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## Warren Buffett takes charge

Warren Buffett hasn't just seen the car of the future, he's sitting in the driver's seat. Why he's banking on an obscure Chinese electric car company and a CEO who - no joke - drinks his own battery fluid.

By Marc Gunther  
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(Fortune Magazine) -- Warren Buffett is famous for his rules of investing: When a management with a reputation for brilliance tackles a business with a reputation for bad economics, it is usually the reputation of the business that remains intact. You should invest in a business that even a fool can run, because someday a fool will. And perhaps most famously, Never invest in a business you cannot understand.

So when Buffett's friend and longtime partner in Berkshire Hathaway (BRKB), Charlie Munger, suggested early last year that they invest in BYD, an obscure Chinese battery, mobile phone, and electric car company, one might have predicted Buffett would cite rule No. 3 above. He is, after all, a man who shunned the booming U.S. tech industry during the 1990s.

But Buffett, who is 78, was intrigued by Munger's description of the entrepreneur behind BYD, a man named Wang Chuan-Fu, whom he had met through a mutual friend. "This guy," Munger tells Fortune, "is a combination of Thomas Edison and Jack Welch - something like Edison solving technical problems, and something like Welch in getting done what he needs to do. I have never seen anything like it."

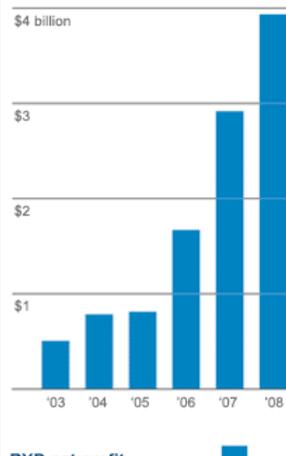


PHOTO: DAVID YELLEN  
Warren Buffett with BYD's E6. The car came straight to Omaha from the Detroit auto show.

### Flooring it

BYD's breakthrough growth got Buffett's attention. Profits dropped off in 2008 due to increased costs for R&D and declining cellphone sales.

#### BYD revenue



Coming from Munger, that meant a lot. Munger, the 85-year-old vice chairman of Berkshire Hathaway, is a curmudgeon who frowns on most investment ideas. "When I call Charlie with an idea," Buffett tells me, "and he says, 'That is really a dumb idea,' that means we should put 100% of our net worth

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into it. If he says, 'That is the dumbest thing I've ever heard,' then you should put 50% of your net worth into it. Only if he says, 'I'm going to have you committed,' does it mean he really doesn't like the idea."

This time Buffett asked another trusted partner, David Sokol, chairman of a Berkshire-owned utility company called MidAmerican Energy, to travel to China and take a closer look at BYD.

Last fall Berkshire Hathaway bought 10% of BYD for \$230 million. The deal, which is awaiting final approval from the Chinese government, didn't get much notice at the time. It was announced in late September, as the global financial markets teetered on the abyss. But Buffett and Munger and Sokol think it is a very big deal indeed. They think BYD has a shot at becoming the world's largest automaker, primarily by selling electric cars, as well as a leader in the fast-growing solar power industry.

Wang Chuan-Fu started BYD (the letters are the initials of the company's Chinese name) in 1995 in Shenzhen, China. A chemist and government researcher, Wang raised some \$300,000 from relatives, rented about 2,000 square meters of space, and set out to manufacture rechargeable batteries to compete with imports from Sony and Sanyo. By about 2000, BYD had become one of the world's largest manufacturers of cellphone batteries. The company went on to design and manufacture mobile-phone handsets and parts for Motorola (MOT, Fortune 500), Nokia (NOK), Sony Ericsson, and Samsung.

Wang entered the automobile business in 2003 by buying a Chinese state-owned car company that was all but defunct. He knew very little about making cars but proved to be a quick study. In October a BYD sedan called the F3 became the bestselling sedan in China, topping well-known brands like the Volkswagen Jetta and Toyota (TM) Corolla.

BYD has also begun selling a plug-in electric car with a backup gasoline engine, a move putting it ahead of GM, Nissan, and Toyota. BYD's plug-in, called the F3DM (for "dual mode"), goes farther on a single charge - 62 miles - than other electric vehicles and sells for about \$22,000, less than the plug-in Prius and much-hyped Chevy Volt are expected to cost when they hit the market in late 2010. Put simply, this little-known upstart has accelerated ahead of its much bigger rivals in the race to build an affordable electric car. Today BYD employs 130,000 people in 11 factories, eight in China and one each in India, Hungary, and Romania.

Its U.S. operations are small - about 20 people work in a sales and marketing outpost in Elk Grove Village, Ill., near Motorola, and another 20 or so work in San Francisco, not far from Apple. BYD makes about 80% of Motorola's RAZR handsets, as well as batteries for iPods and iPhones and low-cost computers, including the model distributed by Nicholas Negroponete's One Laptop per Child nonprofit based in Cambridge, Mass. Revenues, which have grown by about 45% annually during the past five years, reached \$4 billion in 2008.

In acquiring a stake in BYD, Buffett broke a couple of his own rules. "I don't know a thing about cellphones or batteries," he admits. "And I don't know how cars work." But, he adds,

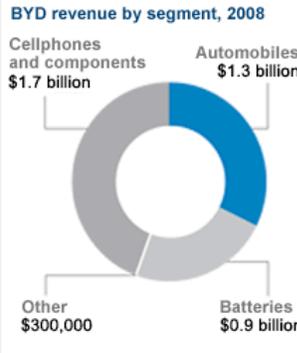
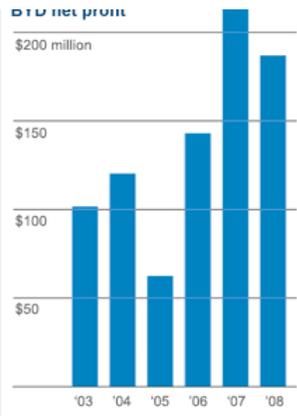


PHOTO: DAVID YELLEN  
BYD CEO Wang Chuan-Fu figured out how to make cheaper batteries than the Japanese by replacing machines with migrant workers.



PHOTO: DAVID YELLEN  
BYD's breakthrough all-electric E6, photographed at this year's Detroit auto show.



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"Charlie Munger and Dave Sokol are smart guys, and they do understand it. And there's no question that what's been accomplished since 1995 at BYD is extraordinary."

One more thing reassured him. Berkshire Hathaway first tried to buy 25% of BYD, but Wang turned down the offer. He wanted to be in business with Buffett - to enhance his brand and open doors in the U.S., he says - but he would not let go of more than 10% of BYD's stock. "This was a man who didn't want to sell his company," Buffett says. "That was a good sign."

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**We're lost in Shenzhen.** I've flown 8,000 miles to meet Wang, and on the way to the interview, my driver pulls to the side of a dusty highway. He's yelling in Cantonese into his phone and frenetically sketching Chinese characters on the touchscreen of a GPS navigator. The PR woman beside me looks worried. "The GPS isn't working," she says. "Too many new roads."

I can't blame the driver or the GPS - which, it occurs to me, was probably made nearby, since Shenzhen is the manufacturing hub of the global electronics industry, the place your cellphone, digital camera, and laptop probably came from. Just across a river from Hong Kong, Shenzhen is the biggest and fastest-growing city in the world that most Americans cannot find on a map. It's also the Chinese city most like America, because people who live here have come from elsewhere in search of a better life.

When Deng Xiaoping designated Shenzhen as China's first "special economic zone" in 1980, inviting capitalism to take root, it was a fishing village; today, it's a sprawling megacity of 12 million to 14 million people, most of them migrant workers who toil in vast factories like those run by BYD and earn about 1,300 renminbi, or \$190, per month.

When we find BYD's new headquarters - a silvery office building that would not look out of place in Silicon Valley - I'm given a tour of the company "museum," which celebrates products and milestones from the firm's brief history, and then escorted into a conference room where plates of apples, bananas, and cherry tomatoes are spread on a table. Wang takes a seat across from me - he is 43, a smallish man, with black hair and glasses - and begins, through an interpreter, to tell me his story.

He started BYD with a modest goal: to edge in on the Japanese-dominated battery business. "Importing batteries from Japan was very expensive," Wang says. "There were import duties, and delivery times were long." He studied Sony and Sanyo patents and took apart batteries to understand how they were made, a "process that involved much trial and error," he says. (Sony and Sanyo later sued BYD, unsuccessfully, for infringing on their patents.)

BYD's breakthrough came when Wang decided to substitute migrant workers for machines. In place of the robotic arms used on Japanese assembly lines, which cost \$100,000 or more apiece, BYD actually cut costs by hiring hundreds, then thousands, of people.

"When I first visited the BYD factory, I was shocked," says Daniel Kim, a Merrill Lynch technology analyst based in Hong Kong, who has been to the fully automated production lines in Japan and Korea. "It's a completely different business model." To control quality, BYD broke every job down into basic tasks and applied strict testing protocols. By 2002, BYD had become one of the top four manufacturers worldwide - and the largest Chinese manufacturer - in each of the three rechargeable battery technologies (Li-Ion, NiCad, and NiMH), according to a Harvard Business School case study of the company. And Wang stresses that BYD, unlike Sony and Sanyo, has never faced a recall of its batteries.

The E6 will hit the Chinese market later this year. The first buyers will be fleet users, which will build central fast-charging facilities.



PHOTO: DAVID YELLEN

MidAmerican's David Sokol, BYD's Wang, and company advisor Li Lu flew with Sokol from Detroit to Omaha so that Wang could meet Buffett in person.

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Deploying the armies of laborers at BYD is an officer corps of managers and engineers who invent and design the products. Today the company employs about 10,000 engineers who have graduated from the company's training programs - some 40% of those who enter either drop out or are dismissed - and another 7,000 new college graduates are being trained. Wang says the engineers come from China's best schools. "They are the top of the top," he says. "They are very hard-working, and they can compete with anyone." BYD can afford to hire lots of them because their salaries are only about \$600 to \$700 a month; they also get subsidized housing in company-owned apartment complexes and low-cost meals in BYD canteens. "They're basically breathing, eating, thinking, and working at the company 24/7," says a U.S. executive who has studied BYD.

Wang typically works until 11 p.m. or midnight, five or six days a week. "In China, people of my generation put work first and life second," says the CEO, whose wife takes responsibility for raising their two children.

This "human resource advantage" is "the most important part" of BYD's strategy, Wang says. His engineers investigate a wide array of technologies, from automobile air-conditioning systems that can run on batteries to the design of solar-powered streetlights. Unlike most automakers, BYD manufactures nearly all its cars by itself - not just the engines and body but air conditioning, lamps, seatbelts, airbags, and electronics. "It is difficult for others to compete," Wang says. "If we put our staff in Japan or the U.S., we could not afford to do anything like this."

Wang himself grew up in extreme poverty. His parents, both farmers, died before he entered high school, and he was raised by an older brother and sister. The train ride from the village where he grew up to Central South Industrial University of Technology, where he earned his chemistry degree, took him by Yellow Mountain, a popular destination for hikers and tourists, but he has never visited there. "I didn't go then because we had no money," he says. "I don't go now because we have no time."

As for accumulating wealth? "I'm not interested in it," he claims. He certainly doesn't live a very lavish lifestyle. He was paid about \$265,000 in 2008, and he lives in a BYD-owned apartment complex with other engineers. His only indulgences are a Mercedes and a Lexus, and they have a practical purpose: He takes their engines apart to see how they work. On a trip to the U.S., he once tried to disassemble the seat of a Toyota owned by Fred Ni, an executive who was driving him around. Shortly after BYD went public, Wang did something extraordinary: He took approximately 15% of his holdings in BYD and distributed the shares to about 20 other executives and engineers at the company. He still owns roughly 28% of the shares, worth about \$1 billion.

The company itself is frugal. Until recently, executives always flew coach. One told me he was appalled when he learned that Ford, which lost billions last year, had staged a gala at the Hotel George V during the Paris auto show. By contrast, the last time BYD executives traveled to the Detroit auto show they rented a suburban house to save the cost of hotel rooms.

This attention to costs is one reason that BYD has made money consistently even as it has expanded into new businesses. Each of BYD's business units - batteries, mobile-phone components, and autos - was profitable in 2008, albeit on a small scale. Overall, net profits were around \$187 million. BYD, which is traded on the Hong Kong exchange, has a market value of about \$3.8 billion. That's less than Ford ([F, Fortune 500](#)) (\$7 billion at the beginning of April), but more than General Motors ([GM, Fortune 500](#)) (\$1.3 billion).

Near the end of our conversation, I ask Wang about the company name. It's been reported that BYD stands for "Build your dreams," but he says he added that as the company motto only later. Others say that as Motorola, Apple, and Berkshire Hathaway have made their way to Shenzhen, the name has taken on yet another meaning: Bring your dollars.

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**When David Sokol toured BYD's operations last summer**, Wang took him to a battery factory and explained that BYD wants to make its batteries 100% recyclable. To that end, the company has developed a nontoxic electrolyte fluid. To underscore the point, Wang poured battery fluid into a glass and drank it. "Doesn't taste good," he said, making a face and offering a sip to Sokol.

Sokol declined politely. But he got the message. "His focus there was that if we're going to help solve environmental problems, we can't create new environmental problems with our technology," Sokol says.

Sokol, author of a slim volume on management principles called *Pleased but Not Satisfied*, sized up Wang during that visit and decided he was an unusually purposeful executive. Sokol says, "Many good entrepreneurs can go from zero to a couple of million in revenues and a couple of hundred people. He's got over 100,000 people. Few can do that." When he got back to the U.S., Sokol told Buffett, "This guy's amazing. You want to meet him."

Even before visiting BYD, Sokol believed in electric cars. His people at MidAmerican have studied clean technologies like batteries and wind power for years because of the threat of climate change. One way or another, Sokol says, energy companies will need to produce more energy while emitting less carbon dioxide.

Electric cars will be one answer. They generate fewer greenhouse gas emissions than cars that burn gasoline, and they have lower fuel costs, even when oil is cheap. That's because electric engines are more efficient than internal-combustion engines, and because generating energy on a large scale (in coal or nuclear plants) is less wasteful than doing it on a small scale (by burning gasoline in an internal-combustion engine).

The numbers look something like this: Assume you drive 12,000 miles a year, gas costs \$2 a gallon, and electricity is priced at 12¢ per kilowatt, about what most Americans pay. A gasoline-powered car that gets 20 miles to the gallon - say, a Chevy Impala or a BMW X3 - will have annual fuel costs of \$1,200 and generate about 6.6 tons of carbon dioxide. Equip those cars with electric motors, and fuel costs drop to \$400 a year and emissions are reduced to about 1.5 tons.

The big problem is that they are expensive to make, and the single largest cost is the battery. Manufacturing a safe, reliable, long-lasting, and fast-charging battery for a car is a complex and costly undertaking. BYD claims to have achieved a breakthrough with its lithium ion ferrous phosphate technology, but no one can be sure whether it will work as promised.

Skeptics say that BYD's battery cannot be both more powerful and cheaper than those made by competitors, and the U.S. Department of Energy has purchased an F3DM to take the battery apart. Chitra Gopal, an analyst with Nomura Securities in Singapore who follows the company closely, says BYD is betting on "entirely new technology, and the ability to produce it at scale and at a low cost remains unproven." William Moore, publisher and editor-in-chief of EV World, an electric car website, says, "They need to persuade people that they are selling a reliable, durable, quality automobile."

Even BYD's admirers say the fit and finish of the company's cars leave much to be desired. "Their cars are way behind Toyota, for sure," Sokol admits. BYD currently exports gasoline-powered cars to Africa, South America, and the Middle East, but they compete on price, not quality.

BYD's first plug-in hybrid, called a dual-mode car, is designed to run primarily on electricity, with an internal-combustion engine for backup. Two all-electric cars - the E3 and the E6 - will follow later this year. Both will be sold first in China, primarily to fleet users: the government, post office, utilities, and taxi companies, all of which will build central fast-charging facilities. Europe, with its high gas prices, is the most promising export market for BYD's electric cars. Wang signed an agreement last year with Autobinck, a Dutch dealer group, to distribute its cars in the Netherlands and five Eastern European countries.

The company hasn't yet decided whether it will enter the U.S. market, where the economics of electric cars are not as compelling. Sokol, who now sits on BYD's board, says BYD could instead become a battery supplier to global automakers. Some Americans, though, are eager to do business with BYD. The day after Fortune's visit to BYD, Oregon Gov. Ted Kulongoski arrived to test-drive an electric car and urge the company to import through the port of Portland. Meanwhile, BYD researchers are on to their next big idea, a product they call a Home Clean Power Solution. It's essentially a set of rooftop solar photovoltaic panels with batteries built in to store power for use when the sun's not out, all to be designed and manufactured by BYD. "Solar is an endless source of energy," Wang says. "With better technology, we can reduce the costs."

Wang is also focused on building a stronger executive team to drive the company forward. "The good news is, he's 42 years old," Sokol says. "The bad news is that he's clearly the brains behind the organization, and the drive. He has to develop a team faster, but I think he knows that." Last winter it was Sokol's turn to lead Wang on a tour of his home country. They started in Detroit, where BYD's cars generated buzz at the North American Auto Show, and wound up on the West Coast, where Wang met for the first time with Charlie Munger. In between, they stopped in Omaha.

"How did BYD get so far ahead?" Warren Buffett asked Wang, speaking through a translator. "Our company is built on technological know-how," Wang answered. Wary as always of a technology play, Buffett asked how BYD would sustain its lead. "We'll never, never rest," Wang replied.

Buffett may not understand batteries or cars, or Mandarin for that matter. Drive, however, is something that needs no translation. ■

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