UNILIA

FUEL CELLS MADE BY HUMANS

CLEAN ENERGY

We believe in Duty of Care to the planet

Ever since our story began in 2017, we've had our heads down and our focus on perhaps the most important topic of our times, addressing climate disruption.

This is because we are committed to the principle of *Duty of Care* for our habitat, and for civilization.

All of our efforts are aligned with the goal of becoming net contributors to a reduced carbon economy which will lead to cleaner skies.

We believe that Hydrogen-powered electrification at scale is the cornerstone solution to our pressing environmental issues, and we have built our company around this premise.

This is why we have gone all-out to prepare this incredible technology for mass roll-out.

~ Regis Yang, President, UNILIA

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UNILIA is Energy in Unison

The UNILIA name and insignia embody the origins and drive of our company.

The sound in English is both a phonetic interpretation of the Chinese for Energy in Unison - Yun Liang - and our own linguistic construct meaning *The Alchemy that Unifies.*

We feel this encapsulates our core wizardry: electrochemistry and engineering, which are at the very core of the hydrogen-powered electrification revolution.

VANCOUVER

SHANGHAI

FOSHAN

Hydrogen-electric power at scale is the cornerstone solution

UNILIA is one of the world's leading providers of fuel cell stack technology. We focus on R&D, application engineering development, and at-scale production for our global customers.

Our scientists, engineers, and production specialists are global industry veterans with decades of experience in all aspects of fuel cell technology.

With R&D labs, prototyping, testing, and mass production facilities in Canada and China, Unilia was built from the ground up to offer unparalleled competitive advantage through technological edge, manufacturing prowess, and, importantly, market access.

The result is an agile synergy of East and West: the passion of a start-up coupled with the resources and capabilities of a seasoned industry contributor. We are actively engaged in the China automotive market and have begun several other projects around the globe which include marine and mobile power.

GLOBAL

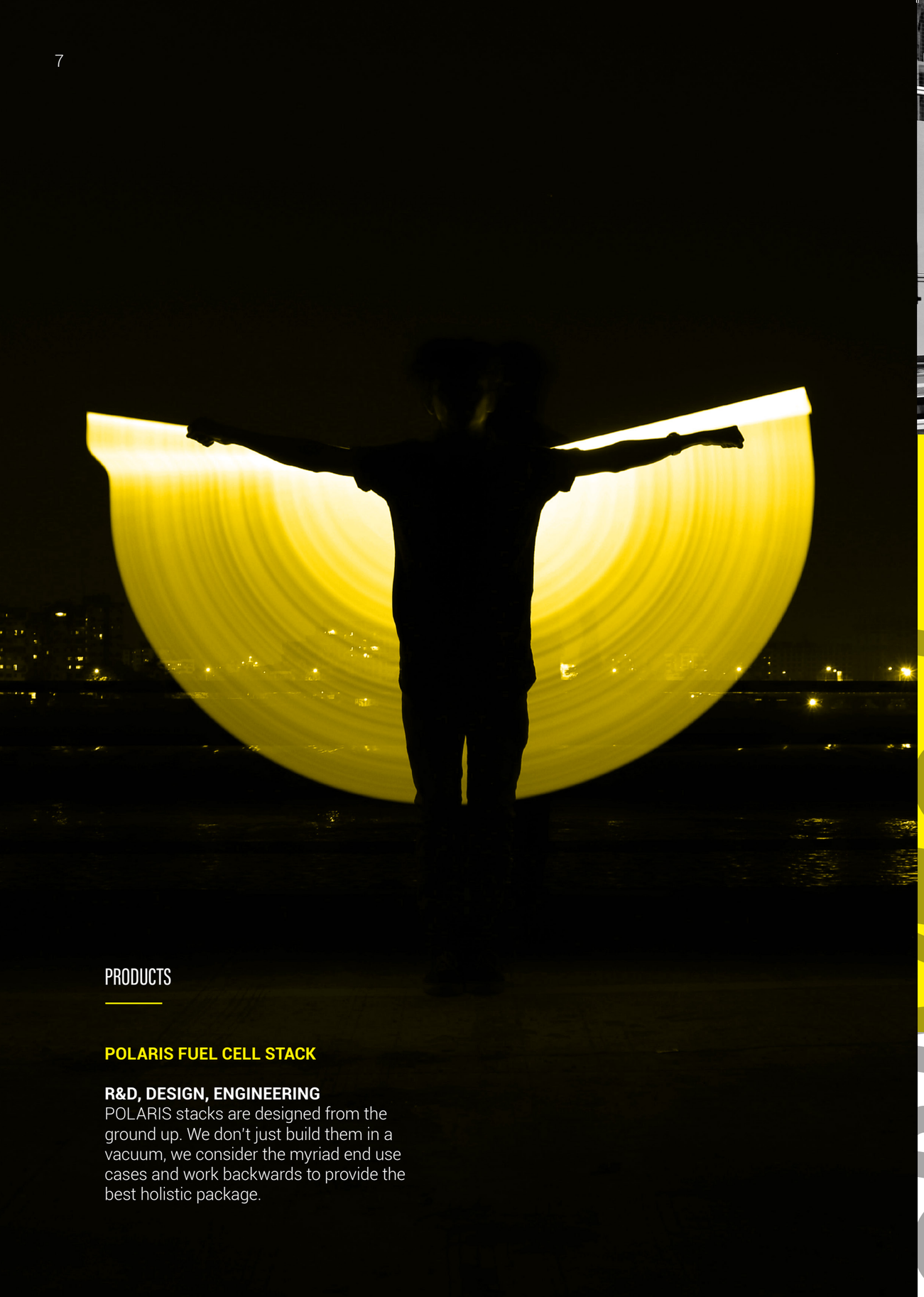
The beating heart of fuel cell systems

FUEL CELLS STACKS are the beating heart of fuel cell systems which are electro-chemical devices that generate electricity on demand using hydrogen and air.

Stack technology is where material science and electrochemistry meet to allow for zero roadside carbon emissions. This miracle of engineering offers the world a compelling and immediate contribution towards solving atmospheric pollution and climate disruption.

Our stacks are already racking up the clean kilometres in various parts of the globe - they are powering buses, trucks, and specialised vehicles - helping to clean our skies. We're also proud to share that our manufacturing has already been certified with industry benchmarks ISO9001 and IATF16949.

FC STACKS



PRODUCTS

POLARIS FUEL CELL STACK

R&D, DESIGN, ENGINEERING
POLARIS stacks are designed from the ground up. We don't just build them in a vacuum, we consider the myriad end use cases and work backwards to provide the best holistic package.

POLARIS

TECHNICAL SPECIFICATION

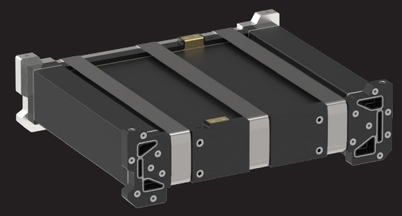
Scalable to 96 kW
STACK POWER[1]

-30°C
FREEZE START-UP

3.8 kW/L
POWER DENSITY

2.1 kW/g
PGM[2] UTILISATION

[1] Power at 2.5 bara Oxidant, 0.6V/cell
[2] Platinum Group Metal Catalyst



POLARIS is a versatile stack, designed and engineered by UNILIA for deployment in fuel cell systems for everything from minibuses to heavy-duty trucks.

Ideal applications are commercial and specialised vehicles, ocean-going or freshwater vessels, and mobile power units.

PRODUCTS

ELECTRA FUEL CELL STACK

R&D, DESIGN, ENGINEERING
ELECTRA is our second generation stack and builds upon the succeses of POLARIS as well as countless prototypes and iterations in between. It is designed to meet the challenges of heavy duty, longer range, and more demanding power requirements.

ELECTRA

TECHNICAL SPECIFICATION

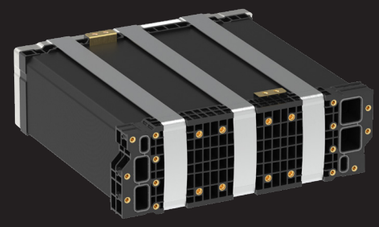
Scalable to 130 kW
STACK POWER[1]

-30°C
FREEZE START-UP

4.4 kW/L
POWER DENSITY

3.9 kW/g
PGM[2] UTILISATION

[1] Power at 2.5 bara Oxidant, 0.6V/cell
[2] Platinum Group Metal Catalyst



ELECTRA stacks have been developed by UNILIA from the ground up with in-house MEA. They are suited for use in the most demanding heavy-duty fuel cell systems.

Ideal applications are vehicles, vessels, and power units with heavier load and torque requirements, and harsh working conditions.

PRODUCTS

SIRIUS FUEL CELL STACK

R&D, DESIGN, ENGINEERING
SIRIUS incorporates the next evolution of UNILIA fuel cell stack technology, delivering higher power at competitive value.

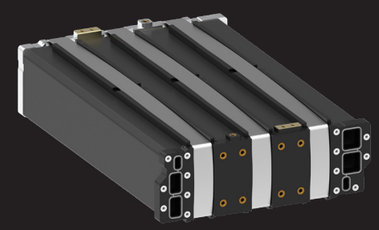
SIRIUS

TECHNICAL SPECIFICATION

Scalable to 180 kW
STACK POWER[1]

-30°C
FREEZE START-UP

[1] Power at 2.5 bara Oxidant, 0.6V/cell



SIRIUS is a brand new stack incorporating in-house MEA for optimised value.

The stack provides high power in a flexible form factor for mobility use cases or stationary power. It is optimisable for a broad range of product integrations and operating environments.

PRODUCTION

IATF16949 and ISO9001 certified

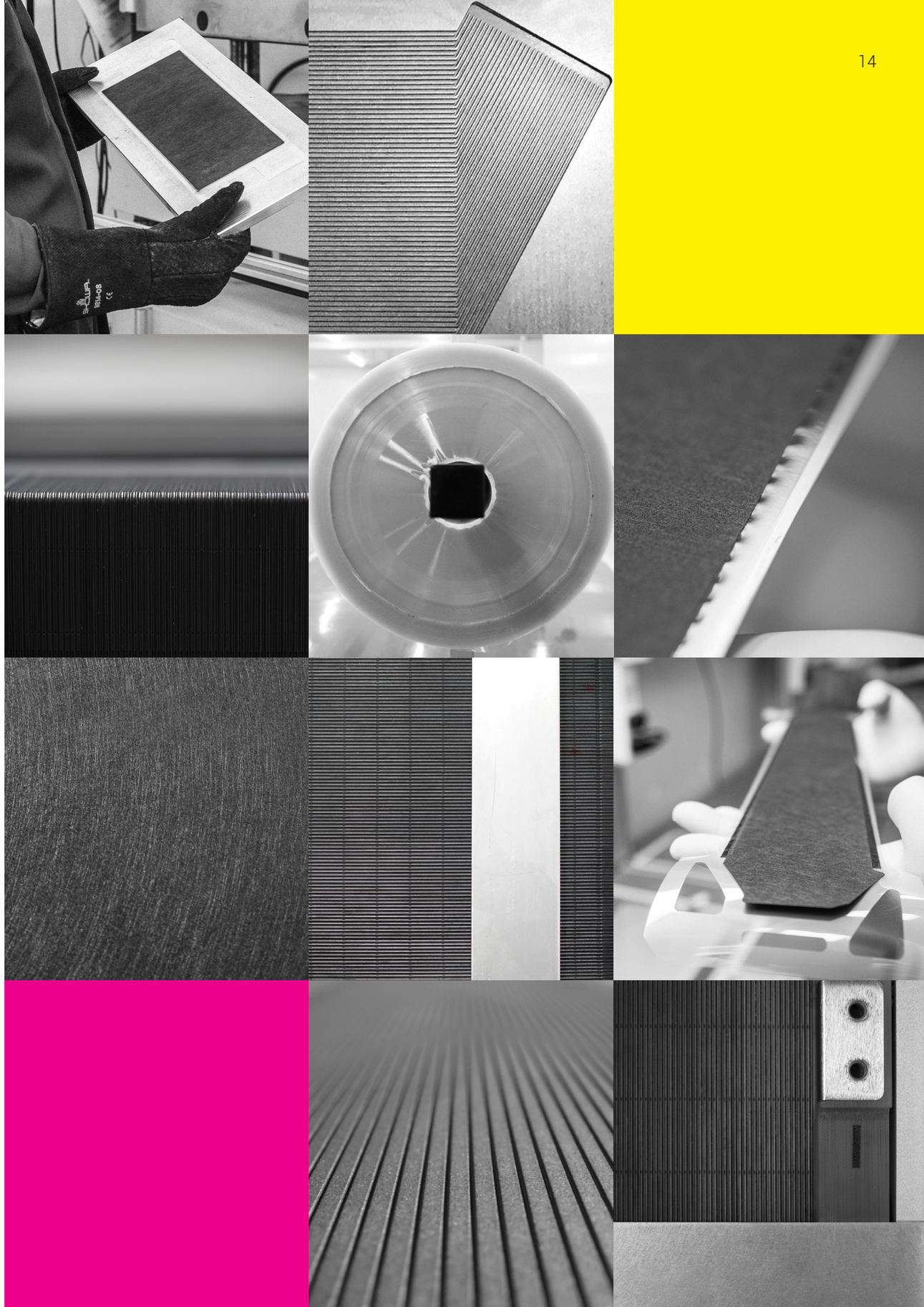
Our core competencies are in electrochemical science, stack design and engineering, and at-scale production solutions.

With thousands of fully integrated stacks delivered, and now on our second generation of product, we continue to iterate on the success of our manufacturing pipeline; from engineering verification to production of CCM[1], MEFA[2], BPP[3], bipolar seal, to system integration and FAT[4], we have end-to-end expertise and capability.

Our Foshan and Shanghai plant have a combined capacity of 7200 stacks annually, each city serving their regional markets domestically, as well as other markets overseas.

UNILIA is fully certified and adheres strictly to IATF16949 and ISO9001 quality management systems.

1 Catalyst coated membrane
2 Membrane electrode frame assembly
3 Bipolar plate
4 Factory acceptance test



Customized MEA Production

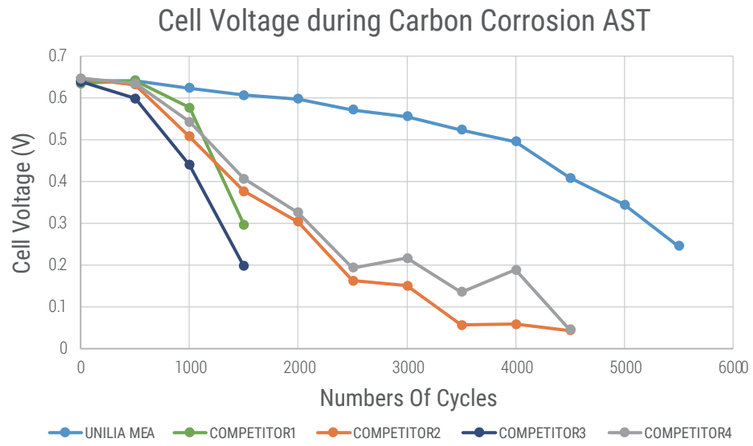
Power your fuel cell stack with UNILIA's industry leading MEA. Our team will work with you to produce an MEA to your size and shape specifications utilizing validated CCM & GDL technology. UNILIA meets customer needs with rapid service from development to at-scale production. Contact us at sales@unilia.com to learn more.

Production Capabilities:

- Framed MEA sizes up to 520 x 200mm and 750cm2 active area (maximum 400mm CCM width)
- 1.5 million+ parts per year
- Geometric tolerances of ±0.3mm
- Extensive quality monitoring and reporting throughout production process

KEY PARAMETERS	MEA
Pt loading (mg/cm^2)	0.4 +/- 5% (Cpk 1.65)
POWER DENSITY (W/cm^2 @ 0.6V)	1.32[a], 0.93[b]
LIMITING CURRENT	6.42A/cm^2@80°C, Air 100kPa-g
CARBON CORROSION	<20mV@2.0A/cm^2 after 2,000 cycles[c]
PT DISSOLUTION	40% ECSA loss after 30,000 cycles[d]
REVERSAL TOLERANCE (min)	>200

[a] 65°C, 100%H2/Air, 100kPa-g
[b] 80°C, 85%H2/9.5%O2, 70kPa-g
[c] Triangle sweep: 500mV/s, 1.0-1.5V, 80°C, 100%RH H2/N2, 100kPa-g
[d] Square wave: 0.6-0.95V (3s/3s), 80°C, 100%RH H2/N2, 100kPa-g



SHOWCASING

Tailored to each end use case

Hydrogen fuel cells have borne decades of development, testing, and proving in some of the harshest conditions known to man – from the polar wilderness to the International Space Station.

Today, it is clear that fuel cell power is poised to transform some of the dirtiest sectors of mobility: mass transit, logistics, and utility vehicles.

Our stacks, POLARIS, ELECTRA and SIRIUS are now reliably powering an impressive range of end use applications, in real-world working conditions, day in, day out.

We tailor all aspects of our stacks to yield optimal performance, suiting operational conditions, power requirements, reliability factors, range, and other nuanced variables.

Crucially, we are able to guarantee that what our scientists and designers achieve in prototype is repeatable at commercial scale by our manufacturing engineers.

[1] integrated stacks shipped

CLEAN LOGISTICS HYBATT BUS [BRANDENBURG, GERMANY]

SYSTEM POWER	60kW
HYDROGEN ON BOARD	30.6kg
RANGE[1]	330km
TYPICAL DUTY CYCLE	EXTRA-URBAN, URBAN

[1] Range estimates based on typical duty cycle.

On July 29th 2021 German bus operator UVG took its first delivery of a fuel cell-powered bus featuring UNILIA fuel cell stacks. The bus was commissioned to operate routes between the town of Schwedt and the ecological tourist area known as the Lower Oder Valley National Park, in the state of Brandenburg.

Launched in response to the EU's Clean Vehicle Directive, the fuel cell bus project was warmly welcomed by residents and officials from the area who praised its clean and quiet operation, zero emissions power, and impressive range of over 300km.

FAW JIEFANG 10.5M BUS [BAICHENG]

SYSTEM POWER	63kW
HYDROGEN ON BOARD	24.8kg
RANGE[1]	500km
TYPICAL DUTY CYCLE	EXTRA-URBAN, URBAN

[1] Range estimates based on typical duty cycle.

In 2020, fifteen fuel cell buses equipped with UNILIA stack-powered fuel cell systems were deployed in the city of Baicheng. The small fleet marked a new era of clean hydrogen energy usage in the area and offers residents improved travel options. Besides being zero polluting, as with other electric vehicles, the buses are characterised by their low noise and easy operation.

The fleet is well suited to the stop-start duty cycles typical of urban public transport and offer compelling kerbside energy conservation. With a driving range of nearly 500km, the buses have served the busy Route 102 since October 2020 with proven reliability through extremely harsh winter conditions, even down to minus 30°C.

SANY 31T CEMENT MIXER

SYSTEM POWER	110kW
HYDROGEN ON BOARD	37.2kg
RANGE[1]	350km
TYPICAL DUTY CYCLE	LOW SPEED ENCLOSED AREA

[1] Range estimates based on typical duty cycle.

The urbanisation of China is marked by its ever-changing skylines. The humble cement mixer is a vehicle right at the centre of these changes. It must navigate infrastructure and commercial development project sites, often in adverse conditions. Durability and reliability are prerequisites. Every component must interoperate flawlessly, from the chassis and suspension to the fuel cell powertrain.

UNILIA stacks have helped to redefine this workhorse of the construction industries with a zero carbon operational footprint. All the benefits of its hydrogen-electric drive are brought to bear on its complex duty cycle, such as impressive torque, quiet operation, driver comfort and ease of use.

SKYWELL 31T SLAG TRUCK [QINGDAO]

SYSTEM POWER	110kW
HYDROGEN ON BOARD	33kg
RANGE[1]	450km
TYPICAL DUTY CYCLE	LOW SPEED ENCLOSED AREA

[1] Range estimates based on typical duty cycle.

The steady stream of debris removal from urban construction sites puts additional pressure on local environmental conditions. However, particulates from diesel exhaust can be mitigated by deploying zero carbon vehicles for construction transportation.

The UNILIA fuel cell stack-powered Skywell 31 tonne truck is a powerhouse that operates between construction and waste disposal sites and produces no kerbside pollution. Several of these trucks are currently operating on urban roads between Qingdao and Linyi where a new hydrogen energy industrial cluster is being developed.

Drivers are routinely impressed by the short top-up and refueling times (8-15 minutes) and the range of 450km. Importantly, they have also praised the quiet operation of these vehicles for the reduction in noise pollution around the clock.

FAW JIEFANG 18T SPRINKLER

SYSTEM POWER	110kW
HYDROGEN ON BOARD	24.8kg
RANGE[1]	350km
TYPICAL DUTY CYCLE	MUNICIPAL UTILITY USAGE

[1] Range estimates based on typical duty cycle.

Sprinkler trucks across China are poised to be revolutionized with non-polluting drivetrains. Although such sanitation vehicles typically cleanse city streets during the warmer months, emissions from conventional diesel models are an unwanted atmospheric burden.

Manufactured by FAW, the 18t sprinkler has been reinvented with a UNILIA stack-powered zero emissions hydrogen-electric powertrain. When hydrogen fuel cells combine hydrogen and fresh air to produce on-demand electric power, the only by-product is pure water. Additionally, the low noise produced by the upgraded vehicles is a valuable benefit to urban residents.

HQUBE 49T TRUCK

SYSTEM POWER	126kW
HYDROGEN ON BOARD	74.4kg
RANGE[1]	1000km
TYPICAL DUTY CYCLE	INTER-CITY ROAD FREIGHT

[1] Range estimates based on typical duty cycle.

Equipped with UNILIA's Polaris fuel cell stack, the 49 tonne HQUBE heavy duty truck delivers a peak power of 126kW. The vehicle houses 12 hydrogen storage tanks pressurised to 70Mpa which can be refuelled in only 5-8 minutes.

Thanks in part to its streamlined, low drag coefficient cab design the HQUBE is capable of nearly 1000km on a single fill. This range ensures that it meets the commercial requirements of heavy duty long haul, intercity and inter-provincial freight.

FAW JIEFANG J6P 49T TRUCK [SHANGHAI]

SYSTEM POWER	110kW
HYDROGEN ON BOARD	37.2kg
RANGE[1]	310km
TYPICAL DUTY CYCLE	LONG HAUL ROAD FREIGHT

[1] Range estimates based on typical duty cycle.

The FAW Jiefang heavy-duty tractor is making waves in logistics. One of the drivers, Mr. Zhang has expressed his satisfaction on switching to the fuel cell-powered vehicle. He uses the truck to supply raw materials to garment factories around the Yangtze River Delta. In a typical day he explains that he only needs around 15 minutes to top up the tanks at 8 am before setting off for a same-day delivery. The vehicle can then comfortably achieve over 300km before needing a refill - easily enough range for any of his day trips. Even with a full load, the excellent range is due to the high energy density and power efficiency of the UNILIA stack-powered fuel cell system.

OPPORTUNITIES

Join the hydrogen-electric revolution

Do you dream of working with other top scientists, engineers, and manufacturing experts to innovate cleaner energy and power for a sustainable planet?

Are you eager to experience the synergy between scientific R&D, hands on engineering, and real-world products?

At UNILIA you'll see the fruits of your labour leave the lab and hit the road, power buildings, machines, and more.

Our fusion culture of East and West combined with the energy and passion of a seasoned startup sets us apart. We invite you to join the hydrogen-electric energy and power revolution now.

UNILIA.COM

Scan the QR above,
email, message or call us to
get the conversation started.

info@unilia.com
careers@unilia.com
+1 (778) 588-9353

UNILIA OPPORTUNITIES 2022-23

UNILIA

FUEL CELLS MADE BY HUMANS