Bloomberg Businessweek

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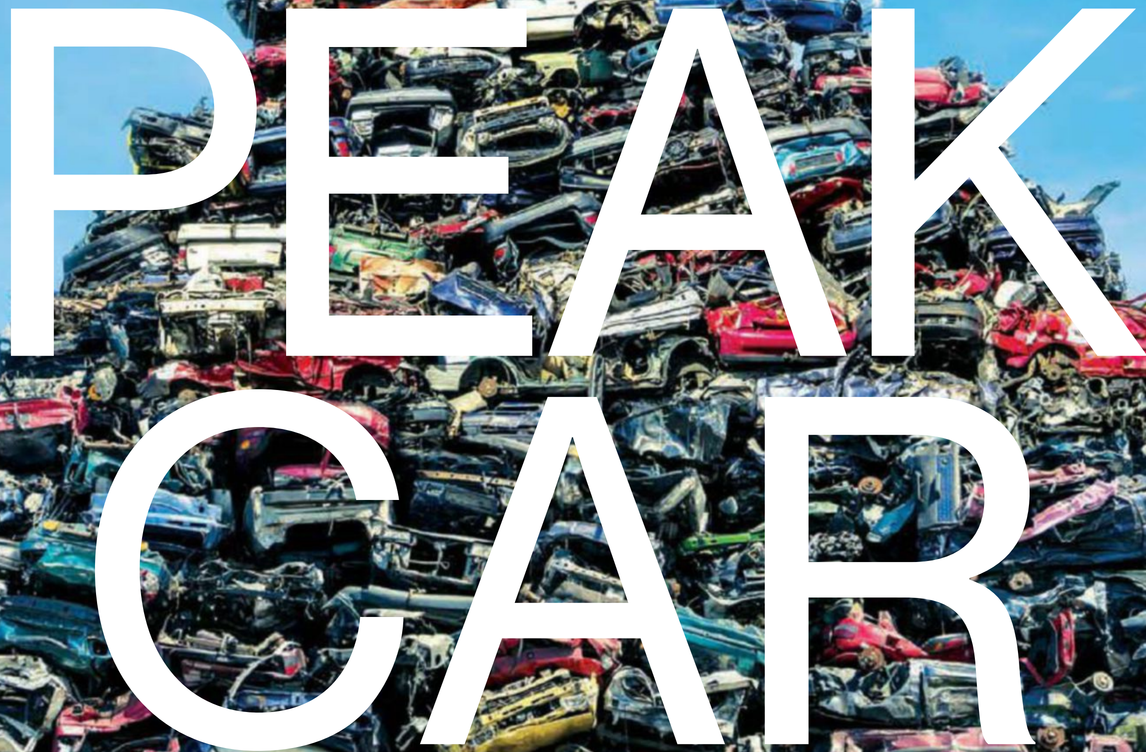

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GAINBRIDGE

Bloomberg Businessweek

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◀ Powder, the mascot at Alterra's Steamboat resort

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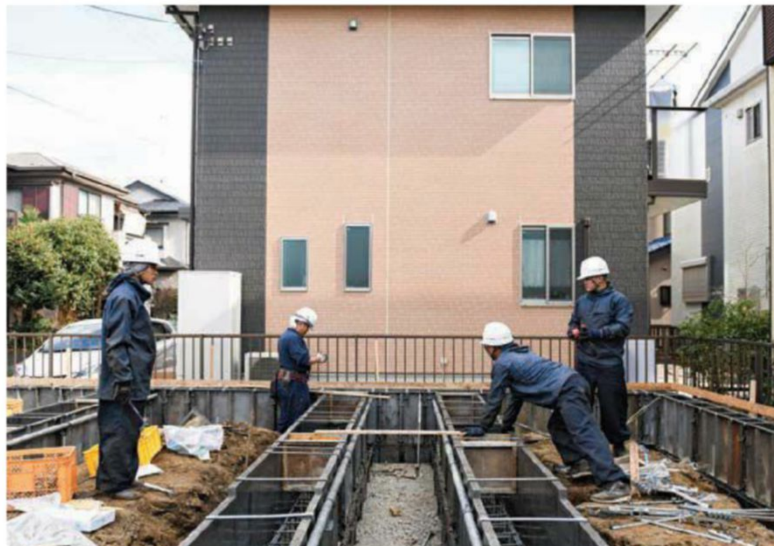

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The State of The Economy

With China's political season underway, how is the economy performing? By Wang Xiaosong

The author is a researcher with the National Academy of Development and Strategy, Renmin University of China (RUC), and a professor at the RUC School of Economics

As China's top lawmakers and political advisers convene their annual sessions in Beijing in March, the economy is at the top of their agenda. The events, officially known as the sessions of the National People's Congress and the National Committee of the Chinese People's Political Consultative Conference, are occasions when such issues of national importance are deliberated and decided upon. China's economic health has been in the spotlight lately, and major concerns include a lack of growth impetus, the stability of growth and the future of economic development.

China's 2018 macroeconomic data helps put matters into perspective. It shows that China's economy has generally maintained tempered growth and made progress in transforming from a high-speed growth model to high-quality development. China has also deepened domestic reforms and further opened up to foreign investment and trade, taking bold steps to achieve the nation's long-term goals.

Growth and progress

In 2018, China's GDP was approximately 90 trillion yuan ($13.3 trillion), an increase of 6.6 percent from 2017, achieving the set target of around 6.5 percent growth.

XINHUA

A bullet train travels through Duchang County in China's Jiangxi Province on October 6, 2018.

Although growth slowed slightly in 2018, intrinsic growth drivers were further strengthened, and consumption became a crucial pillar for economic development, accounting for 76.2 percent of China's GDP growth in 2018, up 18.6 percentage points over the previous year. The structure of consumption has been enhanced, and the trend of consumption upgrading continues.

In 2018, primary industry accounted for 7.2 percent of GDP, down 0.4 percentage points, while secondary and tertiary industries accounted for 40.7 percent and 52.2 percent of GDP, up 0.2 and 0.3 percentage points, respectively. This indicates a continuous optimization of China's economic structure.

Innovation-driven development played a key role in 2018. The value-added output of leading enterprises engaged in emerging and hi-tech industries increased by 8.9 percent and 11.7 percent respectively year on year—2.7 and 5.5 percentage points faster than the growth rate of leading industrial enterprises. Online retail sales also surged.

The nation's industrial structure is also being optimized as new growth drivers account for a bigger portion of China's economy. This, in turn, stimulates relevant industries. For example, the information technology, transmission and software industries, the leasing and business services industries and the transportation, storage and postal industries all expanded in 2018, helping drive the growth of GDP.

Aside from relatively stable economic development, China's consumer price index (CPI) increased by 2.1 percent last year, in line with the trend of moderate growth since 2012. The core CPI, which excludes food and energy prices, went up by 1.9 percent, down 0.3 percentage points from 2017. The producer price index went up by 3.5 percent, down from the previous year.

By the end of 2018, urban employment in China reached 434.19 million, 9.57 million higher than in 2017. The monthly surveyed urban unemployment rates remained between 4.8 percent and 5.1 percent, mostly on par with the previous year.

Residents' per-capita disposable income in 2018 was 28,228 yuan ($4,176), a nominal growth of 8.7 percent, or a real increase of 6.5 percent after deducting price factors, year on year. The real growth of per-capita GDP reached 6.1 percent. This shows that income growth is essentially in sync with economic growth.

As proposed at the 19th National Congress of the Communist Party of China in 2017,

China's economy has been transitioning from a phase of rapid growth to a stage of high-quality development. The country's economic performance in 2018 exemplified this transition, with stable growth and structural optimization.

Reform and opening up

China has achieved remarkable progress on the road to development since it launched its reform and opening up program in 1978. Its GDP has doubled every eight years, on average, and the country has evolved to become the world's second-largest economy, largest manufacturer, largest goods trader, second-largest consumer market and second-largest foreign direct investment destination.

At the same time, great challenges lie ahead for China. The huge dividend yielded at the beginning of reform and opening up has diminished. Manufacturing faces rising costs and difficulties in technological innovation, and anti-globalization and protectionist politics are causing external uncertainties for China's development. Mounting pressures on resources and the environment also restrain the growth of the Chinese economy.

In April 2018, President Xi Jinping delivered a keynote speech at the opening of the Boao Forum for Asia Annual Conference, where he said, "China's door will not be closed and will only open even wider." Against the backdrop of profound transformations in the international environment, China will continue to adhere to its fundamental national policy of opening up and pursue development.

The Belt and Road Initiative, launched by China in 2013 with the aim of enhancing connectivity along and beyond the routes of the ancient Silk Road, has unleashed new opportunities. China has since built closer economic and trade ties with participating countries, and has made steady progress in negotiating new free-trade agreements. Foreign trade has also developed in a more balanced way—a sign that China's doors are opening wider to the world.

China is also accelerating its domestic reforms—streamlining government administration and the delegation of powers, facilitating state-owned enterprise reform and strengthening intellectual property rights protection. In the current environment, China seeks to improve and adjust its economic policy, implement supply-side structural reform and tax reduction and hone macroeconomic regulation.

Further steps

As China celebrates the 70th anniversary of the founding of the People's Republic of China this year, the world is ushering in the brand new era of Globalization 4.0, defined by the World Economic Forum as being characterized by plurilateralism, multipolarity, ecological challenges and the fourth industrial revolution.

For China, there are tremendous opportunities and challenges, along with motivations and pressures. In order to achieve sustainable and healthy development and deal with the uncertain external environment with ease, the country will focus on improving quality and efficiency.

Looking at the history of world economic development, we know that high growth rates cannot last forever. Many economic powers have entered a period of long-term low growth after a truncated economic boom. However, a low growth rate does not necessarily indicate a deteriorating economy; instead, it often signifies high-quality, competitive growth. As long as employment rates remain stable, there is no need to obsessively focus on ever-increasing GDP figures.

The depth of China's opening up is of great importance. The foreign investment negative list (detailing the sectors where foreign investment is not permitted), released on June 28, 2018 by the Ministry of Commerce and the National Development and Reform Commission, provides a roadmap and a schedule of opening up the financial and automobile sectors—gradually widening the opening-up process and allowing the transition of relevant industries.

A new foreign investment law is expected to be adopted at this year's plenary session of the National People's Congress. The law will help attract more foreign investment, protect foreign investors' legitimate rights and interests and foster an environment favorable to doing business.

Independent innovation of key technologies also plays a crucial role. Since the U.S. has put the export of hi-tech products under increasingly severe scrutiny, indigenous innovation will become ever more important. China is converting pressures into driving forces, strengthening basic scientific research, promoting the shift from science to technology and creating a new engine for economic and social development. ■

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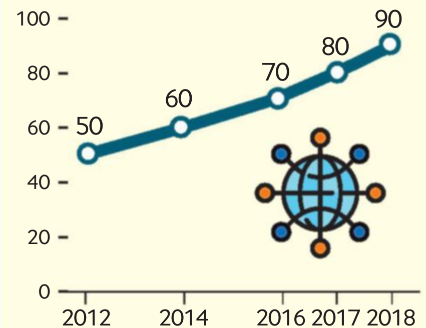
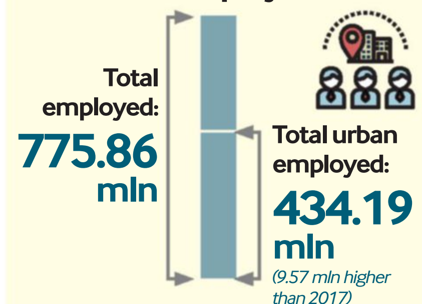
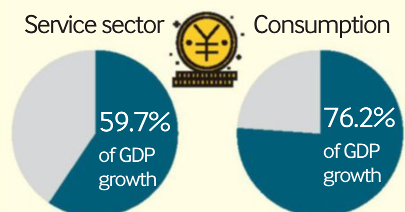
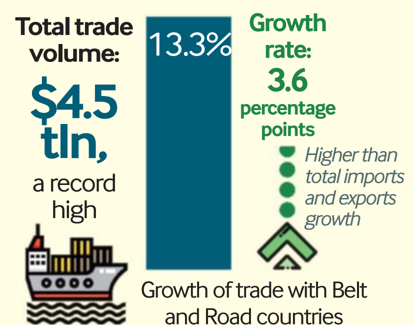
China's 2018 Economic Performance









(Compiled by *Beijing Review*; designed by Pamela Tobey)

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IN BRIEF

By Benedikt Kammel

● British Prime Minister

Theresa May offered to extend the Brexit deadline beyond March 29 to avert the risk of a cliff-edge departure from the European Union. In the meantime, she continued to negotiate with the European Union to make her existing deal palatable enough to win a parliamentary vote on March 12.

● Nuclear powers India and Pakistan engaged in tit-for-tat military action after India carried out an air strike on Pakistan and claimed to have killed more than 300 alleged terrorists in a camp there. Islamabad responded the next day by shooting down two Indian fighter jets.

● The Trump-Kim Jong Un summit began in Hanoi on Feb. 27.

● Investors who lost billions from Bernard Madoff's Ponzi scheme a decade ago can hope to recoup an additional

$2b

that was transferred overseas. So far, trustee Irving Picard has already recovered more than $13 billion for victims.

● **AT&T scored a decisive victory in the battle to keep its $85 billion purchase of Time Warner alive.**

● GE agreed to sell its biopharmaceutical business to Danaher, the former employer of GE CEO Larry Culp, for

$21.4b

● The Dutch government surprised its French counterpart with the purchase of a 13 percent stake in Air France-KLM. The airline partnership has existed since 2004, but recurring strikes in France and higher margins at KLM have weighed on the alliance.

● Twenty-First Century Fox was ordered to pay

$179m

in a case brought by four *Bones* actors and producers who claimed they were cheated out of their share of profits from the hit TV series. Fox said it would challenge the ruling.

● The SEC asked a judge to hold Tesla CEO Elon Musk in contempt for violating a settlement that required him to get Tesla board approval for his social media posts. Musk didn't take long to respond—via Twitter, of course—saying that "something is broken" with the SEC's oversight.

● **"Donald Trump is a man who ran for office to make his brand great, not to make our country great. He had no desire or intention to lead this nation."**

Michael Cohen, Trump's former personal lawyer, testified in Congress. He called his ex-boss a "racist," "con man," and "cheat." Trump tweeted that Cohen, who pleaded guilty in the Mueller probe, was "lying in order to reduce his prison time."

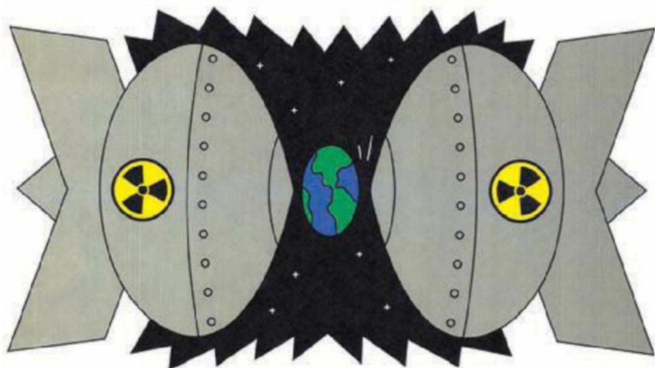
● Nigeria's Muhammadu Buhari won a second term as president of Africa's biggest oil-producing nation.

● Australian Cardinal George Pell was found guilty of sexual abuse, the highest-profile conviction in the Catholic Church.

● The U.K. should hand the Chagos Islands in the Indian Ocean back to Mauritius after 53 years, the top UN court said.

● Former Enron CEO Jeffrey Skilling was released from federal custody after serving 12 years and two months.

MAY: SIMON DAWSON/BLOOMBERG. TRUMP: EVAN VUCCI/AP PHOTO. COHEN: ANDREW HARRER/BLOOMBERG



► Worries Over the New Nuclear Age

The International Atomic Energy Agency's board of governors meets in Vienna from March 4-8, as concern rises about global nuclear proliferation. President Trump has left the Cold War-era arms-control treaty with Russia that's kept a limit on intermediate-range nuclear missiles.

► The Reserve Bank of Australia reveals its rate decision on March 5. Central Bank Governor Philip Lowe has warned that growth risks have increased.

► Still planning your next vacation? Get ideas at ITB Berlin, the world's largest tourism fair, which starts on March 6.

► The monthly U.S. employment report is due on March 8, with economists looking for signs that robust hiring has kept up.

► The European Central Bank announces its rate decision in Frankfurt on March 7 amid mounting evidence of an economic slowdown in the region.

► The International Geneva Motor Show opens its doors for 10 days on March 7, as the industry contends with consumers' growing doubts about buying second cars.

► On March 8, Christie's will begin an auction of 150 works by artists such as Damien Hirst and Tracey Emin collected by late U.K. pop star George Michael.

■ BLOOMBERG OPINION

Another Referendum?

● After months of muddling, the Labour Party leader says he's in favor of a new Brexit vote. Better late than never

After dithering for months, Jeremy Corbyn says he and his Labour Party will support a second referendum to avoid what he calls "a damaging Tory Brexit." Labour's sudden shift isn't definitive and settles nothing; however, in this endless saga of ruinous incompetence, the change counts as a hopeful development.

About time. But it isn't just a damaging Tory Brexit that the U.K. needs to avoid. It's any kind of Brexit, including the supposedly less damaging Labour Brexit that Corbyn seems to have in mind.

The case for holding a second "people's vote" has been simple all along: It's to reverse the mistake that the people made the first time around.

Corbyn's belated call for a new referendum was prompted by his party's mounting discontent over its own muddled line on leaving the European Union. Recent defections of "remain" supporters to a new Independent Group of former Tory and Labour members of Parliament made the maneuver more urgent. But Corbyn, like many of the party's supporters in the country, is no admirer of the EU. He's hoping to engineer a softer Brexit than the no-deal departure that Prime Minister Theresa May is dicing with.

Corbyn has said he supports staying in some kind of customs union and wants liberal access to—though not full membership in—the single market. To be sure, this would be better than leaving with no deal, but that wouldn't make it a good outcome. It would leave the U.K. as a second-class member of the EU, committed to following most of its rules but with no say in what those rules should be.

If the country were unhappy with the EU before, consider how much more unhappy it would be under this dispensation. If this is the Labour Brexit that Corbyn wants, it's a formula for simmering anger.

"Remain" supporters in the House of Commons need to take two steps. First, they should vote to extend—or, preferably, withdraw—the U.K.'s Article 50 notice to quit the EU on March 29, on the grounds that the risk of an accidental no-deal Brexit is now intolerably high and the lack of adequate preparation would make it a disaster.

With that done, they should vote to put the issue to a second referendum. MPs should admit that both government and Parliament alike have been unable to devise an exit that makes sense for the country. Their advice to the British electorate should be to look at what has been learned in the last several chaotic months—and reconsider.

This might not be what Corbyn wants. But if momentum toward a second referendum has increased, good. Tory and Labour MPs who put the country's interests first should join the campaign to cancel Brexit with a people's vote before it's too late. Ⓑ

Written by the Bloomberg Opinion editorial board

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● The U.S.-China negotiations may end up weakening the world trade regime—and hurting other economies

● By Shawn Donnan

On a wintry Sunday in February 1784, the *Empress of China* pulled out of New York Harbor and headed for Guangzhou with a crew of 42 and a cargo of liquor, Mexican silver, and American ginseng. It was off on what's now a well-worn trade route between the world's two largest economies—the first ship under the flag of an independent United States to venture to China in search of fortune. It also raised a question that's consumed U.S. policymakers since: How do you cut a deal with China when the rest of the world wants to make one too?

As John Pomfret, author of *The Beautiful Country and the Middle Kingdom*, a history of U.S.-China relations that documents the voyage of the *Empress of China*, writes, America's preoccupation with China goes back to the Boston Tea Party. The protest was at its root against Britain's use of unfair taxes to control the price of tea from China. The *Empress of China* set out in part to loosen the British grip on the tea trade.

The U.S. long ago replaced Britain as global hegemon and now stands challenged by China. Much as America's Founding Fathers once did, Donald Trump seeks to redefine the relationship with Beijing. Only there is more at stake than bilateral ties. "We have a long tradition in U.S.-China relations of trying to cut a deal with the Chinese that shuts out other people," says Pomfret. The pact taking form between Trump and China's Xi Jinping may do exactly that. It seems increasingly likely to test U.S. alliances as well as the global trading system that American leaders spent decades building. The end of one trade war may well trigger others.

As negotiations continue, it's worth remembering history. Britain's trade hold on China arguably peaked in the 19th century with its victory in the Opium Wars and the painful settlement it imposed. The Chinese haven't forgotten that humiliation: It informs their prosecution of the current trade war with America. With his tariffs, Trump has sought to force what some in Beijing see as a similar capitulation on 21st century issues such as China's model of economic development, its treatment of intellectual property, and the global reach of its technology. He has also, however, forced a line-by-line discussion over increased purchases of U.S. agricultural and energy exports that reeks of 19th century mercantilism, the philosophy that a nation's wealth is derived from selling as much as it can to the world rather than enjoying the broader benefits of open trade. Trump wants Beijing to buy more to reduce a U.S. trade deficit with China that's grown larger under his watch.

But the slip toward what purists call "managed trade" is a major departure from U.S. economic policy. It's also causing anxiety in the rest of the world, particularly among U.S. allies such as the European Union and Australia, which are likely to see their own trade with China affected. No one wants a trade war. But many fear the U.S. is putting at risk the global trading regime that has thrived since the end of World War II. "We know that a destructive global trade war between the two big economic powers would be bad for global economic growth and be negative for Australia," says Simon Birmingham, the Australian trade minister, but "the way in which the U.S. has gone about these and some other negotiations is not a way in which Australia would have or, indeed, supports."

As it is, the current trade war has caused collateral damage. The dip in demand from China, which results partly from trade tensions, has hurt the profits of U.S. companies such as Apple Inc. and Caterpillar Inc. Global trade in goods has been slowing, with exports from trade-dependent nations such as South Korea and Japan declining. Germany sits on the cusp of a recession at least in part because of a slowing China; its economy may fall over the edge if Trump imposes threatened auto tariffs. Australia's decision to bow to U.S. pressure and ban Huawei Technologies Co. equipment from its new 5G network leaves it facing retaliation. One Chinese port has forbidden imports of Australian coal, prompting fears Beijing is targeting the country's most lucrative exports.

The fallout may get worse if there's a U.S.-China agreement. In a Feb. 21 note, economists at Barclays estimated other countries could see exports to China drop as much as 20 percent. The EU would see a $55 billion hit to its exports to China, or the equivalent of a 2.2 percent drop in its exports to the world. That's why many critics see Trump's strategy as a beggar-thy-ally approach—with consequences for U.S. power. "The fact that we will have broken so much china, and have battered our allies and angered them and still reached a deal, is a reflection on the continued economic power of the United States," says Stuart Eizenstat, who was in the room when President Jimmy Carter and his Chinese counterpart, Deng Xiaoping, hashed out a deal to normalize relations in 1979 and writes about it in a recent book on Carter's White House. But, he adds, "I think in the end it will subtract from that power. It's a sort of a last fling at unilateralism."

Eizenstat says the U.S. and Europe are facing the worst crisis in their relationship since World War II, and things may get more fraught. The EU and Japan are about to embark on their own trade talks with Trump while facing the threat of auto tariffs. And while they're working quietly with Washington on a common agenda to take on China inside the World Trade Organization, those efforts seem increasingly futile.

The irony is that any understanding Trump reaches with China may end up being a blow to the American-led global trading order. Until his presidency, the U.S. led the push for trade pacts that focused on building up institutions such as the WTO to arbitrate disputes and on establishing rules to govern trade—rather than rely on mercantilist, government-directed purchases. Trump and his aides have pursued the bulk of their trade war with China outside the trade organization's rules. ▶

◀ That approach appears likely to continue. Enforcement of a deal with China, they say privately, is likely to come via U.S. tariffs rather than a reliance on the WTO to adjudicate disputes, a process that's often painfully prolonged.

Increased Chinese purchase of U.S. products, from aircraft to commodities such as beef, corn, and natural gas, may be just as corrosive. European and Japanese officials grumble about the cost they're likely to bear in loss of potential sales to China. Some of that disquiet might be offset if Trump is able to extract Chinese reforms to address the shared complaints of U.S. and European companies, such as intellectual-property theft. However, the potential agreement could well undermine the principles of nondiscrimination that underpin global trade—specifically the tenet that all trading partners treat each other as most favored nations. "By doing this you are also putting into question the trust that companies and others put into the system," says Luisa Santos, director for international relations at BusinessEurope, the leading voice for European companies.

Douglas Irwin, a Dartmouth economist and author of *Clashing Over Commerce*, a history of U.S. trade policy since 1776, says Trump is in many ways revisiting a debate that was largely resolved in the 1930s. In a 1934 decision that set the stage for decades of U.S. trade policy, President Franklin D. Roosevelt sided with Cordell Hull, his secretary of state, over George Peek, a White House trade adviser and the first president of the Export-Import Bank. Hull argued the U.S. and the world were best served by trade deals that established rules that allowed the free market to work. Peek argued that trade pacts ought to be purely transactional and the U.S. was best served by a government acting as a broker for U.S. goods rather than negotiating abstract rules. Peek lost the debate in part by losing the moral high ground: He negotiated what amounted to a barter agreement with Nazi Germany. He left FDR's government shortly afterward.

The rules-vs.-transactions debate resurfaced in the 1980s when U.S. administrations took on Japan in a trade war that led to agreements not unlike those now in play with China. These set a series of export limits for Japan, though the issue of how to enforce them was different, given Tokyo's reliance on U.S. military protection. That debate effectively resolved itself with Japan's economic downturn in the 1990s, Irwin says. The trade conflicts with Japan, he says, helped clear the way for the creation in the 1990s of the WTO as a neutral arbiter of trade disputes.

Which brings us back to Trump and China. Irwin argues that a deal that swings the relationship to managed trade would involve a "deterioration of the system." Trump and his aides aren't sentimental about the global trading regime. They say they're unwinding decades of policy that have resulted in little more than America's industrial decay. Any purchases the Chinese may make are simply welcome commitments aimed at reducing a yawning U.S. trade deficit with China.

The administration's approach isn't monolithic. Hardliners such as White House trade adviser Peter Navarro want a strategic decoupling of the U.S. and Chinese economies. Others, such as Treasury Secretary Steven Mnuchin, seek a less disruptive path. As Trump angles for a deal that makes the stock markets happy, the tension inside his administration is largely between demands for substantive Chinese reforms and the sort of easy deficit-reducing purchases Beijing is willing to make. "The issues on the table are too serious to be resolved with promises of additional purchases," U.S. Trade Representative Robert Lighthizer told Congress on Feb. 27.

Even with a mercantilist agreement, Irwin says, the situation needn't be cast in stone. The very nature of managed trade, he says, means "you usually have to go back to the negotiating table, and things can be repaired."

However, by pursuing bilateral negotiations and ignoring the WTO as a venue to enforce any deal, Trump is encouraging other members to do the same. His invocation of a once-taboo WTO national security loophole to impose tariffs is seen as encouraging others, such as Russia and Saudi Arabia, to do the same. Potentially worse, Trump's blocking of new WTO judges is hobbling the organization's ability to hear cases. Its seven-member appellate body may be down to one panelist by the end of the year.

If Trump uses the current tariffs on $250 billion in imports from China as the primary and long-term tool to enforce any deal, he will hand his successor a difficult legacy to unwind. The U.S. has a history of temporary tariffs that have endured. The prime example is the 25 percent "chicken tax" on imported light trucks introduced in the 1960s over a poultry dispute with Europe that's survived until now. The duties Trump has imposed on China may follow that pattern, Irwin says. For one thing, there's a growing bipartisan consensus on the need to crack down on China that will make lifting any tariffs politically awkward. "With China, there's this ratchet effect," he says. "It's not easily undoable."

While some see cognitive dissonance in Trump's push for state-directed purchases alongside economic reforms intended to reduce the long-term role of the state, others call the approach pragmatic. China for years slow-walked the delivery of promised reforms. Better to get what you can now. "You have to recognize that achieving some short-term goals requires working with China as it is rather than as you wish it to be," says Brad Setser, an expert on international economics who served in the White House and the Department of the Treasury in the Obama administration.

The *Empress of China* returned to America with a sizable profit in 1785. And the U.S. push to gain an advantage over European rivals on the Chinese mainland has continued ever since. In 1946 drivers on the mainland were forced to switch to the right side of the road after the U.S. lobbied Nationalist Party leader Chiang Kai-shek—who was dependent on U.S. aid—to make the change. Washington, Pomfret says, "got him to do it partially because U.S. auto companies wanted to sell more automobiles in China and wanted to shut the Brits out of the market." Now it may be the rest of the world that gets shut out of a deal between China and the U.S. Ⓑ

Eleven-year-old Meti in Ethiopia lives in extreme poverty that keeps her from becoming all she can be. But it doesn't have to be that way.

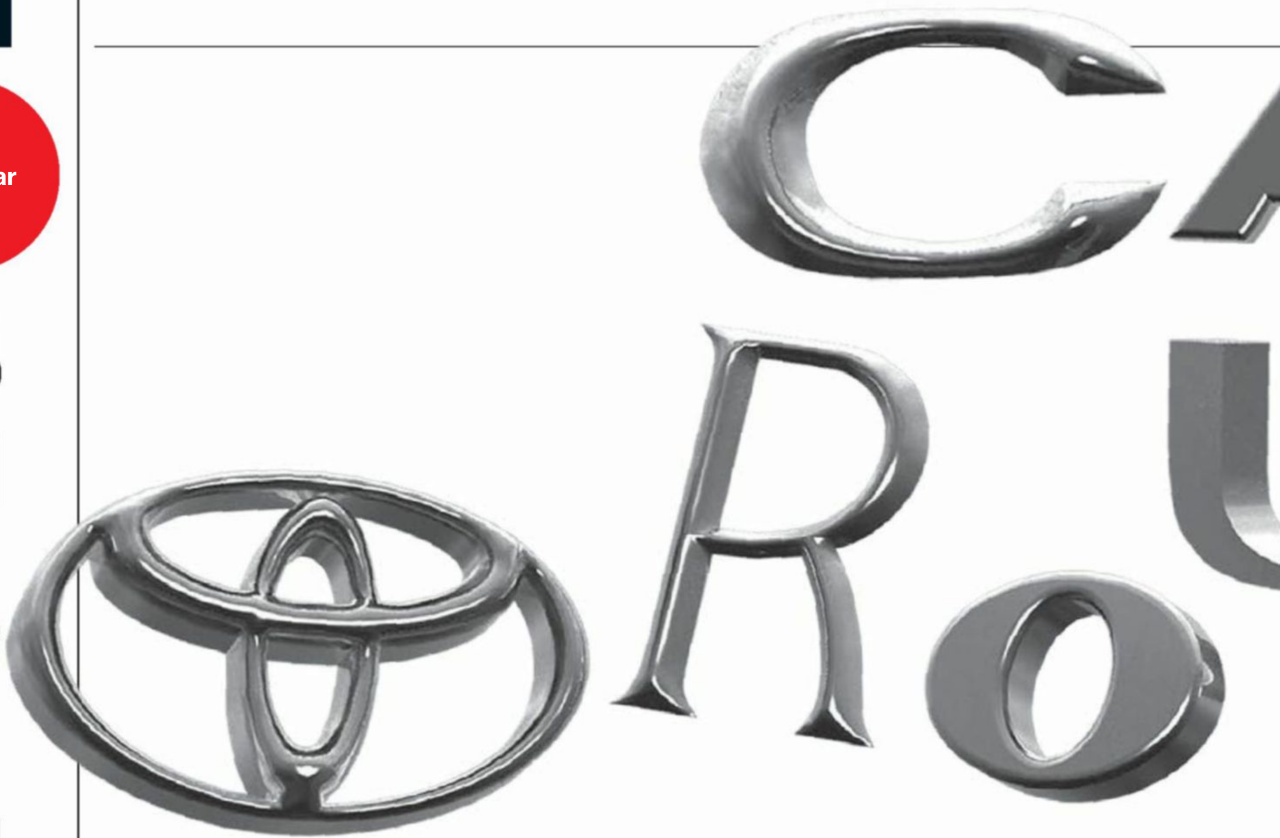
ChildFund works in 25 countries to ensure that millions of children like her grow up healthy, educated, self-sufficient and safe. Fueled by support from generous sponsors, our programs help children fulfill their potential no matter where they were born. The right thing to do for Meti? Help her prove the world wrong.

Learn more at **ChildFund.org**

ChildFund International | 80 Years

Peak Car

BUSINESS



● For many people, new forms of mobility may make owning a vehicle obsolete

After one too many snowstorms, Boston tech executive Larry Kim had had it with shoveling out his car and struggling to find parking. So in 2014 he ditched his Infiniti luxury sedan and began commuting by Uber and Lyft—at an annual cost of as much as $20,000. "I would never go back to owning a car," says Kim, chief executive officer of MobileMonkey Inc., a Facebook Messenger marketing platform, who says he's recovered an hour a day by not driving. "Your time is not free, right? Your time is worth more than $20 an hour. So in my case, why not spend $15,000 to $20,000 a year to get all of that time saved?"

The automobile—once both a badge of success and the most convenient conveyance between points A and B—is falling out of favor in cities around the world as ride-hailing and other new transportation options proliferate and concerns over gridlock and pollution spark a reevaluation of privately owned wheels. Auto sales in the U.S., after four record or near-record years, are declining this year, and analysts say they may never again reach those heights. Worldwide, residents are migrating to megacities—expected to be home to two-thirds of the global population by midcentury—where an automobile can be an expensive inconvenience. Young people continue to turn away from cars, with only 26 percent of U.S. 16-year-olds earning a driver's license in 2017, a rite of passage that almost half that cohort would have obtained just 36 years ago, according to Sivak Applied Research. Likewise, the annual number of 17-year-olds taking driving tests in the U.K. has fallen 28 percent in the past decade.

Meanwhile, mobility services are multiplying rapidly, with everything from electric scooters to robotaxis trying to establish a foothold in the market. Increasingly, major urban centers such as London (page 20), Madrid, and Mexico City are restricting cars' access. Such constraints, plus the expansion of the sharing economy and the advent of the autonomous age, have made automakers nervous. That's also pushed global policymakers to consider the possibility that the world is approaching "peak car"—a tipping point when the killer transportation app of the 20th century finally begins a steady decline, transforming the way we move.

Rather than signaling the end of the road for the automobile, peak car is a reflection that reurbanization and the widespread adoption of mobile apps that can summon a vehicle on demand will lessen

Edited by James E. Ellis and David Rocks

the need for many of the 1.3 billion vehicles now on the road. And with new cars increasingly expensive, but mostly used just a few hours a day, the financial case for alternatives is growing stronger. “When you put all these trends together, you’re going to see a cap on personal vehicle ownership start to emerge,” says Mike Ramsey, an automotive consultant with researcher Gartner Inc. “We are near peak car.”

A decade ago the auto industry predicted annual global vehicle sales would top 100 million by now, but they’ve stalled instead, falling to 94.2 million last year, down 1 million from 2017. Researcher IHS Markit predicts the 100 million vehicle milestone will be surpassed in the next decade, but only because of growth in China, India, Russia, and other emerging markets. And even carmakers in China, the world’s top-selling auto market, are starting to throttle back their projections (page 18).

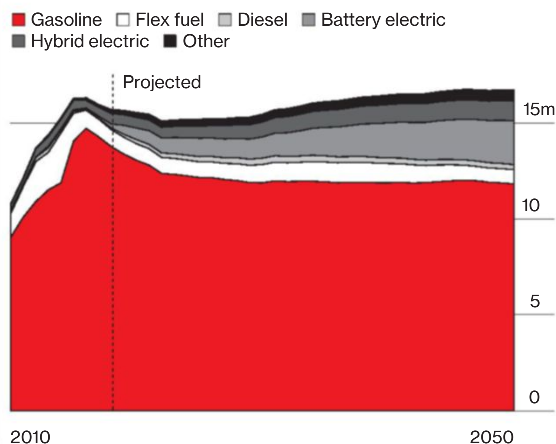
Globally, the success of mobility services is already chipping away at long-term forecasts for the industry. IHS last year trimmed 1.4 million vehicles from its 2030 prediction after studying the new options for getting around, says Henner Lehne, vice president for forecasting. “Longer term,” he says, “we will see a flattening of private-car purchases.”

IHS sees the biggest impact of mobility services coming in China. Auto sales there plunged 18 percent in January, an unprecedented seventh consecutive monthly decline, as commuters rapidly embraced ride-hailing. Last year, 550 million Chinese took 10 billion rides with the Didi ride-hailing service. That’s twice as many rides as Uber provided globally in 2018. “Increasing numbers of Chinese are opting for mobility as a service over car ownership,” wrote Michael Dunne, CEO of automotive researcher ZoZo Go.

China’s car sales momentum may have slowed, but that’s better than the situation in established markets such as the U.S. and Western Europe, says ▶

Light-Duty Vehicle Sales by Fuel Type, U.S.

■ Gasoline □ Flex fuel ■ Diesel ■ Battery electric ■ Hybrid electric ■ Other



● Share of population residing in urban areas

North America
Latin America and Caribbean
Europe
Oceania
Asia
Africa

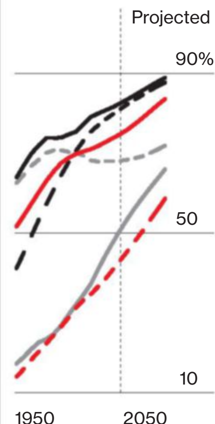


ILLUSTRATION BY CAROLINE DAVID. DATA: U.S. ENERGY INFORMATION ADMINISTRATION, UNITED NATIONS WORLD URBANIZATION PROSPECTS

◀ Jeff Schuster, senior vice president for forecasting at researcher LMC Automotive. “Mature markets could very well be at peak auto,” he says.

The tipping point worldwide will come at the end of the next decade, when self-driving cars start gaining traction, predicts Mark Wakefield, head of the automotive practice at consultant AlixPartners. Replacing a taxi driver with a robot cuts 60 percent from a ride’s cost, making travel in a driverless cab much cheaper than driving your own car. “The take-off point is the robo-taxi,” Wakefield says. “By 2030 we have a pretty substantial amount of sales volume coming out [of vehicle sales] because of that.”

Also helping to drive away car buyers: rising sticker prices. To boost their profit margin, automakers have been loading cars with expensive extras and high-tech touches, pushing the average price of a new car in the U.S. to a record $37,777 by the end of last year, according to Kelley Blue Book. That’s caused many people to hold on to their existing rides longer; the average age of autos on U.S. roads reached a record 11.7 years in 2018, according to IHS.

European drivers face the same rising cost of ownership. That’s what led Copenhagen lab technician Linda de Sparra Terkelsen to sell her Fiat 500 and zip around town by bike or public transportation instead. “It’s faster to bike, much cheaper, and it’s really nice to start the day with fresh air,” she says, adding that she’ll never buy another car.

Nonetheless, auto executives are predicting a prosperous future for the traditional automobile. Population growth and economic expansion should fuel ever-growing sales, even in mature markets, says Elaine Buckberg, chief economist for General Motors Co. Yet GM is placing big bets on mobility investments and cutting back on carmaking. It’s planning to close five North American car factories, starting with an Ohio plant in March, while plowing $1 billion a year into developing self-driving cars. Employment at its autonomous tech arm, GM Cruise, has grown to more than 1,000 workers, from just 30 in 2016. GM, which plans to debut a robo-taxi service late this year, already offers car-sharing through its Maven unit and has invested $500 million in Lyft’s ride-hailing business.

In Europe, Daimler AG and BMW AG on Feb. 22 said they’ll pour more than €1 billion ($1.1 billion) into their jointly owned car-sharing and ride-hailing businesses. The year-old umbrella venture, ShareNow, is expected to become the world’s largest car-sharing operator; it will weigh purchases of startups or established players along with collaborations, Daimler said.

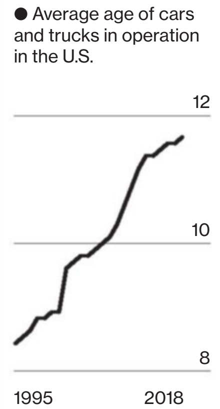
Indeed, automakers may talk a good game about moving metal, but increasingly they’re chasing profits expected to come from services that charge by the mile. Revenue from those “disruptive” options will grow to 25 percent of the transportation market by 2030, from 1 percent now, according to McKinsey & Co. While earnings from traditional carmaking decline, profits from mobility services will come to dominate the $634 billion that the auto industry is expected to make in 2030, Accenture says. “Right now, everyone still hopes to sell more cars. I haven’t come across a single company that forecasts a decline,” says Philipp Kampshoff, a McKinsey partner who specializes in transportation. “But there is just a huge profit pool emerging, and everybody is thinking, How can I tap into it?”

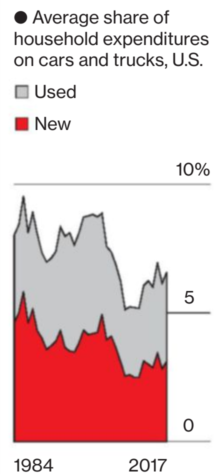
Automakers are engaged in a delicate dance, relying on their century-old manufacturing businesses to generate profits to finance their future in shared and electric driverless cars. The first big challenge is persuading new car buyers to give up gas guzzlers and go electric, a shift energy researcher BloombergNEF predicts will occur in the next decade, with China leading the charge. Electrified cars connected to the internet will enable cheap forms of mobility that will make owning an auto expensive and obsolete. “Before peak car, there’s going to be a peak in internal combustion engine vehicles,” says Colin McKerracher, head of advanced transport analysis for BNEF. “That will have a big effect on automakers’ strategies, because investment has a habit of chasing growth.”

Ultimately, individual car ownership will give way to having a mobility app on your phone, where an automobile is but one mode available, says Kersten Heineke, a McKinsey transportation specialist. A wealthy commuter might order a driverless Uber Black to take her to the office in solitude. A regular joe could hail a robo-shuttle that gets him to the subway just before his train departs for the city center, where he’ll hop a prebooked e-scooter to carry him the last mile to work. “This is the ideal future of mobility for a city,” Heineke says. “The main question around peak car is how much of this will trickle down to smaller cities and the countryside.”

The minority of the world’s population living in those wide-open spaces by midcentury will likely still own vehicles, because the distances are too large and population density too small for many mobility services to operate profitably. But urban dwellers may well have to spend a day in the country to catch a glimpse of that 20th century show pony known as a car. —*Keith Naughton and David Welch, with Alexandra Semenova*

THE BOTTOM LINE With new forms of mobility poised to eat into car sales, automakers are preparing for a future beyond privately owned vehicles.

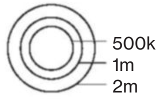




DATA: IHS MARKIT, BUREAU OF LABOR STATISTICS CONSUMER EXPENDITURE SURVEY

The Road to the Peak

Light vehicle sales, 2018



Projected change in car sales, 2018-19

20%
10
0
-10
-20
-30

Analysts expect sales to surge now that Egypt's government has eliminated tariffs of as much as 40 percent on vehicles from the EU

With women now allowed to drive, sales in the No. 1 Middle East auto market are likely to soar

The collapse of the lira last summer sharply boosted the price of imports and increased the cost of financing, sending sales plummeting

High interest rates and inflation, as well as a collapsing peso, have combined to strangle expected demand in South America's second-largest economy

Egypt
Algeria
Saudi Arabia
Hungary
Romania
Oman
U.A.E.
Vietnam
Morocco
Philippines
Brazil
Peru
Colombia
Chile
Poland
Czech Republic
Portugal
Switzerland
Russia
Austria
Belgium
South Africa
France
Spain
U.K.
Germany
China
India
Uzbekistan
Israel
Indonesia
Japan
U.S.
Canada
Mexico
Denmark
Ireland
Italy
Sweden
Norway
Netherlands
Taiwan
Malaysia
South Korea
Australia
New Zealand
Thailand
Pakistan
Iran
Turkey
Argentina

DATA: LMC AUTOMOTIVE

China Can't Save the Industry Forever

● The country is subject to the same trends troubling the industry around the world

Persuading people to buy a new car in the world's biggest auto market used to be easy for Mark Zhang, a salesman in the central Chinese city of Zhoukou. Flush with cash and eager for their first sedan or SUV, middle-class consumers who visited his showroom didn't bother haggling over terms. "Back in 2016, a lot of buyers made quick decisions," says Zhang, who has spent the past five years working at a dealership for a major Western brand that he can't name because he isn't authorized to speak with the media. "It was like taking home a new dress."

That was before a slowing Chinese economy and a trade war with the U.S. sent a chill through dealerships across the Asian giant. For the first time in a generation, China's auto market shrank last year. In Zhoukou, sales fell 4 percent; in December they plunged 33 percent, according to consultant WAYS Information Technology Co., leaving Zhang struggling to meet his monthly targets. "Now it takes days, back-and-forth visits, price comparing, and bargaining before people make up their minds," he says. "Many people found it difficult to make money last year, so a lot of my clients hesitated big time to spend on expensive items like cars."

Thanks to rising disposable incomes and falling vehicle prices, the Chinese auto market grew at a compound annual rate of 12 percent from 2007 to 2017, according to Shanghai-based consulting firm Automobility Ltd. But sales fell 4.1 percent in 2018, to 23.7 million vehicles, the first drop since the early 1990s. China's dealer association reported yearend inventory levels at a record high, with dealers holding more than 1 million excess vehicles, according to Sanford C. Bernstein & Co. analysts. And the share of Chinese sales originating in small cities and rural areas—previously a major contributor to car demand—has fallen since 2016, according to the China Passenger Car Association. "The massive PRC market has turned soft," analyst Michael Dunne of Chinese automotive adviser ZoZo Go wrote in a Jan. 23 report.

A slowdown in China could spell trouble for automakers who are long accustomed to the market there moving in only one direction—up—and have been adding capacity to meet expected demand. Honda, Toyota, and Volkswagen are expanding production in China, and Tesla Inc. is building a new factory there. Meanwhile, BMW and Daimler's Mercedes are introducing new electric vehicles in China, which has ambitious targets to phase out internal combustion cars.

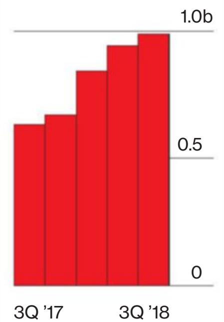
Unfortunately for many of those automakers, there's more to the slowdown than just a temporary economic weakness caused by the trade war. "The Chinese market is now mature and will show slower and more cyclical growth going forward," wrote Bernstein analysts Robin Zhu, Luke Hong, and Sijia Hao in a report published in January.

While a trade war truce might help restore consumer confidence, some of the same trends depressing auto demand in other parts of the world are hurting China, too. One is the increased popularity of ride-hailing apps that make it easier for urban residents to do without cars. Didi Chuxing, the nation's biggest hailing service, had 30 million active users a day last year, mostly in China, according to the company. That's twice the number of trips that Uber Technologies Inc. completed in all of its markets.

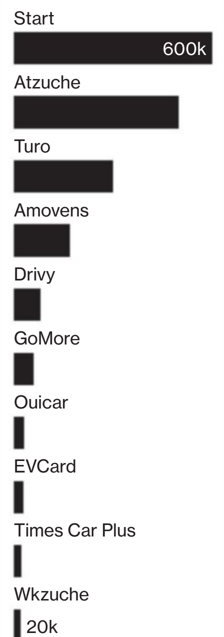
Even when young Chinese consumers want their own cars, they're less likely to buy a vehicle fresh out of the factory. While China's used-car market accounts for about one-third of vehicle purchases, it's growing fast. Sales of used cars grew 11.5 percent in 2018 to a record 13.8 million, according to the China Automobile Dealers Association. "You have a menu that wasn't available a few years ago," says Automobility Chief Executive Officer Bill Russo. The average age of a Chinese car is just 4.8 years, he says, and as the supply of used cars increases a Chinese shopper with a budget of 250,000 yuan ($33,000) might now purchase a used Mercedes or BMW rather than a new Ford or Hyundai. "It's the middle-market brands that are most threatened by people shopping on price who want a brand upgrade," he says.

China's slowdown is already forcing foreign automakers to downshift expectations there. Japan's Suzuki Motor Corp. in September pulled out,

● Active users of digital hailing services, globally



● Top car-sharing services by registered vehicles in fleet



PHOTOGRAPH BY CAROLINE TOMPKINS FOR BLOOMBERG BUSINESSWEEK. DATA: BLOOMBERGNEF

agreeing to transfer its half-ownership in a Chinese joint venture to its local partner. In January, Korea's Hyundai Motor Co. disclosed plans to cut the workforce at its joint venture in Beijing as weak demand sent sales that month down 7.7 percent. And on Feb. 7, Mumbai-based Tata Motors Ltd. announced it was writing down the value of its Jaguar Land Rover unit by $3.9 billion and overhauling its Chinese dealer network after Jaguar Land Rover sales in China—the brand's largest market—collapsed 35 percent in the nine months through December.

Ford Motor Co.'s China business lost $534 million in the fourth quarter. "The swift erosion of demand in China—given the scale of that market—is a dynamic that has the potential to wipe out large swaths of capital as fast as North America can generate it," Bloomberg Intelligence analysts Kevin Tynan and Kieran Ryan wrote in comments after the earnings announcement.

There's still room for the Chinese auto market to grow, if at a slower pace. There are 150 cars per 1,000 people in China, compared with 800 in the U.S., according to Automotive Foresight Shanghai Corp. And President Xi Jinping's government, which has intervened in the past with tax changes to juice auto sales, on Jan. 29 announced policies to stimulate demand, including measures to encourage replacement of old cars and subsidize purchases by rural residents. Senior economic policy officials have also promised more tax cuts. Such moves "will help to make consumers feel more confident," says Jefferies analyst Patrick Yuan.

That's one reason some foreign automakers are still expanding. Although General Motors China sales fell 10 percent in 2018, the company is adding more than 20 new or refreshed models this year. Elon Musk traveled to Shanghai in January for the groundbreaking of a $5 billion Tesla factory scheduled to begin producing electric vehicles by the end of the year. Volkswagen AG opened four factories in China in 2018 and plans to have enough capacity to turn out 5 million vehicles a year by 2020—a 25 percent increase in just three years.

But Volkswagen, whose Audi brand was one of the earliest foreign nameplates in China and remains a top seller, may fare better than many other foreign carmakers and smaller Chinese outfits, according to Automotive Foresight Managing Director Yale Zhang. "The weaker foreign brands are really facing a problem," he says, and the outlook for most Chinese local brands is even worse: "They're doomed." —*Bruce Einhorn and Ying Tian*

THE BOTTOM LINE Foreign carmakers are struggling in China as the slowing economy, the trade war with the U.S., and the rise of ride-hailing apps put a dent in sales.

Artifact Air Freshener

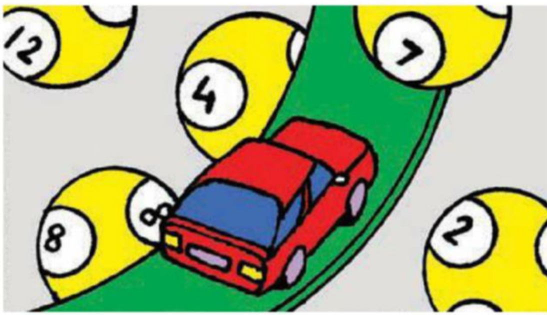
In addition to royal pine, one of its original scents, Little Trees offers fragrances such as bourbon, cotton candy, and "new car smell"

After a milk-truck driver complained about the smell of spilled milk in 1952, Julius Sämann put fragrance onto blotter material and an auto icon was born. Car-Freshner Corp.'s Little Trees brand is still going strong, but Procter & Gamble's Febreze and other upstarts are vying for nose share.

Baby, You Can't Drive My Car

● In more and more places, owning a vehicle is increasingly difficult—and out of fashion

● In Beijing, New Rides Are for the Lucky



It's not the half-million-yuan price tag keeping Beijing resident Sandra Zhao from buying her dream car, a BMW X4 SUV. It's the license plate she needs to have a conventional gasoline car. She's been in a lottery pool for five years, competing with more than 3 million fellow residents for one of the plates. The complicated bimonthly drawing awards about one plate for every 2,000 applications. Meanwhile, her husband has been on line since the end of 2017 with 420,000 others for a license to own a supposedly easier-to-acquire electric vehicle. He's hopeful he'll get it in another two years—those at the back of the line may have to wait eight. "Owning a car is extremely difficult in Beijing," says Zhao, who desperately wants one to ferry her 10-month-old daughter around. "If it wasn't for the baby, I'd rather give up the idea and use ride-hailing apps."

Traffic congestion and air pollution are such headaches in the capital that the government since 2011 has used a lottery to restrict the number of cars registered each year. The annual new vehicle quota, which was 240,000 in 2013, fell to 100,000 in 2018. The municipal government will issue 38,000 of those plates to individual buyers of gasoline-powered cars and 54,000 for EVs. It aims to cap the number of locally registered vehicles at below 6.3 million by the end of 2020—in a city of 22 million people.

What's more, Beijing requires each licensed gasoline-fueled car to be idle one day a week. (The day is determined by its license-plate number.) Many residents used to simply register their car outside the city to avoid the yearslong waits, but officials are closing that loophole. Starting in November 2019, cars without a local license will be allowed only 12 permits to drive within the city per year, with each permit valid for just seven days.

"China's car ownership restriction has made people consider other alternatives," says Bill Russo, chief executive officer of Automobility Ltd., a Shanghai-based consultant. "It's changing the attitude of the consumers from necessarily owning a car to booking a car on demand." —*Yan Zhang*

● Driving to Town? That'll Be $15

For most of the past decade, Samantha Basham drove the 16 miles to work in central London from the suburban borough of Bexley, but last year she switched to the train. Why? London's congestion charging system was costing her hundreds of pounds a month. These days, "I don't drive in at all," says Basham, 45, a freelance makeup artist for magazines and broadcasters. "I take the train even though I have to carry a heavy suitcase full of makeup."

Basham is among the thousands of Londoners who've shifted to public transport since the city introduced the charges in 2003. Drivers pay as much as £11.50 ($15) to enter central London from 7 a.m. to 6 p.m. on weekdays. The rules are enforced by cameras that snap photos of license tags at the zone's perimeter and by random camera checks inside. They've cut the number of cars entering the area by 30 percent on weekdays, the municipal transport agency says. While the primary goal of the charges was to ease traffic, they've also dampened auto sales: In 2017 some 710,000 cars were registered in London, down 2 percent from 2009, vs. an 11 percent increase across Britain.

More than a dozen cities worldwide have instituted similar programs, and after years of false starts, New York appears poised to impose a fee on vehicles in parts of Manhattan. Proponents say such plans result in time savings, fewer accidents, and

ILLUSTRATIONS BY FELIX DECOMBAT. DATA: ACCENTURE

lower carbon monoxide emissions—benefits that outweigh the cost of implementation.

To further limit pollution, London will double down on its system in April with an additional £12.50 daily fee for many older cars. Basham says that while the charges have complicated her life, she expects they ultimately will make the city more livable. "It's inconvenient for me, but I do realize that it's meant to be for the good of the environment," she says. "So I'm sympathetic." —*Irene Garcia Perez*

● When a Shuttle Is the Commuter Car

Each workday, software engineer Edoardo Conti rides Facebook Inc.'s shuttle bus from his San Francisco neighborhood to the company's headquarters in Menlo Park. At an hour or more in crawling traffic, it's a tedious ritual. But were it not for the shuttle, the carless Conti says he might not have taken a job at Facebook at all.

The Bay Area has a mishmash of lackluster public transit options, including trains that don't service many of the places people live and work and buses that are slow and often overcrowded. So private options have emerged: ride-hailing services Uber and Lyft; scooter and bike rentals such as Bird, Lime, and Jump; and corporate shuttles from the likes of Facebook, Genentech, and Google that ferry workers to their campuses. A Santa Clara Valley Transportation Authority study counted more than 100 shuttles operating in the area daily.

While a recent report found car ownership in San Francisco grew 6 percent from 2012 to 2017, researchers suggested that part of that rise could have been spurred by buyers intending to use vehicles for ride-hailing, along with population growth and an influx of affluent workers. Over the same period, the number of car-free or "car-light" households—ones with fewer cars than drivers—increased in San Francisco by 10 percent. Other cities with heavy Uber and Lyft use also saw jumps in car-light households. "San Francisco public transportation is inconvenient or kind of gross," Conti says. Without these new sharing options, he says he'd "probably move to New York." —*Kristen V. Brown*

A Breakdown In Autobahn Culture

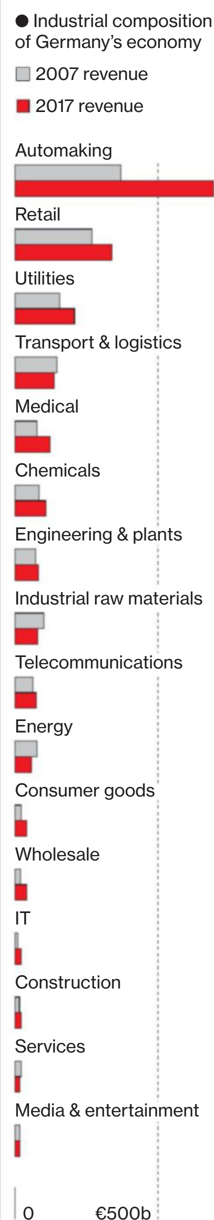
● Carmaking is a pillar of the German economy. Peak car poses a mortal threat to the industry

Germany is the birthplace of Karl Benz, the inventor of the automobile, and gave rise to the "People's Car," Volkswagen, which has grown into the world's biggest auto manufacturer. It's home to four brands—BMW, Mercedes, Audi, and Porsche—that account for 80 percent of global sales of luxury vehicles. And with 835,000 workers, the auto industry is Germany's biggest employer, responsible for a fifth of the country's exports.

But automotive employment will start to decline this year, the powerful IG Metall union predicts. Germany may have reached peak car, posing a threat to the most important pillar of the economy. "We're preparing for a time when fewer people will work in the industry in our region," says Rüdiger Schneidewind, mayor of Homburg, a western city of 42,000 with four big factories that account for 30,000 jobs. "More than half of this region's prosperity is due to auto manufacturing."

It's hard to overstate the degree to which the automobile permeates German culture. The country's no-speed-limit autobahns are the stuff of legend, and the cars that run on them are technological marvels supporting a vast ecosystem of suppliers and developers. But as people shift to ride-hailing, car-sharing, and driverless electric vehicles, many of Germany's advantages will evaporate. "The three core features of mobility in the 20th century are dissolving: cars that need a driver, are privately owned, and are powered by a combustion engine," says Stephan Rammler, an auto industry consultant and professor of transportation design at Braunschweig University of Art. "Germany risks falling behind new giants being created in China and the U.S."

The concern for the Germans is that profits will flow increasingly to arrivistes such as Waymo, Apple, or Uber Technologies. Battery-powered cars don't need as much precision engineering as traditional models, and making them will require ▶



◀ fewer workers. More than a third of Germany's 210,000 jobs in engine and transmission production will disappear by 2030, IG Metall says. "Carmakers can only survive as mobility-service providers, not as auto manufacturers," says Horst Lischka, IG Metall's Munich head and a member of BMW AG's supervisory board.

Unlike in the U.S., where the industry is concentrated in a handful of regional strongholds, automaking in Germany is a nationwide endeavor: Volkswagen is headquartered in Wolfsburg, 140 miles west of Berlin. BMW and Audi have offices and factories across the southern state of Bavaria. Daimler AG and Porsche are based in Stuttgart in the southwest. A bit farther north, in Cologne, Ford Motor Co. employs 17,500. And around Homburg, near the French border, suppliers such as Bosch, ZF Friedrichshafen, and Schaeffler make everything from transmissions to diesel injectors to pistons. Workers are typically well-compensated: Manufacturing jobs pay about 20 percent more than those in services, providing a ticket to the middle class for hundreds of thousands of people with only a high school diploma.

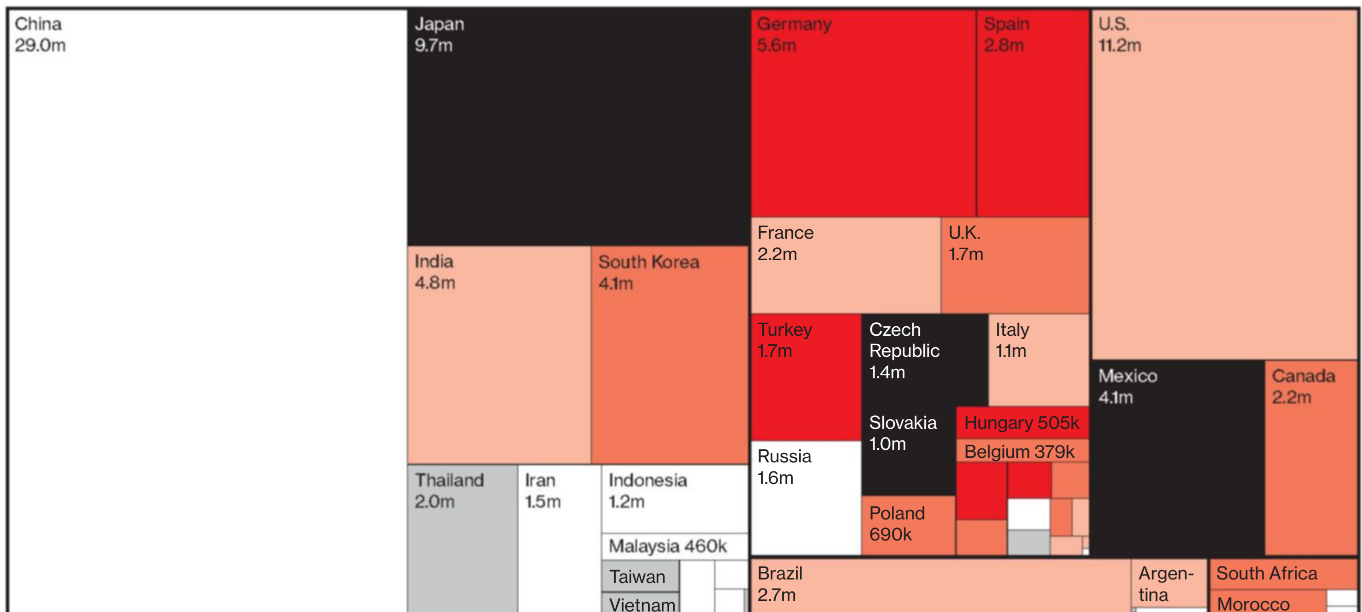
Even places with little history of auto manufacturing have embraced the sector. The former East German state of Saxony had no modern vehicle production before the Berlin Wall came down. Then in 1991, VW started making Golfs in Zwickau, three hours south of the capital on one of the world's first superhighways, built in 1930s by the Nazi regime. In 1999, Porsche opened a plant near Leipzig where it makes Macan SUVs and Panamera sedans. And in 2005, BMW inaugurated a facility near Leipzig designed by Iraqi-British architect Zaha Hadid; it was hailed at the time as the world's most advanced factory. Today the three companies and their suppliers employ 95,000 people in Saxony and account for a quarter of the state's industrial output.

While German automakers have announced ambitious electric-vehicle programs to stay ahead of the transformation, the shift hasn't been smooth. VW will spend €1.2 billion ($1.4 billion) retooling Zwickau to make a half-dozen electric models by 2021—but it warns that the payroll is likely to shrink. Three years ago, the carmaker created the Moia brand to spearhead its push into 21st century mobility; in December it wrote off the unit's $300 million investment in ride-hailing startup Gett Inc. BMW and Daimler each created car-sharing units, but after struggling to turn a profit they merged them last year. The new brand, Share Now, will oversee the companies' combined car-sharing operations as well as initiatives in charging EVs and apps to help drivers find parking spots and taxis. "There's plenty of opportunity," BMW Chief Executive Officer Harald Krüger told Bloomberg TV. "It's an important amendment to our core business. You have to have these services." —*Elisabeth Behrmann*

THE BOTTOM LINE German carmakers are preparing a host of battery-powered cars and starting other initiatives as they seek to transform from manufacturers to providers of mobility.

Motor Vehicles Produced, 2017

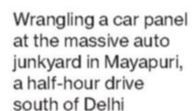
Vehicles and parts as share of exports □ 0-5% □ 5%-10% □ 10%-15% □ 15%-20% ■ 20% or more □ Not reported



PRODUCTION FIGURES FOR GERMANY AND SWEDEN INCLUDE CARS ONLY. FIGURES FOR ARGENTINA AND FRANCE INCLUDE CARS AND LIGHT COMMERCIAL VEHICLES. FIGURES FOR INDIA DO NOT INCLUDE REPORTS FROM AUDI, BMW, JAGUAR LAND ROVER, OR MERCEDES. DATA: OICA, UN COMTRADE

Photostat

The Graveyard



Wrangling a car panel at the massive auto junkyard in Mayapuri, a half-hour drive south of Delhi

India's scrapyards have long provided a living for people who can handle the tough job of tearing apart old cars. Now the government is considering recycling rules that could dramatically boost the business. The End-of-Life vehicle policy would offer incentives to take the most-polluting vehicles, those more than 15 years old, off the road—and into the scrapyard. —*James E. Ellis*

SAUMYA KHANDELWAL

How Long Can U.S. Cities Run on 1980?

Creaky municipal computer systems are becoming a serious problem that requires byzantine workarounds—even in San Francisco

The only place in San Francisco still pricing real estate like it's the 1980s is the city assessor's office. Its property tax system dates back to the dawn of the floppy disk. City employees appraising the market work with software that runs on a dead programming language and can't be used with a mouse. Assessors are prone to make mistakes when using the vintage software because it can't display all the basic information for a given property on one screen. The staffers have to open and exit several menus to input stuff as simple as addresses. To put it mildly, the setup "doesn't reflect business needs now," says the city's assessor, Carmen Chu.

San Francisco rarely conjures images of creaky, decades-old technology, but that's what's running a key swath of its government, as well as those of cities across the U.S. Politicians can often score relatively easy wins with constituents by borrowing money to pay for new roads and bridges, but the digital equivalents of such infrastructure projects generally don't draw the same enthusiasm. "Modernizing technology is not a top issue that typically comes to mind when you talk to taxpayers and constituents on the street," Chu says. It took her office almost four years to secure $36 million for updated assessors' hardware and software that can, among other things, give priority to cases in which delays may prove costly. The design requirements are due to be finalized this summer.

For local officials throughout the country, the shift from old-school servers to rented cloud storage has made it tougher than ever to fund upgrades. They can budget physical equipment as capital expenses, meaning they could issue bonds to pay for them. But cloud computing is a service, as the people selling it love to say, which means officials have to pay for it with operating funds–the same pool of money that goes toward addressing more tangible demands, such as parks and cops. The deliberate pace of government compounds the problem of strained resources, says Marc Pfeiffer, a former New Jersey official who now advises municipalities on managing technology as part of Rutgers University's Bloustein Local Government Research Center.

Edited by Jeff Muskus

ILLUSTRATION BY TOMI UM

Chicken Wire and Duct Tape

Municipal offices across the country are struggling to do their jobs with obsolete gear that can often be expensive and time-consuming to replace

Place	Agency	Issue	Cost
Baltimore	Police department	Issue: The system for storing and tracking crime reports is more than 20 years old, doesn't comply with the national incident reporting system, and can't link to other databases.	Upgrade cost: **$4m**
Broome County, N.Y.	Office of emergency services	Issue: Twelve different radio systems with portions dating to the 1970s prevent units from talking to one another.	Cost: **$23m**
Dallas County	Courts	Issue: Case-tracking software to replace the Texas county's outdated programs began development in 2012 but has faced repeated delays, leaving judges stuck with inefficient systems.	Cost: More than **$30m**
Lawton, Okla.	Municipal court	Issue: A 1980s system for court records relies on typewriters. New software would ease the workload and reduce errors from having to repeatedly enter information.	Cost: **$400k**
New Jersey	NJ Transit	Issue: The nation's second-biggest commuter railroad uses paper forms to procure its equipment and supplies. It wants a central, digital inventory.	Cost: **Unknown**
Philadelphia	Streets department	Issue: Control systems for most of the city's 3,000 traffic signals date to the 1960s and make it harder for the department to manage congestion.	Cost (per intersection): **$175k to $735k**

Businesses have started to see municipal woes as opportunities. Salesforce.com Inc., a maker of cloud-based applications that are being put to work on the assessor's office project in the company's hometown of San Francisco, has focused more on government solutions in the past five years. During an earnings call in August, co-Chief Executive Officer Keith Block called the public sector "one of our strongest verticals." But cities and states are continuing to plow money into maintaining legacy systems, because they still work. Upgrades are difficult to start–and to finish–and attracting new skilled workers is expensive.

The impetus for change is often public outcry over a crisis, such as the chaotic 2009 crash of a disco-era computer system regulating traffic signals in Montgomery County, Md., or the cyberattacks that brought Atlanta's government to a standstill last March. And promises to improve are no guarantee of success: Minnesota spent about a decade and $100 million to replace its ancient vehicle-licensing and registration software, but the new version arrived with so many glitches in 2017 that Governor Tim Walz has asked for an additional $16 million to fix it.

Of course, improvements cost money that constituents don't always want to pay. "We're dealing with an irrational public who wants greater and greater service delivery at the same time they want their taxes to be lower," says Alan Shark, executive director of the Public Technology Institute, an association for municipal tech officials.

In San Francisco the assessor uses a Cobol-based system called AS-400, whose welcome screen reads, "©COPYRIGHT IBM CORP., 1980, 2009." As the city tax rolls jumped 22 percent over two years, workers were struggling to keep track of the changes on their ancient systems. At one point they fell three years behind. It's a "lot of manual work" just to perform basic functions, Chu says.

Searches that should seem simple take much longer because of the system's quirks. If a resident contacts the agency saying her house should have a different assessed value, a worker has to look up the block and identification number that's technically taxed; there's no way to filter by address. Also, all street numbers need to have four digits, so 301 Grove St. becomes 0301 Grove St. Another problem: The system doesn't flag data entry mistakes, such as if a worker misidentified 301 Grove St. as 0031 Grove St. An employee giving a homeowner a tax exemption can cause the break to be revoked the next year by entering a single wrong digit on a different screen. It would take a complaint by the overcharged resident to bring the error to light.

It's taking what seems like forever to drag Chu's office into the present century. After a bidding process, San Francisco awarded contracts in November to Sapient Corp. and Carahsoft Technology Corp., which provides the Salesforce software licenses. The new system, slated for completion in 2022, needs to address problems that can't be solved in the App Store. Although tech companies like to fancy themselves altruists and world changers, Chu says they "have not really focused on solving the mundane problems of basic core government functions." Private developers have created an app that lets people report poop on San Francisco streets. (It's called Snapcrap. Yes, really.) Designing something to help the city pay for the cleanup? Different story. —*Romy Varghese*

THE BOTTOM LINE Behind San Francisco's gleaming office towers packed with tech workers, city assessors are struggling to manage with software that predates *WarGames* and *Tron*.

"We're dealing with an irrational public who wants greater and greater service delivery"

Your Genetic Data Needs Protection

● A person's privacy can be compromised if a third or fourth cousin takes a home DNA test

The growing popularity of consumer DNA testing has helped law enforcement make arrests in decades-old crimes that would otherwise have remained cold cases. That may not be entirely good news for the rest of us, because using the technology to trace DNA to suspected criminals requires police to use a whole lot of other people's genetic data, too. Like cell phone data a decade ago, it's hard to say how all this information might be employed in the future. Imagine drug companies using it to target ads, life insurers using vast networks of relatedness to determine risk, or a scorned ex-lover employing the technique in some very 21st-century stalking.

Millions of U.S. consumers are paying genetic testing companies to analyze their spit, and the data of at least two leading genealogy websites are now accessible to law enforcement. Yaniv Erlich, a Columbia professor who's the chief science officer at DNA testing company MyHeritage, estimates that only 2 percent of people with European ancestry–the majority of DNA testing customers–might need to share their data to identify samples from the other 98 percent. At this point, there's little hope of keeping such information private, so experts are advocating for measures to protect it, such as the creation of one giant, central DNA database to which access could theoretically be controlled and regulated. "There is no absolute protection anymore for anyone's data, genetic or not," says Barbara Prainsack, a political scientist who studies ethics in forensics and life sciences at the University of Vienna.

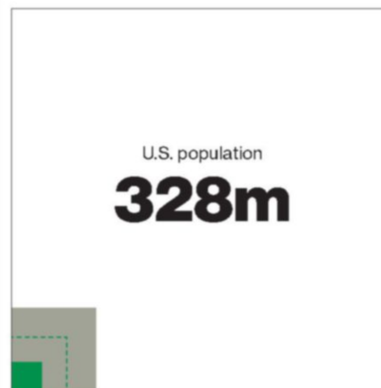
The true power of genetic information, Prainsack says, is realized in conjunction with other online data culled from, say, public records and social networks. That became apparent last year, when police arrested a man they suspect to be the Golden State Killer based on profiles of his distant cousins on a mostly free genealogy website called GEDmatch. The suspect didn't have to share his data: Investigators uploaded crime scene DNA and asked the database whose family bloodline matched it, then used other sources to help build those people's family trees until they reached the suspect, whose background matched other relevant details.

GEDmatch has about 1 million users. In late January news broke that a second website, FamilyTreeDNA, had opened its doors to law enforcement last year. FamilyTreeDNA's cooperation with investigators roughly doubles the number of genetic profiles cops may use. With access to some 2 million people's genetic data, investigators could potentially identify hundreds of millions more people from their DNA samples, using tactics like those employed in the Golden State case.

The larger these databases become, the greater the potential for abuse. Once enough people share their information, it doesn't matter how rigorously everyone else attempts to protect their privacy. That's why controlling access may now be the only real option, says James Hazel, a researcher at the Center for Genetic Privacy and Identity in Community Settings at Vanderbilt University Medical Center in Nashville. "The recent revelations surrounding FamilyTreeDNA, coupled with law enforcement's increasing reliance on public resources like GEDmatch, demonstrate that we continue to move closer to an underregulated, de facto universal database," he says.

Law enforcement, of course, has already long had access to its own database of DNA from criminals, and sometimes police turn to it to help solve new crimes, checking to see if the DNA of an unknown suspect matched that of relatives already in the system. Several states have strict laws governing this practice. Maryland and the District of Columbia have forbidden such searches altogether. But while government DNA databases have rules for who may access them and for what reasons, the consumer space is a genetic Wild West. The only rules are in each company's terms of service. Even then, there may be little a company can realistically do to keep law enforcement agencies–or anyone else–from using its service however they like.

How Police Can Track Anyone With a Tiny Subset of DNA



■ More than 2 million Americans are in consumer DNA databases that share information with law enforcement

⬚ If as few as 2 percent of people with European ancestry shared their data, it may be possible to identify samples from the other 98 percent

■ More than 15 million Americans (about 4.6 percent) have genetic data in consumer databases

By using genetic data from relatives as distant as a third or fourth cousin, along with family links and other information from social media, experts can potentially identify just about any DNA sample

FamilyTreeDNA may have found itself in this situation. Although most genetic testing companies don't let users upload genetic data from outside sources, FamilyTreeDNA does. Police could have made use of its database without the company's permission. "We have recognized this reality and believe it is our responsibility to give guidance to law enforcement as to how they can do their jobs effectively, without violating the privacy and confidentiality of our customers," Chief Executive Officer Bennett Greenspan said in a statement. GEDmatch founder Curtis Rogers says the use of this kind of DNA data requires a new conception of privacy.

Laura Hercher, a genetic counselor and researcher at Sarah Lawrence College, says dictating the terms of access shouldn't be left up to companies, and that new laws are needed to make such searches illegal except in rare circumstances. "We would create limits that would be analogous to search warrants and restrict access to law enforcement," she says. "It's a great way to catch serial killers, but less savory uses are easily imagined."

To that end, in January, Maryland state legislator Charles Sydnor, a Democrat, proposed a bill to ban police use of DNA databases, calling such use an overreach of authority. Maryland has led on genetic privacy matters in the past, and other states may follow suit. So far, though, even the rules that govern state DNA databases vary widely. California, for example, has very strict criteria, only allowing police to turn to familial searching once all other options have been exhausted. But many government DNA databases have no rules at all.

In the wake of the Golden State case, Hazel and other researchers at Vanderbilt suggested the establishment of a nationwide DNA database that could establish a higher floor for privacy protections. Access to such a database would be heavily limited, they say, though they acknowledge the challenges of implementation. And it could contain a more limited set of genetic information than the data that can now be culled from consumer testing reports, allowing investigators to solve crimes without snooping quite so much on people who might simply be a suspect's distant relative.

"Law enforcement already has potential access to the genetic information of a large segment of the population, either directly or through a relative," Hazel says. "There is an urgent need for additional regulation of government access to the genetic information housed in public and private DNA databases." — *Kristen V. Brown*

THE BOTTOM LINE With access to some 2 million consumer DNA tests, investigators could identify hundreds of millions of people, without the safeguards that protect criminal databases.

ILLUSTRATIONS BY THOMAS COLLIGAN

Climate Carbon Capture

The United Nations estimates that warding off catastrophic global warming requires removing 100 billion to 1 trillion tons of carbon dioxide from the atmosphere by midcentury. "We have to create an industry equivalent to the oil and gas industry whose job it is to undo emissions," says Julio Friedmann, a senior research scholar at Columbia who heads Carbon Wrangler LLC. Here are some of the most promising demo-ready projects trying to do just that. —*Michael Belfiore*

Active Air Capture

Innovators: Christoph Gebald and Jan Wurzbacher

Co-founders and directors of Climeworks AG, a startup in Zurich with 63 employees

● The Climeworks plant in Hellisheidi, Iceland, blows air through reusable filters that chemically trap CO_2. Heating the saturated filters releases the gas, which the company and partner CarbFix then inject underground to bind with basaltic rock, which can hold it indefinitely.

Passive Air Capture

Innovator: Klaus Lackner

Director of the Center for Negative Carbon Emissions at Arizona State University

● When it's dry, a resin developed by Lackner's team absorbs CO_2 from the air, releasing it for capture when dunked in water. Lackner envisions artificial "trees" that can each capture a daily ton of CO_2 with a cycle of repeated drying in air and soaking in an enclosure. He's working with a local utility to develop the technology further.

Air to Fuels

Innovator: David St. Angelo

Chief technology officer at Carbon Engineering Ltd., a startup in Squamish, B.C., with 50 employees

● Carbon Engineering says its test plant uses air-captured CO_2 and supplemental hydrogen—split from water molecules using renewable energy—to produce gasoline and diesel fuel for less than $4 a gallon. The company says its tech can also capture CO_2 for permanent storage.

Capture from Biofuel

Innovator: Todd Werpy

CTO at Archer Daniels Midland Co., which has 31,000 employees and is headquartered in Chicago

● CO_2 is more concentrated in industrial exhaust plumes, and capturing it there results in negative emissions if the facility runs on renewable biofuels. ADM, with U.S. Department of Energy funding, began capturing CO_2 emitted by its Decatur, Ill., ethanol plant and pumping 1 million tons a year underground in late 2017.

Blue Carbon Restoration

Innovator: M. Sanjayan

CEO of Conservation International, a 900-employee nonprofit in Arlington, Va.

● So-called blue carbon, the CO_2 stored in coastal ecosystems such as mangroves and salt marshes, is 10 times as dense as carbon stored in forests. Last fall, Apple Inc. announced it had invested an undisclosed sum in a Conservation International project to protect and restore 27,000 acres of mangroves in Colombia, which is expected to capture 1 million tons of atmospheric CO_2.

3G Capital Gets Indigestion

● The investment firm's mashup of Kraft and Heinz just took a $15.4 billion hit

3G Capital, the private equity firm co-founded by Brazilian billionaire Jorge Paulo Lemann, shook up the food industry with its ruthless focus on efficiency. After taking over H.J. Heinz in 2013, with financing help from Warren Buffett's Berkshire Hathaway Inc. conglomerate, the New York-based investment shop fired thousands of workers and shuttered factories, creating industry-leading profit margins in less than two years.

Then it bought Kraft Foods, also with an assist from Buffett, and started cutting there, too. Again, it slashed the workforce. It also used zero-based budgeting, a strategy that asks managers to constantly justify costs without regard to previous spending levels, to help eliminate $1.7 billion in expenses. The firm even yanked employee perks such as free cheese sticks and Jell-O. Wall Street cheered. Shares of the combined Kraft Heinz

Edited by Pat Regnier

PHOTOGRAPH BY CAROLINE TOMPKINS FOR BLOOMBERG BUSINESSWEEK

Co.—whose largest shareholders are 3G and Berkshire—steadily climbed, hitting a record $96.65 in February 2017.

Two years later, the stock has fallen by about two-thirds, to $32 a share, wiping out more than $75 billion in market value. An earnings report released on Feb. 21 contained a slew of bad news, including a $15.4 billion writedown on the value of some key assets, including the Kraft and Oscar Mayer brands. The stock slid 27 percent in a single day.

The remarkable decline at Kraft Heinz has raised questions that go beyond the struggle to sell more products of megabrands such as Maxwell House and Oscar Mayer to today's more discerning consumers. The spotlight now is on 3G and whether its cost-cutting is an effective strategy for running a consumer company or simply an aggressive way to boost profit margins and chase returns on Wall Street. "They got a pass for a long time, but now you have to question the strategy," says Brittany Weissman, an analyst at Edward Jones. "You can't just cut and buy, cut and buy—it's a packaged-food company, all you have is the value of your brands."

The firm's approach may be backfiring in another way, by turning off potential acquisition targets. In 2017, 3G made a $143 billion bid to buy Unilever, the European consumer-products giant that makes Dove soap, Lipton tea, and Hellmann's mayonnaise. Then something unexpected happened. Unilever rebuffed the offer, counting on Buffett's known aversion to hostile takeovers. Since then, Kraft Heinz shares have been sliding, and the company hasn't been able to make a major acquisition.

That ratchets up the pressure to generate growth from a portfolio of brands that may be getting a bit tired. The problem is that 3G doesn't have expertise in remaking products. Chief Executive Officer Bernardo Hees, a Lemann protégé who previously ran Burger King and Heinz, defended the 3G strategy while continuing to tout the company's profit margins. "Our model is working and has a lot of potential for the future," he said on a conference call.

"You can't just cut and buy, cut and buy—it's a packaged-food company"

The 3G model is meant to create a meritocracy, rewarding hard work and results and weeding ▶

◀ out employees who aren't pulling their weight while freeing up cash to invest back into the business. Everything from travel expenses to office supplies comes under scrutiny. After the 2015 merger with Heinz, managers removed refrigerators in the Chicago-area headquarters that had been stocked with Kraft snacks, such as the cheese sticks. The default setting on office printers: double-sided with black toner, according to a memo obtained then by Bloomberg News. Spending on meals during travel was limited to $50 a day.

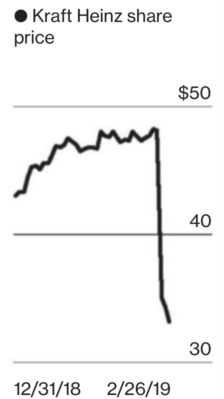
Kraft Heinz has tried to boost sales and adapt to changing consumer tastes. It created an organic version of Capri Sun and expanded its condiment business into mustard and barbecue sauce. In 2016 the company spent at least $10 million to reformulate its Oscar Mayer hot dogs, removing nitrates and preservatives, and create new packaging. But that wasn't enough to shore up the value of that brand. "All these changes they've been doing to revitalize the top line didn't return any benefit at all," says Ken Shea, an analyst at Bloomberg Intelligence.

While the problems are most pronounced at Kraft Heinz, there's trouble elsewhere in the 3G universe. Co-founder Lemann also formed Anheuser-Busch InBev NV, the world's largest brewer. It's run by Carlos Brito, another of his protégés, and 3G partners are on the board. The company, grappling with declining beer consumption in the U.S., and particularly of top-selling brands such as Budweiser and Bud Light, recently cut its dividend in half, giving it more cash to help pay down debt that swelled with the 2016 acquisition of SABMiller. The stock has slipped about 25 percent over the past year.

3G has done better in the fast-food industry. It took over Burger King in 2010 and is credited with turning around the chain, in part by selling off restaurants to franchisees, a form of cost-cutting that's popular across the industry. Restaurant Brands International Inc., the Burger King parent company that counts investor Bill Ackman and Buffett among its largest shareholders, acquired the Canadian coffee-and-doughnuts chain Tim Hortons in 2014 and Popeyes Louisiana Kitchen three years later. Neither chain has taken off under its new owners. Still, investors have been a bit more patient with this 3G project. Restaurant Brands' shares have gained 20 percent this year, outpacing the S&P 500 so far in 2019.

For now, Kraft Heinz appears stuck. There's a chance 3G could try to take the company private, perhaps tapping a $10 billion fund it has, according to a person familiar with the situation. There also remains the possibility of a big acquisition. In the last few years, Campbell Soup, Kellogg, General Mills, Mondelez International, and Colgate-Palmolive have all been mentioned as targets. But with Kraft Heinz shares trading below $40 each and a balance sheet burdened by debt, it's hard to see the company making the kind of large purchase where it could again bump up margins by attacking costs. And even if 3G tries, Unilever may have laid out for other companies a playbook for keeping the buyout firm at bay.

Then there's the question of where Buffett stands. The iconic investor's stamp of approval, not to mention his cash, have been key for 3G's dealmaking. Buffett recently called Lemann "outstanding" while acknowledging that 3G and Berkshire had overpaid for Kraft and misjudged the competitive landscape in the packaged-food industry. He said he has no plans to sell Kraft shares but also didn't envision buying more. "The pendulum swung very quickly," says Weissman, the analyst. "It's interesting how fast the story fell apart the last couple of months." —*Craig Giammona and Katherine Chiglinsky*



THE BOTTOM LINE 3G's business model is to buy a company and then relentlessly cut its costs. It may have trouble finding another big target to combine with Kraft Heinz.

A Double Whammy for HSBC

● Brexit risks and slowing growth in China are putting pressure on the global banking giant's new boss

John Flint, a lifer who rose to the top job at HSBC Holdings Plc in 2018, inherited an institution that had already seen shake-ups. In the previous seven years, 60,000 jobs had been eliminated and operations in 21 countries were sold, closed, or shrunk. Still, the same core problem remains in the 67 countries where HSBC still does business: Costs are too high and revenue isn't increasing fast enough.

PHOTO: JASON ALDEN/BLOOMBERG. DATA: COMPILED BY BLOOMBERG

Profit in the fourth quarter of 2018 came in 23 percent below analysts' forecasts, stoking worries that Europe's biggest bank by market value still lacks a recipe for growth. London-based HSBC has exposure to some of the world's fastest-expanding markets—it was born as the Hongkong and Shanghai Banking Corp. in 1865 and derives 90 percent of its profits from Asia. And yet its return on equity is mired in the single digits, while U.K. rival Lloyds Banking Group has earned almost 12 percent even though it's focused on Britain's slumping domestic economy.

"HSBC is a behemoth—it is a massive challenge to change the direction of the ship," says Edward Firth, an analyst at Keefe Bruyette & Woods. "It's got these fantastic businesses, such as the Hong Kong retail operation, but somehow after they pass through the miasma of the rest of the bank, you end up with a 9 percent return on equity." There's no turnaround on the horizon. Even the bank's global reach could prove to have a downside as HSBC faces the dual threats of Brexit and a slowdown in China.

The opening up of China to the global financial and trading system was a profit engine for HSBC for decades, but lately the bank has been caught in the middle of trade tensions between Washington and Beijing. Brexit poses a more immediate threat. With a no-deal exit from the European Union looming, HSBC is on the fault line of a schism that could have disastrous consequences for its home market.

The poor fourth-quarter numbers were driven by a revenue decline brought on by chaotic financial markets. But even with markets stabilizing, the path to higher revenue might not be so straightforward. For one, interest rates, which boost profits from lending when they rise, appear to have leveled off.

Analysts at UBS say the bank might well have to give up on one of its key targets—to increase revenue faster than costs—and settle for having the two rising at about the same rate. UBS estimates the bank's costs will grow by 2 percent or 3 percent per year. Speaking hours after the publication of the annual numbers on Feb. 19, Flint nodded to the challenges the lender faces. Although his task was to get the bank "growing again," he would defer investments to contain expenses, he said.

Managing costs in an organization with 235,000 employees is no mean feat, particularly because 55 percent of staff are based in Asia, where wage inflation is a problem for employers. Like other established institutions, HSBC is also grappling with the fast pace of change in the industry. Technology is undercutting once unchallengeable businesses, such as retail foreign exchange and even deposit-taking, meaning any move to postpone investments in information technology systems carries risk.

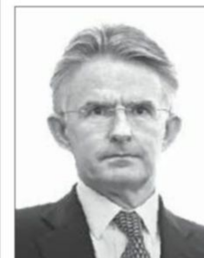
Profitability of European Banks

Return on tangible equity* for 2018

Bank	Return on tangible equity
Banco Santander	12%
Lloyds Banking	12
UBS	11
ING	10
HSBC	9
BNP Paribas	9
Intesa Sanpaolo	9
RBS	4

*NORMALIZED; DATA: COMPILED BY BLOOMBERG

Mergers could also change the competitive landscape, particularly if the bank's smaller U.K. rival Standard Chartered were to be bought by a U.S. competitor or an Asian banking group. As does HSBC, Standard Chartered conducts much of its business in Asia. A beefed-up competitor could provide a direct threat to the crown jewel of HSBC, its Hong Kong operations.



● Flint

Hopes of improved growth were high in late 2017 when veteran insurance executive Mark Tucker arrived as HSBC's chairman. The role had typically gone to an insider, so bringing in the hard-charging former chief of insurer AIA Group Ltd. was a widely welcomed break from the past. But Tucker's appointment of Flint as chief executive officer showed there was a limit to culture change. Flint had served a three-decade HSBC apprenticeship advancing toward the top job. Some investors are getting restless as he enters his second year as CEO. "It's too early to judge Flint's credibility, but he probably only has another six months to a year to deliver," says Joseph Dickerson, an analyst at Jefferies.

There appears to be little appetite for more major surgery after cuts executed by Stuart Gulliver, Flint's predecessor as CEO. "The trick with HSBC is patience. They work in decades, not years," says Mike Fox, head of sustainable investments at Royal London Asset Management, one of the 15 largest shareholders in the bank. "The return on equity does need to move higher, and that is the mission for the CEO and the chairman. But the way to do that is not big restructurings. It's about making incremental improvements." —*Harry Wilson*

THE BOTTOM LINE HSBC has been trying to hold down costs while growing revenue at a faster pace, but analysts worry it may not be able to live up to the second half of that formula.

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Africa's King of Cement Aspires to a Higher Title

PHOTOGRAPH BY ANDREW ESIEBO FOR BLOOMBERG BUSINESSWEEK

● Aliko Dangote's new refinery will boost his wealth while curbing Nigeria's fuel imports

The best way to appreciate the scale of Aliko Dangote's empire is to hitch a ride on one of his private jets. A half-hour after his Bombardier Challenger 605 takes off from Lagos's airport, it descends into a seemingly desolate area of Kogi State in central Nigeria, dusty fields and clusters of trees stretching to the horizon. Suddenly a tangle of exhaust stacks, silos, and kilns pierces the sky to the left of the aircraft as Dangote Cement Plc's Obajana plant comes into view. It's already the biggest in Africa, churning out enough sacks of cement to fill 1,000 trucks a day. A fifth production line under construction will make it one of the largest in the world.

The cement plant and its two sister factories in Nigeria have long been the bedrock of Dangote's fortune, Africa's biggest. But his future—and, as he likes to say, that of the entire continent's economy—lies to the south on the Nigerian coast. About 40 miles east of Lagos, on more than 6,700 acres of former swampland bound by a lagoon and the Atlantic Ocean, contractors are putting the finishing touches on a fertilizer plant valued at $5 billion. Next to it, construction of a vast oil refinery—a $12 billion project—is under way.

If all goes to plan, the complex will immortalize the 61-year-old Nigerian businessman as Africa's most prominent industrialist, vaulting Dangote Industries Ltd.'s annual revenue from $4 billion to about $30 billion, roughly 8 percent of Nigeria's gross domestic product. Oil industry experts such as London-based Citac have questioned the project's timeline, citing logistical and financial challenges. But Dangote insists the refinery, which will be Africa's largest, is on track. "By 2020, I will finally dispatch oil," he says during an interview at his Lagos home in January.

Despite having the world's 10th-largest oil ▶

Edited by Cristina Lindblad

◀ reserves, Nigeria has only four aging, inefficient state-owned refineries, leaving it almost wholly reliant on imports for its fuel needs. Dangote says his massive refinery could end that dependency and lift electricity generation in a nation plagued by blackouts: "It will change the entire economy of Nigeria."

The fertilizer plant, which Dangote says will come online in a few months, will be capable of producing up to 2.8 million metric tons of urea a year. "It's probably the largest-volume plant ever executed at one time," says Alistair Wallace, an analyst at Argus Media in London. Natural gas, a key component in the manufacture of urea, is abundant and cheap in Nigeria, meaning Dangote's fertilizer will likely be profitable even in the competitive export market. "It will generate hard currency and bring in dollars. It will be a good look for the administration and for Dangote," Wallace says.

Born into a wealthy Muslim family of traders in the north, Dangote incorporated his own business selling cement when he was 21. He shifted to manufacturing the building material in the 1990s, convinced his homeland, the world's seventh-most-populous country, could meet its own demand for staples. Dangote factories churning out sugar, flour, and salt followed. A vertical integration push gave rise to other businesses, including oil, property management, packaging, and port operations.

Four publicly traded companies under the Dangote Industries umbrella account for about a third of the value of the Nigerian stock exchange. While a sell-off in emerging markets caused Dangote Cement shares to shed a quarter of their value in the past year, the fertilizer plant has boosted Dangote's net worth to $17 billion, according to the Bloomberg Billionaires Index. (No value is attributed to the refinery in Bloomberg's analysis, because it's still under construction.)

In many ways, Dangote's ascension recalls that of Gilded Age tycoons such as Andrew Carnegie and Cornelius Vanderbilt, who accumulated great fortunes as they created industries. His critics have attacked him for holding much of his wealth offshore and say he's a shrewd monopolist who's plied his political connections to secure an advantage over competitors both local and foreign. They claim his market-dominating cement company overcharges local consumers while slashing prices in neighboring markets to crush competitors. A World Bank report published in 2016 found that African cement prices averaged $9.57 per 50-kilogram (110-pound) bag, compared with $3.38 globally. Dangote's cement business has also been accused of exploiting a government-run investment promotion program to secure generous tax breaks.

Dangote shrugs off such criticism while preaching the gospel of markets as the best way to narrow the divide between the haves and have-nots. "China in 30 years has taken almost 500 million people out of poverty," he says.

Soft-spoken and unfailingly polite, he offers up his chair in meetings to guests and serves food for others during a lunch in an office conference room. But the courteous chief executive officer is also a hard-driving manager. " 'Not possible' aren't words he understands," says Giuseppe Surace, chief operating officer of the refinery project, as our convoy of Toyota Land Cruisers sets off on a four-hour tour of the site. "In his own way, he is very tough."

Nigeria's $376 billion economy is by some measures Africa's largest, but the operational challenges for companies are also outsize. The World Bank assigns the country a lowly score of 53 on ease of doing business (Kenya gets a 70 and South Africa a 66). Besides an overabundance of red tape and weak protections for investors, Nigeria is perceived to be more corrupt than many of its neighbors. The country's chronic logistical logjams, infrastructure failings, and political risk are why Citac says Dangote's 2020 timeline for the refinery may not be feasible.

Even the so-called smart money has stumbled here. Five years after pledging to invest $5 billion in infrastructure alongside Dangote, Blackstone Group LP is in the process of exiting an African subsidiary called Black Rhino Group because of a dearth of suitable opportunities, according to a person familiar with the situation who asked not to be identified because the discussions are private. KKR & Co. disbanded its Africa deal team in 2017.

Dangote, for his part, has decades of experience negotiating Africa's pitfalls. Yet even by the continent's standards, the refinery project could be characterized as a heavy lift. Dangote Industries bought the plot for $100 million at the end of 2013, but it took almost three years—and many truckloads of sand—to prepare the swampy ground for construction. The company erected a jetty and

● Dangote's fortune

Shares in publicly listed Dangote companies $8.3b

Fertilizer plant $5.2b

Investment portfolio and other assets $2b

Oil blocks $0.6b

Property $0.3b

Private companies $0.3b

◀ Construction at the site of Dangote's $12 billion oil refinery

widened and reinforced roads to accommodate shipments of cranes and other equipment.

Dangote's existing empire gives him advantages. The refinery's construction relies heavily on Dangote Cement, and the roads to and from the surrounding quarries are clogged with the group's trucks. Also, his timing was fortuitous. The project geared up during an economic recession, giving him more bargaining power over contractors keen to land work. Plus its location inside a free-trade zone means the complex should be better insulated from Nigeria's political scene, according to Dangote's lieutenants. "We're an island," says Surace, an Italian previously employed at oil services company Saipem.

Talk to ordinary Nigerians, and plenty crack smiles at the mention of Dangote. He's featured in internet memes, and a recent single by Nigerian singer Teni plays on his wealth. It's the kind of name recognition any politician would envy. Nigeria's Feb. 23 general election, which was marred by delays, technical glitches, and violence that killed at least 39 people, saw President Muhammadu Buhari beat his main challenger, Atiku Abubakar. But Dangote, who avoided playing political favorites and deflected questions on the election throughout the campaign, says he's not interested in governing. "If I exit from business and go into politics, nobody can actually sit in Dangote Group and take the kind of risk that I can, because I'm the owner," he says. "My real job is to see how do I transform Nigeria and Africa and to take this kind of risk." *—Tom Metcalf and Devon Pendleton, with Paul Wallace*

THE BOTTOM LINE Nigeria's Dangote built his fortune on cement and is making a move into fuels and fertilizer that could multiply his already considerable wealth.

Canada Tries the OPEC Way

● Alberta's effort to control the flow of crude is supposed to be temporary

When prices for Canada's heavy crude collapsed late last year, Alberta did something quite out of character. The traditionally conservative, free-market-loving province took a page out of OPEC's handbook and ordered its largest oil producers to throttle back output by about 325,000 barrels a day, the equivalent of almost 9 percent of daily production.

The move was an unprecedented intervention meant to rescue Canada's oil producers—and the province's tax revenue—from a lack of pipeline capacity that caused a glut of crude to back up in storage tanks. It worked: The price of Western Canadian Select, the benchmark for crude extracted from Alberta's oil sands, has more than tripled since closing at $13.46 a barrel in mid-November, its lowest level in at least a decade. But the unintended consequences have critics fuming and even some of the policy's supporters wringing their hands.

"We think free markets work," said Rich Kruger, chief executive officer of Imperial Oil Ltd., on a recent conference call. "With a stroke of the pen, the government began picking winners and losers." Imperial, an oil-sands producer that's 69 percent owned by Exxon Mobil Corp., counts itself among the losers. When Canadian oil prices were low, Imperial's refineries were able to buy crude more cheaply. That's no longer the case.

Some are concerned that the government's intervention will chip away at the province's pro-business reputation, scaring off international investors. "It's a province that's been built around allowing the private sector to operate freely and independently," says Rafi Tahmazian, senior portfolio manager at Canoe Financial in Calgary. "The tax regime, the royalty regime, the work environment, the quality of the resource, all of those things tick all the boxes that allowed global investment here. Why would we screw with that?"

In another move that Tahmazian doesn't approve of, Alberta's government is getting into the oil transport business. Premier Rachel Notley announced in February that the province will lease 4,400 rail cars, buy oil from local producers, and sell it to refiners across North America. The plan is meant to aid smaller producers, who are getting outbid by bigger rivals on access to pipelines or rail capacity. The province expects to turn a C$2.2 billion ($1.7 billion) profit on its C$3.7 billion investment.

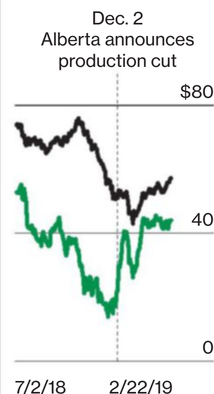
Notley is a center-left politician whose New Democratic Party ended more than four decades of conservative rule in Alberta in 2015. But even the leader of the rival United Conservative Party, Jason Kenney, supported the production curtailment plan, though he's balked at the crude-by-rail investment.

Notley herself has expressed discomfort with the intervention, saying in the Dec. 2 speech announcing the production cuts that markets are the best way to set prices. And since the program went into effect, ▶

● Price of crude oil per barrel

West Texas Intermediate

Western Canadian Select



● Notley

FROM LEFT: PHOTOGRAPH BY ANDREW ESIEBO FOR BLOOMBERG BUSINESSWEEK; NOTLEY: COURTESY GOVERNMENT OF ALBERTA. DANGOTE DATA AS OF FEB. 26, 2019; DATA: BLOOMBERG BILLIONAIRES INDEX. CRUDE OIL DATA: COMPILED BY BLOOMBERG

◀ officials have bristled at the OPEC comparisons, arguing that they're only trying to head off a crisis.

Many of Alberta's free-market oilmen were among those lobbying hardest for the government to step in. They argued it was the provincial and federal governments that had caused the oil glut by withholding permits for new pipelines even as output from Canada's tar sands continued to climb—so it was their problem to fix. Cenovus Energy Inc. CEO Alex Pourbaix made the case that production cutbacks were needed to support the industry until additional pipeline capacity comes online at the end of 2019, starting with Enbridge Inc.'s expanded Line 3 in the fourth quarter. "Curtailment is an emergency response to an untenable situation in our province," says Pourbaix. "It is not in any way, shape, or form a long-term solution. The solution is to get oil moving by pipe."

He says Alberta has managed the program well, noting that the government responded to the overshoot in prices by raising the production limit by 75,000 barrels a day earlier this year. And for Cenovus, the higher prices have more than made up for the mandated reduction in output. "Think about the impact on our industry, on our province, and on everybody directly or indirectly employed by this industry," Pourbaix says, "and I don't know how you make a case that this has not been good for our province." —*Kevin Orland and Robert Tuttle*

THE BOTTOM LINE The government of Alberta's increasingly interventionist policies have bolstered oil prices while sowing discord within the industry.

Japan's Stealth Immigration Policy

● The government has downplayed the significance of a new guest worker visa

Naosuke Sugihara runs a business that would have been unthinkable just a few years ago. Since 2016 he's been recruiting Filipinos, Vietnamese, and Chinese for low-skilled jobs at Japanese hotels, nursing homes, and food-processing plants. Despite the country's long-standing resistance to employing foreigners, Sugihara's company, Gaijinbank—*gaijin* means "outsider" in Japanese—is on track to place more than 500 people this year, about double what it did in 2018. "This is just the start," he says. "A big wave is coming."

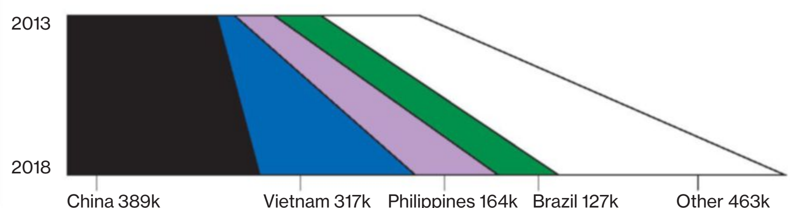
As President Trump and other leaders in the West move to erect barriers to immigration, Japan is moving in the opposite direction. The number of foreign workers has doubled in the past five years, to almost 1.5 million, with most entering via a back door for student visa holders and overseas trainees. Beginning in April, the front door will open a bit wider as Japan starts officially issuing visas for unskilled guest workers, something it's never done before.

After years of insisting labor shortages could be solved by employing more women, increasing the retirement age, and using more robots, politicians grudgingly have come to a realization that those steps won't suffice. Japan's aging labor force is forecast to shrink 23 percent in the next 25 years, according to projections by the Mizuho Research Institute. Vacancies already outnumber applicants by more than 3 to 1 for lots of key jobs. In caregiving alone, the government predicts 550,000 additional workers will be needed by 2025. "Japanese people just don't want to do these jobs," says Daisuke Matsuyama, a manager at MM International, a janitorial service used by several big Tokyo hotels that's hired staff through Gaijinbank.

The new visa program, which Prime Minister Shinzo Abe pushed through parliament in December with scant debate, will grant five-year residency permits to as many as 345,000 low-skilled workers over the next five years. Although the terms are still vague, some who pass language and technical exams will be allowed to extend their visas indefinitely and bring their families.

Gabriele Vogt, a Japan immigration expert at the University of Hamburg, says the country can

Foreign workers in Japan by nationality



▲ Vietnamese construction workers share a meal at home

PHOTOGRAPH BY NORIKO HAYASHI FOR BLOOMBERG BUSINESSWEEK. JAPAN DATA: MINISTRY OF HEALTH, LABOUR AND WELFARE

learn from Germany's experience with guest workers, the *gastarbeiter*. Starting in the 1950s, millions of temporary workers from Turkey and Yugoslavia were invited in to build cars, clean homes, and sweep streets. Many stayed, married, and had children. "We're going to see the same thing in Japan," Vogt says. "It's silly to think you can just recruit workers and they'll come without all the human things attached to it."

Japan has already experimented with bringing in temporary workers from abroad—with not altogether happy results. A technical trainee program set up in the 1990s, ostensibly to offer overseas development aid, has admitted hundreds of thousands of mostly unskilled migrants, mainly from other parts of Asia. A 2017 government investigation revealed widespread abuses on the part of employers, fodder for critics who say the program is being used to import cheap labor from poorer countries.

Kenichi Tanaka, who runs a 15-person company that lays foundations for builder Toyota Home, started hiring Vietnamese laborers through the trainee program in 2014. "It's a win-win," he says, because he's able to sustain his company while his workers earn the equivalent of $8.90 an hour, many times what they'd make back home. Thanh Dat Nguyen, a 24-year-old who's been on Tanaka's crew for just over a year, says he's glad for the work and would stay in Japan if he could. He misses his family but says: "I still feel it's worth coming here."

There's been little pushback against the new type of visas—perhaps because the country's leadership has downplayed their significance. In a speech to legislators in October, Abe said the program "is not an immigration policy" because the workers won't stay.

"Japan is becoming a multiethnic society in some respects but is totally in denial about it," says Jeff Kingston, director of Asian studies at Temple University in Tokyo. Change is already striking in the capital, where 1 out of 8 young people who registered as adults this January on the annual coming-of-age day were non-Japanese. In the downtown ward of Shinjuku, where City Hall is located, 46 percent of the 20-year-olds were from other countries—mostly Vietnam and China.

At Gaijinbank's small third-floor office late on a Friday afternoon, Xinyu Ling was prepping for a job interview. Fluent in English with solid Japanese and a master's degree from a top Chinese university, the 26-year-old was overqualified to work for $1,800 a month as a hotel desk clerk. But the job came with a five-year work visa—a major enticement for Ling, who loves the freedom of being an expat, far removed from the pressure of keeping up with the Joneses back in China. "My friends in China are always saying, 'Why don't you come back? You can have everything—the good job, get a car, whatever,'" Ling says. "But I'm like, 'I don't want that. I feel happy here,'" she says. —*Jason Clenfield and Yuko Takeo, with Pavel Alpeyev and Xuan Ouynh Nguyen*

THE BOTTOM LINE Japan will soon begin issuing five-year residency permits to low-skilled workers. The policy could change the face of a country that has long been uneasy about foreigners.

How Pharma Lost Its Edge in Washington

Drug company CEOs have dodged the issue of high prices, but there's nowhere left to hide

For decades drug manufacturers in the U.S. have been able to set prices virtually at will. They introduce new medications with five- or even six-figure price tags, while they raise the prices of existing ones as much as 10 percent a year. Unlike their counterparts in the airline or auto industries, most leaders of these companies have never appeared before Congress. Until now.

The heads of pharma giants Merck, Pfizer, and Sanofi, among others, faced members of the Senate Finance Committee on Feb. 26 in what turned out to be a mostly cordial hearing. The executives had planned to push harder on the idea that other parts of the supply chain—mainly middlemen known as pharmacy benefit managers—are to blame for high prices but were forewarned by Finance Committee Chairman Chuck Grassley (R-Iowa) that this approach wouldn't fly.

After the hearing, Grassley told reporters that he thought the companies "realize there is a problem" and expressed the expectation that "every one of them is going to help us solve it." There will be more hearings to come with representatives of other links in the supply chain, including pharmacy benefit managers. Whatever comes out of those, drug companies are now being forced to engage on issues they've historically been able to avoid.

For years lobbyists from PhRMA, the Pharmaceutical Research and Manufacturers of America, have kept Congress at bay. They've defeated bills that would have curbed anticompetitive practices and allowed the importation of cheaper drugs, and managed to avoid negotiating with the federal government over prices for Medicare recipients during the Affordable Care Act debate. PhRMA faced opposition from natural rivals, including generic drug makers, but not often from patient groups, which tend to be funded by the brand-name drug companies competing to treat their conditions. This time the industry is up against what PhRMA President Steve Ubl calls a "well-organized, well-financed" price-fighting coalition, made up of "organizations and others that wake up every day with the ambition of keeping drug pricing as high on the political radar screen as possible."

The most high-profile of these is Patients for Affordable Drugs, founded by David Mitchell, who started the communications firm GMMB and helped lead public-awareness efforts including "Save Darfur" and "Campaign for Tobacco-Free Kids." He was diagnosed with multiple myeloma in 2010; by the time he decided to retire in 2016, the list prices of the two cancer drugs he was taking totaled $440,000 for a year of treatments. Knowing that most patient advocacy groups relied on drug companies for funding, he decided to start one that didn't. "We stepped into a void," he says.

His opposition was well-armed. Last year, PhRMA devoted about $28 million to lobbying, according to the Center for Responsive Politics; Biotechnology Innovation Organization (BIO), a lobbying group for the biotech industry, spent $9.9 million, while individual companies spent comparable amounts, including $11.4 million for Pfizer Inc. and $6.8 million each for Merck & Co. and Eli Lilly & Co. Mitchell managed to raise more than $10 million in 2018, all from Arnold Ventures, started by Enron trader-turned-hedge fund manager John Arnold and his wife, Laura, a former oil executive. Drug pricing is an example of a "real market failure" resulting from "inefficiencies or outside influence," says Arnold Ventures spokeswoman Vanessa Astros.

Edited by Jillian Goodman

"No one person and no one organization on an issue like this changes anything," Mitchell says. He does, however, have partners, including the Campaign for Sustainable Rx Pricing, which spun off from the National Coalition on Health Care last year. The Campaign is backed by more than 30 players in the health-care system, including drug purchasing group Vizient, insurers Blue Cross Blue Shield Association, CVS Health, and the health-insurance industry lobby group. "Change happens because a lot of people go to work," Mitchell says. "All we think we're doing is adding a piece that is missing."

The first sign the drug lobby was losing its grip on Congress came last February, when PhRMA was blindsided by a change lawmakers made to Medicare, putting drugmakers on the hook for more of seniors' prescription costs. As a result, the companies had to offer a much more generous discount to beneficiaries who fall into the so-called doughnut hole coverage gap, marking down retail costs by 70 percent instead of the previous 50 percent. PhRMA spent the summer lobbying to reduce the size of the discount, but by the time the congressional session ended in December, it hadn't succeeded.

Drug prices are one of the few areas where the Trump White House and Democrats in Congress may work together. The administration is proposing an "international pricing index" that would peg prices to those paid by nationalized health services, which have used their market power to keep prices lower than in the U.S. This won't be an easy one for the drug lobby to fight with a unified voice. Preventing price controls is in the interest of the entire industry, but once the conversation becomes not whether but how to control prices, drugmakers' competing interests take hold. They can't avoid the conversation anymore, says Rob Smith, an analyst at Capital Alpha Partners in Washington. "They realize they have to put something on the table."

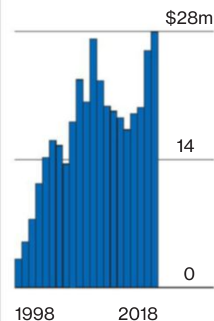
James Greenwood, president of BIO, who says he spends 95 percent of his time talking about drug prices, thinks politicians are missing the point. "People are not angry at the price of drugs, they're angry at what they pay," he says. This has long been Big Pharma's refrain: Patients should direct their anger toward high-deductible insurance plans that force them to shoulder an ever-growing portion of their drug costs. Drug companies also point to the fees charged by middlemen, who negotiate preferred status for them in certain health plans, as a reason for drugs' higher list prices.

Greenwood says it's possible the industry would float inflation caps to limit price hikes, and PhRMA's Ubl says he's working on alternatives to the international pricing proposal. Ubl adds that his group wants to be "constructive," but it appears to be relying on its old playbook so far. "Our desire is for patients to have lower out-of-pocket costs" set by insurers, said Lori Reilly, PhRMA's executive vice president for policy, research, and membership, when asked at a January roundtable whether the group had specific alternatives to propose to the administration's international pricing policy draft.

Alex Azar, Trump's secretary of Health and Human Services, has made it clear that he and the president want lower costs for patients across the board, but that any solution must include lower drug prices. "You have a Congress that is committed to drug-pricing reforms," says Smith, the analyst. "You have a president that has made no bones about his disdain for pharma and their pricing practices." And you have Azar, who was once a president of drugmaker Eli Lilly's U.S. affiliate but "knows that his job performance is being measured based on his ability to make some of these changes Trump wants." —*Cynthia Koons and Anna Edney*

THE BOTTOM LINE Drug manufacturers are facing an invigorated price-fighting lobby, plus a bipartisan consensus in Congress and the White House that prices are too high.

● Annual lobbying expenditures by the Pharmaceutical Research and Manufacturers of America



The Slo-Mo Revolt

● Nicolás Maduro clings to power in Venezuela in his struggle with opposition leader Juan Guaidó

There's a saying used in Venezuela when there's a stalemate or showdown: "*Él que se cansa pierde*"— "He who tires first loses."

The standoff in Venezuela took a fatal turn over the weekend of Feb. 23, when President Nicolás Maduro sent the military to confront supporters of opposition leader Juan Guaidó on the Colombian and Brazilian borders. In the ensuing chaos, trucks full of essential food and medicine were destroyed, and about 280 people were injured, more than 60 of them by bullets. Guaidó was able to blame the violence on an oppressive regime, while Maduro framed the aid effort as an attempted U.S.-backed invasion.

"You can limp along with a very corrupt and cash-starved government"

And so the political paralysis continued into its second month. Guaidó, leader of Venezuela's ▶

ILLUSTRATION BY KURT WOERPEL. DATA: CENTER FOR RESPONSIVE POLITICS

◀ National Assembly, brought hope to some when he declared himself the rightful interim president on Jan. 23. However, the country's 30 million citizens still struggle to find food and treat curable diseases. Venezuela is entering its sixth consecutive year of economic recession, with hyperinflation running to 360,000 percent annually. The minimum monthly wage is barely enough to buy a meal at McDonald's or three liters of Pepsi.

With little visibility into the Maduro regime's accounts, it's impossible to say just how much money it has left. International reserves stand at $8.3 billion, much of it in gold ingots, and the U.S. is threatening to sanction anyone trading precious metals with Venezuela. The U.S. has already banned the purchase of Venezuela's crude and its exports of refined goods in order to starve Maduro financially, which would in turn exert pressure on the military and his supporters to cross over to Guaidó's side.

But the full effects of the sanctions may not be seen for months. While Guaidó has drawn the diplomatic support of more than 50 countries, including most of Venezuela's regional neighbors, Maduro still commands thousands of generals and pro-government armed fighters who vow to defend the regime.

In another sense, time isn't on Maduro's side. With help from the American sanctions, the young opposition leader managed to wrest control of U.S. refiner Citgo from its Caracas-based parent, Petróleos de Venezuela SA, diverting a crucial source of revenue. Russia and China, Maduro's most powerful allies, haven't extended significant loans—at least publicly—in years, and other friendly governments including Turkey seem unable to prop up the regime.

After the failure of his aid mission, Guaidó said in a tweet that he's willing to consider all options, which presumably includes military intervention. Some Venezuelans are beginning to ask when the U.S. Marine Corps is going to step in. After 20 years of Chavismo, many believe the only way to remove Maduro and his enablers is by force.

Trump so far hasn't ruled out deploying the military, but any U.S. action would likely be a major challenge. "The U.S. has two alternatives: to double down or to back off," Torino Capital chief economist Francisco Rodriguez wrote in a report. "If the current strategy fails at generating regime change, then the opposition could end up in the worst of both worlds: with its followers demobilized and disillusioned, and with its leaders potentially being held responsible for having brought about crippling economic sanctions." Before members of the Lima Group, an organization of Latin American governments formed in 2017 specifically to respond to the crisis in Venezuela, gathered on Feb. 25 in Bogotá, many had already made it clear they weren't willing to attempt removing Maduro by force. U.S. Vice President Mike Pence also attended the meeting, pledging stronger sanctions and more aid.

There are other options for the U.S. and its allies, including seizing more Venezuelan assets. But Maduro's government also has cards to play that would likely deepen the crisis. Maduro could arrest Guaidó, who violated a travel ban by crossing the border into Colombia. The embattled leader could also try working around the oil ban and securing new financing, whether by legal means or through illicit activities such as trafficking in cocaine and illegally mined metals, or even off-the-books arms trading.

▲ A burned-out aid truck at the Venezuela-Colombia border

Calls by the European Union to seek a negotiated solution are going unheeded for now. Greg Weeks, a professor of political science at the University of North Carolina at Charlotte, says the opposition may seek Maduro's resignation as a precondition to any diplomatic discussion. Even if the president agrees, elections would still take months to arrange. His popularity has sunk to about 14 percent, according to a poll by the firm Datanalisis, compared with 61 percent for Guaidó. For Maduro, at least publicly, the stalemate is a zero-sum game. He's said he'll defend the Chavista revolution with his life, if needed.

"There's no reason to think he's about to fall. You can limp along with a very corrupt and cash-starved government," Weeks says. Guaidó's opposition is unified for now, but if his supporters begin to doubt his ability to break the deadlock, it would be easy to see his bloc splintering. "He's in a honeymoon period," Weeks says, "and it won't last forever." *—Daniel Cancel*

THE BOTTOM LINE Guaidó continues to grind away at Maduro's hold on power. The longer the two are stuck in deadlock, the worse conditions are likely to become for Venezuelans.

VENEZUELA: EDGARD GARRIDO/REUTERS. DEMOCRATS: BLOOMBERG (1); GETTY IMAGES (5)

Democrats Need That XX Factor

● After a bruising 2016 and a triumphant 2018, many voters just want a woman

Three years ago, Linds Jakows was one of the New Hampshire voters who gave Senator Bernie Sanders of Vermont a decisive victory in the state's Democratic presidential primary. For 2020, Jakows wants something different. "I like a lot of things about Bernie Sanders, but I think there's a lot of things that he still doesn't get," Jakows says. "I really hope I have a strong progressive woman to vote for."

Already, 10 months before New Hampshire's first-in-the-nation primary, an unprecedented number of women have entered the race. Sanders and others thinking about running, including former Vice President Joe Biden and insurgent Texas Senate candidate Beto O'Rourke, will have to confront a base of women, energized by their success in the 2018 midterm elections and angered by the Trump administration, who want to see someone like them finally win the White House.

Of the six women currently in the race, five spent the weekend of Feb. 15 campaigning in New Hampshire. (Senator Elizabeth Warren of Massachusetts took her economic message to South Southeast and Southwest instead.) During a stop in Concord, New York Senator Kirsten Gillibrand touted the number of women running as a benefit for the political system. "Not only does it give the American people a chance to see what leadership looks like in all its diversity but see what sensibilities perhaps women leaders bring to the table," she said. "We might see different problems—we might see different solutions."

Not all of them emphasized gender. California Senator Kamala Harris spoke about her background as a prosecutor, while Minnesota Senator Amy Klobuchar portrayed herself as a Midwestern moderate and pragmatist, and Hawaii Representative Tulsi Gabbard focused on her military service. Self-help author Marianne Williamson, who joined the field in late January, pushed back against political elites.

"It wasn't that Amy Klobuchar wasn't ready to run four years ago, or Kirsten Gillibrand, but they deferred because they believed Hillary Clinton should be president of the United States," says Stephanie Schriock, president of Emily's List, which raises money for women who support abortion rights. "The pipeline's been there, and now without a clear desired front-runner like Hillary Clinton was, it's their time."

In interviews, women voters in New Hampshire said they weren't sold on any particular candidate and that gender wouldn't be the sole determining factor for them. But many expressed hope that a woman would campaign and win on the issues they value. "I definitely think that the Democratic nominee will be a woman. I'm hoping so," said Beverly Duval, a 65-year-old office administrator from Manchester, during a Klobuchar event in Goffstown. "Men have been given many years, and I think that women now have—I'm hoping that maybe they now have—their chance to show that they can govern, too."

Tory Gavito, who co-founded Way to Win, a network of hundreds of liberal donors and strategists, in 2017, says voters and donors are looking for a candidate with big, bold plans. "Women are at the forefront right now about having the new ideas, and being the innovators and the disruptors and speaking truth to power," Gavito says. "I do think this is a women's moment."

The eventual nominee will have to break out of a crowd of at least a dozen contenders. Biden leads in early polls, followed by Sanders, who raised a remarkable $5.9 million in the 24 hours after he announced his second presidential bid on Feb. 19. Harris and Warren vie for third. Early attention means early criticism, which might make it harder for current contenders to gain traction. "I'm afraid with so many women coming out now, it in a way is going to hurt their chances," says Professor Karen O'Connor, founder of the Women & Politics Institute at American University.

Despite the ground Clinton broke as the first woman to run as a major party nominee in 2016, voters, candidates, and strategists all say sexism is still an issue. The biggest obstacle may be convincing voters that a woman can win. A Feb. 4 Monmouth poll found that 61 percent of Democratic women would back a candidate who has a better chance of beating Trump over one they agree with, compared with 45 percent of men.

"There are a handful of folks who are being controlled by their own fear and their own inability to forget about the last race," says Schriock. "I tell this to candidates all the time: Don't go into this running the last presidential race. We're running the new presidential race." —*Arit John*

THE BOTTOM LINE While eager to have a woman president, many Democratic women voters say they'd back the candidate who has the best chance to beat Trump.

● Gabbard

● Gillibrand

● Harris

● Klobuchar

● Warren

● Williamson

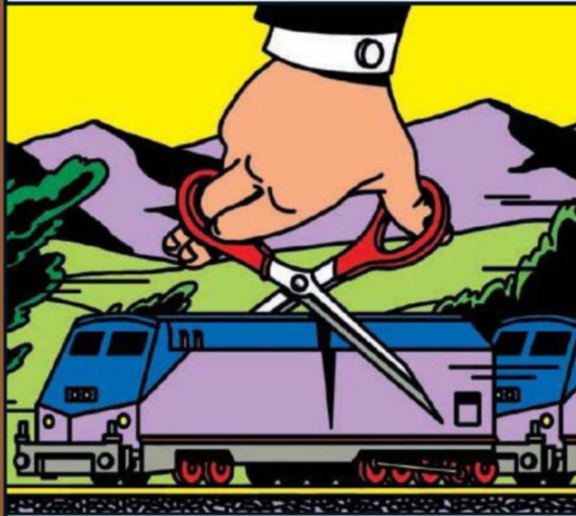
+

SOLUTIONS

Infrastructure

Derailment in California

If one of the richest states in America can't make high-speed train travel work, can others?



For more than a decade, California has been trying to develop a 520-mile network of trains speeding as fast as 220 mph, much as they do in parts of Europe and Asia. Investing in high-speed rail in the U.S. is also a key plank of congressional Democrats' "Green New Deal" to mitigate climate change. But California's bullet train project is in trouble, plagued by cost overruns, political controversy, poor decision-making, and now questions about the scope of the project and a fight over funding with President Trump. Its fate shows just how challenging the goal remains of replacing emissions-spewing vehicles on congested highways with fast, clean travel by rail.

Democrats led by Representative Alexandria Ocasio-Cortez of New York and Senator Ed Markey of Massachusetts offered a nonbinding resolution on Feb. 7 to create the Green New Deal, which includes investing in high-speed rail to help reduce greenhouse gases.

Five days later, California Governor Gavin Newsom said he was scaling back plans for a high-speed rail system between Los Angeles and San Francisco because it "would cost too much and take too long." Instead, he's focusing on finishing 170 miles of track already under construction in the interior Central Valley.

Newsom's comments prompted Trump to call the project a "failed Fast Train" and "a 'green' disaster" on Twitter. The U.S. Department of Transportation then moved to cancel more than $900 million in federal grants earmarked for the bullet train and is exploring legal options to recover $2.5 billion already allocated.

While Newsom and high-speed rail proponents say the project is simply being refocused, some advocates fear it will doom the state's bullet train and hurt broader efforts to build high-speed rail networks in the U.S. "It could be the death knell" for the California project, says Ray LaHood, a former Republican congressman from Illinois and U.S. transportation secretary under President Obama. "As long as Republicans are in control of the Senate and you have a Republican in the White House, I see no hope for rail funding."

Obama pushed high-speed rail and included $8 billion for it in the federal stimulus package Congress passed in 2009 to help pull the economy out of the recession. California got

Edited by Paula Dwyer and David Rocks

ILLUSTRATION BY MAXIME MOUYSSET. PHOTO: IRA L. BLACK/CORBIS. DATA: BUREAU OF TRANSPORTATION STATISTICS

$2.6 billion of that, plus an additional $929 million in fiscal 2010 for its bullet train. Voters approved $10 billion of bonds in 2008, with an expected completion cost of about $40 billion. A state auditor's report in November said the California High-Speed Rail Authority has secured $12.7 billion of the cost, now estimated at $77.3 billion. The report concluded that "flawed decision-making" and other problems with construction of the Central Valley portion so far "have contributed to billions of dollars in cost overruns for completing the system."

Newsom has said he's not killing the project, but rather focusing on completing the Central Valley segment as efforts to plan and secure funding for the rest of the system continue. He's vowed to fight Trump to keep the federal money already approved. While shrinking the system is a setback, finishing the Central Valley portion could prove the project can work, says Karen Philbrick, executive director of San Jose State University's Mineta Transportation Institute, founded by former U.S. Transportation Secretary and onetime California Representative Norman Mineta. "We think that once people see how the train runs, how efficient, safe, and affordable it is, that excitement will, in fact, increase," Philbrick says.

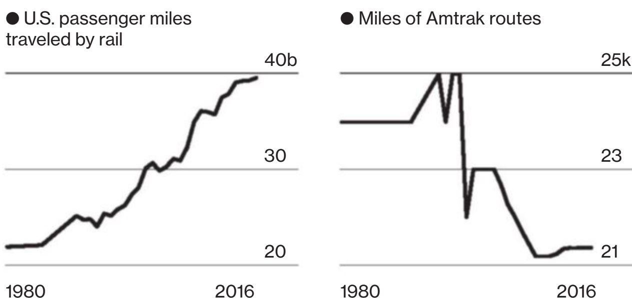
Many of the problems with the California project are unique and don't necessarily apply to others, says Jeff Davis, a senior fellow at the Eno Center for Transportation, a Washington think tank. He's identified seven "worst practices" for it, including committing federal dollars for a construction project that's not ready. High-speed rail advocates also say that scaling the project back won't affect bullet train ventures elsewhere in the U.S. The investor-owned Texas Central Partners, which plans a 240-mile link between Houston and Dallas, has even outlined differences between its proposal and the California system.

Planning for similar rail networks continues. As part of a spending bill to avoid another partial federal government shutdown in February, Congress approved $10 million toward a high-speed, magnetic levitation train between Washington, D.C., and Baltimore that could later reach New York City. While the Green New Deal faces strong political opposition, it can also make bullet trains part of a central debate in Washington rather than one on the fringes, says Andy Kunz, president and chief executive officer of the U.S. High Speed Rail Association, an advocacy group. "I think it elevates high-speed rail to something more important," he says.

Ocasio-Cortez in New York on Jan. 19

Still, the main challenge in the U.S. is a lack of money and political support, especially among Republicans, LaHood says. As long as people who control the federal purse have no vision for bullet trains, "obviously there's not going to be any money." In California, Republicans including U.S. House Minority Leader Kevin McCarthy are applauding Trump's effort to reclaim federal money from what they call a failed project, or "train to nowhere." California and other states must find their own money or private funds; otherwise, a permanent, multiyear federal funding program is needed, Davis says. "If the whole Green New Deal thing comes about, maybe that can happen," he said in a Feb. 14 webinar. "But I wouldn't hold my breath waiting on it." —*Mark Niquette*

More travelers are using conventional trains even as routes dwindle



THE BOTTOM LINE Some advocates fear that problems with California's bullet train project will hamper broader efforts to build high-speed rail networks in the U.S.

Automakers Say, 'Chaaarge!'

After years of waiting for others to build refueling stations for electric cars, manufacturers are starting to do it themselves

Just a few years ago, automakers had a largely uniform response to questions about the construction of refueling stations for electric vehicles: "Not my job." Today, they're starting to realize that no one else is going to build stations at the scale needed to stimulate sales of battery-powered cars, so they'll have to do it themselves. "Charging infrastructure is a bottleneck," says Andreas Tschiesner, head of the European automotive practice at McKinsey & Co. Carmakers are "ready to get the ball rolling because nothing is happening on its own."

Volkswagen, Daimler, Ford Motor, and BMW have teamed up to create Ionity, a company that's building charging stations across Europe. VW has formed Electrify America, a unit that will spend $2 billion on stations in the U.S., and the German company is considering a similar operation in China. Porsche is installing chargers at dealerships and is working with BMW and Siemens to develop ultrafast charging. And Japan's big manufacturers have set up a company to promote installation of quick chargers.

The moves come as automakers are preparing to flood the market with EVs. Carmakers worldwide will spend $255 billion in the five years to 2023 developing more than 200 battery-powered models, consulting firm AlixPartners predicts. General Motors Co. expects to sell 1 million electric cars annually by 2026. Volkswagen says it'll have 50 such models by 2025, BMW will have a dozen, and Renault eight. To persuade customers to buy them, "carmakers need to create a positive charging experience," says Colin McKerracher, an analyst at BloombergNEF.

About 80 percent of EV charging today is done at homes or offices. But refueling on the go is a key concern for consumers, and as the technology spreads, more buyers will be homeowners and apartment dwellers who won't have a dedicated parking space with easy access to a plug. The International Energy Agency predicts the global fleet could be about 30 percent electric by 2030, which would require as many as 30 million public chargers—50 times the number today. But the economics of building them are tough. Fast-charging stations need at least eight customers a day to break even, and many of them struggle to get half that, BNEF says.

The risk is that if carmakers build their own networks, charging will become more atomized than it already is. Globally, there are more than a dozen plug types with at least eight charging speeds, and to access them as easily as tanking up at the local Kwik-Stop would require multiple subscriptions with various providers. "When you're traveling farther, you need fast charging," says Hakan Samuelsson, chief executive officer of Volvo Cars, which introduced its first all-electric car in February. "Unfortunately, it's a bit of a jungle" of different systems today.

The exception among manufacturers is Tesla Inc., which in 2012 started building so-called superchargers to serve buyers of its cars. Today it has nearly 13,000 docks in more than 1,400 locations on four continents. It's little surprise, then, that Tesla is the market leader, selling almost 400,000 EVs since 2010. Even so, the company's chargers can be hard to find and aren't always operational. As extensive as it is, the current network "is not going to be relevant if Tesla sells a million cars every year" as it ramps up production of the lower-cost Model 3, says Ashish Khanna, a partner at L.E.K. Consulting, which advises auto companies on the shift to electric power. "Undoubtedly, they will need to build it out further."

Ionity, the automakers' joint venture, in April built its first fast-charging station, in Germany. By mid-2020 it will have 400 rapid-power stations across Europe, or about one every 120 kilometers (75 miles) along the continent's superhighways. The network will feature charging docks, compatible with most cars on the road, that are 50 percent more efficient than Tesla's, able to add 200km of range in eight minutes. While today's cars won't be able to charge at that rate, next winter Porsche expects to introduce the Taycan, an all-electric sedan that can take full advantage of the Ionity network. And Electrify America, funded with money from VW's settlement of lawsuits over cheating on diesel engine emissions, says it has more than 100 charging sites and by July plans to have almost 500 that will work with most EVs. "The flood of cars is coming," says Brendan Jones, Electrify America's chief operating officer. "We want to get the infrastructure in place." —*Elisabeth Behrmann, with Niclas Rolander, Brian Eckhouse, and David Stringer*

THE BOTTOM LINE Automakers will spend $255 billion developing hundreds of EV models by 2023, and will need a wide network of charging stations to persuade customers to buy them.

ILLUSTRATION BY MAXIME MOUYSSET

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Fire & Fur

A bankrupt, distrusted util
crucial to California's pla

By Drake Bennett

y & PG&E
ity with a criminal past is
n to slow climate change
and Mark Chediak

Laine Mason arrived at work on Nov. 8 expecting a busy day: Strong winds were forecast, which meant falling branches and toppled trees, and with them the possibility of downed power lines. Mason, who lives in the Northern California town of Corning, works for Pacific Gas & Electric Co. as what's known as a "troubleman." A 50-year-old former logger, he drives a robin's-egg-blue PG&E bucket truck and wields a chainsaw and a 6-foot-long fiberglass hot cutter that can sever live power lines. In his words, "If you call PG&E and say, 'Hey, my lights are out,' they send me out to figure out what's going on."

That morning, Mason and two fellow troublemen were waiting for assignments in the company's yard in Chico. At around 6:45, the others were sent out to deal with an outage on nearby Flea Mountain. A little later, Mason's boss called and told him to head to Paradise, a town in the Sierra Nevada foothills, where another of his co-workers needed help. Mason could already see smoke, and on the road he passed a steady stream of cars headed the other way. In the time it took to drive 15 miles, a small blaze that had been spotted a few miles from Paradise had exploded into a wind-whipped, galloping monster. He was just outside town when the inferno arrived. "I saw the treetops start swirling around," Mason says, "and within five minutes it was like midnight—the fire was there, the smoke was there."

Mason worked all that day in Paradise, clearing fallen poles and lines. For a while he partnered with a team from the California Department of Forestry and Fire Protection, or Cal Fire, opening paths through the downed debris so the firefighters could go house to house urging holdouts to evacuate. He stayed on the south side of town, where the blaze was less intense, moving downhill when it edged closer, watching houses around him combust and smolder. His co-worker, he later discovered, had been trapped in the gridlock created by panicked evacuees on the north side and had survived by moving to the center of a large parking lot. Mason worked until 10 that night, went to Chico to grab a bite, then drove back up. When he finally left, he'd been on the clock for more than 36 hours.

His cleanup assignment in Paradise lasted two and a half more weeks. For the most part, people were happy and grateful to see him. A few, though, seeing his truck, would yell profanities and flip him off. A PG&E mechanic he knew was spit on at a fast-food place. Others got called murderers. Mason knew why: The day the fire started, PG&E had filed a report with its regulator, the California Public Utilities Commission (CPUC), raising the possibility that the utility itself had caused the inferno—at 6:15 that morning there had been an outage on a transmission line on the hillside east of Paradise where the fire was first reported. Later examination showed an insulator and jumper wire that had broken loose from the tower, and a "flash mark" where the damaged equipment, swinging free, could have created an electrical arc, sending sparks into the parched vegetation below. In a follow-up filing, the utility mentioned a second outage a few miles away from the first and a half-hour later—the Flea Mountain outage. It could have been a second ignition point.

The Camp Fire, as it was named, proved the deadliest and most damaging blaze in California history—85 people were killed, most of them in Paradise, and 18,800 buildings were destroyed. Cal Fire won't conclude its investigation into the cause for months, possibly years, but the realization that PG&E's equipment might be the culprit led in short order to a collapse in the utility's stock price, the resignation of its chief executive officer, and, on Jan. 29, a declaration of Chapter 11 bankruptcy. Survivors of the fire, along with insurers and the town of Paradise, have already brought more than 40 lawsuits against PG&E, adding to 700 suits already on the books for its role in deadly fires that ravaged the state's wine country in 2017. The plaintiffs' attorneys—and angry protesters at the utility's regulatory hearings and its San Francisco headquarters—portray a company whose negligence led to death and disaster. PG&E's defense is that, for reasons beyond its control, it's become impossible to prevent these catastrophic fires, no matter how careful the company is.

In the coming months, judges, juries, regulators, and politicians, not to mention PG&E's millions of customers, will be parsing the company's culpability. The bankruptcy is an early test of the state's new governor, Gavin Newsom. But this isn't just a California story. It's also a multibillion-dollar case study for a set of once-abstract questions about corporate responsibility, societal risk, and climate change. California's political leaders have long seen the power grid as a vital tool for reducing carbon emissions to curb global warming. What's become clear is that the grid is also dangerously vulnerable to the already palpable effects of climate change. The future that climate scientists have been warning of has arrived, and the system in place to power our wired world wasn't built to withstand it.

The company that would become PG&E was founded in 1852, when gas was used not for heat but for light. A series of mergers moved the growing company into the new electricity business as well, culminating in the 1905 union of California Gas & Electric and San Francisco Gas & Electric. The resulting utility was a hydropower pioneer, generating electricity from the snow-fed rivers of the Sierra Nevada and bringing it down to San Francisco and the Sacramento Valley's fertile farmland. In the years after World War II, the utility built a 500-mile pipeline to bring in natural gas from Texas. Like other utilities, PG&E was long seen as a reliable widows-and-orphans investment, a government-regulated monopoly whose dividend was supplied by the payments on gas and electricity bills.

In the mid-1990s, to combat high electricity prices, the California Legislature and the CPUC decided to break up the state's three big utilities. PG&E, Southern California Edison, and San Diego Gas & Electric were required to sell most of their power plants to independent electricity providers, then begin buying electricity from these suppliers on a specially created exchange. They were also forbidden, for a few years, from raising the rates they charged their customers.

Then, in the summer of 2000, a combination of

factors—among them a heat wave that caused air-conditioning usage to spike and a drought in the hydropower-reliant neighboring states from which California usually bought some of its power—created an electricity shortage, driving wholesale prices up. Thanks in part to the poor design of the state's new electricity market, suppliers discovered they could make more money by withholding power, exacerbating the shortage and further increasing wholesale prices—energy traders at the soon-to-be notorious (and defunct) Enron Corp. proved particularly creative and unscrupulous in this regard. With retail prices capped, utilities began hemorrhaging money. There were statewide rolling blackouts, and the mess helped lead to an unprecedented recall of the state's governor, Gray Davis, and the election of Arnold Schwarzenegger. PG&E declared bankruptcy in April 2001, claiming debts of $18.4 billion—money its customers helped pay off when, as part of its reorganization, the company was allowed to raise its rates.

Over the past decade, the utility has been shadowed by deadlier disasters. On Christmas Eve 2008, a PG&E gas line explosion outside Sacramento killed a man and injured five members of his family. The evening of Sept. 9, 2010, another PG&E pipeline exploded in San Bruno, 12 miles south of San Francisco. The blast sent a 28-foot section of pipe skyward, and the resulting fireball destroyed 38 homes and killed eight people. Gas continued to flow out of the crater and feed the fire for an hour and a half, until two off-duty PG&E mechanics who'd heard about it on the news arrived and manually closed the valves.

An investigation into the explosion by the National Transportation Safety Board, whose remit includes accidents involving the transport of hazardous materials, was damning. PG&E's protocols for ensuring the mechanical integrity of its pipelines, the agency's report read, were "deficient and ineffective"—the pipe that blew up had been misclassified for decades and, as a result, only cursorily inspected—as was its fumbling response to the disaster. The CPUC imposed a record $1.6 billion penalty, and in 2016 the jury in a federal criminal trial found PG&E guilty of six felony counts of violating pipeline safety regulations and obstructing the NTSB investigation. The judge fined the utility $3 million and sentenced it to probation, complete with community service for its executives and a requirement to pay for national media ads to "publicize its criminal conduct." A monitor was assigned specifically to oversee the safety of the company's gas system.

In the wake of the San Bruno fire, PG&E hired a new CEO, Tony Earley, a lawyer and onetime nuclear submarine officer who'd previously run the Detroit-based utility DTE Energy Co. PG&E tested and replaced hundreds of miles of pipelines, opened a gas-safety operation center, and installed more than 230 automatic or remote-controlled valves throughout its gas transmission network so workers wouldn't need to manually shut off the flow in an emergency. The gas business, long a stepchild to the much larger electricity division, got its own dedicated management team.

Earley's tenure coincided with a push by California's government to deploy the state's utilities to meet ambitious green

A PG&E crew cleans up in Paradise on Nov. 10

energy goals. In 2011, California passed a law mandating that a third of its energy come from renewable sources by 2020. PG&E signed contracts to buy power from a giant wind farm at Altamont Pass and solar arrays in the Mojave Desert—and, increasingly, from the rooftop panels Californians were installing on their homes. It hit its renewables target three years early, in 2017 (as did Southern California Edison and San Diego Gas & Electric).

That year, Earley stepped aside for Geisha Williams, who as PG&E's president had overseen the politically fraught process of decommissioning the company's Diablo Canyon nuclear power plant. (It's expected to be retired in 2025.) A daughter of Cuban dissidents, Williams became the first Latina to head a Fortune 500 corporation. "We at PG&E are deeply committed to the California vision of a sustainable energy future," she announced from a conference stage in early 2018. "We see the electric grid as a climate-solutions platform that offers the scale to support this transformation."

Californians haven't forgotten the San Bruno explosion and the lapses it revealed, however. "They have a rap sheet much longer than any other utility," says Mindy Spatt, a spokeswoman for the Utility Reform Network (TURN), a ratepayer group. "I mean, the pattern is clearly there. It's negligence, negligence, negligence, again and again."

California has always burned. Flames drive its ecosystem; coastal chaparral and mountain pine alike depend on summer wildfires to clear the open spaces where they thrive. But in recent years, fires have grown more frequent—and more destructive. According to Cal Fire, 12 of the largest 15 fires in state history have occurred since 2000. It's impossible to trace this change to any one cause. For decades, the owners and overseers of American forests suppressed the ▶

PREVIOUS SPREAD: GABRIELLE LURIE/SAN FRANCISCO CHRONICLE/POLARIS. THIS SPREAD: JANE TYSKA/DIGITAL FIRST MEDIA/THE MERCURY NEWS/GETTY IMAGES

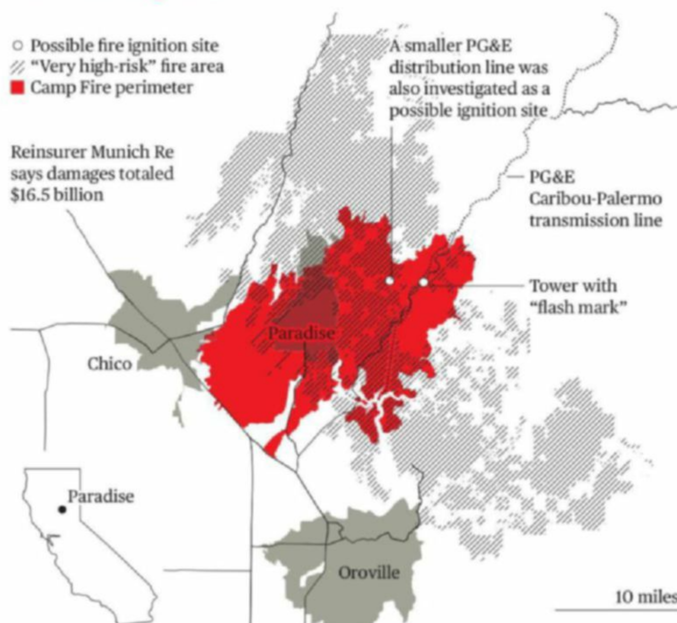
“They have a rap sheet much

regular burns that clear out underbrush, ensuring that when fires do occur they have more fuel. A punishing drought and a bark beetle infestation in recent years have combined to leave hillsides dense with dead, dry trees. And more and more people, priced out of the state's metropolises, are building homes in what was formerly wild land, in the path of blazes that once killed only wildlife.

In addition to these factors, and often exacerbating them, is climate change. Warmer winters have helped bark beetle populations explode, and hotter summer air sucks more moisture out of vegetation, priming it for combustion. There's also growing evidence that warming is shifting California's precipitation patterns, delaying the autumn rains that once brought a reliable end to fire season. “Part of it is the temperature,” says Daniel Swain, a climate scientist at the University of California at Los Angeles and the National Center for Atmospheric Research, “but it's also a change in the seasonality of the rain.”

The past two years have been especially bad. The 2017 wine country fires burned more than 245,000 acres and killed 44 people; last year, even before the Camp Fire and the devastating Woolsey Fire in Southern California, an area about the size of Delaware had been scorched. Power lines are far from the only culprits–wildfires are more commonly sparked by untended campfires, cigarette butts, or the sparks thrown from the wheel rims of flat tires. Nevertheless, Cal Fire investigators have found PG&E equipment responsible for at least 17 of the 21 major 2017 fires and referred 12 for possible criminal prosecution. The utility's critics charge that, as with its gas lines, PG&E failed to properly inspect and maintain its infrastructure. On Feb. 27, the *Wall Street Journal* reported that PG&E had for years been delaying planned safety upgrades along the nearly century-old transmission line where the first Paradise outage occurred. Plaintiffs suing the utility accuse it of habitually failing to protect its lines by trimming trees and other vegetation.

The Camp Fire



DATA: CALIFORNIA DEPARTMENT OF FORESTRY AND FIRE PROTECTION; MUNICH RE

In response, PG&E spokeswoman Lynsey Paulo pointed out in an email that the company spent $2.3 billion on vegetation management from 2013 to 2018, patrols every mile of its 100,000 miles of overhead wires at least once a year, and prunes or removes 1.4 million trees annually.

Compounding PG&E's problem, however, is California law, which allows the company to be found liable even if it did nothing wrong, under what's known as “inverse condemnation.” This concept grows out of the more familiar notion of eminent domain: If your home happens to be where the state plans to build a highway, the state can condemn it, pay you just compensation, and take it, all in the name of the public good. Now imagine the inverse: The state, or a utility acting on its behalf, irreparably damages your home in the process of performing a public purpose (such as providing everyone electric power). Your property has effectively been condemned, and you're owed just compensation, whether or not anybody has been negligent. “If this is for a public purpose, then you shouldn't put all of the burden on this one landowner,” says Shelley Ross Saxer, a Pepperdine University law professor. That's the argument, at least, and California's courts have found it convincing.

Despite intense lobbying by PG&E and the support of Newsom's predecessor, Jerry Brown, the California Legislature has refused to pass laws that would weaken inverse condemnation. Last September, Brown did sign a measure that would allow PG&E to recoup the costs of its 2017 wildfire lawsuits by issuing bonds backed by customer bills, as long as the CPUC found that the utility hadn't been negligent. That law, however, doesn't cover the 2018 fires–legislators were reluctant to give utilities a free pass going forward.

Only three weeks after the Camp Fire was finally under control, the CPUC released a report accusing PG&E of falsifying pipeline location records from 2012 to 2017, increasing the odds that underground construction crews might accidentally crack the pipes. The news exhausted any sympathy that remained in the state legislature for the utility. On Jan. 30, William Alsup, the federal judge overseeing PG&E's probation, ruled the utility had violated the terms of its supervision. He proposed that, as part of its probation, the company reinspect its entire grid, remove or trim all trees that could fall on its lines, and begin aggressively shutting off electricity to at-risk areas when conditions are ripe for fires, no matter the inconvenience to customers or the cost to the company.

In court filings, PG&E pushed back, saying those measures could cost as much as $150 billion. But changes were already under way. In mid-January, Williams stepped down. Two weeks later, PG&E filed for bankruptcy protection, citing $30 billion in potential fire lawsuit liabilities–and an insurance policy that

longer than any other utility”

would cover only $2.2 billion of that. On Feb. 11 the company announced that at least half of its board was leaving.

Even nonbankrupt utilities are rarely the masters of their fate. PG&E has always had to answer to state politicians and the CPUC. More recently, there’s Judge Alsup. Now a bankruptcy judge will oversee the utility’s finances. Already there’s been tension among the company’s different overlords, reflecting the different goals PG&E has been assigned. At issue are the utility’s contracts with solar and wind providers. The deals helped it surpass its green energy mandates, and they also boosted the then-nascent renewables industry, locking in prices, often for decades, as a guarantee of future income. With advances in technology, however, the cost per kilowatt of wind and solar has dropped precipitously: Were PG&E buying its renewable energy at today’s market rates, it could save about $1.1 billion total, estimates BloombergNEF.

A bankruptcy judge interested primarily in putting PG&E on sounder financial footing might allow it to break those contracts. The victims in that case would be not only PG&E’s renewables suppliers, but also all green energy companies, which would likely find investors leery of being similarly kneecapped by a bankruptcy judge. Climate change, like a science fiction villain with a time machine, would have managed to undermine today’s efforts to combat its future effects.

Meanwhile, the June start of the 2019 fire season grows closer. PG&E is stepping up tree trimming in high-risk areas, increasing inspections of power lines, and installing more sensors and cameras to detect shorts and spot fires once they start. The utility also plans to replace wooden poles with fire-resistant composite ones, install insulated power lines, and expand its network of weather stations. All of that costs money, of course, money that can’t go toward subsidizing clean energy (a law passed in September requires California utilities to be 50 percent green by 2026 and entirely carbon-free by 2045) or reimbursing wildfire victims. Days before filing for bankruptcy, PG&E told a judge it could no longer afford settlement payments it owed victims of a 2015 fire traced to its equipment. And it’s pledged to be more aggressive in cutting off power to parts of its grid when the fire risk spikes, meaning preemptive blackouts may become a fact of life during the state’s lengthening fire season.

PG&E has been understandably eager to stress the role climate change plays in California’s fire-plagued “new normal.” Williams, before her departure, repeatedly emphasized the link. To the utility’s many critics, this sounds like a tactic to minimize its own accountability. “PG&E blames Northern California’s wildfires on climate change,” says California State Senator Jerry Hill, a longtime critic whose district includes San Bruno. “But that didn’t ignite the fires. PG&E’s equipment did.” On Feb. 6 another PG&E gas main exploded in San Francisco, igniting a fire that burned five buildings. It is said that generals always fight the last war, but PG&E seems unable to do even that.

In response to criticism such as Hill’s, the company sent a statement acknowledging that “while we have made progress, we have more work to do.…PG&E is committed to working cooperatively with regulators, policymakers, and other stakeholders to continue to provide PG&E customers the safe gas and electric services they expect and need.” The company declined to make any executives available for this story.

To the extent that California’s heightened flammability is related to climate change, it’s not just PG&E’s problem. A Feb. 19 report from S&P Global found it “entirely possible” that the 2019 fire season would force one of California’s other investor-owned utilities into bankruptcy. Because of rising temperatures and the ways they’ve begun to perturb the dynamics of Earth’s atmosphere, extreme weather outliers—fire seasons that stretch through November, polar vortexes, 100-year floods—are becoming commonplace. Replacing wooden posts will probably help prevent wildfires, but it’s not only physical structures that need updating. Electricity infrastructure safety regulations are products of a time when fires were less common and less disastrous. The job of inspecting power lines, for example, is largely left up to the utilities themselves. “The way we do grid safety is not the way we do food safety or airline safety,” says Severin Borenstein, director of the Energy Institute at the Haas School of Business at the University of California at Berkeley. He argues that some sort of change is inevitable: “It’s clear that when we have these really serious risks, we move to a different model.” That model entails, at a minimum, oversight bodies with the money and manpower to carry out their own inspections, as the U.S. Food and Drug Administration and the Federal Aviation Administration do.

Investor-owned utilities such as PG&E have always been odd beasts: private companies providing public services. Much of the argument so far has been over who will have to shoulder the costs of hardening the grid and compensating fire victims. Should it be the shareholders or ratepayers? Nobody wants to bail out a negligent company. On the other hand, it’s foolish to think that all of us won’t bear the costs of adjusting to and, if possible, mitigating climate change. Those costs could take the form of bigger electricity bills. They could mean higher insurance premiums for those who live in the widening path of floods and fires—an expense often passed along to fellow policyholders and taxpayers by public insurance programs. (California legislators are discussing a state-run wildfire insurance fund modeled on one in Florida for hurricanes.) In a world ruled by economist-kings, the costs might take the form of a carbon tax.

“This is going to be happening everywhere,” says Pepperdine’s Saxer. “It’s not just the fires, it’s the floods with sea level rise. We just keep tossing back and forth who’s going to pay for it, but we’re all going to have to pay for it. It’s just a question of how.” Ⓑ

NO ONE SKIPS SPORTS HOUR

A lot of CEOs preach clean living and team building, but nobody leads by example quite like Henrik Bunge of Sweden's Bjorn Borg

By Josh Dean   Photographs by Knut Egil Wang

In retrospect, it seems perfectly natural that one of the world's fittest chief executive officers, a man who prefers the title Head Coach and requires that all able-bodied employees of the high-end underwear and fitness apparel company Bjorn Borg AB participate in a weekly training session known as Sports Hour, would ask that I come immediately to the office upon arrival in Stockholm from New York to join him for a workout. I hadn't slept in 24 hours nor eaten breakfast when Henrik Bunge's assistant called at 10:20 a.m., right as I was checking into a hotel with thoughts of a shower and a nap, to see if I could make it in by 10:50 for kayaking.

"He won't wait for you," she warned.

I raced across Stockholm, arriving at Borg's headquarters, in an old power station, just in time to hear my name being yelled in a deep, Swedish-accented voice from the second-floor loft above the lobby. Bunge, 45, arrived in a blur down the stairs, looking tan and fit and rushed, his default state. He handed me a motorcycle helmet as he breezed past and out the door to a black Ducati. "This is one way to get to know each other," he joked as I climbed on for the fast ride to a rowing club at a nearby lake, where the company's even-more-ripped business development manager, Stefan Erlandsson, was waiting.

"What you will realize about me is that I'm not very flexible," Bunge said, as he fast-walked in bare feet toward his boat, carrying a paddle. This was why it had been so hard to schedule a visit. When Borg's public-relations manager first agreed to let me embed at the company, she asked if I could come to Sweden in three days. Her next offer was for five weeks later.

"I don't really adjust the schedule for anyone," he said, and laughed. Bunge explained that he ends his daily 10 a.m. meeting no later than 11, not 11:01, because by 11:01 he needs to be en route to his bike to complete his daily workout without disrupting the afternoon. This time is sacrosanct. Some days he does CrossFit. Other days he wrestles. And on Fridays there's Sports Hour.

Today it's kayak intervals with Erlandsson, an ultramarathoner and former competitive kayaker who once rowed across the Atlantic Ocean—and there's little time to waste if Bunge is going to complete a 30-minute paddle, then squeeze in some strength work at the club's gym, shower, and get back on the Ducati to make it to lunch by 12:30 at the latest. By 1 p.m.—not 1:01—he needs to be at his standing desk, ready for the afternoon's first meeting. "If you're on time, that's a sign that 'I can control things,'" he said. "It's a very small victory—always being on time. It also sends a signal to the one you're meeting that 'I respect you.'"

Bunge helped carry my loaner kayak to the dock and gestured for me to step in. I did, then promptly fell in the lake, which caused a brief delay as I climbed back onto the dock and tried again, more successfully. Then we were off.

Or, rather, they were off—two extremely fit Swedish businessmen zooming across the water as I tried in vain to keep up. And this wasn't the workout. That happened once the men reached an area where the lake was a few hundred yards wide. There, they did five furious sets of laps, with short rests in between, as I paddled around looking at ducks.

Each lap, Bunge later explained, was at 75 percent to 90 percent of maximum effort. "You feel it a little in the shoulders," he said.

The final lap complete, they were off again, back toward the club, to do bench presses and pullups, and then it was time to shower, as a group. I realize this is a very American thing to point out—Scandinavians are often communally nude—but in many years of writing profiles, I'd never before been nude with a subject, and here I was, showering alongside the CEO I'd come to interview, not long after riding on the back of his motorcycle and falling into a lake. Henrik Bunge does not waste a minute.

It's easy to be reductive when writing about Bjorn Borg's peculiar culture—especially if the writer visits on a Friday morning, when Sports Hour takes place. Really, who could blame you when everyone in attendance is wearing apparel emblazoned with a single word, "Borg," and drinking out of water bottles that also say "Borg," which happens to be the name of a fictional alien civilization in *Star Trek* described by the *Star Trek Encyclopedia* as a society of "enhanced beings...linked together in a great collective."

The symbolism, while extremely on the nose, is coincidence. It was a design decision to start using "Borg" on the company's shorts, tights, shirts, and jackets instead of the complete name of the Swedish tennis legend who started the company but is no longer affiliated with it. And although the Friday 11 a.m. workout may be mandatory—as in, if you're not sick or incapable of walking, you have to go—it's also wildly popular. Employees say they look forward to it. They seem almost giddy by Friday at 10:45.

Borg is a publicly traded company with a high-visibility brand in Scandinavia and Western Europe; it has 48 physical stores, a strong web presence, and a relationship with the pop star Robyn. And Bunge himself is well-known in Sweden for his unconventional management style. The first board meeting after his hiring in 2014 happened in London, on a Friday, and, yes, there was a Sports Hour, and, yes, billionaires took part. "If I have a COO saying, 'I'm the best COO on the Earth, but I train on Thursday,' it's not gonna work," Bunge says. "I know people who would say, 'I'm not a child. I can train when I want.' And I say, 'It's not really about that, though.'"

Corporate wellness is very much of the moment in America, especially in tech, but the culture at Borg is next level. There are healthy snacks and meditation classes and guest lectures from life coaches and chair-free conference rooms. (Bunge on chairs: "I used to have them, but I took them out because everyone was sitting all the time.") Fridays start with an hour dedicated to reflecting—in strictly enforced silence—on the week's successes and failures and on what you must do better next week.

With regard to Sports Hour, Bunge does have a sense of priorities. "If your

Bunge at the Borg shop in the company's Stockholm headquarters

wife is calling, saying 'I just got hit by a car,' then drop everything," he says. "But besides that—in terms of work, at least—the ability to get as much out of the work hours that you have is about focusing on one thing at the time. The rigid focus on time is the easiest way of building a disciplined organization. It's such a strong symbol."

All of this, ultimately, is about business. There's limited research on whether fitness and workplace performance are truly connected, but Bunge is, as in all things, fully committed. Ditto the employees I spoke with at headquarters. "We believe that if we are living our brand, which means our strongest version of ourselves, that's when we can add value in every small detail of the business," says Lena Nordin, the human resources chief. "We really believe that each small part will be better if you do it with a strong engagement and strong heart, and a strong body and mind."

And no one at Bjorn Borg is a better example of this than Bunge. He has to be. "Most managers would not understand what it takes to build such a strong culture in terms of being that role model, because you need to be better than everyone else in living what you're teaching or preaching," Nordin says. "Otherwise, this won't work."

Bunge was born in Stockholm and raised by his mother on Gotland, a small island in the Baltic Sea. After high school he spent two years as a medical sergeant in the army's special forces. He then moved on to law school, where he was miserable but met his wife, Aino, making it a net win. He had no interest in becoming a lawyer; instead, he decided to ski to the North Pole, unsupported, with an army friend, Magnus Persson. The expedition was a race, pitting the Swedes against other, far more experienced and better-funded teams of adventurers. But it was the two broke neophytes who won, reaching the North Pole in a record 41 days. "Everybody thought, This has to be luck, but that's really when I started developing the framework that you see now," Bunge says, referring to the rigid, goal-oriented philosophy that's the foundation of his management style. "I concluded that success is much more about having the ability to make the right decisions than it is about background."

He wrote a book called *Framåt* (meaning "forward"), lectured about overcoming adversity, and established himself as a professional adventure athlete. But he felt unfulfilled. Chasing records seemed pointless, a lot of risk for very little satisfaction. "Whether you succeed or fail, no one really cares," he says. "Except you, of course." As a last hurrah, he skied across Greenland in 2001, setting another record.

Bunge then followed Aino to Boston, where she'd won a scholarship to Harvard Law School. He noticed an ad for management trainees at RadioShack, and when no one replied to his application, he went to the head office. He was hired on the spot, one of 1,000 people placed as bosses in troubled locations, and soon thrived as a peddler of dongles. "I went in at full force, like I'm gonna be the best guy you ever had," he recalls.

When his wife got a job in London, Bunge followed and started a management consulting firm. The lectures and the book got him meetings and clients, including the ultraluxe bedding company Hastens Sangar AB, which sells $50,000 mattresses and is the official supplier of beds for the Swedish Royal Court. When Jan Ryde, Hastens's owner and executive chairman, asked Bunge to give his everything-is-possible North Pole lecture to company wholesalers, Bunge suggested an alternative approach. "Let me prove to your guys that it's only attitude that separates success and failure," he said. He proposed a contest with the company's best sales rep, a woman in the flagship Stockholm shop who was so good, Ryde warned, that Bunge might not only lose but also go home with a bed that cost more than his car. Undeterred, Bunge spent a weekend studying the company's sales materials, went to the store, and announced his challenge.

"And of course she won," he says. But not by much. He sold three mattresses that day to her four or five. Ryde was impressed. He made Bunge the export manager of Hastens. Within a few months he'd taken over marketing and then sales. "It was very easily spotted how great he is," says Ryde. "He has a very positive mindset. That means whatever he points his mind to, nothing can stop him. He is a force."

Bunge eventually found himself longing for the CEO job, which wasn't coming along anytime soon. When Adidas AG called looking for a sales director to handle Scandinavia and the Baltics, he took the job. Within a year he was made managing director for Scandinavia.

The previous director had been using a soccer team as a metaphor for his management vision, complete with goalies, forwards, and substitutes. "I gathered the whole team, and I just threw it away, saying, 'This is just ridiculous,'" Bunge recalls. "No one is sitting

on the sideline. Everyone is playing."

That's when his management framework formally became the Framework. He still uses it. "We need to know where we're going, where we are, what to do, how we are, and why we're here doing this," he says.

The Framework is built around those five questions, "none more important than the others." The questions lead toward goals that are, in Bungespeak, SMART—specific, measurable, attractive, relevant, and timely. Every employee at Adidas Scandinavia was asked to memorize the Framework and to create individual goals that help achieve the company goals. They were reviewed monthly.

Bunge stayed at Adidas for six years. In 2012 he was hired away to run Peak Performance, a Swedish skiwear maker. He was, at last, CEO at a company that seemed perfectly aligned with his personal story. But less than a year into the job, the man who hired him was fired, and as Bunge tells it, he didn't mesh well with the new boss. "I'm not sure I gave him any other way than to fire me, so he fired me. It wasn't the way I would want it to be, but that's the way it is."

With a year of severance and a noncompete agreement, plus a 6-month-old daughter, two other children, and a wife on maternity leave, he decided to pack up the family and move to Thailand. He played with his kids, took up Thai boxing, and sat on the beach pondering his future. The experience, he says, reconfirmed his beliefs that "Hey, you need to be around people. So don't look for a brand. Look for individuals that you want to be a part of."

Finding time to talk to Bunge—as in real, focused time—is a challenge. You might have to show up at his house for breakfast on Monday. That's the day his wife leaves early for a workout with her trainer. Bunge gets breakfast and lunch prepped, then drops his daughter at preschool before heading to the office in time for a 9 a.m. meeting that is, of course, mandatory for all employees. "My wife wanted to be sure I told you that this is only a Monday thing," he says while cutting berries. "Every other day, she is doing this."

The Framework is not applicable to parenting. Children are far too hard to motivate and coerce. So although management hasn't made Bunge a better parent, he says parenting has made him a better manager—certainly a more patient one.

So far, his only major failure has been Peak Performance, and he chalks that up to a poor match of personalities. "For the first 10 or 15 years of my career, I always nailed all the goals," he says. "Whether it was breaking world records in the North Pole or overtaking Nike, at Adidas, as the market leader in Scandinavia, I always succeeded."

But at Borg, the wins have been harder to come by. "When I reflect on that, it's probably not because I'm worse than I was 10 years ago," he says. "I've probably added some things, but it's much harder these days to predict the future." It's a constant struggle to effectively position a premium brand in a market that demands discounts and can shop the literal world to find them.

In 2013, the year before Bunge joined Bjorn Borg, the company had sales of 500 million Swedish krona ($54 million) and profit of 21 million krona. Last year revenue was 709 million krona and profit 55 million. Bunge's 2019 goal, stated right there on the company's website, is to reach 1 billion krona in revenue and 150 million krona in profit.

That, I observe as he drives to the office in a matte gray Tesla Model S, seems like a big ask. "Everything is possible," he responds. "If you ask my CFO, he will say, 'Never.' But I've seen miracles before, and I think we can do it again. It doesn't really matter, either, whether we hit it or not, because you get further with a goal than without a goal." Recently he's overhauled the supply chain, rebuilt the company's information technology infrastructure, and taken over most distributors so that Borg manages its own sales territories. A push into the U.S. is in the works. It's all about staving off online competition. "I can't give away a geography when there are no geographies anymore," he says. "Amazon is all over the place. How can you give away exclusivity for certain regions?"

Bunge reports to the board, which answers to shareholders, but his goals are checked by Nordin and Borg's director of business development, Daniel Grohman. "They are my boss," he says. "In the past my managers have been really good at letting me do what I want. They've not been very good at doing as I would want them to do. You understand the difference, of course. They managed me the way they wanted to manage me. The way I want them to manage me is the same way I manage others." That process is objective. "If it says 2, and you've done 1.1, that's lower. Let's see how can we get to a 2."

All 208 employees at Bjorn Borg establish their own goals. People sometimes get frustrated that goals can't be changed midstream, but that's nonnegotiable. "You wait until the end of the year, and then you do new goals for next year," Bunge says. "If you picked the wrong one, don't focus on it, but don't take it out. It still should be there as a reminder that I picked wrong, and I'm not going to do that again."

Bunge recognizes the challenges of premium retail, but he sees no use in fretting over the struggles of his industry. "I made a call being here," he says. "If we talk about the industry, it's not doing well. It's OK. The weather is what the weather is."

When he looks around the Borg office, he isn't worrying about how to sell more $35 boxer briefs. He's worrying about how to make the people who design and market and sell $35 boxer briefs happier and more fulfilled so they'll accomplish their goals (which ideally would include selling those briefs). "It should all deliver results," he says.

"And then I think the side effect is that, when it comes to having stress and workload, we know that training, eating, sleeping, and being with people you love, that's one of the strongest ways to mitigate your stress. It's like a balanced scale. You have all these resources—training, eating, sleeping, and relationships. And then you have all these demands. That's life." B

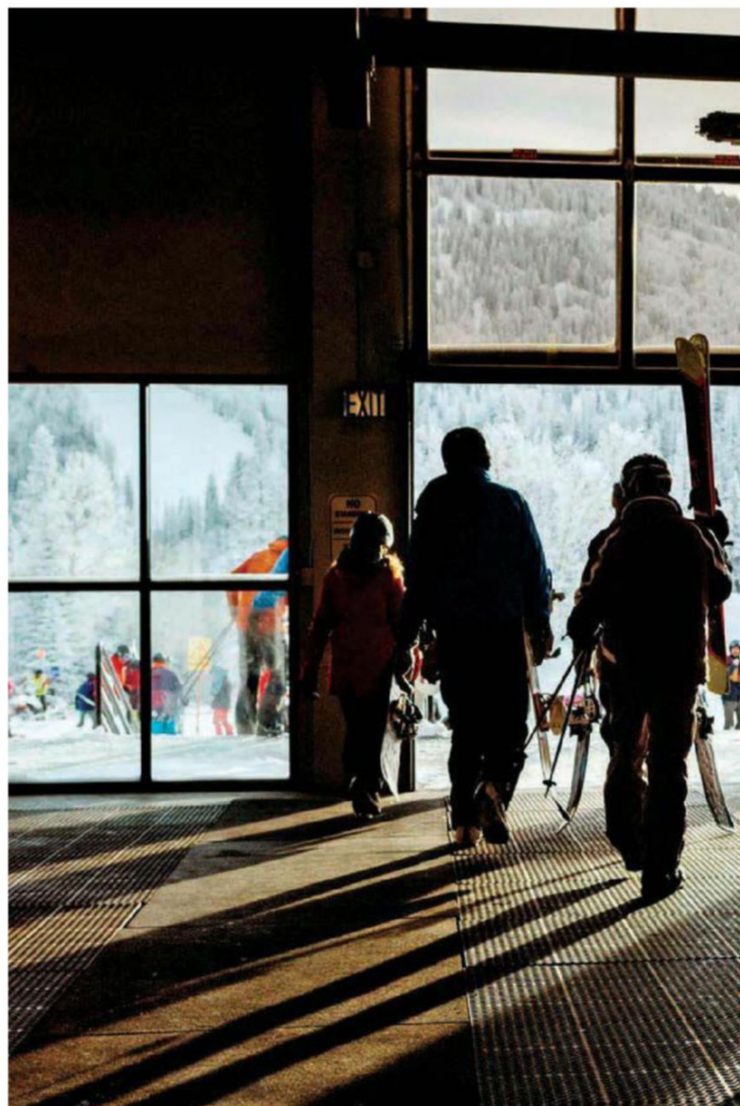
ONE PASS TO SKI TH

EM ALL

Alterra and Vail Resorts have bought up dozens of slopes to enhance their competing all-you-can-ski season tickets. How will the new business model weather the coming storm?

By Kyle Stock

Illustration by Yann Kebbi



Even among the world's most polished ski resorts, Deer Valley—with its vast carpets of flawlessly groomed snow spread across four Utah peaks—was always conspicuously clubby. Skiers can pick up a free copy of the *Wall Street Journal* on their way to the fire, while instructors eat lunch in separate employee cafeterias, lest they mingle with the guests. "The idea was to replicate the service and experience of a five-star hotel," says Bob Wheaton, who ran the resort for 22 years before stepping aside in January.

But when the lifts started cranking this season, things looked a little different. Among the affluent families were young couples and packs of Salt Lake City friends navigating the runs for the first time. The reason: Deer Valley had suddenly become a bulk-buy product. In 2017 a new conglomerate (later dubbed Alterra Mountain Co.) bought 11 of America's most popular ski resorts and teamed with dozens more mountain owners to honor a single-season lift ticket called the Ikon Pass. Compared with buying a string of daily lift tickets for as much as $200 a pop, the Ikon Pass (which ranges from $599 to $899) can pay for itself in as few as three days. Only one other product is in direct competition with Ikon: The Epic Pass from Vail Resorts Inc. admits skiers to its aggressively expanding chain of 20 destinations including the company's namesake ski area in Colorado's Rocky Mountains.

Together, Alterra's and Vail's passes can be swiped at 58 North American resorts, as well as a handful of resorts in Oceania and Europe. The two competing conglomerates are trying to turn occasional skiers into frequent skiers and frequent skiers into serial skiers who incidentally buy a lot of midmountain beers and slopeside hotel rooms. Deer Valley and resorts like it have become a sort of research and development lab forecasting possible futures for the long-struggling ski industry.

Skiing isn't necessarily a bad business—it's just lumpy and volatile, given natural cycles both economic and meteorological. (Industry lifers jokingly refer to it as "snow farming.") As a result, ski resorts have historically attracted two types of owners: affluent families willing to ride out some tough years and investors looking to leverage chairlifts to sell condos. But in 1997, a third approach emerged when Vail Resorts bought nearby Keystone and Breckenridge in Colorado for $310 million and prepared an initial public offering. The plan was to make skiing a viable business on its own rather than a convoluted real estate gambit. Vail would buy ski areas and improve them, attracting more (and more affluent) skiers.

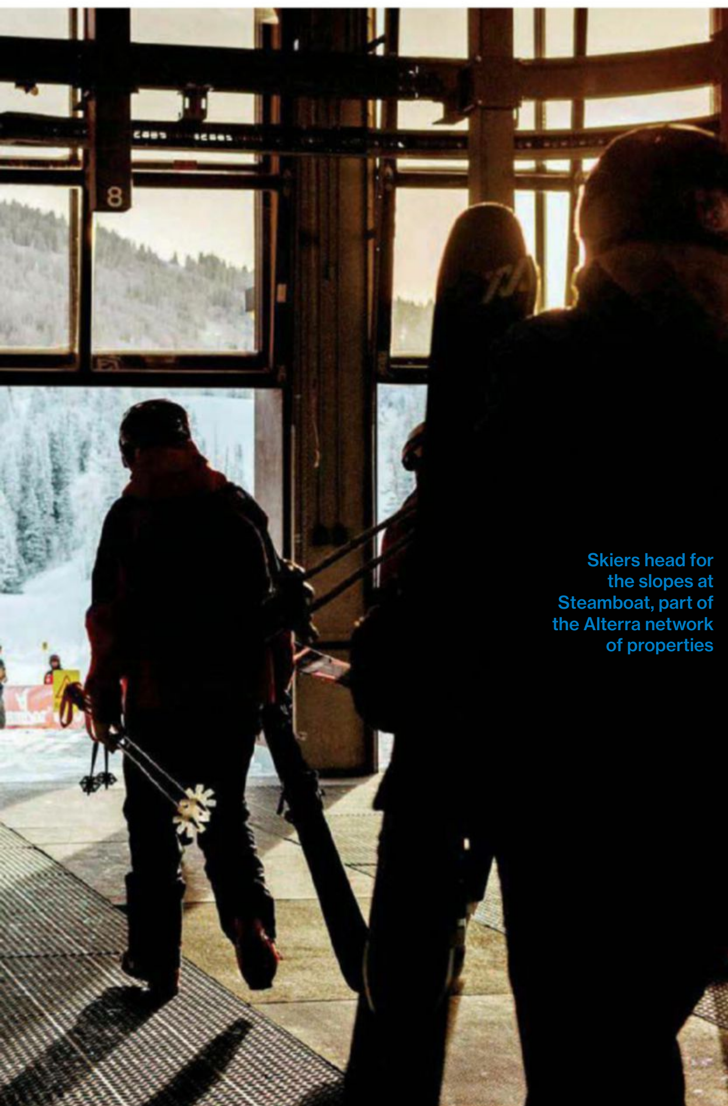
In 2008, Vail introduced the Epic Pass for unlimited lift rides at all of its (then five) resorts for $579, roughly one-third the cost of other existing passes. In providing such an inexpensive end run around daily lift tickets, Vail seemed to be leaving money on the table. But there was an important catch: Pass sales were offered only before the season hit its stride, closing right before Thanksgiving. By getting skiers to buy early, the company locked in a mass of customers and raked in a pile of revenue during its slowest months. Its season-pass revenue increased 22 percent in the first year, from roughly $78 million to about $94 million.

Much of the strategy came from Rob Katz, a square-jawed graduate of the Wharton School and a rising star at Apollo Management LLP, the private equity firm that bought Vail out of bankruptcy and steered it onto the stock market. As a New York native, Katz had learned to ski on Hunter Mountain, a few hours north of Manhattan, and as Apollo's winter sports enthusiast, he'd slid onto the Vail board in 1996, at age 29; 10 years later, he'd taken the chief executive officer job.

Gradually, Vail added resorts in different regions of the country as a hedge against weather. If Colorado's Rockies were snow-starved, the company could make up the difference in California's Lake Tahoe region or Utah's Wasatch Mountains. By 2017, Vail had 13 properties, including Whistler Blackcomb in British Columbia, one of the most trafficked resorts in North America. The cost savings weren't great;

PHOTOGRAPH BY JAKE STANGEL FOR BLOOMBERG BUSINESSWEEK

"THERE'S SOME GOING



Skiers head for the slopes at Steamboat, part of the Alterra network of properties

Vail couldn't share much equipment or staff between mountains. But there was a revenue upside—as the empire grew, it enjoyed a network effect. Epic Pass holders traveled across the country, from Afton Alps in Minnesota to Heavenly in California, while still staying at Vail properties. Independent resorts teamed up in various alliances to sell season-pass products, but these rickety coalitions changed from year to year and never kept pace with Vail.

In the 10 years since Vail began selling the Epic Pass, its shares have nearly quadrupled. Last year, despite anemic snowfall, the company still got almost half of its revenue from lift tickets. For every daily visit by a skier, it collected $168 and paid only $135 in expenses, a 20 percent profit margin. "It's been the ultimate Teflon stock," said Stifel Financial Corp. analyst Brad Boyer. In response, virtually every ski executive drew up a plan to either join up with or compete against Vail. Among them was Rusty Gregory, CEO of one of the country's busiest resorts, Mammoth Mountain.

Gregory first clicked into a pair of skis a couple of weeks after finishing a final season as a University of Washington linebacker. He put off graduate school to help skiers onto lifts at Mammoth. "I was probably the most gregarious liftie on the mountain," he says. Gregory befriended Mammoth owner Dave McCoy and was soon welding lift towers. Eventually he ran human resources and negotiated with investment bankers to sell the resort twice, most recently to Starwood Capital Group, a private equity firm. Now, with a 15 percent ownership stake, he lives at the Four Seasons Hotel Denver with his camper van parked out front. (It won't fit in the hotel's garage.)

Gregory squeaked through the Great Recession more bullish on skiing than ever. Even though people stopped buying slopeside condos, they kept coming to ski. In 2016, having weathered the worst of the storm, the industry's private equity owners wanted an exit. Starwood Capital was looking to sell Mammoth and its sister resorts, Big Bear and June, and Fortress Investment Group LLC was trying to offload its majority stake in Intrawest Resorts Holding Inc., a conglomerate of seven mountains that Vail had soundly whupped. It was a rare opportunity: 10 of North America's most popular winter playgrounds on the block at the same time.

Ever the gregarious liftie, Gregory suggested Starwood Capital join forces with the Chicago-based Crown family and KSL Capital Partners LLC, a private equity firm led by two former Vail executives. "It was the kind of thing that probably wouldn't have happened if we hadn't been casually drinking beer together for years," he says. The descendants of the industrialist Henry Crown owned a number of Colorado resorts known for fine dining and being favored by celebrities. KSL Capital, which owns California's Squaw Valley, had previously worked with the Crown family on developing Aspen Snowmass in Colorado. In April 2017, KSL and the Crowns bought Intrawest for $1.6 billion and folded in Mammoth, Big Bear, June, and Squaw Valley on undisclosed financial terms. David Perry, longtime chief operating officer of Aspen Skiing Co., took command of the deal, with Gregory as a close confidant. Both men knew size would equal safety, so they began calling their buddies, which eventually led to the formation of Alterra.

In October, Alterra invited leaders of the continent's largest non-Vail resorts to New York City's Gansevoort hotel. Their pitch was, "If you won't let us buy you, honor our season pass, and we'll split the revenue even-steven." Under the partnership agreements, a resort would be paid for each day a skier swiped her Ikon Pass—either a negotiated fee or a "blended rate" based on how many Ikon days were tallied over the ▶

AMOUNT OF THE MARKET THAT'S TO VAPORIZE OVERNIGHT"

course of a winter. Stephen Kircher, president of Boyne Resorts, which owns nine properties spread from Maine to Oregon, says the offer went over well, particularly among ski areas that had been fending off Vail for years. "I emailed them within about eight seconds," he says.

Soon after, Vail started making similar calls, offering to host partners on its Epic Pass. "We were all in play," says Jerry Blann, who was then the president of Jackson Hole Mountain Resort Corp. in Wyoming. Through the winter of 2017-18, America's biggest ski mountains were picking sides. Jackson Hole went with Alterra, as did Sugarbush in Vermont, plus Boyne Resorts and Powdr Corp.—two smaller conglomerates comprising 18 resorts, including Montana's Big Sky and Vermont's Killington. By the time flurries starting falling this past fall, an additional 11 resorts had signed on to the Ikon Pass, and Alterra had purchased two more resorts.

Vail's mergers-and-acquisitions squad was also working overtime. The company snapped up five resorts over the summer and fall of last year, including Stowe in Vermont and Colorado's Crested Butte. Telluride Ski & Golf Resort CEO Bill Jensen went with Vail largely because it had a long track record managing a number of resorts under one season pass. He figured his mountain would lose up to 15 percent of its out-of-town business if he didn't align with one pass product or the other. "We're a rural place," he says. "I have an entire community to think about, not just the ski resort."

Wheaton, the former Deer Valley president, estimates he'd been turning down acquisition offers for the resort every two weeks for almost a decade. Most of the time he wouldn't even bother to relay the bid to the families that owned the resort. But Alterra's offer, still undisclosed, was on a different scale. "I thought, 'Well, this is one I better call them about,'" he says. "It was like, holy s---."

On a crisp, sunny morning in late December, a massive snow-grooming machine trundled up one of the slopes at Steamboat, an Alterra resort northwest of Denver. The rig ground to a stop on a midmountain plateau, cranked out some reggae, and started slinging Mexican food. Taco Beast, as the machine is called, is a paragon of Alterra's approach to the ski business: a $300,000 experiment that resort managers didn't bother running by headquarters. By 2 p.m. the food truck had sold almost $2,000 in tacos before crawling off to restock.

"We're not selling widgets here—we're creating experiences," Gregory says. He claims this approach was critical in getting independent mountains to sign on to Alterra's season pass over Vail's. Erik Forsell, the marketing chief, says the best metaphor is the beer industry: If Vail is Budweiser, Alterra wants to be a six-pack of craft brews.

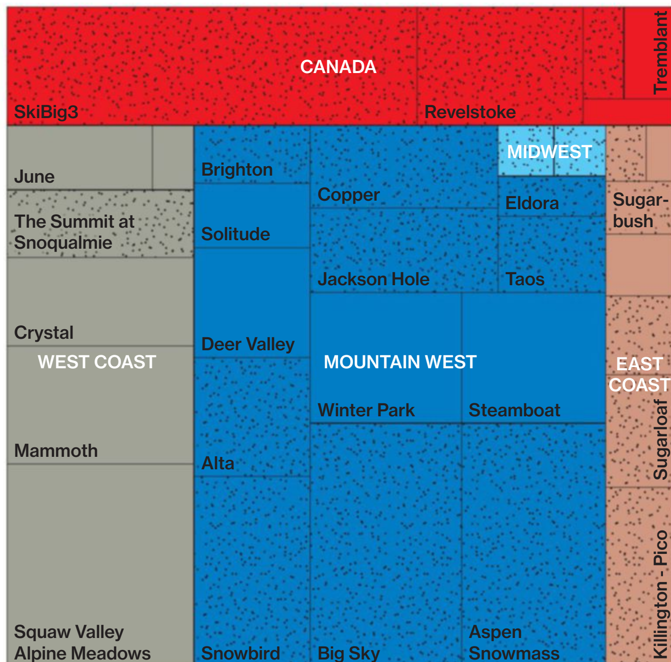
At Vail, Katz bristles at the implication that the company's resorts are homogeneous. Sure, there's still a small band of crusty ski-town lifers driving around with "F*ck Vail" bumper stickers, irate that their favorite lift was upgraded to a high-speed quad or some jobs were moved to Denver. But that's a

WHERE A SEASON PASS GETS YOU IN NORTH AMERICA

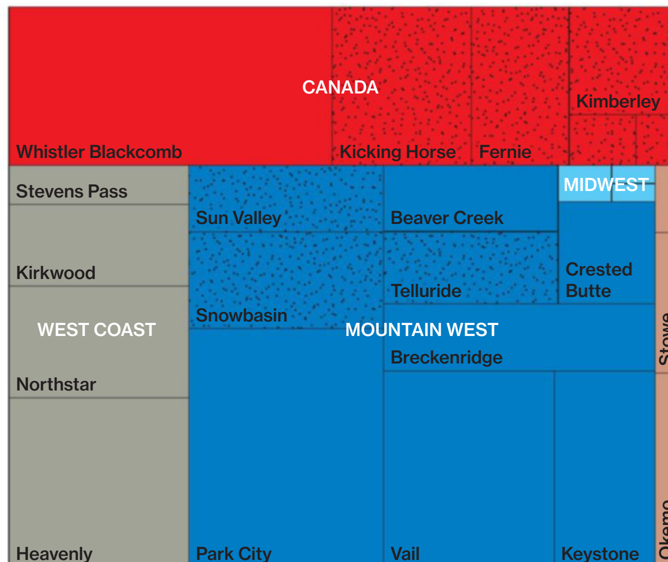
Skiable acreage of North American resorts owned by or partnering with the two largest ski resort companies

Resort owned by the company
Resort partnering with the company

Alterra



Vail Resorts



DATA: ALTERRA, VAIL RESORTS

small demographic, and savings aren't easy to come by in the ski business, Katz notes. "There are plenty of things I hear from guests that they think we should do better," he says. "I never hear that Breckenridge looks like or feels like or gets confused with Vail or Park City or Whistler or Kirkwood or Stowe."

One thing Vail resorts have in common, besides matching employee parkas, is technology. Every Vail pass or ticket is embedded with a radio frequency identification chip, which is automatically scanned like an E-ZPass at every one of the company's 430 lifts. Vail knows how much, where, and with whom each guest skis. The data are used to predict how likely the person is to return to a Vail resort. It's a Big Data play in an historically analog industry, and the machinery will only get smarter every time Vail swallows another resort.

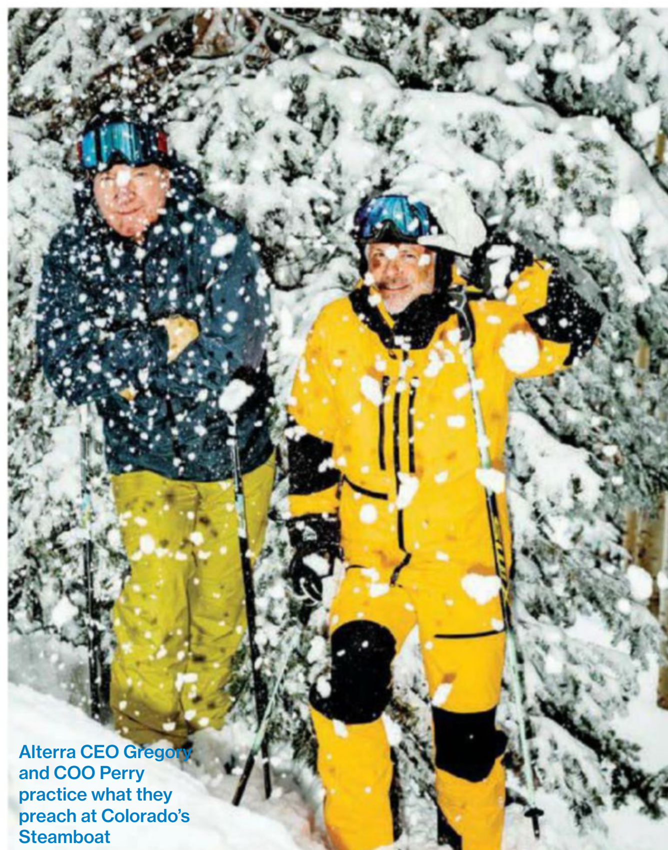
Right before Christmas, Alterra was still moving into its new headquarters just east of downtown Denver. Cardboard boxes and computer screens were stacked against panoramic windows framing the Front Range and a handful of breweries and weed stores. "You'll have to excuse us," Gregory said. "We're kind of building the airplane as we're flying it." Alterra won't say how many Ikon Passes it sold, but orders were ahead of expectations by 30 percent, and the company was on track to book $1.5 billion in annual revenue.

In a suburb 18 miles north, Vail headquarters was more organized but arguably less chipper. On Dec. 6 shares of the company had plummeted by almost 18 percent when it reported season pass sales slightly lower than expectations. A few weeks later, shares fell an additional 13 percent when Vail said it welcomed smaller-than-expected crowds leading up to the December holidays. Boyer, the analyst at Stifel, lowered his target price on Vail. "There is that 'Eff Vail' crowd out there, and those folks embraced Ikon from the start," he says. "It's definitely a competitive threat." Even so, Vail pass sales have increased by an average of 13 percent a year for the past six years, and the company is on the cusp of selling 1 million season passes for the first time, thanks in part to a new sales program aimed at service members and military veterans.

Vail's growth is impressive relative to the industry at large. The number of U.S. skiers (about 9 million last year) and how many days they log on a mountain (53 million) have changed very little in the past two decades, according to the National Ski Areas Association. Meanwhile, the $8.4 billion industry faces an existential crisis on two fronts: climate change's feast-or-famine cycles of snowfall and a tide of baby boomers heading for the permanently aprés-ski scene of hip replacements and retirement homes.

Nor has skiing shed its stigma as an expensive pastime. Alterra and Vail may be exacerbating the problem as they increase daily rates to nudge people into buying a season-long lift ride. "In the eyes of a potential new skier, that's what skiing costs," says Evan Reece, CEO of online lift-ticket marketplace Liftopia Inc.

Reece spends his days trying to persuade resorts to price daily tickets the way airlines price seats, fluctuating constantly based on a range of factors including weather and how far in advance someone is purchasing. It's an economically proven way to maximize value and get novices on the hill at a discount; it's also a tough sell. Reece worries that as the industry rewards the loyalty of its core customers, fewer people will give skiing a try. "There's some amount of the market that's going to vaporize overnight if the industry keeps doubling down on season passes," he says.



Alterra CEO Gregory and COO Perry practice what they preach at Colorado's Steamboat

PHOTOGRAPH BY JAKE STANGEL FOR BLOOMBERG BUSINESSWEEK

Katz says the focus on regulars helps the industry: "The more days we can get out of somebody, the more likely it is that they'll continue skiing." He says he's heartened that participation has held stable, a contrast to the hordes of weekend warriors giving up on golf.

In mid-December, Gregory flew into Deer Valley to see how things were going. After a conference call, he loped up to the lift to meet Wheaton, who'd delayed his retirement and signed on as a sort of roaming consultant for Alterra. They're two unlikely ski bums turned even less likely ski executives. Wheaton, a native of Detroit, is short with a rancher's belly. Gregory, who paid for his few finance courses by welding bridges, hulks with a linebacker's head. On the lift ride up, they were sanguine about the future of their industry. Who wouldn't love this? they wondered, as the sun saturated the Wasatch Range. "I can tell you one thing," Wheaton said, "we're not done shopping, and Vail's not either."

Disembarking, the men tucked their chins to the wind, leaned into the descent, and carved sinuous turns with near-perfect form. In the parlance of the sport they love, they ripped, zipping past crowds of new guests at speeds that seemed almost reckless. Ⓑ

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Looking west from Goldbug Hot Springs

Endless Simmer

The oohs and many aahs that come with a hot-spring-hopping road trip through the Idaho wilderness

By Matt Gross
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March 4, 2019

Edited by Chris Rovzar

Businessweek.com

We'd driven three hours already, down icy, foggy roads that snaked along frothing rivers and through mountains covered in snowy conifers. And now, as we finally emerged into a high desert of sandstone bluffs and wide-open skies in Elk Bend, Idaho, it seemed we might go no farther.

Before us, a narrow trail that switchbacked up the north-facing hill was covered in 3 inches of snow concealing a layer of thick, slick ice. Three companions had joined me: Joyce Lee, a heavily laden photographer; Tristan Pettigrew, her less-burdened assistant; and Erin Gray, an old Idaho friend I hadn't seen in years. We came armed with headlamps and hiking boots, poles and fleece, supermarket sandwiches and a thermos of hot coffee. But what we needed were crampons, something, anything, to help our feet dig in. Because who knew how long it would go on? We had at least 2 miles of trail to hike and 1,400 feet to climb; slipping and sliding the whole way didn't seem smart.

Smart or not, we'd do it anyway, because in them thar hills, we knew, lay gold—Goldbug Hot Springs, that is. "One of those too good to be true occurrences in nature," according to the *Complete Guide to Idaho Hot Springs*. Idaho? Hot springs? Yes! Idaho has 130 soakable hot springs, more than any other state, thanks in large part to the Idaho Batholith, 15,400 square miles of mountains created over millions of years by colliding tectonic plates.

Rather than being heated directly by active magma, as in Yellowstone National Park, the hot water here results from plate friction. Dozens and dozens of springs lie just off highways, down trails short or long, nestled in canyons, or built into hotel features.

Over the last few years, these kinds of hot springs have become my ideal form of relaxation. Whether it's a Japanese *onsen* or an improvised backwoods pool, a hot spring requires a soaker to do nothing but soak. You take off (almost) all of your clothes. You stash away your phone. You sit and breathe and stare at whatever vista lies before you. Maybe you even sweat a little. It's yoga without the stretching, meditation without the meditating. It's all I crave these days.

My goal was to visit as many of these miniature natural wonders as possible over a four-day, three-night sprint in the middle of winter, when air temperatures in the teens would contrast invigoratingly with water that was halfway to boiling. The brevity of the trip only compounded a looming sense of urgency: Although Idaho's natural beauty is its chief attraction, the environment is under threat. Mining projects such as CuMo at the Boise River headwaters, Bunker Hill up north, and Triumph just downriver from Sun Valley are flashpoints for conservationists across the state, and the public lands on which so many hot springs sit no longer feel eternally protected. Who knows how much longer intrepid hydrophiles can expect to find a free, safe soak?

A bald eagle hunts for fish over the hot spring at Boat Box. The pipe at left feeds the tub

I was hoping our expedition would culminate at Goldbug, generally regarded as the crown jewel of Idaho's hot-water treasures. We began in Ketchum, a former mining town that's

the nexus of old-meets-new Idaho. Its downtown contains crusty classics such as the Pioneer Saloon—"the Pio," as everyone calls it, where there's almost as many animals on the walls as on the menu. It's been joined lately by arrivals such as the Argyros arts center, the contemporary Limelight Hotel, and Cookbook, a new restaurant where the walls are decorated not with trophies but with colorful tomes that inspire its Mediterranean-ish cuisine. Summertime is high season, but even in winter Ketchum and nearby Sun Valley are busy, mostly as a haven for downhill and cross-country skiers.

Ten miles west, on the other side of Bald Mountain, lies Frenchman's Bend, my immediate post-airport stop. Just driving to a hot spring in Idaho, I quickly realized, was part of the thrill: As my rented Chevrolet Suburban Z71—a 4x4 with off-road suspension—coasted down Warm Springs Road, I gawked at the hills upon hills, sparkling sunlight limning the fractal edges of the evergreens, bright cabins crouching in the snow. By the time we reached Frenchman's, I was as excited as I was nervous. Was this the best of the best already or a hint of what was to come?

The spring flowed into the far side of a 15-foot-wide creek, smelling of sulfur and demarcated by rocks dragged into rough pools shaped by soakers past. "No Nudity," read a sign, though "No" was partly scratched out. I stripped to my swimsuit, then half-climbed, half-slid down a snowy embankment, wading through shin-deep rushing water.

I wasn't alone. A trio of soakers occupied various parts of the steaming, 2-foot-deep spring, each trying to find just the right level of temperature and comfort. This was an oddity I had to get used to when all I wanted was to hurry up and relax: Too-hot currents ran right next to too-cold ones, some over and some under them. When my torso was warm, my feet froze. When my left hand was tepid, my right hand was scalded. Eventually, though, I found a pool that was in the Goldilocks zone and watched fat snowflakes drift off the trees above us and melt into the spring. *Aahhhhhh.*

The trio knew this spot well. Jody Stanislaw, a diabetes educator, and Eric Alberdi, who owned commercial real estate, both lived locally, though Eric split time between Ketchum and Maui. Their friend Trevor Bain, who preferred unbearably hot water, was over on business from Jackson Hole, Wyo. For them, soaking on a Tuesday afternoon was normal, what you did with free time. Indeed, we were soon joined by a quartet of furloughed government workers, who settled in upstream with tallboys from Rogue Ales.

Frenchman's was as perfect as I could imagine—comfortable and convivial. But then, after an hour or so, I had to get out, which meant refording the cold creek, climbing the steep, snowy embankment, and trying to change into warm, dry clothes before my feet froze solid.

This was a dance I would become intimate with over the next few days, and while I was prepared—I'd brought an inflatable pad to stand on and a huge, hooded towel—it was never less than awkward. The discomfort was also invigorating; the chill on my skin only heightened the glow from within. I was cold, I was hot, I was energized, I was relaxed. And I was ready to hurry up and do it all over again.

That would have to wait for the next day. In the meantime, we checked into the Sun Valley Lodge, a gloriously ▶

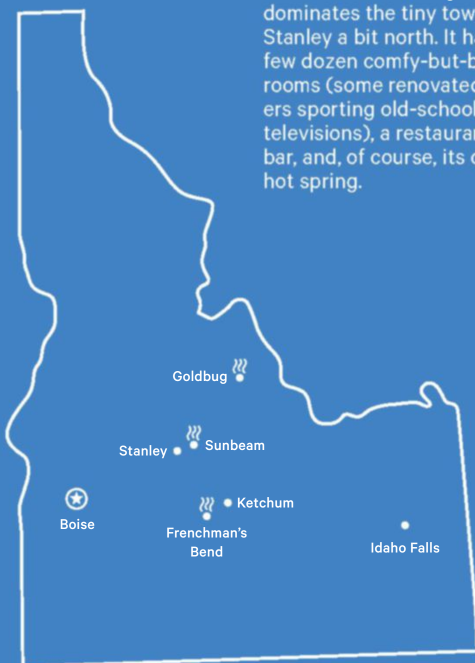
WHEN TO GO
Some hot springs can be visited year-round, but most are best in summer, fall, and winter. During spring—which really starts in late April—melting snow swells rivers and renders many of them impossible to visit. Winter is fantastic, but some springs may be too tepid to be worthy of a soak.

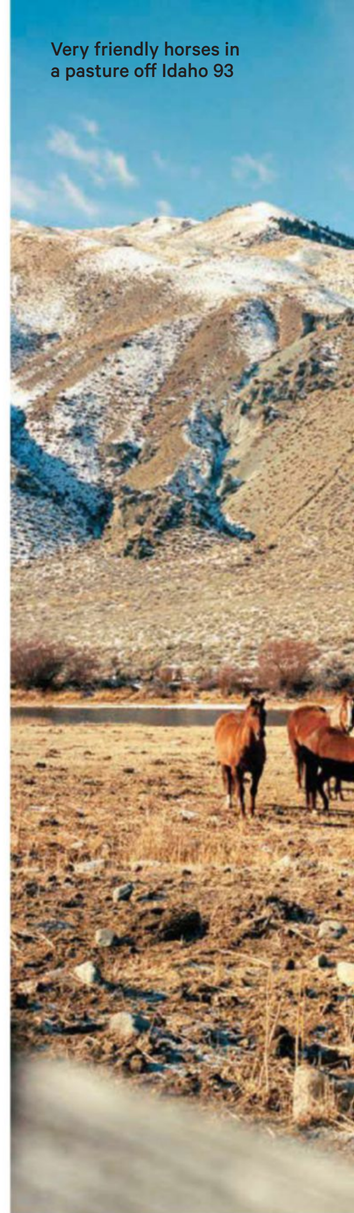
WHAT TO BRING
For $20, the ***Complete Guide to Idaho Hot Springs (Second Edition)*** contains 312 pages of detailed listings, including latitude and longitude, seasonality, historical information, likeliness of nudity, and more. Your wintertime hot-springs gear should include: thick towels, flip-flops or an inflatable sitting or standing pad, crampons or Yaktrax, poles, drinking water, a headlamp, and an extra pair of socks. A digital thermometer is nice for testing water temperatures, and a bucket will let you mix cold water into overheated springs. Depending on conditions, you might also need snowshoes, topographical maps, and more serious backcountry equipment, such as an avalanche beacon and emergency bivouac.

WHAT TO DRIVE
A vehicle with four-wheel drive is good for such adventures—and pretty much essential in the winter. My Chevy Suburban did just fine. The Idaho Transportation Department offers up-to-date information on driving conditions via an iOS/Android app called **Idaho 511**. It's always worth checking before a day's expedition.

WHERE TO EAT
For carnivores, Ketchum's **Pioneer Saloon** is all about the meat, whether prime rib, barbecue pork, fresh Idaho trout, or buffalo burgers. It also specializes in that classic Idaho side: a big baked potato. Its polar opposite a few blocks away is **Cookbook**, a colorful, modern restaurant with a menu of crispy pizzas and a delicious beet caprese salad. The wine list fits on a single page and includes nice surprises from Corsica and Greece. Linger over breakfast or lunch at nearby **Kneadery** and discuss the latest avalanche or up-and-coming skier with weathered locals. Try the Eggs Blackstone, a fine Benedict riff with grilled tomato and chopped bacon.

WHERE TO STAY
The cushy, historic, all-in-one resort to know is **Sun Valley Lodge**, which lovingly ensnares you with its majestic Sun Room, a 98F pool, and sprawling lounge that feels so big, you can wander and gawk and read and drink for hours before remembering you wanted to go skiing or hot-springing in the first place. If the lodge's Old West rusticity is a bit much, there's the **Limelight**, which appeals to younger travelers and those here on business. The **Mountain Village Resort** dominates the tiny town of Stanley a bit north. It has a few dozen comfy-but-basic rooms (some renovated, others sporting old-school CRT televisions), a restaurant and bar, and, of course, its own hot spring.




Very friendly horses in a pasture off Idaho 93

renovated 1936 gem with a wood and stone interior that signified comfort, solidity, and protection from the elements. Ernest Hemingway once stayed in Suite 206. I got Suite 200, with a fireplace, a cushy armchair with a cowskin throw pillow, and a bathroom the size of my first Manhattan studio apartment. After a beer in the lounge, I hiked to the 20,000-square-foot spa for a test: How would a man-made version of a hot spring–a Himalayan Salt Soak–compare to Mother Nature's?

For 30 minutes, I lay in a tub of hot water in which 2 pounds of salt had been dissolved and listened to twittery New Age music. Had I just returned from a day of snowboarding or fly-fishing, it would've been amazing. But it was too late for me–I'd been spoiled by Frenchman's.

Our hot-spring hopping resumed in earnest the next morning. Using the *Complete Guide* and an online map from the National Oceanic and Atmospheric Administration, I'd plotted a dozen springs along the roads leading north from Ketchum into the Salmon-Challis National Forest. All we'd have to do, I figured, was drive up, march through snow, jump in, and move along.

What I hadn't counted on was the weather. Snow was falling along Idaho 75, the only highway north, slowing our progress over Galena Summit, where we spotted a Jeep Cherokee flipped on its side. (No one seemed hurt, and an emergency vehicle was already on the scene.) The wintry weather had cooled one spring, Russian John, and entirely blocked access to two that lie on private property. Again, with the jagged Sawtooth Range to our left, the scenery was impressive, but I was in a rush to relax.

We were well over an hour from Ketchum before we reached an accessible hot spring. Or perhaps "accessible" doesn't do justice to Boat Box, which lies off the side of the highway, unmarked and nestled among boulders next to the Salmon River. The "box" was a witches' cauldron, fed by a pipe connected to the spring and big enough to poach three or four humans in 110.4F water. (I measured with a digital meat thermometer.) Standing on rocks and pebbles–not snow, thank goodness!–I stripped down and climbed in. For a few minutes, we were in solo heaven, listening to the rush

Smiley Creek Lodge, home to all the essentials: food, coffee, and gas

of the river, and I felt the intense heat quicken my heartbeat.

Soon, we were joined by Whitney Mercer and David Selassie, a funky young couple from Portland, Ore., who were on a weeklong road trip to Missoula, Mont., hitting two or three hot springs a day. So, I wasn't alone in my obsession! As we traded stories and expectations, a bald eagle swooped into view, then plummeted to the river, snagged a fish, and hobbled to shore for a feast.

A few miles farther up the highway was Sunbeam, a popular soaking spot since the 1930s. Alas, its natural pools were too cold, and while some kind soul had installed a soaking tub, its pipe-fed water was 125F, and we had neither a bucket to chill it with river water nor the time to let it cool down naturally. The sun was setting—I hurried back to Ketchum and salved my failure with bourbon under the low ceilings of the Casino, a legendary dive bar downtown.

If any sense of disappointment still lingered, the trip to Goldbug the next day erased it entirely. After our initial frustration—we wound up taking a steep shortcut over a snow-covered scree field—we found the trail not only safe but gorgeous, a gentle 90-minute climb past sagebrush and juniper trees into a warm, bright canyon. Precisely where the GPS coordinates suggested we'd find it, there it was: a steaming hot, sulfur-free stream that cascaded down the hill, filling a half-dozen pools that glimmered in direct sun.

Some were occupied. One held a snowmobile racer proposing to his bikini'd girlfriend; another had two guys dressed only in beards and tattoos. Our by-now-dear friends from Boat Box, pink-ponytailed Whitney and frizzy-haired David, were also there. But Goldbug hardly felt crowded. And as I settled into a broad, 99.5F pool at the edge of a waterfall, the view west gave me the sense of infinite space. South slopes glowed russet in the sun, north slopes wore thin caps of snow, and on and on the mountains stretched. I ate my ham and cheese, and it was the best thing I'd ever tasted.

That night, we would sleep in the town of Stanley (population 63) and feast on chili and beer. At sunrise we'd soak in the Mountain Village Resort's private hot spring (106F), gaping at yet more mountains and planning to visit the secret spots lying among them sometime in the future. Because sitting at Goldbug, I knew: Out there were scores more springs just like this one, bubbling and steaming as they had for tens of thousands of years and, one hopes, for millennia to come. And for once, I was in no hurry. B

Top Down, Track-Ready

The McLaren 720S Spider is a stealthy supercar that's ready for the sun

By Hannah Elliott

An electrochromic glass roof tucks away silently and smoothly in only 11 seconds, far faster than the standard 14- to 20-second range on most sports cars. You can even drop the top while driving at up to 31 mph

The 720S Spider comes with a 710-horsepower twin-turbocharged V-8 engine with 568 pound-feet of torque. Top speed is 212 mph. Fuel efficiency reaches 22 mpg on the highway

LED headlights include a timed follow-me-home function that keeps them on low as you go from parking to your front door

Want to make a $300,000 convertible supercar feel unsexy?

Try retracting the roof while sitting in traffic. More often than not, it will clunkily fold in on itself over the course of 20 yawning seconds, a lethargic praying mantis settling awkwardly onto a branch. The lines of the car become an interrupted conversation. As your head is finally exposed to the elements, suddenly you don't know what to do with it.

Yet in February, on a desolate stretch of highway in Arizona's Sonoran Desert, I found myself charmed by the retractable roof of the 2020 McLaren 720S Spider.

I'd been cruising through forests of towering saguaro cacti (did you know it takes 100 years just to grow the main trunk, plus an extra 75 years per arm?) with the top of this supercar firmly in place. I wanted to protect my skin from the sun and wind, especially during some triple-digit speeds. Only a pale wash of brumal light was allowed through the electrochromic glass roof. But then I came across a roadside junkyard that offered an excellent photo op, and I decided I needed some air.

I reached to push a little black button embedded in the center console. Without a sound, the roof tucked itself away in exactly 11 elegant seconds. Yellow sun and crystalline air drenched my skin. The entire structure is a single pane of high-tech glass that can also be darkened or switched clear again in a flash—a "wow" moment that goes beyond the brand's former emphasis on speed and speed alone.

McLaren's deployment of generous innovations like this should rattle rivals five times its age, such as Ferrari, Porsche, and Lamborghini, and move the nine-year-old company in Woking, England, beyond its track-car roots. Although the 720S Spider retains the narrow footwells and quirky cabin technologies of its coupe counterpart, significant improvements in this topless supercar have nudged it past the original, which I drove last year. These include frameless, wider-opening dihedral doors that are easier to get in and out of, and front and rear fenders that improve aerodynamic potency and visual allure.

More important, glazed Plexiglas reinforcements that act like flying buttresses (picture Notre Dame, in car form) are set behind the headrests and elevate the car to architectural status. Because they are separate buttress arms, rather than solid pillars, they also increase over-the-shoulder visibility (by 12 percent, McLaren says). Usually, changing lanes in a supercar requires a significant amount of neck craning; swerving the

720S Spider through the twilight traffic of Old Town Scottsdale as I returned to my hotel required not a single crank.

What it did require was plenty of focused attention. The 720S Spider may be designed for wider use than predecessors such as the MP4-12C and the P1, and it feels much more at home on sweeping desert roads than cooped up on a track. But it still has explosive acceleration through its gears, posting identical times to its coupe sibling: 2.8 seconds from zero to 62 mph and 212 mph at top speed.

That it accomplishes this with an additional 108 pounds, an increase that comes mostly from the bulk of that glass, is no small feat. Cars with their tops lopped off typically require additional structural reinforcement to compensate for the missing roof. That tends to make them noticeably heavier and less aerodynamic (hence, slower) than their coupe counterparts. Credit for this achievement goes to a Formula One-developed carbon fiber monocoque tub.

The 720S Spider and the coupe share the same twin-turbocharged 710-horsepower V-8 engine. They also share the same seven-speed dual-clutch transmission that flows through gears like quicksilver. The connection I felt with the 720S Spider to the road was so complete that at every touch point—feet, hips, shoulders, hands—the car might as well have been an extension of my body in machine form. (A word to the wise: Arizona 5-0 swarmed to it like bees to honey. If I bought one, I'd make fast friends with my local law enforcement officers.)

Nonessentials—360-degree parking cameras ($3,100), Bowers & Wilkins surround sound ($4,420), carbon fiber racing seats ($6,390), and the no-cost option of a lift kit that raises the front of the car a few centimeters to better navigate inclines—make the 720S Spider occupiable for extended periods. With 5.3 cubic feet of storage space under the front hood, plus 2 cubic feet behind the seats when the top is up, it's conceivable that you could drive the 720S Spider on a regular, even daily, basis. That notion was heretofore ridiculous for McLarens of this caliber, with their bone-rattling rides, spartan interiors, and chin-splitting proximity to the road.

That it costs $315,000, $22,000 more than the coupe—plus $9,100 more for that magical roof instead of the standard carbon fiber top—is more or less moot considering the hefty price of the car itself. McLaren engineers have conjured something special: sensual freedom worth more than just the sum of its parts. Ⓑ

PHOTO COURTESY MCLAREN

WE TESTED IT

Your Lyin' Eyes

Exhausted? Panicked by current events? Just getting old? With these seven multitasking eye creams, you don't have to show it. *By Aja Mangum*

If the daily stresses of work and family aren't enough, a hostile political climate and 24-hour news cycle can produce enough anxiety and weariness to take a visible toll on your skin. This is doubly true for the eyes. "The eye area is much thinner and sensitive, so it's going to show fine lines and wrinkles more than the rest of your face," says Cindy Kim, co-founder and chief executive officer of Silver Mirror Facial Bar in New York.

New eye creams claim to reduce wrinkles, dark circles, and puffiness with the dab of a finger–part of a move toward multipurpose skin-care products. The trend can be friendly on the wallet, but depending on the expert you talk to, not realistic. "There isn't magic in a bottle," says Amy Wechsler, a board-certified dermatologist and psychiatrist. "There are things that go on with people's lids that can only be fixed with a small operation. Eye creams help with the appearance of wrinkles more than anything else."

Brands such as Argentum Apothecary and MMXV Infinitude have created face creams that serve double duty, arguing that eye creams are unnecessary. But dermatologist and cosmetic surgeon Dendy Engelman says eye creams are typically thicker and more emollient. "And retinol eye creams combat wrinkling in a different way by building collagen and elastin. If you thicken the skin, the underlying vessels are less noticeable." She recommends caution: "If it's formulated for the face, it could be too strong [for the eye] and cause peeling."

To separate fact from fiction, we assembled a wrinkly, puffy, dark-eyed team of journalists to test 24 multiaction eye creams and see which battled fatigue the best.

PERRICONE MD ESSENTIAL FX SMOOTHING AND BRIGHTENING UNDER-EYE CREAM
This lightweight formula detoxifies, protects, and repairs using antioxidants and a vitamin F blend of flaxseed, chia seed, and macadamia seed oils. *$122 for 15ml; perriconemd.com*

FRESH BLACK TEA FIRMING EYE SERUM
Nothing can replace eight hours of sleep, but a jolt of kombucha, black tea extract, and peptides is a solid alternative. *$72 for 15ml; fresh.com*

VALMONT V-LINE LIFTING EYE CREAM
The steep price tag is justified—this peptide-packed cream is blepharoplasty in a jar. *$230 for 15ml; valmontcosmetics.com*

JURLIQUE HERBAL RECOVERY SIGNATURE EYE CREAM
Its citrus and herbal notes provide a whiff of the spa, while silk tree extract and antioxidants do the heavy lifting, diminishing puffiness, wrinkles, and discoloration. *$50 for 15ml; jurlique.com*

DIOR CAPTURE YOUTH AGE-DELAY ADVANCED EYE TREATMENT
Crithmum, a natural alternative to retinol found on sea rocks, plumps and smooths skin, while botanicals and antioxidants reduce visible signs of aging. *$75 for 15ml; dior.com*

EMMA HARDIE MIDAS TOUCH REVITALISING EYE SERUM
Using a patented ingredient found in the bark of the Persian silk tree, this serum lightens dark circles, reduces puffiness, and lifts with daily use. *$66 for 15ml; shop.emmahardie.com*

PHYTOQUANT SOLAVIE DE-STRESS EYE CONTOUR CREAM
Bovine colostrum—the first milk a cow produces after giving birth—is the hero ingredient, with its nourishing and healing properties, but the addition of aloe vera, argan oil, lavender, ginger, and cucumber extracts gives it multiaction heft. *$45 for 15ml; takamichibeautyroom.com*

ILLUSTRATIONS BY JACI KESSLER LUBLINER

Not so long ago, Balenciaga creative director Demna Gvasalia sent supersize, almost comically large handbags down the runway when the microbag still reigned supreme. Fast-forward to this season, and every big name is creating its own gargantuan carryall—emphasis on carrying it *all*. Designed for the modern-day Mary Poppins who wants to pack gym clothes, day-care supplies, and her notes for a portfolio review in one place, this 19-inch-long Marni handbag ($3,190) is a counterpoint to all those itsy-bitsy clutches.

THE COMPETITION

• Almost 26 inches tall and more than 16 inches wide, the Bottega Veneta Maxi Cabat bag ($9,500) is the largest in the brand's collection that's not luggage. Made of nappa leather, it's one of the first pieces from its new designer Daniel Lee.

• Yves Saint Laurent's Manhattan large canvas tote bag ($2,205) is more than 19 inches long and 14.5 inches tall. Trimmed with black leather, the bag bears a small gold-tone metal logo between the push-lock fasteners.

• The 22-inch-long Rajah maxi tote from Gucci ($3,200), lined with a suedelike microfiber, can be carried or worn over the shoulder.

THE CASE

Most purses hover at about 9 inches long and stand 6 or 7 inches high. Marni's turquoise leather handbag is more than twice that length and, at 10 inches tall, deeper as well. Inside, a suede interior features a separate leather pocket with a zippered closure so you can find smaller items easily. A minimalist magnet clasp keeps the whole thing closed, but you'll probably want it to stay open—there's always room for more stuff inside. *$3,190; 212 257-6907*

Deep Space

The gigantic Marni handbag opens up a galaxy of possibilities
Photograph by Hannah Whitaker

Tech Finds No Home Away From Home

By Shira Ovide

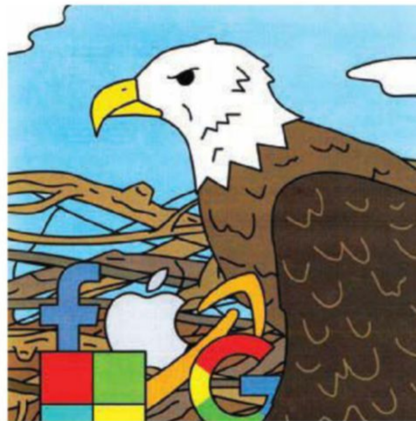
America's technology superpowers are worldly, in a way. Google's YouTube is used more in India than anywhere else. Nine out of every 10 people logging in to Facebook are outside the U.S. and Canada. Microsoft Corp. sells software in more than 190 countries. But U.S. technology giants are provincial when it comes to their finances. Apple Inc. is the only one of the five American tech giants that generates significantly more money overseas than in the U.S.

It may not be surprising that U.S. companies rely on their home country. Then again, software and the internet can be exported worldwide instantly with just the push of a button–at least in theory.

The tech stars face two main barriers to international growth: One, U.S. industry spends the most on advertising and business technology–the principal source of revenue for many of these companies–and U.S. consumers spend the second-most on internet retail. China has the largest online shopping market, which brings us to barrier No. 2: U.S. technology companies have a hard time there because of government restrictions and local competition.

Amazon.com Inc. provides a snapshot of how tricky international diversification can be. The company has invested heavily in India and other parts of the world, but it's grown more reliant on the U.S. rather than less. Meanwhile, it's flopped in China, where online shoppers spend three times more than their U.S. counterparts.

That said, the giants' domestic dependence could be a good thing. The U.S. economy and consumer spending are humming along, while China and some other parts of the world have growth hiccups. Parochialism has never looked so good. *—Ovide is a tech columnist for Bloomberg Opinion*



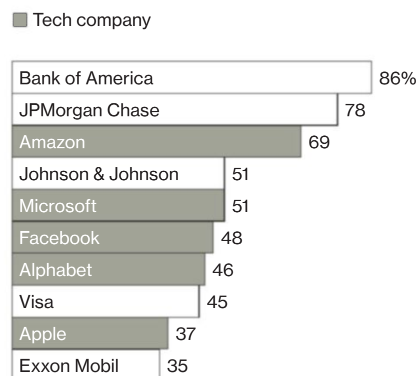
● FALLING FAR FROM THE TREE
Apple is one of Silicon Valley's biggest global successes, particularly in China. Future international growth will be tricky, however. Relatively high iPhone prices and a disinclination to tailor products to regions puts Apple at a disadvantage in fast-growing smartphone markets such as India and Vietnam.

● HOME-FIELD ADVANTAGE
Amazon generated

69%

of its sales last year in the U.S., with revenue growth there increasing faster than in the rest of the world.

● WHERE THE MONEY IS MADE
Large U.S. companies tend to generate a large share of revenue at home. Most of America's tech superstars are no exception, despite the global popularity of their products.



● TWO COUNTRIES, TWO MARKETS
The U.S. and China are the biggest markets for digital ads, e-commerce, and information technology, but many U.S. tech companies are barred or irrelevant in China.

*LATEST FISCAL YEAR AVAILABLE; FACEBOOK FIGURE ALSO INCLUDES CANADA. DATA: COMPANY REPORTS.
ILLUSTRATION BY GEORGE WYLESOL

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