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BYD’s Electric Vehicle Roadmap[[1]](#endnote-1)

*Yan Gong and Qiong Zhu wrote this case solely to provide material for class discussion. The authors do not intend to illustrate either effective or ineffective handling of a managerial situation. The authors may have disguised certain names and other identifying information to protect confidentiality.*

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In 2007, Chuanfu Wang, chairman of BYD Company Limited (BYD), announced an ambitious target to establish the company’s strong presence in the automotive market through sales of its electric vehicles (EVs), and to secure its place as China’s largest auto manufacturer by 2015, as well as the world’s largest by 2025.[[2]](#endnote-2) According to a March 2015 report, sales of BYD’s Qin, a new energy vehicle (NEV), reached 1,932 units—or 32 per cent of total NEV sales in China—in February of that year.[[3]](#endnote-3) The Qin had been selling extremely well since its launch: total sales in 2014 hit 14,747 units, or 27 per cent of China’s total production of passenger NEVs and 88 per cent of plug-in hybrid passenger EVs. By January 2015, the Qin had a backlog of orders for more than 8,000 units.[[4]](#endnote-4)

In 2014, sales income from the Qin and BYD’s other NEVs amounted to ¥7.328 billion[[5]](#endnote-5) (an increase of six times from the previous year), and accounted for 27.05 per cent of BYD’s total income from auto sales. In the same year, BYD was ranked 15th among China’s passenger vehicle companies, with sales of nearly 440,000 units.[[6]](#endnote-6) How could BYD succeed in jumping from number 15 to number one as Wang projected? Should BYD rebuild its brand and maintain its low-cost competitiveness in the NEV market?

COMPANY BACKGROUND

BYD was founded in Shenzhen, China, in 1995. With borrowed registered capital of ¥2.5 million, Wang initially established the company in the battery business. On July 31, 2002, BYD was listed on the Hong Kong Exchanges and Clearing Limited (HKEx). The following year, the company made its first move into the automotive market, and on December 20, 2007, its cellphone components and modules division spun off and was listed on the HKEx. In 2008, BYD expanded its business to the NEV market, especially the EV segment. On June 30, 2011, BYD was publicly traded as an A-shares company in the Chinese mainland.

According to BYD’s 2014 annual report, it had three major businesses at that time: automobiles and automotive products; cellphone components and cellphone assembly; and secondary batteries and photovoltaics, with ¥94.058 billion in total assets. In 2014, BYD pulled in ¥58.196 billion in revenue, with a net profit of ¥434 million. Sales from its auto, cellphone, and battery businesses totalled ¥27.834 billion (47.8 per cent), ¥24.48 billion (42.06 per cent), and ¥5.339 billion (9.17 per cent), respectively.

The Battery

Wang had concentrated primarily on batteries during his undergraduate and graduate education, and they continued to be his main research interest after graduation. When the first generation of cellphones appeared in Shenzhen, Wang became keenly aware of the huge potential demand for batteries as the devices caught on, and he established BYD to capitalize on this demand.

Market Background

Since 1990, the rechargeable battery had been adopted worldwide; however, initially, Japanese companies such as Sanyo and Toshiba kept a tight grip on the technology, setting a high barrier for Chinese producers. Then, in 1993, the Japanese government called a halt to the production of nickel–cadmium (NiCd) batteries in Japan due to environmental concerns.

The termination of NiCd battery production in Japan presented a rare opportunity for Chinese battery companies. In Wang’s opinion, Japan’s halting production did not signal the end of the NiCd battery worldwide; rather, he believed demand would remain as strong as ever because the product was durable and economical. Any company that stepped in to take the business from the Japanese companies could become a huge success overnight,[[7]](#endnote-7) but a fully automatic production line for NiCd batteries would cost tens of millions of yuan, which Wang could not afford at that time.

Lower Manufacturing Costs

Due to cost constraints, instead of replicating the Japanese system, Wang created a new production mode by delving into the Japanese model step by step, and dividing the manufacturing process into a semi-automatic model that combined manual operations and necessary machinery. With an investment of only ¥1 million, Wang created a NiCd battery production line with a daily output of 4,000 units.[[8]](#endnote-8) The BYD facility, which cost nearly 40 per cent less than its Japanese counterparts, was granted ISO 9000 Certification in 1996, ISO 9001 Certification in 1998, and QS 9000 Certification in 2000. Three years after its founding, BYD outdid its rivals in the global NiCd battery market, taking a 40 per cent share.[[9]](#endnote-9)

At the end of 1997, Wang sought to make a quick push into the lithium-ion battery (LIB) market by buying equipment from Japan. Lithium, a highly active metal, required a special dry environment for processing and storage. At that time, a fully automatic dry production facility cost billions of dollars, and the technology was controlled by Japanese firms. Visiting an equipment provider in Japan with ¥2 million in hand, Wang discovered that the least expensive set cost ¥4.14 billion. Even worse, the company’s executives turned him down coldly, stating that they would not sell any equipment to a Chinese company.[[10]](#endnote-10) Wang’s appeals to other Japanese equipment suppliers received similar rebuffs.

Wang realized he would have to create a facility himself. A water-absorbent material was added to the desiccant to dry the environment and simulate a drying chamber. These alternative measures later helped to address the public’s doubts about BYD’s technological capabilities. In 2002, as BYD pursued an initial public offering, an American investor asked Wang whether BYD had plagiarized the technology. He replied, “Our technology and equipment are totally different from [that of our] Japanese counterparts.”[[11]](#endnote-11) This unique production mode, though created out of expediency, ultimately enabled BYD to outperform other LIB producers, thanks to its lower cost. In 2003, BYD became the second-largest rechargeable battery manufacturer in the world, and it gained the majority share of the global LIB market in 2009.[[12]](#endnote-12)

The Secret of BYD’s Low Costs: Research and Development

BYD’s low manufacturing costs could be partially attributed to its research and development (R&D) on the company’s manufacturing mode. For example, the production of NiCd batteries necessitated a large amount of corrosion-resistant nickel sheets, which cost ¥140,000 per ton. Nickel-plated sheets, which cost only ¥10,000 per ton, were prone to corrosion, which impaired the batteries’ quality. Therefore, BYD changed the chemical composition of the battery to reduce corrosion on nickel-plated sheets; this change reduced the company’s monthly expenditures for nickel from ¥5–6 million to less than ¥1 million.[[13]](#endnote-13)

Since 1999, BYD had posted an average annual growth rate of 19 per cent in overseas patent applications. Each year, the company had invested ¥50 million in patent maintenance, and offered an average award of ¥10,000 to any employee who obtained a patent.[[14]](#endnote-14) By 2003, BYD had secured a pool of 2,099 effective patents, making it one of the top 10 Chinese companies in terms of patent numbers (see Exhibit 1).[[15]](#endnote-15) In addition, the R&D team had expanded from just over 100 employees in 2003 to 15,000 in 2014.[[16]](#endnote-16)

BYD Auto

Reverse Engineering

BYD’s patent strategy, based on a commitment to patent application and protection, had not only safeguarded its battery business, but also strengthened its development in the automotive industry, as Wang explained: “In fact, a new car is a combination of elements, 60 per cent of which come from open literature, 30 per cent from samples, 5 per cent from raw materials, and only 5 per cent from R&D.”[[17]](#endnote-17) In January 2003, BYD rushed into the auto manufacturing industry by purchasing Xi’an Tsinchuan Auto Co., Ltd. for ¥270 million, a transaction that allowed BYD to obtain the production permit needed to enter the auto industry. [[18]](#endnote-18)

When BYD set out to develop its first car, the F3, reverse engineering was the company’s first choice for R&D. The contour and interior design of the F3 were similar to those of the Toyota Corolla. Yet when asked about possible patent issues with the F3, Wang answered, “We have applied alternative technology to stay clear of any possible patent problem. Although we have drawn on many non-patented technologies, we have made innovations by integrating them to form new combinations.”[[19]](#endnote-19) He gave an example: the F3’s front and tail lamps were BYD’s original designs, so he was confident that “patent is not an issue.”[[20]](#endnote-20)

In 2005, the F3 was launched in the market at the relatively low price of ¥73,800 (compared with ¥150,000 for the Corolla). At its release, the F3’s strong similarity to the Corolla and the wide price gap between the two cars were the F3’s key selling points. Some BYD dealers in Zhengzhou, Henan Province, even offered to replace the car’s logo with a Toyota logo for less than an extra ¥1,000.[[21]](#endnote-21)

In 2009, the F3 was the best-selling vehicle model in China, and BYD reaped sales of 300,000 units. In 2012, total sales of the F3 exceeded 1 million units, which meant it had passed that milestone in the shortest time of any Chinese vehicle model.[[22]](#endnote-22) From then on, reverse engineering was applied to almost every new BYD vehicle model: the F0 (which was based on the Toyota Aygo), the F6 (based on the Toyota Camry), and the F8 (later renamed the S8, and based on the Mercedes-Benz CLK) (see Exhibit 2). However, each of these BYD vehicles was priced around half that of the comparable branded car.[[23]](#endnote-23)

Vertical Integration

Through the use of reverse engineering, BYD had not only rolled out new car models one by one, but also acquired the know-how for automotive components gradually. Because BYD had set about manufacturing components on its own, the company accomplished vertical integration of the whole auto industry chain. For example, BYD’s 1.5-litre turbo-charged gasoline direct injection engine was based on Volkswagen’s 1.4-litre twin-charger stratified injection engine in structure and layout, but BYD used an aluminum-alloy, die-cast engine block for lighter weight and higher thermal efficiency.[[24]](#endnote-24)

By 2012, except for a few standard components, such as tires and glass, BYD had been able to manufacture nearly all components partly or entirely on its own, including the engines, gear boxes, dampers, seats, lamps, and windshield wipers. A set of BYD F6 moulds consisted of over 1,800 parts. BYD took eight months and spent between ¥70 million and ¥80 million to design and manufacture the moulds internally, while outsourcing would have taken one to two years and cost between ¥150 million and ¥200 million.[[25]](#endnote-25)

As with its battery manufacturing, BYD applied a semi-automatic manufacturing model in its production, using a combination of skilled workers and necessary machinery (the worker–machine manufacturing model), although automatic manufacturing had moved into the mainstream in the auto industry. “We won’t buy automatic production lines. They’re too expensive,” said Wang. “We have managed to split the manufacturing process into separate procedures, which our capable workers can perform according to the programs designed by our engineers. That’s why we can keep our manufacturing costs so low.”[[26]](#endnote-26)

BYD’s ELECTRIC VEHICLEs

Production of gasoline-fuelled vehicles turned out to be merely a springboard for BYD. Wang declared that EVs were the company’s objective for entering the automobile industry.[[27]](#endnote-27) He believed that China’s auto industry had no choice but to develop EVs.[[28]](#endnote-28)

The EV Market

Three Technological Approaches to NEVs

NEVs, which began to be developed in 1992, fell into the categories of EVs, hybrid vehicles, and fuel cell vehicles (FCVs). Launched in 1997, the world’s first mass-produced hybrid vehicle, Toyota’s Prius, reached global cumulative sales of one million units in 2008. Also, in the late 1990s, General Motors launched the world’s first mass-produced electric vehicle, the EV1, but after turning out over 2,000 units, the company ceased production of the EV1 in 2002, because of a low cost-to-income ratio. FCVs were regarded as the toughest approach to NEVs.[[29]](#endnote-29) In 1992, Toyota began parallel R&D of hydrogen FCVs and hybrid vehicles, but Toyota’s first hydrogen FCV did not make its debut until December 2014.[[30]](#endnote-30)

The EV market picked up in 2008, when Tesla Motors, a U.S. automotive company, launched its pure electric vehicle (PEV), the Roadster. Seeing the market gain momentum again, General Motors realized that the commercialization of LIBs would grow, and thus shifted its focus from FCVs to PEVs with the launch of the Chevrolet Spark EV and the Chevrolet Volt (an extended-range electric vehicle). Meanwhile, BMW rolled out its i3 PEV and Volkswagen debuted its Golf PEV.

Major Players in China’s EV Market

There were over 300 models of EVs in the Chinese market. Most pioneers in EV R&D were Chinese-branded manufacturers, such as BYD, Chery, Changan, and SAIC Motor.[[31]](#endnote-31) In 2014, China’s NEV industry had a total of 78,500 units in output, and 74,800 units in sales—up by 3.5 times and 3.2 times, respectively, from the previous year. PEV production increased by 2.4 times from 2013 to 2014, and sales by 3.2 times. For plug-in hybrid electric vehicles (PHEVs), output and sales grew by 8.1 times and 8.8 times, respectively.[[32]](#endnote-32) The growth of the market was due to the contributions of its major players (see Exhibit 3).

Government Policies

In addition to the forward-looking strategies among automakers, government support could also be credited with the rise of NEVs. The Chinese government began a push for NEVs in 2001. R&D on hybrid vehicles, PEVs, and FCVs was incorporated into the EV project under the 863 Program, a high-tech development program funded by the government to boost basic research in certain spheres. In July 2012, the State Council issued the New Energy Automobile Industry Development Plan (2012–2020), which committed the government to facilitate the development of PEVs and the industrialization of PEVs and PHEVs.

On the consumption side, the Chinese government issued a subsidy policy to encourage private purchases and the use of NEVs in June 2010. For each NEV produced, the manufacturer would be granted a subsidy of ¥3,000 per kilowatt-hour, up to ¥50,000 per unit for PHEVs, ¥60,000 per unit for PEVs, and ¥3,000 per unit for energy-saving vehicles with a swept volume of 1.6 litres or less. In September 2013, the Chinese government increased subsidies for NEVs. The subsidy system remained effective until the end of 2015. In response to the central government policies, five cities also granted their own subsidies and lifted the restrictions on licences for NEVs. Further, PEVs, PHEVs, and FCVs would be exempted from the vehicle purchase tax from September 1, 2014, to December 31, 2017.

BYD’s Approaches to ELECTRIC VEHICLES

BYD’s Dual-Mode EVs

In December 2008, BYD launched its first EV, the F3 Dual Mode (DM), which was based on the F3.[[33]](#endnote-33) According to BYD, dual-mode EVs were vehicles that could switch between the pure electric modes and hybrid modes.[[34]](#endnote-34) BYD’s DM vehicles, unlike other hybrids, had high-capacity, plug-in battery packs. For example, when fully charged, BYD’s F6DM could travel a maximum range of 430 kilometres (km), including 100 km in the electric mode and 330 km in the hybrid mode. The car was equipped with a one-litre gasoline engine and a 15-litre tank for long-distance trips when recharging was inconvenient. With such a gasoline engine, the fully charged car could travel around the city for one to two days. Battery packs in other hybrid EVs, such as the Toyota Prius and the Lexus LS600HL, had much lower capacities because they were aimed at keeping the gasoline engine working in the most fuel-efficient manner for as long as possible, rather than at powering the vehicle in electric mode for long-distance travel, like BYD’s offering.

BYD’s first EV was dual mode rather than pure electric because of limited auxiliary charging facilities.[[35]](#endnote-35) However, in its 2014 annual report, BYD reemphasized that it would continue to give priority to PHEVs that could run in electric-only mode for short trips and in hybrid mode for longer distances. Due to the inadequacy of auxiliary facilities like charging stations in the long run, the company believed that PHEVs were the most suitable NEVs for China, and that they would dominate the private market.[[36]](#endnote-36)

Entering the Government and Company Segments First

Instead of targeting private buyers (as was typical for gasoline-fuelled cars), BYD first promoted the F3DM to group customers like governments and businesses. It was initially sold only in Shenzhen, where BYD’s headquarters were located. The car’s principal customers included organizations like the Shenzhen municipal government and China Construction Bank.

BYD later confirmed that, aside from the shortage of auxiliary facilities, the marketing strategy for the F3DM was also based on the fact that individual consumers valued a strong user experience. If the F3DM failed to make consumers’ lives easier, they would respond negatively to the car and maybe to BYD in general. Moreover, the NEVs were priced twice as high as their gasoline-fuelled counterparts, which might further deter individual consumers. With group customers, however, the user environment was standardized, or easier to control. Governments or businesses could build new parking lots for NEVs, or add charging poles to existing facilities, while these measures were beyond the capacity of most private buyers. Furthermore, BYD could provide after-sales service more easily for group customers, ensuring a better user experience and a greater brand reputation for the F3DM.[[37]](#endnote-37)

The company later extended its marketing strategy for the F3DM to PEVs as well. In 2011, BYD electrified buses and taxis, and then spread the PEV concept to the public.[[38]](#endnote-38) Together with the China Development Bank, BYD initiated a solution to electric buses and taxis in cities in 2012. With the promise of “zero payment, zero cost, and zero emissions,” the project offered such financing as financial leasing, operating leasing, and buyer’s credit to enable public transport service providers to access EVs at no (initial) cost. For example, with financial leasing, a financial company could purchase BYD electric cars and lease them to a taxi company, which would pay rents by installments, and could assume ownership after the lease expired.[[39]](#endnote-39)

However, BYD’s attempt to enter other local EV markets for public transport across the country suffered from local protectionism. Because EVs were entitled to national and local government subsidies, many local governments would siphon these subsidies to their local NEV manufacturers, and remove any EVs produced by non-local companies from their EV catalogues. Therefore, BYD would seek to become a local manufacturer by building factories in the local market to boost local growth of gross domestic product.[[40]](#endnote-40)

BYD extended this marketing strategy for public transport to such overseas markets as Europe, South America, and Singapore. It entered the taxi market by establishing partnerships with local governments and companies. In March 2015, BYD signed a deal with Uber, a U.S.-based ride-sharing service provider, for trial operations of electric cars; 25 BYD EVs were subsequently put to the test in Chicago.[[41]](#endnote-41)

BYD’s Advantages

Wang regarded BYD’s battery technology as the backbone of the company’s EV development, and an advantage against its competitors. He believed that the LIB was the future for EVs. [[42]](#endnote-42) On the strength of its LIB technology, BYD kicked off its EV battery program in August 2002. In November 2006, the company showcased its ferrous battery-powered concept car at the Beijing International Automobile Exhibition. In October 2007, BYD succeeded in producing rechargeable ferrous EV batteries ahead of its Chinese competitors, and launched the F6DM as its first hybrid EV powered by ferrous batteries.

A lithium iron phosphate battery was a patented ferrous battery; however, BYD maintained that the patent simply meant that lithium iron phosphate materials could be used to make batteries, and thus, it filed a utility patent. In early 2010, BYD began to mass produce ferrous batteries. In October of the same year, BYD and Tibet Jinhao Investment Company, Ltd. jointly acquired a 22 per cent stake in Tibet Shigatse Zhabuye Lithium High-Tech Co., Ltd. for lithium mineral exploration and refinement, so as to secure the supply of raw materials.[[43]](#endnote-43)

BYD embarked upon R&D on EVs in 2002, developing not only batteries, but also motors and electronic control units in place of combustion engines and the peripheral technology used for gasoline-fuelled cars. In 2003, BYD and Tesla set about producing EVs at the same time, although BYD sought to produce EVs to meet public needs, while Tesla’s position was in a much smaller high-end segment. In February 2008, Tesla integrated external resources to launch the Roadster as its first EV; in December, BYD delivered the F3DM to the market. BYD’s first DM vehicle was the F6DM, but the F3DM reached the market first. Among the company’s gasoline-fuelled vehicles, the F6 was positioned higher than the F3.

By applying its vertical integration model to EV development, BYD tried to secure the supply of both raw materials and technology in the upstream sector. Consequently, BYD acquired Sino MOS Semiconductor (Ningbo) Inc. for ¥200 million in October 2008, for the R&D and production of EV motors. The company also established a horizontal integrated chain with its strong presence in photovoltaics, light-emitting diodes, and energy storage stations, thus making an efficient two-direction supply between NEVs, energy storage stations, and solar energy plants. Further, BYD’s organizational culture found expression in EV manufacturing and marketing as well. The company stuck to its worker–machine manufacturing mode and sold EVs in its dealer stores, as it had with its gasoline-fuelled cars.

Development and Challenges

Partnerships with Warren Buffett and Daimler AG

In September 2008, investment guru Warren Buffett announced he had acquired 10 per cent of BYD’s stock at HK$8.00[[44]](#endnote-44) per share.[[45]](#endnote-45) Less than two years after the acquisition, the price of BYD’s H-shares skyrocketed by a factor of 13.73, to HK$88.40.[[46]](#endnote-46) Since then, Buffett and his partner, Thomas Munger, had supported BYD. In January 2009, Buffett appeared at the BYD stand at the Detroit Auto Show, wearing BYD’s logo. In September 2010, when BYD’s auto sales had been declining for five consecutive months and dealers had backed out, both Buffett and Munger attended the company’s town hall meeting in Shenzhen, and Buffett offered a free dinner to thousands of BYD dealers. On the first day of Buffett’s arrival in Shenzhen, BYD’s H-shares rose 4.25 per cent, closing at HK$57.65, and Morgan Stanley raised the company’s stock rating from “neutral” to “overweight.”[[47]](#endnote-47)

In addition to Warren Buffett, BYD’s new energy business had attracted Daimler AG, the German auto giant. In July 2010, BYD and Daimler AG founded a 50–50 joint venture with total registered capital of ¥600 million. The new venture would focus on China’s EV market[[48]](#endnote-48) and would operate on the basis of BYD’s battery and drive technology and Daimler AG’s leading whole-vehicle technology.[[49]](#endnote-49) In March 2012, the joint venture launched its NEV brand, DENZA, positioned as a premium brand.[[50]](#endnote-50) Since September 2014, DENZA PEVs had entered the markets in Shanghai, Beijing, and Shenzhen, with a goal of selling 5,000 units in 2015.[[51]](#endnote-51)

Challenges

Despite an impressive performance in the EV market, BYD found its profitability slightly disappointing. Net profit had decreased dramatically from 2010 to 2014, with 2013 being the only exception (in that year, BYD’s year-on-year growth rate was 579.63 per cent) (see Exhibit 4). One reason for this exception was that the battery, cellphone, and regular auto businesses posted gross margin growth of 4.53 per cent, 1.63 per cent, and 0.07 per cent, respectively, in 2013; another reason lay in the government subsidies for NEVs,[[52]](#endnote-52) which totalled ¥677 million.[[53]](#endnote-53) Finally, net profits in all BYD’s businesses fell to an all-time low in 2012, which made growth in 2013 even more prominent. The poor profitability raised BYD’s expectations for an explosion in market demand for NEVs.

How to Maintain Cost Advantage on the Battery Side?

The battery made up 40 per cent of the cost of an EV; therefore, a low-cost battery could give a vehicle a significant competitive edge in the market.[[54]](#endnote-54) BYD’s ferrous battery cost less than other EV batteries in both China and Japan,[[55]](#endnote-55) but paled in comparison to Tesla’s battery. Tesla’s ternary EV battery cost US$416 per kWh (¥2,554 per kWh), while BYD’s ferrous battery cost US$435 per kWh (¥2,671 per kWh) in 2014. Moreover, Tesla’s battery cost could be expected to drop by 30 per cent once annual production reached 500,000 units.[[56]](#endnote-56) When a large number of companies took interest in Tesla’s ternary EV battery in 2014, Tesla opened up all its related patents to EV manufacturers around the world. Naturally, most Chinese NEV makers (including JAC, Chery, BAIC, and Zotye) declared that they would use Tesla’s ternary battery rather than BYD’s ferrous battery, further trimming Tesla’s battery costs.

How to Win in the Private Vehicle Market?

BYD’s Qin was a leading PHEV in the private vehicle market. With subsidies of ¥70,000 from the central and local governments, the vehicle’s lowest sale price was ¥119,800. Around 70 per cent of the Qin’s sales came from Shanghai in 2014, where the Qin was among the NEVs entitled to financial subsidies and other incentives from the Shanghai government. In addition, Shanghai offered the bonus of a free licence plate for NEVs. Since the vehicle licence auction policy was implemented in Shanghai in 1994, car buyers had faced increasing difficulties in affording licence plates.[[57]](#endnote-57) In July 2014, the hammer price of a licence plate in Shanghai hit ¥74,000, with a success rate of no more than 5.44 per cent.[[58]](#endnote-58) Some buyers bought the Qin simply to obtain the free licence plate, but most bought the car to use as a traditional vehicle.[[59]](#endnote-59) Contrary to its popularity in Shanghai, the Qin was greeted with a cold response in Beijing, because it was not on Beijing’s list of NEVs eligible for government subsidies. Without those subsidies or incentives (particularly the free licence plate), how could the Qin sustain its popularity?

How to Shift from DM EVs to PEVs?

BYD had stated that DM PHEVs only provided a springboard for PEVs. However, in shifting from DM to purely electric vehicles, BYD would face considerable challenges, not only in the availability of charging facilities, but also in terms of battery range. A fully charged BYD Qin could run 70 km,[[60]](#endnote-60) far below the 300-km threshold for commercialization.[[61]](#endnote-61) In contrast, the Tesla Roadster’s battery range had reached 480 km, and the company was attempting to extend its battery life through software optimization.[[62]](#endnote-62)

With only 10 years left for BYD to realize its goal of becoming a global auto leader by 2025, how could BYD make it?

Exhibit 1: BYD’s Number of Annual New Patent Applications Over the Past 10 Years

Source: Patent Search and Analysis of SIPO, accessed March 7, 2017, http://pss-system.gov.cn.

Exhibit 2: Roadmap of BYD’s Vehicle Models

F3—BYD’s first A+ class passenger car, launched April 16, 2005

F3R—BYD’s first A class compact car, launched July 2007

F6—BYD’s first mid-size sedan, launched March 2008

F0—A one-litre mini-car, launched September 2008

F3DM—BYD’s first dual-mode electric vehicle, launched December 2008

S8—BYD’s first entry-level sports car, launched July 2009

M6—BYD’s first multi-purpose vehicle (MPV), launched July 2010

S6—BYD’s first sports utility vehicle (SUV), launched May 2011

Qin—BYD’s second-generation dual-mode electric vehicle, launched December 2013

e6—A purely electric crossover based on the SUV and MPV, launched March 12, 2014

S7—An SUV, launched October 2014

Source: BYD, accessed March 7, 2017, www.byd.cn/BYDEnglish/index.jsp.

Exhibit 3: Major Players in China’s Electric vehicle Market

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Players:** | BYD | BAIC | Changan | FAW | SAIC | Chery | Zotye | JAC | Tesla | Dongfeng Nissan | BMW |
| **Typical Models:** | Qin, e6 | EV200, E150EV | EADO EV | B50-EV | Roewe E50 | MIEV, eQ | ZD, Cloud | iEV4 | MODEL S | Venucia EV | i3 |
| **Launch of EV:** | 2008 | 2014 | 2015 | 2014 | 2011 | 2014 | 2014 | 2009 | 2008 | 2014 | 2014 |

Source: “Changan Launched 9 NEVs During 2 Years” [in Mandarin], Info Agency, July 13, 2015, accessed August 1, 2015, http://auto.sohu.com/20150713/n416661918.shtml; “Chery Launched Two NEVs,” Anhuinews.com, November 8, 2014, accessed March 22, 2015, http://ah.anhuinews.com/system/2014/11/08/006592301.shtml; “Dongfeng Nissan Produced Its First NEV” [in Mandarin], EnergyTrend, September 12, 2014, accessed March 22, 2015, www.energytrend.cn/news/20140912-9585.html.

Exhibit 4: Net Profit of BYD (2010–2014)

Source: BYD, *Go with Green: Annual Report 2010*,accessed March 7, 2017, www.byd.cn/byd/upload/2010-01/2010%E5%B9%B4%E5%B9%B4%E6%8A%A5.pdf; BYD, *Catching the Eye on Green Stage: Annual Report 2011,* accessed March 7, 2017, www.byd.cn/byd/upload/2010-01/20120325-2011%E5%B9%B4%E5%A0%B1.pdf; BYD, *Energy 100% Clearing through Our Way: Annual Report* 2012, accessed March 7, 2017, www.byd.cn/byd/upload/2010-01/20130324-2012%E5%B9%B4%E5%B9%B4%E6%8A%A5%EF%BC%88H%E8%82%A1%EF%BC%89BYD.pdf; BYD, *Gearing Up for Our Future: 2013 Annual Report*,accessed March 7, 2017, www.byd.cn/byd/upload/2010-01/20140429-%E6%AF%94%

E4%BA%9A%E8%BF%AA%E8%82%A1%E4%BB%BD%E6%9C%89%E9%99%90%E5%85%AC%E5%8F%B8%202013%E5%B9%B4%E5%B9%B4%E6%8A%A5.pdf;BYD, *Promote Green, Practice Theory: 2014 Annual Report*,accessed March 7, 2017,www.byd.cn/byd/upload/2015-03/2015032911115431738598782.pdf.

Endnotes

1. This case has been written on the basis of published sources only. Consequently, the interpretation and perspectives presented in the case are not necessarily those of BYD Company Limited or any of its employees. [↑](#endnote-ref-1)
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