



LeydenJar



## How high energy density pure silicon anodes are changing industries

From fast charging and high range EV to drone deliveries and electric aviation



**Battery  
Tech  
Expo**

Tim Aanhane

April 20, 2023



# Batteries need higher energy density to unlock innovation and sustainability

## THE DREAM

Electrifying aviation,  
including drones and planes



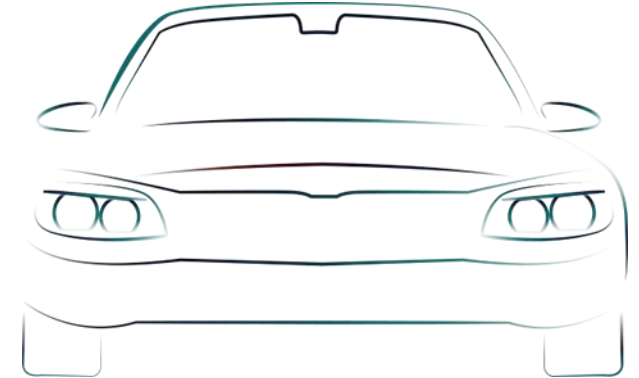
Limited by energy density and  
discharge rates

Smarter wearables, phones,  
laptops



Limited by energy density

Driving EV without range  
anxiety

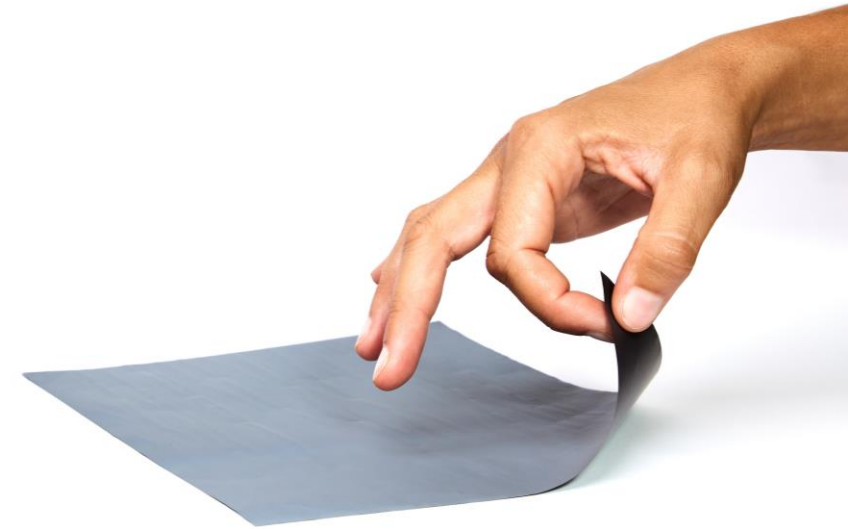
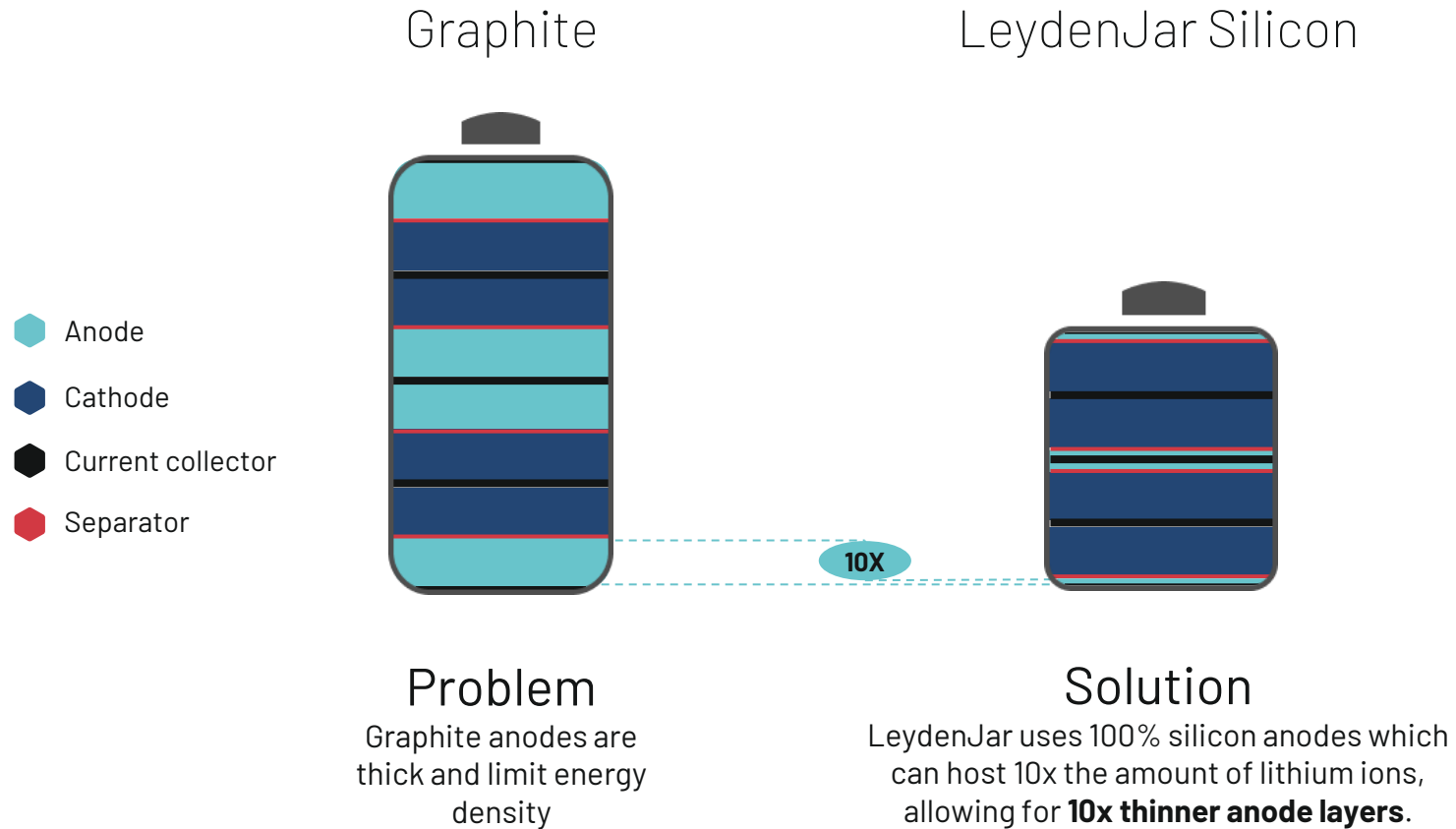


Limited by energy density and  
charge times

## THE PROBLEM



# LeydenJar boosts Li-ion battery energy density by 70% by using 10x thinner anodes





# World-leading energy density of 1350 Wh/L, now at 450 cycles

## Performance

Energy Density  
Nominal, stack level

**1350 Wh/L** | **390 Wh/kg**

Rate capability  
At 25 °C

**>5 C**



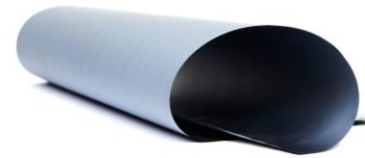
Cell capacity  
Pouch

**0.1 - 5 Ah**

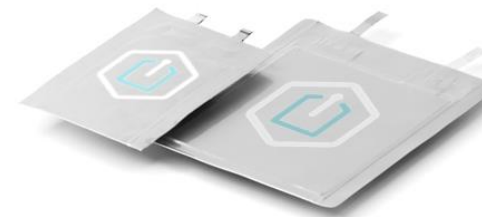
Cycle life  
EOL 80%

**>450 cycles**

## Products



Silicon anode foil  
Rolls, sheets



Sample cells  
0.1 - 5 Ah pouch cells



# In 2022 LeydenJar improved cycle life to >450

## Cell specification

0.1 Ah pouch cell (single layer)

## Testing specifications

25°C

2.5-4.2V formation

3.0-4.2V cycling (0.5C/0.5C)

## Anode

Composition - Pure Silicon

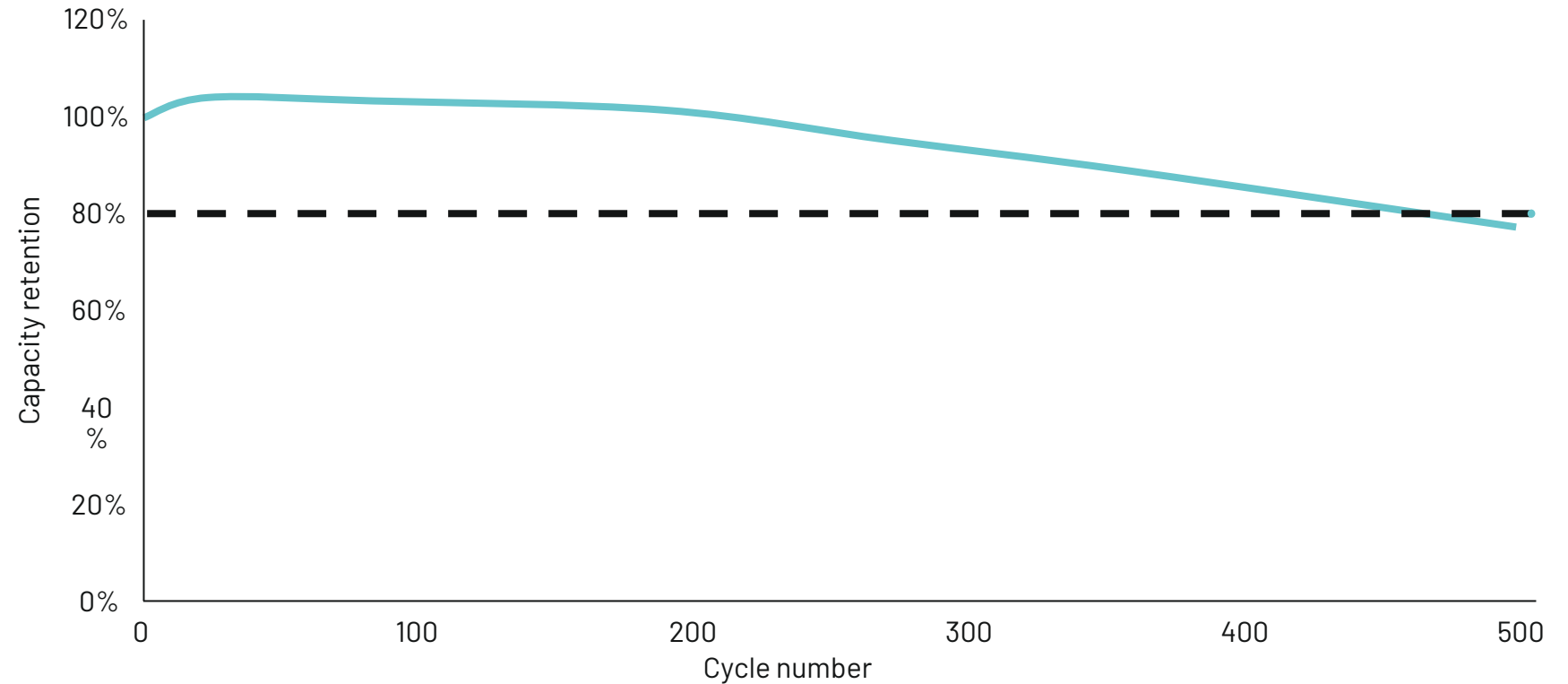
Pristine thickness - 6  $\mu\text{m}$

No pre-lithiation

## Cathode

Composition - NMC 622

Reversible capacity (0.2C) - 3.5 mAh/cm<sup>2</sup>



Working to improving cycle life to >1,000 cycles through:

1

Anode morphology

2

Cell chemistry

3

Surface treatments

4

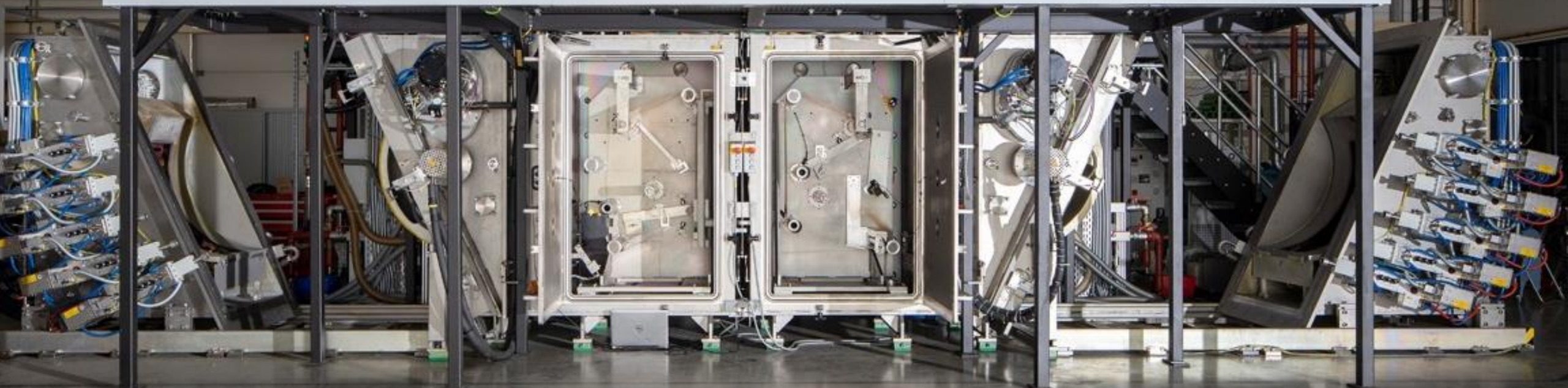
Pre-lithiation



LeydenJar

ENERGISING TECHNOLOGIES

BOOSTING BATTERY ENERGY  
WITH PURE SILICON ANODES





# End-to-end cell making capabilities and a scalable production platform



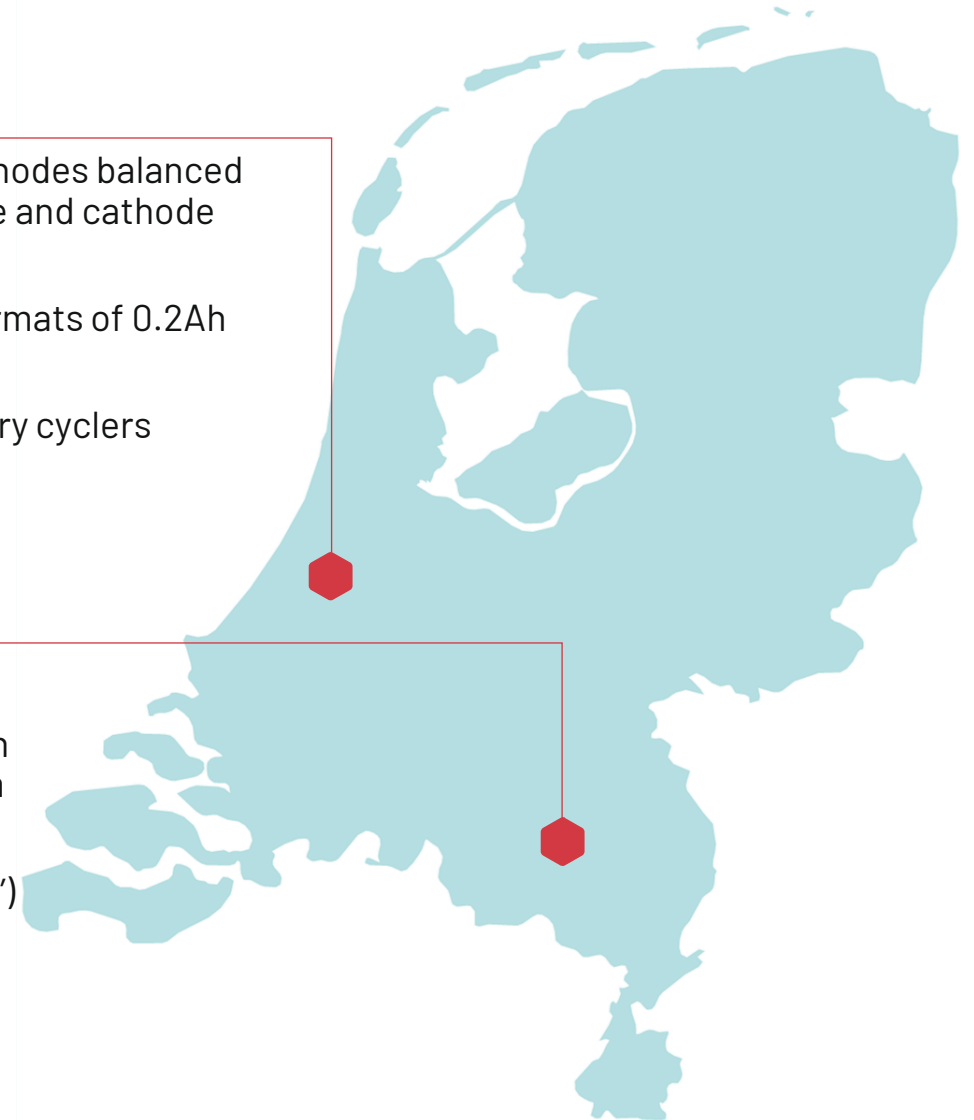
## Leiden Battery Lab

- Full cell build. 100% silicon anodes balanced with off-the-shelf electrolyte and cathode material (NMC, LFP)
- Work based on pouch cell formats of 0.2Ah (single sheets) up to 1.5Ah
- Installed base of >1000 battery cyclers



## Eindhoven Production Facility

- PECVD technology
- Current production capacity at 0.3MWh per annum. In 2026 100MWh per annum
- 2024: launch of LeydenJar proprietary 35MWh modular PECVD tool ('Gen3 tool')







# Impact on industrial drone applications

Current batteries

Reachable area:  
**9850 km<sup>2</sup>**

LeydenJar battery

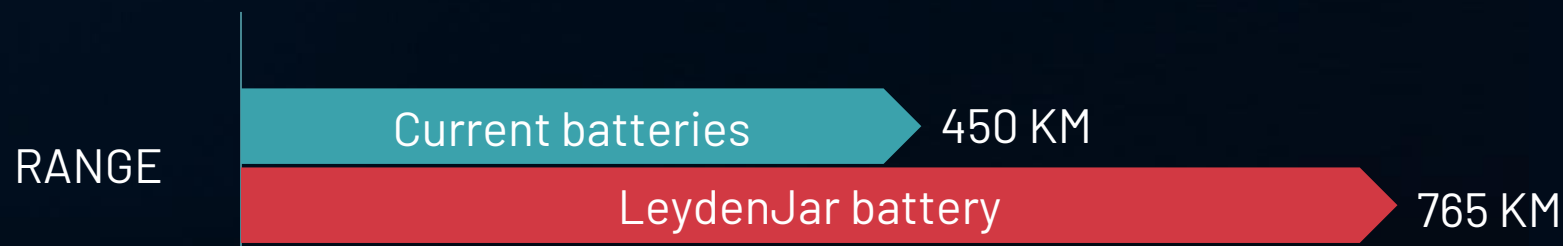
Reachable area:  
**22200 km<sup>2</sup>**

**+125%**

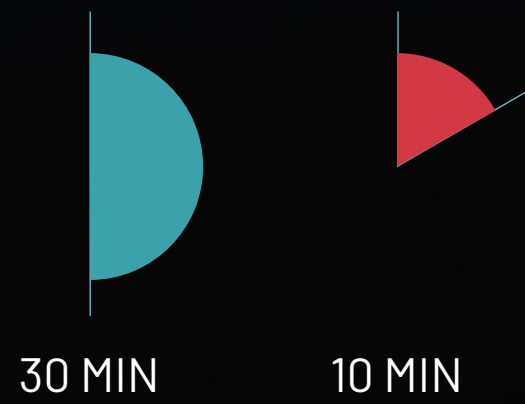






# Impact on electric vehicles



## FAST CHARGING 0-60%



Validation ongoing:



Part of GreenSPEED consortium



# Impact on electric aviation

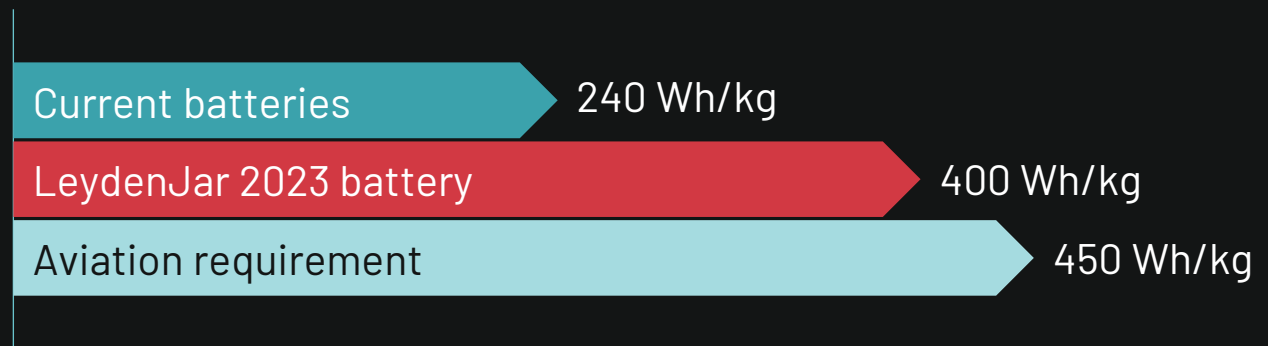
## Maeve Chooses Advanced Batteries For Electric Regional

April 13, 2023

Source: Maeve - [www.maeve.aero](http://www.maeve.aero)  
LeydenJar is not involved in Maeve's activities



ENERGY  
DENSITY





LeydenJar