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## Alternative Power Report

By *Guy Youngs*, Forecast & Adoption Lead



*Guy  
Youngs*

### Germany Drops Subsidies for Electric Semi-trucks and Buses

Like it did with passenger EV rebates in December, Germany has decided to pull the plug on subsidy programs for electric semi-trucks and city buses. What happens to the nation's commercial EV market now?

When the German government established the funding program for climate-friendly commercial trucks in 2021, the subsidies were seen as a highly effective tool to drive up demand for electric vehicles in the medium- and heavy-duty truck markets.

**Source:** *Electrek* [Read The Article](#)

**PSR Analysis.** Large orders suggest that subsidies have worked, but what remains in question is whether these orders will fall back without any subsidies like the EV Car market has.

### Lithium-Air EV Batteries Tapped For Net Zero Economy Of The Future

Lithium-air batteries seemed destined for the dustbin of automotive history just a few years ago. But the US Department of Energy has tapped four different Li-air projects in a new round of funding aimed at developing new batteries powerful enough to move full-sized airplanes, locomotives, and seagoing vessels.

Lithium Air batteries are better than the Li-Ion batteries used in most EVs today because they breathe in air from the atmosphere for use as an active material in the battery, which greatly decreases its weight. Li-Air batteries also store nearly 700% as much energy as traditional Li-Ion batteries.

**Source:** *Cleantechnica* [Read The Article](#)

**PSR Analysis.** The great potential of Lithium air batteries remains unrealized but this investment by the US government of several hundred million dollars could be the start of something really big, even though its results will be some time away.

### Why Are Hydrogen Fuel Cells So Expensive?

The technology involved in using H<sub>2</sub> as an energy source can be costly for several reasons. Their use is considered to have zero-carbon operations but only when green H<sub>2</sub> is used, meaning that it is produced using processes powered by renewable energy such as wind and solar. That said, the most common production method currently used involves burning natural gas, a fossil fuel.

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## Alternative Power Report

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Currently, costs of producing fuel cells and of producing H2 are among the leading barriers to growth of H2 use.

**Source:** *Hydrogen Fuel News* [Read The Article](#)

**PSR Analysis.** Until these costs come down significantly (and remain low after government subsidies end as they inevitably will) H2 will struggle to compete with EVs.

## Europe May Slap Retroactive Tariffs on Chinese EVs

In October 2023, Europe launched its formal investigation into the Chinese EV industry, as European companies continue to struggle to compete with the cheap, high-tech Chinese imports, made by low-cost labor, entering the European Union.

After months of investigation, the European Commission says it has found evidence that China has been “unfairly” subsidizing the EVs it exports to Europe. Possible “remedies” on the table include retroactive tariffs on Chinese EVs.

**Source:** *Electrek* [Read The Article](#)

**PSR Analysis.** This article was mentioned in previous issues of the Alternative Power Report and now that the EU has found its evidence, we can expect tariffs to be raised, especially as the European car market continues to flounder. **PSR**

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## Global Report

### Van Hool To End City Bus Production in Belgium



Chris Fisher

By *Chris Fisher*, Senior Commercial Vehicle Analyst

Van Hool has announced its exit from the City Bus business and focus on Hydrogen fuel cell coaches which appears to have been a serious miscalculation. As the market transitions away from internal combustion engine buses toward battery electric buses, Van Hool has been left behind.

Van Hool recently lost a bid for 300 electric city buses to BYD which assembles their buses in Hungary at a lower cost than Van Hool could manufacture these in Belgium. It was reported that the BYD bid was approximately 20% less than the Van Hool bid. This along with other issues will result in Van Hool ending most if not all of their bus and coach operations in Belgium and transfer the bus and coach making activities to their assembly plant in Macedonia.

However, Van Hool will need a significant cash infusion in a short period of time to cover the cost of their existing debt and the coming redundancy payments in order to stave off insolvency.

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## Global Report

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*Van Hool's decision to assemble hydrogen fuel cell buses in the coach segment is a good ambition for the longer term and makes good sense for longer distance coaches.*

**Source:** Electrive [Read The Article](#)

**PSR Analysis:** Van Hool's decision to assemble hydrogen fuel cell buses in the coach segment is a good ambition for the longer term and makes good sense for longer distance coaches. However, battery electric buses are currently the solution to zero-emission vehicles for city buses. A big problem Van Hool had was their ability compete on the scale of the larger OEMs let alone a Chinese OEM who has considerable technology and experience and is able to assemble battery electric buses in a low cost country.

While hydrogen fuel would be a very good alternative to the internal combustion engine for the coach segment, this technology is in the very early stages of field testing and will not be ready for significant adoption for at least another 3-5 years, assuming there is enough hydrogen re-fueling infrastructure and the cost of hydrogen fuel is more on par with the cost of diesel.

In the city bus segment, battery electric buses are currently the best solution for zero-emission since the duty cycles are shorter and the buses can typically be charged at their terminals when their shifts are complete. **PSR**

See additional information about Van Hool in the European Report in this publication.

## E-Battery Technology Increases Application Opportunities



Michael  
Aistrup

By *Michael Aistrup, Senior Analyst*

As battery technology increases, the opportunities for battery-powered equipment continue to grow, especially in the Lawn & Garden and recreational products segments. The factors of reduced weight, increased charging capacity and lower cost are making battery-powered equipment more attractive to consumers and commercial users in these segments.

**Lawn & Garden.** The capacity of lithium-ion battery technology to meet the horsepower needs of the homeowner and the commercial landscaper has grown significantly in the last couple of years. Battery-powered lawn and garden equipment can now match the power of traditional gas-powered lawn and garden equipment. Some brands now have available 56V which is more than double what was the standard power available. Batteries now charge quicker, last longer, and can hold a charge indefinitely.

Home Depot pledged recently that 85% of the outdoor lawn equipment it sells will be battery-powered by 2028. The company claims the transition will prevent 2,000,000 metric tons of carbon dioxide and other harmful emissions from the exhaust pipes of residential lawn equipment from being dumped into the atmosphere.

On the commercial side, the initial high costs of equipment will soon pay for itself with the reduced maintenance and fuel costs. The Inflation Reduction Act includes

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## Global Report

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a tax credit for electric vehicles where commercial operators can utilize a tax credit of 30% (maximum of \$7,500) on each piece of battery-powered equipment that qualifies. To qualify, a piece of equipment needs to be any commercial-grade battery-powered lawn mower weighing less than 14,000 lbs. and has a minimum battery capacity of 7kWh.

**Powersports.** Electric Vehicles (EVs) in the recreational Powersports segment are gaining momentum, offering numerous benefits such as increased efficiency, reduced emissions, and quieter operation. Electric dirt bikes and ATVs are providing instantaneous torque and eco-friendly performance. With advancements in battery technology and the charging infrastructure, the range and longevity of electric powersports vehicles continue to improve, paving the way for a greener future.

The high initial cost associated with e-power sports vehicles could potentially hinder the electric power sports market growth, however. While EV's offer longer-term savings through reduced fuel and maintenance expenses, their upfront purchase price is often higher compared to traditional gasoline-powered counterparts.

One of the key advantages of electric powertrains is their efficiency. E-motors convert energy into motion with higher efficiency than internal combustion engines, delivering more power to the wheels. Electric powersports vehicles also produce zero emissions, reducing the environmental impact and enabling riders to explore nature without the noise and fumes associated with gas-powered engines.

The e-batteries market has a huge potential to grow due to the rapid increase in incorporation of electronic systems in powersports vehicles and lawn and garden equipment. Lithium-ion batteries as compared to other batteries, can store very high voltage and charge per unit mass and unit volume. Lithium-ion batteries have low self-discharge, high energy density, fast charging speed, and long service life. **PSR**

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## DATAPOINT: North America US Trenchers

### 4,800

By *Carol Turner, Senior Analyst, Global Operations*

4,800 units is the estimate by Power Systems Research of the number of Trenchers expected to be produced in North America in 2024.

A trencher is used to dig trenches typically for laying pipelines or cables, or for drainage and is available in walk-behind and ride-on models. Trenchers can be configured as chain, rock wheel and bucket wheel, to name a few configurations.

Trenchers, typically wheeled or chain, are utilized in a variety of applications and these machines are quite diversified for various markets having a wide range of clients.

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## Datapoint Report

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Very few Trenchers are electrically powered. Tesmec, which produces trenchers for hard rock cutting needs, is producing less than a dozen electric units.

This product 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 30% worldwide. Buyers in South Africa and Russia make these the two leading markets.

**Market Share:** With 46% of total units produced, Charles Machine Works leads in production of Trenchers in the United States (NA). In second position is Vermeer with 12% (614 units); third, is Ground Hog with 12.5% (604 units).

**Trends:** In 2023, production of Trenchers in North America decreased nearly 3%, dropping from about 5,150 units in 2022 to 5,000 units in 2023. Production is expected to drop 5% in 2024. Prior year demand was mostly from rental companies to have new models in fleet along with construction companies seeking new units. Even though the trencher market fluctuates, expect trencher production to gain an additional 10% by 2030. **PSR**

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## Europe Report

### Rolls-Royce Reports 16% Revenue Growth in 2023



By *Natasa Mulahalilovic*, Finance and Admin. Manager – Europe

Rolls Royce Power Systems Business Unit, based in Friedrichshafen, Germany, reported sales of EUR 4.56 billion in fiscal 2023, a 16% increase over 2022, which was a record year for the company. Operating profit hit 10.2%, up from 8.4% in 2022.

*Natasa  
Mulahalilovic*

The operating profit increase is due to the investments in transformation and process optimization, implementation of a new commercial policy, better cost, and stock management.

Strong demand for standby power generation especially for data centers, implementation of the “From bridge to the propeller” strategy for large yachts, and development of an energy storage systems in Europe integrating renewable energies into the Duch public grid have contributed significantly to the revenue growth.

Rolls Royce Power Systems continues investments into the development of engines using alternative fuels such as hydrogen and focuses its business on five strategic initiatives: power generation, marine, governmental business, battery storage and service.

Dr. Joerg Stratmann, CEO of Rolls-Royce Power Systems AG, says “We’re seeing

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## Europe Report

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growth potential in nearly all our markets, largely independent of global economic developments. Our transformation with its strong focus on high-margin business and profit is paying off. After taking the first steps in implementing the new strategy last year, we are now working rigorously on continued implementation,” he added, “and are convinced it’s going to enable us to set technological and economic standards in the industry.”

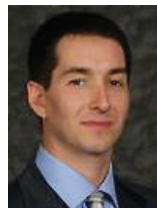
**Source:** *Rolls Royce* [Read The Article](#)

**PSR Analysis:** Investments in updating existing products and continuous development of new products continue to have a positive impact on the Rolls-Royce Power Systems Business unit financial results.

RR recently launched a new generation of diesel power generation sets, the MTU 12-cylinder Series 1600 Gx1; it’s one of the multiple contributors to the MTU success story. The engine’s performance has increased by 49% compared to the previous model. It is certified to use renewable diesel and synthetic fuels to decrease carbon footprint by up to 90% compared to fossil diesel and can be used in different applications, mainly critical ones such as hospitals, airports, data centers, and power plants.

Responding to exigent demand by creating products and solutions like this one is the Rolls-Royce Power Systems strong advantage in the global power systems market. **PSR**

## Van Hool Making Major Changes



*Emiliano  
Marzoli*

*By Emiliano Marzoli, Manager European Operations*

**Brussels, Belgium** – At a special works council recently, bus manufacturer Van Hool announced over 1,100 jobs will be lost at the company between now and 2027. The redundancies and other job losses are part of the 'Van Hool Recovery Plan' the company is introducing to get the business back on track.

The largest number of job losses - about 830 – are planned for this year. Bus production is now being moved to Macedonia, while trailers, industrial vehicles, R&D will remain in Flanders.

**Source:** *VRT News*. [Read The Article](#), [Read This Article](#), [Too](#)

**PSR Analysis:** Van Hool has struggled recently under the pressure of competition from Chinese manufacturers. Even in the Flanders, home of Van Hool, Chinese bus manufacturer BYD was able to win a public tender for the supply of 300 electric urban busses. The biggest advantage of Chinese companies is the know how and attractive price they can offer on battery powered busses. In recent time, Van Hool has invested heavily in Fuel cells busses, but this move has not pay off.

As reported by our latest CV Link™ database, In 2023, urban buses produced worldwide were still in majority powered by internal combustion engines. However,

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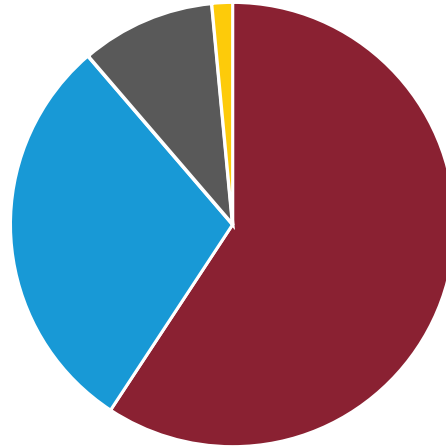
## Europe Report

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*Van Hool recently introduced the “A” platform, a battery electric series of Urban busses, but it’s clearly not easy to compete against Chinese OEMs.*

battery powered vehicles have reached 30% of global production. Fuel Cell urban busses, on the other hand, represented a mere 1.5%.

## 2023 Global Urban Buses Mix



■ Internal Combustion ■ Battery Electric ■ Hybrid ■ Fuel Cell

Source: Power Systems Research CV Link™

Van Hool recently introduced the “A” platform, a battery electric series of Urban buses, but it’s clearly not easy to compete against Chinese OEMs. In 2023, 80% of battery electric busses were made in China, while only 12% were manufactured in Europe (including Turkey).

However, in the days after the announcement of the restructuring, a new way for Van Hool has risen. Latest news reports point to an interest from Guido Dumarey, a leading Belgian entrepreneur, to take over Van Hool, and relaunch the company, retaining the city bus business, and all the employees in Belgium. The situation is in development, and we will monitor it in the weeks to come. **PSR**

## Brazil/South America Report

By Fabio Ferraresi, Director Business Development South America



Fabio Ferraresi

### Car OEMs Announce US\$ 14.3 Billion Investment in Brazil

In the past three months, the aggregate investments announced by automotive manufacturers in Brazil have reached a total of US\$ 14.3 billion. The largest individual investment came from Stellantis, committing US\$ 6 billion to the country between 2025 and 2030, marking a record sum among major vehicle manufacturers operating within the nation. A significant portion

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## South America Report

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of this investment will be directed towards the development of flex-hybrid models.

This investment influx began in December, with Renault earmarking US\$ 500 million for the production of a new SUV in Paraná, featuring engine variants that blend ethanol, gasoline, and electricity. In January this year, General Motors (GM) unveiled investments totaling US\$ 1.4 billion aimed at product rejuvenation.

Subsequently, in February, Volkswagen augmented its previously announced investment plan by US\$ 1.8 billion, extending the total commitment to \$3.2 billion spanning from 2022 to 2028. In the ensuing period, Hyundai announced an investment of \$1 billion, while Toyota declared an allocation of \$2.2 billion.

**Source:** *InfoMoney* [Read The Article](#)

**PSR Analysis:** Most of investment is related to production of hybrid vehicles in Brazil, made by traditional OEMs to compete with Chinese newcomers, BYD and GWM, which are installing plants in Brazil to build hybrid and electric vehicles. The investment will open several windows of opportunity to new suppliers who are expected to join the programs with new hybrid powertrain and plugin technologies for recharge. **PSR**

## AG and CE Segments Poised for Substantial Growth

The agricultural and construction equipment sectors in Brazil are poised for significant growth in coming years, according to data compiled by Anfavea (National Association of Automotive Vehicle Manufacturers) in conjunction with the IBGE (Brazilian Institute of Geography and Statistics).

A comprehensive survey identified 5.1 million agricultural establishments nationwide, of which 14.5% possessed tractors and 2.4% had harvesters, indicating substantial potential for expansion provided farmers have access to both public and private financing avenues for equipment acquisition.

Ana Helena Andrade, Vice President of Anfavea, emphasized the vast scope for mechanization in the country, underlining that the adoption of machinery would lead to enhanced productivity among farmers.

Likewise, the Construction Equipment sector forecasts promising prospects, primarily driven by infrastructure developments, particularly in basic sanitation initiatives. In 2022, only 62.5% of households in Brazil had access to sewage collection, highlighting the pressing need for expansion to serve an additional 27.1 million homes.

The federal government's announcement of the PAC (Growth Acceleration Program), valued at US\$ 260 billion, serves as a significant catalyst for advancing infrastructure projects, with US\$ 70 billion earmarked for the development of efficient and sustainable transportation systems. This initiative encompasses 665 projects encompassing highways, railways, ports, airports, and waterways.

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## South America Report

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*Growth of planted area and productivity in Agribusiness and the pent up demand for infrastructure projects in Brazil are key drivers for these segments, ones that will generate important opportunities for suppliers in these supply chains.*

Initiatives like "Water for All," backed by a budget of US\$ 6 billion, will demand machinery for project execution. Additionally, the refurbishing of existing road networks across the country presents another avenue for equipment demand, with the potential to pave up to 1.4 million kilometers of highways. Presently, Brazil's paved road network spans a mere 12%, totaling 1.6 million kilometers, lagging behind counterparts such as China and the United States, which have paved 84% and 73% of their respective road networks.

**Source:** *AutoData* [Read The Article](#)

**PSR Analysis:** The Anfavea published study matches the Power Systems Research long term perspectives for these segments in Brazil. Growth of planted area and productivity in Agribusiness and the pent up demand for infrastructure projects in Brazil are key drivers for these segments, ones that will generate important opportunities for suppliers in these supply chains. **PSR**

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## Far East: Japan Report

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

### Kubota Plans To Produce Batteries for EV AG Equipment



*Akihiro  
Komuro*

Kubota is considering in-house production of batteries for electric agricultural equipment. It is considering developing and designing its own batteries and building a new plant in Japan.

The company intends to launch electric tractors and mowers in Europe and the United States by 2030. Kubota is preparing for increased demand in Europe, the U.S., and other markets by establishing a system for in-house production of batteries, which determine the running time of electric agricultural machinery.

Kubota currently manufactures diesel engines for agricultural machinery, mainly in Thailand and Japan and ships them to the United States and Europe for final assembly. Regarding batteries, which are a key component of electric agricultural machinery, President Kitao said, "As with engines, we would like to be able to produce batteries for Asian markets in Thailand, and those for Japan, Europe, and the United States in Japan."

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## Far East Report

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Kubota began renting electric tractors in Europe in April 2023. Currently, the company assembles products, including batteries, in a vacant room at an existing plant. Kubota will procure battery cells from outside sources, said Kitao, but the company will be responsible for the overall design and development. It is considering building a dedicated battery plant in Japan to meet demand.

**Source: The Nikkei**

**PSR Analysis:** Kubota has already invested in a Taiwanese start-up company developing battery systems and is moving toward electrification. Kubota's strategy of manufacturing its own batteries is a strategy not seen among other agricultural machinery OEMs, and it can be considered because of the scale of Kubota's business.

At the same time, however, the electrification of agricultural machinery poses significant obstacles. In fact, most people believe that the characteristics of diesel engines are optimal for agricultural machinery, and that it would be difficult to convert to EVs. Frankly, there is no demand for all-electric agricultural machinery currently.

In the automotive sector, the view on BEVs is also changing. Until around 2022, the argument was that BEVs would be the mainstream, but from around 2023, there has been a debate on whether BEVs are really optimal from a life cycle assessment (LCA) perspective.

Considering these different opinions, can agricultural equipment OEMs take a leading role in electrification, and how will that affect the market? Something to think about. **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

### クボタ、電動農機用バッテリーを自社生産にする方針

クボタは電動農機向けバッテリーの自社生産を検討している。バッテリーを自社で開発・設計し、国内での新工場建設も視野に入れている。彼らは2030年までに電動トラクターや草刈り機を欧米に投入する方針だ。電動農機の駆動時間を左右するバッテリーを自社で生産する体制を整えて、欧米などでの需要増に備える。クボタは現在、農機のディーゼルエンジンを主にタイと日本で製造し、米国や欧州に運んで最終製品を組み立てている。電動農機的主要部品であるバッテリーについて北尾社長は、「エンジンと同様、アジア向けをタイ、日本や欧米向けは国内で生産できるようにしたい」と話した。

クボタは2023年4月に欧州で電動トラクターのレンタルを始めた。現在は既存

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## Far East Report

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工場の空きスペースでバッテリーを含めた製品を組み立てている。農機のバッテリーは独自の冷却方式が必要になるため、北尾社長は「バッテリーセルは外部から調達するが、全体の設計や開発は我々が担う」と説明した。需要にあわせて国内にバッテリー専用工場の建設も検討する。

**参考: 日経** (一部筆者により元記事内容を改編しました)

**PSR 分析:** クボタは台湾のバッテリーシステム開発のスタートアップ企業にすでに投資するなど、電動化に向けた動きを進めている。バッテリー製造を自社で行うという戦略は他の農機OEMでは見られない戦略であり、クボタの事業規模があるからこそ検討できる。

だがその一方で農機の電動化自体には大きな障壁がある。そもそもディーゼルエンジンの特性が農機には最適であり、EV化は難しいという見方が大勢なのが実情だ。率直に言って今日の時点では純粋な電動農機の需要は存在しないともいえる。自動車分野でもBEVへの見方は変わりつつある。2022年くらいまではBEVこそがメインストリームだという論調ばかりだったが、2023年ごろから、LCA (ライフサイクルアセスメント) の観点から、果たしてBEVが最適なのか、という議論が出てきている。こうした様々な意見がある中で、農機OEMが電動化の主導的な役割を担えるかどうか、それが市場をどのように変えるのか、変わらないのか。考えていく必要がある。 **PSR**

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## Far East: South Korea Report

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

### South Korea to Build World's Largest Semiconductor Manufacturing Base

The South Korean government announced a plan for a semiconductor industrial park in which Samsung Electronics and SK Hynix will invest a total of 622 trillion won (approx. \$470 Billion). With Japan and Taiwan aggressively investing in the semiconductor industry, the government aims to compete with them by establishing the world's largest base and stabilizing the supply of semiconductors to Korea.

According to the plan announced by the government, Samsung Electronics and SK Hynix plan to invest 500 trillion won and 122 trillion won, respectively, by 2047. In addition to the existing 21 factories, 13 new semiconductor factories and 3 research facilities will be built. The semiconductor industrial park, which stretches from Pyeongtaek to Yongming, is expected to become the world's largest manufacturing base with a monthly production capacity of 7.7 million wafers by 2030.

The amount of investment is a significant increase from the plan first revealed by the government in 2023. The Korean government, which works closely with the private

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## Far East Report

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*It is already well known that the Korean government has placed semiconductors at the center of its economic development.*

sector in its national responsibilities, is increasing its support for the semiconductor sector, which accounts for about 16% of total exports.

**Source: Toyo Keizai**

**PSR Analysis:** I was very surprised by the size of the investment. It is already well known that the Korean government has placed semiconductors at the center of its economic development, and if this plan is realized, it will create an extremely large semiconductor industry cluster in Korea, even by global standards.

Although most observers currently believe that the semiconductor industry will grow significantly in the future, I would point out that as semiconductor research and production increase around the world, price competition will intensify and it is uncertain whether the industry will continue to earn at current profit levels. **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

### 韓国、世界最大規模の半導体製造拠点を建設へ

韓国政府はサムスン電子やSKハイニックスが計622兆ウォン（約68兆円）を投じる半導体工業団地計画を発表した。日本や台湾が半導体産業に積極的に投資するなか、世界最大規模の拠点設立でこれに対抗するとともに自国向け供給の安定を図る。

政府が発表した青写真によると、サムスン電子が500兆ウォン、SKハイニックスが122兆ウォン、それぞれ2047年まで投資する計画。既存の21の工場に加え、新たに13の半導体工場と3つの研究施設を建設する。平沢市から龍仁市にまたがる半導体工業団地は、2030年までに毎月770万枚のウエハーの生産能力を備える世界最大規模の製造拠点になる見込みだ。

投資額は、政府が2023年に初めて明らかにした計画と比べ大幅に増加している。国家的責務で民間企業と緊密に連携する韓国政府は、輸出全体の約16%を占める半導体セクターへの支援を強化している。

**参考: 東洋経済**（一部筆者により元記事内容を改編しました）

**PSR 分析:** 投資額の規模の大きさに非常に驚いた。韓国政府が半導体を経済発展の軸に据えていることはすでによく知られているが、この計画が実現すれば、世界的に見ても極めて大規模な半導体産業の集積地が韓国に出現することになる。現在、半導体産業は今後大きく伸長していくという見方がほとんどだが、今後世界中で半導体の研究が進み、生産が増えていくことで、価格競争が激化し、期待しているだけの利益を今後も得ることができるのか、という点について私は指摘しておきたい。 **PSR**

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## China Report

By *Jack Hao*, Senior Research Manager - China



*Jack  
Hao*

### Electrification of China Construction Machinery Industry Accelerates

The electrification of the construction machinery industry in China continues to accelerate. For example, CATAL and Longgong have signed a strategic cooperation agreement in Ningde, Fujian, a move that follows the January cooperation agreement between CATAL and Lingong Heavy Machinery. According to the agreement, both parties will expand cooperation in the development and production of construction machinery, the development of power batteries for construction machinery, and jointly research and develop adaptive products and market promotion to jointly explore the new energy construction machinery market.

More and more construction machinery companies are turning their attention to the electrification market. Domestic and foreign engineering machinery companies such as XCMG, Sany, Zoomlion, and Carter have developed and launched electric products such as loaders, excavators, and mixer trucks.

In 2023, the total sales of electric loaders increased by 2,435 units compared to the same period in 2022, a year-on-year increase of 209.9%. However, the overall electrification of the construction machinery industry is still in its early stages and the penetration rate is not high. In 2022, only 0.04% of off-road equipment globally was electrified, and the electrification penetration rate in large construction machinery such as excavators, bulldozers, and large loaders was less than 1%.

Although new energy engineering machinery has significantly improved in terms of endurance and power performance, there is still a technological gap compared to traditional fuel powered machinery, and there is a need to improve technical factors such as battery energy density, cycle life, and low-temperature performance.

In terms of cost, the manufacturing cost of new energy engineering machinery is relatively high. At the same time, the construction speed of charging facilities and maintenance networks remains a limitation, since it does not match the growth of market demand for new energy engineering machinery.

However, in the long run, industry insiders indicate that with the development of battery technology and cost reductions, the electrification of the construction machinery industry is expected to accelerate in 2024. The energy consumption cost of new energy engineering machinery is being reduced, construction efficiency is improving, and the economic cost of companies is significantly reduced, achieving a win-win situation of economic and ecological benefits.

**Source:** *EEO Read The Article*

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## China Report

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**PSR Analysis:** With the decline of China's domestic economy, sluggish demand for construction machinery, and increasingly fierce market competition, some foreign-funded companies have begun to consider reducing the scale of Chinese engineering or departing the Chinese market altogether. Companies are putting more resources into the development of new models, expansion in the new energy sector, and growth of overseas markets.

Presently, the main product inventory of domestic construction machinery exceeds 9 million units, and it is growing at a rate of about 300,000 units per year. The penetration rate of new energy construction machinery is less than 1%. Against the backdrop of policy promotion and environmental pressure, the penetration rate of electrification of construction machinery will rapidly increase in the coming years, with an expected penetration rate of over 30% by 2025.

Compared with traditional fuel engineering machinery, electric engineering machinery has a long service cycle, high utilization rate, low operating costs, and the dual advantages of environmental protection and performance, making it more economically efficient overall.

Batteries account for 40% to 50% of the total cost of electric construction machinery. The main purpose of engineering machinery companies entering the battery field is to promote the development of their products. But currently, the main battlefield for batteries is still passenger cars.

As a hidden incremental market, electrified construction machinery needs to continuously expand its application areas. Manufacturers and battery production enterprises need to continue to innovate and collaborate in technology, further reduce battery costs, and improve battery life in order to accelerate the electrification process of construction machinery. **PSR**

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## India Report

By *Aditya Kondejkar*, Research Analyst – South Asia Operations and *Rushikesh Kumawat*, Analyst

### India EV Market Provides Opportunities and Challenges



*Aditya  
Kondejkar*

**EDITOR'S NOTE:** The 5th Annual TWF (Two Wheeler Forum) took place on Feb. 21 and 22, 2024, at the India International Convention & Expo Centre in Dwarka, New Delhi. Hosted in partnership with Trak N Tell, the event spotlighted aspects of the Indian two-wheeler and three-wheeler industry, spanning both electric and internal combustion engines.

The landscape of electric vehicles (EVs) in India is undergoing a transformative shift, with the recent 2 wheeler, 3 wheeler,

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## India Report

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and EV show held in Delhi showcasing the industry's dynamic evolution. Despite constituting less than 1% of total vehicle sales, the electric vehicle sector holds immense potential, and is projected to grow to over 5% in the years to come. Currently, the Indian roads host over 5 lakh electric 2 wheelers and a modest number of electric cars. However, the market's growth trajectory remains subject to fluctuations, predominantly influenced by governmental incentives.

A myriad of players populate the Indian EV market, including prominent names such as Eco, Hero, Ather, Lohia, and Ampere, among others. These manufacturers are pivotal in catalyzing positive change within the country. Notably, 90% of EVs in India comprise low-speed E-Scooters, exempt from licensing and registration requirements. Despite their popularity, the utilization of lead batteries to mitigate costs has led to concerns regarding battery lifespan and failure rates, impeding EV sales.

Rising environmental consciousness and concerns over climate change and air pollution are driving consumer preferences towards greener transportation alternatives. This shift underscores the burgeoning demand for electric two-wheelers as a cleaner mode of transportation compared to traditional internal combustion engines. Moreover, growth isn't confined to two-wheelers; significant strides are evident in other vehicle segments like 3 wheelers, 4 wheelers, and E-buses, propelled by government initiatives aimed at bolstering the EV market.

**Impacts on Stakeholders.** Electrification is affecting many sectors of the India economy, from OEMs and component manufacturers to infrastructure providers.

- **Manufacturers and Suppliers.** The transition towards EVs is forcing traditional manufacturers to adapt to meet evolving consumer demands and regulatory mandates. This entails substantial investments in retooling manufacturing facilities, sourcing components, and intensifying research and development endeavors. Collaborations with battery manufacturers, technology providers, and startups are pivotal in developing EV platforms, charging solutions, and battery swapping infrastructure.
- **Infrastructure Providers.** The proliferation of EVs underscores the need for a robust charging infrastructure. Investments in smart grid technologies, battery swapping networks, and charging stations are imperative to foster widespread EV adoption. Battery swapping technology, in particular, emerges as a pragmatic solution to assuage range anxiety and circumvent charging infrastructure constraints.

**Challenges for EV Adoption.** There are several major challenges that could slow the development of EV use in India. These include:

- **Range Anxiety.** The pervasive concern of range anxiety stems from the limited range of EVs vis-à-vis traditional vehicles, exacerbated by concerns surrounding charging infrastructure availability. Addressing this necessitates concerted efforts in expanding charging infrastructure, especially along major routes and highways.

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## India Report

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*While the Indian EV market teems with promise, successfully navigating its challenges will require concerted efforts from stakeholders across the ecosystem.*

- **Charging Speed and Convenience.** Inconvenience and protracted charging times exacerbate range anxiety and deter EV adoption. Investment in fast-charging technologies and promoting workplace and home charging solutions is imperative to assuage consumer apprehensions.
- **Total Cost of Ownership (TCO) and Total Value of Ownership (TVO).** TCO and TVO analyses offer holistic insights into the economic and environmental implications of EV ownership. While TCO encompasses the comprehensive costs associated with owning an EV, including purchase price, energy costs, maintenance, and depreciation, TVO delineates broader value propositions such as environmental impact, health benefits, and convenience.
- **Market Penetration.** Ola Electric is emerging as a frontrunner in the EV market, leveraging substantial investments to bolster its EV business and infrastructure. Collaborative ventures and strategic expansions underscore the burgeoning potential of the EV sector.
- **Navigating Data Discrepancies.** Discrepancies between OEM-reported data and the Vahan portal underscore challenges in data accuracy and reporting. Delays, incomplete reporting, variations in data sources, and distinctions between registrations and sales underscore the complexities in gauging the true scope of EV adoption.

**Summary.** While the Indian EV market teems with promise, successfully navigating its challenges will require concerted efforts from stakeholders across the ecosystem. Addressing infrastructure constraints, dealing with consumer concerns, and fostering data transparency are necessary to catalyze widespread EV adoption and realize India's electric mobility ambitions. **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 maintained an important presence in Russia from 2013-2022 to bring important updates to our clients about the powered equipment markets within Russia. We are continuing to monitor the current situation and hope to again establish this presence when the conflict with Ukraine is resolved. Please contact us at [info@powersys.com](mailto:info@powersys.com) if you have questions regarding business conditions in Russia. Thank you. **PSR**

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