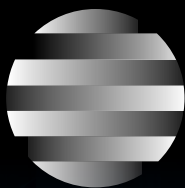


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## LIMITLESS

Linde CEO **Sanjiv Lamba** speaks exclusively on people, policy and new market opportunities

## PURPOSE & PRAGMATISM

**Inside** Linde's strategy for **decarbonisation...**





# Limitless

An interview with Sanjiv Lamba, Linde plc

Sanjiv Lamba, CEO of Linde plc, takes gasworld inside the high-performance culture at the company and explains why 'limitless' doesn't just embody the team's mantra, but the vast opportunities ahead in industrial gases and decarbonisation

What does it take to be a global industry leader, to be at the forefront of global decarbonisation and demonstrably realise it, and to still be true to shareholders and deliverables on a daily basis?

How does a CEO shoulder the responsibility of 66,000 employees across 80 countries, and a commitment to partners, customers, investors and society alike?

For Linde plc and Sanjiv Lamba, it's about a culture of opportunity, empowerment and excellence. As CEO for more than two years now, he recognises the privilege that the role affords and upholds a commitment to high performance across the business.

Lamba sat down with gasworld in an exclusive interview to share that journey and give readers an insight into the path forward that Linde pursues – and what it takes to not only drive but to thrive in that direction.

## High performance

Let's set the scene. This is Linde plc. This is the biggest industrial gases and engineering business in the world.

It's a company that recorded an operating profit of \$9.1bn in 2023 from

full-year sales of \$33bn and mitigated the challenging economic environment last year with industry leading results including a 25.4% ROC (return on capital), 27.6% operating margin and EPS (earnings per share) growth rate of 16%. More than \$6bn were returned to shareholders.

It's a company that boasts a best-in-class safety performance and a gender diversity level of 29%, already well on-track to meet and potentially exceed its target of 30% by 2030. Linde also has 600 community engagements projects active, globally.

Of course, it's all about the detail, and the excellence in execution, customer service and safety; that goes without saying, as does the innovation within its DNA. But as Lamba often reminds, from his office on a cloudy Connecticut morning in early March, it's also about taking a step back and seeing the bigger picture. It's about being the pragmatist as much as it is the purist. You have to own and lead the things within your control, as much as strive for the ideals not yet within

reach. The two go hand-in-hand, or at least they do if you're looking for enduring success, and they're underpinned by a never-ending commitment to the very best levels of performance.

This is the Linde ethos, conveyed and embodied by Lamba himself. He brings clarity, purpose and practicality to fuse with the inevitable vision, ambition and work ethic.

Being frugal by nature, finding innovative and flexible solutions is at the heart of Lamba's approach of navigating through challenges. It is part of his Indian heritage, from which he draws a lot of his strength and energy. "Jugaad" is the Hindi word that probably best describes this uniquely Indian philosophy of seeking opportunity and solutions in adversity while remaining flexible and keeping it simple.

This is the kind of mindset and performance that Lamba envisions for the entire Linde team. "At Linde we talk about being limitless," he says. "Our gases are everywhere. They send rockets to the moon, they are indispensable for tech and

**"For me, growth has two aspects to it. How we grow our business and its profitability, and how we grow our people"**

make your drinks fizzy. We need to recruit and retain people who share the same ambition of being limitless, top talent is crucial."

"We have multiple talent development programmes in place that help nurture this critical success factor. For example, two years ago we launched our Executive Leadership Programme with Duke University. Separately, Linde's Global Immersion Programme opens the doors for all employees to working in a new location and experiencing a different culture, while learning about the business on a short-term assignment."

It's a topic Lamba shows particular passion for as he shares his own personal insights, and that's in part due to the journey he's enjoyed himself at Linde and how grateful he is for the continued opportunities it afforded.

"For me, growth has two aspects to it. How we grow our business and its profitability, and how we grow our people. When I talk about growth, everyone in our organisation knows that is about creating opportunities to improve the quality of our business and for our people to have bigger impact."

"One reason I'm sitting here today and having this conversation with you is because this organisation invested

in me," he continues. "30+ years ago I joined BOC and navigated through its acquisition by Linde AG and more recently the merger with Praxair, when we formed Linde plc."

"I had many opportunities along the way. I took them. I grabbed them with both hands and made the most of every opportunity. For me it's about learning on the job, and I think that's what makes us different."

"My journey is no different to many on our leadership team, the organisation has invested in them, given them the opportunity and said, 'go prove yourself'. In many ways, our whole philosophy around talent is about growing our people, giving them the opportunities to excel. I think that's how we bring it to life."

This high-performance, limitless culture isn't just breeding success on the ground, it's highly effective in talent retention – no mean feat in an industry that regularly talks about skills gaps and labour shortages.

"We describe ourselves as a company of values," Lamba adds. "That's very important for us and we believe that ensuring our employees living those values every day is an integral part of our success. That's what gives purpose



© Linde plc | Sanjiv Lamba, CEO

to our people. That is contributing to our growth, success, and high talent retention."

"We are fortunate that we have employees who are highly engaged and who are driven by our purpose and by our beliefs and our vision. So, when we say 'be limitless' that's the proposition we provide to our organisation. And I believe we are encouraging them to step up and take those opportunities and show what they can do with it."

This positive culture is also reflected in both Linde's employee engagement results. The company undertakes an annual survey of employee engagement, an ever-increasing score that currently stands at 76%.

"When you look at it, 76% is a phenomenal number," Lamba says. "Anything above 65 is considered good. Anything about 70 is considered great, but we're not satisfied with 76 because we are in 2024, so the number has to improve, right? We are challenging ourselves to constantly improve. That's the spirit with which we look at these things, we want to be best performing on employee engagement." ▶



► It's not just best performing on talent and employee engagement, it's a culture of high-performance in sustainability, customer delivery, innovation and most importantly of all, safety. "The goal is to constantly improve. [We're] Never going to be satisfied. Our goal is zero incidents, so for us safety is about making sure we wake up in the morning, and ensuring that we are ZERO TODAY. It's about world-class employee engagement."

"We want to be best performing on our sustainability goals. We saw absolute reduction in Scope 1 and 2 emissions in 2023, a year-on-year absolute reduction. We also actively sourced clean and low-carbon intensity power to meet our emission objectives."

Just days before our interview, Linde confirmed more such plans. This time in China where it will purchase renewable energy from two solar projects in the provinces of Guangdong and Jiangsu, after signing two new long-term power purchase agreements (PPAs). The company will source a total of 320 gigawatt (GW) hours per year of renewable energy through separate 25-year agreements with Guangdong Energy Group (GEG) and China Three Gorges Corporation (CTG).

"We've set ambitious goals for ourselves and are on a path to getting there," Lamba affirms.

"Last but not least, we want to be best performing in serving our customers. We want to be the ones to count on when they say, 'Hey, I need innovation in this space – can you help me get better at this? Can you help me reduce my emissions, or can you just help me expand and grow?' And we stand there

## "Artificial intelligence is a rapidly evolving technology and will be an important driver for productivity and growth in the coming years"

saying we want to be best performing when it comes to that relationship as well."

### Innovation in air gases and applications

This is a good juncture to discuss customers and applications. Linde has been at the forefront of the industrial gases industry for over 140 years, from the first intrepid steps in refrigeration cycles by founder Dr. Carl von Linde. The company has thrived due to the continuous development and improvement in production and application technologies.

Today, innovation is even more relevant in a fast-changing world with climate change, space exploration, artificial intelligence (AI) and quantum computing. As Lamba acknowledges, "there's no doubt that air separation and air gases will continue to play an important role in the future, including new applications supporting the space industry, enabling energy storage and reducing energy consumption in data centres."

"The industry needs to continue to innovate and develop air separation technology that meets the needs of the future," he adds.

This is certainly underway at Linde, and Lamba quickly reels off a range of promising applications and technologies that the company is working on – and clearly excited about. "We have a great

team of people with deep technology and market expertise and the right processes in place to nimbly translate customer needs into new solutions."

"Our teams continue to be at the forefront of technological advancement. For example, Linde is commercialising an industry-leading, patented waste heat recovery technology to reduce emissions and improve the energy efficiency of glass production. In another project, we will demonstrate hydrogen combustion in a steel reheat furnace with a team of industry-leading players. Additive Manufacturing (AM) has found its way into more and more applications too."

"Artificial intelligence is a rapidly evolving technology and will be an important driver for productivity and growth in the coming years. Linde's global AI team is focused on developing high-value transformative AI use cases and scaling them to our business."

Of course, hydrogen and its derivatives will play an increasingly important role in the energy transition and Linde continues to develop proprietary technologies. We'll come back to hydrogen shortly. For now, we want to keep the conversation focused on the core air gases at the heart of the industry. Linde has invested in significant efficiency and sustainability wins in the power-intensive air separation unit (ASU) and the mature technology behind it, with Lamba describing the 'huge amount of work happening' around improving efficiency and making it both

more flexible and more sustainable.

"Thanks to continuous refinement of our core technology over the past decades, air separation has reached a remarkably high level of efficiency. However, there is always room for improvement, for example we need to enable the transition to renewables. Linde has developed technology that enables ASUs to adapt the production and liquefaction of oxygen and nitrogen to the natural fluctuations in renewable energy supply – without impacting average production."

"This approach serves as a blueprint for other technologies operating on renewable power and reflects a paradigm shift as industrial plants have historically aimed to operate at a constant load."

This is essentially about separating

### FACT FILE

#### Linde: Decarbonisation & diversity by numbers

- 66,000 employees across 80+ countries
- 30% representation of women in workforce by 2030
- 35% reduction in GHG emissions by 2035 (35 by 35) target
- Target to double low carbon power consumption by 2028
- 40% of Linde's energy consumption already comes from low carbon sources
- Target for 450 sites with zero waste-to-landfill by 2028
- Target for 100% water management plans at high-water use sites in areas of high-water stress by 2028



and liquefying air when energy is cheap and available, and the result is the FLEXASU<sup>®</sup> technology from Linde Engineering. Until now, ASUs were designed for continuous operation and as such, load changes were rare and usually only occurred for maintenance windows. ASUs are not traditionally good at dealing with fluctuations; Lamba explains that a small disruption in incoming electricity can cause a trip and disrupt the ASU for anywhere between 4-24 hours, before production comes back. That's a costly disruption for an industry turning over hundreds of billions of dollars of revenue each year.

The FLEXASU<sup>®</sup> allows operators to respond to market dynamics without impacting average production, ensuring uninterrupted supplies to customers. In simple terms, this means front-loading production during times when there is an excess of electricity and it is therefore cheap. Manufacturers can store these air gas reserves and then use them while cutting back on ASU operation when energy is scarce and subsequently more expensive.

"We've gone back to the basics on process design, to make sure that we have now got enormous flexibility to be able to deal with the impact that comes from renewable energy sourcing," Lamba adds, "which is a high degree of

variability both in terms of time of use, the amount of power you get, and also the quality of that power."

Gasworld understands the technology is already being rolled out 'as we speak' and two pilots are running in Europe. "We are actually quite excited about the results that we're getting from them," Lamba adds.

### Meeting electronics growth

Part of the growth in the air gases business can be attributed to markets driven by digital technologies and electronics. Readers will note that Lamba has already cited AI, data centres and space in terms of future hotspots, and he makes clear his anticipation of a pick-up in the electronics end market later this year.

He does, however, enthuse, "I am encouraged by the momentum around AI, because that momentum requires significant investment in data centres driving higher chip demand. So, you will likely see that recovery in the second half being driven by that and at this point in time we still believe you'll see a recovery in the second half of the year."

Lamba is optimistic about Linde's capabilities to provide plants and specialty gases to meet the expanding electronics markets and the wave of capital investment in fabs in both the ►



► US and Europe. He also speaks with enthusiasm about an announcement in early March from the government in India regarding a \$15bn investment in three new semiconductor fabs, adding “we are really excited about the prospects as they open up in India as well.”

#### Decarbonisation

Without doubt one of the biggest opportunities for Linde today is decarbonisation. This naturally becomes the focal point for the remainder of our conversation.

For Linde, its decarbonisation strategy incorporates carbon management and clean hydrogen. The company is actively involved in everything from carbon capture projects to low carbon and renewable hydrogen.

“When we think about decarbonisation, we think about three pillars: decarbonising Linde; enabling our customers to decarbonise; and the new market opportunities,” Lamba affirms.

Linde is forecasting up to \$50bn in clean energy investments over the next decade or so, a figure that Lamba stands by in our interview, and this will span all three of those critical pillars.

“Let’s look at the three elements,” he explains. “Decarbonising Linde is about recognising that we have Scope 1 and 2 emissions. We feel strongly about our sustainability goals – a 35% reduction in absolute emissions by 2035 and our ambition to be climate neutral by 2050. To get that done, we need to decarbonise our own operations.”

“We are moving forward with plans

## “Linde is forecasting up to \$50bn in clean energy investments over the next decade or so, a figure that Lamba stands by in our interview...”

on that and of that \$50bn figure, I expect \$3bn+ to go towards decarbonizing our existing hydrogen facilities by retrofitting them for carbon capture and then working with partners for carbon storage and sequestration to decarbonise those sites - and ensure there is low-carbon intensity hydrogen available for our customers.”

“The second piece, where the bulk of that investment sits, is helping our customers decarbonise their processes and operations. And there are many examples in the space, we’re working with a number of customers across chemistry, steel, glass and cement. An example of that is the announcement by Dow in April last year.” Lamba refers to Dow’s proposed Net Zero carbon emissions integrated ethylene cracker site in Fort Saskatchewan, Alberta, Canada.

Lamba noted that “for the chemical industry, particularly when you’ve got crackers, I think the introduction of hydrogen as a substitute for natural gas significantly reduces emissions at scale.”

Continuing, he adds, “We’re also working with steel companies to help them in this space. This is right in our wheelhouse – it is where we have incumbent customer relationships, and we are helping them grow and decarbonise their operations.”

“The last pillar is what we call new markets and as you know, we’re seeing momentum in the market around clean

ammonia and methanol. We see clean ammonia as a new market development for us, and our project with OCI is a great example in that context.”

Linde signed a long-term agreement to supply clean hydrogen and other industrial gases to OCI’s new world-scale greenfield blue ammonia plant in Beaumont, Texas back in February 2023. The deal sees Linde build, own and operate an on-site complex which will include autothermal reforming with carbon capture, plus a large air separation plant. The new complex will be integrated into Linde’s extensive Gulf Coast industrial gas infrastructure and supply clean hydrogen and nitrogen to OCI’s 1.1-million-tonnes-per-annum blue ammonia plant. It will become the first greenfield blue ammonia facility of this scale to come on-stream in the US.

This is a particularly pertinent project as it underscores a proven off-take model that Lamba believes will enable significant headway to be made in the path to sustainability – and is proven across the gases industry.

“Our model is the industrial gas model, which is working with off-takers. We are very good at what we do in terms of bringing our technology, our engineering capability, our operational expertise and experience, and the asset network that we have. We bring a combination of these to create a world-class, highly competitive platform that allows very cost-competitive production

of low-carbon intensity hydrogen, which is then supplied to an off-taker who may produce methanol, ammonia, and so on.”

Clean Hydrogen: A journey from low-carbon to fully renewable

Finally, we talk hydrogen and the development of hydrogen as an energy carrier – which itself can often be a loaded subject.

Lamba admits sentiments expressed in this space can evoke emotive responses, no matter how well intentioned. It’s the nature of the beast, a beast that Linde believes must be tamed with pragmatism.

“In the US the IRA has accelerated interest surrounding hydrogen and carbon capture solutions, that’s good! However, it was only introduced at the end of 2022 and the regulatory framework is still being finalised. We expect our future US onsite clean hydrogen projects to initially focus on low-carbon hydrogen. Our project with OCI Global in Texas is a good example of this, where Linde will invest approximately \$2bn to produce 300 million cubic feet per day of clean hydrogen, sold under a standard industrial gas supply contract.”

“We need to recognise that there is

need for a common understanding and a pragmatic path to supporting the energy transition,” he continues. “I find ideology sometimes pushes people to go one way or the other. My view is the world should be interested in low-carbon intensity hydrogen. That’s really all we should be interested in.”

“Low-carbon intensity hydrogen comes from the production of hydrogen with carbon capture and sequestration. That’s available at scale today. That technology is mature and it is scalable. We can do world-scale projects to ensure that low carbon intensity hydrogen is available for industrial applications.”

“I see that as a bridge to getting to what I call renewable hydrogen. Renewable hydrogen is electrolyser-based hydrogen that uses renewable energy. Renewable hydrogen requires a few things to happen. The technology around electrolysis needs to mature, particularly PEM electrolysers. It needs to mature to a point where you have reliable and cost-effective operational capability available at scale.”

Lamba does believe the industry ‘will get there’ on that issue of

technology maturity for electrolysers, “I do expect technology maturity will happen. I also expect to see significant reduction in capital cost of electrolysis. With technology maturity will come high reliability. The last element that we can’t control, is the availability of low-cost renewable energy at scale. The cost of the renewable energy used to produce the hydrogen represents the largest segment in the cost stack of renewable hydrogen,” he says.

“As an industry, we can work hard on the electrolyser technology. I’ve no doubt we’ll see progress and we hope to see improvements in the next five to seven years. I think we can get there both in capital, OPEX, higher reliability, and safety.”

“But we are also dependent on renewable energy developers ensuring there is adequate renewable energy available to fuel this large, multi-GW asset base that we want to build up in terms of renewable hydrogen based on electrolysis. So, I think that’s really the challenge, and that’s why I said there is a bridge through low-carbon to renewable hydrogen.”

Lamba concludes by stating, “I am convinced that demand in industrial gases will continue to grow. From traditional to new end markets, such as AI, space and quantum computing, all alongside the continuous push for decarbonisation. My confidence stems from looking at our unrivalled portfolio of technologies, our existing network density across the globe and our excellent people. For all these reasons, Linde truly remains a company for all seasons.” **GW**





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