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In This Issue

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Power Systems Research (PSR) is a world leader in providing power equipment information, whether it's pure data, analysis, forecasting or specific business intelligence. This product information ranges from IC engines to battery-electric and hybrid powertrain technologies. PSR has been providing world class business and market intelligence to industry leaders for 45 years. How can we help you? For details, call **+1 651.905.8400** or email **info@powersys.com**.
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North America Report

Staff Report

Power Systems Research Expands Forecast Capabilities and Focus on Technology Adoption

Guy Youngs

EAGAN, Minn.—Power Systems Research (PSR), a leading source of global production and forecast information for powered equipment, has expanded its capabilities with the addition of Guy Youngs, an experienced market intelligence specialist.

Youngs, who has more than 30 years' experience as an industry market analyst, most recently spent 11 years working for Perkins Engines in the United Kingdom. While at Perkins Engines, he led the development of important forecast tools, including the creation of a Market Model used by Perkins Engines' global team as a single source for its market analysis and planning efforts.

At PSR, Youngs will assume the new role of Forecast and Technology Adoption Lead. He will be responsible for continuing to develop and adapt PSR's industry forecast, overseeing the rate of technology adoption of alternative power sources into the future outlook and technology mix. His duties will involve regular engagement with PSR's global analyst team. These efforts will guide and mentor the team towards thinking analytically about market developments for alternative power sources such as fuel cells and battery electric powered equipment as well as growth drivers and trends within various regions and applications.

"In the new position of Forecast and Technology Adoption Lead, Youngs will provide PSR with expanded capabilities towards ensuring our overall process and approach to forecasting is in synch with the market," said Joe Zirnhelt, CEO and President of Power Systems Research. "This increased resource will permit us to stay on top of new developments and ensure we are constantly evaluating and evolving our approach to forecasting," said Zirnhelt.

"We know from our clients that historical context is important but there are increasingly questions surrounding short, medium and longer-term outlook expectations. These questions not only center around underlying market growth but also the adoption of alternative drive technologies into the forecast outlook. This is where Guy's background and experience will benefit PSR as we to continue to adapt our forecast of the powered equipment market to changes that are only accelerating within the marketplace." **PSR**

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Cummins, Inc., is working to develop hydrogen-powered engines, using approaches for Hydrogen combustion engines and hydrogen fuel cells.

Cummins Develops Hydrogen-Powered Engines

By Chris Fisher, Senior Commercial Vehicle Analyst

Chris Fisher

Cummins, Inc., is working to develop hydrogen-powered engines, using approaches for hydrogen combustion engines and hydrogen fuel cells.

Both hydrogen engines and hydrogen fuel cells are better suited for long haul and many regional-haul truck applications than pure battery electric vehicles.

In North America, Cummins plans to introduce hydrogen internal combustion engines across their existing engine platforms starting in 2024.

Read The Article

PSR Analysis: PSR believes the engines will be initially installed in Freightliner, Volvo, Kenworth and Peterbilt medium and heavy trucks starting in 2024. The engine platforms include the B6.7 liter, the L9 liter and eventually the X15 liter engine starting in 2027. Cummins refers to this as their fuel-agnostic engine platforms in which the B6.7 liter engine will be offered with diesel, natural gas, gasoline, propane, and hydrogen versions while the L9 and X15 lines will be available in diesel, natural gas, and hydrogen versions.

Cummins is developing a hydrogen fueled B6.7L engine for Europe. Production is likely to begin in the 2023/2024 timeframe and it is likely that the DAF LF medium truck will be an early adopter.

Lower hydrogen cost and expanded fueling infrastructure would be needed before any significant vehicle adoption would occur.

Cummins is also entering the hydrogen fuel cell segment. By 2024, Cummins plans to provide 20 proton exchange membranes (PEM) to Scania in the Netherlands. The PEMs will then be integrated into Scania's existing battery electric truck platform. The trucks will be delivered to HyTrucks that same year.

Cummins and Daimler plan to upfit the Freightliner Cascadia platform with hydrogen fuel cells based upon the Cummins fourth-generation fuel cell powertrain with initial delivery in 2024. Initial volumes will be relatively low primarily due to the high cost of hydrogen and a lack of re-fueling infrastructure. **PSR**

E-Motorcycles Market Update

By Michael Aistrup, Senior Analyst

The global e-motorcycle market has experienced high growth in the last couple of years, fueled in part by the declining price of Lithium-ion batteries. The battery is one of the most expensive components of an e-motorcycle, and changes in the price of Li-ion batteries affect the entire cost of an e-motorcycle. The cost of Li-ion batteries has been steadily declining, and this trend is likely to continue.

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Michael Aistrup

Power Systems Research has forecasted the global CAGR for electric motorcycles, at 11% for the years 2022 – 2027.

Drivers-of-Demand for this forecasted growth are:

- Increased environmental concerns.
- Higher fuel efficiency of e-motorcycles compared to conventional motorcycles.
- Increased demand for sustainable transportation.
- New incentive programs for e-motorcycles driven by government units.
- Advancements in technology such as high-speed handling, smaller/compact size, quicker acceleration, and reduced motor weight.
- Introduction of fast-charging stations.
- COVID-19 virus played a vital role in increasing the demands for the e-motorcycle. Pandemic halted the manufacturing of vehicle components and OEM parts for conventional motorcycles and available e-motorcycles in the market became the first choice among the consumers.
- Expanding dealer and distributor network promoting the e-vehicle and its advantages.
- Consistent research and technological advancements in the automobile industry to provide advanced technologies to e-motorcycles

Two factors hampering the growth of the market are the comparatively higher initial cost for e-motorcycles and the lack of a developed charging infrastructure.

Market Intelligence: A Review of E-Motorcycle OEMs

By Michael Aistrup, Senior Analyst

Michael Aistrup

The global e-motorcycle market is changing almost daily as market share leaders develop new products and new companies continue to enter the market with competitive products. Here's an update on several leading e-motorcycle OEMs.

Husqvarna Motorcycles - Husqvarna is in a similar position as most major motorcycle manufacturers, desperately racing to catch up with **a new wave of electric motorcycles greeting new riders**. The company is showing its first electric motorcycle model concept known as the Husqvarna E-Pilen and releasing some of its early specs. The E-Pilen Concept has a power output of 8 kW and a range of 100 km. The E-Pilen Concept has been developed with the urban commuter and leisure rider in mind, with a range that maximizes the time between battery charges.

Essence Motorcycles - Though the lineup varies ever-so-slightly in appearance, each E-raw uses the same strict formula of a steel-trellis frame wrapped around a 10.1-kWh battery pack, a machined aluminum swing-arm, and a set of Ohlins forks. The e-power flows through a Pymco electric motor, rated to produce 107 hp and 132 pound-feet of torque. Range is said to be 115 miles per charge, but the

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Honda e is in the process of developing a business motorcycle series to provide easy-to-use business motorcycles that maximize the advantages of EVs to support a variety of business situations.

E-raw can be fully re-charged in just 30 minutes. Top speed is a healthy 96 mph, while it hits 60 mph in just 3.2 seconds.

Tork Motors has launched the Kratos electric motorcycle in the Indian market. The new Tork Kratos will be sold in two variants – Standard and R and will be available across India in a phased manner. In the first phase, this e-motorcycle will be available in Pune, Hyderabad, Bangalore, Chennai, Ahmedabad, and Delhi. The electric motor on the base model makes a peak power output of 7.5kW or 10.05bhp and a maximum torque of 28Nm. Tork has a manufacturing capacity to make about 500 units a month at its pilot plant and about 4,000 units a month at its new plant at Chakan near Pune.

Revolt Motors has launched two motorcycles: RV400 and RV300. The bikes were launched with a unique subscription-based plan, which made owning the two bikes a cost-friendly affair. Currently, Revolt is only operational in Delhi-NCR and Pune. The company has also revealed a one-time price for its products, which includes FAME-II subsidies for the bikes. Currently, only the RV400, Revolt's flagship e-motorcycle, is on sale as the entire lot of RV300 was bought by Domino's to make it their delivery fleet vehicle.

Harley-Davidson has now lifted the veil on a second full-size electric motorcycle model. Called the LiveWire **S2 Del Mar**, the new electric motorbike joins "LiveWire **ONE**," the latest update derived from the original LiveWire model back in 2019, before that name was spun off as its own brand. LiveWire says the initial batch of 100 Del Mar "Launch Edition" machines done up in special paint schemes have already sold out. LiveWire said the first bikes should arrive for owners and showrooms in spring of 2023.

Ideanomics has finalized the acquisition of **Energica Motor Company**. **Carlo Iacovini, GM of Energica Inside**, touched on the company's goals for 2022 and formally introduced the market to **Energica Inside** – a new business unit dedicated to the development and production of powertrains, battery assembly and technology for electric vehicles.

Honda e is in the process of developing a business motorcycle series to provide easy-to-use business motorcycles that maximize the advantages of EVs to support a variety of business situations. They are developing the BENLY e: a two-wheeled and compact motorcycle with a high load capacity that enables it to perform a variety of pickup and delivery tasks; the GYRO e: a three-wheeled motorcycle with a large, low-floor cargo bed that does not swing and is suitable for delivering heavy or bulky cargo; and the GYRO CANOPY e: a three-wheeled motorcycle with a roof and a swinging cargo bed that is suitable for lightweight loading and food delivery.

Power Systems Research is a leading source of reliable global business intelligence, forecasting and trends in the electric/battery field. **PSR**

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North America Report

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DATAPOINT: *North American Pavers*

2,900

By Carol Turner, Senior Analyst, Global Operations

2,900 units is the estimate by Power Systems Research of the number of Pavers to be produced in the U.S. and Canada during 2022.

This information comes from industry interviews and from two proprietary databases maintained by Power Systems Research: **EnginLink™**, which provides information on engines, and **OE Link™**, a database of equipment manufacturers.

Exports: Collectively, up to 40% worldwide.

Market Share: With combined plant totals of 20%, VT LeeBoy (includes LB Performance Paving) leads in production of Pavers in North America. In second position with 17% is Weiler; third place is held by Cat Global Paving with 16.5%.

Trends: In 2021, production of Pavers in North America increased 17%. Production is expected to gain another 3% in 2022 to about 2,900 units. This increase is based on growth in road related repairs and increased international sales.

Despite 2020 uncertainties, mostly affected by COVID related issues, 2021 showed a strong increase in production. This turnaround from 2020 focused on repairing crumbling roads and bridges that are a concern throughout many regions. COVID factors caused government transportation departments to reduce or cancel road construction and maintenance projects in 2020.

Stabilization of this paver market segment this year will depend on factors that may include public funding and the demand for "greener" products due to environmental issues and concerns. Overall, production is expected to rise slowly over the next three years with a gain of up to 5%. **PSR**

Europe Report

By Emiliano Marzoli, Manager – European Operations

Volvo CE Pushing Alternative Powertrains

Volvo Construction Equipment (Volvo CE) has started testing its prototype "HX04" Hydrogen Fuel-Cell Articulated truck. Carolina Diez Ferrer, Head of Advanced Engineering Programs at Volvo CE expects that this prototype will "give valuable insights into the opportunities of hydrogen in the energy transformation alongside battery-electric solutions."

The on-going development of the hauler began in 2018 and experienced

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Europe Report

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partnerships with different Swedish institutions and companies. Fun fact: The machine is nicknamed "Electric Charlie," a homage to "Gravel Charlie," the world's first Articulated hauler produced by Volvo in 1966.

Emiliano Marzoli

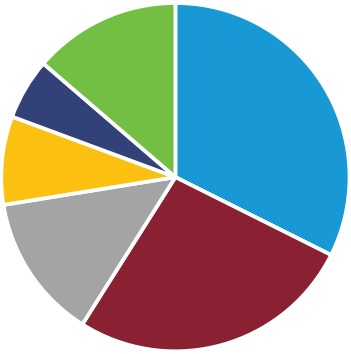
Shell has been involved in the project, supplying the hydrogen refuelling station for Volvo's test track. The Volvo HX04 is charged with 12 kg hydrogen in about 7.5 minutes, enabling it to operate for approximately four hours. Fuel cells work by combining hydrogen with oxygen and the resulting chemical reaction produces electricity which powers the machine.

In the process, fuel cells also produce heat that can be used for heating the cab. Fuel cells only emit one thing – water vapor. Vehicles with fuel cell electric powertrains have an uptime, range, and fuelling time similar to that of combustion engine powered vehicles.

Source: *Volvo* **Read The Article**

PSR Analysis: Volvo CE development of the HX04 has particular value. So far, most of the alternative drive construction machines have been small products, mainly battery powered. Mixers, Tampers, Rammers and Concrete Finishers were the most popular electric products in 2021, with Wheel Loaders, the first large machine type, representing 8% of the total electric products, according to the Power Systems Research proprietary database **OE Link™.**

2021 Global Electric Machinery Production



Cement/Mortar Mixers
Tampers/Rammers
Concrete Finishers/Trowels
Wheel Loaders
Mini Wheel Loaders
OTHERS

Source: Power Systems Research OE Link™

This development is especially important, considering that fuel cell machines are even rarer, with just another prototype from JCB. This project will help define the future of the segment and drive its sustainability. However, we do not expect to see significant volumes, before at least 2030.

While products need to be refined and tested, the refuelling infrastructure will remain a critical limiting factor. Considering the current range of operations and

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refuelling, Fuel Cells would represent a solid and serious alternative to internal combustion engines. According to political agendas around the world, we will see different development and adoptions of these machines, but it is not surprising that Volvo is at the forefront of this transition, a revolution that could change completely the Construction machinery Industry. **PSR**

Brazil/South America Report

By Fabio Ferraresi, Director Business Development-South America

Trailers with Electric Drive Axle Authorized in Brazil

Fabio Ferraresi

Heavy vehicles using electric axle systems in the trailer now can be driven on Brazilian Roads, following approval by the National Traffic Council (Contran) at its meeting in May.

Suspensys, a Brazilian company that is part of the Randon Group, launched the product at Fenatran of 2019, but only now has it been approved by traffic authorities.

Source: *M&T Magazine* **Read The Article**

PSR Analysis: Approval of this regulation is the kickoff of a new market for new Trailers as well as the retrofit of existing trailers in the market. The promise of up to 25% of Diesel consumption is very welcome on the scenario of Diesel Shortage and price escalation.

There is definitely a demand in the market, and we will see growing volumes both in OEM and Retrofitting (IAM) markets depending on product sale prices. As part of the Randon group, one of the biggest trailer manufacturers in Brazil, Suspensys provides the capabilities to grow sales and increase profitability.

Brazilian Marcopolo Launches H_2 Bus in Australia

Brazilian-based Marcopolo has expanded its product line of renewable and zero-emission fuels. Volgren, a company owned by the Brazilian manufacturer, is Australia's largest bus producer. It has signed an agreement with Wrightbus, an Irish bus manufacturer, and market leader with Hydrogen technology in Europe, to develop and launch hydrogen fuel cell-powered buses for the Australian market.

The first units of the Volgren-Wrightbus are expected by early 2023. The vehicles will be the first Hydrogen buses in Australia to be built by a local manufacturer using European fuel cell technology.

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South America Report

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Chinese electric vehicle (EV) and battery maker BYD is going to become Tesla's battery supplier for the first time, a senior executive at the company backed by Warren Buffett's Berkshire Hathaway said recently.

Source: *Press Release* **Read The Article**

PSR Analysis: Marcopolo is committed in its strategy on new propulsion, either with their own EV chassis in Brazil or with the H_2 chassis in other markets, such as the Volgren in Australia. It enables Marcopolo to compete better in growing markets while it keeps its position in ICE markets with its current products. **PSR**

China Report

By Jack Hao, Senior Research Manager - China

Buffett-backed BYD Will Supply Batteries To Tesla

Jack Hao

BEIJING— Chinese electric vehicle (EV) and battery maker BYD is going to become Tesla's battery supplier for the first time, a senior executive at the company backed by Warren Buffett's Berkshire Hathaway said recently.

"Tesla is a very successful company. BYD has great respect for Tesla and raises our hat to it," said BYD's executive vice president Lian Yubo in an interview with the state-owned news channel China Global Television Network (CGTN), when he was asked his thoughts of China-made vehicles in comparison with Tesla. "(Tesla CEO) Musk and us are good friends now as we are preparing to supply batteries to it very soon. We learned a lot from Tesla," Lian added, noting the U.S. rival's positioning itself as a high-end EV brand.

Lian's remark suggests BYD is set to be the second China-based battery supplier of Tesla next to CATL, the world's largest EV battery company. LG Energy Solution, the South Korean battery maker second to CATL, and Tesla's long-time partner Panasonic currently are another two battery makers in Tesla's supplier list.

Lian confirmed rumors about Tesla and BYD's partnership. It was reported last August that Tesla reached an agreement to use BYD's "Blade Battery," a product introduced in 2020 that was alleged far-less-susceptible to catching fire. Delivery was reported to begin in Q2 2022 as Tesla models equipped with blade batteries had entered the C-sample test phase.

Lian's comment also mirrored the increasing competition that CALT faced from BYD and other competitors. Earlier this year, Tesla's Chinese rival Xpeng was reported to be switching from CATL batteries to products made by another Chinese battery company, CALB, because of price increases by CATL.

A report in March said Fudi Battery, a unit BYD spun off last year, was said to win orders from Xpeng's domestic peer NIO and Xiaomi Auto, a unit founded last November by the leading Chinese smartphone maker.

Source: *Visual China* **Read The Article**

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PSR Analysis: BYD and Tesla are both major makers of new energy vehicles. Tesla is BYD's second big attempt to provide batteries for EVs; it also has targeted Toyota. The moves show that BYD's battery technology and costs have reached a good balance.

In 2021, sales of new energy vehicles in China were less than 3 million units, accounting for about 14% of the Passenger market. Today, the new energy vehicle market is still in development, and the overall strength is far from surpassing that of fuel vehicles. In fact, the only goal of BYD and Tesla is to surpass the brands in the fuel car camp.

However, after the market and scale of new energy vehicles increase and become stronger, BYD and Tesla will benefit from this partnership. Considering the competition between BYD and Tesla, it is better to join forces to compete with fuel brands.

At the same time, both BYD and Tesla have different priorities. BYD's core competitiveness is the technology, safety and endurance of new energy batteries; it provides new energy power solutions in all fields. The cooperation with Tesla is conducive to BYD's further brand building in North American and European markets and the expansion of other overseas markets.

Tesla's core competitiveness lies in the global promotion of its ADAS and Internet of vehicles technology. The technical cooperation between the two sides can provide Tesla with another battery supplier after CATL and LG, so it can take advantage of technology improvements and competitive costs. **PSR**

Far East: Japan Report

By Akihiro Komuro, Research Analyst, Far East and Southeast Asia

Show Report: NEW Environmental Exposition

Akihiro Komuro

Last month, I visited the three-day 2022 NEW Environmental Exposition, an exhibition of environment-related equipment in Tokyo. The show promoted the effective use of resources, new energy and energy reduction, and the utilization of CO2 emission reduction technologies

Source: Official Website

PSR Analysis: The exhibition featured many environment-related devices for waste treatment, demolition, bioplastics, water treatment and purification, heat utilization systems, recycling, and more.

Large equipment such as those that crush and efficiently separate debris mixed with earth, sand, and wood; metal recovery systems from seawater using special

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Far East Report

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As for electrification, there were exhibits of electric models of wood crushers, rough terrain transporters, and jaw crushers.

fibers, and equipment related to crushing wood, stone, and other materials were eye-catching in variety and size.

As for electrification, there were exhibits of electric models of wood crushers, rough terrain transporters, and jaw crushers. Many of these electric models were developed using battery units sold by power companies as packs. These battery packs are large in both weight and size and are not easily replaceable, so future issues will probably be higher output and drive time.

Longer drive times are essential for models that are designed to be transported and moved on rough terrain, etc. At the present time, these models are still in the concept model stage, but through the development of such models, manufacturers are gaining a variety of know-how and accumulating technology for future mass production.

For equipment that is designed for stationary use, such as crushers, users already understand that as long as a separate power supply is provided, the capacity is almost equal to that of an engine model, and I feel that acceptance in the market has matured. The wave of electrification is also reaching the fields of off-road equipment and environmental equipment.

The admission system for this event has changed considerably. In the past, visitors who had pre-registered had to hand in their business card and receive a neck holder at the reception desk, but recently the system has been changed to a touchless system whereby visitors take a neck holder placed on a wagon, insert a form printed after pre-registration in place of a name tag, and the QR code is read by staff using a tablet for entry. The exhibition hall also featured live YouTube streaming on a large LCD screen, a sign of the changing times. **PSR**

極東 > 日本レポート:

小室 明大 – 極東及び東南アジア リサーチアナリスト

2022 NEW 環境展 視察レポート

筆者は環境関連機器の展示会である「2022 NEW環境展」を視察した。

展示会名	2022 NEW環境展
テーマ	資源有効利用や新エネルギー・省エネルギーの推進、CO2排出削減技術の活用
展示会場	東京ビッグサイト 東1-5ホール、屋外実演会場
開催期間	2022年5月25日（水）～2022年5月27日（金）
展示規模	462社・団体
来場者数	67,402人（3日間）

出典: 2022NEW環境展公式サイト（一部筆者により元記事内容を改編しました）

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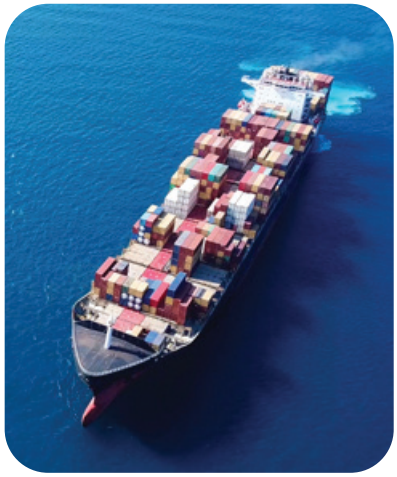

PSR 分析: COVID-19の影響で中止されていた展示会もだいぶ開催機会が戻ってきた。入場方式はコロナの影響で随分様変わりした。以前は事前登録をしていても受付で名刺を渡し、ネックホルダーを受け取っていたが、最近ではワゴンに置かれているネックホルダーを自分で取って、事前登録後に印刷した名札代わりの用紙を差し込み、QRコードをスタッフがタブレットで読み取って入場する、というタッチレスの仕組みに変更されている。会場では大型の液晶スクリーンでYouTubeのライブ配信をしていたり、時代の流れを感じるものだった。

展示会自体は廃棄物処理・解体・バイオプラスティック・水処理浄化・熱利用システム・リサイクルなど、環境に関連する多くの機器が見られた。土砂と木材などが混ざったガレキを粉砕して効率よく分けていくような大型装置や、特殊繊維を使った海水中からの金属回収システム、木材や石材などの破砕関連機器の展示は種類やサイズも多く目を引いていた。

電動化については、木材破砕機や、不整地運搬車、ジョークラッシャーなどの電動モデルの展示があった。これらの電動モデルの開発には、電力会社がバッテリーユニットをパックとして販売したものが多く採用されている。このバッテリーパックは重量とサイズともに大きく、簡単に交換ができるようなものではないため、やはり今後の課題は大出力化と駆動時間だろう。不整地運搬車など、運搬や移動を前提とするモデルにとっては駆動の長時間化は必須であり、現時点ではまだコンセプトモデルの段階だが、こうしたコンセプトモデルの開発を行うことでメーカーは様々なノウハウを得て、将来の量産に向けた技術的な蓄積がある。破砕機などの定置使用が前提の機器については、電源を別途用意しさえすればエンジンモデルとほぼ同等の能力があるとユーザーはすでに理解しており、市場に受け入れられる土壌の成熟を感じた。こうしたオフロード機器、環境機器の分野でも電動化の波は及んでいる。**PSR**

Far East: South Korea Report

By Akihiro Komuro, Research Analyst, Far East and Southeast Asia

Korean EVs Hyundai and Kia Doing Well in UK

The European EV market is expanding, and in the UK, Korean-made EVs are gaining popularity as vehicles that are more affordable than Tesla's and that offer superior performance.

Last year in the UK, the Tesla Model 3 ranked second in sales of all passenger cars by model, marking the "first year of EVs" in earnest. However, the popular Tesla cars are not inexpensive, costing about three times as much as similarly

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UK EV Market Share by Brand (Feb-April 2022)	
TESLA	25.37%
Hyundai & Kia	14.61%
VW Group	13.61%
Stellantis	12.92%
BMW Group	8.96%
Mercedes	6.70%
Renault Nissan	4.43%
Others	13.40%
Total	**100.00%**

sized gasoline-powered cars. On the other hand, Hyundai and Kia cars are priced at 60-70% of Tesla's Model Y and have been a hit with environmentally conscious 30–40-year-olds who had been putting off purchasing EVs because they wanted to replace their cars with EVs but thought Teslas were too expensive.

A major reason for the high support for Korean-made EVs is their price competitiveness. In terms of corporate car leasing prices, Tesla's Model Y costs 40 pounds per day (for a three-year lease), while Kia's low-priced e-NIRO EV costs less than 20 pounds per day, about half the price. While the price may be reasonable due to the large difference in vehicle quality, the figures are enough to shatter the preconceived notion that EVs are expensive.

The reason why Europeans have no resistance to "Korean-made EVs" has to do with historical backgrounds other than vehicle prices and tax benefits. Korean-made cars are highly regarded in Europe, and Korean cars have an extremely high share of the compact car segment in Europe. This is due to the fact that Korean automakers have aggressively expanded their factories into former Eastern European countries, where wages are low but skill levels are high; Hyundai and Kia established production bases in the Czech Republic and Slovakia, respectively, soon after both countries joined the European Union.

Source: Economist

PSR Analysis: As mentioned above, many potential buyers believe EVs are more expensive than conventional engine models. Hyundai and Kia are successfully implementing mass-market EV strategies in Europe, where EVs are most prevalent, in order to overcome the sales slump caused by this image. IF the Korean carmakers can overcome this mis-perception of pricing, it will make a big difference in acceptance in this important EV market. **PSR**

極東 > 韓国レポート:

小室 明大 – 極東及び東南アジア リサーチアナリスト

現代や起亜自動車「韓国製ＥＶ」が英国で健闘

拡大する欧州のEV市場。英国ではテスラより手が出しやすく、性能面でも優れたクルマとして韓国製EVが人気となっている。

英国では昨年、米テスラ「モデル3」が全乗用車でのモデル別販売ランキングで2位に入り込むなど、本格的な"EV元年"を迎えた。ただし、人気のテスラ車は、同程度サイズのガソリン車と比べ車両価格が約3倍と、安いとはいいがた

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UK EV Market Share by Brand (Feb-April 2022)	
TESLA	25.37%
Hyundai & Kia	14.61%
VW Group	13.61%
Stellantis	12.92%
BMW Group	8.96%
Mercedes	6.70%
Renault Nissan	4.43%
Others	13.40%
Total	**100.00%**

い。一方、HyundaiやKiaの車両価格は、テスラの「モデルY」の6～7割程度で、「EVに買い替えたいが、テスラは高い」と購入を見送っていた環境意識の高い30～40代を中心にヒットした。

韓国製EVが高い支持を集めている大きな理由は、価格競争力にある。法人向け社用車リースの価格では、テスラの「モデルY」が1日当たり40ポンド（3年リースの場合）に対し、Kia製の廉価版EV「e-NIRO」は同20ポンド弱と半値まで下がる。車両グレードが大きく違うので安くて当然かもしれないが、「EVは高価だ」という先入観を打ち砕くのには十分な数字だ。

欧州の人々が「韓国製EV」に抵抗がない、という理由には車両価格、税制上の優遇以外の歴史的な背景も関係している。そもそも欧州では韓国製のクルマが高い評価を得ており、欧州のコンパクトカーのセグメントでは韓国車のシェア占有率は極めて高い。これは、韓国自動車メーカーが、労働者の賃金水準が低めながらも、技能レベルが高い旧東欧諸国に工場進出を積極的に行ったことに由来している。Hyundaiはチェコ、Kiaはスロバキアへとそれぞれ生産拠点を展開、いずれも両国が欧州連合（EU）に加盟して程なく進出している。

出典: エコノミスト（一部筆者により元記事内容を改編しました）

PSR 分析: 上記記事でも触れられている通り、従来のエンジンモデルと比較するとEVにはどうしても割高なイメージがある、という声は根強く存在している。これはテスラに限った話ではない。HyundaiとKiaはそうしたイメージによる販売不振を脱却するために、EVが最も

普及する地域である欧州で、大衆向けのEV戦略に成功している。これはブランディングの観点からも非常に大きな実績となっていくだろう。最も成熟したEV市場に受け入れられるという意義は大きい。**PSR**

Southeast Asia: Indonesia Report

By Akihiro Komuro, Research Analyst, Far East and Southeast Asia

Komatsu Provides Hybrid CE To Southeast Asia

Komatsu began introducing hybrid construction equipment in Indonesia this spring. Equipped with an engine and electric motor as the power source, these machines can improve fuel efficiency by 20-30%, compared to conventional machines.

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Southeast Asia Report

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Chinese manufacturers are pushing low-priced construction equipment, and are now rivaling Komatsu, which has a stronghold in Indonesia, in terms of market share. With fuel prices rising sharply, emerging countries are also becoming more environmentally conscious. Komatsu is fending off Chinese competition with its highly fuel-efficient construction equipment and is tapping into demand for decarbonization.

In Indonesia, the largest construction equipment market in Southeast Asia, Komatsu has launched a hybrid hydraulic excavator. Equipped with a hybrid system developed in-house, the excavator's swing unit is electrically powered. When turning the body, including the arm and driver's seat, from side to side, the energy generated during deceleration is used to generate electricity, which is stored for future use. The company plans to market the system to nickel mine developers and others, where demand for EV batteries is growing.

A hybrid model has been introduced in the best-selling class 30-ton weight class. The price is in the range of several tens of millions of yen per unit, which is 20-30% higher than that of a normal diesel-powered hydraulic excavator. Excavators used in nickel mines require a lot of turning to the left and right when digging ore and loading it onto dump trucks, so the introduction of hybrids will have a significant effect on fuel efficiency. "Considering the current sharp rise in fuel costs, the price increase can be recovered in a few years" says President Ogawa.

Source: The Nikkei

PSR Analysis: The electrification of construction equipment is quite different from the electrification of automobiles. In terms of ease of use, the availability of charging infrastructure is a major consideration. At construction sites, often there is no charging infrastructure unless a generator is brought in. And there are currently no batteries that can continue to provide high output for eight hours per a day of full operation.

However, hybrids can overcome these weaknesses and improve environmental performance and fuel economy. In the past, Komatsu had not fully deployed hybrid construction equipment in Southeast Asia. However, environmental awareness is growing in the region, and the government has set a goal of virtually eliminating greenhouse gas emissions by 2060.

Indonesia has traditionally been a stronghold of Komatsu, but Chinese companies such as SANY have been increasing their sales, and their market share is expected to remain at the same level. Competition is certain to intensify in the future. **PSR**

東南アジア > インドネシアレポート:

小室 明大 – 極東及び東南アジア リサーチアナリスト

コマツ、東南アにハイブリッド建機

コマツは2022年春からインドネシアでハイブリッド方式の建設機械の投入を始めた。電気で動くモーターも動力源に備え、燃費を従来機より2～3割改善できる。中国勢が低価格攻勢をかけ、インドネシアを牙城とするコマツにシェア

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で匹敵するようになってきた。燃料代が急上昇するなか、新興国でも環境意識が高まっている。燃費性能の高い建機で中国勢の追撃をかわし、脱炭素の需要を掘り起こす。

東南アジア最大の建機市場インドネシアで、ハイブリッドの油圧ショベルを売り出した。自社開発のハイブリッドシステムを搭載し、旋回装置を電動化した。アームや運転席を含む車体を左右に旋回させる際、減速時に発生するエネルギーで電気をつくり、蓄電装置にためる。車体の旋回時にはその電気を使い、エネルギー効率を高める。電気自動車（EV）電池向けに需要が伸びるニッケルの鉱山開発事業者などに売り込む。

売れ筋の車体重量30トン級にハイブリッドモデルを投入した。価格は1台数千万円程度で、通常のディーゼルエンジンの油圧ショベルより2～3割程度高くなる。

ニッケル鉱山で使うショベルは、鉱石を掘ってダンプトラックに積み込む作業での左右への旋回動作が多く、ハイブリッド導入による燃費改善効果が大きい。「足元の燃料費高騰を考えれば、価格上昇分を数年で回収できる」（小川啓之社長）としている。

出典: 日経（一部筆者により元記事内容を改編しました）

PSR 分析: 建機の電動化は自動車の電動化とはまったく異なる。異なる点を挙げればきりがないほどだが、使い勝手という意味では充電インフラの有無だ。建機が動く工事現場では、発電機を持ち込まない限り充電インフラは無い。また、あったとしても、1日8時間稼働すると仮定しても、フル稼働で8時間を高出力し続けられるバッテリーは現時点では存在しない。だがハイブリッドであればそうした弱点を克服し、対環境性能の向上、燃費性能の向上を狙える。

これまでコマツはハイブリッド建機を東南アジアでは本格的に展開していなかった。だが現地でも環境意識は高まり、政府は2060年に温室効果ガスの排出を実質ゼロにすることを目標に掲げた。インドネシアは従来からコマツの牙城だったが、SANYなどの中国勢が販売を伸ばしており、シェアは同水準にあると見られる。今後競争が激化することは確実だ。**PSR**

India Report

By Aditya Kondejkar, Research Analyst – South Asia Operations.

India Amends Bio-Fuel Policy, Hikes Introduction of E20

The government of India has amended its National Policy on Bio-fuels that will accelerate the adoption of E20, allow the use of new bio-fuel feedstocks, and grant permission for biofuel exports under certain conditions.

Source: *Ethanol Producer Magazine.* **Read The Article**

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India Report

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To tackle soaring fuel oil prices, India plans to introduce 20% ethanol blending with gasoline in several regions of the county beginning in April 2023, and it will be implemented nationwide starting in FY25.

Aditya Kondejkar

PSR Analysis. To tackle soaring fuel oil prices, India plans to introduce 20% ethanol blending with gasoline in several regions of the county beginning in April 2023, and it will be implemented nationwide starting in FY25. The Indian government has streamlined the process to increase local oil production and the transition to alternative fuels to reduce the dependencies on other countries. Currently, India is using a 10% mixture of ethanol and gasoline.

According to the India government think tank Niti Aayog, India's net import of petroleum was 185 Mt at a cost of US$ 55 billion in 2020-21. A successful ethanol blending program is expected to save US$ 4 billion annually. Availability of large areas of arable land, rising production of food grains and sugarcane leading to surpluses, availability of technology to produce ethanol from plant-based sources, and the feasibility of making vehicles compliant to ethanol blended petrol make E20 an important strategic requirement. The government hopes to save up to US$ 6.5 billion in the current FY from ethanol blending

However, the biggest challenge with this process is the shortage of ethanol. The country needs more than 1,000 crore liters of ethanol to achieve its 20% target and the country needs an estimated 600 crore liters more ethanol to meet this goal. Ethanol is the byproduct of the sugar industry, and it may have to divert 60+ lakhs tons of extra sugar to meet the ethanol demand.

The country also needs to introduce more area under cultivation of raw material products which can be converted into ethanol.

However, using food-based raw material to generate ethanol will affect India's world hunger index (currently 101 in 106 countries).

Also, existing vehicles are compatible with 7-10% ethanol-blended gasoline, so an increase in blending would mean reduced efficiencies of engines. Replacing vehicle inventories would require significant investment in retrofitting and calibrations. This level of modification and calibration of vehicles will require large scale investment in infrastructure. To offset this, the government might have to consider tax incentives on E10 and E20 fuel. **PSR**

Russia Report

By Maxim Sakov, Market Consultant, Russia Operations

Editor's Note: *Power Systems Research has paused all research and business development activities in Russia. We have maintained a presence in Russia since 2013 to bring important updates to our clients about the powered equipment markets within Russia. We are monitoring the current situation on a daily basis and hope to again establish this presence when the conflict with Ukraine is resolved. Please contact us at* ***info@powersys.com*** *if you have questions regarding business conditions in Russia. Thank you.* **PSR**

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