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## MAKE WAY FOR THE INTERNET OF ENERGY

If world leaders gathering at Davos this month are to live up to the theme of the 2018 World Economic Forum, “Creating a Shared Future in a Fractured World,” they will have to call on the full power of emerging digital networks that create new connections between people, companies and devices.

By linking up physical infrastructure to the digital world, these technologies have the potential to transform basic industrial



processes and make the economy of tomorrow more inclusive and more sustainable.

“The fourth Industrial Revolution will completely alter how we produce, how we consume, how we communicate and how we live,” WEF founder and executive chairman Klaus Schwab has forecast. “It will allow, if we get it right, a much more human-centered approach, fostering not only material satisfaction but also genuine individual and societal well-being for all.”

Whether new networks are integrating household solar panels into national energy grids, helping car manufacturers predict and

prevent traffic jams before they happen, or improving the efficiency and sustainability of the mining industry, digitalization is already having a profound impact across all areas of the economy.

In the energy sector, the Internet of Things and digitalization “will turn the whole industry upside down,” says Cedrik Neike, the youngest member of the Managing Board of German conglomerate Siemens, with special responsibility for energy management.

**Digitalization is the new normal and is driving the Internet of Energy.”**

Cedrik Neike, Member of the Managing Board, Siemens

“Just as the arrival of the Internet meant that anybody could communicate with anyone else without having to go through a central telephone exchange, now the Internet of Energy is decentralizing the world’s energy system and making electricity greener and more affordable,” he adds. “Energy companies need to embrace a new mindset to respond to the emergence of millions of smart energy-generation units and to build a more sustainable, affordable and reliable grid.”

One of the most dramatic implications of the Internet of Energy is the so-called virtualization of the traditional power

plant, the replacement of large generating facilities by aggregated small producers. At a major shopping mall in Helsinki, Finland, Siemens is installing solar panels, a microgrid and a state-of-the-art battery storage system. As a result, the shopping mall will soon be able to operate as a virtual power plant, generating its own power, selling surplus electricity back to the national grid and reducing the need for major investments in expensive and often polluting backup plants.

“With the Internet of Energy, a project that starts out being driven by cost savings can expand to create entire new business models,” Neike says. “Not only will the mall save energy, but it will also help to stabilize the Finnish grid.”

Across the Atlantic Ocean, Siemens is using another digital innovation to develop a business model that will take the energy revolution even further. Working

with a start-up in Brooklyn, Siemens is developing a microgrid that will use blockchain to let local residents and businesses buy and sell solar power directly from each other, creating a completely self-sufficient energy network.

**We have now a historic window of opportunity to shape technological breakthroughs.”**

Klaus Schwab, Founder and Executive Chairman, World Economic Forum

“Thanks to new technologies, whole neighborhoods could start producing and trading their own electricity,” Neike says. “This will not only make energy more affordable and more reliable, it will also give energy an emotional meaning for the consumers and producers of the future.” ■



Smarter infrastructure points to a brighter future



## LEADING THE ENERGY TRANSITION

As the lifeline of modern economies, the energy sector plays a critical role in steering the world toward a low-carbon and digital future. Companies in the industry are now reinventing themselves to tackle a series of challenges that range from increasing access to clean energy to installing two-way charging points for electric vehicles.

“The extremely rapid changes that are transforming the entire energy industry are creating a new frontier of products and services,” says Francesco Starace, CEO of



Access to energy is critical to sustainable development

Italian energy company Enel. One of the world's largest energy businesses, Enel has moved into vanguard positions on many of the industry's varied frontlines. In Italy, it first installed digital

meters 15 years ago and is now replacing them with a second-generation smart meter that will enable innovative services for end users and energy operators alike. On the sustainability front Enel is

committed to delivering on four U.N. Sustainable Development Goals (SDGs) aimed at ensuring quality education, access to affordable and clean energy, decent work and economic growth, and combatting climate change.

Recently Enel has unveiled a new brand, Enel X, reflecting its strategy of opening up energy to new uses, new technologies, new partnerships and new services. The brand positions Enel at the heart of today's fast-developing ecosystem of innovative services and shared value. ■

### Q&A with FRANCESCO STARACE, CEO, ENEL

#### How well prepared is Enel for the transformation of the global energy industry?

We are leading in key areas for sustainable growth such as renewables and digitalized distribution networks. We can leverage the trends of urbanization, the electrification of transportation and other industries as well as decarbonization to capture the opportunities presented by the global energy transition.

#### How important is digitalization to the future of Enel?

Digitalization is the key to making the most of the energy transition and boosting efficiency and sustainability. That's why we increased investments in digitalization to €5.3 billion in our 2018-2020 strategic plan. Digitalizing our grids, assets and processes will create new value for cities and for industrial and residential customers.

#### What are the main focus areas for Enel X?

We are focused on customers,

which is why we launched a new global business line; it will come into the market under the new brand, Enel X. We set up four product and service lines to address new customer needs. E-Industry offers solutions to large commercial and industrial clients, while e-Mobility will turn Enel into a technology leader in electric mobility. E-City offers advanced and integrated energy services to public administrations and municipalities, such as fiber optic network connectivity. E-Home delivers innovative solutions to residential customers, such as the installation, maintenance and repair of smart home energy appliances.

#### How is Enel contributing to sustainable development?

Sustainability is deeply embedded in our industrial strategy. We gave structure and focus to our sustainability efforts by embracing the U.N. Global Compact approach, and we also sit on the GC Board. The 17 U.N. Sustainable Development Goals inspire all our companies' efforts, and we have publicly committed to deliver on four SDGs. For each of them, we set specific and measurable targets to be achieved by 2020: ensuring

quality education to 800,000 people, giving access to clean and affordable energy to 3 million people, promoting decent work and economic growth for 3 million people, and lowering emissions to below 350g of CO<sub>2</sub> per kilowatt-hour equivalent.

#### Can you tell us how Enel is applying the Creating Shared Value (CSV) model?

CSV is an inclusive approach combining the understanding of social issues with the design of a profitable and sustainable business model. This approach



opens up opportunities for local communities and for the companies involved.

We decided to undertake this journey by providing energy access to more people, while addressing

climate change and supporting local communities.

With this in mind, we restructured our value chain, integrating CSV in all our business processes. Moreover, we work in close cooperation with

**The energy sector is experiencing an unprecedented transformation, opening up new opportunities for utilities and communities.”**

Francesco Starace, CEO, Enel

institutions, civil society, local communities and NGOs, as well as with universities, startups, clients and investors, creating a solid network of partners who share our sustainability vision. ■



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## INNOVATING SUSTAINABILITY

Every business today cares about corporate social responsibility—or every business should, anyway. And on a global scale, one of the most pressing issues we currently face is the impact of runaway carbon emissions on the livability of our planet. Now digital innovation is helping companies improve the sustainability of their operations.

Much of our global carbon footprint results from the physical constraints of traditional work: what you can do depends on where you are and what you have with you. To be productive, you've got to commute to a climate-controlled office and use applications delivered from a power-hungry corporate data center. To meet with people in other locations, you've got to travel there—burning carbon along the way.

Digital innovation helps erase physical constraints. When employees can access a complete digital workspace from anywhere, they can work remotely and their business doesn't need to provide (or heat, or cool, or light) as much office space. When digital services are delivered via the cloud, public cloud providers like Amazon, Google, IBM and Microsoft can leverage massive efficiencies of scale that no corporate data center could match. When people can meet and collaborate virtually using digital tools, they don't have to travel as much.

The more you embrace digital, the less physical you need and the more sustainable you become. More productive, too—so sustainability can come without sacrifice. That's the kind of innovation our planet needs today. ■

**Christian Reilly**  
VP Global Product and  
Technology Strategy, Citrix

## DIGITAL TECHNOLOGY RESHAPES CITY SERVICES

Faced with the many economic, social and environmental challenges of rapid urbanization, city authorities of today have found an important new ally in the shape of cutting-edge digital technology and services.

When Mauricio Macri, the current Argentinian president, served as mayor of the national capital, Buenos Aires, he was able to cut the operational and energy costs of the city's lighting system, and reduce CO<sub>2</sub> emissions significantly, by replacing traditional streetlights across the city with 91,000 connected LED street lights from Philips Lighting. Using the company's CityTouch system, operators can now dim and brighten individual lights remotely in response to changing conditions, rather than just turning the entire network on and off. Thanks to a digital dashboard provided by software company SAP, authorities also enjoy a complete 360-degree view of their smart city infrastructure, including real-time performance data from the LEDs. This is helping the city improve planning and cost management.

## PROTECTION FROM NEW THREATS

In the early days of the Internet, the first cybersecurity companies would detect one or two new viruses each week. Now, 30 years later, the scale of the threat has



Avast Threat Labs



SAP and Philips Lighting are smart city partners in Buenos Aires

"The project has optimized energy consumption and improved the quality of life," says Massimiliano Claps, SAP global public sector team lead for future cities. "It has

**Digital technology is reshaping the way local governments deliver valuable services."**

Massimiliano Claps,  
VP Global Future Cities, SAP

enabled city operators to manage the level of illumination for different neighborhoods, making city streets brighter and safer for drivers, night-time walkers and shoppers. It is environmentally sustainable and financially sustainable."

"Once a city starts with connected lighting, it doesn't tend to return to traditional lighting," says Andreas

Knobloch, the alliances manager for Philips Lighting, which has struck up a partnership with SAP to address the growing market for smart city infrastructure. "It's like using a smartphone compared to using a regular cellphone."

Lighting is not the only public service to benefit from the analytical power of the SAP HANA platform. In Buenos Aires, authorities have installed sensors in more than 30,000 storm drains to provide early warning against the risk of flash floods. Utilizing SAP HANA, the city analyzes data from these sensors, combined with information from weather reports and from residents on social media, to determine where action is needed immediately. "The public sector is now using SAP HANA to enable innovation and save lives," Claps says. ■

Claps says. ■

Things (IoT), that number is set to rise even higher, Vlček predicts. Hackers are already reprogramming IoT-enabled devices such as baby monitors and home security cameras to run their own apps or attack global services such as Twitter and Amazon.

To respond to threats of this magnitude, Avast is using the power of big data, artificial intelligence (AI) and machine learning to detect suspicious behavior and defend networks automatically. "The IoT space is a ticking time bomb today," Vlček says. "I see our role as securing this new frontier of consumer computing." ■

## THE CONNECTED CAR: SMARTPHONES ON WHEELS

As industrial leaders at Davos grapple with the challenge of responding to rapid technological and social change, one car manufacturer is showing how digital innovation can serve as a catalyst for transformation. In a market that is struggling with macro-economic headwinds and regulatory pressure, Barcelona-based SEAT is incorporating mobile communications and entertainment technology into its models to appeal to a young and vibrant segment of the population. The results have been spectacular: in 2016, SEAT obtained

the highest operating results in its history, and in the first 10 months of 2017 its worldwide sales increased by 14.4%. SEAT president Luca de Meo, who has been named CEO of the Year by *Automotive News Europe* for his role in the brand's transformation, says that the turnaround has been based on the company's willingness to embrace change and adapt to the millennial generation. "By simply listening to what our customers are telling us, we have been able to get a 10-year head start over our competitors,"



The SEAT Arona in Barcelona

he says. "We are becoming a front-runner in the connected car." De Meo's ambitions for SEAT go well beyond integrating technologies such as Apple CarPlay and Amazon Alexa. Working

closely with technology start-ups in Barcelona and beyond (for instance in Israel), de Meo is now positioning the brand at the very center of a new world of connected mobility. ■

### Q&A with LUCA DE MEO President, SEAT

**What do the awards you have received, such as *Automotive News CEO of the Year* and *Bocconi University Alumnus of the Year*, say about SEAT?**

These awards recognize the turnaround that we have achieved in the last couple of years. The automotive press has been surprised by the strength of the SEAT brand in the market. Things have really taken off in the last 24 months, after more than five years of hard work by the people at SEAT. There is a very positive feeling inside the company now, and I hope it will continue long into the future.

**What role do you think you have played in the transformation of SEAT?**

I see myself as a facilitator. I like seeing people and organizations developing, growing and improving. Here at SEAT, I have been encouraged to witness how people are becoming more confident at trying new things. We are focused on unlocking innovation.

Innovation is not a function or a process: it is an attitude.

**How is this emphasis on innovation contributing to SEAT's current success?**

We have made real progress in the area of the connected car. We are leaders in this space because we were able to re-engineer our processes and bring people from different functions together to work on connected car solutions. We are also working very closely with local start-ups and global technology giants. We are the first car company in Europe to

integrate Amazon Alexa into our cars. We were able to go from the initial conversation to announcing the news at the Frankfurt Motor Show within six months. This reflects the sort of company that SEAT has become. We have an agile and responsive culture. We can react to trends and implement

**We are the gateway for the VW Group to conquer the next generation."**

Luca de Meo,  
President, SEAT

new services faster than our competitors.

**How do you see the role of SEAT within the Volkswagen Group?**

On the innovation side, we are highly contributing to the group's efforts in connectivity, especially in developing solutions for the human-machine interface. We have special strengths in software, ideas and creativity.

We are also the brand that helps Volkswagen Group reach the millennial generation with affordable cars.

**How is SEAT preparing for Industry 4.0?**

In our Martorell factory we are already using innovations such as smart glasses, virtual reality and autonomous, collaborative robots. But there is much more to Industry 4.0 than digitalizing our infrastructure. We have introduced a training program to help our employees prepare for these challenges and transform their skills. For SEAT, the ultimate goal is to connect our plants to our suppliers and to our customers, for the full life cycle of our products. ■





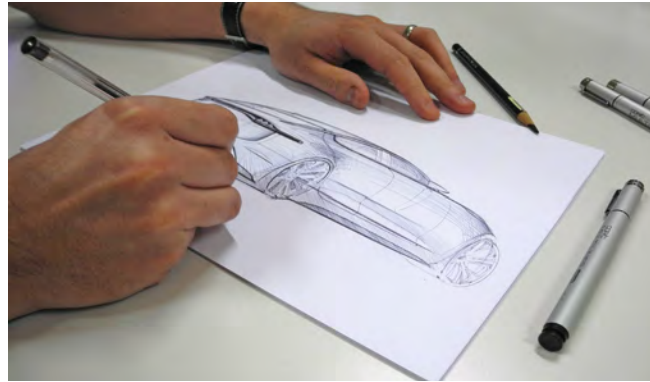
## TAKING KIA TO THE NEXT LEVEL

As the automotive industry faces the greatest period of change in its history, coming to terms with new technologies for connectivity, electrification, autonomous driving, market share, scale and global reach have become even more critical to success. To prepare for this new era and enhance its position in the market, Korean carmaker Kia is developing innovative new designs and has launched the highest-performance production vehicle in its history: the Stinger.

For a brand better known for sport utility vehicles such

as the ubiquitous Sportage, the introduction of a sports sedan that can go from 0 to 60 mph in under five seconds, complete with sleek and athletic styling, has turned heads across the automotive world. "It is a bold move for our company because nobody expected this from Kia," says Artur Martins, VP of marketing and product planning at Kia Motors Europe. "The Stinger is our global brand ambassador, representing what we want to be as a brand in terms of design, technology and the driving experience."

The launch of the Stinger is the result of years of sustained attention to design and branding.



Sketch drawing of the Kia Stinger

In the hands of legendary car designers Peter Schreyer and Gregory Guillaume, Kia has flourished on the back of classic European aesthetics coupled with competitive pricing. With the Stinger, it has now created

a car that can excite a new generation of car buyers. "Design is the best way to take a car brand forward," Martins says. "The Stinger is a car designed for our customers to fall in love with." ■

### Q&A with GREGORY GUILLAUME, VP Design, Kia Motors Europe

#### How did the GT concept car develop into the Kia Stinger?

We showed the concept car at the Frankfurt Motor Show in 2011 and the reception was very positive. We were confident that there was a good chance to get it through production, so we started working on the production version even before we got the green light from Korea. I sent a model to Korea without them expecting it. The board was happy, satisfied and proud. They could see that this was going to be our future flagship injecting a valuable boost into the brand.

#### What were your inspirations when designing the Stinger?

I grew up in France in the early 1970s, when people used to work hard and make money in Paris and then go

to Saint-Tropez to have fun. In the summer as a kid, we used to go to Saint-Tropez, and on the highway we would see all these sports cars. I wanted to replicate what those cars stood for: fast and powerful but also stylish, elegant and fun.



#### What is your favorite feature of the Stinger?

It's not really a single feature. It's the proportions. Proportions are very important to me. Because it is a Gran Turismo, no single element should be louder than the others. It is all about harmony. Everything in this car is about balance and

subtleties. It should not be too loud, too brash or too sporty. It should be elegant, but you still need to express the power that is going to the rear wheels because it is a rear-wheel-driven car. That is why we use Coke bottle curves over the rear wheel. You can feel

brand achieve what it wants to communicate and where it wants to go. Kia has been a challenger brand. We came from nothing, and we have surprised a lot of people. We have pushed the bar higher. We are all about shaking things up, which is one of the

### **We have never produced anything like the Stinger before.**

Gregory Guillaume, VP Design, Kia Motors Europe

reasons we launched the Stinger. We want to reach people in a different way. We want to reach their hearts.

#### What impact do you think the Stinger will have on your market positioning?

The Stinger is going to help how people perceive Kia overall, so it is going to help all our models. People will buy a front-engine rear-wheel-drive car because of emotion. The Stinger is all about emotion and the fun of driving. ■

the power, tension and muscle there, but it is only when you walk around the car that you sense that it starts to grow out ever so slightly.

#### How important is design to enhancing the Kia brand?

Design is a tool that helps the

## NISSAN DESIGNS INTELLIGENT MOBILITY

It is not only the shape of the car industry that will be changed forever by the arrival of electric vehicles, connectivity and autonomous driving, but the shape of the cars themselves. While tailpipes and driveshafts already look as if they're being consigned to history along with the internal combustion engine, new digital technologies are poised to have an even more dramatic impact on car interiors and exteriors.

### **It is a thrilling time to be a designer. We are being asked to dream.**

Alfonso Albaisa, SVP for Global Design, Nissan Motor Co. Ltd.

At the end of 2017, Japanese car manufacturer Nissan unveiled an all-electric concept car, the IMx, to demonstrate just how car design may change in the near future. "We see technology as giving us freedom from the things that hold us back as human beings," says Alfonso Albaisa, SVP for global design at Nissan Motor Co. Ltd.



"The IMx is an inspirational statement that expresses the life-changing possibilities of these new technologies."

When Nissan's ProPILOT mode for autonomous driving is activated, the steering wheel is stowed inside the dashboard, which becomes a private entertainment center, and the seats recline to give occupants more space. When in driving mode, artificial intelligence enables drivers to control the car and infotainment systems with eye movements and hand gestures. On the exterior, the IMx's sporty but stable silhouette suggests the power and rapid acceleration that are the hallmarks of electric vehicles (EVs).

"With the IMx, we are expressing what the next generation of autonomous EVs and connected cars may look like," Albaisa says. "We are not just chasing the dreams of customers. We are chasing the dreams of mobility for whole societies and communities."

"Human beings see objects as reflections of themselves, and the car itself is the ultimate dream of humans for freedom."

According to Albaisa, the concept vehicle represents the response from Nissan's designers to the company's Intelligent Mobility vision of how cars will be driven, powered and integrated into society. It is a vision that has already begun to transform the world of personal transport: the Nissan LEAF

is the world's best-selling zero-emissions vehicle and enjoyed a redesign in 2017, gaining enhanced aerodynamics, a sharper, more dynamic look and an overall sense of effortlessness and flow. "The new design positions the LEAF as the cutting-edge flagship of Nissan Intelligent Mobility," Albaisa says. ■

## ONE SUPERCOMPUTER TO RULE THE ROADS

Historic car manufacturers are moving onto the front line of cutting-edge technologies and powering a new era in computing as they reposition themselves for a world of connected and autonomous transport.

At the end of 2017, German car giant Volkswagen teamed up with Google to work on the development of applications on a quantum computer. While classical computers store information in bits with the values either of one or zero, subatomic particles can exist in a state of superposition of both of these states, increasing their power exponentially. Before long, quantum computers may be able to perform operations that are beyond the reach of their classical counterparts.

"Quantum computing is opening up a completely new chapter of performance," explains Martin Hofmann, CIO at Volkswagen Group. "Some computations that would take one year for a conventional supercomputer to carry out can be done in seconds by a quantum computer. In some cases, a solution will only be possible with quantum computers."

Volkswagen and Google are focusing their initial research on three areas: traffic optimization, materials simulation for vehicle construction and battery research, and the development of new machine learning processes and artificial intelligence (AI) processes needed for self-driving cars.

Even before the Google announcement, Volkswagen had already taken its first steps into the use of quantum computing for traffic optimization. In a project in Beijing, the company deployed the technology to optimize the traffic flow of

10,000 taxis. "We used quantum computing to predict traffic jams and then dissipate them before they happened by giving each car a different route," Hofmann says. "Quantum computers give us a completely new dimension. In 10 years, they will be orchestrating mobility in metropolitan areas, routing autonomous vehicles, predicting traffic flows and optimizing urban mobility."

### **We will always build cars, but we will be both an auto company and software company.**

Martin Hofmann, CIO, Volkswagen Group

To prepare for this world, Volkswagen is training its workforce in new technologies and reinforcing its IT resources, adding 1,000 software engineers, AI specialists and cloud computing experts. However computing technologies evolve in the future, Hofmann says, it is ultimately people who will steer this latest revolution in the car industry: "AI must always help human beings in a meaningful way. AI systems and autonomous robots will provide support, but our people will remain the decision-makers." ■





## DIGITAL DEXTERITY IN THE WORKPLACE

It may be a long way from the secluded mountaintops of Switzerland to the fast-paced, cutting-edge world of Silicon Valley, but for corporate and government leaders gathering at Davos this month there is no escaping the shockwaves of the digital revolution.

As developments in automation, artificial intelligence and

**Our goal is to drive the highest level of individual productivity and happiness.”**

Christian Reilly, VP Global Product and Technology Strategy, Citrix

cloud computing begin to transform the world of work, one of the main challenges that delegates at Davos are facing is how to manage the impact of new



The changing face of modern work

technologies on their employees and citizens in a way that preserves their well-being while enhancing their productivity.

“We are on the cusp of the fourth Industrial Revolution, driven by different types of devices and data and by different methods for delivering information,” says Christian Reilly, VP global product and technology strategy at Citrix.

“The revolution may be powered by the cloud, AI and the Internet of Things, but at the end of the day it will not eliminate people. So there needs to be a top-down approach, with organizations using these new technologies to empower their people and to support their aspirations,” he adds.

In the workplace, there can be dramatic opportunities for companies adopting a culture that embraces the possibilities of technological change. At Baloise, a Swiss insurance business founded in 1853, the introduction of Citrix services that enable employees to use their own devices securely at work and at home has helped change the company culture almost beyond recognition. No longer desk-bound, Baloise employees are freer to work with their colleagues across the organization as well as with outside partners. “There has been a real change in the way we work,” says Olaf Romer, the company’s CIO. “We have more of a start-up culture now, with an elimination of the hierarchy, which makes us a more attractive employer to talented young people.”

“Organizations from all sectors are using digital technologies to reimagine the physical workspace,” Reilly says. “They are creating physical and virtual environments that allow their workers, and in

particular their millennial workers, to be more effective wherever they want to be.”

It is not only large multinationals and public sector organizations that are reaping the productivity rewards of the digital workspace. Small and medium-sized enterprises are increasingly turning to the remote working abilities enabled by cloud computing, which releases them from the requirement to invest in their own on-premises IT infrastructure. “Our customers can use any device to connect to any application from any network securely,” Reilly says. “We can provide them with a completely secure digital workspace.”

Meanwhile, the benefits of flexible working extend well beyond the standard metrics of cost savings and returns on investment. By minimizing requirements for physical office space and energy and for corporate travel, remote working technologies can also reduce an organization’s environmental footprint. At the same time, they play an important role in increasing social inclusion, making it easier for mothers and caregivers to join the labor market or remain in their positions.

**Now we enjoy more collaboration and a more user-friendly environment.”**

Olaf Romer, CIO, Baloise

“Customers are using these technologies to employ a more diverse workforce and to help improve the work-life balance of their employees,” Reilly says. “We can help them build a simple framework that will not only improve people’s productivity but increase their happiness and improve their satisfaction with their lives.” ■

## MINING INDUSTRY 4.0

One of the oldest industries in the world, mining has played a major role at critical stages of human development, from the beginning of the Bronze Age to the start of the Industrial Revolution some 250 years ago, and to all the minerals and metals that enable modern life today.

Now the industry is entering the Information Age, as digital and automated technologies transform the traditional process of extracting ore from rock. Mining companies have put the excesses



of the commodity boom behind them and are refocusing their investments on innovation. They are introducing automated drilling into high-risk underground areas, putting microbes to work to extract metal from ore more efficiently and even using blockchain to trace

diamonds through the supply chain. Meanwhile, miners are working together to reinvent their industry and put it on a more sustainable and more collaborative footing. At the same time as sharing their infrastructure to reduce costs, they are deepening their partnerships

with local communities and other stakeholders to preserve their long-term licenses to operate. “Many of our members are working jointly with communities and local, regional and national governments to develop a shared vision about how to maximize the positive impact of their operations,” says Tom Butler, CEO of the International Council on Mining and Metals. ■

IMAGE: Brent Bergeron, EVP Corporate Affairs and Sustainability, Goldcorp; Elaine Dorward-King, EVP Sustainability and External Relations, Newmont Mining Corporation; Mark Cutifani, CEO, Anglo American

### TRANSFORMING MINING WITH TECHNOLOGY

Mining giant Anglo American is the recognized industry leader when it comes to increasing productivity and enhancing sustainability by investing in innovation and technology. CEO Mark Cutifani explains how new technologies are transforming the 100-year-old business.

### What contribution has innovation made to the Anglo American turnaround story?

Today, every person in our business is delivering 70% more saleable product than in 2012. Half of that improvement per person is a consequence of refining the overall quality of our portfolio. The other half comes from different

mining designs, new operating practices and the implementation of new technologies or technical improvements. Of the changes that we have been in control of, one-third has been the result of technology.

We have re-tooled the organization and put the best technical brains together with the most practical operators. We want to find different ways to mine the ore body and more efficient ways to mine. The cost benefits of new technologies are enormous because they require smaller equipment and smaller plants.

### What new technologies are you working on?

To be more productive and cost-competitive as an industry, we need to develop new ways of extracting the ore without all the waste rock.

Extractive technologies that we are looking at include using lasers for drilling and deploying microbes which digest the ore to produce an elixir full of mineral.

**Miners that embrace change will succeed. Those that do not will be left behind.”**

Mark Cutifani, CEO, Anglo American

At the same time, we are also using big data to analyze truck movements around the pit to increase productivity and medical imaging of the extracted ore to adjust our processing in real time.

The rate of technological change in our industry is going to be quicker than we have ever seen before.

### How are your investments in innovation helping support sustainability?

Innovation touches everything we do. It has made Anglo American safer, more productive, more cost-competitive and more accepted by our host communities. On the safety side, automation and new mining technologies are taking people out of dangerous areas into higher-skilled jobs. In the environmental area, we are working on new processing technologies that eliminate the use of freshwater and reduce energy consumption. From the social development point of view, we are working with a whole range of stakeholders so that we can make local communities partners in the way that we develop our operations. Sustainable innovation is critical to our business model. ■

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**Q&A with ELAINE DORWARD-KING, EVP Sustainability and External Relations, Newmont Mining Corp.**

**How has Newmont's position as a leader in sustainability supported its financial performance?**

There is data suggesting that companies that deliver in social arenas also outperform in terms of value over companies that do not. If you are able to successfully manage the complexity of risks associated with the environment, community and political dynamics, then you will also be managing the financial and production side well.

**How does this focus help Newmont attract new talent?**

Newmont is in competition with every other industry for

the brightest and best. We have seen in our recruitment process in the past couple of years that we are able to attract dynamic young people from all kinds of academic



Newmont is building a diverse mining workforce

backgrounds because they do their research and know about how credible we are. They believe it is the place they want to work and make a contribution. Sustainability plays a big part in being able to recruit good talent into the organization.

**What are you doing to create a more diverse workforce?**

One of the things that we are putting emphasis on at Newmont is inclusion and diversity. Inclusion is

the company. We have targets in countries such as Ghana, Peru and Suriname for having nationals in leadership and management positions. We also have targets in place for every region to improve the percentage of women at both the senior level and also in the workplace. Newmont now has five women directors, which puts us right at the top of the pack for a Fortune 500 company. We have three women on our executive leadership team out of nine. We are also actively working to increase the number of women leaders in our operational and technical areas. At our KCGM operation in Australia, we have put in place our first female general manager. At KCGM, about 28% of the workforce are women, which is about twice the average for the Australian mining industry. ■

one of our core values. We recognize that having a diverse workforce is important, but diversity by itself is not enough. The people who are part of our workforce need to feel included and recognized for their contributions. We are actively working to increase diversity across



**STARTEGY: NOT A TYPO**

*In today's sharing economy, the decisions of a company are no longer the result of internal hierarchy but of its ecosystem, through its community of internal and external influencers and decision-makers. Instead of making a concrete strategy, a company fixes the starting point, but the rest is built with its external partners and the exchange of knowledge, experience and ideas.*

*This shift effectively means that companies are switching from a strategy to a startegy, giving way to collective innovation with start-ups and major partners. This comes as the result of open dialogue, evolving thanks to the contribution of those on the outside offering a different perspective. Companies, instead of planning, must make repeated and quick attempts with partners to adapt to the frequent technological and social changes of our world.*

*The company activates sensors in its ecosystems and in other contiguous areas. A company's strategy used to be comparable to chess, with a clear goal and predictable moves. In today's world, strategy looks a lot more like poker: the cards are evaluated at the beginning, but the high unpredictability and, above all, the dynamics of the game make it impossible for managers to act independently. Welcome to our shared future! ■*

**Ernesto Ciorra**  
Chief Innovability Officer,  
Enel Group

**TOWARDS ZERO WATER**

When miners extract metals from the earth, they currently rely heavily on water to drill and process minerals and then to dispose of the crushed waste product (or tailings) in giant tailings dams. Canadian mining company Goldcorp, which estimates that it manages more water than ore by mass, is now pioneering a new approach that aims to dramatically reduce the use of water in its operations. And it is aiming to eliminate the need for traditional slurry tailings altogether.

There are financial, environmental and social drivers behind Goldcorp's innovative Towards Zero Water (H2Zero) initiative, explains Brent Bergeron, EVP for corporate affairs and sustainability.

"First, from a human rights perspective, we mine in areas that are very remote, where the local people are often dependent on agriculture and aquatic resources," says Bergeron. "The use of water for them is extremely important and can cause conflict in the area."

"Second, reducing the cost of moving water around a mining site, storing it and treating it is very important to us from both



Protecting precious water resources

a financial and an environmental perspective."

One of Goldcorp's first steps towards improving water management has been to increase water recycling rates at its mines.

**At some of our sites, we are recycling nearly 90% of the water we use."**

**Brent Bergeron, EVP, Corporate Affairs and Sustainability, Goldcorp**

At the Musselwhite gold mine in Northern Ontario, Goldcorp has installed an underground water recycling system that has cut its daily consumption of freshwater from a nearby lake by almost 40%. At the same time, as part of Towards

Zero Water, Goldcorp is developing a revolutionary system for mine waste management: EcoTails. This innovative process combines filtered tailings with waste rock and results in the potential for some important environmental improvements including reducing the overall size of mine waste storage facilities, increasing the stability of these facilities, and a major reduction in the amount of water trapped in tailings.

"With EcoTails, we could make a step change reduction to the mining industry's environmental footprint," Bergeron says. "We expect to see significant results from our pilot projects in 2018. Following a successful test phase, we can start deploying the technology at our sites in Canada and Latin America." ■

**TECHNOLOGY HOLDS KEY TO FUTURE HEALTH**

Combine an aging and growing population with an acute shortage of health care workers and it is clear that the world is about to face a health crisis of dramatic proportions. If global leaders meeting at Davos do not rise to the challenge of reform, complete collapse is a real possibility, warns Liat Ben-Zur, SVP for connected propositions at technology company Philips:



"There is more pressure on health care systems and not enough people to work in them, while prices are rising out of control. Something is going to break."

A crisis can only be averted by introducing new Internet-connected devices and services that make health care more economic and more intelligent.

In areas as diverse as sleep therapy, respiratory care, ultrasound and parenting, these solutions can already provide seamless, personalized care at the right time, in the hospital and in the home. "Our technologies bridge the gap from the consumer world to the health care system," Ben-Zur says. "They can improve the treatment of patients while also helping hospitals reduce their costs and become more efficient." ■

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