China’s Next Cultural Revolution

The People’s Republic is on the fast track to become the car capital of the world. And the first alt-fuel superpower.

The Challenge Bibendum is the anti-Nascar, a road rally where dozens of cars, two-wheelers, and buses vroom the straightaways like a pack of DustBusters, cough out water vapor instead of sooty exhaust, and corner at peak speeds of 35 mph. Named for the morbidly obese mascot of Michelin, which sponsors the event, Bibendum is the proving ground for alternative-fuel and low-emissions vehicles.

For the first five years of its existence, the rally was staged in rich cities with bohemian tendencies—San Francisco, Heidelberg, Paris. But last fall Michelin brought the Bibendum to Shanghai. The booming Chinese auto market, which grew by 76 percent in 2003, is an obvious lure. It’s a market still under central control—for the moment, anyway—which means that if Beijing wants to go green, it can go in a huge way. And so in Shanghai, Bibendum lost its utopian vibe. The stakes were simply too big: What will 1.3 billion people drive?

The answer, believes professor Huang Miao Hua, is an electric car prototype made by her students at the Wuhan
University of Technology. The Aspire (not to be confused with the Ford compact car) is a giddy marriage of tadpole and pickup truck. The $12,000 target price includes a Linux OS, GPS, and an onboard bicycle. A bike? If you get stuck in gridlock, Huang explains, you can park the car and pedal instead. Think of it as a concept car for traffic jams. She pushes up the Aspire’s door (it opens vertically, for parking in tight spots) and smiles. “Get in,” she says. As the vehicle lumbers to a start, engine whining under the strain, the driver shouts, “It’s got a few problems, but it feels good, doesn’t it?”

In the West, clean cars mostly have been the toys of wealthy worrywarts—too expensive to be economical and too technically challenged to be cool. China’s feeling an urgency that slower-growing countries don’t face. The demand for oil is skyrocketing, rising even faster than the price. And here’s the eye-opening stat: In the absence of new regulations, pollution-related illness will suck up as much as 15 percent of the country’s gross domestic product by 2030.

China’s central planners are throwing everything at the problems of fuel and pollution—hybrids, electric cars, propane taxis—all while building conventional cars and infrastructure at a furious pace. “There’s a controversy about ‘Green GDP’ and how to grow,” says He Dongquan, a transportation expert at the Energy Foundation in Beijing. “China’s in a transition where everyone’s mind is changing.” Amid the hurly-burly, the only thing that’s clear is the future, where hydrogen beckons.

China is already taking bold steps toward an alt-fuel future. In late 2003, Beijing mandated some of the world’s toughest fuel-efficiency standards. China is even now one of the largest markets for alternative fuel vehicles, with 200,000 in service. In preparation for the 2008 Olympics, Beijing officials plan to convert their entire bus fleet of
nearly 120,000 vehicles to run on compressed natural gas (CNG).

All this opens up vast opportunities for automakers. The major car manufacturers (with the exception of Honda) have come to Bibendum to show that they’re ready to play China’s game, whatever it turns out to be. Toyota will begin producing hybrid Priuses in Changchun by the end of the year. GM, which made 15 times more profit per sale in Asia than at home in 2003, will manufacture hybrid buses for Shanghai. “This will be the biggest market in the world by 2010,” says Dongfeng Citroen chief Gilles Debonnet, standing beside a CNG car his company designed for Bibendum. “If we don’t bring a [low-emissions] solution to the taxi market, then we can’t stay.”

Decades behind developed nations when it comes to supporting a car culture, China may actually benefit from its very backwardness. All those bicycles mean there isn’t a cumbersome—and entrenched—gasoline infrastructure to stand in the way of the next big thing. That’s why China hopes to eventually bypass the oil-based auto culture and go right to a hydrogen economy. “Some theorists believe China has an advantage with fuel cells because it has no resistance,” says General Motors vice president David Chen as he attends to a Shanghai dignitary at Bibendum. “It’s been cut off from the world for 30 years. It may be in a unique situation to leapfrog.”

Leapfrogs are an intoxicating vision, but can this one really jump? “We consider China a wild card,” says Shell Hydrogen VP Gabriel de Scheemaker, who installed Iceland’s hydrogen infrastructure and is now at Bibendum trying to get into the Chinese market. His eyes get dreamy as he imagines Shanghai on H₂—city blocks powered by fuel cells, cars filled from hydrogen supplies embedded in build-
ings: “In Deng [Xiaoping]’s day, he experimented with whole cities!”

Although China’s in an experimental mood, innovations are hard to finance. The Aspire bobbles toward Shanghai’s Formula 1 track, past Toyota’s Prius; Volvo’s lozenge-shaped 3CC concept car; and the Mercedes-Benz A-Class F-Cell, which has its magnificent fuel cell guts jammed into a frumpy hatchback. The team from Wuhan is taking on the big guys with two goofy Aspires made for a total of $60,000.

The six-day Bibendum turns out to be a coming-out party for China’s homegrown clean cars. The Aspire wins a special design prize. And of the 43 Chinese vehicles entered, 19—including 11 two-wheelers, 6 buses, and 2 cars from an array of fuel sources—score very high on the Bibendum tests of overall emissions, CO₂ emissions, noise, fuel economy, braking, slalom, and acceleration. A year before, there wasn’t even one Chinese entry. “We wanted to do something good for the country,” Huang says, her students giggling with excitement as they push the little car out of the garage for the trip back to Wuhan. “My students gave without expecting any return. That’s the spirit!”

Here’s the new cultural revolution: Every morning Wang Jian Shuo and his wife leave their condo in the suburbs of Shanghai, get into their Fiat sedan, and drive to jobs in the city. Two years ago, they lived in a cramped, decrepit apartment in the center of Shanghai, and Wang, an engineer for Microsoft, traveled to work by bus or train. “I never thought of getting a car,” he says. “Driving was a very serious profession—like medicine.” Cars were for party bureaucrats or at least the very rich.

But in 2000, Shanghai’s per capita GDP (already much higher than China’s overall) rose above $4,000, and the roads
started filling with private cars. Local highways, which were
designed by engineers who’d never driven, clogged. Shang-
hai’s narrow streets became so congested that commuters
abandoned their bicycles for the subway just to avoid the
cars. Smog grew so thick that on many days you couldn’t
even see the boisterous skyscrapers looming above you.

And so, a year ago, Wang moved into a spacious condo
in the suburbs—and bought a car. “The change the car
brings my life is bigger than the house,” he says. “My life
scope is much larger now.” Today Wang and his wife shop
in Western-style supermarkets instead of haggling with the
fishmonger, and they can drive to visit friends and return
home by car long after the subway has shut down for the
night. They grew up in a world bounded by transit sched-
ules, shabby housing, and nosy neighbors, but now they live
in an airy apartment, surrounded by the brand-new high-
rises that have sprung out of the rice paddies. Some nights,
when they’re tired, Wang and his wife get in the car and
drive out to the new airport just to experience speeding
down the empty highway. But even that road is filling up. It
makes Wang happy he bought a car as soon as he did.
“When a car becomes something everyone can afford, forget
it,” he says. “You won’t be able to drive.”

At a Hyundai dealership not far from Wang’s condo,
families prowl the showroom, inspecting the stitching on
the seats, criticizing the design of the rear lights, trying to
find the biggest car for their yuan. A TV blares a govern-
ment program featuring a singer in a yellow dress crooning
in front of a suburban development. “Nowadays life is get-
ting better, sweeter and sweeter,” she sings. “You can fulfill
your dreams. The roads are getting wider and wider.”

Managing dreams is a big problem for the Beijing
bureaucrats who pull the levers of China’s economy. Yang
Yiyong is low enough in the party hierarchy that he’ll talk
with a foreign reporter, high enough that he insists on meeting in the back room of a restaurant famous for its duck with stewed fruit. His official title is deputy director of the Institute of Economic Research, which is a government-sponsored think tank.

Yang wears a serious pin-striped suit and talks big numbers. China’s population, he says, will approach 1.5 billion in 2030. The only way to forestall economic calamity is to maintain 25 consecutive years of high annual GDP growth. That kind of growth, in turn, requires massive amounts of energy. Already the world’s second-largest oil importer, China is expected to more than double imports by 2020. This is a painful subject for Yang, who fulminates against cars, car culture, traffic, and the prestige New China is attaching to big cars. “I object to this vague notion of status,” he says.

His concern is ideological, but the problem is practical. After food, oil is the most important issue for Chinese economic planners. Without an increasing supply of oil, high GDP growth will be impossible, creating unemployment and social unrest, potentially threatening the government’s hold on power. That’s not all. Dependency on foreign oil, in Yang’s opinion, inevitably leads to war. Every official I interview makes the same point. Yang uses a pun to summarize the leadership’s view: “If you pump for oil, you have to fight wars for it.” (Pump and fight sound similar in Mandarin.)

In the face of an oil crisis, the government is embracing fuel efficiency and alternative energy resources. In every scenario, oil imports will rise, but the hope is that new technologies and conservation will minimize the rate of growth. The plan is to replace 10 percent of China’s energy supply with renewable sources by 2010, 12 percent by 2020. (Today, less than 1 percent comes from renewables.) “We’re not say-
ing we can reduce consumption,” he cautions, “but we can reduce the increase and win some time.”

A chauffeur-driven Audi A6 stops near the Mao statue facing the gates of Shanghai’s Tongji University, and Wan Gang steps lightly out of the back. He is a compact man in his early 50s who retains the enthusiasm and pink cheeks of a boy genius. As the chief scientist of the 863 Program’s Key Electric Vehicle Project (the 863, named for its approval date, March 1986, is China’s national high tech R&D initiative), Wan has to get Chinese industry mass-producing fuel cells by 2020. It’s an ambitious national agenda that started in 2001 with an unambitious budget: $106 million. That figure must sustain the network of 200 universities and companies that are developing and testing scores of electric, hybrid, and fuel cell vehicles.

The fuel cell mission is born partly out of necessity. In 2000, China’s Ministry of Science and Technology contacted Wan, who had been living in Germany for a decade doing research for Audi. The ministry asked him to come back and create a strategy for the overall Chinese auto industry. Wan concluded that it would be futile to try to compete with the West by building a better or cheaper internal combustion engine. Getting a head start in fuel cell technology would be the country’s best bet. But still a long bet.

Wan, who is also the president of Tongji University, convenes his interview with me in a giant Mao-modern formal room. The tractor-sized chairs inhibit normal conversation, so he quickly moves us to a utilitarian conference room, indistinguishable from one you might find in an office in Berlin or New York. Wan lays out a 15-year plan that will lead to fuel cell cars, putting China at the forefront of the hydrogen economy. He pulls out a piece of paper. “I’m trying to demonstrate that the picture is reasonable and practical,” he says, sketching a grid.
The grid contains four major fuel types: electric, hybrid, CNG, and hydrogen. Hydrogen, Wan explains, is a glorified battery, a way to store energy from various sources—coal, solar, nuclear, or hydroelectric—until it’s needed. He draws a circle lassoing the hydrogen and electric columns. Today’s investments in electric car R&D, he argues, will still be paying off in a hydrogen fuel cell–powered future.

Likewise, hybrid technology, Wan explains, is all about fuel efficiency. For example, advanced hybrids brake by forcing the electric motor to spin backward, generating energy that’s stored in the battery. “Engineers in the States say hybrids are transitional, but I believe the technology will last a long time,” he says, drawing arrows across the grid to show how regenerative braking technology will make both electric- and hydrogen-powered cars more efficient.

CNG cars will require a network of gas pipes connecting refineries to filling stations. But natural gas, he explains, can be converted easily to hydrogen. And with one final pencil stroke, the whole chicken-and-egg problem of hydrogen cars versus hydrogen infrastructure is gone. Wan holds up the grid, covered in optimistic arrows, and declares, “China has the advantage of not being burdened by previous investment.”

China is waving its big red wand, but will a hydrogen economy pop out of this hat? “It’s lovely to forecast out 15 years,” says John Wallace, an American fuel cell consultant working with clients in China, “but nobody remembers.” Wallace is fond of Wan Gang and admires the 863 Program’s “credible” technology and pluck. But he says no amount of determination can summon the resources that China needs to make hydrogen vehicles a reality: start-up infrastructure, niche technology companies, and venture capital firms.
Those resources may be coming. Venture capitalist Mike Brown, chair of Canadian fuel cell investment firm Chrysalix Energy, is looking at China. “Wan’s plan is eminently doable. If they went balls to the wall, they could do even more,” Brown says. “The big question is whether the government will have the nerve to scoop the world.”

In the lobby of one of Shanghai’s vast Epcot Center–like hotels, Cai Xiaoqing taps his foot restlessly. He wants to jump-start the hydrogen economy immediately. With an astronaut’s brush cut of salt-and-pepper hair, Cai looks the part of the former space program technocrat he is. As director of the Equipment Industry Department for Shanghai’s Municipal Economic Commission, his job is to make Shanghai the Detroit of China.

Like everyone else here, Cai speaks in billions and of far-off years, but he’s more impatient than most. He can’t wait for a homegrown fuel cell. Cai wants Shanghai to quickly move to hydrogen. But how do you start a hydrogen economy without a hydrogen car?

Cai looks abroad and sees foreign auto manufacturers sitting on piles of expensive fuel cell technology with nowhere to test it. In California, they’ve been reduced to clownish stunts like putting a fuel cell in Arnold’s Hummer. Cai can do better than that.

Bouncing slightly, Cai pitches Shanghai as a test track: 10 fuel cell cars in circulation by the end of this year, 1,000 by 2010, and 10,000 by 2015. But making hydrogen cars a reality by 2020 will require government investment in technology and subsidies to consumers. Cai calls it “a long step.” Others say it’s impossible. But consider the payoff: clean cars ready for export just as the rest of the world starts to choke on pollution and gasoline supply problems.

To provide the fuel cells, Cai has his eye on General Motors, which has poured more than a billion dollars into a
hydrogen-powered fleet but has nowhere to drive it. “If China develops the infrastructure, GM would put those cars to use,” Cai says. “I think they see China’s big market, too.”

In fact, they do. For more than a year, Tim Vail, GM’s director of business development in charge of commercializing fuel cells, has been traveling to China and liking what he finds. He looks at Shanghai’s propane taxis, 38,000 in all, and sees an industry ready to experiment. He looks at Shanghai’s $1 billion magnetic levitation or “maglev” train and sees a city that’s ready to spend. He looks at a coal-processing plant in the city and sees a source of industrial hydrogen that should last for the next 15 years. But most important, he sees a government that’s ready to do the social engineering needed to speed the adoption of fuel cells. To Vail, Shanghai’s ridiculously crowded city center, where the nouveau riche compete to conspicuously outconsume each other, is a plus. “You would see well-heeled people buying fuel cell cars if they had enhanced rights,” he says. “More than anywhere else, Shanghai could say, ‘Only fuel cell vehicles [in the downtown]’ without a lot of debate.”

Last October, GM chair Rick Wagoner shook hands with the vice mayor of Shanghai. They agreed to codevelop a fuel cell demonstration vehicle and help write the standards and policies for hydrogen power and infrastructure. Meanwhile, Volkswagen endowed a chair at Shanghai’s Tongji University and agreed to jointly research fuel cell technology. “It’s strategic positioning at this point,” says Chris Raczkowski, a top Beijing-based alternative energy consultant, “but some companies may get a captive market for their products, and that’s really the only way to get a market jump-started.”

The day after the GM deal is struck, local dignitaries gather at the Shanghai International Automobile City in Jiading to celebrate this triumph of focus and vision. Four
years ago, Jiading was a suburban farming village. Out went the farmers; in came the $300 million F1 racetrack (site of the Challenge Bibendum), Tongji University’s College of Automotive Studies, six square miles of automotive-themed industrial park, and a golf course.

A band plays “Remember the Red River Valley,” and Wan Gang takes the stage to reminisce about the eight years he spent in the countryside during the Cultural Revolution. Back then his work crew built an entire town from scratch: the roads, the electrical grid, farms, even a hospital. Yesterday they built Motor City. Tomorrow they’ll build a hydrogen economy.

Across the hall, the 863 Program unveils its newest prototype, the Spring Light 3, a fuel cell–electric hybrid with steer-by-wire technology and regenerative braking. Target price: about $5,000—the car for the new masses. While Western automakers often boast that their enviro-wagons make “no compromises,” the 863 Program makes compromise its guiding principle. Like the funky Aspire, the Spring Light takes you where you want to go, without promising more. American cars are all ego, but the Aspire and Spring Light are friendly, even neighborly. They’re all about getting along, not getting away.

By the end of the afternoon at Jiading, it isn’t the Spring Light or the VIPs that are making the big impression. It’s Wan’s preview of Tongji’s new dormitories, complete with hot water and Western-style toilets. The engineering students see the bathrooms and let out a loud gasp. Their reaction is part awe, part appreciation, part anticipation of a new world that can only be better. Does the hydrogen highway start here? Maybe. Maybe your future and mine is being created by people desperate enough to imagine it.