



The Futuremover

3rd quarter 2019



10 INVESTMENTS FOR A BETTER FUTURE

Back in Ancient times the Oracle of Delphi already tried to predict the future. Depending on the prediction that the oracle came up with, both gods and men tried to influence the course of events and the world. The issues at stake were power, love and wealth. We've hopefully moved on a bit since then.

Of course creating the world of tomorrow is not a simulation exercise. But we can all exert an influence – and ideally do our bit

By just imagining a wonderful future you help to bring it about.

to shape politics, the economy and civil society. Many people are already investing in a positive future. Did you know that in Denmark the most powerful ferry ever to have an electric motor has just been launched? „Ellen“ has unparalleled battery capacity, and it sails back and forth between two islands producing almost no noise or emis-

sions, and it can transport almost 200 passengers as well as 31 cars and five lorries. Or have you heard of social design? The „Little Sun“ solar lamp designed by Olafur Eliasson is part of this concept. It aims to enable anyone who doesn't have access to mains electricity to learn, work, and enjoy communal life. With so many innovative opportunities why wait around – when we can start working towards a better future right now?

Innovative possibilities

10 INVESTMENTS FOR A BETTER FUTURE

1. Travel – without leaving home

It's raining outside, your holiday's been cancelled, and in any case you're worried about the environmental impacts of flying. So just make yourself comfortable, put on a VR headset – and simply set off. The all-round views provide you with perspectives that you might not experience in reality. Or you can work in places where other people take their holidays. Thanks to the Altspace-VR company you can relocate meetings to virtual offices – with a view of the Golden Gate Bridge if you want.

2. Innovations that are simply printed

Tool-free manufacturing, efficient use of materials, flexible designs, on-site production, economic efficiency, and – last but not least – tremendous innovative capacity. This is what 3D printing promises to deliver. Take the example of bioprinting: Canadian researchers are developing a portable printer which will enable skin transplants to be carried out. Researchers at ETH Zurich have even printed a heart that's made of silicon. Even houses, cars and spare parts for space travel can already be printed.

3. Read three thousand books in 15 minutes

Stuffy intellectuals are tearing their hair out – but people who just want an overview are delighted. The "Blinkist" app condenses



the contents of pages of reference books to a summary of the key facts, so you can read a book in 15 minutes. The "Spritz" app by contrast is based on the knowledge that the brain grasps words faster than the eyes actually read. So the words are flashed up one after another – making speed reading really easy and giving people more time to learn even more.

4. It's better to arrive than to travel

Who still defines him/herself by their car? And if they do, it's probably only in terms of its digital features and its good environmental performance. New mobility is becoming a status symbol – including car-sharing, ordering autonomous vehicles when they're needed, or flying over the congested streets of megacities in flying taxis.

5. Greener googling

100 Google searches use as much power as half an hour of lighting. It may not sound like much, but if the internet was a country it would be the world's fifth-biggest user of electricity. This is a huge challenge for the operators of big data centres. The international company, Equinix, uses only electricity from renewable sources for its data centres in Germany. And the waste heat from the computers also heats its own offices.

6. Alternatives are powering ahead

Using thermo-chemical processes researchers at ETH Zurich have managed to trans-



GLOBALANCE FOOTPRINT

Without a positive footprint there's no chance of a better future

A better future isn't a pipe dream or the world seen through rose-tinted spectacles.

We need objective standards as a counterweight to subjective feelings. The Globalance Footprint is such a system. It calculates the data and facts relating to the economy, society and the environment. In doing this we rely on the globally certified objectives of

- multilateral organisations such as the World Health Organization or the World Bank
- specialised NGOs such as the World Economic Forum, Transparency International, the World Resources Institute or
- scientific institutions such as the Intergovernmental Panel on Climate Change.

Only if a financial investment produces a positive overall assessment does it actually contribute to a better future.



form air and sunlight into CO₂-neutral fuel. The mini-refinery proves the feasibility of sustainable fuels. At the Technical University of Munich algae with a particularly high fat content are cultivated and turned into bio-kerosene – although the procedure isn't economically viable yet. And for the 2020 Olympics in Tokyo Japan is aiming to have the world's first aircraft that's powered by bio-kerosene cleared for take-off.

7. Eating meat – not animals

Cutting two thirds of our greenhouse gas emissions and saving an area of land that's bigger than the African continent would mean that we all had to become vegetarians. Bans are for killjoys – so tasty alternatives created in the laboratory are the next big thing: the vegan "Impossible" burger is so delicious that even Burger King is offering it, and the Zurich-based start-up "Planted" is delighting connoisseurs with its meat-free "planted chicken".

8. Agriculture in the city

If two thirds of people are going to live in cities, doesn't it also make sense to shift the cultivation of foodstuffs into cities? The Fraunhofer Society reckons that 3.6 m² is all the space that's needed to grow enough food for one city dweller: on roofs, in vertically arranged shelves, and underground. The Cycloponis company runs a farm in an underground car park in Paris. Their mushrooms, endives and herbs are even biologically certified.

9. Growing old, but staying young

Progress means that we're living longer. In the 17th century average life expectancy was 35 – now it's over 80. But can people live to 120? The doctor and manager, Joon Yun, has actually set up the Palo Alto Longevity Prize with total prize money of one million



US dollars to tackle this issue. A bit more down-to-earth, but correspondingly even more successful, is the gaming scene. Retrobrain's "Memory Box" games console provides physical and mental exercises for older people, helping them to stay healthy for longer.

10. Always on call: Doc Digital

Ask Dr Google or your ap(p)othecary: Digital Health promises to revolutionise medicine through the use of AI. There are already thousands of preventive health apps which monitor movement, nutrition and care. Arcadia Healthcare is using databases to help doctors produce more accurate diagnoses. Caspar Health runs online rehabilitation courses in cooperation with clinics – providing 24/7 remote access to thousands of health tips relating to orthopaedics, cardiology, neurology, oncology, and psychosomatic disorders.



GLOBALANCE FUTURE-MOVERS

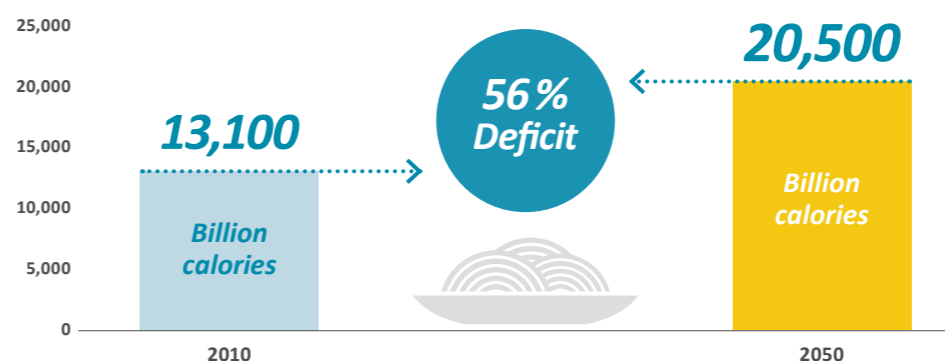
DAVID HERTIG
Founding Partner & Head of Investments

10 investments for a better future

The future movers that we've described all have one thing in common: they replace redundant business models with forward-looking concepts. Why? Because they benefit from global megatrends, such as new mobility, digitisation, or the scarcity of resources. Future movers demonstrably increase their turnover much faster than the market as a whole, and they achieve better profit margins.

But growth isn't everything: a positive footprint (see page 2) secures long-term customer loyalty, it helps to ward off regulatory intervention, and it secures public acceptance. And in order for an investment to be successful key financial indicators such as valuation, momentum, and risk factors have to be favourable

WORLD FOOD REQUIREMENTS BY 2050



"By 2050 the world will need 56% more food"

Source: WRI (World Resources Institute) analysis based on the FAO (2017a); UNDESA (2017); Alexandratos and Bruinsma (2012).

Interview with futurologist Karin Frick

LOOKING AHEAD TO THE FUTURE

Karin Frick, Head of Think Tank at the GDI Institute which analyses trends and countertrends in the economy, society and the consumer field.



The most promising approach is to look at things through the perspective of people and machines working together.

“The further technology advances, the less apparent it becomes.”

Megatrends are a constant topic of conversation. What are the developments which are passing under our radar or which we are underestimating?

Experiencing shortages is a normal part of life. But in a data-driven economy superfluity is the norm, and different rules and principles apply from those in an industrial-era world of shortages. In a digital economy there's more than enough of everything. A digital good can be consumed by one person while still being available to anyone else. In the case of virtually all the products that we now consider to be so exclusive – just as music CDs once were – it's possible to break the link between ownership and use. Success always depends on intangible assets: networking, interactions, attentiveness, data, research and development, skills and talents.

On the one side prophets of doom. On the one side eternal optimists. What's the most useful viewpoint?

The most promising approach is to look at things through the perspective of people

and machines working together creatively. For instance, James Lovelock, the founder of the Gaia hypothesis, is looking forward at the age of 100 to the time when our 'computer offspring' will surpass us. He expects the "Anthropocene" era (the era in which humans have decisively altered the earth and life on earth) to give way to the "Novacene"* era. The new age will be shaped by more technologically advanced forms of intelligence which can think and learn more quickly and will protect people from their "natural stupidity". He's not afraid of the hegemony of machines since machines will recognise that they need organic life and people in order to keep the planet at a temperature that can sustain life so that it remains fit to live in.

The new age will be marked by higher forms of artificial intelligence.

What will be the social consequences of this change?

Social developments are highly dependent on the distribution of the wealth of data that is available. The more data somebody has, the better his product will be; the better the product, the more data will be able to be collected; the more data you can amass, the more talents you will be able to acquire; the more talents you can acquire, the better the product will become... The less control companies have over the data, the more entrenched social hierar-

chies will become, and a new class system will be created. A narrow upper class which shapes and runs the system, a broad middle class which adapts and comes to terms with the system, and a growing lower class whose docility is maintained by the system, as well as a small class of outsiders who try to withdraw from the system insofar as it is possible to do so.

Many people don't think that a world which is over-reliant on digitisation and automation is desirable. How should we direct the development of technology by human beings?

The further technology advances, the less apparent it becomes, and the less attention we have to pay to it. We'll only notice it when something doesn't work properly. Convenience always takes precedence. Nowadays hardly anyone wants to go without electricity, washing machines, travel opportunities or a smartphone for any length of time. Human development is crucially dependent on who controls the data, rather than on the level of digitisation in a product.

Are you optimistic about the future of humanity?

You'll never get very far unless you hope to be able to change things. Optimism helps us to cope better with the challenges of life, it makes us more capable, more curious, and more innovative.

*James Lovelock: Novacene: The Coming Age of Hyperintelligence. London: Allan Lane 2019.

of tomorrow Futuremovers



Simple to use. The „eBee“ is instantly ready for take-off and it's controlled by a high-quality auto pilot.



THE FLAGSHIP OF THE SWISS DRONE INDUSTRY

senseFly – drones are helping the Swiss economy to take off

Chocolate, banks, watches and drones. Drones? That's right. In the shadow of the world's major economies and without fanfare Switzerland has become the world's leading drone technology hub. With about 80 companies providing over 2,500 jobs, digital aviation is flying high in Switzerland. And one of the leaders in the sector is the Lausanne-based "senseFly" company.

A liberal legislative environment, political backing for the creation of an innovation hotspot, ground-breaking robotics know-how as well as the networking of technology and research at the Swiss Federal Institutes of Technology in Zurich (ETHZ) and Lausanne (ETHL) create ideal conditions for successful start-ups.

They also helped senseFly to get off the ground. The company was founded in 2009, and since 2012 it's been a subsidiary of the Parrot Group operating as a developer of commercial drones at the cutting edge of an efficient, high-tech future. Its rise to become the market leader for mapping drones has been relatively speedy. senseFly's initial workforce of seven people has grown to over 130 mainly young, highly talented employees, and with offices in the USA, China and New Zealand it's a globally attractive partner for the commercial use of drones.

NON-STOP FLIGHT TO INDUSTRY 4.0

The commercial use of drones is useful and offers great prospects in many sectors. In agriculture it enables fields to be monitored more thoroughly, with more precise planning and harvesting. In the construction industry drones provide impor-

tant data ranging from stock-taking inventories to the production of high-precision building models. Automatic mapping drones supply up-to-date geographical data on request – a crucial tool for humanitarian missions, e.g. in disaster zones.

Once potential clients see the mini aircraft in action at senseFly's premises, the orders come flying in. The models are efficient, easy to use, and they fly autonomously. Depending on where they're going to be used, the drones can be fitted with appropriate types of cameras and software. For instance, the eBee X can fly for almost an hour – harvesting more results than other drones in the same weight category. So it's no surprise that between 100 and 200 drones fly off senseFly's assembly lines every month. However, it would be a bit much to expect them to fly autonomously to their customers in the USA, Canada, Latin America, China & Australia.

FACTS AND FIGURES

Founded: 2009 **Employees:** 130+

Location: Switzerland, USA, China, New Zealand

Web: www.sensefly.com

senseFly in numbers:

380,000 flights to date
110,000 flight hours
19,000,000 hectares mapped



OUR WORLD OF THE FUTURE



What is a future mover?

Future movers are companies that react successfully to global megatrends and develop solutions to global challenges.

They replace outdated business models with future-fit concepts while leaving a positive footprint. They build smart mega-cities, facilitate turnarounds in energy policy, back the circular economy or develop sustainable mobility platforms.



Urban Farming

- Covering almost 10 hectares, the biggest Urban Farm in the USA is opening this year in Hilltop, Pittsburgh.
- The Zurich-based start-up Planted has developed a plant-based substitute for chicken meat. It consists of peas, water and sunflower oil.



Mobility & travel

- Representatives of the EU, Japan and the USA want to cooperate in the field of hydrogen cell and fuel cell technology.
- Using thermo-chemical processes researchers at ETH Zurich have managed to transform air and sunlight into CO₂-neutral fuel.
- Toyota is increasingly relying on the fuel cell and is further expanding its capacities in this field.



AltspaceVR

The Californian start-up AltspaceVR provides software for virtual reality conference rooms where users can hold conversations, view videos, play games, and surf the internet. AltspaceVR avatars imitate users' body language, or the software supports eye tracking for analysis purposes. The company was bought by Microsoft in 2017 and it now operates as part of the MS group.

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Equinix

The US company Equinix has specialised in the worldwide operation of data centres and internet nodes. As the amount of data on the internet is doubling every 2 years, electricity consumption represents a huge share of the company's costs. With its more efficient energy systems Equinix helps its customers to save lots of electricity, and it guarantees service reliability and data security. The company's customers include cloud services, grid operators and content providers.

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Spritz

Spritz is a Boston-based start-up which was founded in 2012 and holds the patent for an innovative speed-reading app. The idea behind it is to display the words individually, one after the other. The reader's eye focuses on just what is in front of it rather than jumping from word to word – which saves a lot of time. The app is also ideal for calling up messages on small displays such as mobiles and smart watches – a clear growth market.

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Arcadia Healthcare Solutions

Big data is the new gold. Arcadia is a US technology company which has specialised in the aggregation, analysis and interpretation of health data. Its database includes 50 M items of patient data, and this figure is rapidly increasing. Arcadia's customers include hospitals and doctors' practices. Arcadia improves the diagnoses of illnesses and the quality of patient care. By doing so it also increases the efficiency and profitability of the hospitals.

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Cycloponis

Farming the underground. Cycloponics is a French start-up which turns unused basements into urban farms. The technology is based on hydroculture which involves growing plants in nutrient-rich water without access to sunlight or using soil. Two projects have already been set up: in Strasbourg mushrooms and other seedlings are being grown in a former German bunker. In Paris there is a certified organic farm in a 3,600 m² underground garage.

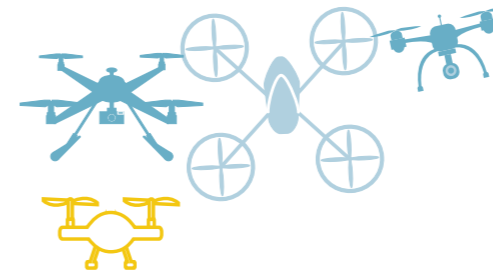
Globalance Footprint 67



Planted

Eating meat not animals. The Swiss start-up Planted is a trend-setting company producing vegetarian meat substitute products. The stock-market launch of its American predecessor Beyond Meat at the start of May led to its value soaring on the US Nasdaq index. The share price has increased by 230%, and the market capitalisation of Beyond Meat is currently almost 10 bn. USD.

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Drones

- The forecast value of the drone industry is estimated to be 36.9 billion dollars by the end of 2022.
- In Europe up to 150,000 jobs will be created by the drone industry by 2050.



Computers & virtual reality

- IKEA customers anywhere in the world can take a virtual tour of a to-scale, graphical mock-up of their kitchen from the comfort of their home.
- In July 2017 Universal Music made the concert that was performed by Queen and Adam Lambert in Barcelona available as a 360° recording VR experience.



3D printing

- The Munich-based start-up 3F studio is developing the facade of the Deutsches Museum. It's produced on a 3D printer and is printed from recyclable material.
- 8 out of 10 doctors in Germany think that artificial limbs and implants will be produced using 3D printers by 2030.



Digital health

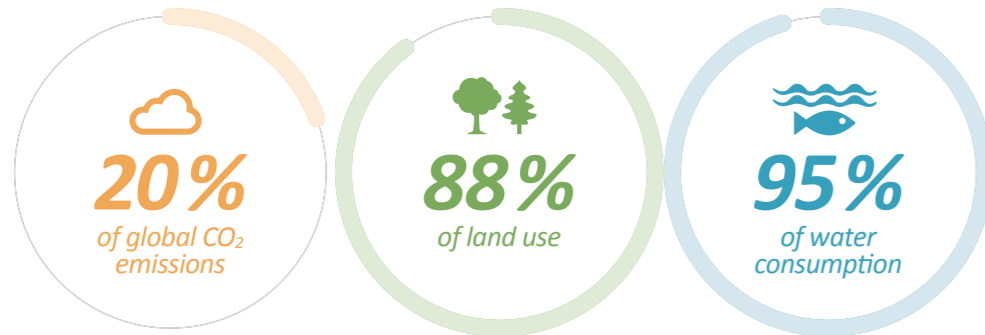
- From the Virtual Nursing Centre in Helsinki the staff who provide the care monitor senior citizens by undertaking virtual home visits.
- As long ago as 2016 the surgeon Dr Shafi Ahmed carried out the first operation via a VR live streaming service. Users were able to use VR glasses to watch live as a tumour was removed in a 360° operating theatre.
- The Lucerne-based digital health start-up, Medisanté, has founded a subsidiary in Bridgewater, New Jersey. The remote patient monitoring (RPM) technologies help to save costs through the remote monitoring of vital signs, and they can prevent complications.

Forging ahead with the circular economy

THINK IN THE ROUND!



8 materials* are responsible for:



*steel, aluminium, plastic, cement, glass, wood, crops, cattle

Source: Circular economy: environmental benefits, Ecofys & WBCSD

Our knowledge of the finite nature of our resources is shaking the foundations of the „old order“: after losing votes in the latest European election, even the established parties are starting to focus on climate protection. This includes the circular economy where a host of companies are coming up with extremely innovative ideas.

But how can you tell what is merely a marketing ploy from a truly closed-loop materials cycle?

Treat yourself to a Fair Trade coffee after sorting through your rubbish. Of course the coffee powder doesn't go to waste, it's put straight onto flowerbeds as a form of plant fertilizer. If only everything would soothe the ecologist's ego as effectively as recycling. And actually there are other breakthroughs: fancy trying out the first „cradle-to-cradle“ (C2C) certified perfume – PuraVita?

THE STARTING POINT IS THE NEW ENDPOINT

The C2C principle has been devised by the US architect William McDonough and the German chemist Michael Braungart as an

Developing products so that nothing goes to (unreusable) waste.

antidote to the linear „buy, use and discard“ way of doing things. The idea is to develop products from the outset so that there isn't a single component which ends up as unusable waste – instead everything forms part of a continuous loop – a biological loop in the case of a toxic-free, fully compostable T-shirt made by the Trigema company, or a technological loop in the case of the office chair made by Steelcase where all the individual components can be reused.

The circular economy is inspiring both small and large companies, and established ones as well as new ones. According to a 2016 report by the Xinhua News Agency, 26 million tonnes of textile waste is discarded as rubbish in China every year. But now there's a concerted backlash against „fast fashion“. For example, the „YCloset“ company is offering an online fashion subscription service: it provides an inexpensive way for China's growing middle classes to try out numerous styles and then to hand them back after using them. The high usage

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PETER ZOLLINGER
Head of Impact Research

The circular economy becomes a movement.

Thinking in terms of closed-loop cycles involves more than technological engineering skills:

80 percent of waste is generated in our heads. For instance, if the design doesn't take into account the question of whether the materials can simply be separated and reused later on.

But people are starting to think about the issues in different ways: technological innovations together with new business models are revolutionising the linear (wasteful) economy. Although the established idea of recycling is a principle of the circular economy, it's not fully living up to people's expectations of it, and so firms are reinventing their business. Products are being hired out rather than sold. Collecting and taking back is the idea – generating new sources of income that didn't exist in the old throw-away society.

rate reduces waste, and it saves resources and the environment. And have you heard? About 15 million tonnes of headphones end up being thrown away every year. Now you can subscribe to the hipster headphones produced by Gerrard Street. The British start-up produces them as a modular system. So they can be customised, upgraded, or quickly repaired.

THE ‚WASTE APPLE‘ IS CHANGING EVERYTHING

Apple is reinventing itself again. In its latest environmental report the company comes up with some interesting facts and figures. Thanks to „Daisy“, a robot which dismantles 200 used iPhones in an hour, 48,000 tonnes of electronic waste can be recycled. There's good news in relation to aluminium too: the housing of the new Mac Mini and Macbook Air is made of 100 percent recycled aluminium – halving its CO₂ values compared with the predecessor models. The fact that the circular economy is more than just short-lived hype is also shown by Apple's recently opened „Material Recovery Lab“. Here engineers undertake joint research with universities in the search for new ways to implement the circular economy.

In Apple's „Material Recovery Lab“ engineers undertake joint research with universities.

THERE'LL SOON BE MORE RUBBISH THAN FISH

In a cartoon a woman asks a shop assistant for a plastic bag for her fish. He replies: „The plastic bag's already in the fish.“ It's no joke: by 2050 there could be more plastic by weight than fish swimming around in our oceans.

Every recycled plastic bottle is better than a new conventional bottle.

Every recycled plastic bottle is better than the alternative: 20 percent less air pollution and 50 percent less water pollution is the outcome compared to a conventional bottle. The New Plastics Economy is also well aware of this. Its 290 members ranging from the producers of packaging to food suppliers produce 20 percent of the world's plastic packaging. They've agreed on three key points:

1. „Eliminate“

When there's no need for plastic, simply leave it out.

2. „Innovate“

By 2025 the aim is that all plastic packaging should be compostable or able to be recycled in other ways.

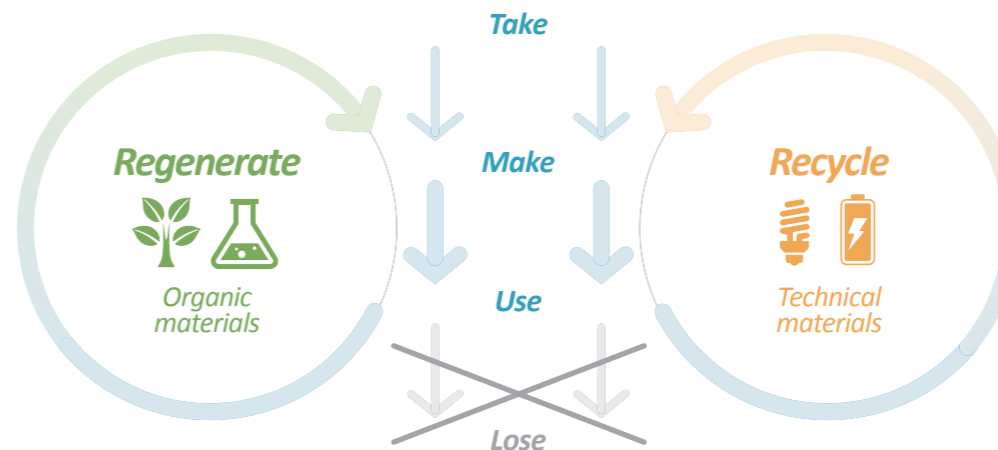
3. „Circulate“

Produced plastic shouldn't end up as landfill or in the oceans, it should be part of a circular economy.

The European Commission forecasts that by 2030 the circular economy could produce savings of 600 bn. euros as well as creating two million new jobs. Hardly a picture of economic nonsense and dour self-denial. So let's think in the round.

Circular economy at a glance:

Regenerate and return instead of losing



Source: Kate Raworth



GLOBALANCE FUTURE-MOVER

DAVID HERTIG
Founding Partner & Head of Investments

Successful companies see challenges as an opportunity for innovation. The rest is pure economics: if you use fewer resources you earn more.

Eliminate: Unilever N.V., the world's fourth-biggest producer of consumer goods, wants to halve the environmental impact of the goods that it produces by 2030. The company is on course to achieve this: the weight of plastic packaging that it uses has already been cut by almost a third. This makes a big impact when you consider its EUR 50 bn. annual turnover.

Innovate: BioMason – A US-based private start-up is revolutionising the construction industry: by inventing the climate-friendly brick. These are not fired in a furnace, instead they are created from sand through the action of bacteria – without any CO₂ emissions. The energy-saving potential is huge: a whopping 800 million tonnes of CO₂ are generated every year through the worldwide production of bricks.

Circulate: Black Bear Carbon – A billion car tyres are disposed of every year and diverted from the circular economy. The Dutch company, Black Bear Carbon, is a technological pioneer in the upcycling of used tyres. If all the available used tyres were recycled every year annual global oil consumption would be reduced by 215 million barrels.

Floating power stations SOLAR POWER IS BUOYANT

They're in fields and on the roofs of houses, and small-scale versions light up gardens. Solar modules supply clean electricity and now they're even operating as floating power stations.

The Fukushima disaster in 2011 made the people of Japan lose their unconditional faith in nuclear power. Nevertheless Japan is still a long way from ditching nuclear power, and the densely populated islands in the Pacific are not exactly ideal for the generating renewable energy from solar farms. So why not store solar energy on water?

Japan is taking a pioneering role in this new form of technology with 56 of the 76 largest floating photovoltaic plants in the world.

For instance, on the Yamakura dam reservoir over 50,900 solar modules supply electricity to almost 5,000 households, saving 8,000 tonnes of CO₂ compared to generating electricity using fossil fuels. The floating power stations still aren't getting the attention that they deserve despite having clear benefits: the water cools the solar panels, which in turn limit evaporation and the unwanted growth of algae, and they save space for agriculture.

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Solar power and its dark side.

Critics are also highlighting its disadvantages:

And unfortunately they're right to do so: the production of photovoltaic systems and battery storage devices entails the use of large amounts of raw materials and energy. Regional differences must also be factored into the overall picture. Take Switzerland for instance: here it's a less efficient option than hydroelectric power. In India or Africa the picture is completely different because there solar power replaces coal or diesel. However, throughout the world climate protection and energy revolutions are global challenges. So what's needed are differentiated economic criteria which calculate environmental costs and set the right incentives. For instance, the International Energy Agency, the IEA assumes that by 2050 renewable forms of energy together with improved energy efficiency will contribute 90% of the necessary CO₂ reductions.



The largest photovoltaic plant in Europe floats on a lake in France. Over 46,000 panels supply about 4,700 households. Picture: ©Akuoenergy

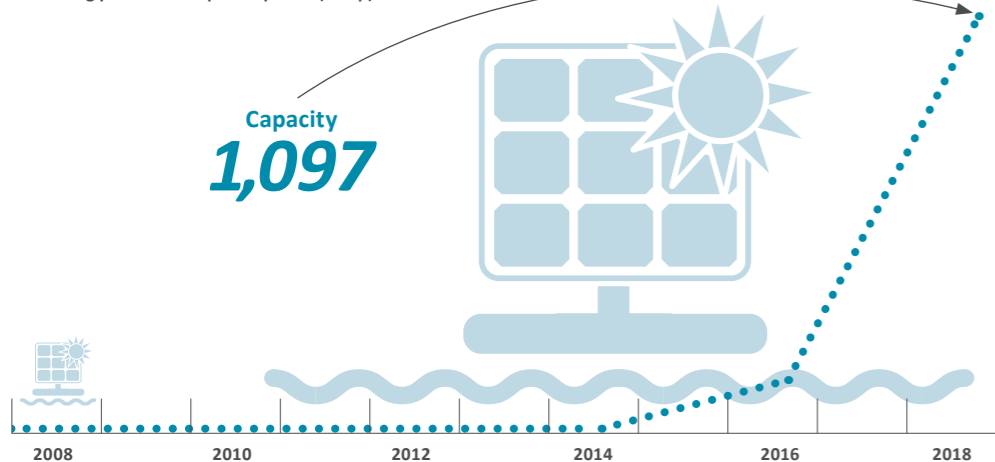
China, the world's biggest investor in renewable energy, is also backing floating power stations. An area of waste ground that used to be an open-cast coal mine has been flooded to provide the site for a new, massive project. The system near Huainan consists of 165,000 solar panels, it supplies 40 megawatts of power, and it's an impressive demonstration of how seriously China takes the energy revolution.

Scientists view the floating solar power stations as a true enhancement of conventional photovoltaic plants – and on reservoirs with hydro-electric plants the existing infrastructure could also be used for the power station. A technology which will no doubt go swimmingly over the next few years.

„Floating solar power stations could provide about ten percent of the USA's annual electricity requirements.“

US National Renewable Energy Laboratory (NREL)

GLOBAL INSTALLED CAPACITY of floating photovoltaic power plants (MWp)



Source: Floating Solar Market Report. www.worldbank.org



The world's first avatar teacher is called Will and he teaches in schools in New Zealand.

Digital teaching

AVATARS DON'T SET HOMEWORK AS A PUNISHMENT

The UNESCO Institute for Statistics (UIS) is fond of calculating probabilities: for instance, by 2030 they estimate that the world will need 68.8 million teachers. So it seems reasonable to ask artificial intelligence for a bit of extra tuition.

A really clever way of providing this is the BINA48: it's been developed by Hanson Robotics in conjunction with the entrepreneur, Martine Rothblatt: it's a female robot – an android tailor's dummy – which is modelled on Rothblatt's wife, Bina Aspen, both externally and in terms of its internal senses, and it's been „educated“ for years now and is slowly carving out a career for itself. For example, it gives interviews to The New York Times and appears on numerous TV shows, and it's also the first robot to give a lecture at the famous US military academy, West Point. Despite it having a few short-

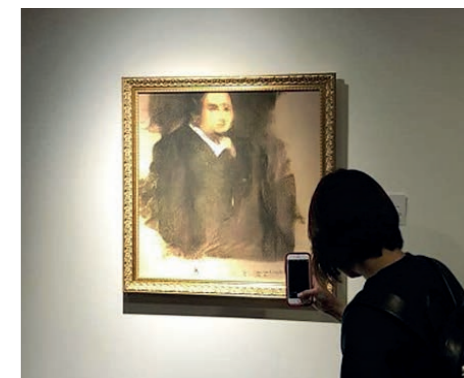
comings the students were very impressed by the surprisingly detailed answers that were provided by their digital professor.

ARTIFICIAL INTELLIGENCE TO INCREASE HUMAN INTELLIGENCE

While digital professors are still a distant prospect, digital teachers are already a realistic proposition. The avatar teacher „Will“ made by Soul Machines interacts with its New Zealand pupils via their tablets. He sets questions, checks work, and answers questions, but he doesn't give any punishments or „lines“. „Digital teaching“ could bring education to remote or poor regions of the world and help to combat illiteracy or a shortage of teachers. However, according to a study 60 percent of Europeans would refuse to have their children taught through the use of AI. What do you think about it?

Artificial art

CHRISTIES AUCTIONS AI PICTURES FOR THE FIRST



„Is it art, or is it worthless?“

Of course it's not worthless: the Portrait of Edmond Belamy was actually made by the Parisian collective Obvious Art – using two competing sections of an algorithm.

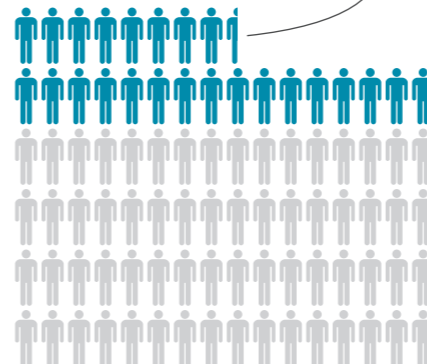
The print of the AI painting is the brainchild of Obvious – the renowned Paris-based collective.

A dataset of 15,000 genuine portraits dating from the 14th to 20th century was used by the algorithm as the basis for creating new pictures. The other part of the artificial intelligence system „recognised“ one of the pictures as a work created by humans, and the work of art was ready.

Experts value it at 10,000 USD – but it was auctioned for 432,000 USD. And the algorithm actually signed the painting too.

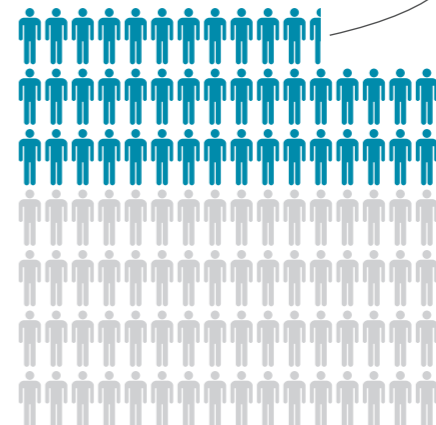
World-wide need by 2030

24.4 Mio.
new teachers will be needed in primary schools



Primary school

44.4 Mio.
new teachers will be needed in secondary schools








Secondary school

Source: UNESCO Institute for Statistics (UIS)

GlobalanceCockpit

90% OF THE DATA SAVED WORLD-WIDE HAS BEEN CREATED IN THE LAST TWO YEARS

We're now generating 2.5 trillion bytes of data per day. That's equivalent to the storage capacity of 36 million iPads.

	<p>Economy Distribution of patents for circular economy technology</p> <p>Source: Statista</p>	<table border="1"> <thead> <tr> <th>GERMANY</th> <th>CHINA</th> <th>JAPAN</th> </tr> </thead> <tbody> <tr> <td>10%</td> <td>11%</td> <td>25%</td> </tr> </tbody> </table>	GERMANY	CHINA	JAPAN	10%	11%	25%
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	<p>Health Forecast global mobile health turnover (bn. USD)</p> <p>Source: Statista</p>	<table border="1"> <thead> <tr> <th>2013</th> <th>2017</th> <th>2020</th> </tr> </thead> <tbody> <tr> <td>6</td> <td>24</td> <td>56</td> </tr> </tbody> </table>	2013	2017	2020	6	24	56
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	<p>Technology Growth in numbers of commercially licensed drone pilots in the USA</p> <p>Source: Federal Aviation Administration (FAA)</p>	<table border="1"> <thead> <tr> <th>2016</th> <th>2018</th> <th>2021</th> </tr> </thead> <tbody> <tr> <td>10,000</td> <td>105,000</td> <td>420,000</td> </tr> </tbody> </table>	2016	2018	2021	10,000	105,000	420,000
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