



KATRICK®  
TECHNOLOGIES

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**Developing world-class, patent protected, technologies  
for OEMs to build products at the forefront  
of the clean energy revolution.**

Equity Capital Raise  
2024

Accelerating the global transition to renewable energy through innovation.

# Strategy

Be a global leader in developing valuable renewable energy IP technologies for OEM product manufacturers to build world-class products under license, and build a diversified, high net-margin, recurring revenue business.

- Current portfolio of 8 renewable energy and zero-carbon related technologies.
- Our first technologies are focused on:
  - Urban Wind Panels**, generating zero-carbon, low-cost, electricity at the point of use.
- Forecast Q4 2024: quarterly revenue £156k, 70% net margin.
- Forecast 2025 annual revenue £8.9m, 60% net margin.

# The team



Karthik Velayutham  
Founder/CTO  
MSc (Offshore  
Renewables)  
Board member



Vijay Madlani  
CEO  
BA (Hons) Business  
Board member



Bruce Chaplin  
Finance Director  
N.Dip CMA



Neil Midgley  
Engineering/Commercial Director  
MBA



Ross Gibson  
Lead Wind Engineer  
MEng.



Dougald Middleton  
Non-Exec, Chairman  
BSc Land Econ



John Leahy  
Non-Exec,  
Director  
MBA Business

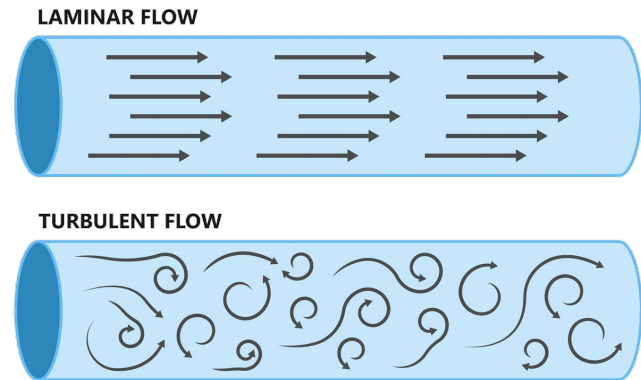
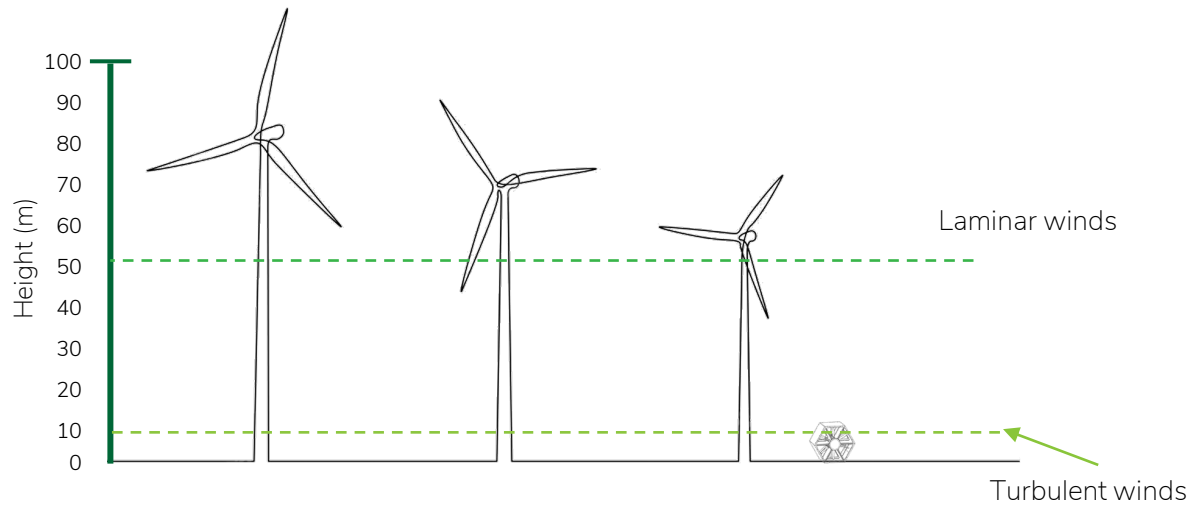
# Renewable electricity market trends

- Cop26 commitment - achieve net-zero by 2050 and encourage investment in renewables.<sup>1</sup>
- Cop28 commitment - tripling the world's capacity for renewable energy generation by 2030.
- Share of zero-carbon generated electricity to increase from 29% today to 60% in 2030.<sup>5</sup>
- Wind-generated capacity to increase 4x from 1,900 TWh to 8,000 TWh by 2030.<sup>3</sup>
- Centralised generation and distribution networks - high capital costs, low flexibility, security.
- Zero-carbon generation from wind at the point of use, 60% cheaper than grid energy.<sup>4</sup>
- Emerging market and developing economies are 75% of demand increase by 2050.<sup>5</sup>
- Recent urban solar growth deployment illustrates price elasticity and adoption trends.



# Wind powered electricity generation

- High-altitude wind patterns are predominantly laminar. Low-altitude wind patterns are turbulent and gusty.
- Conventional rotary wind turbines require laminar wind patterns to operate efficiently.
- Volatile wind patterns, low efficacy, logistics, and ergonomics make conventional turbines unsuitable for urban deployment.



# Innovation in oscillations

- Breakthrough in oscillating aerofoil innovation is perfect for low-level deployment.

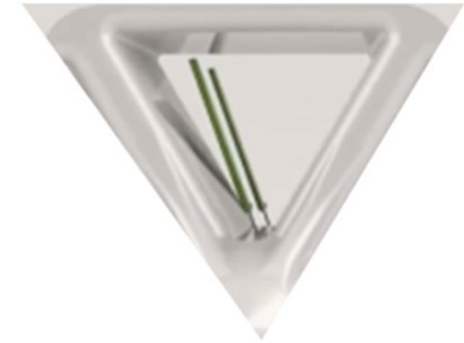
- *Power available (Watts)* =  $\frac{1}{2} \rho A v^3$

Power available (Watts) =  $\frac{1}{2}$  air density x aerofoil swept area x velocity<sup>3</sup> at aerofoil

- *Power generated (Watts)* =  $C_p \times \text{Power available}$

$C_p$  = system efficiency at rated wind speed<sup>1</sup>

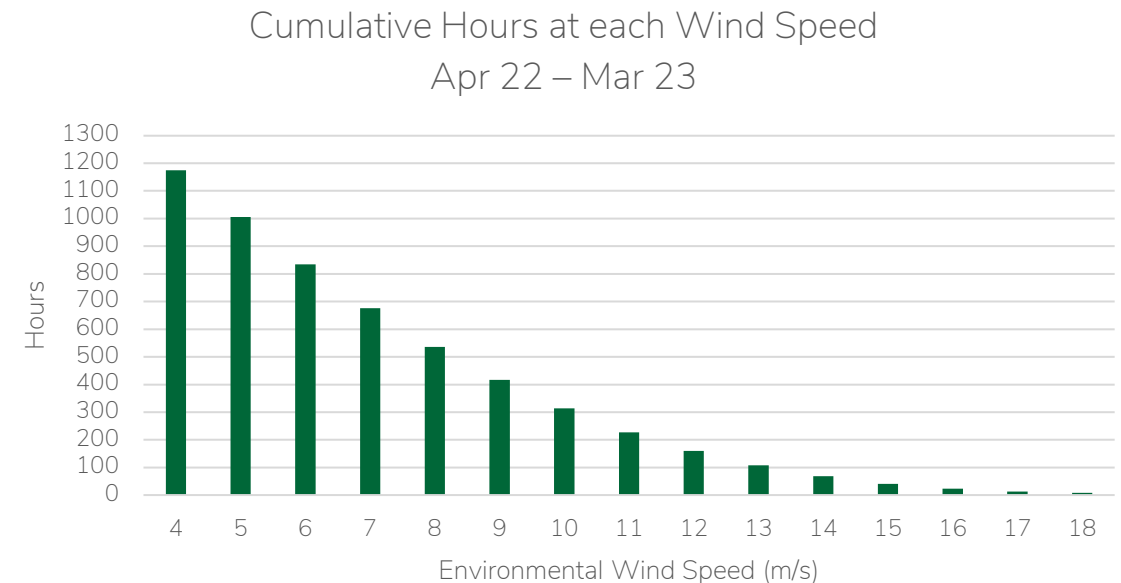
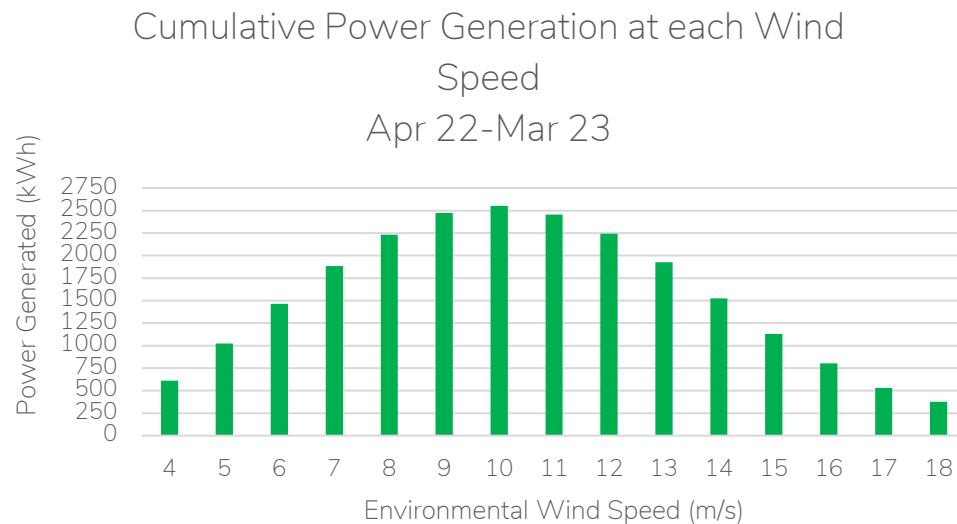
- Katrick innovative duct design accelerates environmental wind speed by 1.4x.
- Katrick rapid response oscillating aerofoil innovation to extract a higher percentage of available energy from gusting winds.



1. Katrick Technologies first-to-market Wind Panel will have a system efficiency of 8% at a rated wind speed of 12m/s. The mass-produced Wind Panel will have an enhanced system efficiency of 14%.  
CP of any system cannot exceed Betz's limit (59.3%).

# Low altitude wind speed analysis

- If the wind blew constantly at 12m/s a 10kW rated Katrick Wind Panel array<sup>1</sup> would generate 87,600kWh per year.
- 1-year study of low-altitude wind speed at Babcock Rosyth site observed a range of 2-18 m/s.
- Independent analysis by [Professor Wolf, Herriot-Watt University](#), to assess low-altitude wind patterns globally.
- 'Load Factor' is a long-term averaging factor applied to account for variability in wind speed.
- Load factor is calculated to be 10 – 25%<sup>2</sup>.



1. One array is made up of 10 individual hexagonal Katrick Wind Panels to have a rated capacity of 10kW at mass production stage.
2. A load factor midpoint of 15% has been used to calculate power outputs and LCOE figures in the deck.

# Independent performance test and validation

- Alpha 1 rig – Full-scale single duct system, two aerofoils, performance analysis and validation.
- Design parameter testing at Silverstone test-bed under the supervision of **MTC Chief Engineer Steve Nesbitt**.
- Performance parameter testing at Strathclyde University signed-off under the supervision of **Mr. Cameron Johnstone, Reader University of Strathclyde**.
- 80 hours testing of 51 critical design parameters for system functionality.
- At wind speed 10.2 m/s a single duct produced 41.1W average power output, with a peak power of 61.1W.

Parameters	Design target	Alpha Stage 1	Unit
Aerofoil span length	600	600	mm
Rated wind speed (at inlet)	12	10.2 <sup>1</sup>	m/s
Ducting effect (increase in velocity)	1.4x	1.4x	
Mechanical power	25-40	41.1	W

# From Alpha Stage 1 to commercial product

- Advancing through single duct system to complete hexagonal panel under variable wind speed conditions.
- Committed design enhancements is expected to increase mechanical power output to 130 – 140 Watts per duct.
  - A first-to-market product to deliver revenue into the business, with a mass production 2<sup>nd</sup> generation product to deliver increased outputs.

Parameters	Alpha Stage 1	Alpha Stage 2	1 <sup>st</sup> to market	Mass production	Unit
Aerofoil span length	600	600	600	600	mm
Rated wind speed (at inlet)	10.2	12	12	12	m/s
Ducting effect (increase in velocity)	1.4x	1.4x	1.4x	1.4x	
Mechanical power per duct	41.1	80-100	130-140	160-170	W
Electrical power per hexagon			570-630	960-1,020	W
Annual electrical power per array <sup>1</sup> (15% load factor)			7,751	13,140	kWh

# Economic cost to end user

- A single hex panel consists 6 ducts, each duct has 2 oscillating aerofoils.
- A typical array consists of 10 panels and rated at 10kW<sup>1</sup>.

Wind Panel economics per 10kW array	
Estimated OEM manufacturing cost	£15,000
Estimated OEM GP margin	£2,500
<u>Katrick</u> average license fee	£600
Installation cost	£1,500
Maintenance cost	£400
Total selling price	£20,000

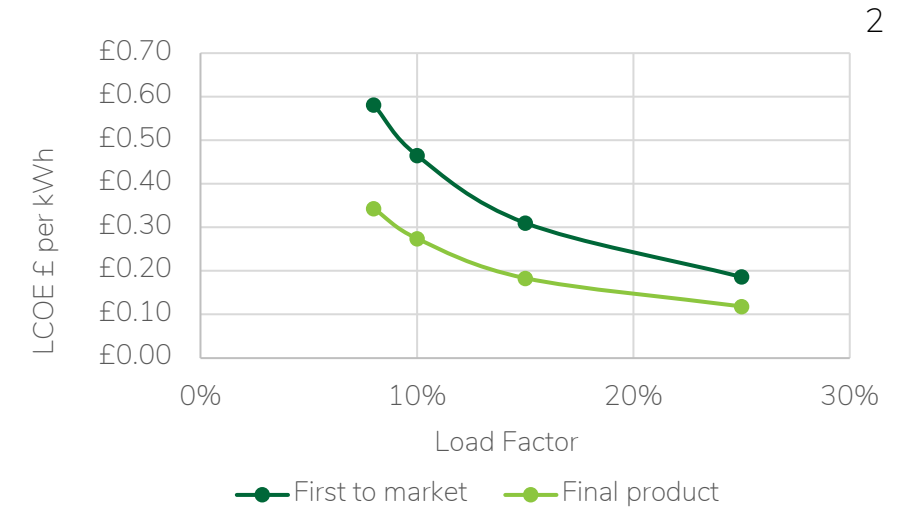


# Economic benefits for end user

LCOE – Levelised cost of energy is the industry standard calculation.

Unit cost of energy accounting for average total cost of building and operating the asset over an assumed lifetime.

	First –to-market product (10kW)			2 <sup>nd</sup> generation product (10kW)		
Price	£20,000			£20,000		
System efficiency	8%			14%		
Load factor	10%	15%	25%	10%	15%	25%
Electrical output (kWh per year)	5,533	8,300	13,834	9,381	14,071	23,452
LCOE <sup>1</sup> (£ per kWh)	0.465	0.310	0.186	0.274	0.183	0.118



Q1 2024 commercial cost per kWh U.K. £0.75/kWh<sup>3</sup>.

Payback time based on the unit price difference of an array which produces 14,071kWh is **2 years**.

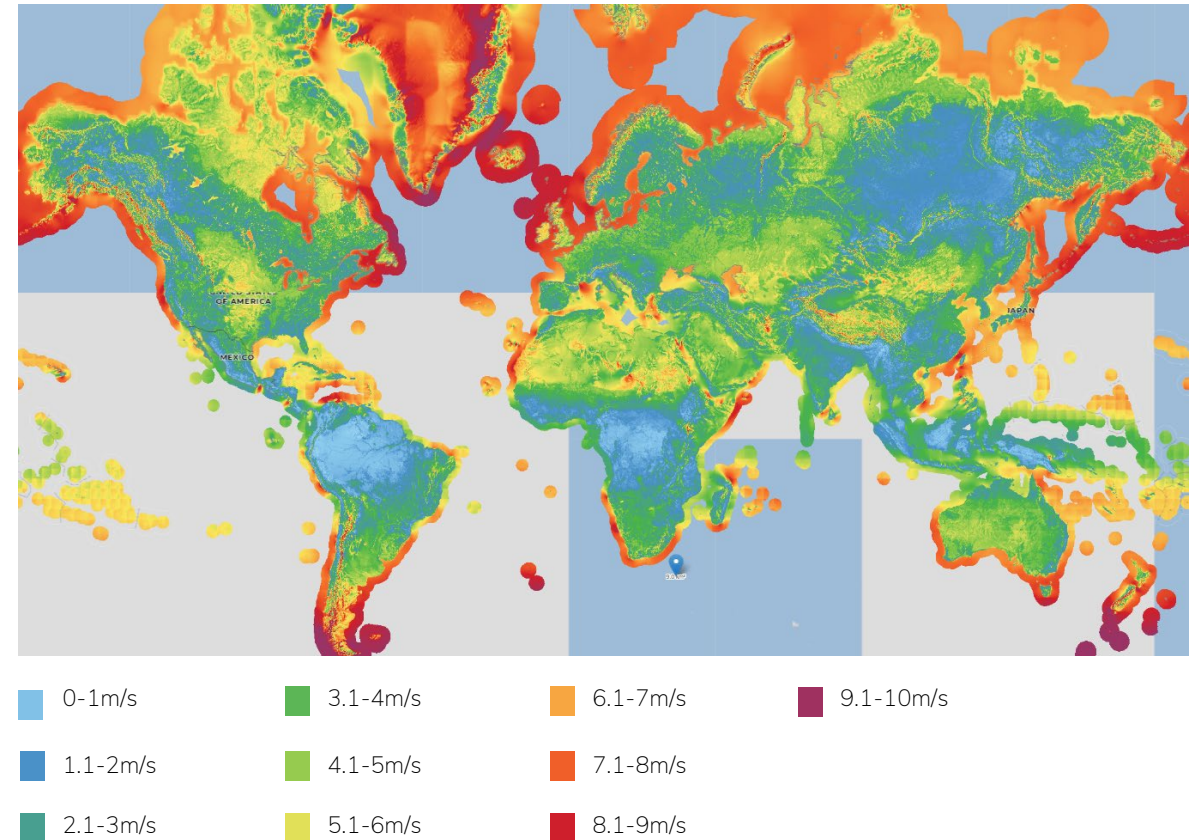
An array that produces 14,071 kWh is estimated to mitigate 3.6 – 8.8 tonnes CO<sub>2</sub> per year.<sup>4</sup>

Katrick 2025 shipment forecast of 12,250 units will eliminate **45K – 108K** tonnes per year.



# Our global market fit

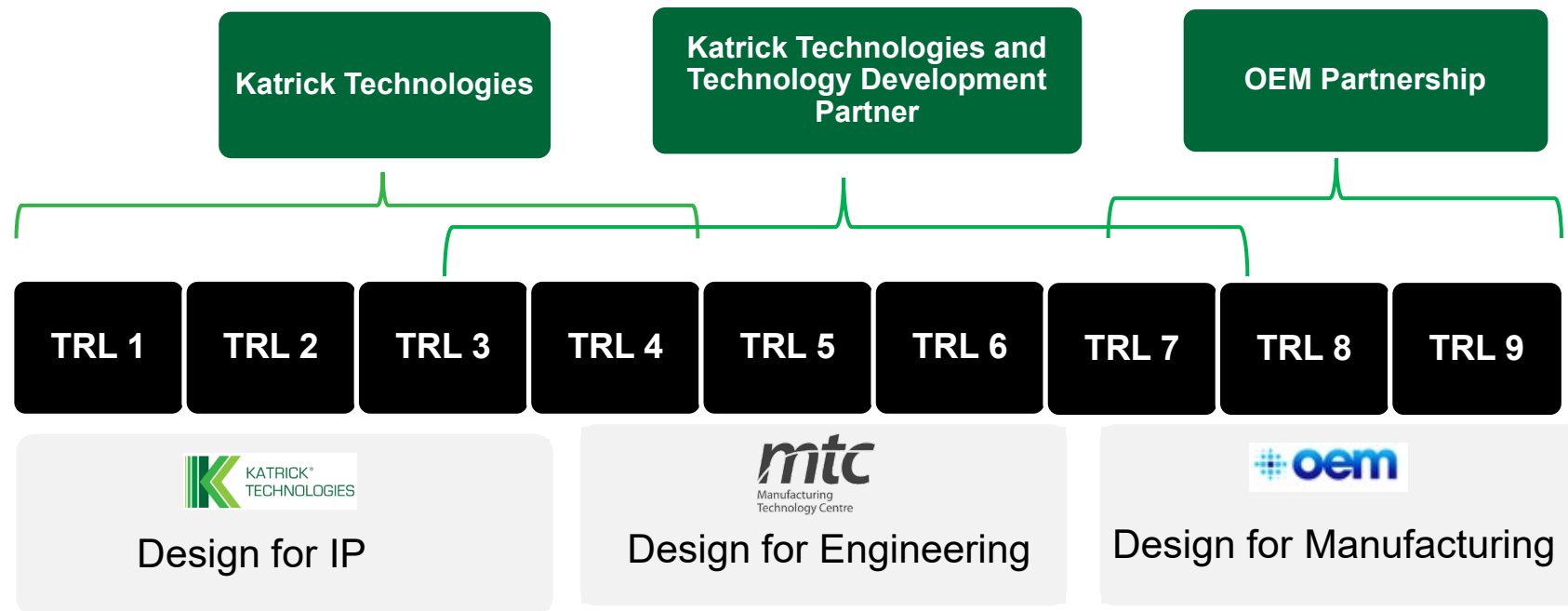
- Our Wind Panel has the real potential to extract economically viable wind energy where the annual mean wind speed is above 4 m/s.<sup>1</sup>
  - In the UK the 20-year annual mean wind speed is 4.35 m/s and 4.25 m/s for 2022 (provisionally).<sup>2</sup>
- Our Wind Panel has a levelised cost of energy of 19-49p/kWh at these wind speeds, keeping our device in a competitive range.<sup>3</sup>
- First product to market will fit comfortably top global markets:
  1. Europe (including UK)
  2. USA
  3. Australia
  4. China
  5. India





# First products to market

- Robust and widely adopted TRL development philosophy.
- Rapid development and low-risk benefits to OEM partners.
- Leveraging world-class expertise for rapid time-to-market.



# Technology development partner

- One of the seven UK's high value manufacturing catapult.
- Major public-sector investment in UK manufacturing capabilities.
- Developing innovative manufacturing processes and technologies in partnership with industry, academia, institutions.
- Katrick are members along with Siemens, Rolls Royce, GE, Amey, London Underground, Network Rail.
- Co-development of full working prototype for manufacture and engineering support.
- Producing complete designed-for-manufacture documents.
- Enabling rapid OEM product development, reduced time to market.



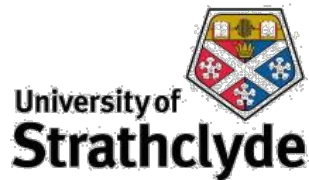
<https://the-mtc.org/>

# Who we work with

## Our commercial partners



## Our research, and academic partners



## Our technology and development contractors



# First commercial order

- Edinburgh Airport have signed a soft order for over 300 Wind Panels for their site.
- This is to complement their existing onsite solar infrastructure.
- Katrick's Wind Panels will provide a cost-effective solution to deliver power at a lower price point compared to their current solar configuration.



# Competitive benefits

- Benefits to OEM's
  - Our robust IP patent strategy provides competitive barriers to entry
  - Rapid time-to-market
  - Architecture provides scope to add unique features to drive product differentiation
- Benefits to end users
  - Complements urban solar to increase overall renewable point-of-use electricity
  - Solution for emerging markets inadequate generation and transmission networks
  - Potentially significant reduction in LCOE
  - Behind the meter security of supply



# Future customer

“Partnering with technology experts and embracing innovation is essential for AGS to meet its decarbonisation goals.

Renewable technologies have the potential to power vast amounts of on-site equipment, offset energy costs and reduce the requirement for carbon-based energy supply...

Managing this is an integral part of how we grow our airports responsibly”

- Derek Provan, CEO of AGS Airports 2021.



Katrick wind panels demo [here](#).



AGS Airports Limited is jointly held by Ferrovial (via Faero UK Limited) and AGS Ventures Airports Limited. has invested in 32 airports across the UK, Italy, Australia, Chile and Mexico, since 1998



# Patent strategy

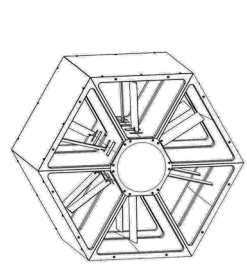
- Developed with IP Patent Attorneys.
  - Robust geographic and market sector patent strategy.
  - Contract implementation by legal team.
- 
- Based on our world's first core concepts
    - **Wind**: IPO passed, and PCT implemented.
    - **Passive Cooling**: Specific product patents covering our multiple use cases.
    - **TVB Heat & Cooling**: UK pending filing with no objections.
    - **Core IP foundation**: Energy harvesting & manufacturing (UK granted & Intl PCT app).

lincoln {ip}<sup>®</sup>

  
Pinsent Masons

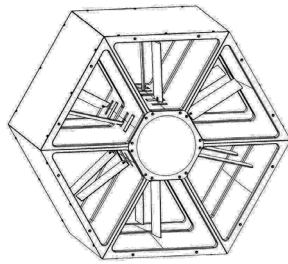
# Our 48-month product development strategy

A patent family of technologies with a clearly defined roadmap to commercialisation.



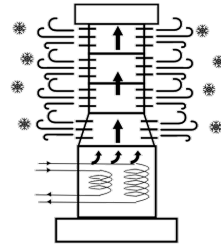
Industrial Wind

H1 2023

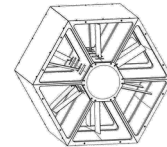


Wind Farm

H1 2024

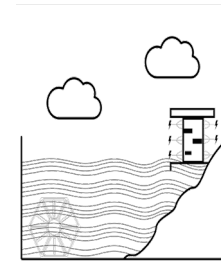


Passive Cooling



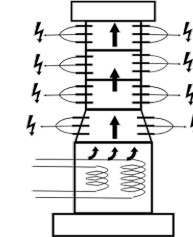
Residential Wind

H2 2025

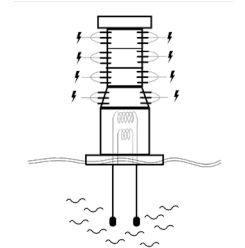


Wave & Tidal

H1 2026



Heat Recovery



Geothermal

H2 2026



# Licensing economics

Licence fee percentage on selling price from commercial manufacturing partner.

- Dependent on commercial manufacturer and route to market channel – OEM, contract manufacturing, build for use.

Licence fee to be split:

- **Fixed**

- Agree to minimum volumes manufactured over 3 to 5 years
- Agree to monthly payments on signing of commercial agreement

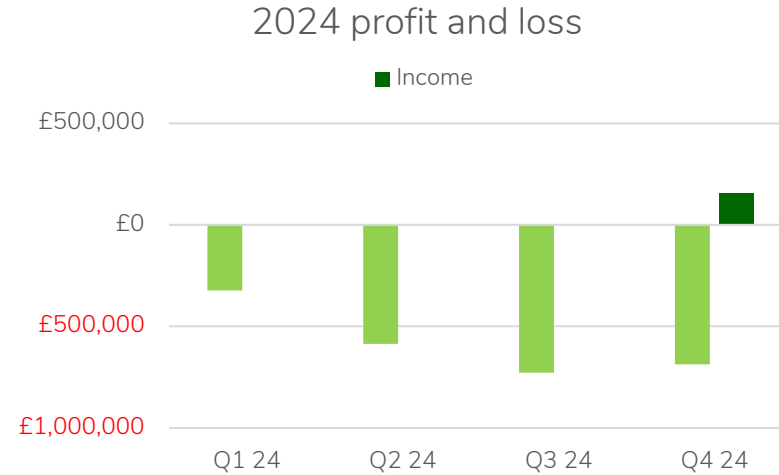
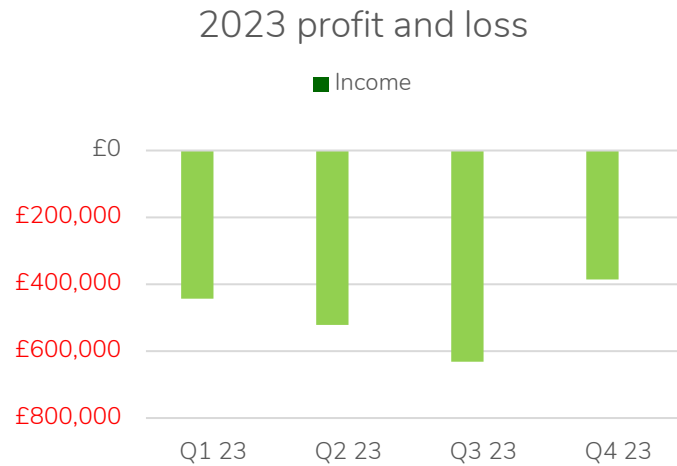
- **Variable**

- Balance of actual volumes manufactured to be paid monthly

# 3-year P/L financial forecast

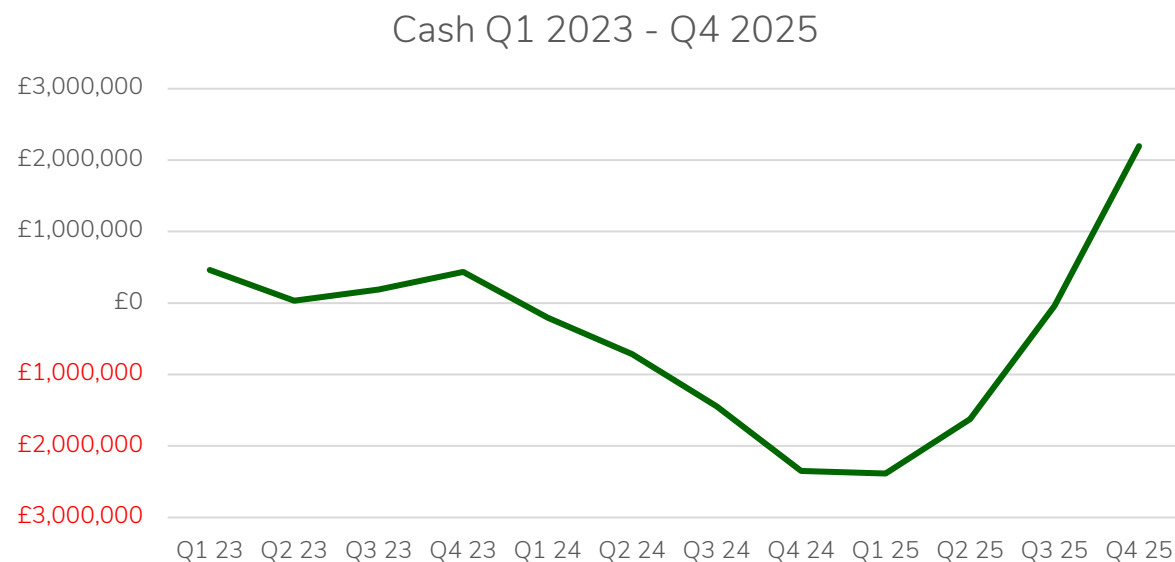
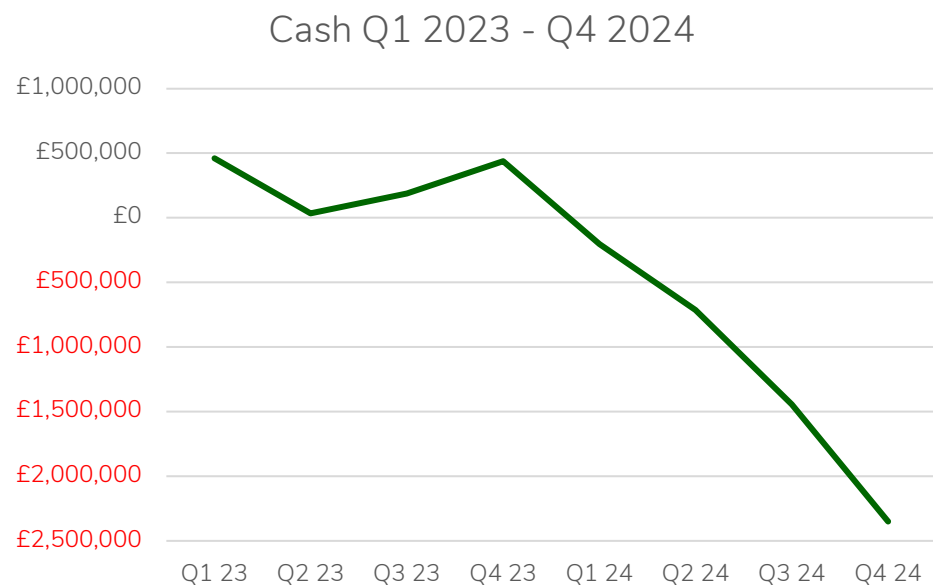
£'000	Q1 23	Q2 23	Q3 23	Q4 23	Q1 24	Q2 24	Q3 24	Q4 24	Q1 25	Q2 25	Q3 25	Q4 25
Income total	£0	£0	£0	£0	£0	£0	£0	£156	£811	£1,622	£2,777	£3,750
COGS	£83	-£118	-£215	-£77	-£172	-£189	-£344	-£125	-£279	-£311	-£562	-£214
Gross margin	£83	-£118	-£215	-£77	-£172	-£189	-£344	£31	£532	£1,311	£2,215	£3,536
Payroll	-£303	-£245	-£274	-£213	-£212	-£220	-£220	-£607	-£220	-£293	-£293	-£695
Property	-£31	-£17	-£25	-£21	-£29	-£29	-£29	-£29	-£32	-£32	-£32	-£32
Office	-£30	-£16	-£25	-£22	-£33	-£18	-£28	-£24	-£36	-£19	-£31	-£27
Motor vehicle	-£16	-£2	-£3	-£2	-£17	-£2	-£4	-£2	-£19	-£3	-£4	-£2
T&E	-£23	-£15	-£14	-£9	-£25	-£17	-£20	-£10	-£27	-£18	-£22	-£10
Other expenses	-£124	-£107	-£76	-£42	-£140	-£111	-£84	-£46	-£154	-£123	-£92	-£51
Total OPEX	-£526	-£403	-£417	-£308	-£456	-£397	-£384	-£718	-£489	-£488	-£473	-£817
EBITDA	-£443	-£521	-£632	-£385	-£628	-£587	-£729	-£687	£44	£824	£1,741	£2,719
EBIT	-£448	-£526	-£636	-£390	-£633	-£591	-£732	-£690	£37	£817	£1,736	£2,712

# 3-year P/L financial forecast



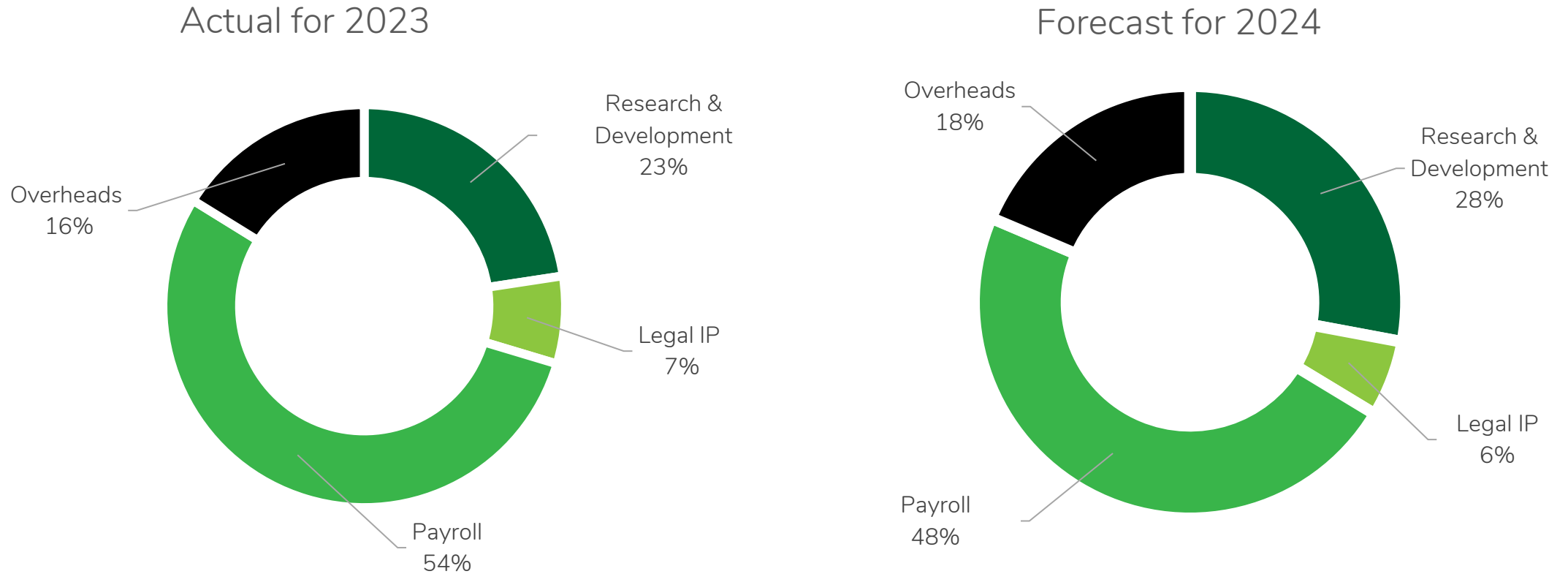
- 2023 & 2024 are investment years with first revenue Q4 24 (£156k).
- 2025 is accelerated revenue growth from OEM shipments rising from £811k in Q1 to £3.75m in Q4.
- Operating costs are average £489k per qtr in 2024, and £567k per qtr in 2025.

# 3-year cash forecast



- Total cash requirement to break even in Q3 2025 is £2.4m.
- Rapid revenue growth from Q2 2025 provides strong free cash flow from Q4 2025.

# Funding strategy and use of funds



- Primarily EIS Investor funding for 2023 of £1.3m.
- Forecasted EIS and Institutional funding for 2024 £2.5m.

“The next 1,000 unicorns won’t be search engines or social media companies, they’ll be sustainable, scalable innovators –’ startups that help the world decarbonize and make the energy transition affordable for all consumers.”

Larry Fink, CEO of Blackrock 2022

Katrick’s mission is to be centre stage of that revolution  
and deliver substantial shareholder value.



**Developing world-class, patent protected, technologies  
for OEM's to build products at the forefront  
of the clean energy revolution.**

Equity Capital Raise  
2024

Accelerating the global transition to renewable energy through innovation.