

# Show Report

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## BAUMA 2022



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As part of our ongoing effort to collect industry intelligence and information on new products, analysts from Power Systems Research regularly attend major trade shows around the world. We share our findings with you in these Show Reports.

## Smaller Bauma Returns To Munich

**Summary.** After more than three years, BAUMA, one of the largest construction events in the world, reopened its doors for seven days in Munich Oct. 24. Power Systems Research (PSR) had a five-person team at the event, discussing trends with industry representatives, from new products and services to topics around the future evolution of sustainable technologies.

The show was smaller than the last time it was held, in 2019. Close to 3,200 exhibitors from 60 countries (2019: 3,684 exhibitors from 63 countries) participated and more than 495,000 visitors from over 200 countries (2019: 627,603 visitors from more than 200 countries) came to Munich for the event.

Bauma is the world's leading trade fair for construction machinery, building material machines, mining machines, construction vehicles and construction equipment. International visitors made up about 50% of the attendance. That's a change from 2019 when about two-thirds of visitors came from Germany.



The top 10 exhibitor countries at Bauma were, in order, Germany, Italy, Turkey, Great Britain and Northern Ireland, the Netherlands, France, the U.S., Austria, Spain and China.

The next Bauma will be held in Munich April 7–13, 2025.

The show seemed to be very well received by stakeholders and industry players. One reoccurring topic during the exhibition was the importance of being back live, in person, at the show.

People were very interested in open discussions and knowledge sharing, compared to pre-Covid events. It

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seemed evident, to us and to many of the people we talked with, that people wanted to talk, to compare visions on the industry and understand what is happening, around the industry and in broader terms around fast changing geopolitical status.

Bauma 2022 was a great venue for OEMs and engine manufacturers to demonstrate the electrification that started slowly during the pandemic and now is speeding up. In 2022 we are able to see this migration from the most common power technologies (diesel, gasoline, gas) to greener technologies and alternate fuels, such as hybrids, electrics and hydrogen.

We visited many OEMs and component suppliers to identify the most important market trends, production locations, market shares, production and new models introduced.

Companies took this opportunity of Bauma to present their latest electric products and innovations. At this stage, many were still prototypes, but there was much equipment that is already in production and in the market.

According to conversations we had, some OEMs presented their most innovative alternate fuel solutions to their customers and dealers in order to get their first impressions, review feasibility and acceptance in the market, especially with electrics and hydrogen since the price and lead time at this stage is still very high.

Other OEMs are already selling their electric and hybrid solutions. Most manufacturer product portfolio strategies consider a mix of power solutions, with a trend to make the market switch to more environmentally friendly solutions. However, some experts think that diesel will continue to dominate as one of the most preferred technologies.

The main focus at and topics is on electric drives because, just like on the roads, there are more and more construction machines and vehicles in the construction sector that rely on electric motors.

Overall, it was noticeable at the show that most of the industry wants to see where the electrification journey is going. Electromobility is on everyone's lips, the main discussion is about when the big transformation will take place.

When it comes to sales, the numbers are generally looking good across the board. Due to delivery bottlenecks caused by component manufacturers and suppliers, there are delivery problems in many cases. But on the whole, companies are satisfied with their figures.

**Mergers & Acquisitions.** Two acquisitions that we confirmed and that are already completely integrated to their businesses in the last months were CNH acquiring Eurocomach (2021) and Yanmar acquiring ELEO (2022). CNH Industrial's Construction Equipment business

acquisition is enabling them to have Eurocomach make their mini and midi excavators at their facilities and continue with its market participation in that segment.

In the case of Yanmar, and as part of their carbon-neutral electrification strategy, they acquired majority ownership of ELEO, a battery tech company based in the Netherlands.

**Product Reports.** We visited many stands during our time at Bauma and picked up lots of information on new products, both in production and in development. Here are 10 noteworthy new products we saw.

- 1. Putzmeister / Sany** exhibited one of their iONTRON construction application 100% electric series truck (BSA 1005). It offers 6-7 years warranty of the battery. They expect to sell between 75-100 by next year. The trucks are equipped with a CATL battery (**China Contemporary Amperex Technology**)
- 2. Komatsu** exhibited their current product line and some electric and hybrid prototypes. They expect to start the production and sales of electric products in 2024. They confirmed they have manufacturing plants in Europe; in UK, Viena, Hannover and Dueseldorff (this one is only dedicated to build the very large mining models, including PC4000).
- 3. Honda** exhibited the eGX electric engine, which they had unveiled at the previous Bauma. It was very interesting to see the adoption rate of this electric engine for the smaller construction products had since last Bauma.

Honda is still very much in a test and data collection phase to really understand the possibilities offered by electric alternatives. They were also showing what they believe would be the next step in electrification with their power station prototype. This is best described as a rack with batteries.

The general idea is that people can go to these battery racks to exchange their depleted batteries for new fully charged ones. The rack would be recharging the freshly deposited batteries that would then be rented out by another user once charged.

These would be found in common places such as gas stations. So far it has been estimated that electric engines are less than 5% of their total sales.



- 4. Liebherr** exhibited their hydrogen engine prototype. The expected release date of this engine is in 2026. They also showed a hydrogen converter module which they plan to introduce in 2025. They also showed their fuel cell PEM prototype, 55kw They said their current product strategy to the market considers a mix of different power solutions. We talked with representatives about how the engine differs from a standard diesel engine. The main point of difference was how to handle the corrosive effects of hydrogen. Liebherr replaced the cylinder head block and redesigned the injection units (to look like an adjusted common rail diesel) but in stainless steel.
- 5. Kohler** announced its new strategy from a power producer to an energy supplier. A strategy that may even replace ICE technology in some applications. Mentioned that they are working on their hydrogen solutions to be introduced in 2023. Also a hybrid tech module. They will continue offering gas, diesel, hybrid and hydrogen solutions to the market and stated that they will continue investing on diversified energy solutions to reduce environmental impact.
- 6. Yanmar** introduced their carbon-neutral electrification strategy. From their press release: “Yanmar will establish itself as the all-in-one systems integrator for smart electrified power solutions tailored to the application specific needs of individual OEMs. In its capacity as a systems integrator,

Yanmar will implement system engineering, design and manufacturing of e-powertrains, while also





Yanmar has already embarked on several new-energy projects in its various business lines, including hydrogen-powered cogeneration, research into hydrogen-fueled marine engines, biogas cogeneration, natural gas dual-fuel power solutions, marine fuel cell technology, smart agriculture, and resource recycling technologies.

Yanmar showed its off-road product portfolio and future plans for industrial equipment including:

- Electrification strategy for e-powertrains
- Electric equipment demonstrator
- Yanmar/ELEO modular, high-density battery system
- Extended 5-year Warranty for TN Series engines

**E-powertrains for off-road equipment.** Yanmar says it plans to establish itself as an advanced supplier of electrified solutions--the all-in-one systems integrator for smart electrified power solutions tailored to specific needs of individual OEMs. Yanmar plans to provide system engineering, design and manufacturing of e-powertrains, while also providing control development, system evaluation, procurement, manufacturing and quality assurance.

**Electric demonstrator.** At Bauma 2022, Yanmar demonstrated an electrified vehicle that shows the practical application of the company's system integrator technologies. Powered by an electric drive and 48-volt

batteries with fast charging capability, the electric excavator is a quiet, zero-emission machine designed to meet the most demanding emissions restrictions. The machine is an example of Yanmar's system integrator applications technology, integrating power and control systems with advanced applications management in a versatile and easy to use machine.

**ELEO battery systems acquisition.** Yanmar's acquisition of ELEO, a fast-growing developer and manufacturer of high-performance modular battery systems, is expected to expand Yanmar's electrified powertrain capabilities by providing versatile, customized solutions for off-road applications. ELEO is building a new battery production plant, increasing its annual battery production capacity tenfold to 500MWh, the equivalent of approximately 10,000 battery packs.

**Yanmar 5-Year Warranty.** The launch of Yanmar's 5-Year Warranty (or 5,000 hours) enhances sustainability and extended ownership of the current line-up of clean diesel solutions as the company moves to carbon-neutral power solutions. This extended warranty is free and is valid for TN Series engines sold in Europe and operating on European territory.

For more information on Yanmar and its business activities, visit <https://www.yanmar.com/global/PSR>

## Kohler Announces Clean Energy Plans

Kohler Company sees 2025 when its clean energy program is expected to take off. The company's vision is to develop sustainable and technically sound EV system solutions to increase the performance of internal combustion engines by placing full electric solutions alongside them, thereby making Kohler the best partner for drop-in options in key markets.

At Bauma 2022, Kohler presented the latest K-HEM series, the hybrid unit for the combined electric and mechanical power solution. The range will move from the booster-hybrid version, Kohler's first hybrid alternative solution design that solves the problem of onerous aftertreatment for intermittent cycles, to the versatile-hybrid version, which enables electric-only operation. The so-called new P2 option achieves zero-emissions through full-electric operation, while keeping

the diesel engine ready to step in to add mechanical power when needed or to recharge the battery.

The new hybrid option will be featured in CELA's new application, the DT40, a "spider" aerial platform with an electric track. The DT40 is already geared to be an electric machine; if the battery is fully charged, crawling can be done in electric. Arm movements can also be done in electric, as the hydraulic pump is assembled on the electric machine and the latter can function as either a generator or a motor.

Alternative fuels are aimed at raising awareness of low carbon, more economical and logistically manageable fuels. Kohler has moved in this direction by joining the eFuel Alliance, which represents companies and other organizations that support and promote the use of alternative fuels from renewable energy on an industrial scale. Its goal is to raise awareness of this type of low-carbon fuel.

Since 2022, Kohler has allowed HVO to be used on its entire range of diesel engines in both Europe and USA. HVO is a renewable fuel that can be produced from vegetable oils and fats: it is derived from biological waste and is a 100% recycled product. Depending on the raw material used in its production, it leads to a reduction in overall CO2 emissions of up to 90%.

In addition to HVO, Kohler sees hydrogen as an alternative fuel. Kohler is developing a diesel-derived hydrogen internal combustion engine based on the KDI 2504 for commercial off-road applications. It's a carbon-neutral solution and has near-zero overall emissions. The project has the ultimate goal of providing the same power and torque as the original diesel engine. The hydrogen internal combustion engine will be a cost-effective drop-in solution, and potentially adaptable to most applications.

All the systems under development, from HVO to biofuels to hydrogen, will be able to be applied to hybrid solutions, blending the strengths of each individual energy source to the best overall effect.

Another portion of Kohler's strategy is the award-winning KSD engine. The KSD is a state-of-the-art engine in the under 19 kW category that features a revolutionary electronically controlled indirect injection combustion system. This offers advantages such as high low-end



torque – 95 Nm at 1000 rpm for TC/TCA – and better performance at altitude. The KSD boasts a low total cost of ownership because of its optimized fuel consumption, extended service intervals, and simplified routine maintenance doable with only two tools.

The KSD is a versatile engine that is designed to be a drop-in solution to replace existing engines with minimal design and interfacing effort. It has options for more than 70% of the base engine components.

Vincenzo Perrone, President of Kohler Engines, said, Kohler will pursue the development of hydrogen solutions that have the same performance as diesel units, as well as natural gas and biogas engines and will continue to bring to market hybrid modules. **PSR**

## HIMOINSA Introduces Electrification Strategy

HIMOINSA introduced at Bauma its complete range of 'Mobile Power' products which includes battery power storage systems, lighting towers (hybrid version) and stage V-compliant gas and diesel generator.

During a press conference at the show, HIMOINSA representatives discussed the company's electrification strategy and its roadmap towards reducing emissions.

Founded in 1982, HIMOINSA is a leading designer and manufacturer of power technology solutions. It produces power generation equipment including generator sets, lighting towers, and power storage and distribution systems. It operates factories and research and development centers on five continents.

In 2015, HIMOINSA became part of the Yanmar Group, a leader in the design and manufacture of industrial and marine engines, agricultural and construction equipment.

The company has identified three battery-driven solutions that will be developed over the next three years:

- **EHR | Battery Power Generator.** This is a battery-powered generation solution for which several models up to 60kW/h have already been developed. In this case, the company plans to extend the product portfolio to 2MW to cover higher power generation needs. This is a **MOBILE POWER** solution designed to reduce emissions in short- and medium-term mobile applications.

The EHR is a new power storage and generation system that can work as a single source of power generation (as an island) to supply construction machinery (cranes, pumps...) or can be integrated with gas and diesel generator sets to reduce the number of hours the gen-sets have to run. The EHR also is designed to be connected to the grid or to photovoltaic modules, guaranteeing reduced emissions during the power generation process at all times.

- **MCS | Mobile Charging Station.** MOBILE POWER equipment is used to recharge electrical machinery for construction, agriculture, mining (excavators, building site containers, UTVs...). "Now that the equipment fleet is being electrified, rental companies need on-site charging stations to ensure that they can recharge



their equipment, as well as easily transportable units that can be made available to end users at work sites alongside whatever electric equipment they have rented," says Miguel Ángel Ruiz, Global Engineering and Development Head at HIMOINSA. He says the company is considering offering containerized units with a capacity of up to 2MW that can charge several units and vehicles at the same time to optimize times and reduce downtime.

- **BESS | Battery Energy Storage System.** This storage system is used to accumulate surplus power at sites where there is a combination of multiple power sources (renewables, gas, diesel, biodiesel, etc). These storage solutions are aimed at both off-grid and on-grid applications, and complement HIMOINSA's product portfolio in its 'On-Site Power' product unit.

The company is considering flexible solutions to support electrification in stationary applications and to complement existing distribution grids. In this context, BESS, the company's battery-based power storage system, can be used in micro-grids and, to a large extent, with power ratings ranging from 500kW to 2MW.

**HICORE** is the control unit and management system that HIMOINSA has designed for its battery power generation solutions. It is the central management core, and it has logic that allows it to take decisions and simplify operations, guaranteeing maximum communication and rapport with the other components and external connection sources.

HIMOINSA showed at Bauma new products based on an energy mix and alternative fuel technologies that offer a comprehensive range of solutions using new technologies and energy sources. "We are working on the electrification of products that will coexist alongside the traditional gas and diesel generator sets that HIMOINSA has offered historically, and we are also working hard to reduce our carbon footprint with more efficient and environmentally sustainable gas and diesel generator solutions", says Francisco Gracia, President & CEO at HIMOINSA.

As part of the **Yanmar Energy System**, HIMOINSA is working to integrate control electronics, power electronics, batteries and battery management systems to guarantee the development of new solutions in this electrification process. **PSR**



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## About Power Systems Research

Power Systems Research (PSR), established in 1976, is the leading source of data, analysis and forecasting on the global production of engines and engine-powered equipment, including class 8 vehicles. One of its databases, EnginLink,™ includes production figures down to the model level for OEMs in key market segments, such as commercial vehicles. PSR's global research network includes eight offices and stretches across 200 countries and four continents.



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