

## Company Report

**Apollo Future Mobility Group (0860 HK)**

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Company Research

**All Flowers Blooming****AFMG Switching Sides from Fossil to Electricity**

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**Head and Shoulders Above**

AFMG's strategy is different from conventional electric supercar manufacturers such as Nio and Arcfox, that investing into motor racing, develop proprietary technologies, and apply the results into mass production cars. AFMG may be aiming to license out their know-how developed from EV hypercars as they have been doing with GLM.

**Iron Triangle in EV Value Chain**

AFMG has formed the iron triangle in EV value chain. The apex consists of the Apollo AAT group, GLM and the newly acquired Ideenion which R&D on mobility technologies for licensing and royalty revenue. The second vertex will be the brand image and core device technology, such as the 800V SiC dual inverter. The third composes of downstream vehicle manufacturing, thru JV with Jiangsu Jemmell, that may employ engineering services from the apex.

**Apollo to Shine Brighter and Foster Blooming Flowers**

AFMG has built-up key links in the EV value chain. The next step is the integration of these links and unlock the value of synergy. AFMG is in the footstep of Rimac that in addition to making EV hypercars in limited volume, it also provides services on project basis to major automobile OEMs.

AFMG is NOT RATED.

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MAR 3, 2021	Closing Prices	Mkt Cap
0860 HK Apollo Future Mobility	HK\$0.510	HK\$4.07bn

## Overview

Apollo Future Mobility Group (AFMG) is an evolving turnkey solutions provider in the electric vehicle (EV) value chain. Over the years, AFMG has built up its products and services portfolios in EV design, 3D printing automobile manufacturing, EV engineering, infotainment / advanced driver assistance systems (ADAS), and EV charging.

### AFMG Acquisition Timeline

AFMG ventured into the EV segment and acquired GLM, a leading sports EV OEM, and invested in Divergent, a leading provider of proprietary 3D metal printing solutions for vehicle structure in 2017, and invested in EV Power, a leading EV charging solutions provider in Hong Kong and China in 2018.

In November 2019, AFMG formed a joint venture with Jiangsu Jemell New Energy Automobile with business primarily in the design, R&D, and production of NEVs and related automobile parts, and will also provide related technical support and after-sales services.

In February 2020, GLM collaborated with ROHM, a semiconductor and electronic component manufacturer, to jointly develop 800V silicon carbide (SiC) dual inverters.

Another milestone is the completion, in March 2020, the Apollo acquisition, which is in the design, development, manufacturing and sale of high performance hypercars under the brand "Apollo" worldwide, and AFMG changed its name to the current one to reflect its business focus.

In February, AFMG completed the acquisition of 100% of Ideenion, a leading German mobility solutions provider, which is principally engaged in the design, development and prototyping of internal combustion engine vehicles and new energy vehicles (NEV).

Down the road, it is show time for AFMG to tie the pieces together and unlock the value of synergy.

## Switching Sides from Fossil to Electricity

Despite the fact that its namesake comes from Apollo, the fossil fuel hypercar maker, AFMG has planted its root in EV long time ago and has been undergoing transformation ever since.

The reformed business model of AFMG started in September 2017 when it acquired effective control of GLM Co., Ltd (GLM). Located in Kyoto, Japan, GLM is principally engaged in the manufacturing and sales of EVs and the

provision of EV engineering solutions including chassis, power systems, and vehicle control units to downstream EV OEM in Japan. In March 2020, AFMG also completed the 86.06% acquisition of Apollo Automobil GmbH and Apollo Automobile Limited (Apollo), a hypercar developer. Apollo has no EV in its portfolio, though. Then in October 2019 AFMG also announced the acquisition of 100% interests in Ideenion Automobil AG, which in turn owns 75% interests in Ideenion Design (Ideenion), a Germany based vehicle designer, both in modelling and interior.

### **Apollo Shines Again**

Apollo was founded under the name Gumpert in 2004 by German engineer Roland Gumpert but it filed for bankruptcy in 2013. In the following year it was bought for an undisclosed sum by Ideal Team Ventures, a Hong Kong based investment company. Under the new ownership Apollo turned around and launched the highly impressive “Intensa Emozione”. Ideal Team Ventures also acquired the Italian racing car brand “De Tomaso”, at the time when it went bankrupt for merely EUR1mn plus.

However, the deals between Ideal Team Venture and AFMG are more than straight forward ones. As said, Ideal Team Venture sold 86.06% interests of Apollo to AFMG for a sum between HK\$206mn to HK\$1,032mn in cash and shares (to be issued at HK\$0.52 each). The final amount would be benchmarked to the EBIT of Apollo in 2021 after deducting the losses it made in 2019 and 2020, if any. The reference EBIT would be between EUR1.89mn to EUR9.45mn for 2021.

It all sounds very commercial with the EV / EBIT multiple of 12.56x at prevailing exchange rate at the higher end, but according to the announcement of AFMG dated 12 May 2020, Apollo entered into a license agreement with De Tomaso whereby De Tomaso is granted the proprietary rights to use the new vehicular platform to be designed and developed by Apollo in “De Tomaso” branded vehicles with a term of three years commencing from 12 May 2020 and ending on 11 May 2023. The cap for 2021 would be US\$5mn.

The platform being designed and developed by Apollo is a new vehicular platform which can be used in various types of vehicles worldwide. The platform includes a complete rolling chassis including crash structures, full powertrain, electronics and suspension, and is proprietary to Apollo. The agreement also stated that should Apollo decide to sell the platform in the future, De Tomaso has the right of first refusal to purchase the entire development program of the platform from Apollo, including all intellectual properties.

### **Dark Cloud or Silver Lining**

This is very much like sales and lease back arrangement. Except that in the lease, what the seller (Ideal Team Ventures / De Tomaso) pays to the

purchaser / landlord (AFMG) would fuel the EBIT of the property (Apollo) and would contribute to the profit guarantee provisions that benefit the seller (Ideal Team Ventures), given there is no specific provision suggesting the relevant EBIT must be from independent third party customers, the testimonial on the technological excellence, marketing capability, and financial soundness of Apollo's platform.

So, what does AFMG get from the deals? The brand Apollo, an exquisite manufacturing facility and design capability. And what does Ideal Team Ventures get from the deal? Up to HK\$1bn in cash and shares in aggregate, able to OEM the new Apollo platform that it previously owned under the De Tomaso badge, and they can buy back the platform if needed in the future. Despite that there is no specific news from Apollo in relation to the said new platform, we will not be surprised that Apollo would not focus on this new platform as the gasoline powered version it does on Intensa Emozione. This would confirm our guess that AFMG acquired Apollo mainly for its goodwill and an exquisite manufacturing facility and design capability, as the base for the next generation of electric hypercar. This means Apollo's future direct competitor could be Rimac. A bold yet admirable move.

Now looking back to the other acquisitions, it all made sense. GLM has the experience in designing including chassis, power systems, and vehicle control units as an OEM, and they have a EV roadster "Tommykaira ZZ". Ideenion is very good in surface and interior design and they showcased their works in a number of not publicly disclosed EV projects, in conformity with industry norm on secrecy, with European automobile OEMs. A holy-trinity has formed. Competing in the EV hypercar segment is no longer a distant prospect for AFMG.

Rimac has Porsche as its strategic shareholder, and probably has the support from the entire VW Group, making it the electric version of Bugatti.

### **Head and Shoulders Above**

It is worth to mention that we consider that AFMG's strategy is different from other electric supercar manufacturers such Nio and Arcfox. The Nio EP9 and Arcfox GT are nevertheless excellent electric supercars. However, the business model of Nio and Arcfox (which is owned by BAIC) actually follows the conventional wisdom, in that a car manufacturer invests into motor racing, develop proprietary technologies, and apply the results into mass production cars. We see that in Ferrari / Maserati / Fiat, TRD / Toyota, Mugen / Honda and many others. Both Nio and Arcfox has high-end mass production EVs in their product line-ups, and we believe those are the actual cash cows that they are aiming rather than relying on the sale of EV supercars.

Other EV manufacturers such as Lucid, Tesla, XPeng are producing impressive high performance EVs, but can hardly be considered EV hypercars.

On the other hand, we believe AFMG has neither the intention nor the capital to construct a new full-fledged manufacturing plant to construct high-end EVs in mass production scale. It appears that they may be aiming to license out their know-how developed from EV hypercars as they have been doing with GLM. This is a very different model from other EV manufacturers.

The JV formed by the AFMG and Jiangsu Jinpeng actually follows the above logic, despite its products are in the opposite spectrum of hypercars.

### **Iron Triangle in EV Value Chain**

Upon the completion of Ideenion acquisition, AFMG has formed the iron triangle in EV value chain. The apex being the Apollo Advanced Technologies (AAT) group which performs R&D of mobility technologies that can be adopted in own products and/or licensed to external users. AAT also offers comprehensive outsourcing services from design, engineering, simulation, prototyping, vehicle testing to pre-production prototypes. AAT currently has operations in Japan as GLM and in the United Kingdom, and will be strengthened by Ideenion, with its advanced design and engineering expertise to further enhance AFMG's ability to provide high-end technological solutions to customers, and to expand AFMG's business coverage to Germany.

The second vertex will be the core device technology and brand image. AFMG has cooperated with ROHM of Japan in co-development of 800V SiC dual inverters. As compared to the current generation of 400V insulated gate bipolar transistor inverter using silicon technology, the newly developed 800V SiC dual inverter, coupled with the battery management system with solid state battery can greatly reduce the heat output of the inverter, while reducing weight, size and time required for charging.

By incorporating this inverter into GLM's new EV system, GLM will be able to further optimize its core technology and expand its component business focusing on the development of new models and the supply of EV systems. Prototype production has been completed in May 2020 while testing in driveable electric prototype cars will commence at the end of 2020 or early 2021. The project aims for mass production in spring of 2022.

The third vertex in AFMG's triangle is the downstream vehicle manufacturing and aftermarket services segment. AFMG has formed a joint

venture with Jiangsu Jemell New Energy Automobile, which is a related company of Jiangsu Jinpeng, one of the largest EV tricycle manufacturers in China with well-established supply chains and distribution channels. Combining with GLM's brand and research capability, the JV will produce EVs targeting the young generation to meet the market demands in China, Japan and Southeast Asian countries.

With few moving parts, EVs need less maintenance and servicing than their diesel/gasoline counterparts. Yet charging stations will be the key due to the limited mileage range of current generation EVs, given the expensive lithium battery nowadays. AFMG has invested in EV Power, a leading EV charging solutions provider in Hong Kong and China as early as in 2018.

Yet the synergy from the integration of these three business lines is yet to be seen. Revenue from EV segment as reported by AFMG is still not substantial when compared to the traditional retailing of jewellery and watches, money lending and property investment business.

### **Synergy in Iron Triangle**

AFMG had completed the acquisition of Ideenion Automobil AG (IAAG) in February. IAAG is principally engaged in the design, development and prototyping of internal combustion engine vehicles and NEVs, including vehicle components and accessories for vehicles. Its two subsidiaries, Ideenion Design which is principally engaged in the styling and design of vehicles and the development of software for vehicles, and Ideenion Electronic which is principally engaged in the research and development of electronics and software for vehicles and the design, development and manufacturing of prototype electronic systems and components for vehicles.

With the closing of the IAAG deal, AFMG now have the capability to integrate the Apollo hypercar brand, Ideenion design and development of NEV, software, and power electronics SiC inverters, under one roof.

### **AFMG: Rimac in the Making?**

Though it is still too early to tell if AFMG can make another Rimac, which boasts its C\_Two all-electric hypercar capable of outputting 1,914 horsepower and 1,696 pound-feet of torque, reaching 60 miles per hour in just 1.85 seconds and tops out at 258 mph, and making multiple rounds of fund raisings from Porsche, Hyundai and Camel Group, a battery maker from China.

### **Silicon Carbide (SiC) Technology Going Main Stream**

AFMG is also tackling the EV market from another direction via its second vertex – the 800V SiC dual inverter core device technology in cooperation with ROHM of Japan.

According to a report published by EETimes, an electronics industry information portal, with title Gallium Nitride (GaN) and Silicon Carbide (SiC) Devices and Technology, SiC is taking the centre stage in the EV market with its superior performance compared to silicon: higher efficiency and switching frequency, higher operating temperature, and higher operating voltage. SiC-based devices can efficiently replace some silicon-based devices, such as the main inverter, which is a key component in EVs.

**Exhibit 1: Silicon Carbide (SiC) Taking Centre Stage in EV Market**

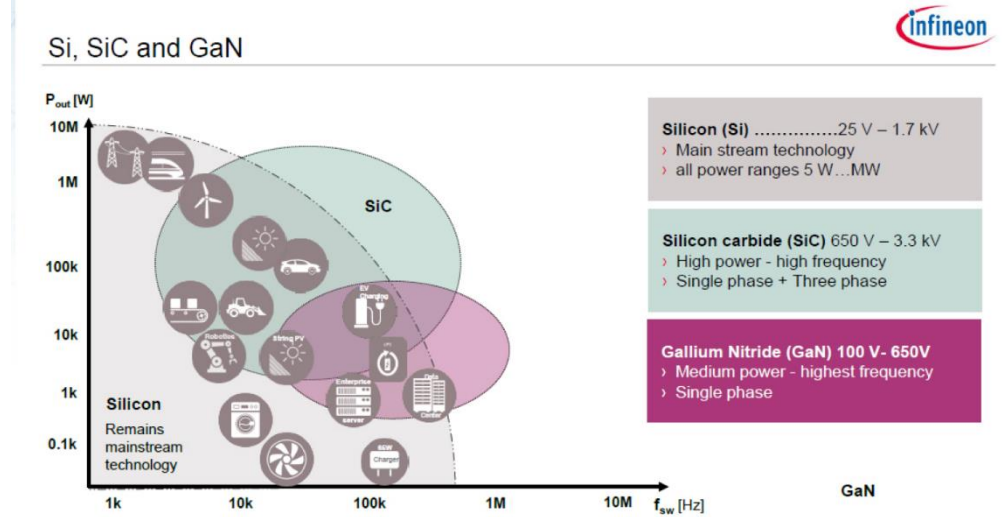


Figure 1: In overlap applications where Si, SiC, and GaN can be used, the choice comes down to density, efficiency, and cost, and once the designers understand those three parameters, it will guide them to which switching technology to use. (Image: Infineon Technologies)

Source: Gallium Nitride (GaN) and Silicon Carbide (SiC) Devices and Technology, EETimes

**Porsche’s Taycan Sport Car with 800V Charging Infrastructure**

Tesla is the first high-end EV manufacturer to integrate a full SiC power module – inverter composed of 24 1-in-1 power modules assembled on a pin-fin heatsink, in its Model 3 in collaboration with STMicroelectronics, a key player in SiC inverter market. The SiC inverter market has been making fast progress in the last two or three years and the gap between makers and OEMs is being bridged, despite in early adoption stage. Delphi Technologies is offering SiC inverters operating at 800 volts with first volume production going to happen in 2022 and Porsche’s Taycan sport car is the first production car to utilise an 800V operating and charging infrastructure, aiming to achieve a DC charge rate of 270kW with further target charge rates of 400-500kW at 800V.

## Going Forward

AFMG has more or less built-up key links in the EV value chain. The next step is the integration of these links and unlock the value of synergy. AFMG has been reporting lower revenue in all of its four reporting segments in its fiscal year ended September 2020, amid global pandemic. And the sales and distribution of vehicles and provision of engineering services segment, which included the EV related business, was still under development and reported only HK\$3.5mn in revenue. Yet there are some significant developments made in this segment.

Another key step in the integration of AFMG's product portfolio is how fast and successful in becoming a world leading mobility solutions provider in the NEV and mobility industry. Ideenion, with expertise in the design, development and prototyping of both ICE vehicles and NEVs, can be put to good use in boosting AFMG's ability to provide high-end technological solutions to customers. In the brief management discussion and analysis section of results announcement, AFMG has yet to provide details regarding the integration.

Having said that, AFMG is again in the footsteps of Rimac. In addition to making EV hypercars in limited volume, Rimac did provide its services on project basis to major automobile OEMs and chief executives or senior representatives from almost every major car manufacturer are said to have visited the Rimac site. We are keen to learn what projects that Ideenion has worked on.

Another key step that Rimac is making is on components for the bigger automobile OEMs in higher volumes, hundreds of thousands of them. It is aiming for high-performance electric cars segment on cells, batteries, electronics, electric motors, inverters, transmissions, torque vectoring systems, ECUs and infotainment systems. Though no concrete details are disclosed by this private company, from the variety of components indicated, such components are likely future targets rather than current products on offer. Yet the message is clear for Rimac, limited production of EV hypercars is not the only goal, it must be supplemented by high volume production of components.

AFMG has 800V SiC dual inverter to offer in the near future. How well this next generation technology is being integrated into AFMG's existing or prospective Ideenion development platform will be a test of AFMG's capability in unlocking synergetic benefits.

### Europe Catching Up Fast with China in 2020







Sales of plug-in passenger car in Europe in 2020 rose 137% year on year to almost 1.4 million in contrast to the broad auto market that was down 20%



year on year overall, according to EV-volumes.com. In China, EV sales rose 12% to 1.34 million vehicles.

Europe based EV OEMs are aggressive in new products roll out in the European market, and USA and Japan OEMs are also joining the fray.

**Exhibit 2: Carmakers EV Portfolio Roll Out in the European Market**

Carmakers	Pre-2020 models	H1 2020	H2 2020	2021
	Ampera-e, C-zero, iOn	e208, e2008, Corsa-e, DS 3 Crossback	e-C4	Mokka-e
			XC 40, Polestar 2	
	Model 3, S, and X		500e	Model Y
	i3	Mini	iX3	iX, iNext, i4
	Zoe		Twingo	Dacia EV
			MX-30, Lexus UX	
	Leaf			Ariya
				Mach-E
	Ioniq, Kona, e-Soul, e-Niro			
	eGolf, e-tron, Taycan, Mii, Citigo, eUp!	e-tron Sportback	ID.3, ID.4, Cupra el-Born	Enyaq, ID.5, e-tron GT, Q4 e-tron
	I-Pace			XJ, J-Pace
	EQC, Fortwo, Forfour			EQA, EQB, EQS, EQE

Source: Transport & Environment, Hooray Securities

Eyeing the booming EV market, outsiders are also jumping in. The most notable one will be Apple which is said to be engaging Kia to develop Apple brand EV. Despite market news are mixed on whether their talks are going on or broken down, it is more likely than not if we have a 5-year horizon, instead of just looking around the corner.

In view of the current and expected presence of its EV assets in Europe, AFMG is poised to benefit from this new booming market. Yet few details are available regarding Ideonion’s business development, we may have to grope in the dark as all parties are tight lipped in such deals, in conformity with industry norm on secrecy.

Taking Rimac as a reference, despite quoting 35 projects in Rimac’s history, only one is publicly disclosed - the Cupra, the high-performance sub-brand of Seat, the Spanish marque owned by Volkswagen. Not to mention the Apple-Kia partnership that has been in talk since 2018.

Hope Apollo shines brighter and fosters blooming flowers. AFMG is NOT RATED.

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