THE MOBILE CENTURY

THE GREEN TECH REVOLUTION

HOW COMMUNICATIONS TECHNOLOGY CAN FOSTER A SUSTAINABLE, LOW CARBON FUTURE.

MOBILE INDUSTRY ON CARBON FOOTPRINT

SINCH: GOLD SPONSOR'S PROFILE

SPACE TECH POWERING GREEN TECH

OVERVIEW

Welcome to the 2020 edition of The Mobile Century: Life and Work in the Digital Era. In this edition we are focusing on the global challenge of our era – climate change and how to ensure a sustainable, green economy and society into the future. Despite the cancellation of Mobile World Congress in Barcelona this year, due to the COVID-19 virus, we decided to publish this edition as a webzine, and to look forward to further discussion on the topic as we prepare to meet again in Barcelona in 2021.

While the subject of green technology is not new, the challenge for the ICT and broader tech sector remains two-fold: to reduce its carbon and environmental footprint, while also grasping the opportunity presented by the need to address the climate emergency.

As an Australian I have witnessed first-hand over recent months the most extreme bushfire summer season that anyone can remember, followed by extreme flooding as the drought has broken in some of the same areas. The shock and horror of this experience has brought home to many Australians that this is a global emergency which we must all address, in order to try to limit future catastrophic events. And for business, there is a realization that consumer sentiment has now turned towards sustainable industries, with major investors such as large pension funds now favouring investment in industries and firms which reduce or mitigate their environmental impact.

For the tech sector, this presents an enormous opportunity to grow new businesses while also addressing this global challenge. These vast business and investment opportunities are now emerging. Professor Lord Nicholas Stern estimated the global green tech market as follows "Globally, the market to supply low-carbon power, transport and building technologies could be worth more than US$3 trillion per year in 2050 (IEA 2010). The opportunities in low-carbon power alone could be around US$380 billion per year, spread across a range of technologies. PWC's estimates for the World Business Council for Sustainable Development suggest annual sustainability-related investment opportunities in natural resource sectors in 2050, in food and agriculture and forestry of $1.2 trillion per year and $200 billion per year, respectively."[1]

It is because of this business and investment potential that the ICT and broader digital technology sector are now turning their focus to the future of green tech and the development of a low carbon future. This is an industry which has transformed the global economy and society in only a few decades from an analogue to a digital reality. The challenge now is to become major players in driving the economic and social transformation to a low carbon sustainable future.

I hope you are inspired to action and further thought by these articles on a range of issues, including: the promise of new battery technology; how the mobile industry is enabling a low carbon future; the role of satellites in earth intelligence and space situational awareness; the future of the energy sector; how we can create green data centres; and the ongoing policy debate around climate change and its response.

We would like to express our sincere thanks to our authors, who have given so generously of their time and expertise to contribute to this discussion. We acknowledge the support of our Gold Sponsor, SINCH, who are ready to welcome our guests at our Welcome Reception in Barcelona in 2021. We would also like to congratulate the GSMA on the tenth anniversary of its Connected Women program, while mWomen continues to promote innovative mobile solutions for women in the developing world, and Women4Tech encourages women and girls to develop their careers in mobile technology. We are proud to partner with these industry leading programs.

Vicki MacLeod
Editor-in-Chief

1	https://www.greengrowthknowledge.org/sites/default/files/downloads/resource/green_growth-opportunities_for_new_zealand_vivid_economics_and_energy_centre.pdf

INSIDE

HOW THE MOBILE INDUSTRY IS ENABLING REDUCTION OF THE CARBON FOOTPRINT

ANA TAVARES

Head of the GSMA for North America

Reading about climate change these days can feel like a race against the clock. We're bombarded with headlines about the urgent need for action, and the dwindling time remaining to take it.

According to the UN's International Panel on Climate Change (IPCC)[1], we need to cut emissions by half by 2030 to limit global overheating to 1.5 degrees Celsius, the target outlined by the Paris climate agreement. And we have just around 10 years left to make the massive structural and societal changes necessary to make that happen.

If we don't get global warming under control, it's not an exaggeration to say that the effects on our planet will be catastrophic. Rising sea levels, more severe storms and devastating droughts are just some of the more visible and immediate effects. Long term, humanity could face famine, expanding refugee crises and other serious economic impacts.

We know what must be done but how do we get there? It's a difficult question to wrestle with. One possible solution comes from what may, on the surface, seem like an unlikely source: Technology.
Specifically, the mobile communications sector. Yes, technology requires energy to operate and visions of a carbon-neutral future may evoke pastoral fields and blue skies rather than crowds of people looking at cell phones. But the advances mobile technologies can bring will enable energy efficiency across many industries and the potential impact is outsized compared to other sectors.

At the GSMA, we call this "the Enablement Effect," and it may be the key to helping us reach the emissions goals needed to combat catastrophic climate change. GSMA

commissioned a report[2] that outlines how mobile communications technologies can positively impact carbon emissions reductions.

In a preface to the report, which was a joint study with the Carbon Trust, GSMA Director-General Mats Granryd has highlighted the enormous business opportunity presented by the climate crisis for the mobile industry: "…while getting our own house in order is important, mobile's greatest positive climate impact lies in its potential to enable other sectors of the economy to reduce their own emissions".

The report offers context and provides a high-level analysis of six different categories of enabling mechanisms, along with case studies:

• Smart Buildings
• Smart Energy
• Smart Living, Working, and Health
• Smart Transport and Cities
• Smart Agriculture
• Smart Manufacturing
.
The mobile industry is already making great strides in creating more energy-efficient equipment, which is notable considering the exponential advances in technology in recent years, coupled with an explosion of data consumption. The total annual emissions of the mobile sector are approximately 0.4 percent of total global emissions.

The mobile industry can have real impact is in enabling efficiency across other industries through improved connectivity, hyper-responsive sensors and the rapid processing of data to impact behavioral changes. In

2018, the enabling impact of mobile communication technologies globally was estimated to be around 2,135 million tons of CO_2 – similar to the total GHG emissions emitted by all of Russia in 2017.

When you look at the potential impact of mobile communications technologies compared to the footprint of the industry itself, there's a possibility of a tenfold impact – a real chance to make a leap toward meeting the goals of the Paris agreement.

Some examples of the areas where the mobile industry can have the greatest impact on potential carbon emissions reduction/avoidance include:

Healthcare: In the UK, a national broadband network called N3 allows healthcare professionals at the National Health Service to manage appointments, send prescriptions electronically and practice telemedicine. It has also saved the NHS an estimated £926 million and reduced carbon emissions by more than 50,000 tons of CO_2 over a decade.

Transport and smart cities: Mobile communication technology will be a catalyst for the increase in electric vehicles by facilitating the use of charging points, and, through telematics, creates an improvement in route optimization and vehicle fuel efficiency. As an example, the Neste SmartTruck service allows truck drivers to access applications like mobile refueling, fuel consumption optimization, GPS positioning and other data. The system helps fleet managers save up to 15 percent of a vehicle's fuel consumption, reducing emissions.

Manufacturing: Mobile-enabled storage and inventory management can reduce the overall level of inventory and area needed, increasing efficiency and decreasing energy use for operations like lighting and cooling. Lineage, a global food warehousing and distribution company, has reduced its yearly energy costs by 8 percent at the 78 warehouses where an the Internet of Things (IoT) temperature system has been installed.

Smart buildings: Mobile technologies are making building management systems smarter, like metering, and HVAC (heating, ventilation, and air conditioning) control systems, to enable energy efficiency improvements, and reduce gas and electricity consumption. One mobile network provided a high-end hotel with an end-to-end service that measured, controlled, and monitored energy consumption and spending, focusing on high consumption points to decrease energy costs by 12 percent.

The explosion of IoT also holds a tremendous potential for impacting these and many other sectors. As more devices come online and networks become faster and more responsive, there will be more ability to monitor energy usage, temperature, lighting and other operations in real-time.

IoT is set to be one of the main drivers of decarbonization enabled by mobile technology, as well as behavior changes from the personal use of smartphones. The latter will lead to things like reduced travel for work and for leisure, increased use of public transport because of better apps providing real-time updates and a reduction in travel due to mobile shopping and banking apps.

Digitization is expected to disrupt all parts of the economy over the next decade and, if sufficient policy and investment is received, has the potential to be a key driver of low carbon development.

This is all a great start, but we must not be complacent. That clock is still ticking and we have precious little time to act if we're going to limit global heating to 1.5 degrees and prevent climate catastrophe.

Mobile technologies currently connect over five billion people around the world – about two-thirds of the global population – there's incredible potential in those numbers. To make that fully realized, governments, businesses and consumers must embrace the opportunities presented by this technological revolution.

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GREEN INNOVATION:

ENERGY EFFICIENT DATA CENTERS

WHICH DRIVE SUSTAINABLE GROWTH

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DATA CENTERS: A CRITICAL INFRASTRUCTURE

The growth of the Internet has been on an exponential trajectory since its inception in the late 1960s. Even today, some 60 years later, more people and their devices are connected, more data is stored, processed, and exchanged at an accelerated pace. Communications, media and computing have converged.

The data hunger of mankind seems inexhaustible – with all the new technologies, and the prospect of ever-growing data demands due to 5G and IoT – the demand for more and more computing power is growing rapidly. The demand for data centers is also growing exponentially. Data centers are increasingly being recognised as critical infrastructure for economic growth. However, they also come with challenges: they are energy hungry,[1] put pressure on local energy grids and do not provide much local employment, at least after the initial design and build stages.

We must all work hard together to deliver the UN's Sustainable Development Goals, for the sake of the future of mankind. It would be fatal if the exponential growth in

[1] https://www.iea.org/reports/tracking-buildings/data-centres-and-data-transmission-networks

information and communications technology, computing power and the cloud, so essential to our modern way of life and to innovation, were to continue to lead to such growth in energy and resource consumption at the present rate.
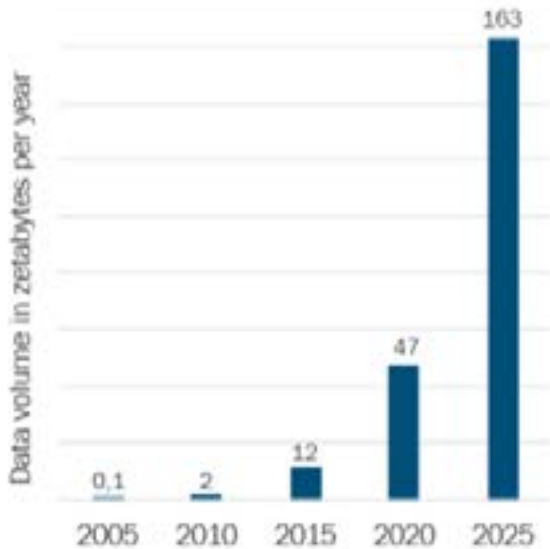
This does not have to be the case in the future, however. New designs allow significant energy and resource savings and subsequently much better environmental performance. Whole System Design provides the potential to integrate with a City, creating centers for data, power, heat and local community. Data Centers can turn into true drivers for innovation and economic growth.

The expansion of the Internet and cloud computing is being driven by an ever-increasing demand for more and more data. This in turn is being driven by an exponential growth in a range of new bandwidth hungry services and applications, including:

- Enterprise cloud services (Software as a service, e.g. Salesforce, SAP)
- Social networking (Facebook, Instagram, Weibo)
- Entertainment: movie streaming (Netflix, Amazon, Apple) and video sharing (YouTube)
- Mobile connectivity and the Internet of Things, 5G, Industry 4.0
- Artificial Intelligence (AI): deep learning, pattern recognition, smart assistance
- Smart Cities and Smart Living

- Autonomous Driving
- Voice over the Internet (VOIP) and video conferencing
- Games and entertainment

- Money-over-IP (MoIP): blockchain technologies, payment systems.

Cloud providers, internet service providers and other global players are facing an ever increasing demand for more capacity and faster speeds. Each day, the world creates new data that would fill 10 million Blu-ray discs, the height of which stacked would measure the height of 4 Eiffel Towers on top of one another.

This enormous amount of data is not only skyrocketing but needs to be processed at top speed. More data to process means more servers, and more servers mean more data centers. This continued drive for increased data requires ever more resources to keep pace.

According to Peter Diamandis, Founder of Singularity University: "In 2010, 1.8 billion people were connected. In 2015 about 2.8 billion are connected…In other words, on a planet with a 7+ billion population, 4+ billion people still don't have access to the Internet. But by 2020, I expect the entire world will be connected."

UNDERSTANDING THE ENERGY DEMANDS OF DATA CENTERS AND WHAT WE CAN DO ABOUT IT

In order to develop ways to make data centers more sustainable, we need first to understand how they work and what drives the increase in energy and resource usage as they expand.

By 2016, data centers had consumed 2% of the world's electricity production. Billions of Internet-connected devices could produce 3.5% of global emissions within 10 years and 14% by 2040. The amount of power used to store and transmit the world's data is equivalent to the power needs of the world's sixth largest country – about as much as Russia or Canada. That figure is expected to rise to the third biggest by 2028. According to the International Energy Agency: "Sustained efforts by the ICT industry to improve energy efficiency, as well as government policies to promote best practices, will be critical to keep energy demand in check over the coming decades."[2]

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2   https://www.bloomberg.com/opinion/newsletters/2019-12-13/energy-efficiency-a-hot-problem-for-big-tech-data-centers-k44f6m1h

Each of these dimensions has the ability to make or break a data center business case.

Densities in the rack are continuously increasing, while the size of data centers is also increasing. As a result, heat loads are increasing, and with thousands of racks this turns into a furnace-like situation.

With the significance, as well as the total amount of energy consumed, energy management becomes a central aspect of data center management, including the dimensions of:

- Renewable energy mix
- Flexibility
- Understanding of local energy markets.

COOLING THE RACKS INSTEAD OF ROOMS

The traditional way to cool data centers is to use standard air conditioning, i.e. blowing cool air around the servers. However, with the increased heat loads, this is nearing the limits of its effectiveness. The closer the cooling is to the heat source, the more efficient it gets. Therefore, there are various approaches that may be more efficient, including: cooling the aisles instead of the entire room; splitting the cooler front side of the racks from the hotter back end; and differentiating the higher loaded racks from the lower loaded ones, and spot cooling those.

A step change is moving away from using air cooling, to using water instead, which is 3,500 times more efficient than air cooling. Water can be brought much closer to the heat source very easily. While cooling of the servers this way is the most effective, it is also the costliest approach, and is most appropriate for high performance applications. For standard applications, so cooling of the racks is an effective compromise.

CHANGING THE BUILDING DESIGN

Standardized construction techniques and optimized project schedules reduce risks and investment costs when building a data center. Conscious use of recycled and recyclable building materials also reduces the overall carbon footprint, helping firms meet their sustainability goals. Simple steel construction, inspired by the design of high bay warehouses in Germany, can reduce the environmental impact by 50% over the entire lifecycle of the building (20-30 years).

SMART CITY INTEGRATION

Taking a whole system approach and integrating data center buildings with other city infrastructure opens up additional synergy potential: heating buildings, vertical farms and gardens; pools etc. Data centers require significant infrastructure for power. With the current move towards electric power trains, especially in the automotive industry, the power infrastructure of data centers can be easily expanded, e.g. for electric charging nodes for cars. Further, having electric charging facilities offers new business opportunities to provide service for electric car owners, as well as for a range of retail applications, including cafes, shops and entertainment venues. Thus, the infrastructure could be expanded towards community centers, which in turn could be heated through excess heat. Looking at data centers in the wider city context offers potential for synergies with the broader economy, with the potential of turning them into heat venters, power centers, or community centers

POLICY AND REGULATORY ACTION

Today's modern world exists in an apparent conflict of objectives: on the one hand, we want continued social and economic progress, but on the other hand, we need to address climate change and other ecological imperatives. The report to the Club of Rome "Transformation is Feasible" calls this balancing act "Addressing the UN

SDG within Planetary Boundaries". National and regional policy makers and regulators need to be proactive, applying cross-sectional principles like the circular economy, applying sustainable business practices such as cradle-to-cradle design, as well as energy and resource efficiency.

CONCLUSIONS

Data centers are key infrastructure of the future. The challenge in sustainability can – and must- be managed through innovation in: energy efficiency (e.g. cooling technology); resource efficiency; waste heat usage; renewable energy generation and procurement, as well as flexibility management. Applying this approach, it is already possible today to increase agility, reduce both CapEx and OpEx, reduce risk, increase energy and resource efficiency and ensure sustainability. Whole System Design Thinking is providing additional potential, especially when integrated with Smart City thinking.

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Thomas Schulz has over 25 years of experience as a serial entrepreneur and early stage investor, in Munich and Palo Alto. As the cofounder of AQAL Capital, Tom invests in exponential tech and energy efficiency, following an Integral Investing approach: "parity of people, planet, and profit – with passion and purpose". Currently, AQAL Capital is invested in NDC Data Centers, the "factory for energy and resource efficient data centers". Tom had founded Germany's first nationwide Internet Service provider, Cybernet AG, and Germany's first demand response aggregator, Entelios AG. In Palo Alto, Tom was member of the investment group The Angels' Forum, member of the management team of The Halo Funds, and he co-founded the Cleantech Circle. Tom holds an MBA from Stanford University, and he studied computer science at the ETH Zurich, Stanford, and the University of Karlsruhe (Dipl.-Informatiker).

GOLD SPONSOR PROFILE:

SINCH

Sinch brings businesses and people closer with tools enabling personal engagement. Its leading cloud communications platform lets businesses reach every mobile phone on the planet, in seconds or less, through mobile messaging, voice and video. Sinch is a trusted software provider to mobile operators, and its platform powers business-critical communications for many of the world's largest companies. Sinch has been profitable and fast-growing since its foundation in 2008. It is headquartered in Stockholm, Sweden, and has a local presence in more than 30 countries.

Sinch shares are traded at NASDAQ Stockholm: XSTO: SINCH. For further details see the website: www.sinch.com

SUSTAINABILITY AT SINCH

The board of directors has overall responsibility for the management of Sinch, including matters related to sustainability.

The main principle for sustainability management at Sinch is to minimize the potential negative impacts of the business and to benefit from the opportunities brought by sustainable business. Sinch therefore has policies in the areas related to sustainability and an internal Code of Conduct for employees. Adopted in 2016, this Code of Conduct applies and is reviewed with all new employees when they join Sinch. It is based on the UN Global Compact's 10 principles for sustainable business, with emphasis on clarifying the company's positions on issues related to respect for human rights, anti-corruption,

diversity, equal opportunity and the importance of sound business relationships.

Sinch also adopts an external Code of Contact for suppliers.

Sinch combats material risks related to sustainability through our risk management processes. Sinch continuously monitors political developments and potential new legislation in the countries in which we collaborate.

As we have identified that our greatest environmental impact is through air travel, we have a travel policy that must be followed by all employees, and all travel is booked through the same travel agency to make it easier to track how much we travel and determine how we can reduce traveling.

We believe it is important to reduce the impact that we do have. Sinch shall run its business responsibly with consideration for the environment, the company's customers and its employees. The company aspires to steadily reduce the negative environmental impact of its operations. Since the aim of Sinch's business is for users of the company's product and services to communicate virtually to a greater extent, Sinch is helping reduce the use of paper and help cut the need for travel and transport in a variety of ways, through delivery of cloud services. Air travel currently generates the largest emissions of greenhouse gases in the world and if we can contribute to reducing air travel, it is good for us and our customers.

As noted above, we also have a travel policy to gain control and reduce our travel. We seek to use our own products to the greatest extent possible and hold meetings via our services instead of traveling to reduce the negative environmental impact of flying. We also installed new printers during 2017, that will reduce our use of paper and we are working with efficient product solutions to reduce our use of electricity and other energy.

At Sinch we believe in helping and doing what we can to make the world a better place is important to us as a

company. In Sweden, we support Hand in Hand, an organization that is working to eradicate poverty by supporting women in developing countries to start their own businesses. In the United States, we work with Habitat for Humanity. One day a year, US employees help build houses for people who do not have homes of their own.

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Oscar Werner is the CEO of Sinch with an extensive experience from the international technology industry. He is responsible for overseeing the company's growth and maintaining overall efficiency within the organization. Prior to joining Sinch, Oscar was President of Tobii Tech, the business unit of Tobii that targets virtual reality, augmented reality, PC and smartphone industries. Oscar has been part of the Tobii success since 2010, starting as President of TobiiDynavox, where he significantly grew revenues and led the division into solid profitability. Oscar hold an MSc in Economics from the Stockholm School of Economics, Engineering Studies at KTH, Stockholm.

HOW BATTERY TECHNOLOGY WILL DRIVE THE FUTURE OF CLEAN ENERGY

CADENZA
interviewed by Vicki MacLeod

As the world considers how to transition to a low carbon energy future, battery technology is increasingly in the spotlight as holding the key to the future of energy production and storage. Industry research firm BloombergNEF forecasts that by 2030 the battery market will be worth $116 billion annually, and that doesn't include investment in the supply chain. Despite this promise, there remain a number of technical, social and environmental issues which need to be addressed to ensure this full potential is achieved.

Lithium-ion batteries offer a light and highly efficient way to store and reuse energy. As a result, they account for the vast majority of "installed power and energy capacity", according to a report released by the U.S. Energy Information Administration.[1] But, while we are carrying around our phones in our pockets and driving electric cars powered with over 7,000 individual cells, lingering questions remain about their safety.

RECENT INCIDENTS

Famously, the Samsung Galaxy Note 7 made headlines in 2016 because of overcharged cells exploding; an individual in Kentucky was even hospitalised as a result. The fallout cost Samsung billions of dollars and negatively affected the way that the public perceived the brand. Less well known, but just as seriously, lithium-ion

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1 https://www.eia.gov/analysis/studies/electricity/batterystorage/pdf/battery_storage.pdf

batteries contributed to a fire[2] at a battery facility at the utility Arizona Public Service. The incident led to the hospitalisation of four firefighters who responded to the incident. In addition, fires at battery production facilities in Korea have been a persistent problem. These situations are driving global demand for new battery architectures that can help prevent these types of problems.

AN EXPONENTIAL PROBLEM

While these incidents are undoubtedly newsworthy, they can be considered a small risk as the rate of failure compared to the number of lithium-ion batteries out there is statistically low. It's not just the chemistry, however, but the way lithium-ion batteries are assembled into packs and racks – particularly for large scale residential and microgrid scale batteries – that highlights why even a small risk is unacceptable. Batteries are typically made up of many small cells. A 1MWh battery can have up to 144,000 cells – statistically, that means 420 cells may be at risk of catching fire at some point in their lives. With so many cells packed together to form the battery, the effect of a single failure can be catastrophic.

CHANGING THE GAME

The demand for energy storage will continue to grow, especially given the fact that there are more companies and governments interested in renewable energy these days. However, organisations are waking up to the safety challenges, especially at large scale. Uncontrollable fire, referred to as 'thermal runaway', is a significant safety risk. Businesses that understand the challenges ahead and can deliver solutions that address the safety issues that affect the energy storage sector will shape the next wave of large scale storage. In doing so, those providers can help organisations move forward with confidence toward a cleaner, more sustainable energy future. Examples of this include BAK in China and Australian renewable energy start-up Energy Renaissance, both of which – have licensed technology exclusively available from U.S.-based Cadenza Innovation to address these safety issues head on and can offer the world's safest lithium-ion battery storage platform.

GUIDING PRINCIPLES FOR

BATTERY TECHNOLOGY AGREED BY 42 GLOBAL ORGANISATIONS

At a meeting of the Global Battery Alliance, held in Davos during the World Economic Forum 2020, the 42 member organisations – including businesses from automotive, mining, chemicals and energy with a combined revenue of approximately $1 trillion – agreed on a set of 10 principles to foster the creation of a sustainable battery value chain by 2030.[3]

In the next decade, batteries will be a major driver in reducing the carbon footprint of the transport and power sectors, which are currently responsible for 40% of annual carbon emissions globally

These principles are intended as the first step in a responsible, sustainable battery value chain as set out in the Global Battery Alliance's "A Vision for a Sustainable Battery Value Chain in 2030".[4] Implementing commitments will be based on existing standards such as the Organisation for Economic Co-operation and Development (OECD)'s Due Diligence Guidance and economically viable considerations for a circular and low carbon economy.

They include maximizing the productivity of batteries, enabling a productive and safe second life use, circular recovery of battery materials, ensuring transparency of greenhouse gas emissions and their progressive reduction, prioritizing energy efficiency measures and increasing the use of renewable energy, fostering battery-enabled renewable energy integration, high quality job creation and skills development, eliminating child and forced labour, protecting public health and the environment and supporting responsible trade and anti-corruption practices, local value creation and economic diversification.

"We all need batteries to power the clean revolution. However, we must ensure violations of human rights do not occur anywhere in the value chain, that local communities benefit and that battery production is sustainable. These guiding principles are an important first step to build a value chain that can deliver on this promise while supporting societies and economies at the

2   https://www.greentechmedia.com/articles/read/what-we-know-and-dont-know-about-the-fire-at-an-aps-battery-facility#gs.95zmmt

3   https://www.weforum.org/reports/a-vision-for-a-sustainable-battery-value-chain-in-2030
4   https://www.weforum.org/press/2020/01/42-global-organiza-tions-agree-on-guiding-principles-for-batteries-to-power-sustainable-energy-transition/

same time", said Dominic Waughray, Managing Director, World Economic Forum.

To realize the full ambition of these principles, the Global Battery Alliance is actively seeking the endorsement of additional organizations to ensure full participation throughout the battery value chain. This alignment among key players in the battery market establishes the basis for a transparent accountability system. It will guide the development of a global digital battery information disclosure system referred to as the "Battery Passport", which is designed to enable a transparent value chain, for example, with respect to human rights and the environmental footprint.

GREEN TECH INNOVATION – PROJECT LOON

JULIE KEARNEY
Global Head of Communications Regulation and Policy, Project LOON

WHAT IS LOON?

Loon is an Alphabet company based in Mountain View, California in the United States. Loon's aim is to bridge the digital divide through the use of balloons traveling on the edge of space. Loon is a prime example of green technology entrepreneurship – creating and applying radical new technologies to solve real world global problems.

HOW DOES LOON WORK?

Loon balloons travel in the stratosphere, acting as floating cell towers, to deliver connectivity to people in unserved and underserved areas around the world. Loon's balloons are made from sheets of custom-developed polyethylene. Each tennis court-sized balloon is built to last more than 150 days in the stratosphere before landing back on Earth in a controlled descent. A Loon balloon recetly passed the 223 day milestone, breaking the previous record of 198 days. Loon balloons are designed and manufactured to endure the harsh conditions in the stratosphere, where winds can blow over 100 kilometers per hour, and temperatures can drop as low as -90 celsius.

A MOONSHOT FROM CALIFORNIA

Prior to July 2018, when Loon became an independent

company as part of Alphabet, the parent company of Google, Loon began its life as "Project Loon" at Google X, the Moonshot Factory. Google X's mission is to create radical new technologies to solve some of the world's hardest problems.

One of the world's hardest problems is that traditional, ground-based infrastructure is limited in its ability to provide Internet access to those in remote or hard-to-cover areas. Additionally, traditional ground-based infrastructure is vulnerable to destruction in natural disasters. Because Loon's balloons navigate wind currents 20 kilometers above the Earth, they can be arranged in small clusters to provide periods of prolonged connectivity down below. What started as an idea at the Moonshot Factory several years ago has come a long way: Loon balloons have flown over one million hours in Earth's stratosphere. In all of those hours aloft, Loon's balloons have traveled nearly 40 million kilometers — enough to make 100 trips to the moon or circle the Earth 1,000 times.

PARTNERING WITH MOBILE NETWORK OPERATORS

Loon itself is not a telecommunications service provider. Loon We partners with Mobile Network Operators (MNOs) to expand the reach of their service. The MNO has the customer relationship, while Loon serves as the infrastructure provider or "cell tower in the sky." Together,

they help expand coverage into remote and rural locations, upgrade existing networks, and also provide expedient coverage after natural disasters.

HOW DO USERS RECEIVE THEIR INTERNET CONNECTIVITY VIA LOON BALLOONS?

A wireless Internet signal is transmitted to the nearest Loon balloon from the MNO partner on the ground using a Loon-provided ground station. That signal is relayed across the Loon balloon network and down to users on the ground. In order for users to connect to the Internet whenever a Loon balloon is overhead, they need the sim card of the MNO partner in that country and a standard LTE handset. Each balloon has a coverage area of around 5,000 square kilometers, which is significantly greater than traditional ground-based cell towers, which have a reach of about 50 square kilometers. At the time of writing, Loon are preparing to deploy commercial service in Kenya with their partner, Telkom Kenya. In Peru, Loon were able to deliver support in the Loreto region with partner Telefonica, after a recent earthquake. Loon were also able to provide service after Peru's devastating 2017 floods. And this is just the beginning – Loon is constantly talking to MNOs around the world about potential partnerships.

READY, SET, LAUNCH!

Loon have developed flight equipment (also known as the "payload") for balloons that is highly energy efficient and is powered by renewable energy. Solar panels power the system during the day while charging an onboard battery to allow for night-time operations. The balloons also carry the antennas that transmit connectivity from ground stations, across a balloon mesh network, and back down to the user's LTE phone. The flight capsule holds the brains that command and control the Loon system. A parachute automatically deploys to guide the balloon safely back to Earth after its flight.

Balloons are launched from sites in Nevada and Puerto Rico, depending on the winds. Custom-built, two-story tall Autolaunchers are designed to launch Loon balloons safely and reliably at scale. Side panels protect the balloon from the wind as it is filled with lift gas and positioned for launch. A crane points downwind to smoothly release the Loon balloon up into the stratosphere. Each launcher is capable of launching a new balloon into the Loon network every 30 minutes.

NAVIGATING THE WIND

Loon balloons can reach countries around the world from the launch sites by navigating the wind. In the stratosphere, different wind currents exist at different altitudes. By moving up or down into these different currents, balloons can change speed and direction and navigate to where they are needed. Predictive models of the winds and autonomous decision-making algorithms help the balloons navigate efficiently. Loon's entire navigation system functions autonomously using our custom software. By moving with the wind, Loon balloons can be arranged into small clusters to provide periods of prolonged connectivity in a defined area. One balloon moves into place just as another one leaves.

Originally, Loon envisioned creating rings of balloons sailing around the globe, and balloons would take turns moving through a region to provide service. Advances in the understanding of wind currents in the stratosphere, combined with improvements to the software algorithms that help balloons navigate, have allowed balloons to be clustered over specific areas. This helps maximize the time balloons spend over areas where people need service. In fact, during a test in 2016, Loon engineers managed to keep a balloon in Peruvian airspace for 98 days. The team has since improved on these techniques

to increase the amount of time one balloon can remain over areas needing service.

AVIATION SAFETY – PRIORITY NUMBER ONE

Loon operates at an altitude nearly twice as high as commercial aircraft. Loon therefore secures all the necessary approvals in all locations where they operate. Safety is critically important and the company adheres to or exceed the international standards for unmanned free balloons set by the United Nations' International Civil Aviation Organization's (ICAO). These ICAO standards are recognized by the vast majority of countries around the world. Loon maintains continuous telemetry and command links with every balloon, tracking the location using GPS. When a balloon is ready to be taken out of service, the lift gas keeping the balloon aloft is released and the parachute automatically deploys to control the landing. Descents are coordinated with local air traffic control to land the balloon safely in a sparsely populated area. A team in Mountain View is dedicated to managing balloon retrieval and analyzing the balloons when they return, and there are trained recovery teams around the world, on call to retrieve the balloons for reuse and recycling after they land.

Julie Kearney, *Global Head of Communications Regulation and Policy, Project LOON*

Julie Kearney is Global Head of Communication and Regulatory Policy at Loon, where she leads the company's U.S. and international regulatory initiatives. Loon is working to bring internet access to unserved and underserved communities around the world via a network of balloons traveling on the edge of space. Loon is a subsidiary of Alphabet.

Prior to joining Loon, Julie was VP of Regulatory Affairs for the Consumer Technology Association (CTA). She previously served in government affairs at NPR, in MCI's International Affairs group, and as an associate at Haley Bader & Potts (now Garvey Schubert Barer).

Julie is a recent Past President of the Federal Communications Bar Association (FCBA) and is a past chair of the FCBA Foundation. She served seven terms on the Federal Communications Commission's Consumer Advisory Committee and currently serves on its Broadband Deployment Advisory Committee.

Kearney earned her B.A. from Mount Holyoke College and a J.D. from Catholic University's Columbus School of Law with a certificate from its Law and Technology Institute. She currently serves on the Columbus School of Law's Board of Visitors. A trained singer, Kearney sings with the "kindie" rock band, "Here Comes Trouble." She also has sung with many choruses in the Washington, DC area, most recently with the Choral Arts Society of Washington.

FROM UNIVERSAL ACCESS TO ACCESSING THE UNIVERSE: HOW SPACE TECH IS POWERING THE GREEN TECH REVOLUTION
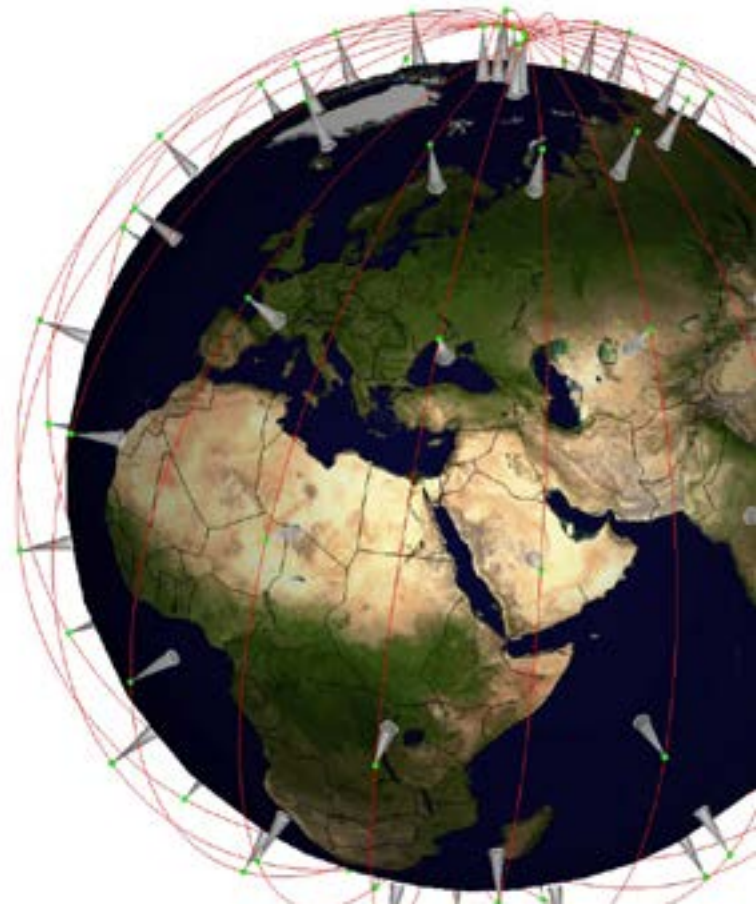
CANDACE JOHNSON

Founder/Co-Founder
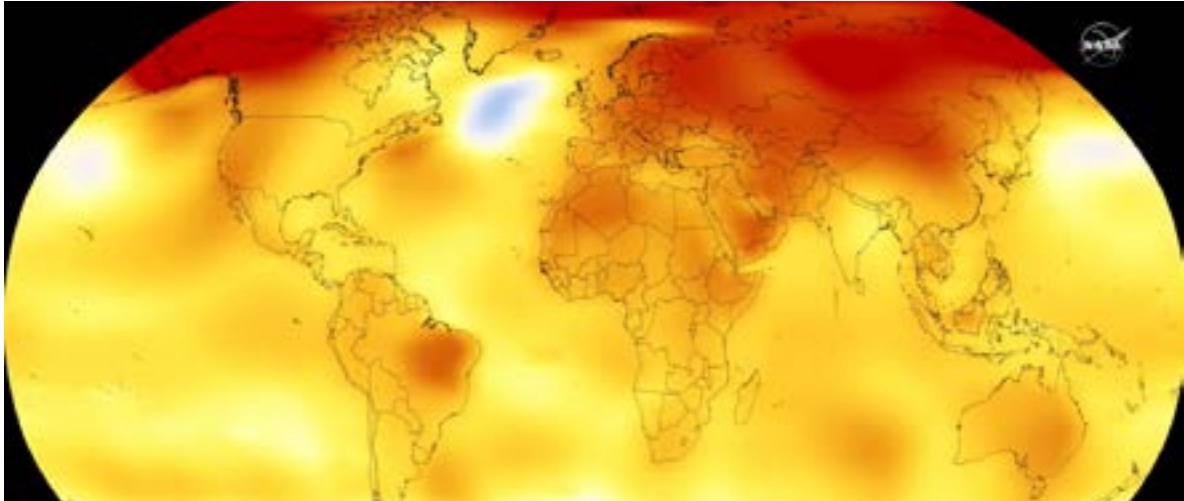SES, Loral-Teleport Europe, Europe Online, Success Europe,
GTWN Founding President

2020 will finally be the year when people around the world realise that the effect of man-made climate change is not something that is going to occur decades from now in far-flung places, but that it is happening today and it is happening in their homes.

For the last 60 years, however, scientists, researchers, and the general public have been using images and data gathered from space to show not only that man-made climate change is happening but that it is (still) accelerating at an alarming pace.

One need only look at the maps and videos on the earth's temperature and CO_2 emissions to understand the gravity of the situation.
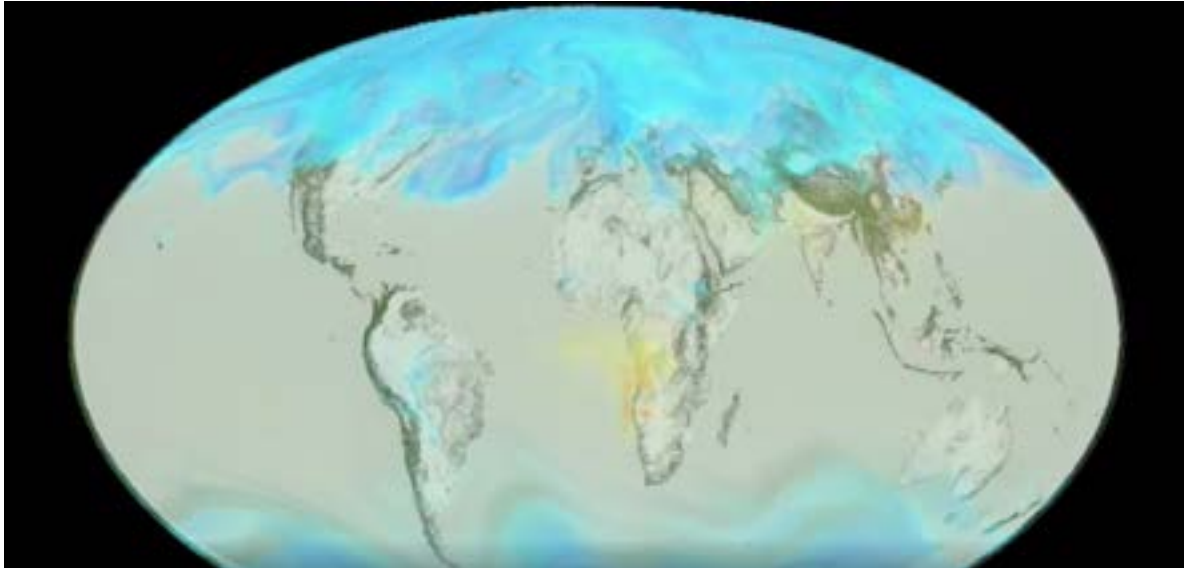
TEMPERATURE VISUALIZATION

source https://nasaviz.gsfc.nasa.gov/

CO2 IN 3D

Source: https://nasaviz.gsfc.nasa.gov/

It is images and data like this, coupled with the activism of his employees that have prompted Amazon founder Jeff Bezos to launch his new 10 Billion USD "Earth Fund" "I want to work alongside others both to amplify known ways and to explore new ways of fighting the devastating impact of climate change on this planet we all share." Mr. Bezos said earth's climate was changing faster than predicted by the scientific community five years ago. "Those predictions were bad but what is actually happening is dire," he said.

As Andy Penn, the CEO of Telstra recently said,[1] climate change will be the "defining challenge" of the decade.. "We need more urgent action on climate as changing weather patterns deliver more frequent bushfires, floods,

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1 https://www.smh.com.au/business/companies/climate-change-defining-challenge-of-decade-telstra-chief-20200206-p53ye2.html

droughts and storms".

For me, as a serial space entrepreneur who during the first 30 years of my career used satellites to help provide "Universal Access" for television, telecommunications, and Internet to citizens around the world, I changed my focus about 10 years ago to "Accessing the Universe" with satellites for the good of our planet and mankind.

SPACE AS AN OBSERVATION INSTRUMENT FOR THE EARTH SINCE 1840

Today, there are already more than 1000 earth observation and weather satellites orbiting the earth, be it in geostationary or low-earth orbit.

As early as 1840, cameras were being attached to balloons provide the first-ever aerial photography, with kites following soon after. And in 1903 photos taken from carrier pigeons became the latest fad after a German engineer designed a small camera to strap on to the birds!

But the real revolution in earth observation with satellites happened in 1960 when the first US meteorological satellite, TIROS 1 (Television and Infrared Observation Satellite), was launched, sending back the first image of cloud patterns over the disk of earth. In 1972, NASA launched the Earth Resources Technology Satellite, ERTS-1, later renamed Landsat. It was the first in a long-running series of multi-spectral remote-imaging spacecraft.
Whether it be NASA, (National Aeronautics and Space Administration) with their LandSat or NOAA (National Oceanic and Atmospheric Administration) satellites; ESA (the European Space Agency satellites such as Copernicus, https://www.copernicus.eu/en,Sentinel, https://sentinel. esa.int/web/sentinel/homeetc; be it the Saudi Arabians who with their Saudi Sats; be it JAXA, *the Japanese Aerospace Exploration Agency; etc. governments have realised the importance of using space to preserve our planet ever since Sputnik was launched in 1957.

NEW SPACE SATELLITES,

LAUNCHERS AND VEHICLES ARE BRINGING THE UNIVERSE EVER NEARER

In addition, there are now many privately funded and commercially-oriented "New Space" satellite systems. These include: Digital Globe, http://www.digitalglobe. com; and Planet, https://www.planet.com, which is one of the largest "image-processing" satellite companies in the world, thus leading to the second generation of New Space satellites. Further examples are: the precision-weather predicting Spire with more than 100 Nano Sats, https://www.spire.com/en; ICEYE with 5 SARS satellites which can detect images in darkness and at night, http://www.iceye.com; or still yet OroraTech detecting forest fires from space, https://ororatech.com; or the IoT Hiber satellite solution, https://hiber.global. Satellites are leading the way in earth observation and earth intelligence for the world.

But none of these new satellite constellations for earth observation and weather can happen unless there are launch vehicles to bring them to space. As a result, there are new companies such as Rocket Labs in New Zealand and the USA, https://www.rocketlabusa.com as well as now one of space's stalwarts, SpaceX, https://www. spacex.com, etc. to make these satellite constellations operational. Just as with the "New Space" satellites, these "New Space" launchers are reducing the cost of accessing space exponentially (see below under the Democratisation of Space).

INTERNET OF THINGS AND SPACE: A MARRIAGE MADE IN HEAVEN FOR MONITORING, ANALYSIS AND PRECISE PREDICTIONS

If there is one thing that has spurred the use of space for earth observation and earth intelligence, it is the Internet of Things.

Not so long ago, computers were just accessed and used by people. Today, thanks to the advancement and

miniaturisation of sensors, computers are attached to "everything" via the cloud, be it plants, pipelines, ocean floors, buildings, etc. As a result and thanks to the analysis of "Big Data" collected via all types of wireless and space technology, insights are being gained which are helping us better understand our environment, monitor the effects of climate change, and precisely predict when a catastrophic event or erosion is happening over time.

This "Big Data" which is changed into real, usable information also with the help of machine learning, better known as AI or Artificial Intelligence, is being used throughout the world by many different groups. These include: farmers for precision agriculture; large oil and gas groups for pipeline monitoring and rupture detection; and national governments for early wildfire detection and prevention. This analysis is also being done for insurance companies analysing risk on all that they insure from bridges, buildings, homes, cars. Local municipalities, small islands and coast guards are using the new insights to prepare for the impact of coastal degradation caused by rising waters. Fisheries are assessing the damage caused to coral reefs and their aqua culture. This is not to not to mention other growing applications for autonomous vehicles, and many others. Indeed, taking the temperature, pulse, pressure of our environment has become essential to the preservation of all life on the planet.

This same approach of using sensors in space to collect and analyse data is also behind the plans of the United Arab Emirates to launch their Hope vehicle to Mars later this year with three sensors – an infrared spectrometer, an ultraviolet spectrometer and a camera – which should basically help explain how, e.g. dust on Mars helped push hydrogen upward in a recent planet-wide dust storm

raged on Mars in the summer of 2018.

THE DEMOCRATISATION OF SPACE AND SPACE DEBRIS

For, just as when Henry Ford democratised cars with his famous and inexpensive Model T car at the beginning of the 20th century, thus leading to other innovations such as traffic lights and sign posting for automobiles, the current democratisation of space which has brought down the cost of accessing space sometimes as much as 1000 times will lead to other innovations.

The burgeoning of satellite constellations in Low Earth Orbit has resulted in the necessity to instigate not only a frequency and orbital assignment system such as what exists already at the ITU, but now to create and operate a global Space Traffic Management (STM) System.

Much has been made in the media about "space debris" and filling up our universe with unnecessary clutter, much the same way that we are destroying the planet's oceans.

Whereas it is true that thanks to the miniaturisation of components which have led to a true democratisation of space and a flourishing of satellite constellations, future 3D factories, Research labs, Habitats, etc in space, it is not so much that we should not use space as described above and below, but that we have to plan and manage this valuable resource and keep it clean.

Thus, increasingly people are realising that Space Situational Awareness (SSA), is mandatory if we are to continue to be able to access space and the universe as a valuable resource. We need the ability to detect and track man-made and natural threats, predict and assess the risks involved, and provide services enabling the implementation of appropriate mitigation measures aimed at protecting space and ground assets.

I have recently proposed the creation of **SMAART** – **S**pace **M**anagement **A**ssociation of **A**ssets, **R**esources and **T**raffic – based very much on the GSMA model and complementing the ITU's work to address these issues.

The Clean Space initiative agreement recently signed between Luxembourg and NorthStar, where I am the Vice-Chair, should also inspire stakeholders in the space industry today to do all that they can to keep our universe and its resources optimally available for millennia to come. See https://www.prnewswire.com/news-releases/

GOING THE NEXT STEP TO ACTUALLY COMBATTING CLIMATE CHANGE AND PRESERVING OUR MANKIND AND THE UNIVERSE THROUGH SPACE TECH

So, where as space tech is playing a crucial role in detecting, predicting, monitoring, and assessing the state of our planet and our universe, the next question which begs to be asked, is "How can space tech actually help us combat climate change and preserve mankind and the universe"?

Certainly, all of the information we are gathering via the various sorts of airborne (drones, stratospheric buses, balloons, etc.) and space vehicles is helping us identify and hopefully stop the perpetrators of this man-made disaster. It is also helping us notify in time those areas where there is no hope of mitigation and develop sustainable alternatives. A satellite system such as Kacific, http://www.kacific.com is helping Pacific islands with this critical information. Also, such applications as precision agriculture are helping us best use the available resources and there are other applications such as finding deep water in the desert which will open up new resources for us.

But there are also totally new applications which are being developed on a very large scale that will hopefully help us not only monitor, analyse and predict, but which will actually also help us find a solution to our environmental challenges. As can be seen above, ever since Sputnik was launched by the Russians in 1967, the exploration of space has helped mankind develop new solutions to be used on earth. It has also always, always been my premise and is the premise of many people that if man is the one behind this catastrophe, man should be able to provide a solution.

In addition, many of the space tech entrepreneurs and explorers today believe that by conducting the exploration of deep space, it will help us solve and

perhaps even preserve our planet.

Certainly, the International Space Station (ISS) has provided a platform for this type of research and this is also why I am so excited to be helping "Astronautin", a project coming out of Germany but which hopes to impact the whole world by sending an all-female crew to the ISS to conduct research and applications with a gender lens.

But, there are actually other shall we say ideas out there, which even a year ago seemed to me far-flung, but which no longer do. Take for instance, "In-Orbit Servicing". This is allowing GEO satellites to extend their lifetimes of 10 – 15 years with re-fueling services. It is also allowing other satellites which have finished their useful lives to be picked up and replaced by space-buses such as D-Orbit. One year ago, these technologies and services would have seemed impossible to me. Today they are reality.

Thus, now when technologists, entrepreneurs, researchers and scientists are coming forward with what today may seem like cockamamy ideas for using space tech to combat the effects of climate change on the planet's environment, I tend to at least give time to consider them.

Here are a few of some of the more interesting ones.

Since at least high school, Jeff Bezos has seen space exploration as a way to preserve the earth. He has posited the idea that heavy industry could be in space, leaving the planet cleaner for human use. "If you want to protect the earth, save the earth, we have to go to space to tap its unlimited resources and energy."

Other entrepreneurs are considering putting data centres onto the moon to take advantage of the cold

environment. The Chinese launched their Micius or Mozi quantum satellite into space to prepare a path for the computing power and energy necessary to unleash quantum computing's promise, most likely indeed able to take advantage of the cold environment of space.

3D printing in space is allowing the manufacturing of an unimaginable assortment of habitats, next gen factories and industries, including perhaps one day the idea of a sun shade for the earth. First proposed by James Early in 1989, it was considered unpractical to build a 2000 Kilometre glass shield which would at once reflect the sun's rays and shield the earth from the sun, so as to prevent global warming. Today, with robotics and 3D manufacturing, such an idea is no longer "far-flung" and scientists around the world are working on it.

Belief in the power of the human mind and of space to combat the effects of global warming and to keep our planet and universe safe

My father, General "Johnny" Johnson was one of the space pioneers who worked on the Apollo Mission at the White House for President Kennedy and President Johnson and was responsible for the first telecommunication satellites for the US Government and then the first private US domestic satellites for Western Union called WESTAR.

I remember him telling me the story of when the first satellites were launched and people asking him, "What can they possibly be used for?"

From those early days in the late 1950's and early 1960's, satellites and space have inspired thousands of entrepreneurs, researchers and scientists to find new ways of using space technology to make the world a better place.

I firmly believe that we shall continue this path and reach our destiny of creating a peaceful, harmonious, sustainable planet and universe for humanity.

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Candace Johnson, Chair Seraphim Space Advisory Board and Vice Chair NorthStar Earth and Space as well as Serial Entrepreneur and Investor, SES ASTRA, SES Global, Loral Teleport Europe, Europe Online, Iridium, Kacific/OWNSAT (Oceania Women's Network Satellite), VATM (Association of Private Telecom Operators), GTWN (Global Telecom Women's Network), GBRW (Global Board Ready Women), and "Astronautin" and President Emeritus EBAN (European Business Angels Network)., Ms. Johnson is the recipient of the Luxembourg Commander of the Order of Merit, the German Officer of the Order of Merit, the Luxembourg Officer of the Oak Leaf Crown and has a Honorary Doctorate from the Hong Kong Polytechnic University as well as Masters degrees from the Sorbonne and Stanford Universities as well as a Bachelors Degree from Vassar and a high-school degree from Punahou.

CLIMATE CHANGE DEBATE: HOW DIGITAL TRANSFORMATION IS PLAYING A ROLE IN DRIVING CONFLICT AND MAY LEAD TO ITS POTENTIAL RESOLUTION

DERRICK DE KERCKHOVE
Scientific Director, Media Duemila, Osservatorio TuttiMedia

MARIA PIA ROSSIGNAUD
Editor in Chief, Media Duemila

In spite of all the scientific evidence that Climate Change (CC) is real, the global debate about it is overwhelming. Serious arguments for (mostly) and against its real occurrence, about its danger, and the human responsibility behind it, number in the hundreds, if not thousands. In this introduction to CC, there is no need to mention more than the most striking. However, to put readers in a mood for salutary relativity, I invite you first to enjoy 4 minutes of pure mirth and view this hilarious clip by John Oliver, following an assertion via twitter by then President Obama that "Ninety-seven percent of scientists agree: #climate change is real, man-made and dangerous". Despite the overwhelming scientific evidence, to this day, there continues to be debate in some countries and some groups on the matter. But this pronouncement by a loved and respected political authority did more than any other to boost the ideology of CC among the wider population.

It is not the purpose of the following meditation on CC to take or support a given position on the matter, but to examine the origin, motivation, formation and distribution of opinions, as well as some of their influence and consequences on social and political action. Both extreme positions put a heavy stress on the economy and world peace. The problem has reached such proportions, in particular over bush fires in Australia and melting icecaps on both poles that it has taken pride of place at the latest Davos World Economic Forum where world government and business leaders usually focus on the more preoccupying matter of making money. Another indicator of the global urgency is that, rising in importance since its first appearance on the sadly famous "Doomsday Clock"[1] in 2015, CC now overtakes the nuclear threat as a key factor that narrows the time left for humanity's survival.

Central in pushing the CC issue center stage is the role played by social media, that is, by one of the key factors of the digital transformation. Indeed, the debate has been hijacked from the scientists by the "people" whose uninformed opinions go viral at the slightest provocation. An itemized list of CC deniers' arguments can be found here. Most invoked by deniers are the lack of scientific evidence for any or all claims that global warming is happening, that it is man-made and that it is dangerous to humanity, sheer denial and downright refuting that the increase of fires, rise of seas, and melting of ice amounts to anything but natural occurrences (including Australia's Prime Minister Scott Morrison arguing disingenuously that bush fires

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1   https://www.economist.com/europe/2019/09/19/why-russia-is-ambivalent-about-global-warming

"happen every year"), references to Paleo climate history that have no pertinence to today's vast increase of world population and consequent augmentation of consuming and waste, etc. Again, this is not the place to argue such positions but to identify them and find out why and how they gather support against all evidence.

The result of this cacophony is conflicting and often bewildering arguments such as the following:

- The fear of total disaster stems from alarmism deeply seated in our ancestral unconscious
- CC is a myth created by China to weaken the US economy
- CC researchers don't want to recognize the truth because they would lose their funding
- Mars and Pluto are warming too, so why not the Earth.

And the best one of all: "What's wrong with warmer weather?" The latter view is evident in the climate change scepticism in some northern European countries, including Norway and Russia.[1]

These kinds of objections hardly seem to require refutation. We can always speculate on motivations, ideological, scientific or self-serving, but the fact that they circulate, and gain traction underscores a great turmoil in global civil society. The geopolitical stage is caught between terrorism and populism, and faces the rout of democracy not only in immature political conditions, but more seriously among the erstwhile most stalwart representatives and defenders of a livable world

order, that is, in three of the five main countries in the Anglosphere (the United States, Canada, Australia, New Zealand and the United Kingdom). It is likely that the present world disorder largely owed to the disruptive effects of the Internet and social media will eventually recover a lost equilibrium when digital transformation is completed but in the short term, governments and businesses will have to confront enormous challenges to either successfully convert or transform the economy and reduce global waste and carbon pollution.

THE INTERNET AS A SOCIAL LIMBIC SYSTEM

In mammals (including humans, of course) the limbic system is the name given to the sequence of organs that identify, assess and act upon internal or external triggers that provoke emotions, to control, resist or transmit them through gestures and utterances; the Internet may be the first technology that allows similar processing to occur and extend it to large swaths of people from a handful to a global response. More than a metaphor, the comparison with the limbic system is a lens to understand controversial social responses to climate change. A direct one-to-one correspondence between such biological organs and technological nodes, edges and hubs of Internet communications, in conjunction with the symphony (occasionally a cacophony) of other media, may not be necessary to establish corresponding functionalities expressed in such concepts as viral transmission, echo chambers and rapid circulation of emotional currents

in society. The intent of this comparison is to introduce parallels that illustrate some of the most striking kinds of social responses that have occurred over the last ten years, from populism to climate change anxiety.

THE "THUNBERG EFFECT"

What appears from the rapid – and viral – uptake of Greta Thunberg's initially modest, if not jejune protest is that it hit a nerve in the younger global population. No one predicted that school children could become a political force since the "Children crusade" of the Middle Ages (1012-1014). The idea here is that, notwithstanding the possibility that the symphony of media has played the dominant role in propagating the movement, the spark that ignited it and the response generated was and remains spontaneous, genuine and authentic, this again, not taking sides for or against the validity of the protest. It could be useful to examine generational differences regarding awareness and expectations about the present and the future outcome of these protests.

LYING AND DENYING: THE POST-TRUTH ERA

Although one cannot help suspecting that denying climate change serves blatant private interests, the various disinformation strategies gathered under the label of post-truth, over and above pointing to potential malice, indicate that the global civil society is undergoing an epistemological crisis. Critics and commentators continue to blithely point out the obvious, that is, the gap between assertions and the reality they obfuscate, without examining why and to what extent opinion has ceased to need verification or objectivity. The evidence presented by proponents of climate change falls on deaf ears because they continue to oppose logical – and verifiable – arguments to a coalition of probably cynical self-interest coteries with a growing number of uninformed and impatient citizens who do not care for truth or evidence, neither being part of their normal frame of reference.

TOWARDS A 'GLOBAL GOVERNMENT': IS IT A CONSPIRACY THEORY OR THE EFFECT OF DIGITAL

TRANSFORMATION?

The argument has been proposed that the Extinction Rebellion (X-R) movement is part of a conspiracy to achieve some sort of global government; the reasoning goes that a growing number of funders concur about the need to establish and enforce globally new regulations to eliminate social and economic practices that are deemed to provoke climate change (the recent (and re-igniting) bush fires in Australia providing a ready example). Be that as it may, the better argument is that, however it comes to pass, such an outcome, rather than from civil unrest and protest, is more likely to emerge from ongoing Digital Transformation than from anybody or any group's intentions. The dominant trends and lines of force of digital media, beside their tendency to converge, are integration (in this case comprehensive regulation) and transparency, albeit fiercely resisted in today's transitory situation. It is to be hoped that global unrest over the wasteful behavior of whole societies recordeded and documented by algorithms will eventually lead governments to apply available digital technologies to the development of a global social order respectful of the environment.

HISTORY OF SOCIAL — AND PERSONAL — RESPONSIBILITY

Different social structures condition different attitudes in communities and among their members. Anthropology has long distinguished 'shame' societies from 'guilt' ones. In a shame society, honor, loyalty and social recognition (including saving face) orient the responsibility of individuals to the "other", be it family, clan or hierarchy, or whatever order prevails in the community. "Reputation Capital" is one of the ways shame culture is developing as part of Digital Transformation of the economy and society. It involves not only traditional meritocracy systems, but also threatening and enslaving methods of pressure and control. Conversely in guilt societies, the responsibility of individuals is primarily to themselves (even if the duty to others remains relevant). The unpleasant experience of guilt remains in the guilty even if no one is aware of the fault. Puritanism was built on this condition. But both guilt (thanks in part to Freud and psychoanalysis) and shame (because of a trend to eschew it completely by autocratic government leaders) are on the way out as dominant motivators. How long can we continue to worry about people's sexual behavior (#metoo etc.) when

everybody apart from dried up saints can be found and declared guilty? One big question today is whether guilt and shame are now giving way to a new, prevalent form of unease, directed not specifically to self or other, but to the whole planetary community of people under the threat of climate change that affects everybody and for which everyone's consumption habits bear responsibility. The corresponding ill-ease is leading to pervasive anxiety and latent stress.

IMPACT ON CONSUMERISM (GOODS, SERVICES AND ENERGY)

One predictable outcome of the growing anxiety about climate change compounded by global crises in geopolitics, as well as the collective and individual precariousness may be that it generates a radical reversal of consumption habits, including the growing trends of veganism, general health concerns, and questions about energy use and abuse. This could slow the acceleration of local and global economies to a standstill. So how will that affect energy production, consumption and waste? The so-called Thunberg generation may or may not have a major

role to play in this economic and social transformation.. At any rate, major oil companies are already showing the way by, for example, forfeiting the prospect of drilling in the arctic and in Greenland, or exploring with a new vigor renewable and environment-friendly sources of energy.[2] The most urgent challenge is the need to transform the economy without causing irreparable damage. It is becoming obvious to many responsible industry leaders that focusing purely on economic growth by uncontrolled consumption is harming the whole system not only for the average consumer, but also for their own business interests. While governments are still talking about 'austerity' as if it were a temporary measure, a much more radical approach is needed in order for us to recover an equilibrium before it becomes permanently out of reach. What are the criteria for such a new approach and how can climate mitigating measures be applied taking society's essential needs into account? And importantly for the digital sector, how can ICT become a major player in this debate? Our collective goal should be to have a positive impact on global sustainable development through the accelerated application of technological solutions, business innovation and structural changes.

[2] https://www.bp.com/en/global/corporate/news-and-in-sights/press-releases/bernard-looney-announces-new-ambition-for-bp.html

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Maria Pia Rossignaud *is Editor in Chief of the digital culture magazine Media Duemila. She is also Vice President of the Observatory TuttiMedia, a cultural association created in 1996, where companies in various sectors (publishing, advertising, television, telecommunications) sit together to imagine the future and propose useful solutions to all with respect to the problems related to the advent of new media. She has been coordinator of Digital Lab Training Coordinator @ eg, and is a former professor of Sapienza University and LUISS. She organizes meetings and conferences on subjects of current importance. The most recent: "Public Mind: construction of public opinion in the era of the algorithm (September 24th, Frederick II Naples); "Program the world". (September 28 Prix Italia Milan); "Is there a past in our future? Information between Liberty / Rules / Post Truth and Lies ". (9 March FNSI Rome).*

GREEN FINANCE: HOW TO MAKE MONEY WHILE SAVING THE PLANET

VICTORIA HERNANDEZ

Board member (NED) at CaixaBank Payments, Business Angel and
Head of the investment committee of Rising Tide Europe

Finance impacts the natural environment both directly and indirectly. The environment also directly and indirectly impacts finance and the performance of investments. As global awareness of the impacts of climate change on all areas of business rises, so does investor concern about what actually counts as "green finance". Green finance is one of a number of terms used to label activities related to the two-way interaction between the environment and finance and investment. Related terms include: responsible investment (RI), environmental, social and governance (ESG), sustainable finance and climate finance.

There's growing concern amongst corporations and investors that wide definitions of sustainability aren't meaningful, allowing some funds to sell themselves as green or ethical even though they may be doing very little to reduce their impact on the environment. And as shareholders become ever more aware of the potential impact of their investments, many people are now asking "how green is green"? There is also growing scepticism in some quarters that so-called 'green washing' of otherwise unsustainable businesses is beginning to undermine the integrity of those companies who are taking their environmental responsibilities seriously.

This makes the job of risk managers even harder, as they are being pressed to encourage investment in these types of asset classes, but at the same time companies are often left to make their own subjective judgements about the parameters of sustainability. Some asset managers want a very strict interpretation and will back only carbon pollution free energy. Others focus more on a range of policies and principles that relate to broader social issues, not just carbon reduction.

While there are many possible definitions of green finance, for the purposes of this article, green finance is defined as any financial initiative, process, product or service that is either designed to protect the natural environment or to manage how the environment impacts finance and investment. Given the growing importance of this financial sector, it is timely to explore the dimensions of green finance and compare and contrast it to other similar concepts such as sustainable finance and climate finance.

This is clearly a very significant part of the economy, and one which will continue to grow as concerns about environmental and social sustainability increase. At least $30.7 trillion of funds is held in sustainable or green investments, up 34% from 2016, according to a report by the Global Sustainable Investment Alliance,[1] a group of organizations tracking those moves in five regions from the U.S. to Australia. Overall, these money flows account for one-third of the tracked assets under management, and in some places have reached more than half. Companies such as the oil major Royal Dutch Shell Plc, British Petroleum, or even the mining giant Glencore Plc are now setting environmental targets for the first time, bringing to boardrooms a new agenda demanding action to limits for greenhouse gases. And renewables developers are now offering major investors securities with steady yields. This has helped create a market for green bonds and loans that barely existed a few years ago, but which is set to grow exponentially. The value of green or ESG funds traded on exchanges hit a record $41.6 billion in 2018, according to data compiled by Bloomberg.

Some investment organisations are attempting to establish a new standard for green investments. For example, The GSIA has a very broad definition, counting

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1   http://www.gsi-alliance.org/

any kind of fund that uses a strategy associated with sustainability. The GSIA also counts those that buy "best-in-class" assets on certain measures or that follow rules on environmental, social and governance, or ESG. Their definition also includes funds that engage corporate boards or that encourage shareholder action.

The International Capital Markets Association (ICMA) has also addressed this issue and established Green Bond Principles,[2] which were updated in 2018. These are a set of voluntary process guidelines for issuing green bonds. Green Bonds are any type of bond instrument where the proceeds will be exclusively applied to finance or re-finance, in part or in full, new and/or existing eligible Green Projects.

As there is still no consensus on the parameters of sustainability as it relates to finance, companies are largely defining their own parameters for ESG, usually around one or more of the following elements:

The environment: issues relating to the quality and functioning of the natural environment and natural systems including biodiversity loss; greenhouse gas emissions, renewable energy, energy efficiency, natural

2   https://www.icmagroup.org/green-social-and-sustainability-bonds/green-bond-principles-gbp/

resource depletion or pollution; waste management; ozone depletion; changes in land use; ocean acidification and changes to the nitrogen and phosphorus cycles.

Social impact: these issues can be very broadly defined and may relate to rights, well-being and interests of people and communities including human rights, labour standards, health and safety, relations with local communities, activities in conflict zones, health and access to medicine, consumer protection; and the use of controversial weapons

Economic impact: which relates to the outcome of investment decisions on economic conditions at local, national, and global levels. Performance areas include direct financial performance and risk, and indirect impacts such as through employment, supply chains, and provision of infrastructure.

Examples of some of the initiatives being taken by both public and private organisations in response to these broad concerns about environmental sustainability include:
• to reduce its reliance on renewable and polluting plastic, the banking sector is considering the possibility of introducing biodegradable payment cards.

- In November 2017, the Spanish Government decided to transport to Spain an EU directive with which it tries to avoid financial exclusion, that is, that certain customer profiles remain outside the banking circuit simply because the entities do not find it interesting. Through a royal decree-law, banks will be required to provide all users with a checking account to deposit their money or make transfers, and have a card. And regardless of the profitability of that citizen.

- Basic payment account. The royal decree-law incorporates as a key tool the creation of a banking product – the basic payment account. This is the way the Spanish Government is aiming to ensure a universal right to financial inclusion, which is a concept that did not exist before now. That account must provide a number of essential services: direct debit, use of debit or prepaid cards, cash withdrawals or transfers.

- There are a number of wealth management businesses as well as much smaller start-up online investment platforms that now only invest in sustainable or ethical businesses. Many of these focus in particular on attracting investment from millennials, who want to be assured that their money is supporting the achievement of the UN's SDGs.

- Many financial institutions and other traditional sectors of the economy, such as airlines or travel companies, give customers an option to support climate remediation initiatives or social programs in the course of their normal business. For example, passengers can now elect to offset the carbon pollution created by their flights, or they can choose to round up transaction costs to make a small donation to their favourite charity.

- Cryptocurrencies and crowd funding are being utilised in charities to enable supporters to fund a specific project, such as digging water wells in an African village.

These and other examples show that the growth in green finance seems certain to continue as more companies and governments worldwide are beginning to focus in earnest on how to cut pollution and greenhouse gases and more regulators require companies to disclose climate-related risks. This is sure to lead to more pressure to ensure transparency of data about the actual impact of initiatives claiming to be "green". It will also give investors and consumers greater insights and more power to influence business to reduce the impact on our planet and ensure that our societies and our way of life are sustainable.

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Green Bond Report

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Verizon allocates nearly $500M in first green bond report

In February 2019, Verizon became the first U.S. telecom company to issue a green bond. The bond offering raised almost $1 billion in net proceeds for renewable energy, energy efficiency, green buildings, sustainable water management and biodiversity and conservation. As of December 31, 2019, approximately $500 million of net proceeds have been allocated. Verizon's green bond projects demonstrate its long-term commitment to minimize its environmental impact, drive operating efficiencies and benefit the communities it serves.

Allocation by Category:

Renewable Energy
$143.23 million

Green Buildings
$319.34 million

Energy Efficiency
$36.65 million

Biodiversity & Conservation
$0.77 million

View Report of Independent Accountants

Examples of projects to which we have allocated 2019 green bond proceeds include:

- Renewable Energy Purchase Agreement
- LED Lighting Project
- Boston Green Building Project
- Biodiversity/Reforestation Project

Renewable Energy Purchase Agreement
$133M allocated to development of renewable energy

As part of Verizon's efforts to meet its commitment to source at least 50% of its total electricity usage from renewable energy by 2025 and increase the supply of renewable energy, Verizon entered into a renewable energy purchase agreement for up to 130 megawatts (MW) of capacity at a new wind energy facility that is under development. The purchase agreement has a twelve-year term and generally is expected to be financially settled. The facility is located within the PJM Interconnection regional market where Verizon has significant energy usage and is expected to commence commercial operation by the end of 2020. Once the facility is online, it will add new renewable energy generation capacity to the power grid and enable the avoidance of greenhouse gas emissions as fossil fuel energy generation is displaced.

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LED Lighting Project

$30M allocated to upgrading to energy efficient lighting across Verizon's real estate portfolio

In 2018, Verizon began a multi-year project to convert existing lighting in its facilities to energy efficient Light Emitting Diodes (LEDs). To maximize the impact of the lighting upgrades and further increase energy efficiency, the project is also replacing existing lighting controls with new motion sensors, timers and dimmable controls.

Boston Green Building Project

$319M allocated to development of a LEED Platinum facility

In 2018, Verizon entered into a long-term lease for more than 446,000 square feet in an office tower to be located in a mixed-use technology community at Boston's The Hub on Causeway, adjacent to TD Garden and with a direct connection to the North Station. The lease provides that the Hub on Causeway office tower is to be designed and built to achieve a Platinum level of certification under the U.S. Green Building Council's LEED v3 rating system for Core and Shell Development.

Biodiversity/Reforestation Project

$0.77M allocated to addressing critical loss of forests

During 2019, Verizon invested over $0.77M with Arbor Day Foundation, Texas Trees and Eden Reforestation as part of our commitment to plant 10M trees by 2030. Verizon is a founding member of Arbor Day Foundation's Time for Trees initiative which launched in 2019 and focuses its replanting efforts in areas as geographically diverse as the tropical rain forests and the iconic California national forests.

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FROM PROFIT MAXIMIZATION TO PURPOSE MAXIMIZATION IN INFRASTRUCTURE

JYOTI BISBEY

World Bank Group (WBG)

The 2019 Economic and Social Survey of Asia and the Pacific by UNESCAP: Ambitions beyond growth reveals that achieving the Sustainable Development Goals by 2030 requires an additional annual investment of $1.5 trillion for Asia-Pacific developing countries—equivalent to 5 percent of their combined GDP in 2018. While this seems unfathomable, it means we need a concerted effort driven by an assessment of fiscal space and leveraging the private sector. I want to emphasize this point: the journey towards sustainable development is affordable, if countries work together.

In fact, raising financing for infrastructure should not be complicated. I encourage you to ask yourself four questions and I offer some of my reflections:

IS THE ANSWER ALWAYS NEW MONEY?

A life-cycle approach is vital. Focusing on new construction and not enough on maintaining existing infrastructure is not sustainable. Moreover, according to McKinsey Global Institute, 20 percent of infrastructure inefficiency relates to project planning and identification. For instance, in the case of Latin America, studies show that better planning could generate annual savings around 2.2 percent of annual infrastructure investment, or 0.05 percent of regional GDP.

The public sector needs to think smart, not more. "Smart" means working efficiently with what governments have.

With a fixed pot of money, what can they do? Difficult issues arise, such as whether to finance commercially suitable projects using public funds and how to facilitate private sector participation.

Leveraging technology yields significant savings. Countries should re-think how they plan, deliver, and operate infrastructure systems and networks as they embrace technology. For instance, rather than focusing on capital efficiency of individual projects, a program could encourage government departments and industry leaders to take a higher-level, portfolio view of projects, prioritizing the whole life of the asset as well as the performance of the entire system.

CAN GOVERNMENTS SPEED UP PREPARATION OF PROJECTS?

Target 'hard' and 'soft' infrastructure together for maximum impact. The impact of physical infrastructure without supportive regulatory frameworks—or soft infrastructure upgrades without underlying physical facilities—is likely to be limited. These linkages are even stronger in multi-sectoral projects that are becoming increasingly common, like smart urbanization, intelligent transport systems, or total asset management of the water cycle. Most commonly, 'hard' infrastructure includes railways, power transmission lines, telecommunication cables, treatment plants, and water pipes. 'Soft'

infrastructure includes intergovernmental institutions, policies, regulations, knowledge, and capacity that facilitate the development and utilization of physical infrastructure.

Building consensus for equal distribution of benefits helps ensure successful implementation. Well-designed infrastructure should benefit populations of all concerned jurisdictions (including transit areas, especially in cross-border projects) and elevate livelihoods of the affected local communities.

Independent institutions and standardized frameworks can quicken project preparation. For more efficient project preparation and implementation, designated bodies that govern outside of national governments should be created as regulatory and guiding vehicles. Most regions are seeing a steep rise in cross-border projects for which designated regional institutions become even more relevant. For example, in Central America, SIEPAC (Central American Electrical Interconnection System) has established two independent regional institutions to undertake the regional power projects: Regional Operating Agency (EOR) and the Regional Regulatory Commission (CRIE).

CAN PRIVATE MONEY REALLY PLAY FOR RETURNS IN A PUBLIC GOOD?

We can change government's strategy by demanding purpose maximization instead of profit maximization. Regulations and bidding arrangements can be changed to seek the private sector's support to capitalize on impact investments. Bring in stakeholders to understand the purpose, not just for today—but for the future.

However, impact investment standards are non-standard. In 1970, Pax Global Funds created an ethical fund that allowed investments in a bundle of sustainable businesses. Yet, the selection process was vague and not very transparent. After socially responsible investing—which excludes securities involved in alcohol, tobacco, weapons, and gambling—failed to show persistent returns, the idea of ESG investing that accounts environmental, social, and corporate governance factors

began to popularize. Impact investing often made in private equity or debt markets with the dual objective of generating positive societal and/or environmental impact and a level of financial return has advanced recently, but this area is still clearly evolving.

CAN LOCAL CAPITAL MARKETS RISE UP TO FILL THE FINANCING GAP?

Infrastructure bonds must play a larger role. Neither governments, multilateral development banks, nor the banking sector alone can provide financing in the quantum needed, making bond markets – both local and international – crucial. Bond markets ensure an efficient and effective distribution of scarce financial resources for optimal benefit to the economy. For investors and savers, they offer attractive investing opportunities, portfolio diversification, and risk management. Private money may not come directly to the projects, but governments can channel investors through capital markets into projects.

However, a pre-requisite to infrastructure bond market is the presence of mature sovereign and corporate bond markets. Most developing countries in Asia are struggling to establish the first two with a stable long-term yield curve. Several have made significant progress in creating local currency bond market ecosystems, albeit with varying levels of development. While the markets of Hong Kong, Korea, Malaysia, and Singapore are at the forefront, markets in China, India, Indonesia, and Thailand are restricted by the lack of depth and liquidity. Markets in most other countries are still nascent. The issues to be addressed differ widely, but some common objectives may be identified for improvement of market and product acceptability, such as market regulation.

While some think of PPPs as a cure-all solution, governments remain in the driving seat both for financing and implementation. And these questions must be answered.

Let's question the 'business as usual' mindset of infrastructure financing for maximum profitability and remember that, without purpose, financing is ineffective.

SUSTAINABILITY

Jyoti Bisbey is currently on an external assignment to the UN from the World Bank Group (WBG), leading the dialogue on SDG 2030 Agenda economics and financing issues for the Asia-Pacific region. At present, she is authoring the theme chapter of the flagship report– Economic Development Survey for 2020 on 'Economics of Sustainability'. She has also co-authored many blogs, an Infrastructure Financing book, available at UN ESCAP's website and presented on topics such as SDGs and ESGs. At the World Bank, Jyoti was at the Infrastructure, Public-Private Partnership (PPP) and Guarantees unit while working at the Central Asia, China, and Mongolia Transport Cluster to explore innovative financing in the region. At the World Bank, Jyoti led the dialogue on PPPs in Kazakhstan, Tajikistan, Turkey, Sri Lanka and generally as a focal point in Eastern Europe and Central Asia region and previously in Brazil, Vietnam, Russia, Uruguay, Mozambique, Madagascar, Kenya and Ethiopia. Jyoti represented the World Bank in discussions with other Multilateral Development Banks (MDBs) on defining Private Capital Mobilization, which is the core of Billions-2-Trillions (B2T) agenda. The work won the World Bank President's Excellence Award. Her recent achievements have been leading the development and implementation of the PPP Certification Program 'CP3P', financial recovery planning for Vietnam Electricity, Inland Water transport (IWT) PPPs in Latin America, construction bond financing using WB intermediation and structuring PPPs in Irrigation subsector. Jyoti holds an MBA from George Washington University and an undergraduate degree in Mathematics from St. Stephens College in Delhi. Contact –Twitter: @BisbeyJyoti and LinkedIn: linkedin.com/in/jyotibisbey

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