

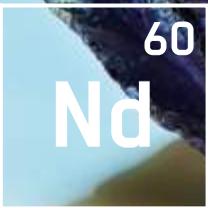
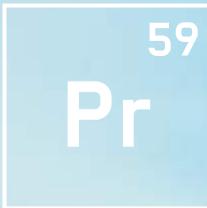
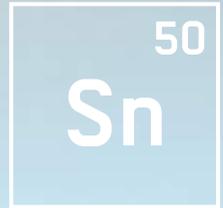
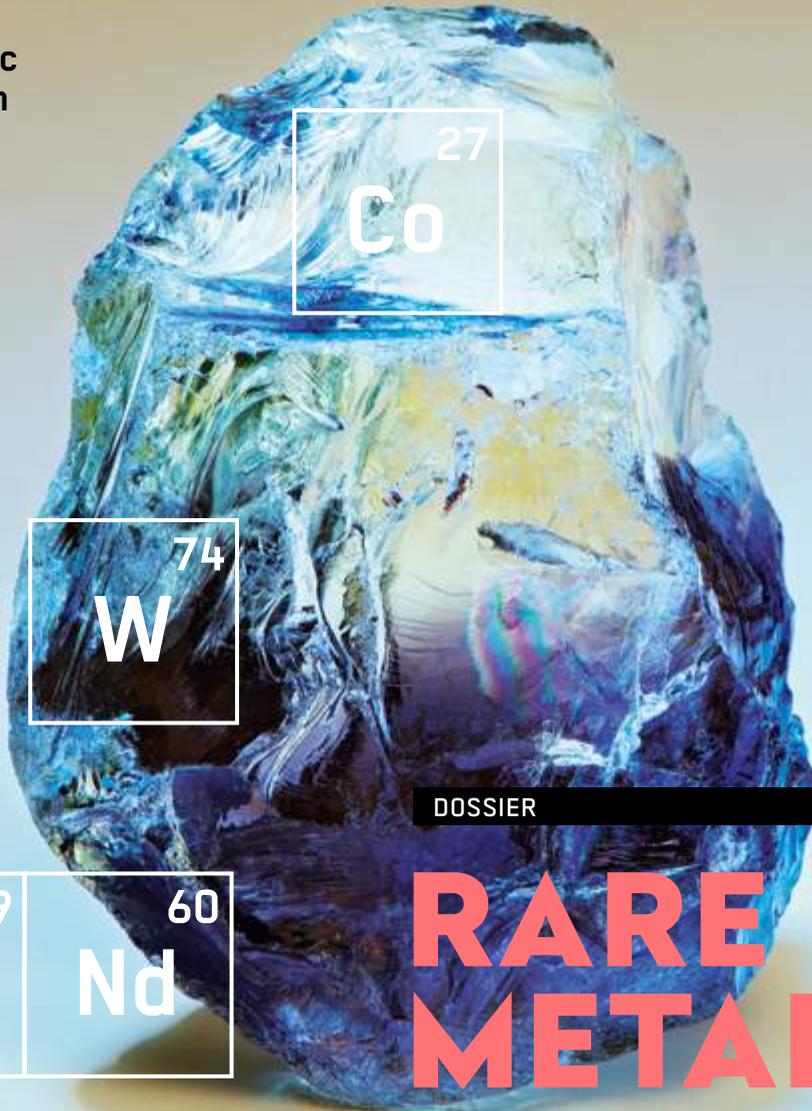
SWISSQUOTE

FINANCE AND TECHNOLOGY UNPACKED

HYPERLOOP
Is this futuristic transport worth the hype?

AUTOMOBILE
German cars go electric

SWISSQUOTE
Welcome to ICOs!



DOSSIER

RARE METALS

THE NEW RESOURCE WARS

- A looming shortage
- China's dominance
- Industry leaders

ISSN 2296-3278





BLACK TIE OR DEEP BLUE

Depuis les profondeurs de l'océan jusqu'au tapis rouge, la Seamaster Diver 300M vous placera au cœur de toutes les attentions.



SEAMASTER DIVER 300M
MASTER CHRONOMETER

Ω
OMEGA

Boutiques OMEGA:
Genève • Zürich • Luzern • Interlaken • Bern
Crans-Montana • Zermatt • Bürgenstock

ICOs: investors gain more options



By Marc Bürki,
CEO of Swissquote

It's everywhere. You can't go a week without seeing blockchain technology in economics news. Last month, a report from the Institute of Financial Services Zug IFZ stated that funds generated by Initial Coin Offerings (ICOs) in Switzerland had reached 288 million Swiss francs in the first half of the year. That's 5 million more than the amount raised via ICOs in all of 2017. Even more surprisingly, this sum is nearly three times higher than the amount invested in start-ups by venture capital in the first half of the year (101 million Swiss francs).

Suffice to say that enthusiasm for this new method of financing — a hybrid of crowdfunding and IPOs — isn't slowing down anytime soon. Currently, approximately 100 ICO projects are waiting to be approved by Finma (the Swiss federal market authority), which is a tidal wave compared to the very few IPOs in Switzerland, of which you can count on one hand each year, particularly due to the high costs.

For private investors, this paradigm shift is a windfall. It is now possible

to help finance very promising, often local, companies, at a very early stage in their development. Digital tokens are replacing traditional shares.

At **Swissquote**, our natural penchant for innovation meant that we had to get involved in this paradigm shift in the financial world... Starting now — and it's a milestone for the history of our company — our clients can participate in ICOs via our platform and enjoy preferential conditions.

But the "media" section of the magazine, which remains its trademark, isn't falling by the wayside this month. We're focusing our feature **dossier** on the fascinating topic of "critical" metals, such as tungsten, cobalt, and certain rare earths that are used to create cutting-edge technologies. This is a subject that is both compelling and concerning and encompasses economic wars, environmental challenges and geopolitical tension.

Happy reading!

p. 64

p. 32

MILLE MIGLIA CLASSIC CHRONOGRAPH

Chopard is the historical partner and official timekeeper of the fabled Mille Miglia, the world's most beautiful car race. Proudly created and assembled in our Manufacture, this unique 42 mm-diameter chronograph showcases the full range of watchmaking skills cultivated within the Maison Chopard.

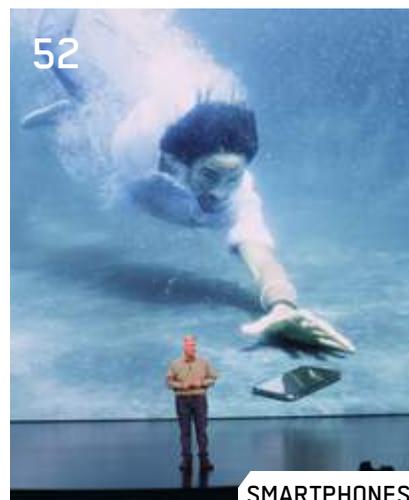
Chopard

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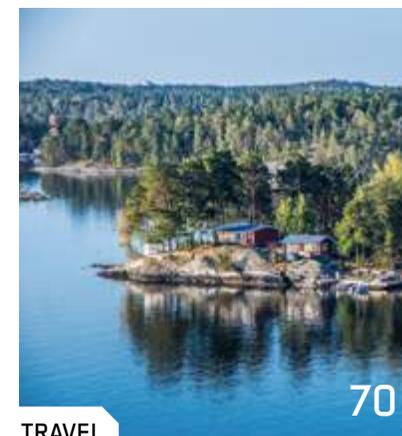
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THE NEW RESOURCE WARS



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Cover
Getty Images

Photography
AFP, Keystone, Getty images,
Istockphoto, Newscom, Reutersw

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PRINTING, BINDING AND DISTRIBUTION —
Stämpfli Ltd.
Wölflistrasse 1 - 3001 Bern
www.staempfli.com

ADVERTISING
Infoplus AG
Traubenweg 51, CH-8700 Küsnacht
hans.otto@i-plus.ch

WEMF
REMP 2018: 52,335 ex. Print run: 60,000 ex.



printed in
switzerland

SUBSCRIPTION
CHF 40 FOR 6 ISSUES
www.swissquote.ch/magazine

ISTOCK /REUTERS / VIVALAPENLER / HYPERLOOP TRANSPORT TECHNOLOGIES / PORSCHE

SCANS

demographics
THE GREY ECONOMY IS GROWING



The Japanese cosmetics giant Shiseido is targeting women over 50 years old.

In Japan, the ageing population is already a reality. People over the age of 65 make up 28% of the population. They will make up 40% by 2065. Several companies are looking to take advantage of this market. Cosmetics brand Shiseido has launched a line called "Prior" designed for seniors. The packaging is simple and the instructions are printed in large type. The brand also visits nursing homes to sell its products. Kobe Steel and Hitachi have begun building homes adapted to older people, with ramps and numerous handles. Rakuten has also launched an online dating service for seniors. — 4911



"For three years, we worked night and day to get rid of the burdens of the past"

Tidjane Thiam,
CEO of Credit Suisse.



During the 2018 fashion week, Burberry deployed a gigantic inflatable bear on the streets of London. Perhaps to delight passers-by and restore the brand's reputation?

marketing
BURBERRY IS SEEING GREEN

UK luxury brand Burberry is looking to improve its image among millennials. After announcing it would no longer use fur, the company has decided it will no longer burn unsold products. This practice, which is widespread in the fashion industry, is used to prevent goods from being stolen or resold on the black market. In July, Burberry revealed

that it had burned €28.6 million worth of goods in 2017, leading to a public outcry. It created a research group at the Royal College of Art in London to develop sustainable textiles and began a partnership with the brand Elvis & Kresse, which will take Burberry's leftover leather scraps and turn them into new products.

— BRBY

insurance
POST A BICYCLE THEFT ON FACEBOOK

Saint Gallen insurer Helvetia is testing an online solution to automate claims. It is currently limited to bicycle theft: users can tell Helvetia via Facebook that their bicycle was stolen and will be reimbursed in 90 seconds. The chatbot was developed by Estonian start-up

Inzmo, in which Helvetia acquired a stake in late 2017. Access to this type of technological solution has allowed Helvetia to make significant savings and grow its profits by 10% in the first quarter of 2018, to 230 million Swiss francs.

— HELN

"America first"
SCHMOLZ+BICKENBACH A VICTIM OF US PROTECTIONISM

Lucerne-based steel manufacturer Schmolz+Bickenbach lost a contract worth \$420 million with the US military. It was supposed to supply a particularly strong type of steel used to make bunker-busting bombs. But the company was cast aside because it was foreign and Donald Trump's administration is looking to promote US companies, under the auspices of the "America First" policy. Schmolz+Bickenbach's association with an investment vehicle owned by Russian billionaire Viktor Vekselberg, who is under sanctions in the US, did not help.

— STLN



JAN MICHAEL HOSAN / FOTOGLOBIA / NEWS.COM



\$143,116

The GDP per capita of Macau by 2020, according to the International Monetary Fund. That will make it the richest place in the world, topping Qatar, Luxembourg and Singapore. The country's 650,000 residents are benefiting from its booming casino industry.

RANKING

TOP 5 MOST POPULAR CITIES FOR TOURISTS
(In number of visitors in 2016)

1. HONG KONG	26.6 M
2. BANGKOK	21.3 M
3. LONDON (UK)	19.2 M
4. SINGAPORE	16.6 M
5. MACAU	15.4 M

Source: Euromonitor

TOP 5 BEST-SELLING PRODUCTS ON AMAZON
(During Prime Day, 16 July 2018)

- UNITED STATES
INSTANT POT, A MULTIFUNCTIONAL AUTOMATED COOKER
- UNITED KINGDOM
BOSCH CORDLESS DRILL, A CORDLESS DRILL
- GERMANY
OSMART ZIGBEE SMART PLUG, A SMART PLUG
- CHINA
SONICARE TOOTHBRUSH, AN ELECTRIC TOOTHBRUSH
- INDIA
REDMI SMARTPHONE, A SMARTPHONE FROM CHINESE MANUFACTURER XIAOMI

Source: Amazon

TOP 5 COUNTRIES WITH THE BIGGEST MANUFACTURING INDUSTRY
(In revenue generated and percentage of GDP in 2015)

1. CHINA	\$2,010 BN (27% OF GDP)
2. UNITED STATES	\$1,867 BN (12% OF GDP)
3. JAPAN	\$1,063 BN (19% OF GDP)
4. GERMANY	\$700 BN (23% OF GDP)
5. SOUTH KOREA	\$372 BN (29% OF GDP)

Source: UN Conference on Trade and Development

SCANS

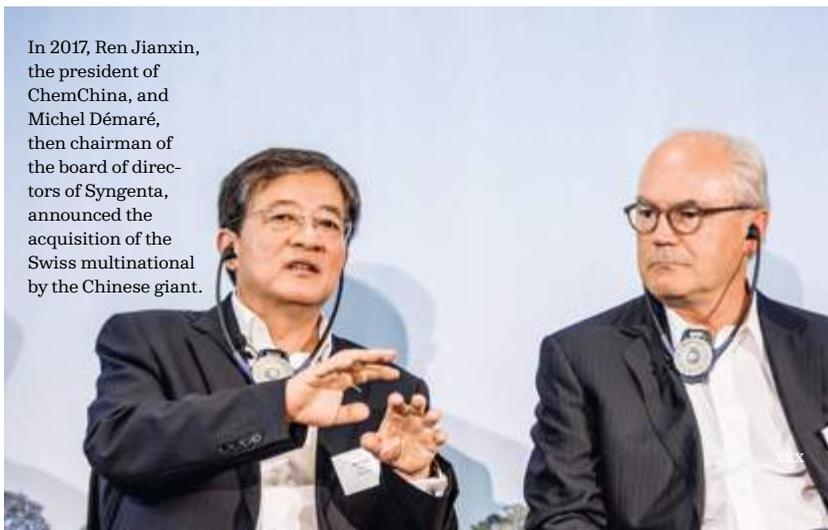


+540%

The increase in sales of gas-powered lorries in China over the first seven months of the year. The growth of these environmentally-friendly vehicles is being encouraged by anti-smog measures put in place by Beijing.

sale
CHINESE COMPANIES THROWING IN THE TOWEL

In 2017, Ren Jianxin, the president of ChemChina, and Michel Démaré, then chairman of the board of directors of Syngenta, announced the acquisition of the Swiss multinational by the Chinese giant.



XU JINDUAN XINHUA NEWS AGENCY / NEWSCOM

Two years ago, several Chinese conglomerates began a wave of foreign acquisitions. Cinema chains, hotels and companies were all up for grabs. In Switzerland, Syngenta was acquired by ChemChina, and Gategroup and Swissport were bought by HNA –

but times have changed. Heavily in debt and under pressure from Beijing to turn a profit, the conglomerates are starting to back-pedal. Dalian Wanda will sell its shares in AMC, the largest cinema chain in the US, and HNA will divest of its 7.64% share in Deutsche Bank.

retail
WALMART GOES SHOPPING

As Walmart opens more stores, as it did here in El Salvador in August, the American company is increasingly relying on e-commerce.



JOSE CABEZAS

Walmart will stop at nothing to compete with Amazon. It purchased the platform Cornershop in September for \$225 million. Users can order goods online and pick up their purchases in supermarkets and pharmacies in Mexico and Chile. In August, the US giant invested \$320 million

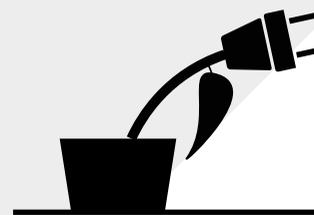
in JC Daojia, a similar platform based in China. Users can order online to purchase goods in the 200 Walmart stores located in China. Earlier in the year, it entered into a partnership with Japanese Rakuten to develop a delivery service for basic necessities. — WMT



“The cost of bringing to market electric cars will be higher than expected. Some of our competitors have been making more progress”

Herbert Diess,

CEO of Volkswagen, which will invest \$23 billion to develop such vehicles.



-3%

The drop in investments in renewable energy in 2017, after several years of growth, according to the International Energy Agency. Last year, fossil fuels' share increased for the first time since 2014 and this trend is expected to continue.



“The banking industry is very, very, very healthy. Lehman (bankruptcy) wouldn't happen today”

Jamie Dimon,

CEO of JP Morgan Chase.

transport
INDIAN AIRLINES FAIL TO TAKE OFF

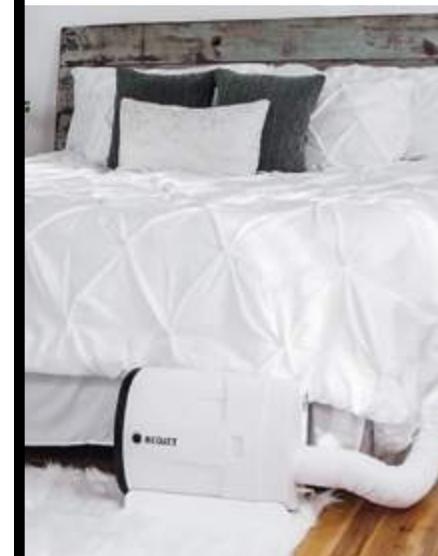


PUNIT PARANJPE / AFP

By 2025, India will be the third largest aviation market in the world, thanks to its growing middle class and the immense size of the country. But domestic airlines are not benefiting from this growth. Jet Airways lost 13 billion rupees (172 million Swiss francs) and IndiGo's profits fell 97% in the last quarter. With too many domestic companies and fierce competition, companies are forced to offer very cheap tickets. The government also forces them to fly unprofitable regional routes in order to obtain runway slots at the country's large airports. Furthermore, Indian passengers rarely purchase extras, such as checked luggage.

— JETAIRWAYS

KICKSTARTER



BEDJET

THE PERFECT TEMPERATURE UNDER THE COVERS

The BedJet is a small box that can fit under the bed and puff hot or cold air under the covers to obtain the desired temperature. Couples that disagree on temperature can heat half the bed and cool down the other half. The BedJet can even be programmed to calculate the perfect temperature for each person based on gender, age and body weight, which will then automatically adjust throughout the night. This will reduce waking up during the night and help you wake up naturally in the morning. A clinical study conducted by the company demonstrated that the BedJet helped menopausal women sleep better. The device works with the Alexa Smart Home system and has its own app.

FUNDS RAISED
\$882,692

AVAILABLE
DECEMBER 2018

SCANS

chemistry

A SWISS INSECTICIDE WREAKING HAVOC

This Indian farmer was intoxicated and says he will never use Syngenta Polo again.



ATUL LOKE, PANOS PICTURES

Last year, Swiss agrochemical group Syngenta exported 126 tonnes of its Polo pesticide, which is designed to kill white flies that attack cotton. India bought 75 tonnes, South Africa 50 tonnes and Colombia 1.5 tonnes. The highly toxic substance caused at least 50 deaths between July and October

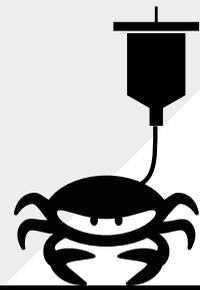
2017 in India, according to NGO Public Eye. The victims were farmers who used Polo to treat their crops, often without wearing protective clothing. This insecticide has been banned in the European Union since 2002 and in Switzerland since 2009 due to its toxicity.

— SYNN



“There are certain things only big companies can do. Nobody in their garage is going to build an all carbon fibre, fuel efficient Boeing Co. (BA) 787”

Jeff Bezos, CEO of Amazon.



€ 320,000

The price in Germany for a new drug developed by Novartis to treat certain blood cancers. The drug, Kymriah, has recently been approved by European health authorities. In the United States, it sold last year for \$475,000.

goods

THE NORTHERN ROUTE IS STARTING TO OPEN UP



MAERSK

Ice melt due to climate change has opened up new shipping channels across the Arctic Circle. The first commercial ship to sail them left Vladivostok in late August headed for Saint Petersburg. Operated by Danish giant Maersk, it carried 3,600 containers. This new route will provide ship owners with an alternative to the high tariffs of the Suez Canal when transporting goods between Asia and Europe. Until now, ships had to go around Africa if they wanted to avoid the bottleneck of the canal, but that required a lot more fuel.

— MAERSK-B

transport

THE FIRST HYDROGEN TRAIN GETS MOVING



DAVID HECKER

Alstom's Zero Emission Train rolled into commercial service in September 2018, as an alternative to diesel locomotives.

The two blue trains were put on the tracks in northern Germany in mid-September. Developed by French company Alstom, they run on hydrogen, with two hydrogen tanks stored on the roof feeding into a combustion battery, which provides electricity to the motor. They expel only water vapour.

The Coradia iLint is the first passenger train in the world equipped with this technology. Designed specifically to run on non-electric lines, the train could eventually replace most of the highly polluting diesel locomotives that run on railways in Germany.

— ALO

banking

VIRTUAL ATMS HAVE ARRIVED

Geneva-based banking software company Temenos has partnered with Zurich's Sonect to create a network of virtual ATMs. How do they work? First, users download the app that indicates where the closest partner shop is. Then they go to the shop and scan the QR code on a mobile phone to retrieve cash from their bank account with no transaction fee. Users save time and banks save money: installing an ATM costs 180,000 Swiss francs. At the moment, this service is available in 220 shops, as well as via food delivery service Smood. — TEMN



8,000

The number of court cases against Monsanto in the US, initiated by plaintiffs exposed to glyphosate (a herbicide). In August, a California court ruled in favour of one of the plaintiffs. The company, which has been acquired by Germany's Bayer, has to pay \$289 million in damages.

THE FLOP

Dr Watson disappoints the medical world

In 2011, IBM's supercomputer Watson was presented as a new, revolutionary tool to cure cancer. With its ability to absorb monumental quantities of data, the computer was supposed to be able to recommend personalised treatments based on the genetic profile of each patient and advances in medical research. But it didn't live up to its promises. The available data is often recorded in vastly different formats and therefore cannot be analysed

side by side. The computer, which is updated by humans, struggles to keep up with the latest medical discoveries. And when it recommends a treatment, the treatment has almost always been suggested by a doctor first. More seriously, in some cases, it failed to recommend a treatment that was necessary. As a result, a dozen hospitals that had decided to use Watson have changed their minds.

— IBM

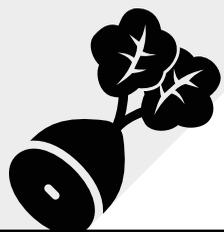
SCANS



“I view our intent to capitulate to censorship and surveillance demands in exchange for access to the Chinese market as a forfeiture of our values”

Jack Poulson,

a former star engineer at Google, regarding Google’s decision to launch a censored search engine in China.



+23%

The spike in vegetable-based meat substitutes in the United States over the last 12 months. Approximately 12% of households now purchase these products.

food

NESTLÉ AND STARBUCKS COMING TOGETHER



MIKE SEGAR

Nestlé and Starbucks have signed an agreement worth \$7.15 billion. It gives the Swiss group the rights to sell products from the coffee chain, which will focus on operating its 28,000 stores. These include capsules for Nespresso machines, coffee beans and Teavana tea.

Under the agreement, Nestlé will take on 500 Starbucks employees. This union will allow the Swiss food giant to benefit from Starbucks’ positive image in the United States, where Nestlé is struggling to establish its own brands, such as Nespresso and Dolce Gusto. — NESN — SBUX

IPO

NIO – TESLA’S CHINESE RIVAL

Chinese electric vehicle manufacturer NIO went public on the New York stock exchange in mid-September, raising \$1 billion. The Shanghai-based company, founded only four years ago, aims to dominate the gigantic Chinese electric vehicle market. This puts it in competition with Tesla, which is selling \$2 billion worth of vehicles per year in China and

is looking to open a mega-factory there to produce 500,000 vehicles per year. NIO is also up against a Chinese competitor, BYD.

NIO’s main advantage is price. Last year, it unveiled the ES8, an electric SUV, for \$65,000, which is nearly the price of the most basic version of Tesla’s Model X.

— NIO

BE RARE!

WITH H. MOSER



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VERY RARE

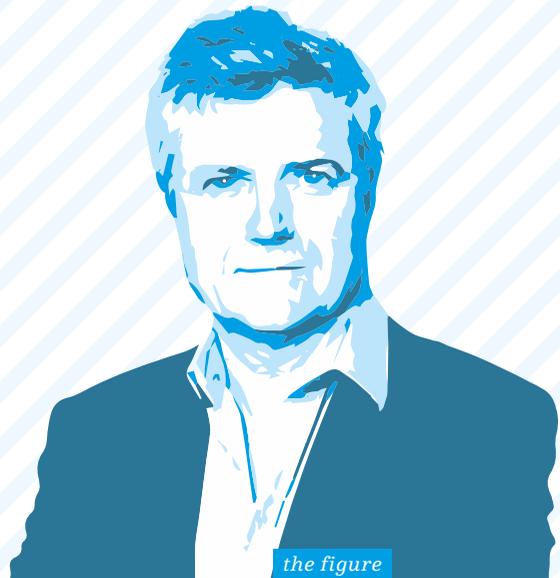
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TRENDS



the figure

MARK READ

An online marketing expert is the new head of WPP

Title
CEO of WPP

AGE
51

Nationality
British

Annual salary
€975,000 and a bonus that could be up to 250% of his salary

As of September, Mark Read is at the helm of the UK marketing giant WPP, after the surprise resignation of founder Martin Sorrell, who was abusing company funds. Read has spent his entire career in the marketing field. He joined WPP in 1989, after obtaining a degree in economics from the University of Cambridge. He stayed until 1995 and then left to create start-up WebRewards. He also worked for some time at Booz Allen & Hamilton. In 2002, he returned to WPP, where he helped establish the group's digital strategy after it was shaken up by the internet boom.

In 2015, Read became the CEO of Wunderman, one of the agencies under the guidance of WPP. He made Wunderman a global leader in online marketing and it is now present in 70 countries. Its clients include Microsoft, Dell, Shell and Adidas. As the new CEO, he hopes to put this digital expertise to good use at WPP. He has already announced that the group's focus for the future is on creative services with high added value. He also hopes to make the company a respected consultant for brands that are looking to improve sales on e-commerce platforms like Amazon.



the country

SENEGAL

Western Africa's little champion

In 2017, Senegal's growth reached 6.8%, exceeding six per cent for the third consecutive year. It is expected to reach a similar percentage this year, according to outlooks from the World Bank. This positive performance is a result of the Plan for an Emerging Senegal (PES) initiative, launched by president Macky Sall in 2014. Objectives include developing infrastructure and growing the farming and fishing industries, as well as information and communications technologies. The country also benefited from good weather, which resulted in a record cotton harvest,

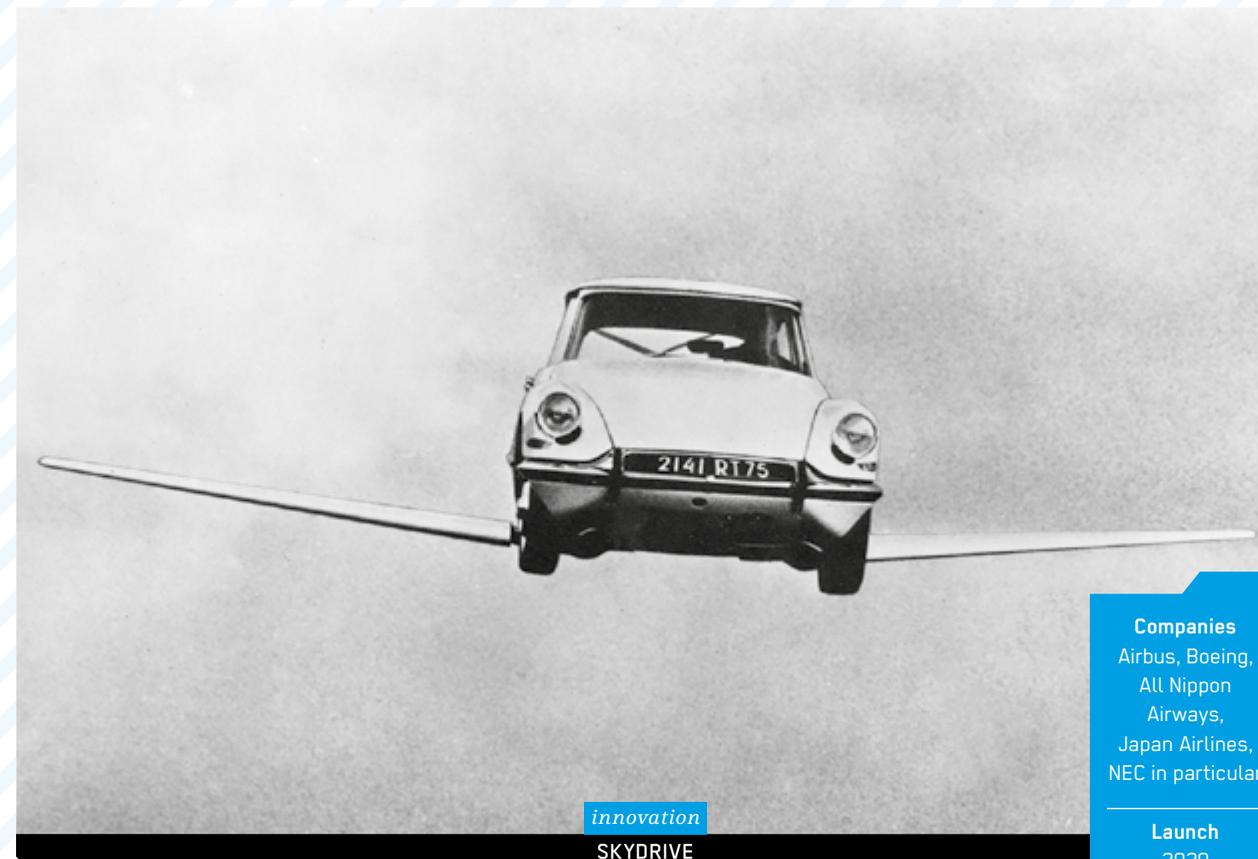
as well as relatively low petrol prices, a godsend in Senegal where the population depends on energy subsidies. Public health has also improved, particularly due to a universal healthcare programme started in 2013. Only 17% of Senegalese are affected by chronic malnutrition, the lowest rate in all of sub-Saharan Africa. The only downfall: public debt continues to rise, reaching 61% of the GDP in 2017.

Population
15.4 million

GDP per capita
\$1,033

Growth in 2017
6.8%

Main economic sectors
cotton, sugar, peanuts, peaches, cement, fertilisers, refining



innovation

SKYDRIVE

Companies
Airbus, Boeing, All Nippon Airways, Japan Airlines, NEC in particular

Launch
2020

Cost
42.5 million yen (361,000 Swiss francs) has currently been invested

Commute to work in a drone

Here's another one! A new flying car project is looking to conquer the skies. The Japanese government has brought together a dozen companies including Airbus, Boeing, All Nippon Airways, Japan Airlines and NEC, to develop a mode of flying public transit. It will be an electric drone capable of vertical take-off thanks to its four propellers. This is part of the SkyDrive project developed by start-up Cartivator, which is sup-

ported by Toyota. The vehicle will be 2.9 metres long and piloted by a human. The first prototype is expected to be ready by late 2019. The goal is to unveil it during the 2020 Olympic Games in Tokyo and use it to light the Olympic torch. In time, it could be used to transport employees from their homes to their workplaces, avoiding rush-hour congestion. The vehicle can be controlled via an application. The major challenges

to overcome are battery life, autonomy and passenger safety. Many other companies have similar projects in the works, such as Chinese manufacturer Ehang, which already has a flying prototype, as well as Geely, another Chinese auto manufacturer, Germany's Volkswagen, France's Safran, and the US' Uber.



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GENEVA • LAUSANNE • ZERMATT
ZURICH



AIR
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SEA

B
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1884

#SQUADONAMMISSION



The Breitling Cinema Squad
Charlize Theron
Brad Pitt
Adam Driver

ANALYSIS

THE VIEWPOINT OF SPECIALISTS

FOCUS

The end of net neutrality: why markets are being careful

Internet providers should be taking advantage of network freedom in the United States. But they are wary, since the subject is a hot button issue.

BY MARTIN LONGET AND BERTRAND BEAUTÉ

“Comcast remains committed to an open internet. We still don’t and won’t block, throttle or discriminate against lawful content.” Surprise: on its website, the #1 cable provider in the United States implicitly denounced the end of net neutrality in the country. Comcast seems to lament the historic decision made on 11 June 2018 by the Federal Communications Commission (FCC). But Comcast, much like other internet service providers (ISPs), is actually the big winner here. For years it has fought to bring down net neutrality. So why is it changing their story now? It’s because it’s such a controversial issue.

To understand the complexity of net neutrality, you have to start at the beginning. “Net neutrality is a fundamental principle of the internet, in that service providers

must handle all types of data in exactly the same way. Nothing is blocked, throttled, or – by contrast – promoted,” said Alexis Fitzjean O Cobhthaigh, attorney at La Quadrature du Net, a French advocacy group in Paris that is fighting for a free, decentralised internet. In other words, much like a post office that handles letters in the order they come in, ISPs would be required to transmit all information packages equally.

But the problem is that the abundance of services and data traveling over the network is forcing ISPs to constantly upgrade their infrastructure. This comes at a price, one which providers don’t want to fully take on themselves. With the end of net neutrality, giants like Verizon, Comcast and AT&T will have the freedom to impose fees on the

most bandwidth-heavy services, for example. “Some ISPs have already signed financial agreements with large content creators,” said Valérie Schafer, professor at the University of Luxembourg and co-author of *La neutralité d’Internet, un enjeu de communication*.

ISPs now have enormous power. They could force web giants like Facebook, Google, Netflix and Amazon to pay access fees

One example is Comcast: since 2014, it has made Netflix pay in

order to ensure subscribers receive high-quality streaming video. At that time, net neutrality still existed in the United States. Now that it’s been repealed, these types of contracts will multiply over the coming months, especially since internet service providers often produce content themselves. In June 2018, AT&T finalised the acquisition of Time Warner, for example. That’s why it is in AT&T’s best interest to slow down the services of its competitors (Netflix and Amazon Prime) in order to promote its homegrown content. Moreover, Comcast owns NBC Universal and Dreamworks...

So ISPs now have enormous power. In theory, they could force web giants like Facebook, Google, Netflix and Amazon to pay access fees. If these companies don’t pay, ISPs could slow the transmission of their

content or even block access to their applications. Another possibility is to make consumers pay more to access high-bandwidth services. But despite these excellent prospects, the market has been quite careful to act after the FCC’s announcement: for the time being, shares of Verizon, AT&T and Comcast haven’t gone up as a result of the end of net neutrality. And shares for content providers haven’t slumped at all.

That means the war is far from over. Tech giants, led by Google and Netflix, have already announced they will challenge the FCC’s decision in court. Moreover, most US states, including California, have either reaffirmed their commitment to net neutrality in their state, or will be voting on it soon. Twenty-two out of 50 states have come together to

bring the FCC to court. Given these uncertainties and the possibility of costly legal battles, investors are right not to act too hastily.

Especially since net neutrality isn’t just a purely commercial dispute. There are ethical challenges at play as well. “Major players are financially more appealing to ISPs, so they could be favoured,” explained Schafer. “Small independent bloggers could get left behind.” Alexis Fitzjean O Cobhthaigh agrees: “Getting rid of net neutrality means allowing service providers to promote some content at the expense of others, which as a result would create a two-speed internet. This would seriously jeopardise universal and equal access to information. In theory, it would be possible to block or discriminate against opposition sites or critical press sites.”

At a time when internet giants such as Facebook are being criticised for manipulating elections, this is a huge risk that could destroy an ISP’s reputation. In a way, Verizon has just experienced this. When huge wildfires ravaged northern California this summer, the US provider voluntarily throttled the internet speed for Santa Clara fire fighters to 1/200th of the regular speed, on the grounds that the fire fighters were using too much data. Following public outcry, Verizon back-pedalled and apologised, stating that “the incident was the result of a customer service error and had nothing to do with net neutrality”. The apology was decisively refused by James Williams, a Santa Clara city councillor: “This slowdown had everything to do with net neutrality. It demonstrates that ISPs will always act in accordance with their financial best interests and don’t care about public safety. This is exactly the type of situation that the end of net neutrality, decided by the Trump administration, authorises and encourages.” Given the tense atmosphere, Comcast’s position and advocacy for an open internet now makes sense. ▽

RYAN MCBRIDE / AFP



In 2017, protesters met in front of a Verizon store in Boston to defend net neutrality. Hundreds of similar gatherings took place in the United States.

China under the charm of Nespresso for babies

Nestlé's BabyNes system is taking the country by storm. The infant formula market is booming, fuelled by China's growing middle class and the end of its one-child policy.

BY JULIE ZAUGG in HONG KONG

The BabyNes shop, all in beige and pastel shades, is located on the second floor of the Lee Gardens shopping centre in central Hong Kong. It sits among a string of luxury brand stores for little ones, such as Jacadi, Ralph Lauren Children and Ferrari Junior. The saleswoman at the store takes a transparent cup, slips a pink capsule into the white, Nespresso-like machine and prepares a tall glass of frothy milk.

The taste is sweet, almost with a hint of vanilla. "This capsule is for pregnant women," she says. "It contains folic acid, magnesium,

iron and vitamins A and D for the baby's development." Another capsule, this time purple, is for breastfeeding women. But these are variations on the star in the BabyNes line, six types of capsules to make bottles tailored just for baby. Each capsule is designed for a stage of the baby's growth, from birth to age three.

"With a simple touch of the button and in less than a minute, the formula is prepared at the suitable temperature with the right dosage," Nestlé boasts on the BabyNes Hong Kong website. All it requires is filling the machine with water (boiled before use), inserting a capsule, placing ▶

the bottle under the spout and pressing the button.

The capsules are hermetically sealed, which protects the product from being contaminated by pathogenic agents or oxidising in contact with the air, and thus from losing its nutritional value. They feature an inner filter to eliminate the bacteria in the water. The powder contained in the capsules is produced in Switzerland by the Nestlé brand Wyeth.

So the price of a bottle comes out to 2.50 Swiss francs

The BabyNes also has an app. Users receive an alert on their smartphone whenever a bottle is prepared. “That function lets you count the number of millilitres that baby drinks every day,” the saleswoman adds. The BabyNes machine is free, but customers have to buy a subscription to order HKD 3,000 (375 Swiss francs) worth of capsules. As with the Nespresso system, they can be ordered online and delivered the next day. A box of 26 capsules costs HKD 550 (70 Swiss francs) and lasts an average of four days. So the price of a bottle comes out to 2.50 Swiss francs.

Launched in Switzerland in the spring of 2011 after several years in development, the BabyNes system is now available in France, the United States, China and Hong Kong. The machine generated \$388 million for Nestlé in 2017 according to The Market Reports. What is more, growth is expected to reach 39.9% a year over the next five years, the report states.

Demand is highest in Asia. Min Chun, an expert in infant milk formula with Daxue Consulting, found ways of



BabyNes is clearly inspired by the Nespresso model.

FABRICE COFFRINI / AFP

measuring the success of BabyNes in China for us. “The number of requests related to this product on the Baidu search engine is increasing,” he says. On the e-commerce website JD.com, the top-selling capsules – those for infants aged six to 12 months – have generated 6,200 comments. Its competitor Tmall sells 673 packages a month. “It remains a niche product, but its popularity is growing,” he says. Meanwhile, Nestlé confirms the trend. “The BabyNes system is mainly

sold in China and Hong Kong,” says Caroline Biétry, a group spokesperson. This trend reflects a broader phenomenon: the incredible success of western infant formula brands in China. They are perceived as better quality and less likely to be fake than domestic products. That is a weighty argument in this country, still reeling from the scandal of melamine-contaminated milk in 2008. At least six infants died, and tens of thousands of others were sick.

“The sector is extremely competitive and fragmented, but the 10 largest brands alone account for 85% of the market,” analyst Min Chun says. The top three are Nutricia by Danone (10.6% market share), Illuma by Nestlé (9.1%) and Friso by Royal Friesland-Campina (7.4%), according to Euromonitor data. But Daxue Consulting estimates that by combining all the brands sold in China that belong to the Swiss giant, Nestlé holds the leading position with 21.1% of the market.

Several small brands that make organic goat’s milk or hydrolysed milk infant formula – easier for Asian lactose-intolerant babies to digest – also fare quite well, such as the Australian brands A2, Bellamy Organic

and Bubs Australia. Nestlé’s Nan Pro brand, which promotes digestion, is also popular.

Domestic products have also gained ground recently, especially those that source their raw materials abroad, such as Feihe International, Yili, H&H Group and Synutra. Notably, Synutra has just bought a whey powder production facility in the canton of Fribourg.

The overall market itself continues to develop. In 2017, the Chinese powder infant formula market was worth 119 billion yuan (17 billion Swiss francs). And Euromonitor expects it to grow to 170 billion yuan (24 billion Swiss francs) by 2021. “This trend is primarily due to ▷



Each capsule is designed for a stage of the baby’s growth.

FABRICE COFFRINI / AFP

COMPANIES TO WATCH

NESTLÉ

Undisputed leader

Nestlé dominates the powder infant formula market, with 22% market share worldwide. In China, the Swiss group is number one. Its brands Illuma, S-26 and Gerber are extremely popular there. In June 2017, the new CEO Ulf Mark Schneider announced that he wanted to focus on infant nutrition. At the end of 2017, he reorganised the sector by appointing regional managers. “This more agile and efficient structure will enable us to respond more quickly to local consumer preferences,” the firm stated.

HEADQUARTERS: VEVEY

EMPLOYEES: 323,000

REVENUE (2016): CHF 89.8 BN

NESN

DANONE

Champion of online sales

Danone ranks second in China’s infant formula market. Its brand Nutricia, the most popular in the country, alone has a 10.6% share of the market. The French group’s revenue rose 5% in the first quarter of 2018 following record sales of infant formula in China. A growing share of these sales take place online. However, Danone suffered a tough blow in 2016 when its Karicare brand was suspected of containing bacteria that cause botulism, and it was removed from the market.

HEADQUARTERS: PARIS

EMPLOYEES: 104,843

REVENUE (2017): €24.7 BN

BN

China's expanding middle class, as they can afford infant formula," says Tage Affertsholt, a milk industry expert at 3A Business Consulting. The repeal of the one-child policy in late 2015 gave the market a further boost. And the government now plans to lift all restrictions on the number of children Chinese couples can have.

In early 2018, stricter quality controls were imposed on powder formula producers. "These measures have squeezed out many smaller brands, namely those using generic milk powder, and now, only 950 brands are authorised, down from 2,300 last year – 209 of those being foreign."

Foreign brands also come to China via the Daigou system, in which Chinese emigrants buy large volumes of powder formula abroad to sell it to people they know still living in China, by sending it back home by post.

Breastfeeding is not favoured in China. Nursing in public is even frowned on

A CONTROVERSIAL INVENTION

Not everybody loves BabyNes. Far from it. For consumers, the price of capsules is the contentious point. "A baby takes in an average of 800 ml per day, so a package only lasts three days at the most," says a user on a forum for young mothers. "That's almost 500 Swiss francs a month. And you still have to come up with a plan B in case you go anywhere, because the machine doesn't fit in the pushchair."

As for the health factor, many organisations that support breastfeeding have challenged Nestlé's system. "The machine heats water to about 40°C, but that's not hot enough to kill the bacteria that can be found in powder infant formula," says Patti Rundall, from the NGO Baby Milk Action. She has also criticised the way Nestlé promotes its system. Last autumn for example, the walls of the Hong Kong metro were covered in BabyNes ads. But since 1982, the

World Health Organization (WHO) has banned any form of promotion that could influence parents to give up breastfeeding.

In Switzerland, this ban has been transposed into law. The ordinance on food stipulates that advertising for infant formulas promoting direct sale to consumers – such as coupons, discounts, the distribution of samples, and other marketing techniques for this purpose – is forbidden. These laws exist for a reason. The WHO estimates that 820,000 babies die every year "as a result of not breastfeeding and suboptimal breastfeeding practices". In other words, they die directly or indirectly due to bottle feeding. For example, if the water used to make breast-milk substitutes is inadequate for consumption, bottles can cause infants to contract fatal diarrhoea. Not to mention that breastfeeding contributes to the health of newborns.



A map of China made from tins of baby milk formula. Here, the artist Ai Weiwei highlights the anxiety surrounding quality of infant formula (Hong Kong, May 16, 2013).

THE ASAHI SHIMBUN

FEIHE

The local giant

The Chinese group Feihe International dominates the domestic infant formula segment. Its brand Firmus holds 6.7% market share. In 2017, sales of its premium infant formula increased by 200%, and its revenue rose more than 45%. The Beijing-based firm has invested \$225 million to build a giant powder infant formula plant in Canada, which is set to open in 2019. It acquired the US firm Vitamin World in 2017. Listed on the New York Stock Exchange until 2013, Feihe plans to launch an initial public offering on the Hong Kong stock exchange in 2018.

HEADQUARTERS: BEIJING

EMPLOYEES: OVER 2,000

REVENUE (2016): CN¥ 6.8 BN (CHF 979 M)

IPO PLANNED THIS YEAR

YILI GROUP

On top of the steppe

Yili Group also holds a top spot in China's dairy industry. Its infant formula brand Pro-Kido, which is produced in New Zealand, is one of the best sellers in the country, with 5.3% market share. In 2017, the group, based in Inner Mongolia, which also makes fresh milk and ice cream, posted growth in revenue of 12%. However, its stock price fell in the spring of 2018 following false rumours that began to circulate on social media about its CEO being under investigation for corruption.

HEADQUARTERS: HOHHOT (CN)

EMPLOYEES: 53,531

REVENUE (2017): CN¥ 67.6 BN (CHF 9.7 BN)

600887

The success of powder infant formula is also driven by cultural factors. Breastfeeding is not favoured in China. Nursing in public is even frowned on. And mothers often go back to work just a few weeks after giving birth. By the age of six months, 72% of infants are bottle-fed. A study by the University of Sichuan showed that 45% of newborns were already being fed at least some formula by the time they were released from hospital.

The absence of dairy products in the Chinese diet also explains the demand for BabyNes capsules for adults. Pregnant or nursing women see it as a quick and practical way of meeting their calcium requirements.

But the good fortune of Nestlé and its peers in China may not last forever. "China is getting older," says Yi Fuxian, a Chinese demographics expert from the University of

Wisconsin-Madison. "In 2015, the fertility rate hit 1.05 per woman, the lowest in the world." This is due to decades of anti-childbirth policy. "Having one child has become the norm in China," he says. Furthermore, more and more women are working and putting off plans to have children. If the Chinese are having fewer babies, there will be fewer little mouths to eat all that powder formula. ▽

Hyperloop Hyper or dupe?

There is an ever-increasing number of plans for futuristic trains that can reach astonishing speeds of 1000 km/h. Are they feasible or too good to be true? *Swissquote Magazine* investigated.

BY ERIC DANEY

“When you’re dealing with tubes that are several hundreds of kilometres long, risks associated with watertightness, accidents or malicious acts become incredibly significant”

Hyperloop Transportation Technologies (HTT) is currently conducting tests in Toulouse, the European capital of aeronautics where many engineers reside.

“ Right now we’ve got planes, trains, automobiles and boats. But what if there was a fifth mode? I have a name for it: Hyperloop.” In 2012, head visionary of Tesla Elon Musk dreamed of a new way of getting around: inside pods travelling 1200 km/h, which is slightly slower than the speed of sound, through narrow tunnels. Six years later, everyone is still talking about it. There is even hope for a Hyperloop which would cut travel time between Washington and New York to just 30 minutes, compared to four hours currently. “I’m starting to think this will really happen,” said Musk in 2016, speaking to US students. The most optimistic predictions believe this type of service could start in 2030, or even as early as 2020.

But could it really? “A Hyperloop to transport goods could be available in as little as 12 years,” says Denis Tudor, engineer at EPFL (École Polytechnique Fédérale de Lausanne), who participated in the EPFLoop project (see inset). “But for transporting people, it will probably take until 2035.” Competing in the supersonic train race are three companies running a technological marathon: Virgin Hyperloop One, Hyperloop Transportation Technologies (HTT) – both from the United States – and Transpod from Canada.

Of the three, the company founded by Virgin’s Richard Branson seems to be in the lead. Since 2017, it has been conducting large-scale test runs on its 500 m track, located close to Las Vegas, Nevada. Its prototype, which has already reached speeds of 387 km/h, could be used as early as 2021 to transport goods, according to the company’s predictions. To reach that goal, Virgin Hyperloop can count on the \$160 million raised by big investors such as General Electric, port giant Dubai DP World Group and SNCF.

HTT has an even shorter timeline. The company, which began working on its test track this summer in Toulouse, could make the trip from Dubai to Abu Dhabi in 12 minutes starting in October 2020 for the inauguration of the Expo 2020 world fair. Up against this competition, Transpod is a smaller player that is looking to open its first commercial line in 2030. But the Canadian

The tubes for Virgin’s Hyperloop One project. Here in the desert, in Mojave, north of Las Vegas.



3D rendering of Virgin’s Hyperloop One project.



ZICHE/BARKE INGELS GROUP (BIG) (SUPPLIED BY WENN)

There are a lot of projects and funds involved, because Hyperloop is very promising: a super-fast transport method that produces less pollution than aeroplanes and is less expensive than current high-speed trains

company has nevertheless raised €50 million and has just applied for a building permit near Limoges to construct the longest test track in the world – a straight 3 km tube on pylons.

There are a lot of projects and funds involved, because Hyperloop is very promising: a super-fast transport method that produces less pollution than aeroplanes and is less expensive than current high-speed trains. It’s easy to see why the media and public are excited. But behind this technological optimism lurks several

questions about these supersonic trains that are still up for debate.

“The first problem is safety,” says Paul Peeters, a researcher specialising in sustainable tourism transport at Breda University in the Netherlands. “The Hyperloop pods are designed to travel inside vacuum tubes, which reduces friction. But what happens if something goes wrong, if there’s a leak, for example?”

“When you’re dealing with tubes that are several hundreds of kilometres long, risks associated with water-

tightness, accidents or malicious acts become incredibly significant,” says Jérôme Schupp, financial analyst at Prime Partner. “I don’t know how it would be possible to guarantee safety with such an infrastructure.”

From a technological standpoint, this issue could certainly be solved in time, but at what cost? Initially, Elon Musk estimated it would cost \$6 billion to link San Francisco and Los Angeles, or one-tenth of the price of the high-speed train being developed between the two Californian cities. The price has ▶



A tube from Hyperloop Transportation Technologies (HTT).



3D rendering of the Hyperloop Transportation Technologies (HTT) project.

“It’s a guaranteed way to make you vomit. Travellers will not be comfortable at all”

gone up ever since. According to an internal document from Virgin Hyperloop published by *Forbes*, the cost for that route would actually range between \$9 billion and \$13 billion. Moreover, this figure is considerably underestimated, according to the experts we consulted. Sébastien Gendron, CEO of Transpod, believes the price would

be around \$25 million to \$30 million per kilometre, which is comparable to the most expensive TGV lines... but with lower capacity.

The number of people or goods transported is a key challenge. “The top priority for railway companies is to run more trains and increase capacity, in order to meet the growing

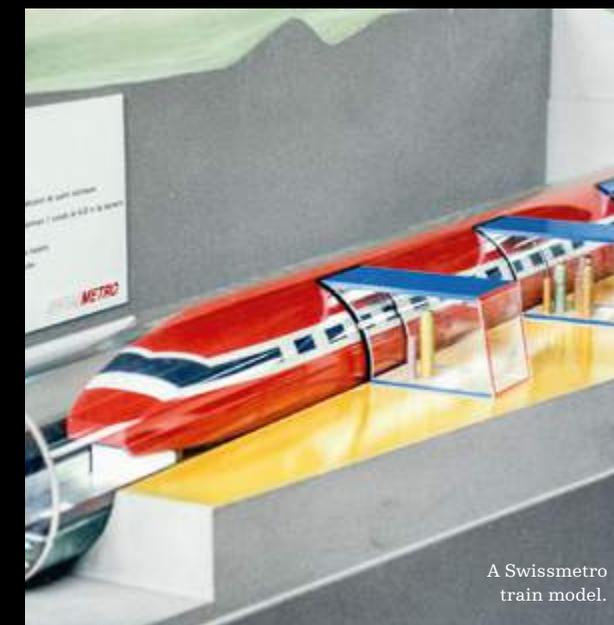
demand for transport needs,” says Schupp. “Increasing speed is not their main focus. Looking at it from this perspective, it seems to me that the Hyperloop projects, in which the goal is to move as fast as possible in small pods that significantly limit the throughput, aren’t focused on the challenges we’ll face in the future. And offering high-speed travel

to a privileged select few who can pay for expensive tickets isn’t necessarily profitable. So I have some serious doubts about the feasibility of these projects.”

Benoît Ziegler, member of the association of Swiss transport engineers (SVI) is even more critical: “The incredible promises made by people promoting this technology are just smoke and mirrors. The Hyperloop project, and the Swissmetro project back in the day, are media sensations that lead people to believe that they could be valid transport solutions, whereas they’re out of touch with the reality of what’s actually happening. What makes a transport system successful, especially in a country like Switzerland, is its interconnectivity: a dense network of frequent trains, easy transfers to buses, pedestrian-friendly spaces and bicycle parking in train stations. Hyperloop is the opposite of this: it would require building a completely new infrastructure that is disconnected from the existing network.”

In terms of transporting people, another vital concern is how comfortable the ride is, especially given the upscale target clientele. There are many questions regarding this aspect as well. In an interview with *Télérama*, Alon Levy, an Israeli mathematician specialised in public transport, said: “Hyperloop isn’t a method of transport, it’s a guaranteed way to make you vomit. Travellers will not be comfortable at all.”

Beyond the technological gambles, Hyperloop projects will need to demonstrate their practical aspects. For the time being, high-speed travel isn’t a top priority according to experts in the transport industry. “These projects must be about efficiency,” says Ziegler. “This means focusing on capacity rather than speed; quality over quantity. In short, moving forward in a more pleasant way.” ▲



A Swissmetro train model.

TWO NEW SWISS PROJECTS

Interest in Hyperloop technology brings back memories for Swiss residents. The Swissmetro project, launched in 1992, was indeed an underground train using magnetic suspension. It was supposed to link large cities between Geneva and St. Gallen. Initial investments of around 11 million Swiss francs were not enough and the project’s founders finally pulled the plug in 2009, due to lack of sufficient financial and political support. But Hyperloop has reignited a spark. EPFL began its EPFLoop project this year, when a student team participated in the Hyperloop pod competition, a design contest organised by Elon Musk. After coming in third place in late July, the Lausanne-based team now wants to move on to an actual prototype.

But the most advanced Swiss project is undoubtedly EuroTube. Founders Doré de Morsier and Gerard Güell presented their project in June in Collombey-Muraz located in the Chablais Valais region. They’re hoping to build a test centre there with a 3 km long tube that will be 2 m wide. Swiss Federal Railways is currently in discussions with EuroTube regarding a potential partnership. “We were very interested in working on an innovative project that would shape the future of transport,” says the former federal transport authority. “Such a project could be used to test new technologies and gain valuable knowledge.” With support from the commune, the canton of Valais, research funds and private sponsors, EuroTube is looking to obtain the required approvals before beginning its first trials.

DOSSIER

RARE METALS

THE NEW RESOURCE WARS

The expected boom in electric cars and renewable energy will significantly increase demand for rare earth metals. To the point where they could even run out in the medium term.

BY BERTRAND BEAUTE



- 40. Infographic: Rarest of materials
- 42. The dark side of green energy
- 46. Interview with Victoire de Margerie "There will be enormous pressure on resources"
- 48. Once upon a time at Mountain Pass

In June 2018, leaders and influencers gathered in Nancy, France. The gilded detailing in the grande salle at city hall was the setting for a meeting between some of the world's top business leaders, including Shunichi Miyanaga, CEO of Mitsubishi Heavy Industries; Patrick Koller, head of the automotive supplier Faurecia; and Nick Stanage, CEO of Hexcel, which specialises in composite materials. But this trip to the former capital of the Duchy of Lorraine was not for sightseeing. They were there to work on the thorny issue of rare earth metals, at the World Materials Forum (WMF). And it's urgent. ▶

Virtuous “green growth”, advocated just about everywhere in the world, may consume less petrol, gas and coal, but it uses masses of rare earth metals. For example, an offshore wind turbine can hold up to a tonne of rare earth elements (a group of 17 metals), namely dysprosium, neodymium and praseodymium. And plans are to install hundreds around the planet.

It takes a lot of tin, cobalt and tungsten to build electric car batteries, along with other rare earth elements for the engine. Sales of these metals are starting to take off. The *Electric Vehicle Outlook 2018* published by Bloomberg New Energy Finance reports that more than 1.1 million electric vehicles were sold worldwide in 2017. That figure is expected to reach 11 million in 2025 and 30 million in 2030. With an average of 700 grams of rare earth elements in each model, the skyrocketing demand comes as no surprise.

“The development of renewable energy and rise of the electric vehicle, as well as the democratisation of new technology as the world’s middle classes grow, are causing an unprecedented surge in demand for certain metals,” says Pierre Toulhoat, deputy CEO and scientific director of the Bureau de Recherches Géologiques et Minières, the French geological and mining research bureau, or BRGM. “If we don’t do anything about it, there will be shortages.” In June, a study revealed at the World Materials Forum stated that six metals face major risk of supply disruption: cobalt, dysprosium, tin, neodymium, praseodymium and tungsten (see infographic p. 40).

For example, a World Bank report from 2017 estimated that demand for cobalt could increase by 1,200% by 2050 in the event of a massive shift towards electric vehicles.

Current mines cannot cover that growth. “If no new reserves are found, cobalt could face a shortage in 30 years,” say researchers from the Karlsruhe Institute of Technology in a study published in March 2018 in the journal *Nature Reviews Materials*.

Demand for cobalt could increase by 1,200% by 2050 in the event of a massive shift towards electric vehicles

This outlook has already seeped into markets. The price of the blue-hued metal more than quadrupled between 2016 and 2018 on the London Metal Exchange, where it currently trades at about \$62,000 per tonne. The world’s largest producer, the Swiss company Glencore, is thoroughly benefiting from this explosion in price, with its share price tripling since January 2016 (see company features p. 37).

GEOPOLITICAL WAR

After about 15 years of lying nearly dormant, the market for rare earth metals is also being revived. “Prices have increased steadily since 2016,” says Pol Le Roux, vice-president of sales and marketing for the Australian company Lynas, the world’s second-largest rare earths producer. “We believe that this increase will continue until at least 2020. The question is, how far will it go? Trading is currently at between \$40 and \$45 a kilo, which brings us a small margin. But that price seems too low given the market environment, and we’re aiming for \$60.”

Guillaume Pitron, author of *La guerre des métaux rares* (The Rare Metals War), agrees, “It’s amazing how rare earths have taken over in just a few years. Their unique chemical properties make them the vitamins powering the digital and energy transition. Without them, our smartphones would be the size of a brick! ▶

WHAT IS A CRITICAL METAL?

Jointly conducted with CRU Consulting in London, McKinsey in Brussels and the Bureau de Recherches Géologiques et Minières (BRGM) in Paris, the criticality assessment lists six metals that are particularly vulnerable to a disruption in supply. But based on what criteria? As Pierre Toulhoat, deputy CEO and scientific director of the BRGM, explains, “We selected six factors that we believe can be used to assess the criticality of a material: known reserves, uncertainty of supply and demand, political exposure, supply chain recycling, and vulnerability to the absence of substitution.”

Using different criteria, the European Union came up with a list of 27 critical materials in its latest assessment in 2017. “Our approach, like the EU’s, has inadequacies,” Mr Toulhoat admits. “But it is intended to specifically address manufacturers’ concerns.” Furthermore, these rankings only provide a snapshot at a given time and could change if, for example, new reserves are discovered. As evidence of the changing situation, the European Union’s first list, published in 2011, included 14 critical materials, the second in 2014 had 20, and the most recent, 27.



In North Kivu, Democratic Republic of the Congo, Alphamin holds the license to operate one of the largest tin deposits in the world.

Our high-tech future will hinge increasingly on these elements. And their consumption is set to grow by 10% to 15% per year until 2021." A case in point: the motor in Tesla's Long Range Model 3 contains between 0.75 kg and 1.7 kg of neodymium and praseodymium. And the Silicon Valley-based builder hopes to sell 9.4 million units by 2020.

Again, this growth in demand benefits the industry's large mining companies. For example, in September 2018 the Australian company Lynas reported a 700% increase in profits over the previous 12 months (see company features, p. 37). "After years of struggling, we're obviously happy about this spectacular turnaround," Mr Le Roux says. "But we have to remain careful. The fundamentals, driven by the electric car revolution under way, are positive, but the market for rare earths is not healthy."

For example, between January and September 2017, the price per tonne of neodymium and praseodymium rose 87% and 81% respectively as a result of rumours of a reduction in Chinese production, before plummeting back down in 2018. "It's symptomatic of the raw materials industry, which is a cyclical market," says Florian Fizaine, an economist at the Université Savoie Mont Blanc and author of the book *Les métaux rares: opportunités et menaces* (Rare Metals: Opportunities and Threats). "When demand increases, supply cannot immediately adjust because it takes 10 to 15 years to open a new mine. Markets panic and prices soar, and then mining projects get launched. That's when manufacturers simultaneously scale back consumption as much as possible. These two actions help quell markets and push prices back down. As such, the raw materials industry regularly experiences dramatic ups

and downs, which investors can benefit from."

But in the specific case of rare earths, investment seems risky. "Unlike hydrocarbons or more common metals such as copper, which are bought and sold on regulated markets, rare earths trade over-the-counter. That means that their prices are opaque and unpredictable. Making matters worse, 20% to 25% of production comes from illegal mines," Mr Toulhoat says.

Meanwhile, China, which covers over 90% of the planet's needs, is frequently accused of keeping the price of rare earths artificially low to prevent other mines from opening around the world and thus promoting its own high-tech companies. "With sights set on more than just mining, Beijing has used its natural resources to its advantage to develop its technological expertise,"

Mr Pitron says. "To benefit from unlimited access to rare earths, western companies have been encouraged to set up operations there. Their technology was then copied, which has thrust China into a position of world leader in the energy transition." The country now largely dominates wind power, solar panels and electric vehicles.

Behind the critical metals market lies a geopolitical and economic war. The world realised this in 2010, when Beijing decided to drastically reduce its global exports of rare earths. Following that decision, dysprosium prices, for instance, shot up 1,000% in just a few months, and supply was disrupted for many companies. China has since rethought its attitude by lifting quotas in 2015. But a similar crisis could reoccur in the next few years.

"I think that Beijing has understood that it is not in its interest to manipulate prices"

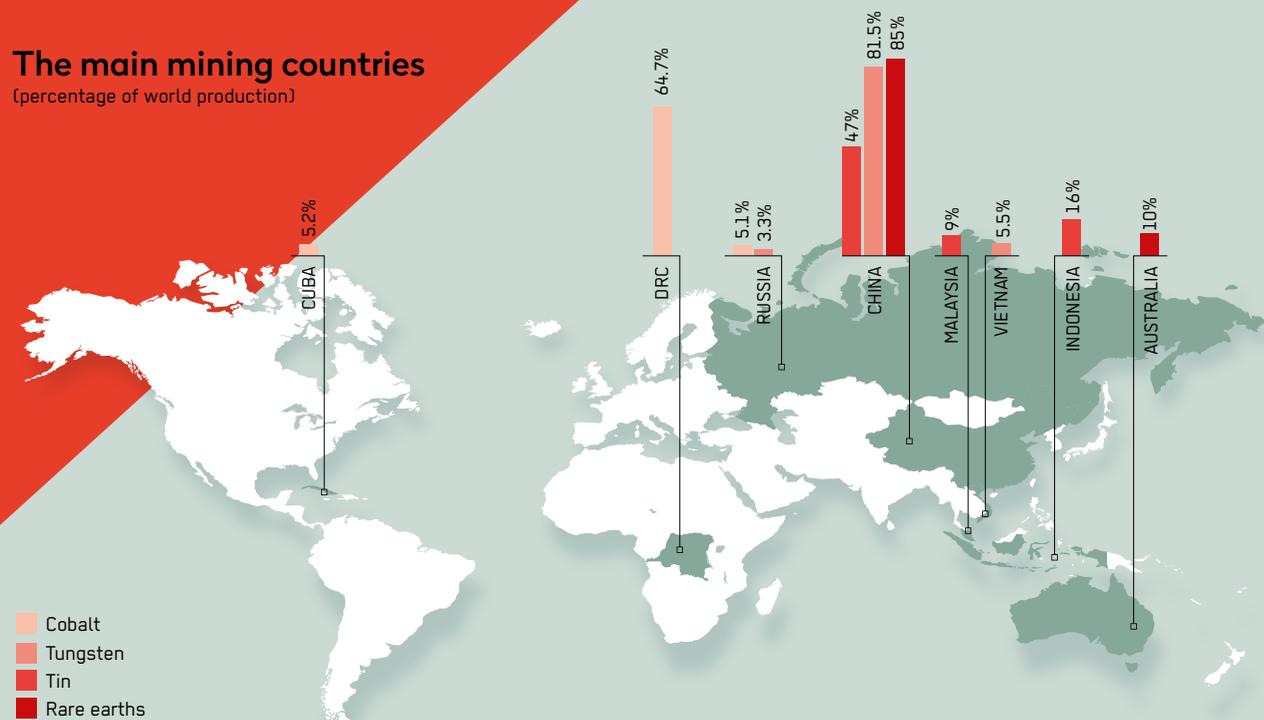
Gilles Lepasant, researcher at Centre Marc Bloch in Berlin

"I think that Beijing has understood that it is not in its interest to manipulate prices," says Gilles Lepasant, a researcher at Centre Marc Bloch in Berlin. "By triggering oil shocks, OPEC has lost its monopoly over petroleum. China does not want to have the same fate. Instead, it wants to control technology." But other countries might be tempted to give it a try. For example, in 2018 the Democratic Republic of the Congo (DRC), which controls 60% of the world's cobalt production, introduced mining reforms that heavily tax cobalt exports. That move sent markets reeling.

As the leading producer but also the leading consumer of rare

The main mining countries

(percentage of world production)



Source: Minéralinfo

FIVE IMPORTANT COMPANIES

GLENCORE THE CONTROVERSIAL GIANT

In July, Glencore was subpoenaed by the US Department of Justice in a corruption investigation. The news made stock prices plunge, but their financial performance remains solid. Glencore quadrupled its profits in 2017, due in particular to soaring cobalt prices. As the world's primary producer of the metal, the company is expected to extract 39,000 tonnes in 2018, the equivalent of one-third of global production. Analysts are confident and recommend purchasing shares – but a decision from the US judicial system could thwart this optimism.

HEADQUARTERS: BAAR (CH)

EMPLOYEES: 146,000

TURNOVER (2017): \$205.48 BILLION

GLENCORE

LYNAS DAVID AND GOLIATH

In a market monopolised by China, Australian mining company Lynas is struggling. Between 2012 and 2016, the group was in the red – its only saving grace was financial support from the Japanese government, via a company called Jogmec. But the rare earths revival in 2017 changed the game. Now in the black, Lynas is expecting to double capacity at its Mount Weld mine. Shares, which are still low, are a good investment if rare earth prices continue to increase – especially since the company has signed long-term contracts with multinationals such as Bosch in order to secure its revenue if prices fall again.

HEADQUARTERS: SYDNEY (AUS)

EMPLOYEES: 750

TURNOVER (2017): \$374 MILLION

LYNAS

NEO PERFORMANCE HIGH QUALITY

After Molycorp went bankrupt in 2015 (see p. 48), its primary creditor, Oaktree Capital, took the most attractive assets from the failed California company and created Neo Performance Materials. Listed on the Toronto stock exchange since 2017, the company specialises in producing very pure rare metals – an approach that ensures significant margins. Neo supplies several multinationals, including Philips, Samsung and BASF. Analysts recommend purchasing shares.

HEADQUARTERS: TORONTO (CA)

EMPLOYEES: 1,800

TURNOVER (2017): \$434 MILLION

NEO



In China, a worker is working on rare earth purification operations – a polluting process.

TOBY SMITH/UNKNOWN FIELDS

metals, China does not intend to get caught up in a game that it knows well. So Beijing gained a foothold in Africa, where the company China Molybdenum now controls 20% of cobalt production in the DRC. “From Zambia to South Africa to Peru, China is investing in raw materials everywhere,” says Mr Toulhoat from the BRGM. And that situation has the European Union, Japan and the United States, as well as listed companies that use critical metals, worried.

WATCH OUT FOR DISRUPTION

“Since the 2010 crisis, the issue of critical metals has many multinationals concerned, because a sharp rise in prices, or a shortage, could have terrible consequences for the econo-

my,” says Patrick Wäger, head of the Technology and Society Laboratory at the Swiss Federal Laboratories for Materials Science and Technology (Empa) in St. Gallen. To raise the awareness of Swiss companies to the danger, in 2015 Empa and Swissmem, the umbrella organisation uniting Switzerland’s mechanical and electrical engineering industries, launched Metal Risk Check, an online tool that companies can use to assess how dependent and vulnerable they are to approximately 30 rare metals. But, our research says that the platform is not used much.

Elsewhere in the world, big consumers of critical materials are trying to reduce their dependence to minimise the risk of supply disruption.

For example, the motor in the Renault Zoe electric car has done away with all rare earths in its rotor coil. “For now, this type of electric motor is bigger and heavier than motors with neodymium magnets,” says Professor Philippe Degobert, head of the Mobility and Electric Vehicles Master’s programme at Arts et Métiers ParisTech. “But new ideas are being developed to improve that.” Meanwhile, Nissan developed a new motor for its Nissan Leaf, reducing the amount of dysprosium used by 40%. And in February 2018, Toyota announced that its next models would contain 20% to 50% less neodymium.

With these efforts, it is difficult to predict how demand for rare metals will evolve over the long

term, especially considering that any compound is susceptible to being used in a disruptive technology. “Until 2025, demand for critical metals will continue to rise significantly. And supply will struggle to keep up,” says Mr Lepasant, an energy transition expert. “After that, we can draw lines on charts, but nothing is certain. For instance, if an alternative solution emerges that replaces lithium-ion batteries, lithium demand could collapse within a few years.”

“From Zambia to South Africa to Peru, China is investing in raw materials everywhere”

Pierre Toulhoat, director of Bureau de Recherches Géologiques-Minières (BRGM)

It’s not just theory. This was the case for platinoids (platinum and palladium), which long featured on lists of critical metals. But the gradual shift from internal combustion engines to electric motors lifted the pressure off platinum (used in catalytic converters in diesel engines) and off palladium in their petrol-powered counterparts.

In his presentation at the World Materials Forum, Robert Friedland, CEO of the Canadian firm Ivanhoe Mines, urged participants not to underestimate disruptive technology faster than we can imagine. The business leader then presented the qualities of vanadium batteries, which can outperform and potentially replace lithium-ion versions. Advantage: the compound is highly abundant in the earth’s crust and can be easily recycled. Disadvantage: vanadium batteries are currently too big and heavy to be used in cars or phones. “At research laboratories, we are making advances in substituting certain critical metals with other materials,” says Mr Wäger from Empa. “But implementation at the industrial level is often complicated and uncertain.”

CHINA NORTHERN THE KING OF BAOTOU

China Northern Rare Earth is relatively unknown. But the discreet Chinese consortium is the top rare earths miner in the world, producing 60,000 tonnes per year – over one-third of the world’s estimated annual production of 160,000 tonnes. Thanks to the 2017 price boom, the company’s profits increased nearly 260% in the first half of 2017 compared to the previous year. Most analysts recommend keeping shares.

HEADQUARTERS: BAOTOU (CN)

EMPLOYEES: 9,500

TURNOVER (2017): ¥ 7.7 BILLION

600111

CHINA MOLYBDENUM GLENCORE’S RIVAL

This company, which is among the top five publicly listed companies on the Hong Kong exchange, is battling Glencore for dominance of cobalt in the Congo. It is the second-biggest global producer of the metal, but also one of the main producers of tungsten and niobium – a rare metal used primarily in the manufacturing of steel and superalloys. China Molybdenum also stands out as a global leader in the production of copper and – as its name indicates – molybdenum, a metal used in alloys. Most analysts recommend purchasing shares.

HEADQUARTERS: LUOYANG (CN)

EMPLOYEES: 11,200

TURNOVER: ¥ 7.43 BILLION

603983

AND ALSO...

ALPHAMIN

In 2019, the Belgian company aims to double its tin production in the Democratic Republic of the Congo. AFM

MEDALLION RESOURCES

This Canadian company is hoping to become a key producer of low-cost rare earths. MDL

YUNNAN TIN

This Chinese company is the world’s leading producer of tin. 000960

RIO TINTO

Alongside Glencore, this UK-Australian company is another global mining giant. RIO

RAINBOW RARE EARTHS

This UK company has just begun extracting rare earths at the Gakara mine in Burundi. RBW

RAREST OF MATERIALS

This periodic table highlights which elements are scarcer and present greater risks of supply shortages.

1 1.008 H Hydrogen	2 4.0026 He Helium	3 6.938 Li Lithium	4 9.012 Be Beryllium	5 10.806 B Boron	6 12.0096 C Carbon	7 14.0064 N Nitrogen	8 15.999 O Oxygen	9 18.998 F Fluorine	10 20.1797 Ne Neon
11 22.989 Na Sodium	12 24.304 Mg Magnesium	13 26.9815 Al Aluminium	14 28.084 Si Silicon	15 30.974 P Phosphorus	16 32.059 S Sulfur	17 35.446 Cl Chlorine	18 39.948 Ar Argon	19 39.0983 K Potassium	20 40.078 Ca Calcium
37 85.4676 Rb Rubidium	38 87.62 Sr Strontium	39 88.9058 Y Yttrium	40 91.224 Zr Zirconium	41 92.906 Nb Niobium	42 92.906 Mo Molybdenum	43 98.906 Tc Technetium	44 101.07 Ru Ruthenium	45 101.07 Rh Rhodium	46 106.42 Pd Palladium
55 132.905 Cs Cesium	56 137.327 Ba Barium	57-71 Lanthanoids*	72 178.49 Hf Hafnium	73 180.948 Ta Tantalum	74 183.84 W Tungsten	75 186.207 Re Rhenium	76 190.23 Os Osmium	77 192.227 Ir Iridium	78 195.084 Pt Platinum
87 (223) Fr Francium	88 (226) Ra Radium	89-103 Actinoids**	104 (261) Rf Rutherfordium	105 (268) Db Dubnium	106 (269) Sg Seaborgium	107 (270) Bh Bohrium	108 (277) Hs Hassium	109 (278) Mt Meitnerium	110 (281) Ds Darmstadtium

*Lanthanoids

**Actinoids

Risk level

- Low
- Moderate
- On watchlist
- High
- Very high

Note: elements in white were not tallied.

57 138.905 La Lanthanum	58 140.116 Ce Cerium	59 140.908 Pr Praseodymium	60 144.242 Nd Neodymium	61 (145) Pm Promethium	62 150.36 Sm Samarium	63 151.964 Eu Europium	64 157.25 Gd Gadolinium	65 158.925 Tb Terbium	66 162.500 Dy Dysprosium
89 (227) Ac Actinium	90 232.0377 Th Thorium	91 231.036 Pa Protactinium	92 238.0289 U Uranium	93 (237) Np Neptunium	94 (244) Pu Plutonium	95 (243) Am Americium	96 (247) Cm Curium	97 (247) Bk Berkelium	98 (251) Cf Californium
67 164.930 Ho Holmium	68 167.259 Er Erbium	69 168.934 Tm Thulium	70 173.045 Yb Ytterbium	71 174.968 Lu Lutetium	72 (175) Hf Hafnium	73 (176) Ta Tantalum	74 (176) W Tungsten	75 (176) Re Rhenium	76 (176) Os Osmium
101 (257) Md Mendelevium	102 (259) No Nobelium	103 (266) Lr Lawrencium	104 (269) Rf Rutherfordium	105 (270) Db Dubnium	106 (271) Sg Seaborgium	107 (272) Bh Bohrium	108 (273) Hs Hassium	109 (274) Mt Meitnerium	110 (275) Ds Darmstadtium

Six critical elements

A key component in batteries, cobalt is being closely watched. On the one hand, the electric vehicle boom is expected to increase demand, which has reached 100,000 tonnes per year. But on the other hand, there is a lot of political uncertainty, as nearly half of the world's reserves of this metal is in the Democratic Republic of the Congo. An example of this tension: the price of one tonne on the London Metal Exchange reached \$95,000 in March, following Kinshasa's threat to impose a usage fee on strategic metals. Ever since, prices have fallen to around \$62,000, but new sudden increases seem inevitable.

Main industries

Rechargeable batteries (electric cars and electronics)

Available reserves

25 years*

Substitutes

Alternatives exist but they offer lower performances

50 118.710
Sn
Tin

According to a study published by MIT in March 2018, the humble tin was ranked the most essential metal to the growth of future technologies. Each year, 300,000 tonnes, of which one-third is recycled, supply our consumption needs. But new resources need to be found, otherwise global tin reserves will run out. For the time being, this outlook hasn't had much of an impact on prices. Since early 2017, one tonne is worth between \$19,000 and \$22,000 on the London Metal Exchange.

Automotive (engines), microelectronics

74 183.84
W
Tungsten

With 37 years of reserves in active mines, tungsten is raising concerns due to the lack of a substitute and price control by China, which oversees more than 80% of global tungsten production. Each year, close to 100,000 tonnes of this metal, of which 20,000 is recycled, is used to help make superalloys needed in the aeronautical and defence industries.

Defense, aerospace

59 140.908
Pr
Praseodymium

Rare earths (a group of 17 metallic elements, the most important of which, for industry, are praseodymium, neodymium and dysprosium) are actually not so rare. There are close to 180 deposits around the world, and about 60 of them can be used. It is enough to meet industry needs for at least 50 years, and maybe even several centuries. But increased demand, associated with China's monopoly that ensures more than 90% of production, is putting pressure on prices. Between January and September 2017, tonnes of praseodymium and neodymium went up by 87% and 81% following Beijing's decision to strengthen its environmental legislation. Rare earths are traded via mutual agreement, but real prices are still largely unknown, especially since at least 20% of global production is assured by illegal mines.

Automotive, wind turbines, computing, aerospace, defense

60 144.242
Nd
Neodymium

66 162.500
Dy
Dysprosium

17 years*

Alternatives exist but they offer lower performances

37 years*

None

50 years minimum*

Efforts are being made to substitute and reduce the consumption of almost all rare earths

* based on known deposits and projection of current consumption rates

Source: "Criticality assessment", prepared by the World Materials Forum, BRGM, GRU and McKinsey / Mineral Info / London Metal Exchange

A worker at a rare earth mine in Jiangxi Province, China (October 2010).

THE DARK SIDE OF GREEN ENERGY

Rare metals, essential for making “clean” energy, are highly criticised because their extraction causes environmental damage.

BY BERTRAND BEAUTÉ

“To fight pollution, drive your car.” To promote its Zoe model in 2013, Renault went with shock tactics. The French manufacturer proudly announced its “100% electric, 0% emissions” vehicle. Excellent, it’s finally possible

STRINGER / REUTERS



to drive thousands of kilometres cleanly without feeling guilty for polluting the planet. That was before reading the fine print at the bottom of the page. Yes, it was a 0% CO₂ emissions vehicle, but only during use and with all new parts.

“This type of advertising is total greenwashing,” said Guillaume Pitron, author of *La guerre des métaux rares: la face cachée de la transition énergétique*, a book on rare metals. “It leads people to believe that we can drive without polluting the earth. But much like clean energy, clean vehicles don’t exist. It’s a marketing slogan designed to feed into the illusion that these technologies are green, when in reality they depend on the extraction of dirty metals.”

Our beautiful electric vehicles, our rechargeable batteries, wind turbines, photovoltaic cells and the latest technologies (smartphones, computers, televisions, etc.) all contain rare metals: cobalt, neodymium, dysprosium, lithium, and more. There’s quite a list. A 7-MW offshore turbine, for example, contains more than one tonne of rare earths. In a Tesla Model 3 Long Range, just the engine alone contains between 0.75 and 1.7 kg of neodymium and praseodymium. As a result: “The energy transition isn’t an environmental transition. It’s a metal transition,” said Pitron. “We’ve stopped using fossil fuels (petrol, coal and gas) and started using rare metals. But there’s nothing clean about the mining industry.”

Especially since rare earths have particular qualities which mean they cause a lot of pollution upon extraction: “Unlike more conventional metals like copper, these metals are very rarely concentrated in active mines. This means you have to excavate incredible quantities of rock to obtain just a few grams,” explained Pierre Toulhoat, director of BRGM, the French geological survey. “Furthermore, rare earth oxides are often associated with

radioactive elements, such as thorium and uranium, which increases the cancer risk for people living nearby.” Using chemical products throughout the extraction process also generates gaseous discharge, waste water and toxic solid waste.

“Here, we’re increasingly environmentally-friendly and virtuous. But that’s at the expense of other countries”

Pierre Toulhoat, director of BRGM, France’s geological survey

For his investigation, which lasted six years, Pitron went to Baotou in Inner Mongolia, the location of the largest Chinese production site for these strategic metals: “Rare earth mines have caused massive environmental damage there,” said the journalist. “Some of the most serious damage

I saw during my on-site reporting were the “lakes” of toxic waste around Baotou. I visited several nearby “cancer villages” where residents are slowly dying due to the radioactivity and the heavy metal concentration in the ground.”

China is trying to improve the situation. In its 2017 five-year plan, Beijing announced it would close 6,000 particularly dangerous mines by 2020, targeting in particular the illegal sites. Inspections will also be ramped up. It’s a first step.

STOP THE HYPOCRISY

In the Democratic Republic of the Congo (DRC), where 60% of the world’s cobalt is produced, the situation isn’t any better and regulation is virtually non-existent. “As a result of high demand, cobalt extraction is becoming more and more common in artisanal mines, where conditions are often horrendous,” said Alexander Lefteris Papadovassilakis, researcher at the Graduate Institute of International and Development Studies in Geneva. “Workers, including children, barely make enough to be able to eat. Furthermore, cobalt could become a ▶

In the film *Rare Earthenware* (2015), we discover the toxic lakes generated by the extraction of rare earths in China.



TOBY SMITH/UNKNOWN FIELDS

source of significant revenue for armed groups, which could possibly spur new conflicts in the country.”

Lithium extraction in the Andean Altiplano (Argentina, Bolivia and Chile) is also problematic, especially because a large amount of water is needed for mines in extremely dry regions.

“We cannot mine these materials in the way we are now,” said Gilles Lepasent, research director at the Centre Marc Bloch in Berlin, and expert in the energy transition. “From a technological perspective, we should be able to implement sectors that are much cleaner and more socially equitable.”

“Investors have an important role to play in supporting ethical projects”

Pierre Toulhoat, director of BRGM

The problem is that most critical metal mining activities take place in countries whose environmental regulations are much less stringent than in Europe, if they exist at all. “Mining giants most often comply with the

legislation that applies in the countries they’re operating in,” said Toulhoat. “Beyond that, market rules apply. The cheaper the production, the better the return on investment. In the DRC, for example, most mines are open-pit because it is less expensive than an underground mine. But the environmental consequences are more significant and longer-lasting.”

REOPENING EUROPEAN MINES

As we sit behind the wheel of our electric vehicles driving through mountain pastures, the pollution is invisible to us. “It’s a form of green neocolonialism,” said Toulhoat. “Here, we’re increasingly environmentally-friendly and virtuous. But that’s at the expense of other countries. When I bring this up to politicians, they look away. They would rather maintain their blinkered vision. But I think it’s an ethical responsibility to address these problems.”

It’s particularly important for rare earths, because these elements aren’t actually rare. They can be found basically everywhere around the world, particularly in the United States and Europe. With that in mind, Pitron is calling for the end of the “hypocrisy”: “Extracting and refining rare earths causes so much pollution that in the 1990s, western states decided to leave the industry. China accepted to pollute its own environment to provide these minerals for the entire world. Now, we must open our eyes to the pollution that no one wants to see: Europe must re-open its mines, since there are far stricter environmental regulations here. As a result, we, alongside China, would share a part of the environmental burden of the energy transition.”

But few are convinced: “When you think about how hard it is to build an airport in France, I’m not sure it would be possible to dig a mine,” said an expert with a smile. “But we can always dream.” In the meantime, Pierre Toulhoat is working with

Recycling’s broken promises

To improve the environmental footprint of strategic materials, everyone’s talking about one thing: recycling. From an environmental perspective, the sector has huge potential. Currently, the recycling rate of rare earths is only 2%, compared to more than 50% for more common materials like copper. But the industry isn’t rushing to implement a recycling programme. “Given the current prices of rare materials, recycling just isn’t profitable,” said economist Florian Fizaine, author of *Les métaux rares: opportunité ou menace?* “Especially since mass-produced products like smartphones contain such a tiny amount of rare earths, so it is quite difficult to extract them for recycling.”

But companies are trying to do so regardless. In Japan, car manufacturers (Toyota Tsusho and Honda) have implemented a rare earths retrieval system for their batteries. In Europe, chemical group Solvay launched its recycling system in 2011 with great fanfare, which was specifically for rare earths used in its energy-efficient lightbulbs. But the Belgian

company had to throw in the towel in 2016. “LEDs replaced energy-efficient bulbs quicker than expected, which was a fatal blow to Solvay’s project,” said Pierre Toulhoat, director of BRGM, France’s geological survey. “Little by little, Solvay ran out of raw materials (used lightbulbs) and the factory had to stop operations because there was nothing to recycle.”

This is one of the difficulties of retrieving rare earths: to establish a recycling process, a company has to ensure that the material to recycle will be constant and sustainable, like glass or PET plastic bottles. “But in the high-tech industry, these conditions aren’t met,” said Toulhoat. “Technological disruptions are too fast and too severe. A very popular metal today, such as lithium which is used to make all our batteries, could be replaced by something else in just a few years. Such a change would effectively be a death sentence for the entire recycling industry for this metal. That’s what happened to Solvay, whose project was stillborn. Technological disruptions are one of the major challenges for recycling.”

In 2016, a woman and a child break rocks in an artisanal cobalt mine in Lubumbashi, Democratic Republic of the Congo.



producer countries, particularly in Africa: “We’re trying to help them identify and access their natural resources while minimising the environmental and social damage.” The BRGM director believes that “investors have an important role to play in supporting ethical projects”.

Consumers, in turn, can purchase products made by companies that use materials that cause the least amount of pollution. In October 2017, Greenpeace published the *Guide to Greener Electronics*, which compares products and strategies of various smartphone and computer manufacturers. It concluded that the three most environmentally-friendly companies were Fairphone, Apple

and Dell. The worst were Oppo, Vivo and Xiaomi.

But for cars, is it better to move towards electric vehicles, or continue to roar our good old combustion engines? To answer this question, the French Environment & Energy Management Agency (ADEME), the Fondation pour la nature et l’homme and the European Climate Foundation compared the life cycle (production, usage and end of life) of six models. The results, published in December 2017, demonstrate that the environmental costs of producing an electric vehicle are more significant than producing a diesel or petrol vehicle, particularly

because electric relies on rare metals. But in terms of usage, electric cars are better. In sum, according to the report, in a country like Switzerland or France where electricity production is partly decarbonised, “greenhouse gas emissions caused by the production, usage and end of life of an electric vehicle are actually two to three times less than that of petrol and diesel vehicles.”

Despite this good performance, the French advertising ethics board scolded Renault and its Zoe for adverts in 2014: though electric cars cause less pollution than their combustion counterparts, they cannot be marketed as “environmentally-friendly” or “clean”. ▲

INTERVIEW

“THERE WILL BE ENORMOUS PRESSURE ON RESOURCES”

Founder and vice president of the World Materials Forum, Professor Victoire de Margerie believes that we must figure out how to handle the critical metals situation immediately.

BY BERTRAND BEAUTÉ

Dubbed the “Davos of materials”, the World Materials Forum (WMF) has met each year since 2015, bringing together leaders and researchers from all over the world. The latest edition was held this June in Nancy. Participants are all concerned about one thing: finding solutions to counter the global dependency on critical metals. Victoire de Margerie, vice president of the forum, spoke with *Swissquote Magazine*.

In the 1970s, experts estimated that petrol reserves would be used up in early 2000. Almost 20 years later, we still have petrol... Should we really be concerned with the availability of critical metals?

I hope that in 30 years, we'll be saying the exact same thing about

what we deem today to be critical materials. But in order to do that, we need to act immediately. The global economy has three major challenges: incredible urbanisation, the growth of the middle class and transport electrification, all of which exert unprecedented pressure on the usage of certain materials.

“If we do nothing, the consumption of materials will double in 10 years”

Let's look at an example: the middle class, which is currently 1.7 billion out of the 7 billion people on the

planet, is expected to more than double by 2030. It is wonderful that more and more people around the world are no longer living in poverty and can access a better quality of life. But at the same time, the middle class consumes more goods and services (smartphones, packaged foods, transport, etc.). As a result, there will be enormous pressure on natural resources: if we do nothing, the consumption of materials will double in 10 years. Obviously, that's a problem.

Are we headed towards shortages?

No. There will never be a significant supply disruption. In the short term, the quantity of available reserves isn't critical. But the concerns we have about the immediate availability of certain metals are already an issue. It would only take an everyday news event, like a new president being elected in Africa, to see a brutal surge in prices. In May 2016, for example, Beijing decided to limit the number of working days in coal mines to 276 days per year, which resulted in a significant increase in the price of coal in November of that year.

A more long-term perspective is that we must never forget that we only have one earth and its resources are limited. If we do nothing, we'll end up being physically limited. That will lead, in my opinion, to two extremes. On the one hand, lawless mining companies will go in search of raw materials wherever they can find them, such as in war-torn countries, using child labour and in an environmentally irresponsible way. On the other hand, Stalinist neo-ecologists will advocate for a return to the Middle Ages. To avoid that, we created the World Materials Forum (WMF) in 2014 in order to provide moderate, pragmatic solutions.

So what are those solutions?

The first solution is to bring all players together around the same table. That's what we're trying to do at the WMF, where CEOs of multi-

nationals, start-ups, scientists, NGOs and politicians can come together to discuss the problems and measure the progress being made. And I can tell you that the discussions get lively (*laughs*).

In order to avoid doubling our consumption of these materials, like we talked about earlier, we're mainly focused on three approaches: *use less* (which includes reducing and recycling), *use longer* and *use smarter* (use the optimal material for a given usage). In all three of these areas, we have a lot of work to do.

Have you already seen concrete results come out of the WMF?

Our “criticality assessment”, which evaluates the risk of a supply disruption for certain metals for the industry (see infographic on page 40), is starting to become an international benchmark that is useful for everyone, from raw materials suppliers to public and private users. Furthermore, we have developed performance tools that allow manufacturers to measure their progress on the path to “Use Smarter, Less and Longer”. Several prominent banks have told me they've studied the relevancy of our indicators in order to include them in future financial analyses of listed manufacturing companies. If financial people get involved, it's the beginning of a virtuous circle.

But what I'm most proud of is undoubtedly the innovations that result from the forum. Each year I see amazing ideas! In 2017, for example, we awarded our grand prize for start-ups to Citrine Informatics. Based in Redwood, California, the company developed an aggregation system for all the available data on materials. Thanks to this algorithm, Boeing was able to develop a new alloy by mixing aluminium and zirconium, which means that the weight of certain parts will be reduced significantly.

So the depletion of resources isn't the end of the world?

No. For us, the most important thing is to find ways to use existing resources in a smart manner in order to make sustainable growth independent of raw materials consumption, while also creating value. Clearly, there are many obstacles and the effectiveness of the measures we take today will only be seen in the medium to long term. But when I see all these innovations, I am optimistic. ▲

THE PRIESTESS OF MATERIALS

With degrees from HEC and Sciences Po Paris, Victoire de Margerie is an industrialist through and through. After beginning her career in 1987 in chemistry at Elf Atochem (now Arkema), she held executive positions in Germany, the United States and France at CarnaudMetalbox (packaging) and Pechiney (aluminium) until 2003. As a professor at the Grenoble School of Management from 2003 to 2011, she published four books on corporate management. In 2012, she became head of Rondol Industrie, a company she founded in Strasbourg. In 2014, alongside Philippe Varin, president of the executive board at Areva, she founded the World Materials Forum, of which she is vice president. She is also the half-sister of the former CEO of Total, Christophe de Margerie, who died in 2014 in a plane crash in Moscow.

ONCE UPON A TIME AT MOUNTAIN PASS

The incredible tale of a California mine illustrates the geopolitical and economic war sparked by critical metals. Here is its story.

BY BERTRAND BEAUTÉ

Yes, there is a tourism office in Mountain Pass, but tourists won't see many sights. There are no casinos, like in the nearest big city Las Vegas, or bizarre landmarks, such as the tallest thermometer in the world, in Baker about 60 kilometres away. Interstate 15, the highway that leads to this hidden town in California, cuts through a rocky desert dotted with a few shabby motels sweltering under the hot sun.

But in a century or possibly sooner, this small American town could become a fascinating museum.

Tourists of the future could come to relive the great battle for rare metals that began at the start of the 21st century, much like tourists of today learn about the Gold Rush in the 19th century by visiting the California Mining and Mineral Museum in Mariposa.

This is because Mountain Pass is home to an unusual feature – an open-cast mine measuring 222,000 sq. metres – whose story is strangely tied up with that of critical metals. It all began in 1949. At the time, Russia and the United States were competing to develop

the most powerful atomic bomb, as they would continue to do throughout the Cold War. As a result, demand for radioactive materials increased and prospectors scoured America for uranium and plutonium. One prospector noticed abnormally high radioactivity in Mountain Pass. The Molybdenum Corporation of America bought the land and mining began in 1952.

But while the site did indeed contain traces of uranium and thorium, two radioactive compounds, it was other metals found there that would become famous: rare earth elements. ▶



“Washington was very happy to get rid of the mine and leave extraction of these metals to China”

Patrick Wäger, director of the technology and society department of the Swiss Federal Laboratories for Materials Science and Technology (EMPA)

In the 1960s, production at Mountain Pass increased quite significantly in order to meet the demands for europium, a metal needed to make cathode tubes used in colour televisions. Then other elements – primarily cerium, lanthanum and neodymium – began to be mined here as well. Elements were so plentiful that by 1984 Mountain Pass alone supplied nearly 100% of US demand for rare earths, as well as 33% of global market.

CHINA MAKES ITS MOVE

But this domination was short-lived. “Starting in the late 1980s, China began to take a closer look at these elements,” says Guillaume Pitron, author of *La Guerre des Métaux Rares*, published in January 2018. “Deng Xiaoping (ed. note: leader of China from 1978 to 1989) predicted: ‘The Middle East has petrol, we have rare earths.’ At that moment, everything changed. The United States, which was the world leader in rare-earth production from 1960 to 1989, progressively left the market open to China.”

Once Chinese minerals made it to the market, prices dropped. Between 1992 and 1996, the price of one tonne of rare earths fell from



MASIMO BREGA, THE LIGHTHOUSE / K EYSTONE

With a surface area of 220,000 m², Mountain Pass is the world's largest rare earths mine outside of China.

\$11,700 to \$7,400. Mountain Pass became less and less profitable. And then an environmental disaster occurred: in 1998, pipelines carrying the mine's wastewater exploded, spilling thousands of litres of radioactive mud into the Ivanpah Dry Lake. That was the final straw for the state of California, which decided to close the complex in 2002 – a decision that suited everyone involved. “Because of the disastrous environmental impact

of rare-earth mines, Washington was very happy to get rid of the mine and leave extraction of these metals to China,” said Patrick Wäger, director of the technology and society department of the Swiss Federal Laboratories for Materials Science and Technology (EMPA) in Dübendorf. “Especially since at the time, these elements weren't yet considered to be critical economically. They were used relatively infrequently and were a niche market.”

Little by little, countries gave up extraction and China took over, inundating the entire world with inexpensive raw materials. At one point, the country controlled 95% of the world's rare-earth production, without anyone worrying about dependence on China. In 2011, however, Beijing decided to implement export quotas and prices skyrocketed. In July 2011, the price of dysprosium, for example, was up to \$3,410/kg, a 10,500% increase from 2002! It was an extreme shock for the entire world, because during that time rare earths had become vital for the production of many products. Without rare earths, there would be no electric cars or new-generation aeroplanes, not to mention the fact that our smartphones and computers contain them as well.

WASHINGTON'S BELATED RESPONSE

Right in the middle of the panic-induced bubble, Washington decided to immediately restart its rare earths production in the US. The Mountain Pass mine, abandoned 10 years earlier, reopened in 2012. In addition to reducing US dependence on China, the site aimed to be an example for the entire world. “We want to be an environmentally-conscious mine,” said Mark Smith, CEO of Molycorp, the company running the site. Indeed, Molycorp strived to present itself as one of the cleanest rare earths producers in the world.

It thumbed its nose, environmentally speaking, at China, which was known to produce high levels of pollution, but it was not to last. In 2012, the price of rare earths began to fall. “I think Beijing understood very quickly that it made a huge mistake by implementing quotas,” said Guillaume Pitron. The sharp rise in prices led to an increase in critical-metal extraction projects around the world: in the United States with Molycorp, in Australia with Lynas, as well as in Brazil and Canada. So China started back up again.”

As a result, prices fell as quickly as they rose. In 2015, one kilo of dysprosium cost only \$32 and Molycorp shares, which were worth around \$75 in 2011, dropped to just a few cents. After 13 consecutive quarters of losses and debt totalling \$1.7 billion, the company abandoned ship on 25 June 2015. The Mountain Pass mine, which was supposed to be environmentally-friendly, was closed once again.

Does the story end there? Not quite. In 2017, the California site was put up for auction. MP Mine Operations LLC offered \$20.5 million to acquire the land. Who would pay such a sum for an unprofitable mine? At the centre of the consortium is an investor from Chengdu, the capital of the Sichuan province: China's Shenghe Resources Shareholding Co. “China possesses approximately 40% of global rare-earth reserves, but accounts for 95% of global

production,” says Florian Fizaine, author of *Les Métaux Rares: Opportunités ou Menace?* “Beijing knows that this position isn't sustainable over the long term; China will inevitably have to import these metals at some point to supply its own industry. Its new policy consists of securing its supply by acquiring foreign resources.” The war of critical metals has only just begun and the story of Mountain Pass could continue. ▲

Elements were so plentiful that by 1984 Mountain Pass alone supplied nearly 100% of US demand for rare earths, as well as 33% of global market



From 1960 to the late 1980s, the Mountain Pass mine dominated the world of rare earths.

DAVID BECKER/REUTERS



SMARTPHONES

The Samsung-Apple duopoly is teetering

Until now, the smartphone market has been dominated by two giants, one from Korea and the other from California. But the industry is now being transformed with the onslaught of newcomers.

BY ANGÉLIQUE MOUNIER-KUHN

Richard Yu is perseverant. That's the least we can say. In an interview with the French financial newspaper *Les Echos* in 2013, a few months after taking the top position at Huawei, the 40-something CEO was unequivocally clear about Huawei's objective to "become the world's number one smartphone maker". The Shenzhen-based group had just moved into third place. But at the time, few people took that somewhat arrogant Chinese businessman seriously. Back then, Huawei only covered 4% of deliveries, still a long shot behind the crushing duopoly formed by the Korean giant Samsung and its US rival Apple.

Five years down the road, things look different. Since then, Huawei has clinched the spot as the global industry's second-largest and is expected to be worth \$380 billion this year, according to Strategy Analytics. In the second quarter of 2018, the Chinese firm shipped 54 million devices (41% more than in the previous 12 months), seizing 15.8% of the market, ahead of Apple's 12.1% (41.3 million units), as estimated by International

Data Corporation (IDC). Although Samsung remains in first place, its market share eroded to 20.9%, with shipments down by more than 10%.

"The industry hierarchy has periodically been shaken up by newcomers"

Neil Mawston, wireless device expert at Strategy Analytics

The unstoppable rise of Huawei is merely the most visible sign of the reshuffle shaking up the smartphone industry, where a whole host of new manufacturers has moved onto the offensive. "The industry hierarchy has periodically been shaken up by newcomers," says Neil Mawston, wireless device expert at Strategy Analytics. "In the 1980s, the United States dominated the market with Motorola. Then the Japanese took over the lead, followed by European manufacturers such as Nokia. Although the US ▶

came back as industry leaders with the release of Apple's iPhone, it quickly had to give up some of the lion's share to the Korean manufacturer Samsung. And now, Chinese companies are the ones upsetting the balance."

US PROTECTIONISM

Together, the top four Chinese brands – Huawei, Xiaomi, Oppo and Vivo – and their smaller emulators (OnePlus, ZTE, TCL) already account for 50% of the global market, despite being virtually absent in the early 2000s. And their ambition seems boundless. "I may not be very humble," Yu said in early 2016. But that admission from Huawei's boss was only a way of reiterating his goal: number one or nothing.

After Southeast Asia and India, he is now out to conquer new continents. But the company has run into problems. Claiming threats to national security, the US government has banned the sale of Huawei and ZTE terminals on military bases. Meanwhile, a deal with AT&T to sell Huawei devices fell through at the beginning of 2018. The trade war declared by Washington on Beijing suggests that the US market is unlikely to be opening any wider.

With little room for manoeuvre in the United States, Europe has become the hotspot for newcomers. Following in the footsteps of Huawei, Xiaomi first launched operations in Spain in 2017, then in Poland, France and Switzerland in

the spring of this year. With its logo stamp "Mi" as in "Mission impossible", the brand already boasts 4% of the European market.

In June 2018, Oppo, until then unknown in Europe, privatised part of the Louvre Museum in Paris to unveil its top-of-the-range model, Find X. The device's performance was praised by the technophile community, and Oppo looks set on the starting blocks to conquer Europe. Still taking its time, Vivo has yet to make its move into the Old Continent.

SAMSUNG COPIES

"The market is being completely resegmented," says Julien Leegenhoek, a tech stock analyst at Union

A global market running out of steam

"Between 2008 and 2017, annual shipments of smartphones rose from 150 million to nearly 1.5 billion units. That's a tenfold increase," says Julien Leegenhoek, a tech stock analyst at Union Bancaire Privée (UBP). "No consumer good has ever become so common so quickly." But today the market has nowhere left to go. Sales fell by 0.5% in 2017, estimates IDC, and are expected to drop a further 0.2% in 2018. Forecasts for the longer term differ depending on the firm, but "there is no way we will see the past performance of double-digit growth within the next two to three years," says Thomas Husson, an analyst at Forrester. Why? "Most people on the planet now have a smartphone," says Neil Mawston from Strategy Analytics, "which leaves little room for growth."

Bancaire Privée (UBP). "As there are only two operating systems – iOS (owned by Apple) and Android (owned by Google but freely accessible) – and all the parts are similar, any company could start making smartphones based on existing designs. With cheaper labour in China, they did it at lower cost."

Mr Mawston from Strategy Analytics agrees. "Huawei is now copying Samsung, the way Samsung once imitated Nokia, which served as a springboard for its development. Apart from minor differences, such as the use of certain materials, no ▶

"Become the world's number 1 smartphone maker"

Richard Yu, CEO of Huawei



COMPANIES TO WATCH

APPLE

LUXURY GOODS GROUP

"Apple is an exceptional brand, like Porsche for cars or Rolex for watches," says Neil Mawston from Strategy Analytics. Building on its premium mystique, the tech giant keeps raising its prices to fatten its margins despite dropping sales. The Max version of the latest iPhone XS culminates at \$1,449 on the US market and is even more expensive abroad. This has analysts wondering how much longer the US brand can maintain this strategy. "No one knows, but there is probably a psychological barrier, beyond which consumers will refuse to pay several times the price of a computer for a smartphone." Until then, UBS recommends buying the stock and raised its price target to \$250 in early September.

HEADQUARTERS: CUPERTINO (US)

EMPLOYEES: 123,000

REVENUE (2017): \$229 BILLION

▲ APPLE

SAMSUNG ELECTRONICS

THE WEAKENED GIANT

The South Korean giant boasted a record-high performance in 2017, a spectacular turnaround after two dark years. But its share fell 10% in 2018, mainly due to concerns about slowing technological innovation to support its smartphone sales. With operations worldwide, the conglomerate generates 50% of its revenue from phone sales, but 75% of its profits come from electronic chips. But the expected drop in memory chip prices after a two-year surge is now weighing on the share price. Goldman Sachs removed Samsung Electronics from its conviction list mid-September.

HEADQUARTERS: SEOUL (KOR)

EMPLOYEES: 320,671

REVENUE (2017): KRW 239,580 BILLION (\$211 BN)

▲ 005930

XIAOMI

COMPROMISED AMBITION

Expected to be one of the landmark financial events of the year, Xiaomi's IPO in July did not live up to its promises. The firm founded by Lei Jun in 2010 only raised the equivalent of \$4.7 billion, setting its value at \$54 billion, i.e. half the announced valuation. And since then, the share price has been idling. Despite that, Reuters analysts have set their consensus recommendation as "outperform".

HEADQUARTERS: BEIJING (CN)

EMPLOYEES: 15,000

REVENUE (2017): CN¥ 114.62 BILLION (\$16.6 BN)

▲ 1810

The boom in refurbished smartphones

The second time his smartphone stopped working, Simon didn't think twice about it. "The only thing that mattered was that I didn't want to pay too much for a new device," the young student said. Within a few minutes on an online platform, he bought a "refurbished" iPhone 7 for about half the price of a new device. Refurbished smartphones are second-hand devices that have been collected, cleaned and rejuvenated to be resold, often backed with a guarantee. Counterpoint Research says that the refurbished market became the fastest growing smartphone segment in 2017, expanding nearly 13% to 140 million units, and accounting for almost 10% of the global market. Another sign of what is happening on the market is the increase in fundraising rounds in the industry. French refurb pioneer Recommerce raised €50 million in early 2018 to grow with the support of Creadev, the private equity investment firm backed by the Mulliez family, which owns the retail group Auchan.

Active in Switzerland through its subsidiary RS Switzerland operating out of Fribourg, Recommerce signed a deal with Swisscom, its main partner in buying used phones, and another with M-Budget, which sells devices refurbished by a Geneva-based rehabilitation company. "The Swiss market is about three or four years behind the French market, but has a promising future. A survey we led found that 78% of people are interested in selling or giving away their phone," says Jérôme Grandgirard, country manager at RS Switzerland.

He estimates that three to four phones out of 100 could end up being refurbished. Even though price is the driving factor 80% of the time, Recommerce and its subsidiary also point to their customers' concern for the environment. "In Switzerland, where people are highly eco-friendly," Mr Grandgirard says, "they buy refurbished devices as much for environmental reasons as for financial ones."

major innovations are coming out of China at the moment."

Newcomers use a "very aggressive, even irrational" pricing policy to gain a foothold in the market, Mawston says. "Most Chinese manufacturers don't generate cash, or very low profits, with an operating margin of less than

5%, as opposed to 30% at Apple," the Strategy Analytics analyst says.

The first and only Chinese smartphone maker to trade publicly, Xiaomi has promised to limit its margin to 5%, but the brand has not even managed to reach that level. The company has taken a rather

negative business figure (see p. 55) and turned it into an effective marketing strategy to stand out from the competition. "We could sell you a smartphone for €600 like all the other companies. But we won't," Manu Kumar Jain, vice-president of Xiaomi, told *India Today*. "It's not in our DNA to sell smartphones while

Newcomers use "very aggressive, even irrational" pricing policy to gain a foothold in the market

Neil Mawston, wireless device expert at Strategy Analytics

making huge profits... No currently available technology justifies a price tag of over €600 for a smartphone."

At a time when the price of iPhones continues to soar (the most expensive version of Apple's latest model, the XS Max, goes for €1,659), it's a relevant point. But Chinese brands hope to offer more than unbeatable value for the price. "The brand Huawei still suffers from a lack of personality, but it would be simplistic to reduce the manufacturer to the status of imitator," says Thomas Husson, a tech innovation expert at Forrester. "Huawei now has a top-notch R&D department." The giant from Shenzhen is investing

massively in rolling out 5G compatibility. Its research budget exceeded €13 billion in 2017. Reuters says that amount is about what Alphabet (Google) pours into R&D.

With its Axon M, released early this year, the Chinese company ZTE also focuses on innovation. The device features dual screens and is fold-

able, like a wallet. But the promise of a single screen that can fold into two is much more exciting. According to market rumours, that type of product may be unveiled by the end of the year, even if no one knows if it will be sold, or at what price. Then, Samsung is expected to retaliate, proof that the old guard has not had its last word in the smartphone industry. ▲

HTC

THE BIG LOSER

After dominating the US market at the beginning of the decade, the Taiwanese manufacturer has been on a steady downward spiral. Victim of fierce competition from Apple and Samsung, HTC now covers less than 1% of global demand. After selling teams (2,000 people) from its mobile division to Google in 2017, the company announced this summer that it would cut 1,500 additional jobs, representing a quarter of its staff. The HTC share was trading at more than NT\$ 1,200 at the top of its game in 2011, but is now worth NT\$ 40 today. The company has been disappointing analysts with each earnings report. Reuters analysts now expect its price to continue to underperform.

HEADQUARTERS: TAOYUAN (TW)

EMPLOYEES: 6,450

REVENUE (2017): NT\$ 62 BILLION (\$2 BN)

2498

THREE LITTLE BRANDS ON THE RISE

OPPO

With the Find X presented in June, Oppo has shown that it can innovate. Its Super VOOC technology can fully charge the battery in less than 35 minutes. A record performance.

POCOPHONE

(owned by Xiaomi)
The F1, the brand's first model, has been on the market since August, sold as an affordable, mid-range smartphone. It sells for 379 Swiss francs.

FAIRPHONE

The Dutch manufacturer is the extraterrestrial in the smartphone universe. The company makes sure it works with factories where staff enjoy decent working conditions, refuses to use conflict minerals and designs its devices so that they can easily be repaired.

TOP GERMAN BRANDS ARE GOING ELECTRIC

Tesla's monopoly on premium 100% electric vehicles is coming to an end. Mercedes and Audi are entering the race, and Porsche will soon follow.

BY BLAISE DUVAL

Until now, drivers who wanted a premium electric car always chose Tesla. Essentially alone in its class, troublemaker Elon Musk's Californian brand comes to mind when thinking of the avant-garde vehicle that is both silent and powerful. The concept has an ever-increasing fan base. Tesla's sales have shot up in recent years to such a point that German brands with superior models have been destabilised. Last year, according to German economic daily *Handelsblatt*, more Tesla Model S saloon cars were sold than BMW 7 Series or Mercedes S Class models. The numbers speak for themselves.

But things may be changing as the German brands fight back. They've planned to invest a total of €40 billion over the next three years to compete with the Tesla Model S, X and 3. Their attack became quite concrete over the

Audi has offered sneak peeks of this camouflage vehicle quite often over the past few months and unveiled a prototype during the Geneva Motor Show in March. At 4.90 m long, the e-tron SUV fits nicely between the Q5 and Q7. Like the Mercedes EQC, it is a worthy competitor for Tesla's top-range vehicles. The definitive model was presented in San Francisco on 17 September. It includes innovations from Audi's latest premium models, including multiple screens, some of which are touch-activated. The German brand also included a surprise feature: futuristic mirrors that look like small cameras. The image is projected onto two small screens inside the vehicle close to the doors.

POWER
400 hp

ADVERTISED RANGE
400 km +

AVAILABILITY
end of 2018

PRICE
starting at €79,900

AUDI E-TRON: IT'S FINALLY HERE



MERCEDES EQC: A GENTLE REVOLUTION

POWER
408 hp

ADVERTISED RANGE
400 km +

AVAILABILITY
first quarter 2019

PRICE
not disclosed

Mercedes is going big with the EQC SUV, its first 100% electric model presented with great fanfare on 4 September in Stockholm. The brand is investing more than €10 million in its range of battery-powered vehicles by 2022, which will include a dozen models. The newcomer's design is inspired by the lines and proportions of the GLC (4.76 m in length) and uses some of the same technical foundations. It will also be produced on the same assembly lines as the GLC in the Bremen factory, in Germany. Only the batteries will be assembled in a different facility in Kamenz. As for the exterior, the EQC stands out due to a bright edging that extends across the entire front panel above the radiator grille. The same design is used on the back panel in a more classic way, but it's still a new stylistic aspect for Mercedes. The cabin is similar to the GLC, albeit considerably updated with an entirely digital display. Drivers who enjoy the interior style of the new A class will feel right at home.



PORSCHE TAYCAN: SUPERCAR ON THE WAY



POWER
600 hp +

ADVERTISED RANGE
500 km

AVAILABILITY
end of 2019

PRICE
not disclosed

First presented as a concept car dubbed Mission E, Porsche's electric limousine will go by the name of Taycan. This highly anticipated model, whose shape and definitive features haven't yet been announced, should set the bar high in terms of performance. The most powerful version will have output of more than 600 hp and a range of 500 km. Good news for

most future European clients: the Taycan will be slightly more compact than the majestic Panamera, which is more than 5 m long. And Porsche isn't stopping there. The German brand announced in early 2018 that it intends to double investments in making its range electric by 2022. In total, more than €6 billion will be invested in hybrid and all-electric vehicles.

RANGE IS ESSENTIAL



This is one of the last hurdles to a widespread adoption of electric vehicles: the range rarely exceeds 400 km in the best of circumstances. It's entirely sufficient for close-range driving, but not for taking off on a long journey with no cars in the world. Major battery manufacturers – including Panasonic and its partner Tesla, Korean brands Samsung and LG Chem, and China's CATL – are battling in this market where ground-breaking innovations are few and far between. Indeed, battery autonomy is improving very gradually, with no big technological breakthroughs.

Well aware of this limit, auto companies are preparing to implement fast charging sta-

tions on motorway networks. Yet again, Tesla is one step ahead. The US company has already built its superchargers in several strategic locations, making long-haul trips accessible for its customers. To counter this more effectively, Daimler, BMW, Ford and Volkswagen have come together to develop a common recharging network dubbed IONITY. At the moment, only a few stations have been built, but 400 are expected by 2020. IONITY also promises a faster recharging experience than Tesla, at a slightly lower price. The stations can charge a battery to 80% in only 10 to 15 minutes. Tesla has already reacted, announcing a more powerful version of its own stations. It looks like the war has just begun.

could go bankrupt over the next few months.

“Tesla is maintaining its advantage as ‘first mover’ for the time being in this market,” said Norbert Rücker, head of macro & commodities research at Julius Baer and author of a very thorough report on the future of mobility. “The US company acquired experience in building and selling electric vehicles and it grew a powerful ecosystem by building fast recharging stations, for example. Tesla batteries are also known to be very powerful and maintain good performance over time.”

“Tesla is maintaining its advantage as ‘first mover’”

Norbert Rücker, analyst at Julius Baer

Meanwhile, the German manufacturers can take advantage of economies of scale, which should allow them to put pressure on prices. The new EQC SUV from Mercedes will be made on the same assembly lines as its C- and GLC-class combustion models. Only battery implementation will have its own assembly line. The German risk-taking seems therefore to be calculated and under control. On the other hand, this type of soft transition by traditional manufacturers leads to a few questionable design choices. The radiator grille on their electric models, for example, is simply aesthetic and serves no real purpose. Similarly, the “fake” transmission tunnel cluttering the cabin of the EQC seems to be an incongruous carry-over from the GLC.

past few weeks, as Mercedes and Audi presented their respective SUVs in September (see insets). Porsche is expected to unveil its Taycan sports car later this year, which should set new standards in terms of sportiness in this category. A study from specialist firm LMC Automotive predicts that Tesla's market share in the electric vehicles segment will drop from 12.3% currently to 2.8% over

the next decade (despite an uptick in sales for the Californian brand).

Is Tesla facing a definitively bleak future? Some shareholders can't hide their concerns as the brand's factories are overheating, delivery delays for the new Model 3 are becoming longer and longer and its CEO's risky antics and declarations pile up. The most pessimistic analysts even believe that the brand

TESLA MODEL 3: SUCCESSFUL CAR, FAILED LAUNCH



POWER
from 261 to 462 hp

ADVERTISED RANGE
up to 500 km

AVAILABILITY
first quarter
2019

PRICE
not disclosed

Recurring delays, often rough assembly quality, various technical problems... The Model 3, Tesla's new core product, is off to a tough start. But the “small” Tesla (measuring 4.69 m) received very positive press from specialist publications. For a reasonable access price, it offers almost the same features as the Model S and is more agile. The interior is

extremely minimalist with only a single immense central screen, which is a departure from the traditional standards of auto production. Technological innovations abound. Tesla is also a step ahead in terms of driver assistance technologies and autopilot capabilities. Furthermore, range and battery management are more of

the California brand's selling points. A “performance” version of the Model 3 is currently in testing and should provide serious competition for the BMW M3, Alfa Giulia Quadrifoglio and other Mercedes C63 AMGs. It can go from 0 to 100 km/h in 3.5 seconds.

At the moment, it's hard to tell which of the German companies will come out on top. Credit Suisse analyst Julie Saussier highlights the good overall performance of Volkswagen, which owns Porsche and Audi: “Because of its size, Volkswagen could benefit from significant economies of scale. The transition to electric will probably be a little more expensive for Daimler and BMW.” But regardless of what happens, analysts aren't expecting spectacular results for

auto manufacturers in the years to come. They could actually be among the potential losers in the current transition. Instead, inspired investors will look towards suppliers of batteries and in-car technologies, such as Panasonic, LG Chem, Continental, Delphi Automotive and Valeo. Swiss companies such as Autoneum, Lem Holding, Bossard and Feintool are other companies to follow. As for car buyers, they will soon have a plethora of options. ▲

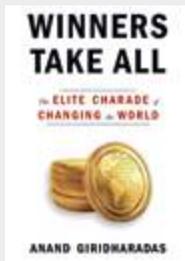
JAGUAR TAKING THE LEAD WHILE BMW TAKES ITS TIME

While the major German brands are indeed turning heads, we must not underestimate Jaguar. A step ahead of its competition, the British brand is already selling its i-Pace electric SUV, which has recently been presented and lauded by the specialised press. Unlike the Mercedes model, the i-Pace was designed from the

very start to be a 100% electric vehicle, with batteries placed under the floor. As a result, the cabin is impressively large for its length of 4.68 m. Power (400 hp) and advertised range (470 km) are at the upper line of electric vehicles. The starting price of 82,800 Swiss francs makes it a worthy competitor to the Tesla

Model X. BMW is also actively preparing for the electric wave. But it is in no hurry to present its iX3 based on the leading SUV of the same name. BMW claims that batteries are still too limited and prefers to wait for the next generation. The iX3 is expected to be available in 2020.

TO READ, TO DOWNLOAD

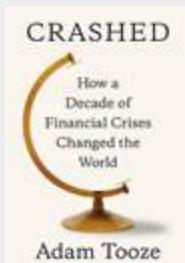


From CHF 30.-

WINNERS TAKE ALL THE ELITE CHARADE OF CHANGING THE WORLD

By Anand Giridharadas
(Knopf, 2018)

The former *New York Times* journalist, Anand Giridharadas, paints an unflattering picture of the world's capitalist elite. They give fortunes to charitable works, but never tackle the root of the problem: inequality. The author asserts that all that money spent could be used much better if they really wanted to change the world.



From CHF 40.-

CRASHED HOW A DECADE OF FINANCIAL CRISES CHANGED THE WORLD

By Adam Tooze
(Penguin Publishing Group, 2018)

Ten years after the 2008 financial crisis, Adam Tooze, a professor at Columbia University, chronicles its causes and consequences in a whopping 700-pager. This compelling, carefully researched account meticulously describes the ins and outs of a crisis that was inevitable, yet no one saw coming. The author also critiques the often uninspired responses from western leaders, which were to shift direction towards austerity.



Paid
(CHF 4.-)
App Store
Google Play

PLANTSNAP SEEING GREEN

All, or almost all, of Mother Nature's secrets will be revealed with this plant recognition app. Packed with an enormous database, PlantSnap identifies trees, flowers and weeds with the snap of a smartphone, and with remarkable precision. On top of detailed information about each plant identified, the app offers advice on gardening and a selection of the latest trends in greenery.



Free
App Store
Google Play

TINYCARDS HOMEWORK CHAMP

This app is great for schoolchildren and students as it gives them a way to sharpen their knowledge by creating their own flashcards or choosing some from its immense database. By the same people that designed the ubiquitous language learning app Duolingo, Tincards inherited the same features that made Duolingo so popular: attractive in design, easy to use and, more importantly, fun, making users want to aim for head of the class.



Free
App Store
Google Play

SWISS RADIOPLAYER SWISS RADIO STATIONS, ALL IN ONE PLACE

A platform initiated by a consortium of local radio stations, including SSR, Swiss Radioplayer provides access to more than 130 Swiss radio programmes. This totally free app was designed using a solution originally developed by the BBC. Users can look up radio stations and podcasts by name or topic, save them to their favourites or listen live.



Paid
(CHF 5.-)
App Store
Google Play

PEAKFINDER THE MOUNTAIN-LOVER'S FRIEND

This useful location-based app lets you know the name of the mountain peaks surrounding you while trekking through higher ground. PeakFinder uses your smartphone's GPS and accelerometer to outline the mountaintops that the lens is pointing to, and show their name on the screen, all while you admire the view. Efficient and elegant.



HOW LONG IS FOREVER?

HYT
#HYTWATCHES

WELCOME TO ICOs!

Swissquote is the first Swiss bank to offer its clients a chance to participate in crowdfunding via blockchain technology. Paolo Buzzi, Chief Technology Officer and company co-founder, explains.

[SWISSQUOTE.COM/ICO](https://www.swissquote.com/ico)

From 22 October to 11 December, Swissquote clients can participate in an exclusive blockchain crowdfunding opportunity for start-up LakeDiamond. This is hopefully the first of many, according to Buzzi. Interview.

Why is Swissquote getting involved with ICOs?

Our philosophy has always been to offer our clients new opportunities. Last year, we were the first European bank to offer cryptocurrencies. Initial Coin Offerings (ICOs) is a logical next step, in a way. Like cryptocurrencies, this new method for companies to raise money uses blockchain, a technology that our clients are very interested in.

For some, it will be an opportunity to diversify their portfolio to include, for example, traditional securities, cash, cryptocurrencies and tokens (ed. note: which are purchased during an ICO). LakeDiamond's ICO is a first, but we're hoping it will be the start of many of this type of fundraising. In time, we would like to offer our clients several dozen ICOs per year.

How will Swissquote clients participate in the ICO?

All they have to do is go to the Swissquote platform. Since the very beginning, the common theme of our company has always been to democratise finance by offering services that are simple and accessible for everyone. Currently, in order to participate in ICOs, people need to have blockchain wallets. That's pretty complex for beginners. At Swissquote, we make it easier. Our clients can purchase tokens using their account in exactly the same way as they would purchase shares of a publicly listed company. In other words, Swissquote is taking care of the technical aspect and our clients only have to focus on their portfolios.

There have been several fraudulent ICOs. What guarantees does Swissquote provide?

Generally, ICOs are intrinsically very risky. Investors are financing the earliest stage of a company. Many start-ups, even promising ones, don't make it. That said, I think it's exciting to be able to help grow young Swiss start-ups, like LakeDiamond, rather than bet on Chinese giants.

In terms of fraud, we've established a certain number of criteria. For example, only the most mature companies that have already requested an ICO from FINMA will be offered on our platform. Where a case of fraud cannot be entirely excluded, we ensure that the company's management structure and project are serious. But we cannot speak to a company's economic relevance. That's where our clients must do their own research. It's up to them to determine if the start-ups we're offering will make it to the market or not. We don't offer any recommendations.

What advantages do your clients have when using the Swissquote platform instead of wallets?

In addition to benefiting from our simple system, our clients will have access to exclusive advantages. With LakeDiamond, for example, clients can buy 10 tokens and get one free during the pre-sale from 22 October to 11 December, until 4 million Swiss francs is raised. ▲



PAOLO BUZZI
CHIEF TECHNOLOGY
OFFICER AND CO-FOUNDER
OF SWISSQUOTE BANK

LAKEDIAMOND

DIAMONDS: THE FUTURE OF NEW TECHNOLOGIES

The purity of diamonds made by Swiss company LakeDiamond significantly exceeds the purity of natural stones. This could revolutionise many high-tech industries.

NICOLAS RIGHETTI/LAKEDIAMOND



After more than 15 years of research and development, LakeDiamond is in the industrialisation phase.

Diamonds are commonly known as a precious stone used for engagement rings and shiny necklaces. But they're actually much more than that. "The unique physicochemical properties of this stone make it an extraordinary material for many uses other than jewellery," said

Alex Kummerman, chief investment officer of LakeDiamond. "Diamonds could revolutionise new technologies, but they could also be used in medicine and microelectronics and even replace silicon in some cases." Strong and elastic, with superior heat conduction and high transparency,

diamonds have many uses in mechanics and optics. But the process of obtaining very pure stones and shaping them into complex forms with micrometer-range precision (a thousandth of a millimetre) is very difficult. LakeDiamond, an EPFL spin-off located at the EPFL ▶

ICO: A USER GUIDE

WHAT IS AN ICO?

Halfway between an initial public offering (IPO) and crowdfunding, an Initial Coin Offering (ICO) is a new way for companies to raise money using blockchain technology. During an ICO, contributors don't purchase shares, but rather digital tokens.

WHAT IS LAKEDIAMOND?

LakeDiamond is a Swiss start-up that will launch its public ICO in January 2019. Swissquote clients can participate in an exclusive presale of LakeDiamond's tokens from 22 October to 11 December.

HOW?

It's very easy: go to the Swissquote Bank platform. Just like trading traditional securities, clients can buy and sell (once the public ICO is finished) their LakeDiamond tokens directly from their Swissquote account.

WHO CAN PARTICIPATE?

All Swissquote clients who have a trading account. The minimum investment required to access this service is 33 Swiss francs. Some countries, such as the United States or China, are excluded.

WHAT ARE THE ADVANTAGES FOR SWISSQUOTE CLIENTS?

During the presale, if clients buy 10 LakeDiamond tokens, they get one free until the first 4 million Swiss francs are raised. But during the ICO, Swissquote clients will purchase tokens under the same sale conditions as the general public.

HOW MUCH DO THE TOKENS COST?

That varies depending on the ICO. For LakeDiamond, the sale price is set at 0.55 Swiss francs per token.

[SWISSQUOTE.COM/ICO](https://www.swissquote.com/ico)

Innovation Park, is an expert in this field. "The diamonds we produce as slabs are purer than the diamonds found in nature," said Pascal Gallo, CEO of LakeDiamond. "We are one of three companies in the world that are able to attain such purity."

LakeDiamond has even more added value in the following step: carving diamonds. In partnership with EPFL, the company improved a technique known as reactive-ion etching, which is commonly used in the electronic chip industry. With this technique, LakeDiamond can carve a minuscule escapement wheel (3 mm wide and 0.15 mm deep), which is used in the watchmaking industry. "We've just signed an agreement with a major Swiss watchmaker," said Kummerman. "That industry is very interested in our work because diamonds significantly reduce friction. As a result, using diamonds could reduce the amount of lubrication needed while simultaneously increasing the power reserve, or the amount of time before the watch has to be rewound." Another advantage of diamond: it is a high-quality translucent material that can be tinted with colour, which is very important for watchmakers.

Wireless energy transfer

"Our process could lead to a small revolution in watchmaking," said Kummerman. "But it is certainly more groundbreaking in the new technologies industry. It could lead to new applications that we have no idea about yet." Once again in partnership with EPFL, LakeDiamond is working to create ultra-pure optical parts designed to be used in lasers. "Placing a diamond in the production zone of a laser's light multiplies the power of the laser," said Pascal Gallo, who has a Ph.D. in quantum physics. "This technology can therefore be used in an incredible number of applications. You could, for example, transfer energy over a long distance wirelessly." "I'm convinced that the next generation of drones and electric aeroplanes will use this technology," predicted Kummerman.

LakeDiamond also has two other potentially disruptive applications in mind. The first is for high-voltage transistors, which are used particularly in electric vehicle recharging stations. "Using diamond-based transistors instead of silicon-based ones would make it possible for the machines to function at very

high temperatures," said Gallo. "For example, current computers shut down when the chips reach a temperature of 120°C in order to not damage the chips. But if diamonds are used instead, computers could still run at 600°C. For regular home computer use, this isn't that relevant, but if this technology was used

in aeroplane reactors, detectors could be placed closer to the motor." Secondly, LakeDiamond is looking at biological sensors, a field in which the use of diamonds could improve the detection of several diseases, thanks to the biocompatibility of diamonds and their electromagnetic properties. ▲

The diamond plates produced by LakeDiamond are purer than natural stones.

NICOLAS RIGHETTI / LAKEDIAMOND

THREE QUESTIONS

"AN ICO IS THE IDEAL SOLUTION"

LakeDiamond will launch an Initial Coin Offering (ICO) in partnership with Swissquote Bank. CEO Pascal Gallo explains why the company chose this method. Interview.

Why is LakeDiamond launching an ICO?

Our goal is to raise 60 million Swiss francs in order to advance to industrial production. We currently have two reactors which can produce 15,000 slabs of ultra-pure diamonds per year. With the ICO, we hope to finance the construction of 50 reactors that will be able to produce 300,000 slabs per year.

Why not seek financing from venture capital firms?

We could have raised funds in the traditional way, as several investment companies were interested in LakeDiamond's capital. But we didn't want to lose control of our company, especially because potential investors were focused on the military industry. We didn't want the company to go in that direction. For us, an ICO is the ideal solution. We'll be able to industrialise our production without diluting capital.

Why did you choose Swissquote as your partner?

Leveraging its expertise in the field of blockchain and its position as an online bank, Swissquote offers its clients possibilities usually reserved for insiders. These features are valuable for the success of our ICO. We are therefore delighted that Swissquote selected LakeDiamond to launch its range of services for ICOs.

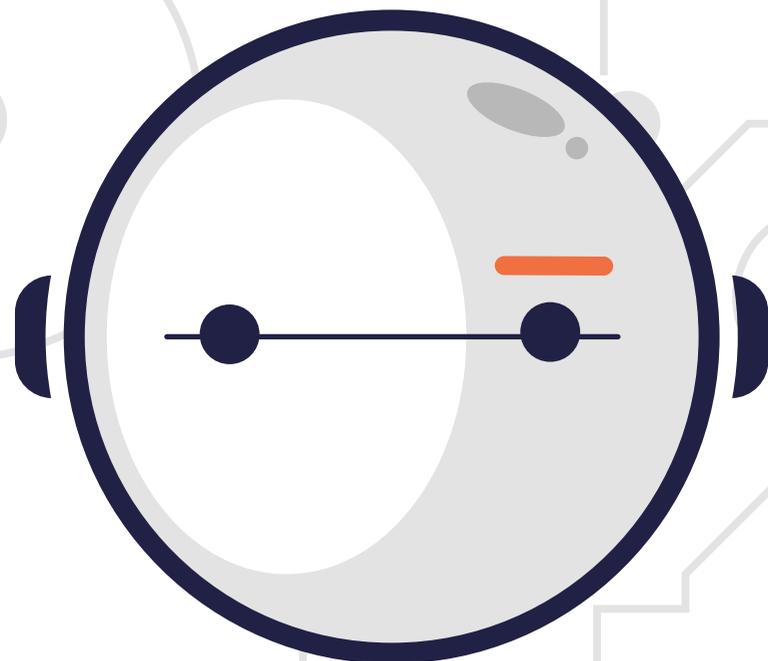


PASCAL GALLO
CEO OF LAKEDIAMOND

SWISSQUOTE IMPROVES ITS ROBO-ADVISOR

Swissquote's bespoke, automated portfolio management system has been enhanced with new functions, which now include cryptocurrency investing. Serge Kassibrakis, Head of Quantitative Asset Management, explains.

[SWISSQUOTE.COM/ROBO-ADVISOR](https://www.swissquote.com/robo-advisor)



FREE DEMO

OPEN A DEMO ACCOUNT TO RECEIVE A VIRTUAL SUM AND TEST THE ROBO-ADVISOR

In just a few words, can you tell us how the Robo-Advisor works?

The idea is to provide our customers with an automated portfolio manager. The algorithm builds and tracks the portfolio of each customer to align it with his or her investment objectives. Once users have set their acceptable risk level, they can define many other parameters if they choose to. For example, they can integrate their preferences for industry sectors, countries or asset classes. It's also easy to add or exclude specific securities. Like an automatic pilot on a plane, the human sets the objectives, and the machine takes care of the rest.

Does the machine follow a predefined strategy?

No. We don't have any dogmas. Unlike prevailing rules for traditional wealth management – where a given risk tolerance level calls for a certain balance between stocks and bonds – here, market and user preferences determine the ideal asset allocation.

Note: Our Robo-Advisor uses the same algorithms as the Swissquote Quant Fund, which won the Lipper Fund Award for the best performing fund over three years. Our Swissquote Quant European Equities Fund came third in the E-Fundresearch rankings, an independent financial information portal. And both have been assigned a three-star rating by Morningstar. Today, we are making this technology available to all through a user-friendly interface.

What are the latest upgrades to the platform?

We enhanced the look and feel of the interface to make it easier and more intuitive to use. Users can also now invest in cryptocurrencies. But these are just the first set of improvements we plan to bring to our service. Investors will soon be able to choose the currency against which they wish to protect themselves and have the choice of fully hedging against foreign exchange

risk. Another function, which has proved effective when used internally, is risk budgeting. We also hope to make this service more intuitive for users who don't want to spend too much time defining their strategy. So we'll be offering them strategies predetermined by us.

Who is the Robo-Advisor for?

All our customers. The minimum investment required to access this service is 10,000 Swiss francs. The interface is designed to be very easy to use, but also allows more experienced investors to customise more advanced parameters. Furthermore, many wealth managers use this platform. The Robo-Advisor lets investors keep control while enjoying access to a powerful calculation engine that was only available to professionals before.



SERGE KASSIBRAKIS
HEAD OF QUANTITATIVE
ASSET MANAGEMENT
SWISSQUOTE BANK

IN BRIEF

WHAT?

The Robo-Advisor is an electronic asset manager that creates an investment portfolio based on customer preferences. The portfolio is monitored round the clock and continually optimised to maintain the customer's desired risk level.

HOW?

Users simply specify their risk appetite, and have the option of selecting their favourite securities or sectors. Then they can let the Robo-Advisor do the rest. Its advanced algorithms analyse thousands of securities and generate suggestions for an ideal portfolio.

WHY?

The Robo-Advisor requires a smaller initial investment than traditional asset management services and is much more cost-effective. It is also fully transparent and gives investors complete control over their investments.



Hiding away in the land of the Vikings

With its mosaic of tiny islands blanketed in mysterious forests and gorgeous lakes, the Stockholm archipelago is the perfect place for some serious R&R in a setting of unspoilt nature. A story.

BY STANISLAS CAVALIER



It could be ten thousand, or it could be one hundred thousand. The estimate is still subject to debate and varies depending on the source. The figure generally cited is 24,000, but we can't really be sure. And it doesn't really matter. What is certain is that the Stockholm archipelago, stretching 150 kilometres from Arholma to Landsort, is made

up of thousands of islands dotted along an arm of the Baltic Sea. Some are just rocky confetti that the waters devour in the summer and ice imprisons in the winter. Others are several kilometres long or wide, and are inhabited year round. Make your choice before departing from Strömkajen pier in Stockholm. Here, the journey begins aboard a boat. ▶



“Välkommen Ombord!” the officer shouts. And we’re already adrift on the Baltic. Huge expanses of soft-wood trees, birches and colourful houses rim the land on either side of the ferry. First, we edge along the larger islands of Djurgården, Lidingö and Vaxholm. Then as we gradually move further away from the Swedish capital, land is more scattered. The landscape changes, and homes and rocks grow scarce. It’s easy to get lost in this maze of seawater, and leave the work routine far behind to become one again with nature. Real nature. Bold and untouched. Despite the summer crowds, thousands of islands remain totally uninhabited and protected. It’s up to you to choose where to set up tent for a night, or more.

We decided on something in the middle; not touristy Vaxholm, where wealthy Stockholmers come to relax and play, nor the other extreme – a desolate rock without a soul on it. So after a couple of hours at sea, we dock at Svartsö. Almost 80 people are permanent residents of this seven square kilometre island, which, of note, is home to an excellent restaurant, Svartsö Krog,

and a convenience store, Svarstö Lanthandel, where visitors can find local products and rent bikes.

In other words, it is comfortable enough not to feel totally alone, but

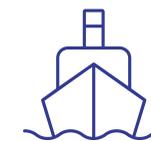
not so much that it is invaded by throngs of people. A few tourists step off the boat with us onto the tiny jetty. No locals rush to greet us, not even a taxi. There are no cars on Svartsö. Total silence.



Bike rental shop in Svartsö.



Small islands punctuate the boat trip to Svartsö.



STOCKHOLM IN WINTER, SPRING, SUMMER OR FALL

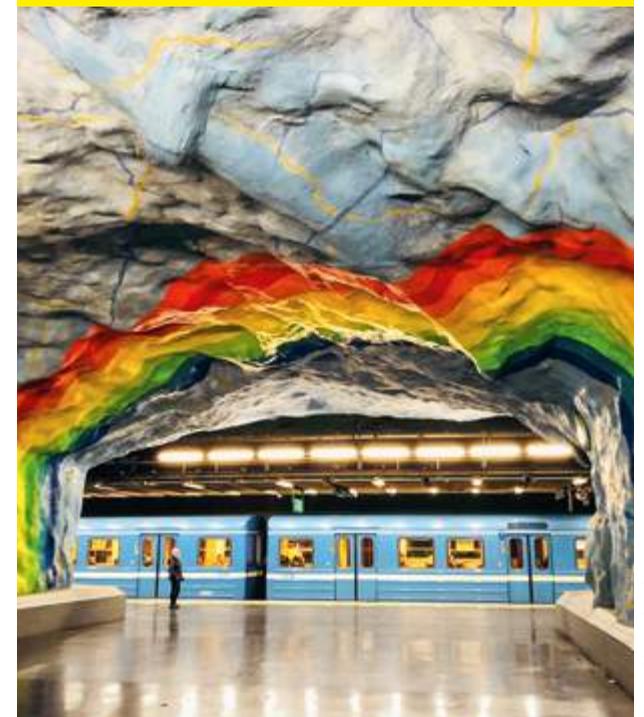
Made up of 14 islands connected by 57 bridges, the Swedish capital draws visitors from around the world to come and discover the Baltic Sea at any time of year. Each distinctive, as they are separated by water, the city’s neighbourhoods are close enough to one another to explore on foot or by bicycle. Gamla Stan, the old town, is full of narrow cobblestone streets and brightly-coloured buildings. The neighbourhood is home to the 13th-century Storkyrkan Cathedral, the Swedish Royal Palace and the Nobel Museum dedicated to the eponymous prize. A 20-minute bike ride away is Djurgården Island – literally “animal park” – the world’s first national city park, opened in 1995. Fans of *Millennium*, Stieg Larsson’s wildly successful trilogy, will not want to miss stopping off in Södermalm, or “Söder” (south), where the story’s characters Lisbeth Salander and Mikael Blomkvist lived. In the summer, beaches are open for swimming all over the city. In the winter, when the Baltic freezes, generally from December to March, you can go ice skating throughout the archipelago. Magic! But don’t go alone, as the ice can be unpredictable.

With bags strapped to their backs, the few travellers walk their way inland along Minkvägen road. As we move deeper into the forest, people scatter left and right onto side roads. We are soon abandoned amid the pine trees, with our only point of reference being a picture of a map on our smartphone. The route takes us to our *stuga*, a typically Swedish wooden cottage painted in red, with white-trimmed windows.

**No TV or
Wi-Fi to
be found.
Time to
disconnect**

The interior is not exactly Spartan but reduced to the bare essentials – electricity and running water ▶

In the Swedish capital, the metro is a true work of art. Paintings, sculptures, engravings, mosaics... Out of 100 stations, more than 90 have been decorated by artists.



provide some comfort, but the WC is in a little shack on the other side of the yard, at the edge of the forest. No TV or Wi-Fi to be found. Time to disconnect. Of course, the modern world doesn't give up its rights easily. Even here, 4G connectivity is available, like Ariadne's thread to keep us in contact with the outside world. However, the solitude invites us to stow our smartphones in a corner of the stuga to set off and explore the island.

Whenever the sun pierces through the clouds, we rush to the deck of the house

Svartsö has seven small inland lakes, where you can go swimming or discreetly watch the herons and majestic white-tailed eagles. The trails to get there are surrounded by lush forests and pastures where cows, horses and sheep graze freely. But the shores of the Baltic are the best spot for relaxing. Whenever the sun pierces through the clouds, we rush to the deck of the house to laze around all day on the water's edge. Braver souls can kayak, row or even swim to the closest islands, some of which are totally untouched by civilisation.

After a refreshing dip in the Baltic, what could feel better than warming up in the sauna? Our stuga has one. Through its windows overlooking the sea, we watch the setting sun as it reddens over the surrounding islets. Lulled by the sound of the waves and calmed by the stifling heat of the sauna, our eyelids droop closed. We're finally relaxed. ▽



It is possible to explore the archipelago by kayak.



BEFORE YOUR TRIP

Note: Not all islands are accessible year round, as much of the archipelago freezes in the winter. Many islets are trapped in the ice and cannot be reached by boat. Svartsö is accessible all year long, but we recommend checking the boat schedule carefully before making any definite plans. Lines run much less frequently outside the summer season. The convenience store Svarstö Lanthandel is also open year round, but its selection of items is limited in the winter. The sale of alcohol is highly regulated in Sweden. Wine and other spirits must be purchased in Stockholm from a state-owned liquor store, the famous Systembolaget, or be delivered directly to the island. For those who don't want to make their own meals, the restaurant Svartsö Krog (open from April to late September) is truly worth a try. No fine Swedish dish is complete without herring – however it is prepared – and it must be tasted here.

WHERE TO STAY

Depending on the island, you can find hotels, youth hostels, bed & breakfasts, campsites... or nothing. On Svartsö, you can sleep at Svartsö Skärgårdshotell & Vandrarhem hotel or go "glamping" in one of the elegant tents right on the water at Svartsö Logi. The best option is to rent a stuga. These typically Swedish cottages used to have no amenities, but some are now lavishly equipped. Prices for a week's rental vary significantly, ranging from approximately €1,500 to €3,000.

GETTING THERE

Flights to Stockholm from Zurich or Geneva start at 100 Swiss francs per person. Then from Strömkajen pier in Stockholm, take a Waxholmsbolaget ferry (starting at SEK 175, about 20 Swiss francs). Note: Ferries do not run daily all year.



Healthcare Innovation



Digitalisation



Automation & Robotics



Ageing Population

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MOTORCYCLES

Three wheels and the road opens wide

Yamaha has come out with a revolutionary motorcycle. And it's wild-looking. Our reporter, a seasoned biker, loved it.

BY PHILIPP MÜLLER



ENGINE: INLINE THREE-CYLINDER
POWER: 115 HP AT 10,000 RPM
WEIGHT: 263 KG, INCLUDING FULL OIL
PRICE: CHF 17,790.-

For Yamaha, one of the biggest makers of motorcycles and scooters, it was a risky technological gamble. This autumn, the famous Japanese firm has begun selling – online reservations are open – what it calls the first three-

wheel motorcycle. One wheel in the back, two in front. And the whole thing tilts. Its name, Niken, means double blade, and it is designed to offer greater safety. And more fun. A few years back, Yamaha released the Tricity, a single-cylinder, three-wheeled leaning scooter. But here, it has taken things to another level. People may or may not appreciate its aesthetics, but we couldn't wait to try it out.

We tested the Niken at a presentation for the brand's dealerships in French-speaking Switzerland. The ride was through Jaun Pass, which straddles Fribourg and Bern in the Pays-d'Enhaut. In other words,

endless kilometres of twisty roads. A dreamland for any self-respecting biker. The weather conditions were, however, less glamorous. The road surface was often cold and wet, with some rain showers that couldn't be missed. All the ingredients for a slippery ride, even with the best of rain tyres.

But in fact, the conditions were ideal for the Niken. The two front wheels mean that the bike grips the road better as it leans into curves. And it does that like a real motorcycle. The maximum lean angle to keep the front end in contact with the road is 45 degrees. That's impressive on the road. Beyond that angle, the

wheel on the outside of the curve can come off the ground, but the inside wheel stays put. On top of that, its improved braking system, comprised of three units instead of two, and three points of contact keep you on the road. Those are the key safety features, along with excellent suspension and skid resistance, which has already proved effective on Yamaha's MT range.

What about the fun that a good motorcycle is supposed to bring its owner? To be perfectly honest, the Niken is mind-blowing. You can easily let yourself go, riding in the rain along a bumpy road. Tearing through bends, you lean as you

would never dare on a traditional bike. The laws of physics being what they are, things come to a point where, despite the rider's optimism, the rear wheel starts coming off the ground, and the tyre starts slipping sideways. But that's ok. The front end remains in its line, and the Niken powers right through the curve. Nothing to it.

As the kilometres whiz by, you realise, unbelievably, that this funky looking bike (Yamaha drew inspiration for its styling from a scorpion) has taken away much of the stress felt by any motorcyclist when riding in bad weather conditions or on a poor road surface. And less stress

means more pleasure. Even more so as the Niken handles great at low speeds while remaining comfortable, either alone or with someone.

Nothing like a road test to be fully aware of all its attributes. Yamaha knows that. That is why the Japanese brand, via its Swiss importer Hostettler, has organised the Niken Tour. This year, it will deliver demo models to dealerships first. Just over 70 in Switzerland for 2018, with only about 10 units delivered directly to individual customers who ordered it without a test drive. But as of 2019, the sales machine will be running full swing. ▽

ALTERNATIVES



PIAGGIO MP3 500

This three-wheel leaning maxi-scooter is popular with Parisians due to the safety it offers on slippery streets, as well as its comfort and practical features (roomy under-seat storage). Switzerland requires a motorcycle licence to drive it. Prices start at CHF 10,995.-



CAN-AM SPYDER

The Canadian maker BRP has made its mark with this originally styled three-wheeler. The selling points are similar to those for the Niken: safety and fun. But you can't lean into curves. It can be driven with a motorcycle or regular licence. Prices start at CHF 20,490.-

BOUTIQUE

WIRELESS, HIGH-END SOUND

Bang & Olufsen has finally given in to the trend of wireless earbuds by coming out with Beoplay E8. To stand out from its competitors (Apple, Samsung, Sony, and so on), the Danish luxury brand has aimed for unbeatable sound performance. And that is what it has achieved. These earphones offer some of the best sound rendering on the market. But their battery life is only average: four hours, versus five for Apple AirPods.

beoplay.com
CHF 299.-



8K PROJECTOR (WELL, PRACTICALLY SPEAKING...)

The DLA-NX9 video projector is definitely not for your average Joe. JVC is targeting image nerds and cinema lovers (with serious money). Available as of October, the device is touted as the best 8K on the market. As for specifics, the DLA-NX9 is a native 4K projector, but built with JVC's e-shift technology to produce an even sharper image using pixel shifting. But that scaling has a price.

jvc.com
CHF 20,000.-



NOSTALGIA... BUT NOT QUITE

After a near-death with the arrival of digital cameras, instant photography is gaining renewed interest. The release of the OneStep+, the latest device from the iconic brand Polaroid, embodies this rebirth. On the outside, the camera dons a rainbow stripe as a tribute to the original OneStep, launched in 1977. But nostalgia only goes so far. The OneStep+ can connect to a smartphone app via Bluetooth. Ideal for combining the old-school charm of analogue with the creative potential of digital.

polaroid.com
CHF 189.-



BOTH SUITCASE AND CARRY-ON

Created by the French start-up Kabuto Design, the Xtend case can transform from a 40-litre carry-on into a 60-litre suitcase depending on the traveller's needs. Equipped with a fingerprint lock, this expandable suitcase features three USB sockets (A, C and micro-USB) concealed under flaps near the handle. Everything is powered by a removable 20,000 mAh rechargeable and replaceable battery.

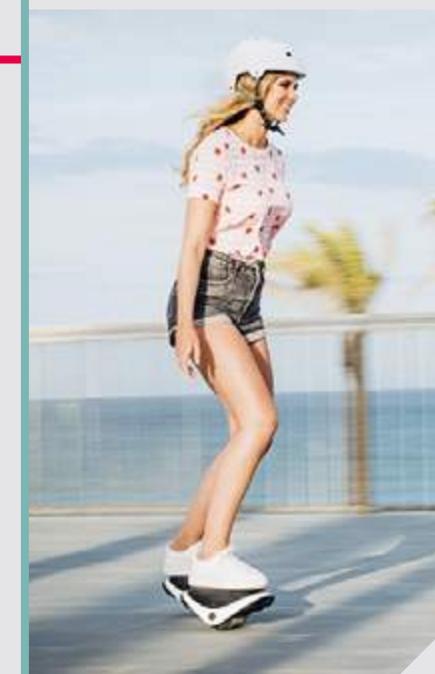
x-tend.io
CHF 679.-



SEGWAY WHEELS INTO ROLLER SHOES

The brand that invented the self-balancing personal transporter some 10 years ago, Segway is now trying to diversify by applying its concept to the future of roller skates. The Drift W1 roller "shoes" are not shoes exactly, as the user's foot is simply set on a flat surface. A motorised version of classic roller skates, the Drifts can reach up to 12 km/h, with 45 minutes of riding for each charge. Should be popular with kids.

segway.com
CHF 450.-



INDOOR GARDENING

It looks like a funky little fridge, but the comparison stops there. Seedo is a fully automated hydroponic grow box designed for growing cannabis. But you can put any seed-based herb or vegetable in it. The appliance features a built-in camera, with a system that automatically adjusts the temperature and delivery of water, CO² and minerals. The door remains closed at all times, guaranteeing growth without parasites or smell leaks. An app has been developed to keep tabs on the process until harvest.

seedolab.com
CHF 2,400.-



THE ROYAL OAK REINVENTED

The new self-winding Royal Oak Concept model by Audemars Piguet is its first since the collection hit the market in 2002. Decked out with a rubber strap, this skeleton timepiece is water resistant up to 100 m, and combines a chronograph mechanism with a visible peripheral oscillating weight and hand-finished tourbillon movement, all packed into a 44 mm titanium case.

audemarspiguet.com
Price on request



TRIED AND TESTED

TRAINING IN A HYPOXIC CHAMBER

BY CAROLINE ZUMBACH

In Geneva, three hypoxic chamber gyms opened this spring. *Swissquote Magazine* tried one.

Summer is coming to a close, and it's time to get back into shape after weeks of being lazy. Off to the gym! But this time, I decided to ditch my regular old gym for a hypoxic chamber gym. What's that, you may ask? The amount of oxygen in the air is reduced in order to simulate high-altitude conditions (up to 8,000 m). Professional athletes do this often. But it has recently been made available to the general public. In Geneva, Centre Sport Altitude and Hôpital de la Tour have opened the first hypoxic chambers in Switzerland. So I head over to Sport Altitude. In the basement of the Onex Medical Centre, the room looks just like any other gym: bikes, treadmills, rowing machines and brand new weights are lined up along walls covered in photos of mountains. The only thing out of place are a few large pipes and air vents.

"For your first time, I'll set the altitude to 3,000 metres," said Emilio Corbex, the physical trainer. "Any higher and the constraints are too significant to be able to train effectively. Anything lower and the hypoxic stress isn't

enough to trigger the physiological changes you're looking for." I quickly felt the altitude change. I was dizzy and had trouble keeping my thoughts straight. While my legs were running on a treadmill at a 15% incline, my eyes were watching the pulse oximeter. The device calculates the rate of oxygen present in my blood. In just a few seconds, my saturation dropped from 98 to 86. "That's normal," Emilio reassured me. "Your body is feeling the lack of oxygen. If your body reacts well to it, your increased breathing and heart rate will compensate for the missing oxygen." I quickly went back up to 90 and was pleased to see that my body was responding positively. But exercise was more difficult than usual. Each effort was amplified by the altitude and I was feeling short of breath.

When I left the room, I was exhausted. "The first few times, it's very tiring," said Emilio. "But your body will adjust and it will become easier." After resting up, I went back to the centre three days later. Even though I could still feel the lack of oxygen, it was a little less difficult.

But is such training really necessary? "It all depends on what your goal is," said Doctor Raphaël Faiss, researcher at the Institute of Sport Sciences at the University of Lausanne. "If you're trying to produce more red blood cells, it's not the right training for you because you'd have to spend hours in the room every day for weeks. But if your goal is to stimulate the body, it's a rewarding technique because the body progresses in response to new constraints." This improvement would remain beneficial outside the hypoxic environment.

"This type of exercise is also useful for people who are overweight, since they can exercise for less time and use the same amount of energy, with reduced strain on the joints," said Faiss. "So this method is effective, but it's not a miracle solution." Personally I didn't notice any changes. Two to three sessions per week for three to five weeks are needed to see a difference, according to Emilio (each session costs between 50 and 75 Swiss francs). But I enjoyed the experience and I'm starting to think about climbing a mountain in order to feel the effects of hypoxia in a natural setting. ▽

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