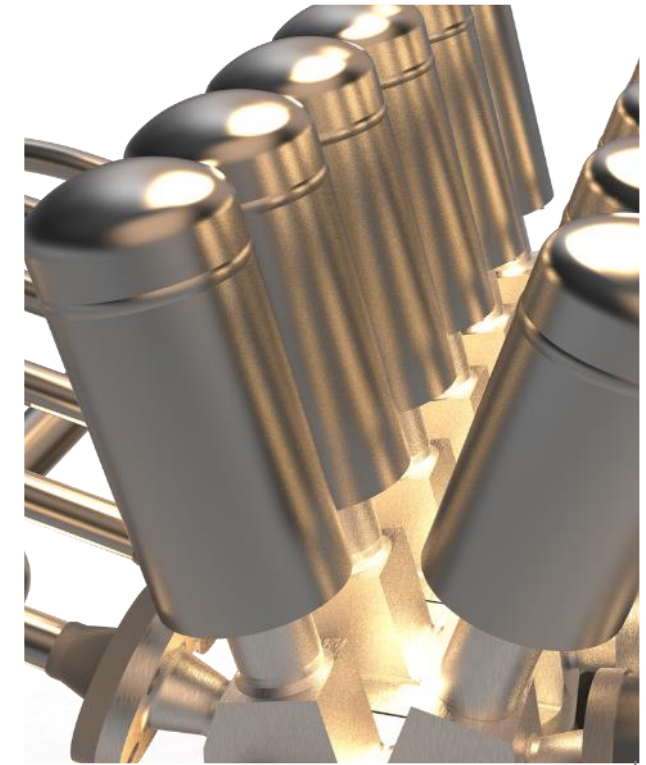
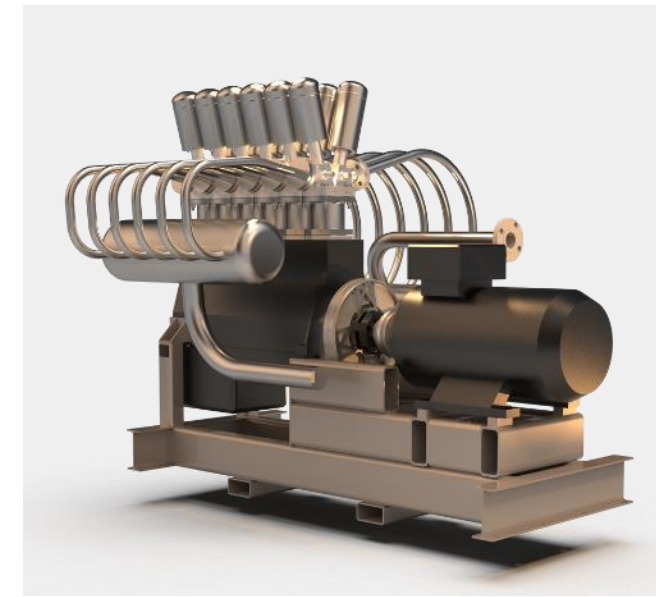


Drawing on existing manufacturing capacity and supply chains to deliver a **cleantech future**.


ENGINES TO AIR COMPRESSORS


CIRCULAR ECONOMY

-  Compressors are adapted from ex-service truck engines (EURO 3 and 4)
-  These would otherwise be a waste stream and a cost to the original manufacturers
-  Our proprietary valve actuation technology and electric drives turn them into zero-emission clean energy assets.




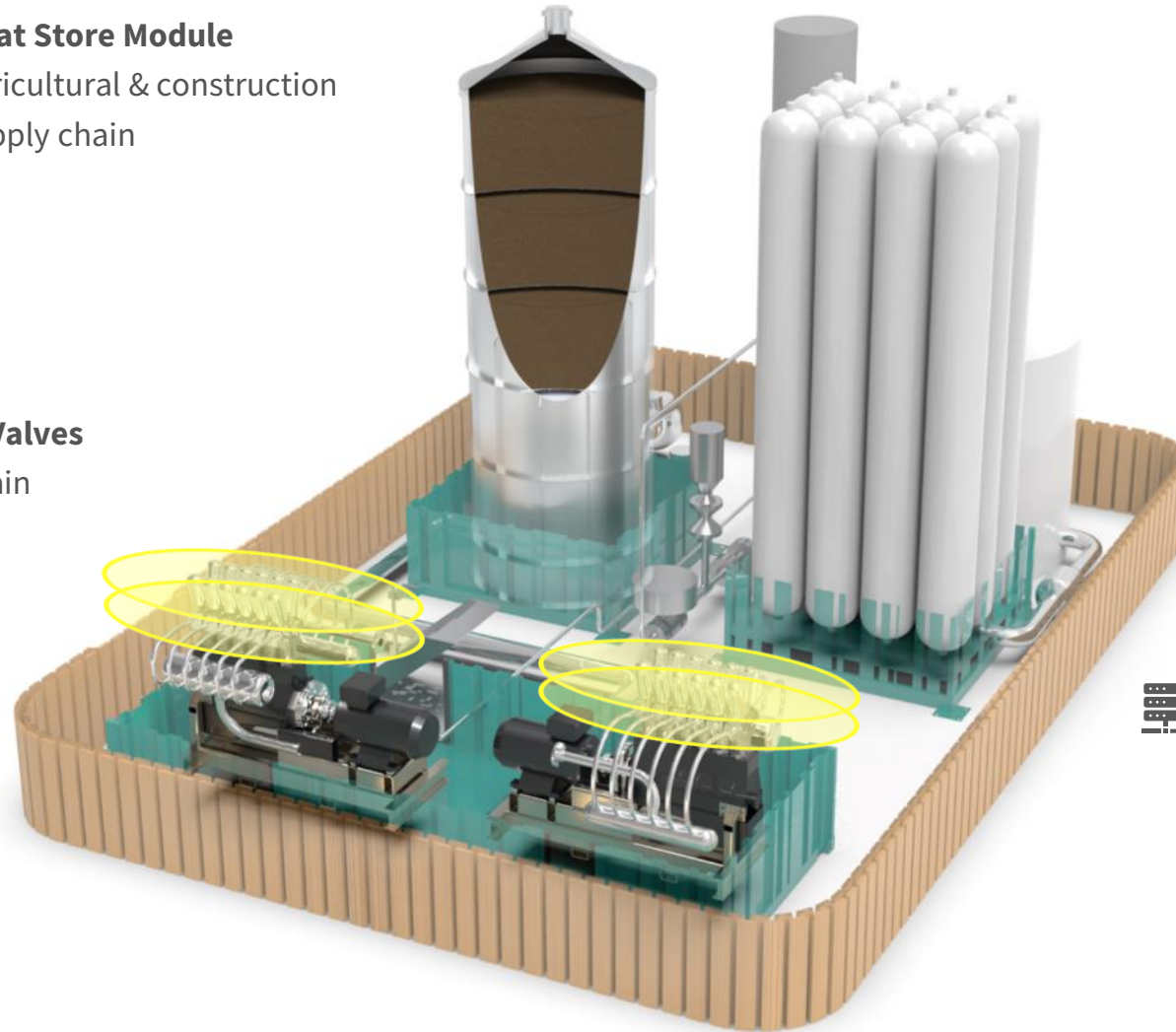
ACCESS TO EXISTING SUPPLY CHAINS FOR SCALABILITY


 **Heat Store Module**
Agricultural & construction
supply chain

 **Air Store Module**
Industrial gases supply chain
Hydraulics supply chain

 **Interconnecting Pipes & Valves**
Industrial gases supply chain

 **Power Module**
Mostly automotive supply chain
Industrial electrical machines
Some oil & gas supply chain



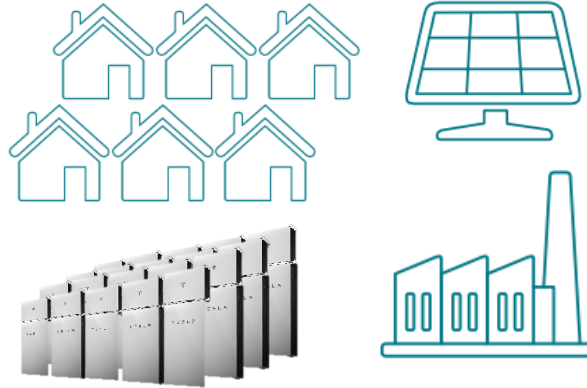
 **CEL Core Scope**
Patented valve actuators
Control & monitoring system

HOW CUSTOMERS BENEFIT

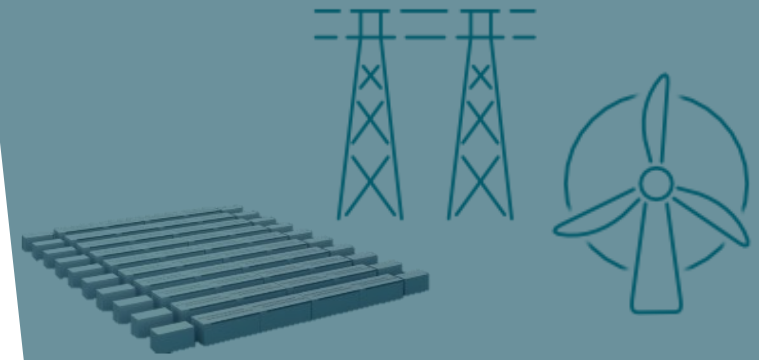
Domestic



Commercial & industrial



Utility scale



Industrial energy users

- ✓ Reduced carbon footprint
- ✓ Round-the-clock power



Business parks & mixed-use developments

- ✓ Energy bill savings
- ✓ Increased energy security



Offgrid communities and industry

- ✓ Reduced carbon footprint
- ✓ Self-reliance

MARKET TRACTION



COMMISSIONING FIRST SYSTEM NOW

150 kW / 300 kWh system

Deploying in Nottingham for performance and lifetime testing



INSTALLATION FOR SOLAR MICROGRID IN 2024

Customer-deployed pilots supported by DESNZ LODES programme.

Unlocking microgrid in grid constrained area.

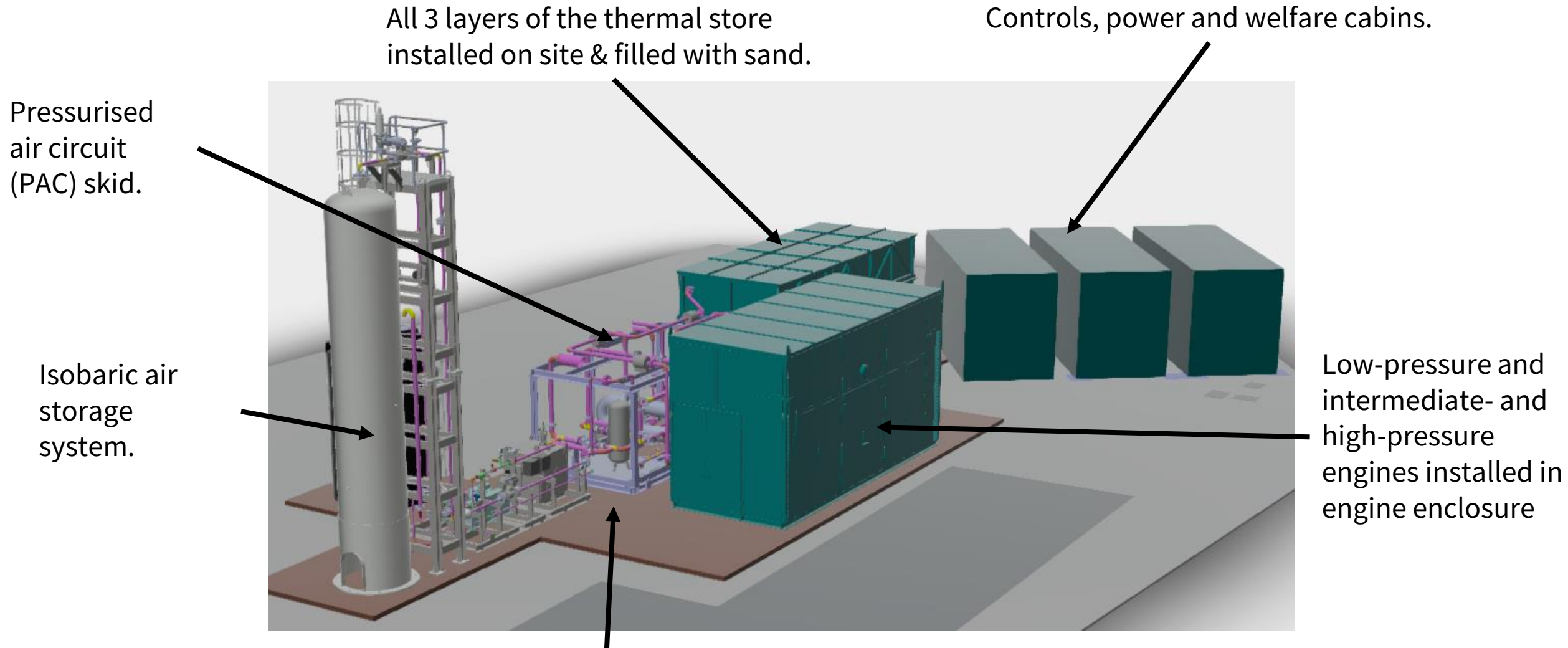


DISPLACING DIESEL FOR MINING (2025)

1 MW / 10 MWh system

Front end engineering design underway

ALPHA - FULL SYSTEM PROTOTYPE



The prototype system is designed for good maintenance access and allows additional space for different upgrades and test configurations.

ALPHA SYSTEM





COLCHESTER NORTHERN GATEWAY

Major new £200m+ development north of the city centre

Up to new 560 homes and 48,000 m² of offices

Leisure park with a Cineworld, Greggs and Wendy's

>12MVA of new electricity demand



CASE STUDY: COLCHESTER DEVELOPMENT

Using a microgrid to overcome **grid constraints** to unlock a new **mixed-use development**

CEL's fleet of energy storage systems will:



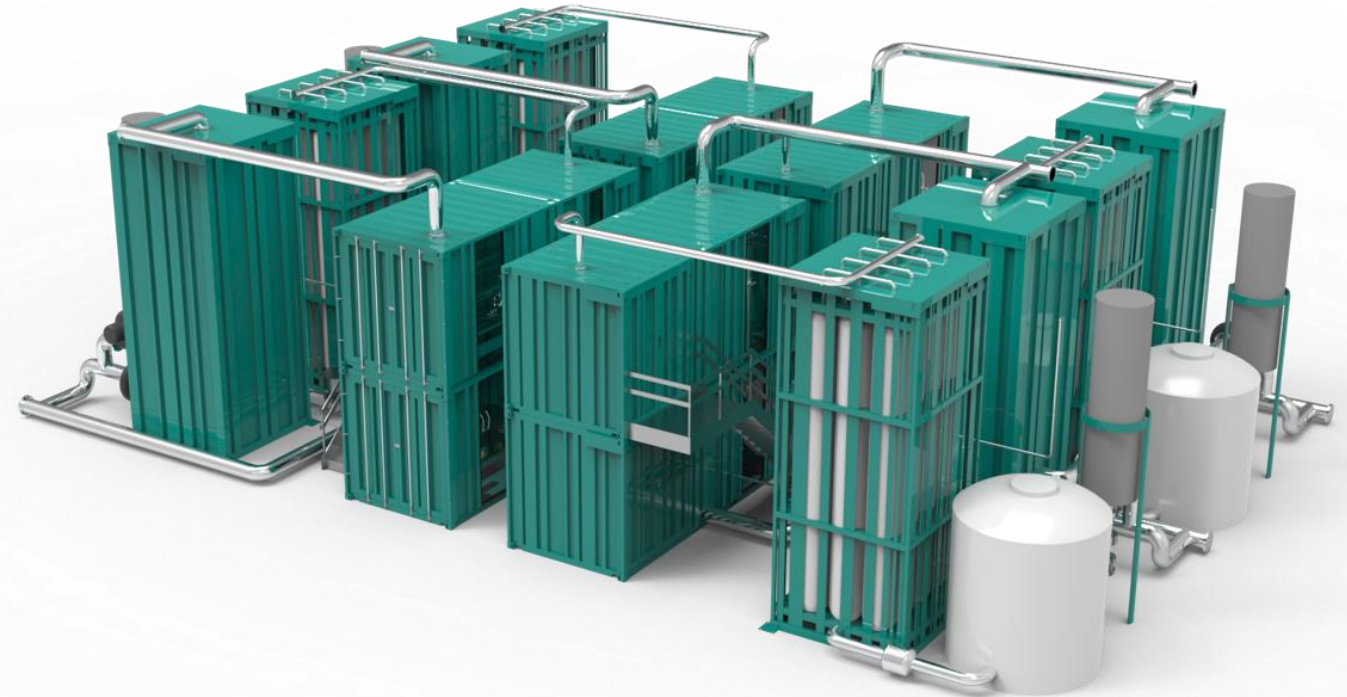
Maximise utilisation of PV electricity



Increase microgrid reliability & resilience



Reduce energy costs



Grid reinforcements could take until 2032 (at a cost of £10-15m) – CEL energy storage will drastically reduce lead times and reduce system costs.



Cheesecake Energy

Delivering thermal and compressed air energy storage for durable, scalable power on demand



Visit our demonstrator system in Nottingham

Major benefits of our technology:

- ✓ Low cost (CAPEX & LCOS)
- ✓ Flexible, scalable, portable
- ✓ Greenest (cradle to grave)

Seeking **further pilot opportunities** and **development partners** for the next generation of **energy storage**



Cheesecake Energy Ltd

Energy storage that doesn't cost the earth

Thanks for listening!

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