

Will your franchise win in the NEV wars? Part 9: Toyota

This post is the last of a series reviewing the financial resilience of seven major auto makers and their ability to make profits during the transition from conventional to electric vehicles. The auto-makers reviewed are Daimler, BMW, Volkswagen, PSA, Ford, General Motors and Toyota. The first post asked where they might get the money to fund the transition to new energy vehicles (NEV's). The second gave the financial results for each firm under three scenarios based on the speed of adoption of NEV's: SLOW, MODERATE and FAST. The rest of the posts look at the outlook for each firm individually taking into account its publicly stated strategy for the transition. This final post in the series assesses Toyota.

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Toyota Mirai 2021 - Hydrogen Fuel Cell powered with expected range of 400 miles.

Toyota took overall #4 place in the Financial Forecast, losing money in the SLOW scenario, but making more money, in absolute terms, than any other OEM surveyed in both the MODERATE and FAST scenarios. Three factors drove its success: First, its financial scale and resilience. Second, its high gross (18%) and operating profit (8%) margins. Only BMW (9.4%) and Daimler (10.1%) have higher operating profit margins. Third, its lower operating leverage (2.2 times in 2018 and averaging 4.0 times over the forecast period) helps it when volumes drop, while its high operating profit margin supports it when volumes rise. Although, Toyota makes losses in the SLOW scenario and profits grow more slowly in the MODERATE and FAST scenarios, its profits have less volatility, so it can withstand wider swings in sales than its volume producing rivals. As Toyota themselves acknowledge, the company is following a MODERATE adoption scenario.

It helps that it starts from higher than average Gross and Operating Profit margins which allows it to outpace all other volume producers in absolute terms, as reflected in the financial resilience KPI comparison where Toyota ranks #1. It scores highest in Revenue and Growth, reflecting how well it has shaken off the 'pedal-gate' litigation issues of 2009 - 2011. Unit volumes and revenues are now



OEM KPI SCORES	FORD	TOYOTA	GM	VW	DAIMLER	BMW	PSA
REVENUE & GROWTH	47%	53%	40%	77%	73%	60%	73%
PROFITABILITY	31%	66%	63%	40%	28%	49%	89%
CASH FLOW	80%	67%	47%	73%	90%	47%	50%
LIQUIDITY AND DEBT	26%	72%	60%	52%	92%	76%	48%
OPERATING EFFICIENCY	55%	83%	60%	65%	60%	55%	65%
SHAREHOLDER RETURN	40%	72%	60%	36%	62%	72%	63%
FINANCIAL RESILIENCE	66%	69%	55%	57%	63%	60%	65%

OEM RESILIENCE SCORES 2018

substantially above 2011 levels. Free cash flow has been positive since 2013, a claim only matched by Ford. It tops the charts on both Liquidity and Debt and Operating Efficiency. Over the period 2013 to 2018, shareholders have enjoyed the highest Return on Invested Capital, lowest level of debt, highest dividend per share growth and the least volatile share price among the OEM's surveyed. It could be fairly described as a stable investment. With that track record, Toyota said it would buy back up to \$1.8 billion worth of its common stock, or 34 million shares, by end-March 2020. Given its \$230BN Market Capitalisation, the share price has risen proportionately since the announcement, so stockholders should be happy enough.

What is Toyota's NEV Strategy?

Being the largest auto-maker by market capitalisation (\$230BN Jan 2020), enjoying significant market share in all three main global markets and located in Asia, the epicentre of electronics manufacturing, has motivated Toyota to widen from its initial two-pronged strategy (FCEV and PHEV 1997 - 2017) to a three- pronged strategy (FCEV, PHEV and EV) from 2019 onwards. Its commitment to hydrogen fuel cell technology (FCEV) has not ended. However, the current paucity of publicly available hydrogen charging stations in key markets, such as the US, simply deters buyers from buying or using the product. Consequently, Toyota is modifying its FCEV strategy - to 'Toyota Inside' - and adding EV's using both conventional and solar-powered batteries while retaining PHEV.

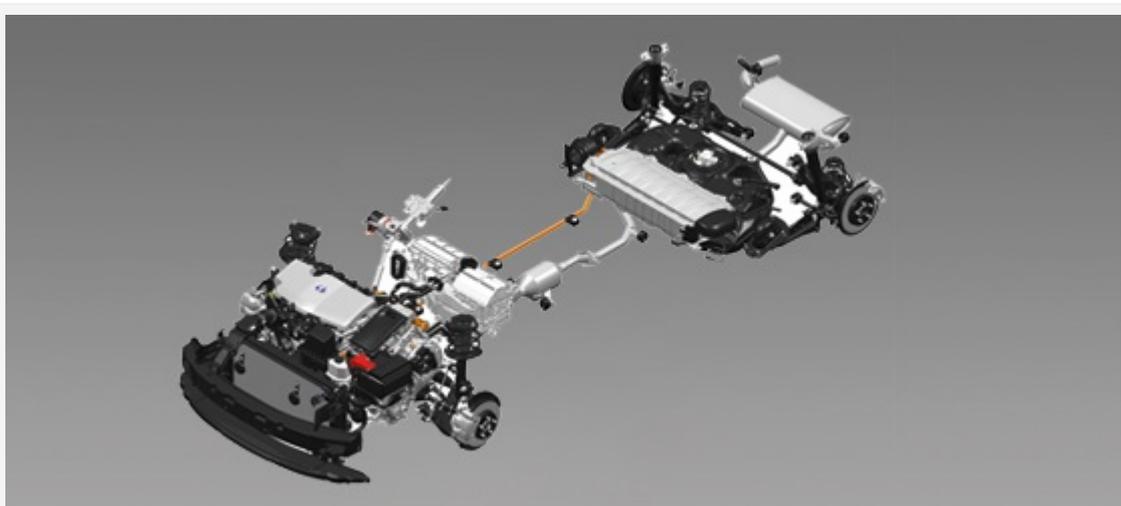


Toyota launched the first PHEV, the Toyota Prius in 1997, arguably paving the way for environmentally friendly motoring. It has now set itself a goal of selling 5.5MN electric vehicles by 2025 which includes 1MN BEV's/FCEV's. Its approach in each technology is different.

Its FCEV approach is 'Toyota Inside', a derivative of the successful strategy used by Intel to encourage use of micro-chips and create its brand. Toyota's idea is to sell its Fuel Cell Stacks to Chinese auto makers so that others can expand the FCEV segment, as well as Toyota making FCEV's themselves. In battery technology, Toyota is pursuing three paths: Modular Lithium, Solid state and Automotive Solar. In PHEV Toyota is seeking to extend the efficiency of both mild and full hybrid products, such as the Corolla, taking advantage of the new regulations in China encouraging PHEV alongside BEV's. These multiple technology commitments are driven by their assessment of the opportunities in each global market. In simple terms, Toyota intend to have an electrified option available for each model, according to its market regulations and consumer acceptance: hybrid electric, plug in hybrid electric, fuel cell electric or pure battery EV.

But Toyota's over-arching strategic vision goes beyond only making finished vehicles. It sees itself as a Tier 1 supplier as well. While it doesn't believe BEVs will replace ICE before 2030, or even 2040, it now feels that the NEV market is large enough to raise their investment level, despite EV's immediate lack of profitability. In March 2019, Toyota Tsusho bought into Fukuta Electric & Machinery Co. which is becoming a global supplier of electric vehicle components and systems. It's also contributing to Automotive Grade Linux, a collaborative effort that wants to set an industry standard for the operating systems of connected cars. Toyota may also see opportunities in software and the digital space beyond manufacturing.

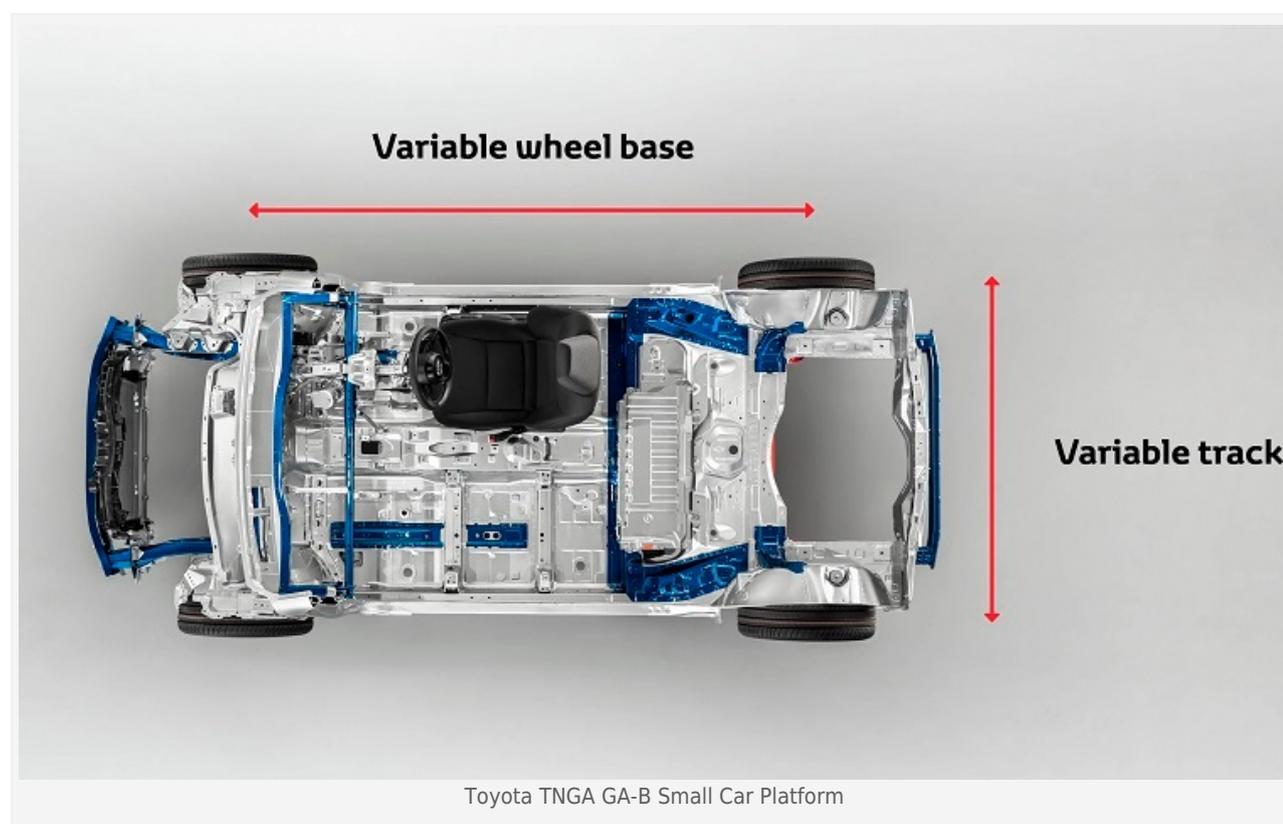
Toyota is taking a diversified approach to NEV's without limiting its options. If BEVs take off, it will emerge as both a supplier and brand. If not, it will license its own technology to companies more willing to take risks in an uncertain market. Toyota is making significant investments while simultaneously keeping its options open. If electric vehicles don't take off, they're positioned with ICE and PHEV's. If they do, Toyota is positioned to become a major producer.



TNGA Platform Elements

Underpinning their multi-branched technology approach is the Toyota New Global Architecture (TNGA) launched in 2013. It is a scalable architecture for platform development that enables Toyota to build cars of different sizes using standardised platforms, power-trains and major components, similar in concept to VW's MQB 'toolkit'. There is a specific e-TNGA platform architecture for BEV's. In partnership with Subaru - Toyota have a 20% stake in Subaru - Toyota and Subaru will develop BEV platforms for mid-size and large passenger vehicles and a C-segment-class (compact) BEV SUV model under each company's brand with AWD.

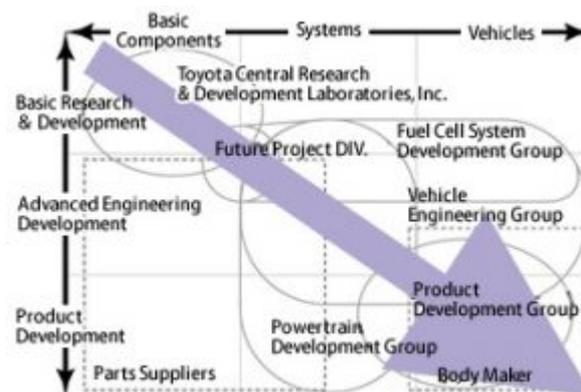
By-products of TNGA are lower resource requirements in construction, lighter weight and lower production cost. In 2013, globally, Toyota used more than 100 uniquely modified platforms and sub-platforms, and 800 power-trains, including engines modified to fit those different platforms. But, with TNGA, these will be reduced to just 5 layouts, from compact sports cars to SUVs. As TNGA-built cars use many uniform parts, fewer components will need to be designed, produced and shipped. The cars will also need 20 per cent less manpower to build - reducing the



development time and engineering cost of future models. Fewer components and less manpower will make factories lower cost too, helping to bridge the gap between conventional and NEV production costs. By 2020 the aim is that half of all Toyota's products will be built on TNGA platforms.

So far, the TNGA philosophy has resulted in the GA-C platform, used for the Prius since 2015, and subsequently deployed for the C-HR crossover and British-built Corolla. Larger vehicles, such as the Camry and RAV4 are built on a similarly derived platform, the GA-K. The new GA-B platform will be rolled out with the next generation Yaris.

Toyota has been investing in battery technology and battery production. Their Primearth EV Energy (PEVE) battery production unit, set-up in 1996, aims to set up a fourth hybrid vehicle battery plant by 2021. Once up and running it will boost their total production capacity to 400,000 batteries a year taking into account their battery manufacturing JV's with Panasonic in Jiangsu, China. To provide batteries for EV's - the company has partnered with four additional suppliers: Japan's GS Yuasa and Toshiba, as well as China's BYD and CATL. Notably, Toyota maintains capability in both Lithium-ion and nickel metal hydride batteries, to avoid capacity and raw material price risks across their range. The Prius can use either battery type while their Fork Lifts use Toyota factor made lithium batteries. PEVE can make both.



Can Toyota Win The NEV Wars?

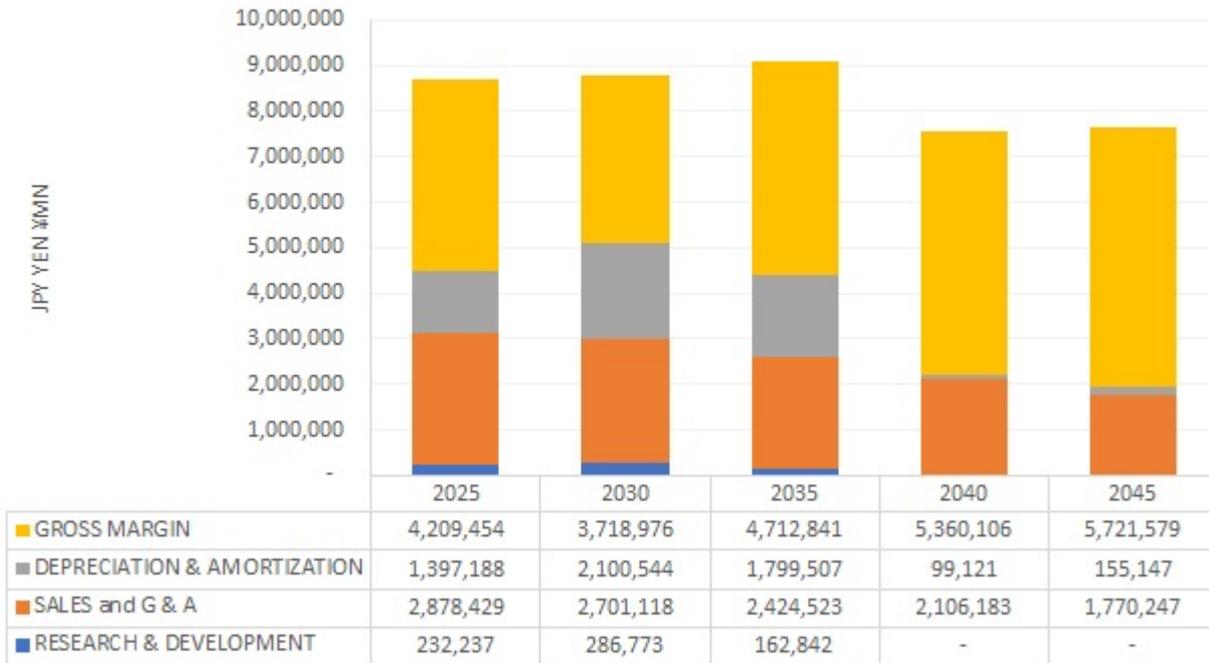
TOYOTA GLOBAL SALES MIX						
	EUROPE	NAFTA	CHINA	JAPAN	ASIA	OTHER
2013	8.0%	24.0%	9.0%	16.0%	14.0%	18.0%
2014	7.8%	25.4%	9.8%	15.6%	12.7%	17.6%
2015	7.9%	26.6%	10.8%	14.8%	12.8%	17.7%
2016	8.8%	26.5%	11.8%	15.7%	12.8%	15.7%
2017	8.7%	26.0%	12.5%	15.4%	12.5%	14.4%
2018	9.4%	25.5%	14.2%	15.1%	13.2%	14.2%
Var 2018/2013	17.8%	6.0%	57.0%	-5.8%	-5.8%	-21.5%

Toyota Motor Global Sales Mix by Region 2013 - 2018

By looking at their investments it's emerging that OEM's believe four factors are critical to success in NEV's: First, the senior management must be committed and aligned with the strategy. Second, they need the money to fund the technology and the transition. Third, the OEM requires control of battery and fuel cell production and technology. Otherwise, much of the potential profit is in the hands of the cell or battery supplier. Finally, a dedicated NEV platform is required. It costs more but, without it, the vehicles produced are, at best, an acceptable compromise. For a manufacturer aiming at the mass-market, two additional factors are critical: the know-how to build low cost vehicles and access to a volume NEV market.

Is their top management committed to NEV's? While notably cautious in decision-making, Toyota has been demonstrably committed to

**MODERATE ADOPTION - 50% EV BY 2035
KEY OPERATING COST CHANGES
TOYOTA FORECAST 2025 - 2045**

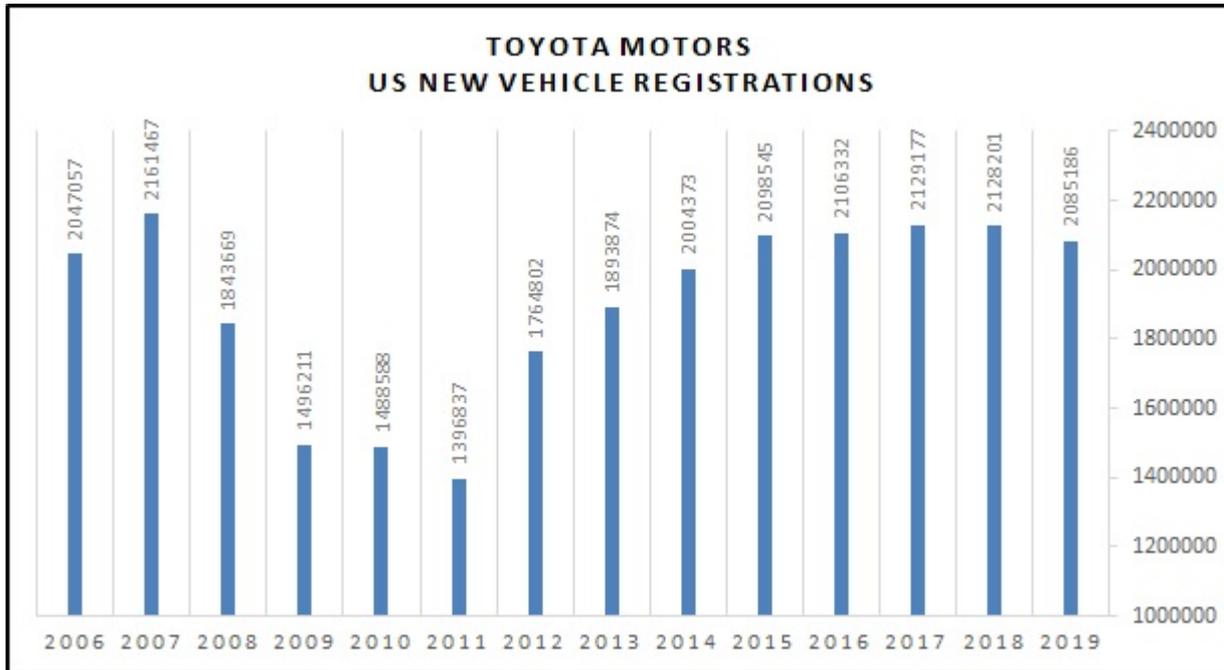


Toyota Moderate Cost Forecast 2020_2045 NB: Depreciation & Amortization and R&D costs refer to incremental costs or investments for the transition only.

environmentally responsible vehicles since the Prius launch in 1997 and sales of 13MN PHEV's world-wide since then evidence that commitment. They have invested continuously in NEV technology since then. They have global R&D capability in Japan, Asia-Pacific, China, Europe and the USA from 15 centres plus numerous **joint-venture** research facilities and have filed almost 24,000 patents for NEV's. Their strategy is to encourage NEV's in every market using whatever technology local regulators prefer rather than imposing a single global solution. To help diffuse the technologies, Toyota made its Fuel Cell patents royalty-free to other users until the end of 2020. They did the same with their Hybrid patents up until 2030.

Can they fund the transition? In addition to positive Free Cash Flow since 2013, Toyota

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all its rivals in the survey and it can pay its debt interest 82 times over. Even given the cyclical nature of the industry and the risks and costs of the NEV transition, institutional shareholders are likely to support Toyota in a MODERATE or even FAST scenario. Making the assumption that Toyota have followed the SLOW adoption path to date, their management commitments are clearly to a MODERATE scenario for the coming decade, with the capability to switch to high gear in specific regions as the opportunity arises. The forecast suggests that after a short period of losses, they will return to profitability quickly.

Does Toyota have the technology and market access? They already have in-house control of battery production and development and their 2019 JV with Panasonic will produce automotive prismatic lithium-ion batteries, solid-state batteries, and next-generation batteries to provide for other manufacturers, as well as themselves. They have a scalable e-TNGA platform architecture. Unlike all of their volume production rivals, Toyota has access to every one of the major global export markets but is dependent on no single one of them. Their capacity to build compelling high quality, low cost products in high volume is acknowledged by customers around the globe.