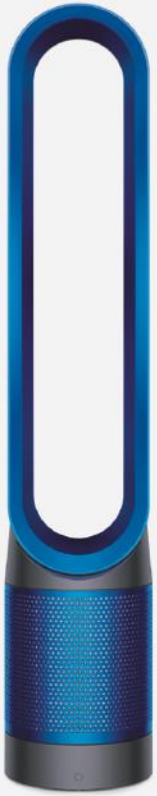
Our lean engineering philosophy and Queen Mary university; a sustainable project.

Candice Wilson – Brand Manager Lighting

Dyson takes problems and find solutions

Vacuum cleaners

Dyson vacuums use Root Cyclone™ technology that flings dust out of the airflow and into the bin by centrifugal force to maintain powerful suction.



Purifiers

Dyson Air Multiplier™ technology provides smooth air flow with no blades. Dyson Purifiers remove 99.95% of allergens and pollutants as small as 0.1 microns from the air.[1]

Hand dryers

Dyson Airblade™ technology dries hands with HEPA filtered air travelling at 430 mph in 10-12 seconds. Certified by NSF and HACCP International.

Lighting

Dyson lighting uses Heat pipe technology to cool LEDs, for powerful light precisely where you need it.

Hair dryers

The Dyson Supersonic™ hair dryer is powered by the Dyson digital motor V9. It dries fast and has intelligent heat control to help prevent extreme heat damage.

1. Tested to EN1822.

About Dyson

DYSON HAS MORE THAN

7,500

EMPLOYEES OF WHICH

3,000

ARE ENGINEERS AND SCIENTISTS

GLOBAL ANNUAL TURNOVER, 2016

£2.5bn

WE OPERATE IN

72

MARKETS

WE SPEND

£5m

A WEEK ON

RDD

dyson

LEAN MACHINE
Our approach to sustainable engineering.

“the very notion of environmental friendliness smacks of marketing hype. Marginal improvements in environmental performance are packaged in a green box and embellished with emblems of nature. It over-inflates the benefit and belittles the challenges faced by Planet Earth.”

James Dyson

James Dyson
Inventor of cyclone vacuum technology

The problem with bags is simple: as the pores quickly clog with dust, the vacuum's suction plummets. So they need to be replaced. Often. As the dust clogs the bags, the bags clog landfill – with paper or non-biodegradable polypropylene. And long before all this, they need to be manufactured, packaged and shipped around the world.

When James Dyson imagined how industrial cyclone separation could work in a vacuum cleaner, it wasn't his focus to prevent billions of tonnes of landfill waste. It was about improving performance – creating a machine that wouldn't lose suction. But that's where lean engineering succeeds.

Dyson vacuums have no consumables. Dirt is collected in a container and emptied straight into the dustbin. And filters are washable throughout their lifetime. Our newer machines have filters that do not need to be washed or replaced.

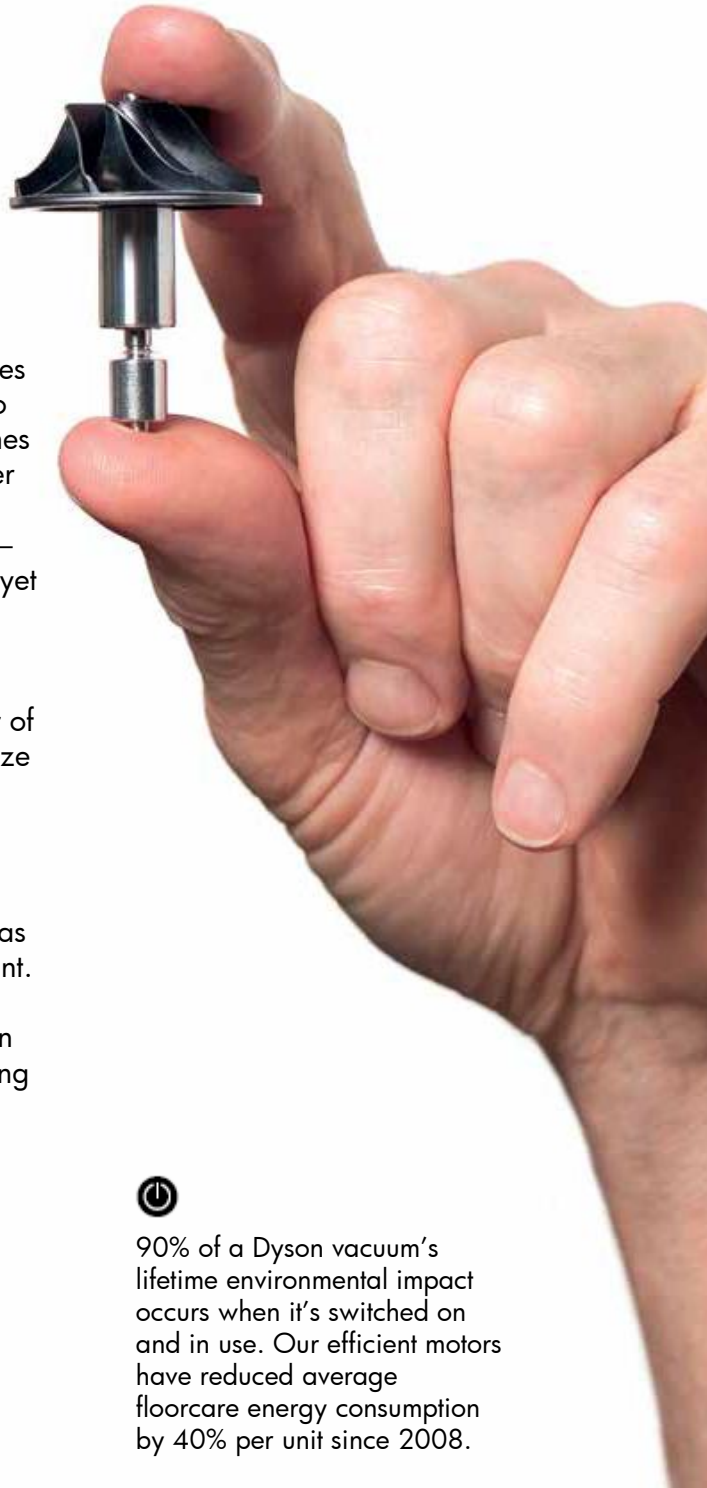
Dyson has sold over 50 million vacuums to date. Had all those machines relied on consumables, billions of bags would have been needlessly laid to rest in landfill.

Conventional motors
Motors are at the heart of Dyson machines. They perform the important job of converting electrical energy into mechanical actions. To do this well they
must be efficient, light and durable. Conventional motors are anything but. A mass of big, clumsy fans, copper windings and carbon brushes which wear out and need replacing. They create lots of sparks, heat and wasted energy. So Dyson engineers designed a new kind of motor.

Why must motors be big and greedy?

The Dyson digital motor - V6
This mini lean machine uses digital pulse technology to spin at up to 110,000 times a minute. It is small, power efficient and much lighter than conventional motors – weighing just 218 grams yet generating 425 watts of power. It is engineered to have the same pick-up performance as a number of more energy hungry full-size machines.

Revolution takes time and investment. The patented Dyson digital motor V6 was seven years in development. Since 1999, Dyson has invested over £150 million researching and developing its digital motors.



90% of a Dyson vacuum's lifetime environmental impact occurs when it's switched on and in use. Our efficient motors have reduced average floorcare energy consumption by 40% per unit since 2008.

Built to last.

We live in a throw away world. Some manufacturers build weak products and sell them cheaply. After a few years, if you're lucky, you're compelled to throw away the duff machine and buy a new one. It's called 'design for obsolescence'.

Dyson machines are built light, lean and durable. From design through to material selection, testing and after-sales service, our philosophy is to keep Dyson machines working. Dyson machines are made of tough materials. For example, a Dyson vacuum's clear bin is constructed of polycarbonate – the same material used in riot shields.

But engineers constantly review our material selection, scouring scientific breakthroughs for proven benefits. Materials piquing their interest include carbon nanotube technology, graphene and bioplastics. Prototypes are subjected to months of repetitive and rigorous testing – a different rig for every part.

Finally, machines are exposed to real human bashing and kicking. In the case of our hand dryers, we sought to replicate potential abuse from vandals. Only by testing to the point of failure can we identify weak points and build machines that last longer. Confident in the rigours of this test regime, we offer a unique no quibble guarantee that includes parts and labour. And after that, there's support online, over the phone or in person. All Dyson machines contain high quality materials, almost all of which can be reused and recycled. That's why we operate service workshops where machines are refurbished and sold as discounted certified machines.

1

Precision tooling

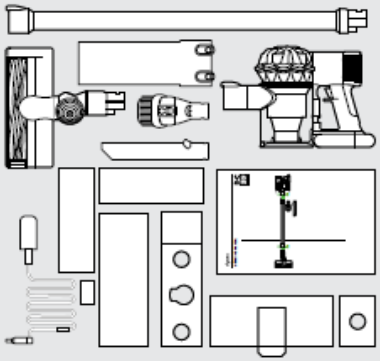
Great chunks of steel press molten plastic into components. An energy and material intensive operation is being made more efficient through the use of hot runner systems, reducing resin wastage. Tooling suppliers are also developing more multicavity tools, allowing for the production of multiple parts in one mould, reducing material and energy use.

2 Spray painting

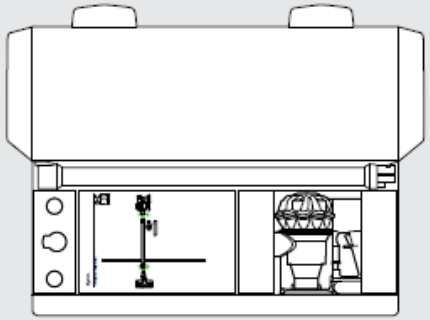
Painting is an energy intensive operation. By improving the positioning of robotic arms, our engineers achieved a 30 second faster cycle time for the painting of our new Dyson Air Multiplier™ fan – as well as a decrease in reject rates, reducing waste.

3 Efficient assembly

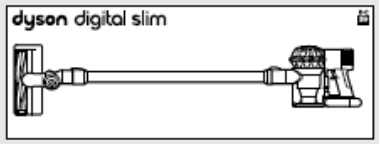
With one Dyson vacuum cleaner born every 3.3 seconds, assembly needs to be highly efficient. Components are synchronised to arrive just in time.



Less cardboard
Packaging for our latest cordless machines has been efficiently designed so that it consumes 20% less cardboard than its predecessor.



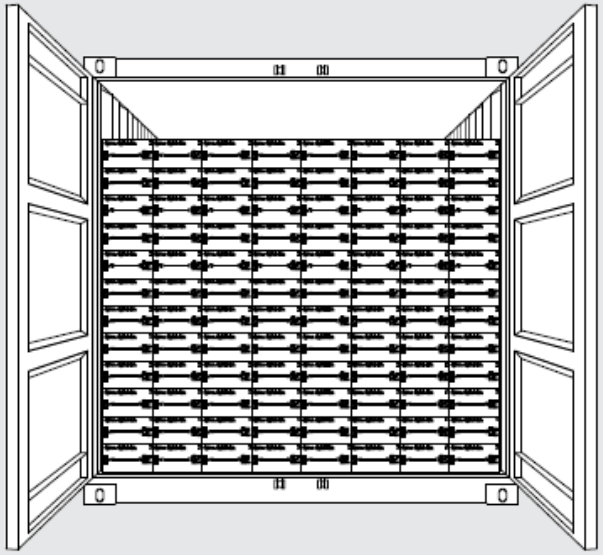
Fewer inserts
Cardboard inserts, which buffer the machine in transit, have been reconfigured so that the latest cordless vacuum needs only five inserts (compared to eight in our previous cordless packaging).



Smaller boxes
More compact packaging not only saves on raw materials but also allows us to fit 60% more boxes in a shipping container.

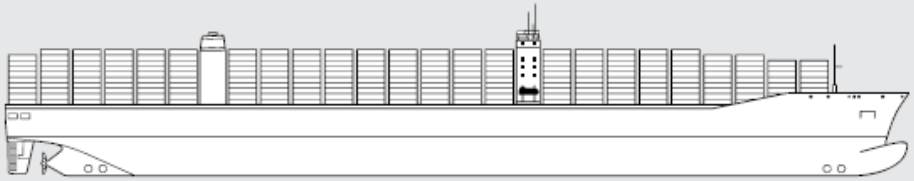
4

Packaging
Unlike many manufacturers, Dyson has, wherever possible, avoided using expanded polystyrene due to the difficulty in recycling it. Instead, our packaging engineers have found a way to tight-pack our machines with recycled corrugated cardboard, minimising environmental impact.



Pallet free
By loading boxes directly into shipping containers, without the use of bulky wooden pallets, we can squeeze 30% more cordless machines into each container.

Ship shape
The average vessel carries 5,000 containers, each 12 metres in length. If such a vessel were dedicated solely to our latest cordless machines, 4,235,000 extra boxes would be shipped thanks to lean packaging and logistics.



5

Shipping
As our machines get smaller and our packaging gets smarter, we can fit more into a shipping container. We also load directly into containers without the use of pallets. Consequently our container use is up from 70% in 2005 to 97% in 2013, reducing transport emissions per unit.

Waste of energy.
Waste of paper.
And a waste of time.

For years hand dryers clung to lavatory walls, content to spew out expensive hot air that never actually dried one's hands. That's because conventional hand dryers rely on evaporation – heating air which contains dirt and bacteria – and blowing it onto wet hands gradually turning moisture into vapour. It's too slow – typically taking up to 43 seconds.

So what about paper towels? They're expensive and energy intensive, requiring tree felling, mulching, bleaching and transportation. Then refilling, disposal and landfill. Even recycled paper towels, despite claims of being environmentally friendly, are barely an improvement due to the energy expended in reprocessing and redistribution.

A Dyson Airblade™ hand dryer scrapes hands dry – with 430mph sheets of cool air generated by the Dyson digital motor – drying them in as little as 10 seconds.

A dry-time of 10 seconds, and using cold air not heated air, means far less energy is consumed – one sixth of that used by the hot air dryers that preceded Airblade™ technology.

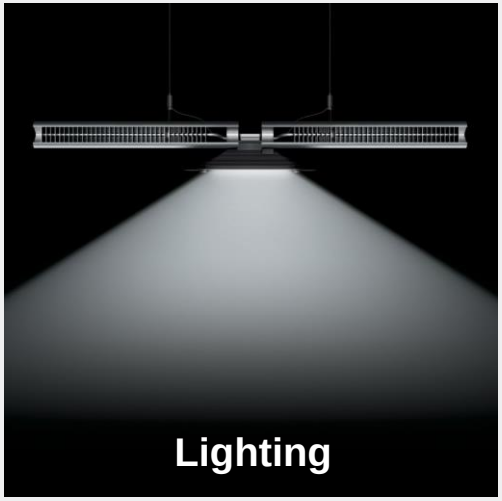
Dyson engineers worked with the Carbon Trust to develop a method to assess the real environmental impact of products through their lifecycle. From materials and manufacture, through to distribution, use and disposal, this robust methodology helps engineers focus on the biggest environmental improvements.*

Doing more with less.
Less energy,
Less waste,
Less Materials..
Being Lean not Green.

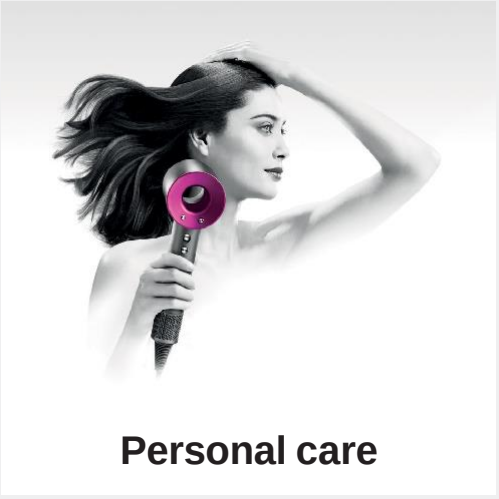
The professional range

Our business and education environments are under closer scrutiny than ever before. From the air we breathe, to the level of light, or the hygiene in washrooms, it all affects the experiences of employees and students. Technology can help or hinder these experiences. When it doesn’t work properly, it can have a negative effect on our productivity, our happiness and even our wellbeing. Technology that does work properly, on the other hand, can improve our lives.

Hand hygiene



Lighting



Personal care

Air quality

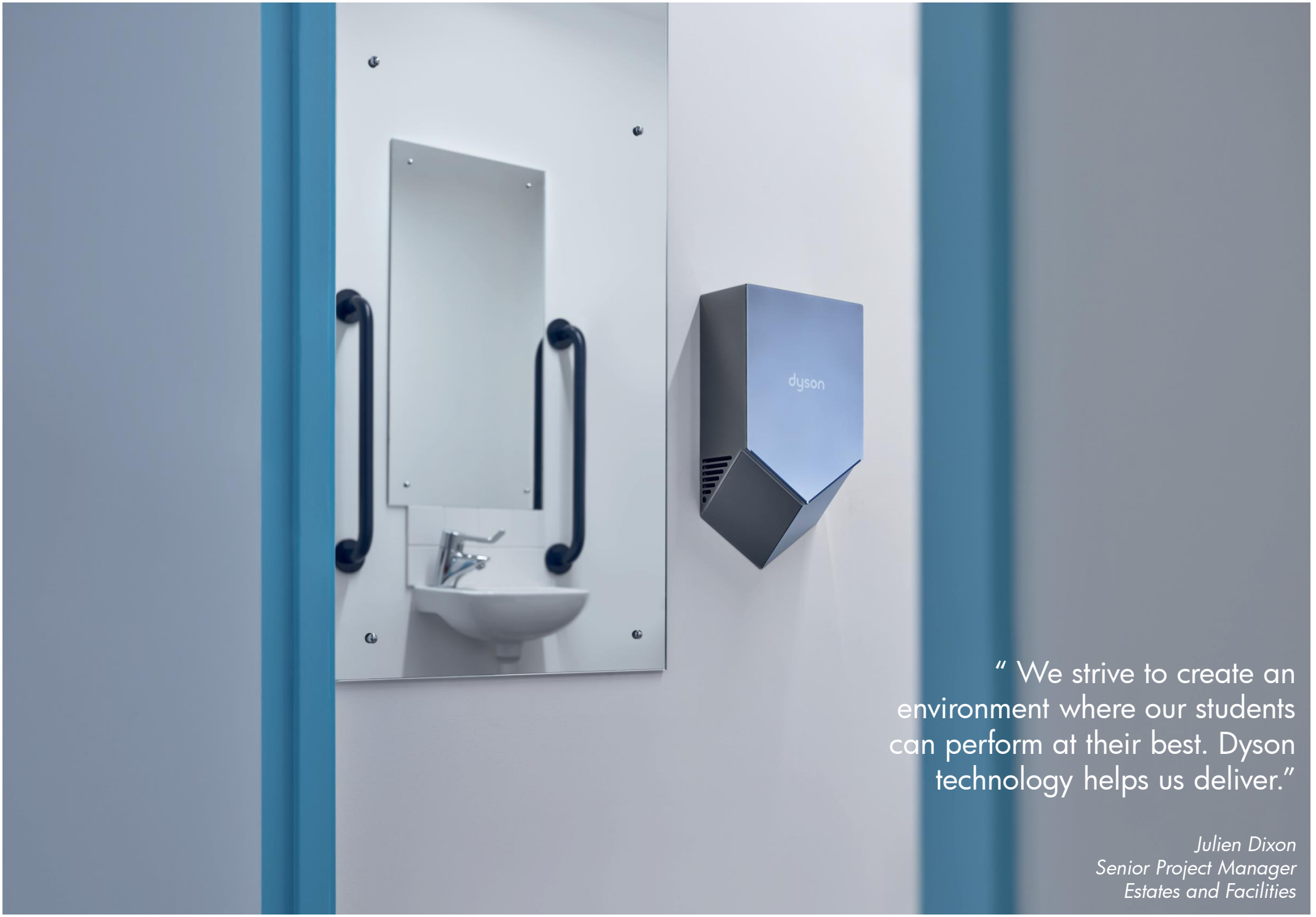

QUEEN MARY
UNIVERSITY OF LONDON
CASE STUDY

QUEEN MARY
UNIVERSITY OF LONDON

DYSON TECHNOLOGY FOR EDUCATION

From light levels to hygiene, every detail can affect students' wellbeing, ability to concentrate and overall study experience. In schools, colleges and universities, it's important to create an environment where students can thrive.

See how Dyson technologies are improving Queen Mary University of London.



" We strive to create an environment where our students can perform at their best. Dyson technology helps us deliver."

Julien Dixon
Senior Project Manager
Estates and Facilities

QUEEN MARY
UNIVERSITY OF LONDON

OPTIMAL LIGHTING FOR LEARNING AND STUDYING

The library's existing lights needed frequent bulb replacement creating prolonged periods of weak light. Poor lighting – either too bright or too dim – can cause eyestrain and headaches, affecting study performance.

Powerful lighting.
Cu-Beam™ up-lights.

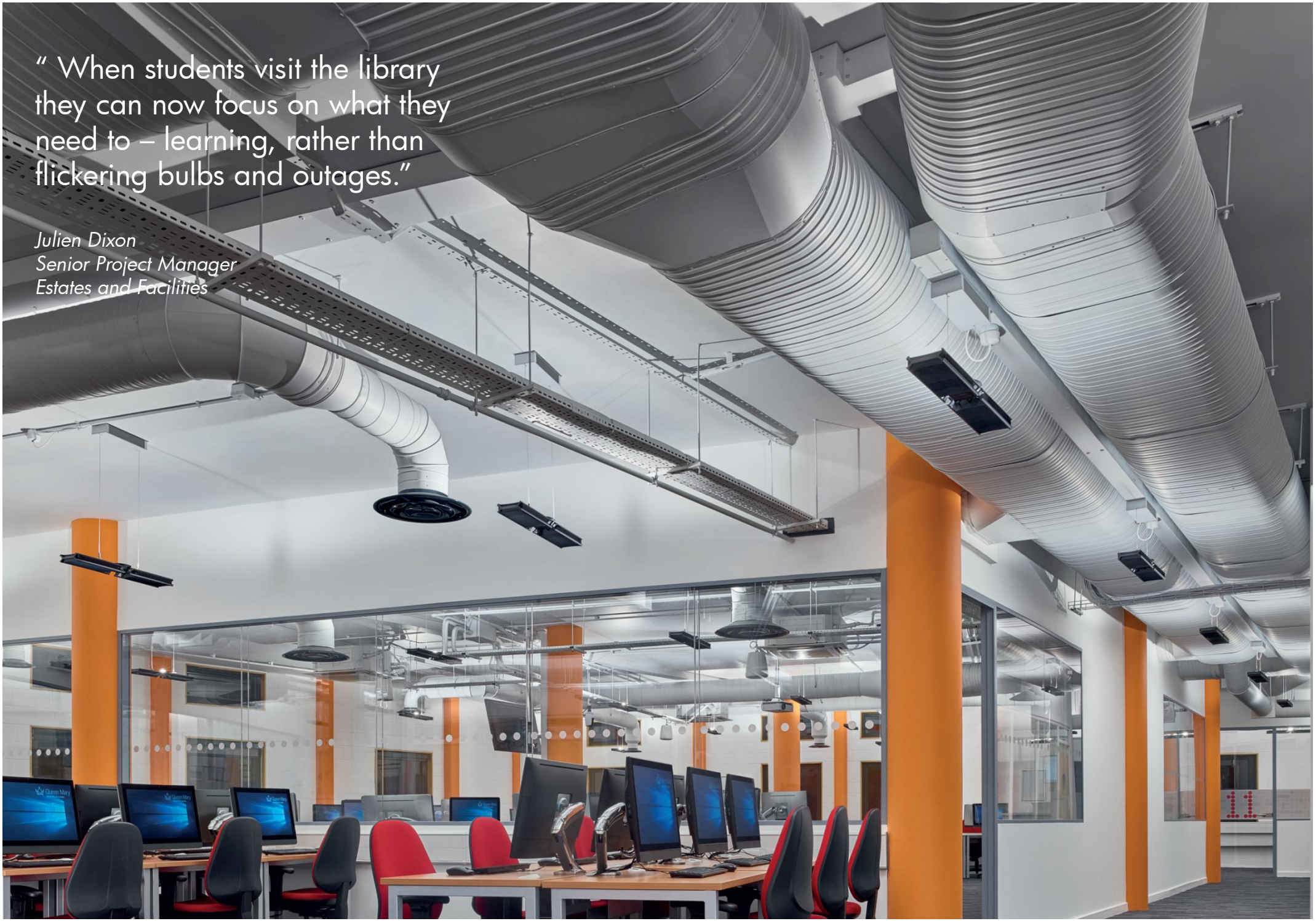
Cu-Beam™ up-lights use a custom-engineered bubble optic lens for an ultra-wide distribution of powerful light. This can eliminate weak spots, ideal for study environments where ambient lighting is often complemented by desk lamps.
" The quality of the light means that our students' productivity can improve as their eyes feel less strained," says Julien Dixon.

Efficient illumination and long-lasting brightness.
Heat pipe technology.

Cu-Beam™ up-lights work with a single power-efficient LED. Heat pipe technology draws heat away, maintaining brightness for up to 180,000 hours.2 "The old lights didn't support our carbon reduction target. Now we are noticeably reducing the energy consumption despite the building being open longer," says Julien Dixon.

Cu-Beam™ up-lights. Illuminate the ceiling and also the top section of the walls with a 4m wide pool of indirect light when hung 40cm from the ceiling.

1 As per the Illuminating Engineering Society's (IES) The Lighting Handbook Tenth Edition. Reference and Application, publisher: Illuminating Engineering; 10 edition (July 30, 2011). 2Calculated lifetime based on LED L70.


" When students visit the library they can now focus on what they need to – learning, rather than flickering bulbs and outages."
Julien Dixon
Senior Project Manager
Estates and Facilities

WASHROOM HYGIENE AND CLEANLINESS

Wash and dry at the sink.
Dyson Airblade Tap hand dryers.

With hands washed and dried at the sink, no water is dripped on the floor – eliminating mess and safety hazards. “They look professional and ensure the washroom facilities reflect the institution’s innovative, premium reputation,” says Julien.

The fastest to dry hands with HEPA filtered air.
Airblade™ hand drying technology.

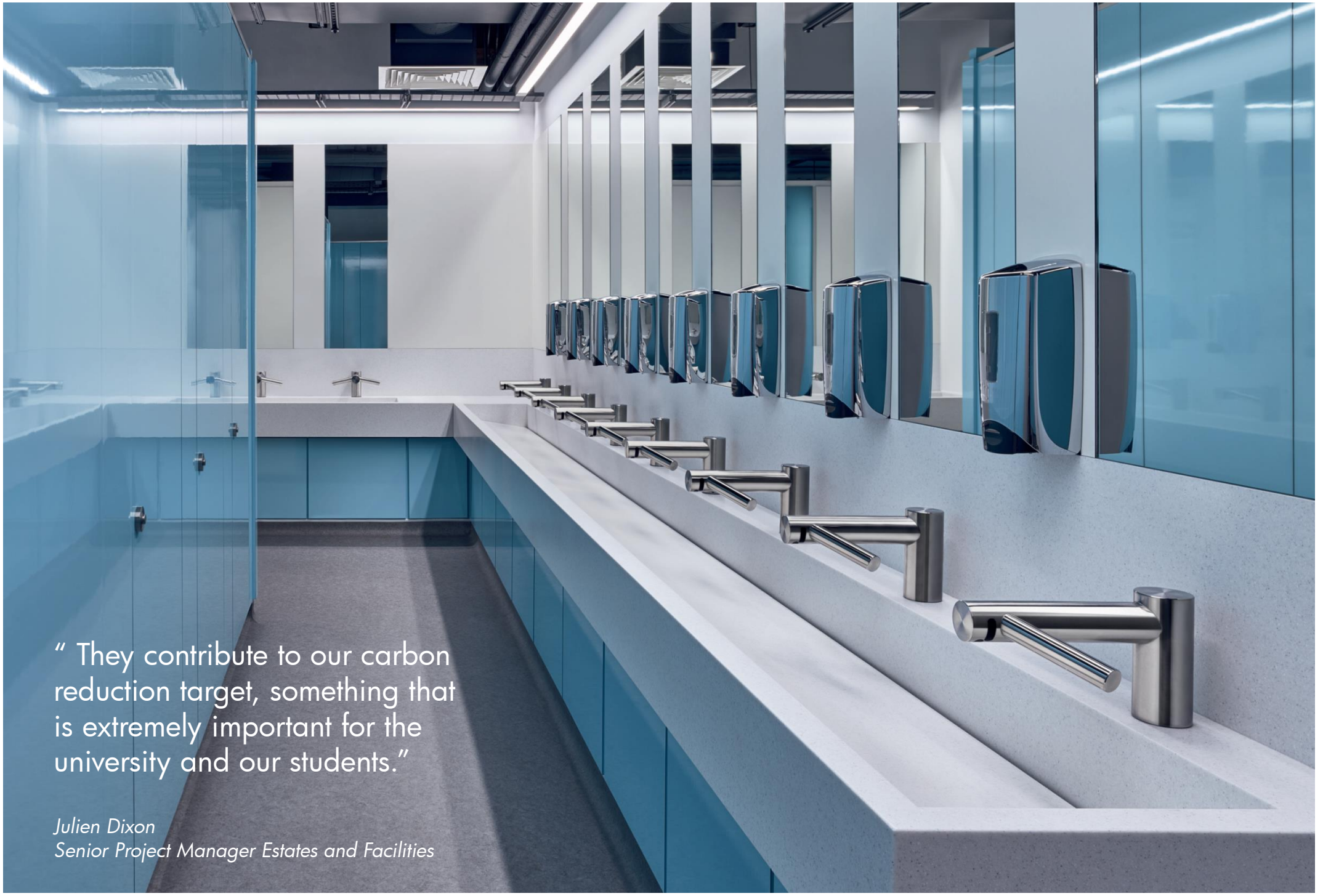
Using sheets of 430mph air, hands are dried in just 10-12 seconds. Advanced HEPA filtration captures 99.95% of particles the size of bacteria – so hands are dried with cleaner air not dirty air.

Low environmental impact.
Low running costs.

Airblade™ technology works differently, producing up to 79% less CO2 than other hand dryers and up to 76% less than paper towels.3 “They contribute to our carbon reduction target, something that is extremely important for the university and our students,” Julien adds.

With reprogrammed digital motor technology and precision air apertures, loudness testing shows that the new Dyson Airblade V hand dryer is now 35% quieter than its predecessor.

3 In collaboration with Carbon Trust, Dyson has produced a method to measure the environmental impact of electrical appliances and paper towels. The carbon calculations were produced using GaBi software provided by PE International, based on product use over 5 years and using the US as a representative country of use. Dry times for products were evaluated using DTM 769.



" They contribute to our carbon reduction target, something that is extremely important for the university and our students."

Julien Dixon
Senior Project Manager Estates and Facilities

Thank you

Candice Wilson
GB&I Brand Manager – Dyson Lighting
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