



Cheesecake Energy Ltd

The world's greenest battery

Medium Duration Energy Storage conference, London, 16th March 2022

Mike Simpson, CPO

THE MEDIUM DURATION ENERGY STORAGE OPPORTUNITY



**GLOBAL
DECARBONISATION**



Growing adoption of distributed renewables is creating new opportunities at the grid edge

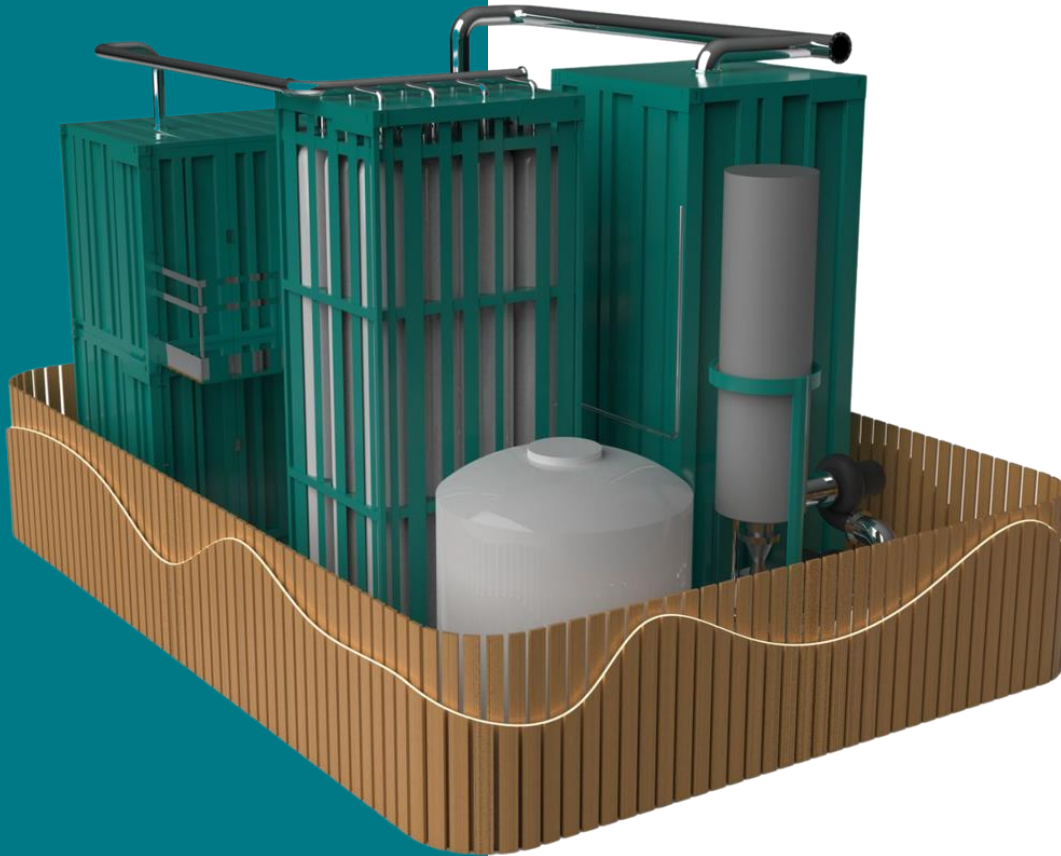


Existing battery technologies remain expensive for longer durations



Critical need for scalable and sustainable energy storage

INTRODUCING *ETANKER*...



System layout
(150 kW / 750 kWh)

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



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



eTanker can discharge at full power for up to 24 hours at 30 - 40% lower cost than lithium-ion batteries



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

ENERGY STORAGE THAT DOESN'T COST THE EARTH



HOW IT WORKS



CHARGE

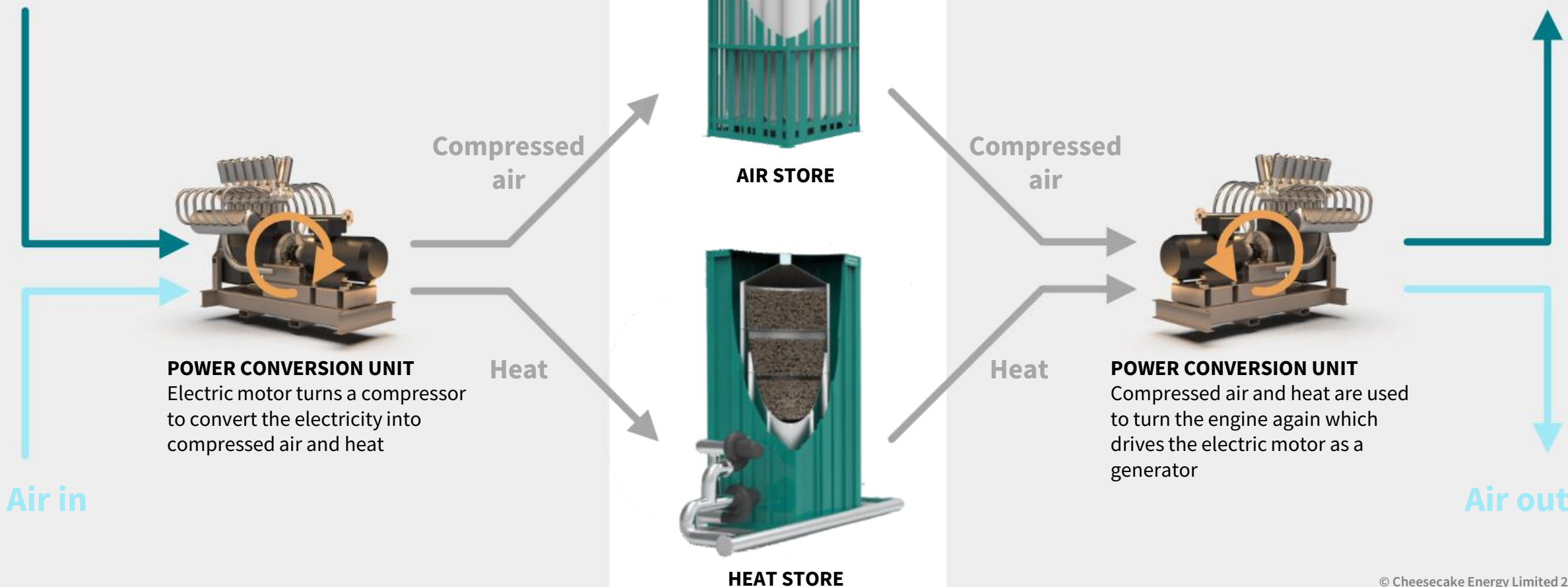
Electricity from the grid or from renewable generation drives an electric motor

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

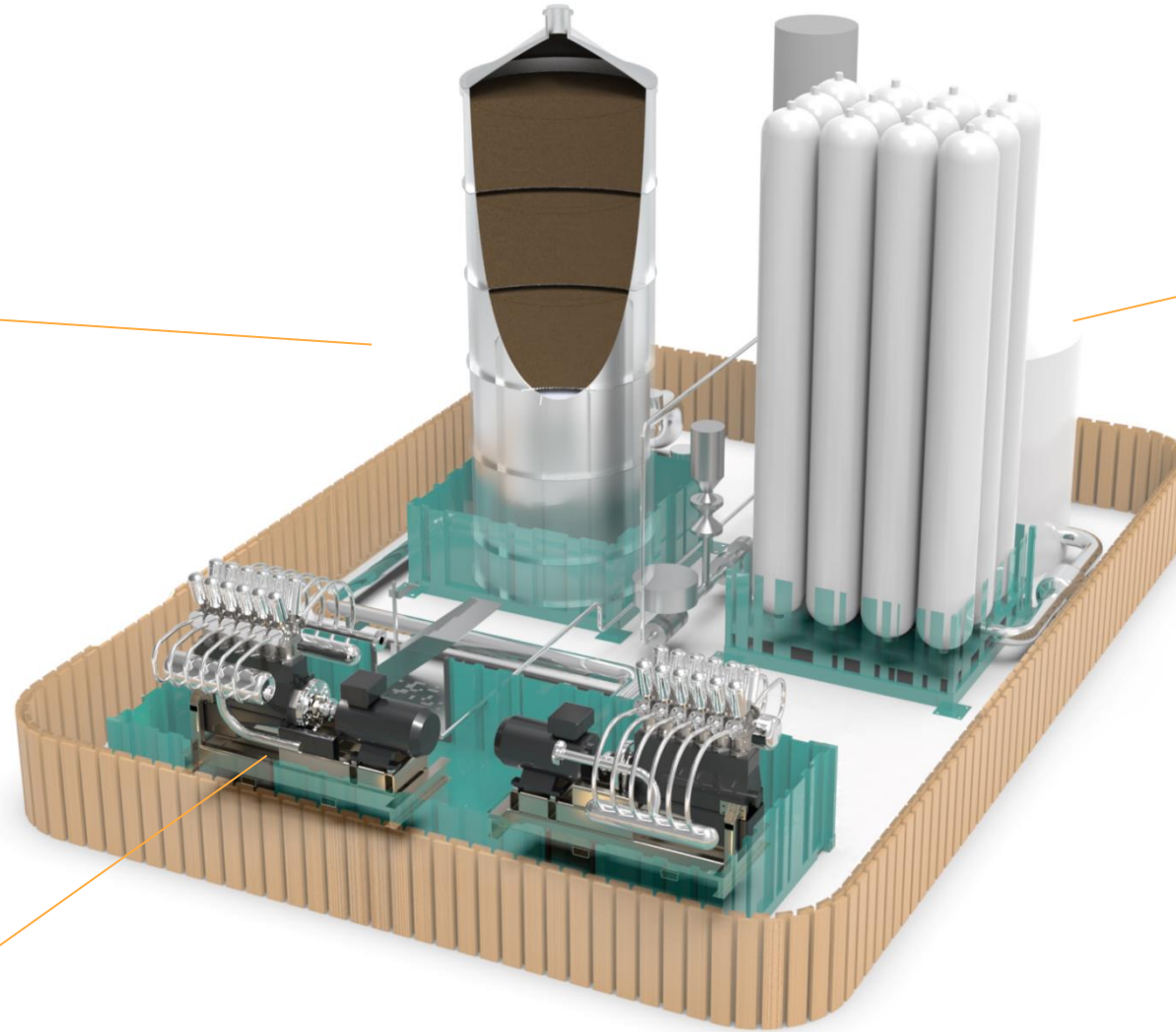
Heat is stored in **gravel** at very low cost, at up to 550 °C

Air store

Air stored at 250 bar in **pressure vessels** repurposed from the compressed natural gas industry

Power conversion

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



Circular economy approach uses **second-life diesel engines** and pressure vessels as well as **automotive infrastructure** and supply chains

MEDIUM DURATION AND MEDIUM SCALE

CEL is addressing medium-duration opportunities requiring

4-24 hours

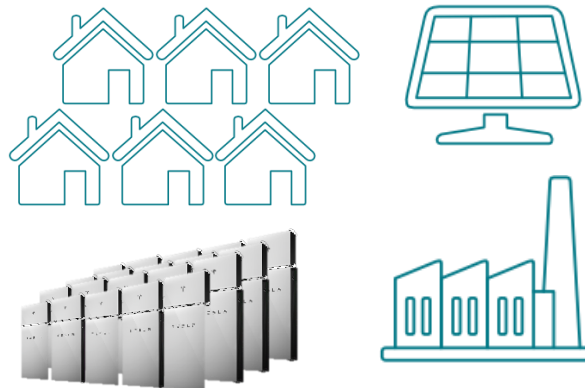
of discharge duration at rated power

Domestic

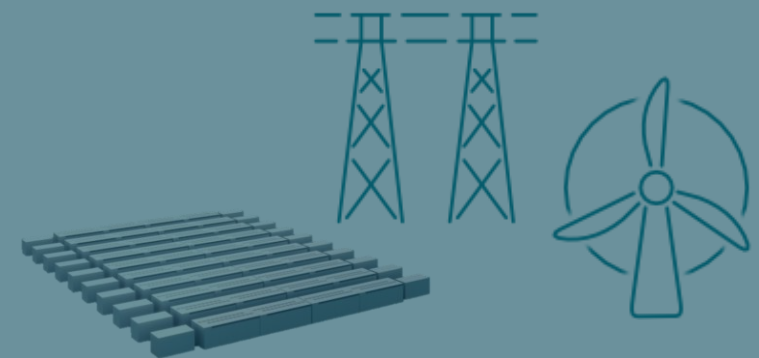


Shell Global Solutions International

Commercial & industrial



Utility scale



CUSTOMER BENEFITS

CEL is working with a variety of customer segments to facilitate a faster, cleaner transition to renewable energy



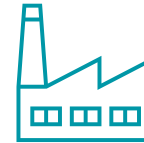
Business parks & mixed-use developments

- ✓ Energy bill savings
- ✓ Increased energy security



Renewables developers

- ✓ Minimise curtailment
- ✓ Maximise ROI



Industrial energy users

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

CUSTOMER BENEFITS

CEL is working with a variety of customer segments to facilitate a faster, cleaner transition to renewable energy



Industry and communities in offgrid and weak grid areas

- ✓ Reduced carbon footprint
- ✓ Self reliance



Electric fleet operators and charge point operators

- ✓ Fast-tracking fleet electrification



Housing developers

- ✓ Energy savings
- ✓ Increased energy security

CEL PROJECTS UNDERWAY



MANUFACTURING SITE

This project alleviates the need for onsite diesel generation at an industrial manufacturing site.

300 kW / 1.5 MWh system
Feasibility study underway



EV CHARGING

eTanker allows the client to save on grid connection upgrade costs, making their electric fleet possible sooner.

150 kW / 750 kWh system
FEED study completed



SOLAR MICROGRID

CEL's system will be integrated into a local authority-owned microgrid to reduce costs and increase resilience.

2.2 MW / 11 MWh system
Feasibility study underway

COLCHESTER MICROGRID



CEL's fleet of energy storage systems at Colchester Northern Gateway will:

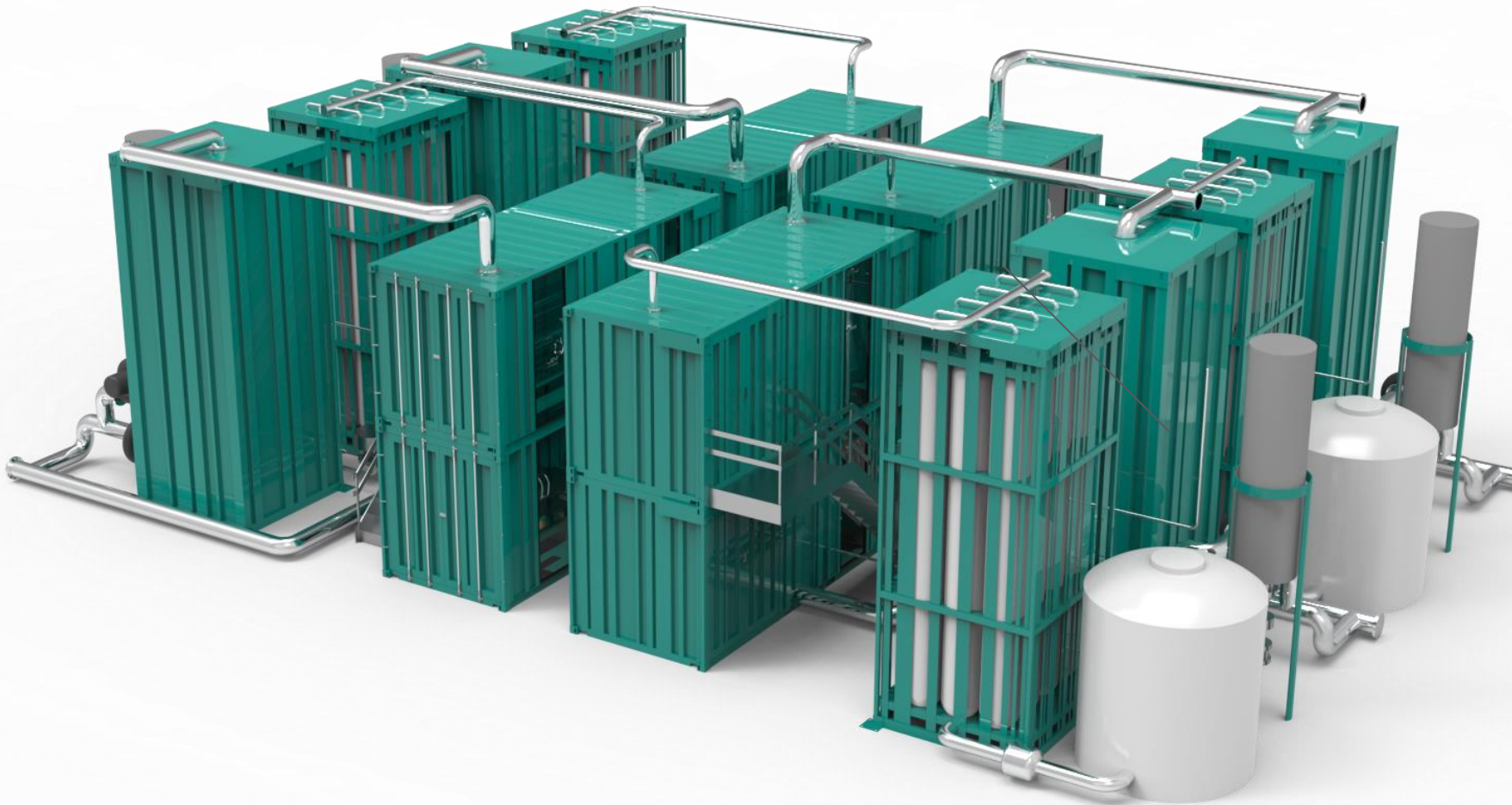
Maximise utilisation of PV
electricity

Increase microgrids
reliability & resilience

Reduce energy costs

Enable microgrid to offer
balancing services to wider
electricity network

FLEXITANKER



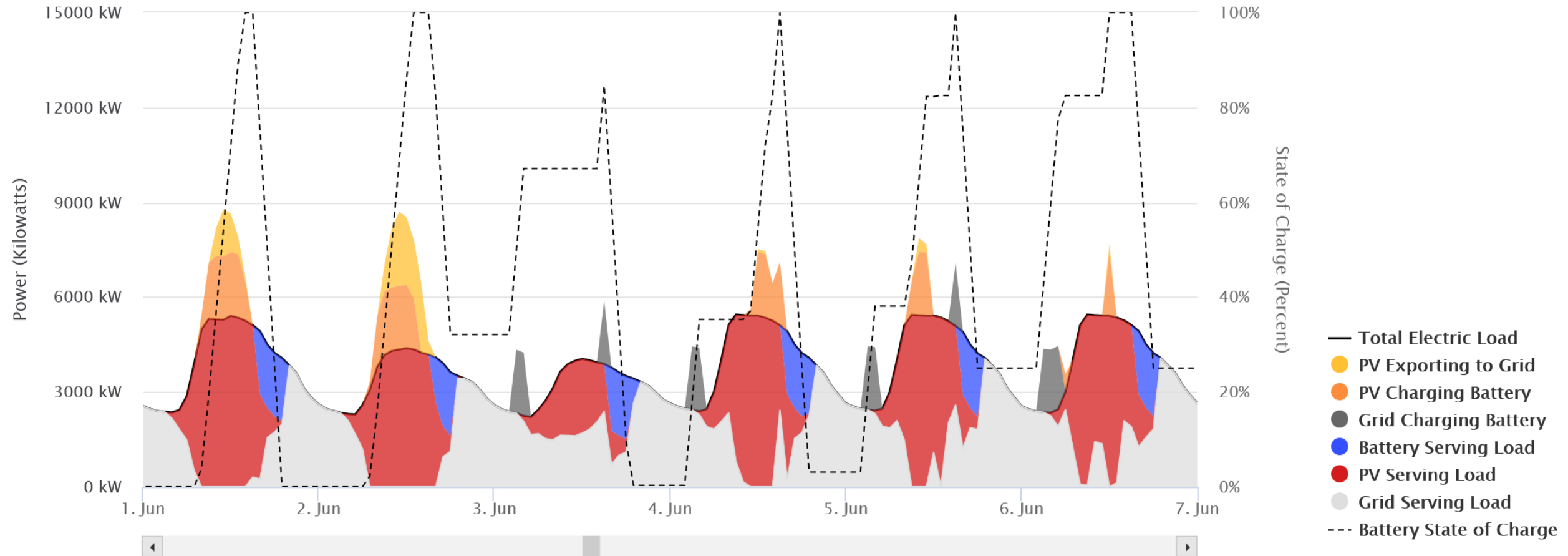
Delivery Date: 2024

Storage capacity:

2.2 MW / 11 MWh

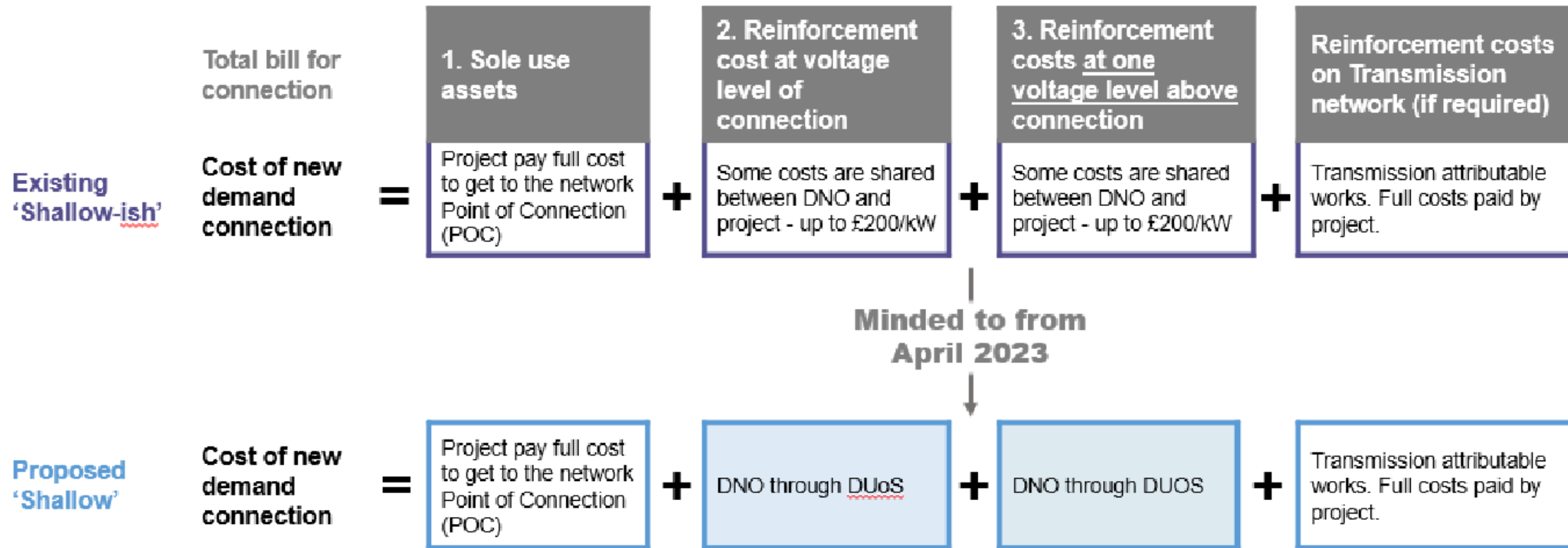
- Black start capability
- Standby to full power <10 minutes
- Efficiency projected to be 65-70%
- Overall level of TRL7 for the system

MANAGING IMPORT COSTS



SIGNIFICANT CODE REVIEW – OPPORTUNITY/COST?

Demand connections becoming ‘shallow’



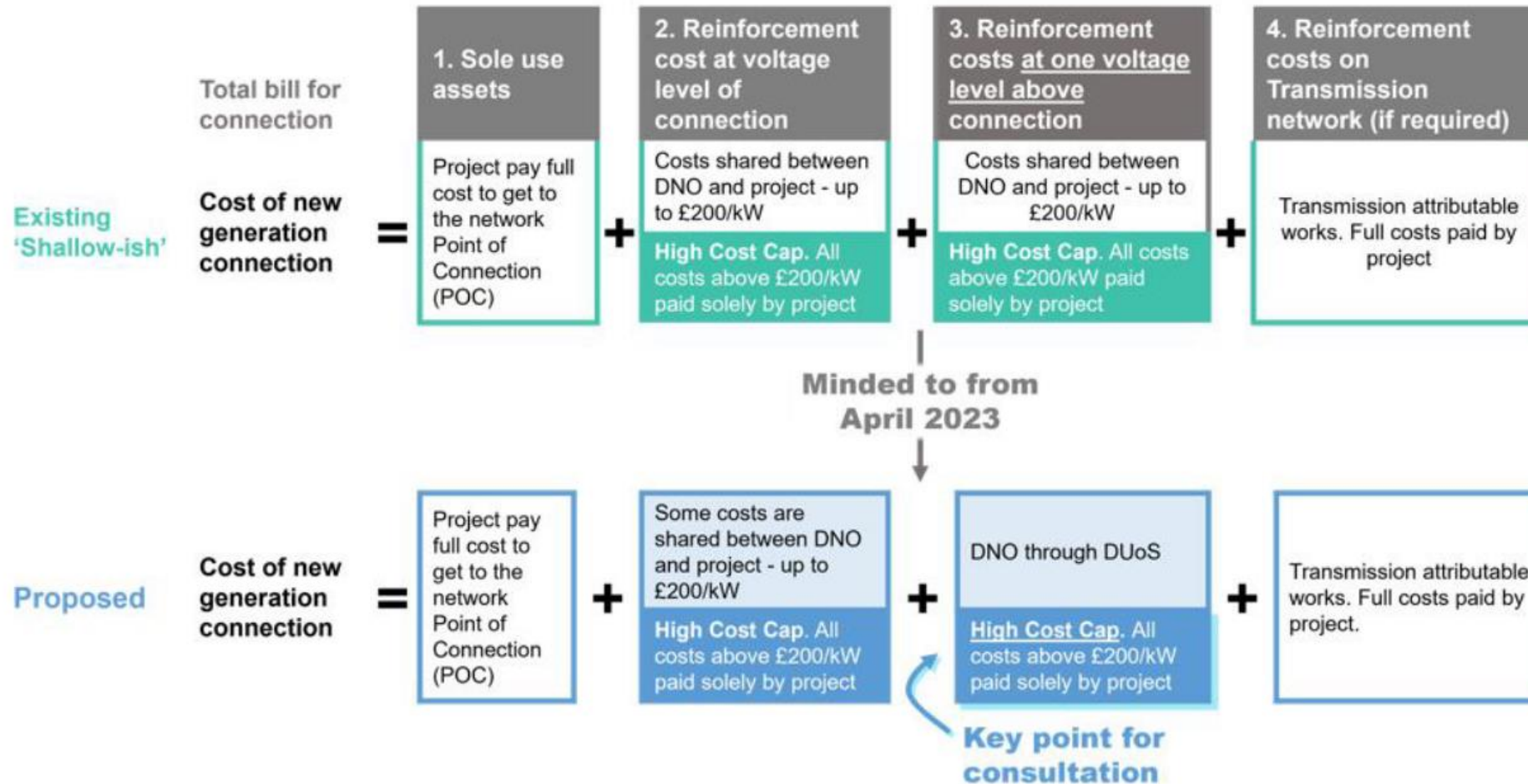
SIGNIFICANT CODE REVIEW – OPPORTUNITY/COST?

Change in cost of connecting for demand

CONNECTION VOLTAGE	SCHEME (Generic) Brief Description	OFFER COST - NOW	OFFER COST - POST SCR	Reduction (%)
LV	Connect 10 new supplies off of an existing PMT	£27k	£21k	-22%
LV	600kVA LV MCCB metered supply with new GMT and 11kV circuit reinforcements	£90k	£59k	-34%
HV	650kVA HV metered car charger connection	£100k	£10k	-90%
HV	HV Metered EV Car Chargers at Transport Hub	£900k	£200k	-78%
EHV	20MW demand with EHV PoC and EHV Reinforcement	£2.0m	£0.5m	-75%
132kV	40MW Demand with a 132kV PoC and 132kV reinforcement	£2.9m	£1.7m	-41%

SIGNIFICANT CODE REVIEW – OPPORTUNITY/COST?

Generation connections becoming shallower



SIGNIFICANT CODE REVIEW – OPPORTUNITY/COST?

Change in cost of connecting for generators

CONNECTION VOLTAGE	SCHEME (Generic) Brief Description	OFFER COST - NOW	OFFER COST - POST SCR	Reduction (%)
LV	To allow connection of a 29kW PV array	£9k	£4k	-56%
LV	To allow connection of 10kW PV	£7k	£0.6k	-91%
HV	2MW of PV with new connection	£121k	£121k	0%
HV	7MW Gas generation facility	£522k	£387k	-26%
EHV	30MW of PV and battery storage with an EHV PoC and upstream ECCR charge (132kV)	£0.79m	£0.17m	-78%
132kV	30MW PV connection with a 132kV PoC that necessitates transmission reinforcement	£6.0m	£6.0m	0%

ENABLING THE GRID OF THE FUTURE – HOW OUR CUSTOMERS BENEFIT



Grid upgrade
avoidance



New revenue
streams from
grid services



Utilise low-cost
energy from the
grid or local
renewables



Increased
resilience



Decarbonisation
and compliance
with legislation



Cheesecake Energy

Delivering thermal and compressed air energy storage at **30-40% lower cost** than lithium-ion



Major benefits of our technology:

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

CEL is seeking partners to develop and deploy the next generation of **energy storage**



Cheesecake Energy Ltd

The world's greenest battery

Please do let us know if you have any questions

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