

Key to unlocking the potential of renewables

Hydrogen, electrolysis and a greener future

An interview with **Jon André Løkke**, CEO of Nel Hydrogen, by **Rob Cockerill**

“The first quarter marks the start of an important year for the Nel and the industry, as we are moving from ambition to deliveries...”

Those were the words of Nel Hydrogen CEO Jon André Løkke, as he presented the company’s first quarter 2021 financials and set the scene for its bold objectives going forward. It’s a statement that arguably best describes the state and intent of the wider hydrogen movement itself today – moving from ambition to deliverables.

A key target of that transition to deliverables, and cited by Nel in its quarterly report, is the cost of green hydrogen. For Nel, that target is green hydrogen at \$1.50/kg by 2025. Key to that, and to cost-competitiveness across the green hydrogen landscape as a whole, is the expansion of electrolyser infrastructure and production – our theme this month at H2 View.

“We’ve heard it before... ‘the time for hydrogen is now!’ So, what makes this time different? The answer to that – why hydrogen’s time really is here – is two-fold,” Løkke previously affirmed in an exclusive column. “First, costs are dropping dramatically. In Nel, we’re working hard to make that happen across all our product lines: alkaline electrolysers, PEM electrolysers, and hydrogen fuelling stations.

“A good example of that is our investment in Herøya, the new alkaline electrolyser manufacturing plant we’re building. We’re expanding capacity by close to 15 times that of our current factory in Norway. Just this first step alone is expected to cut electrolyser costs almost in half. And with the addition of three more lines, we’ll cut the costs almost in half again. That’s just one example.”

He continued, “And the second difference in what makes hydrogen’s time now, also has to do with costs: mainly, that the cost of renewable energy has dropped dramatically in the past years and continues to do so. In many parts of the world, the costs of wind and solar are already out-competing fossil. This is crucial because the main

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cost factor of hydrogen is the energy input.

“When you combine these two cost factors, it really is a killer combination and it will lead fossil parity (a term first coined in Nel!).”

With Nel at the forefront of the electrolyser technologies business, its facility at Herøya in Norway firmly on-track, and a raft of other key announcements announced at the company over the last 12 months alone, H2 View sat down with Løkke to talk all things green hydrogen in an exclusive interview.

Roots in hydrogen

Established in 1927 by Norsk Hydro, one of the largest aluminium companies worldwide, Nel started life as a renewable hydrogen producer for the fertiliser business. Today, the famously purple-branded pure player provides – and pioneers – hydrogen solutions covering the entire value chain: from hydrogen production technologies to the manufacture of hydrogen fuelling stations, through to providing all fuel cell electric vehicles (FCEVs) with the same fast fuelling and long range as conventional vehicles today.

The company is a leader in the industry, installing the first small electrolyser at Norsk Hydro’s Notodden, Norway site in 1927. Since then, Nel has installed several of the largest hydrogen plants in history and, through a compelling combination of a range of acquisitions and organic growth in more recent years, its footprint today is unquestionable; Nel has delivered more than 3,500 hydrogen solutions in 80+ countries worldwide. This includes building and operating the first solar-driven hydrogen production plant in the US and constructing the world’s largest installation of water electrolysers in Rjukan, Norway.

“Nel has been at this for a long time,” Løkke affirmed. “We have a leading position in the industry and have deployed more equipment than anyone else. Our experience speaks for

itself. But I think what really makes the difference is that we recognise that that's not enough; we're not satisfied with staying still."

That mantra has seen Nel take significant steps forward in the last year, and even the first six months of 2021 in particular.

During the first quarter, Nel announced frame agreements with EPC companies Wood and Aibel, significantly strengthening its global delivery and execution capabilities for large-scale, complex projects across the world. It also revealed the signing of an MoU with Haldor Topsoe, enabling the two companies to 'take out synergies and offer end-to-end green ammonia and methanol solutions to customers'.

Further still, Nel is developing its product offering by tailoring to different renewable energy sources – as evidenced in its collaboration with leading solar company, First Solar, to develop integrated PV-hydrogen plants. "The combination of these partnerships enables Nel to deliver across the entire green hydrogen value chain," explained Løkke, a former solar industry professional himself with REC.

"Even as the largest electrolyser company in the world, we are still a relatively small company, and we cannot do everything ourselves," he affirmed to H2 View. "We need to work with strong partners to extend our reach into multiple areas. Being a 'preferred partner' is a key element in Nel's strategy. Therefore, we have been working systematically to establish those key relationships with the right partners to be able to deliver world-class solutions across the entire hydrogen value chain. The partnerships mentioned serve different purposes.

"Our two EPC partners are crucial to delivering on the scope required by customers beyond the Nel scope. For example, construction, civil works, utilities, project management, piping, cabling. In this respect, we've secured two world-class EPC partners, Wood and Aibel, each with their unique capabilities to reach key markets. Consequently, Nel can now deliver multi-hundred-megawatt, turn-key hydrogen production facilities all over the globe together with our EPC partners.

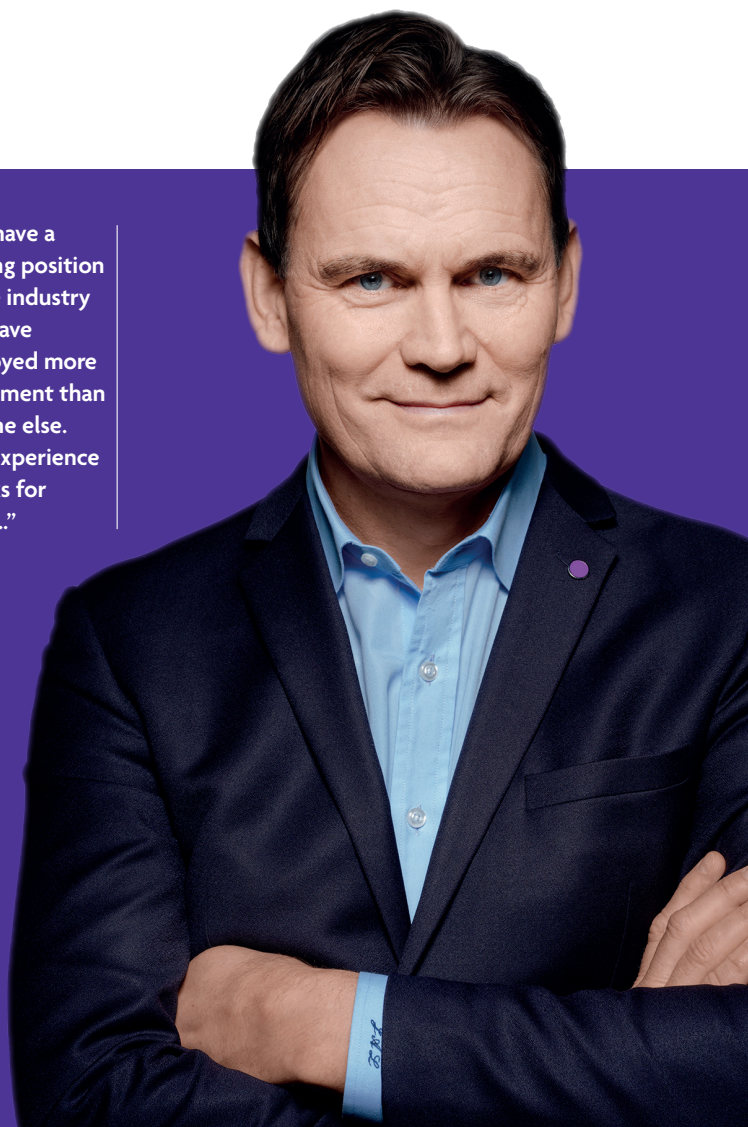
"In other parts of the hydrogen value chain, upstream into renewables and downstream into some key industrial applications, we have also established key strategic partnerships. Haldor Topsoe is the leading technology provider for both green ammonia and green methanol solutions. Together, we can improve the combined product offering by delivering integrated electrolyser and green ammonia facilities.

"When it comes to our partnership with First Solar, which is a leading manufacturer of solar panels, we will be able to further improve the offering and integration between renewable energy (solar) and hydrogen production. In other words, making good on our promise of 'Unlocking the potential of renewables'"

Løkke also pointed to several other projects announced last year, including a framework agreement with Lhyfe for delivery of up to 60MW of alkaline electrolysers in France, a NOK 280m purchase order (PO) from Nikola Corporation for 85MW alkaline electrolysers for the deployment of the world's first 8 tonnes/day hydrogen fuelling stations, and a PO for a 20MW alkaline electrolyser from Everfuel for a green hydrogen production facility in Denmark.

In addition, there were several purchase orders for PEM electrolyser stacks for the US Navy, Nel was selected as preferred supplier and signed a memorandum of understanding (MoU) with Iberdrola for a 20MW PEM solution for a green >>

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➤ fertiliser project in Spain, and the company received a PO for multiple H2Station™ units from Iwatani Corporation of America, with a value of more than NOK 150m.

“2020 was a strange year, starting out with society shutting down due to Covid-19, and ending up with a massive acceleration of the energy transition and the move to green renewable hydrogen for industrial and mobility applications all over the world,” Løkke reflected. “In Nel, we decided to respond to this in a positive way, raising even more cash to enable us to run even faster and earlier than what was originally the plan.

“Out of the agreements we signed last year, naturally the Nikola PO was a highlight and important for deciding to move forward with the expansion of the world’s largest fully automated electrolyser production facility in Herøya, Norway.

“Moving into France and other countries around Europe, Lhyfe was also important as well as the signing of a 20MW electrolyser contract with Everfuel. We very much like to work with these ambitious market disruptors that push the industry and the world forward. Their success will eventually be our success.”

He continued, “In terms of fuelling stations, we continue to see key markets like California and South Korea moving forward and we signed some important agreements in this regard. There is a lot of activities related to the move to heavy duty fuelling, still the number of light duty vehicle stations deployed globally is much higher.”

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Electrolysers...the key building blocks

Construction of the aforementioned fully automated manufacturing facility at Herøya in Norway is seen as something of a jewel in the crown for Nel.

The facility will further enable large-scale projects to be undertaken, and Nel disclosed in its Q1 financials that the construction process for the site is on track, with more than 33,000 manhours completed and zero HSE incidents. Test production of the first 500MW production line was due to commence in the second quarter of 2021, with the start of commercial ramp-up in the third quarter 2021.

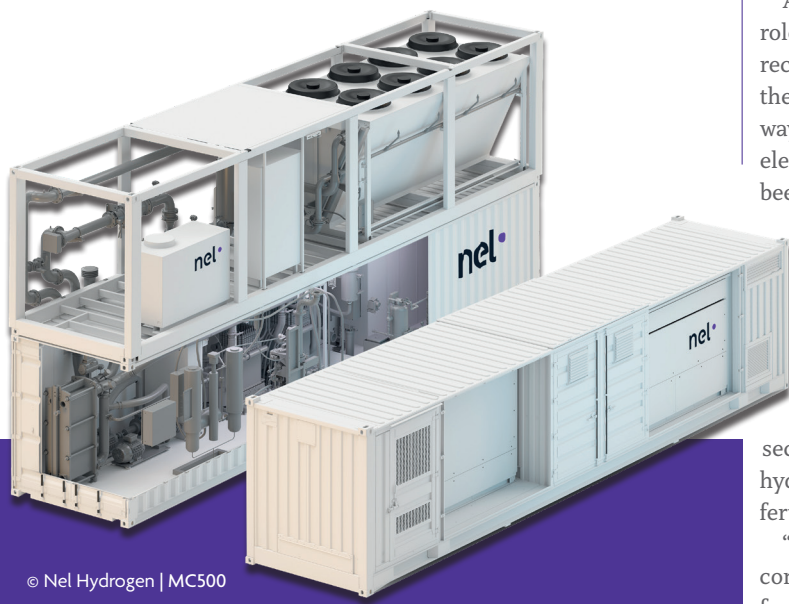
Løkke explained, “The Herøya plant is a game-changer. Not just for Nel, but for the hydrogen industry as a whole. This is a fully automated production facility for electrolysers, and the initially installed line will have the capacity of around 500MW – and we can grow the site to around 2GW. Our big announcement at our Capital Markets Day (CMD) is our \$1.50/kg green renewable production cost target by 2025. The Herøya facility is a key part of reaching that, initially allowing us to cut the production cost approximately in half, with further improvements and capacity expansions, allowing us to cut the cost approximately in half again.

“At a cost of to \$1.50/kg, green renewable hydrogen will start to out-compete fossil hydrogen – that is a game-changer and will allow renewable hydrogen to go mainstream. We call this ‘reaching fossil parity’, helping our customers to cut CO₂ and other emissions by millions of tonnes every year.”

And so, we come back to the fundamental role of electrolysers – the technologies widely recognised as one of the key building blocks of the green hydrogen society. Electrolysers offer a way to produce clean hydrogen from low-carbon electricity, and in a region like Europe which has been lauded for its bold €750bn EU Hydrogen Strategy, electrolysis is at the heart of this plan.

In fact, this is true of all ultimately all corners of the globe and will need to be, as Løkke explained, “Today’s market for hydrogen is actually quite a bit larger than many people realise; the industrial sector alone uses ~70 million tonnes of hydrogen annually, with more than half going to fertiliser production.

“Unfortunately, this market is currently completely dominated by fossil hydrogen made from coal, oil, and gas. This needs to change and



be replaced by green renewable hydrogen, which is where electrolyzers come in.

“Further, the hydrogen market will grow significantly in the years to come, as green renewable hydrogen becomes increasingly relevant in a range of new industrial applications and within transport.”

Policy

Having made mention of the ambitious EU Hydrogen Strategy and other regional clean energies programmes, our focus turns to policy and its integral role in realising hydrogen’s true potential.

How key is the policy pillar in this transition, and does it need to be a case of carrot or stick as we strive for ‘fossil parity’ going forward? Løkke is clear in his belief that it needs to be both – and that it needs to be both quicker and more unified.

“Well, to get the ball rolling, we could always see more,” he said. “But there are large differences. Norway, for example, has been rather disappointing. On the other hand, we see a lot of activities and support in countries like the Netherlands, Germany, Spain, South Korea, and Japan. All these countries have expressed big ambitions and support, and we’re now starting to see real momentum.

“Make sure to watch out for Australia and Chile, too; examples of nations that are coming up fast. But let us not forget that there are also other key issues that will impact the speed of development. Equally important are other rules and regulations, as well as the timing for permitting of new projects – this needs to be simplified and accelerated to enable a speedy development.”

Outlook

As our interview neared its conclusion, it was time for us to ask Løkke about the goals for Nel going forward.

We’ve discussed the first half of the year, but what aims does the company have for the remainder of 2021 and beyond? How important are its new CMDs? And what can both Nel and the hydrogen industry itself learn from incidents like the Kjørbo hydrogen fuelling station explosion in 2019?

We began with the latter. An assembly error of a specific plug in a hydrogen tank in the high-pressure storage unit was identified as the root cause of the June 10, 2019 explosion, which occurred at the Kjørbo refuelling station, located just outside of Oslo. Nel investigated the incident

\$1.50/kg

Nel’s cost target for green hydrogen

with safety consultancy Gexcon at the time and the preliminary investigation showed that the incident started with a hydrogen leak from a plug in one of the tanks in the high-pressure storage unit. This leak created a mixture of hydrogen and air that ignited.


Two years on, Løkke believes Nel has “learned a lot from this unfortunate incident”.

“What is interesting is that most of the learnings do not have anything to do with Kjørbo, but rather, great general learnings you get when a lot of intelligent people work systematically on a topic for a focused period of time,” he added. “Our target is to share all the learnings with the industry and the world. However, so far, we have been limited by the legal process. We intend to get started as soon as that is done and clarified, sharing the important learnings in order to help make an already safe industry even safer!”

Addressing such topics in future may well be the preserve of CMDs, a relatively new communications forum for Nel Hydrogen, having held its first such event in January (2021). That inaugural gathering was widely regarded as a success for Nel and Løkke affirmed these are an opportunity for Nel to bring hydrogen closer to the markets. “We try to make a point of being very open in our communication about where the company stands and the direction in which we’re going. The quarterly presentations give a bit of a snapshot of that, but a CMD is an opportunity to showcase the broader picture.

“It’s the strategic overview of the company, the ambitions we have, and how we’re going to get there. It’s also an opportunity to showcase the latest technology we’re offering, which is always exciting. The January 2021 event was our first CMD, but it won’t be our last. We’re in discussions now on when we’ll hold the next one.”

Which brings us to our close and some final words from Løkke who, as we alluded to earlier, has largely been here before with the nascent solar sector and has stacks of enthusiasm for the position the hydrogen sector currently finds itself in.

“Put simply, the time for green hydrogen is now. We watched the phenomenal acceleration of the wind and solar industries over the last decade and that is the same trajectory that green hydrogen is on now. Achieving fossil parity is visibly within reach. And so, of course, on that note, I would be remiss if I didn’t take the opportunity to use a classic Nel line: Thanks for the ride, dinosaurs. We’ll take it from here!” 

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