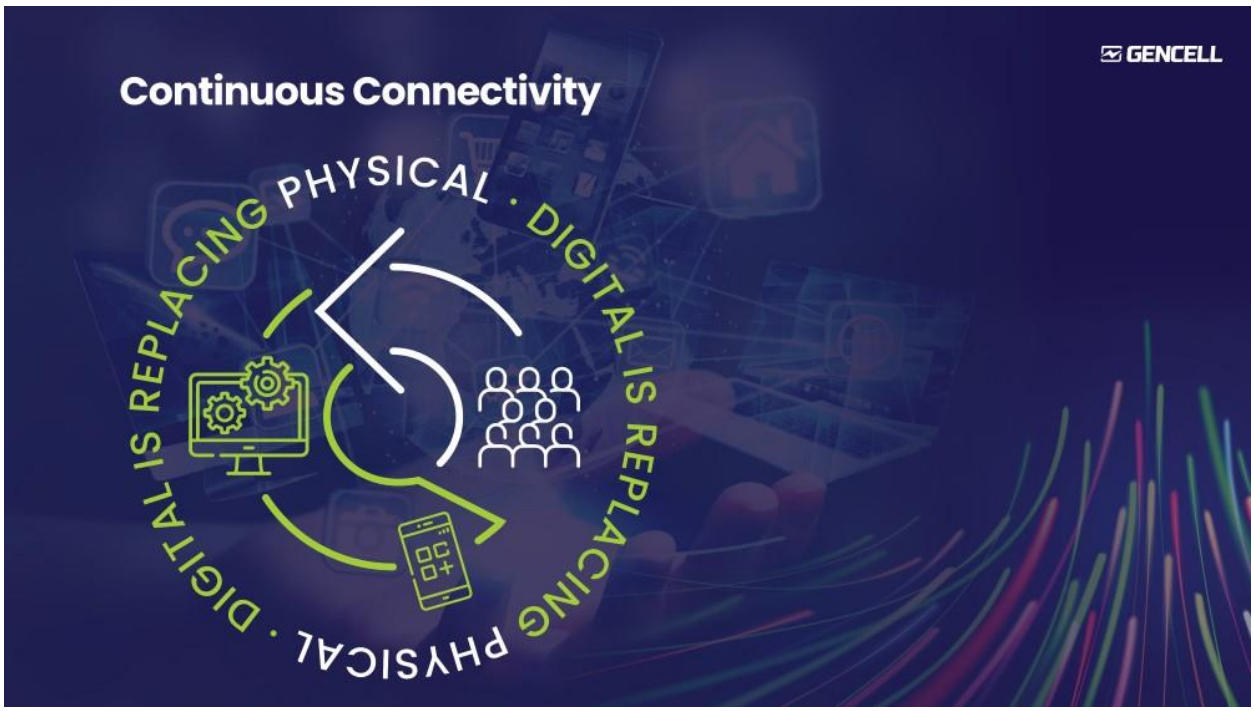
We are pleased to share with you here the slide deck and transcript from the Sustainability: Deep Dive presentation which was delivered by GenCell Energy co-founder and CEO Rami Reshef on March 1st on the stage of the Deutsche Telekom booth at Mobile World Congress 2022.

GenCell Energy, a provider of hydrogen and ammonia to power solutions, are proud to be working with Deutsche Telekom and to have participated in the Technology and Innovation section of DT's booth at MWC; we were especially proud for the opportunity to be a part of the Sustainability: Deep Dive and to deliver the keynote presentation about Telecom and Sustainable Power.

To watch the recorded live event, click here. (Keynote initiates at 14:00 minutes into the recording.)



The recent Covid pandemic has changed our world.

I imagine that your experience has been similar to mine – for over a year my wife and I worked from home while my youngest daughter attended school virtually through Zoom. On holidays and birthdays, we celebrated virtually, viewing our extended family only via MS Teams. Indeed, it is amazing that finally today we are able to meet here together face2face!

It has proven to everyone that to avoid economic and social disaster, people can connect **digitally** while separating **physically**.

Companies, schools, communities, churches and more – are staying connected through online tools and social networks. Telecom networks are keeping processes going by **keeping people digitally connected** while sheltering in place, working at home and even during quarantine.

Video conferences, conference calls, Zoom meetings and webinars let businesses across distances share ideas, reach decisions, make, buy and sell products.

Digital is replacing physical. In this way, telecom networks have become the backbone that keeps our society operational.

So, what is the catch?

Staying continuously connected via telecom digital infrastructure depends on a huge and **constant flow of energy – everywhere, all the time.**

Carrying out so many processes across every walk of life is requiring digital infrastructure to expand **exponentially**.

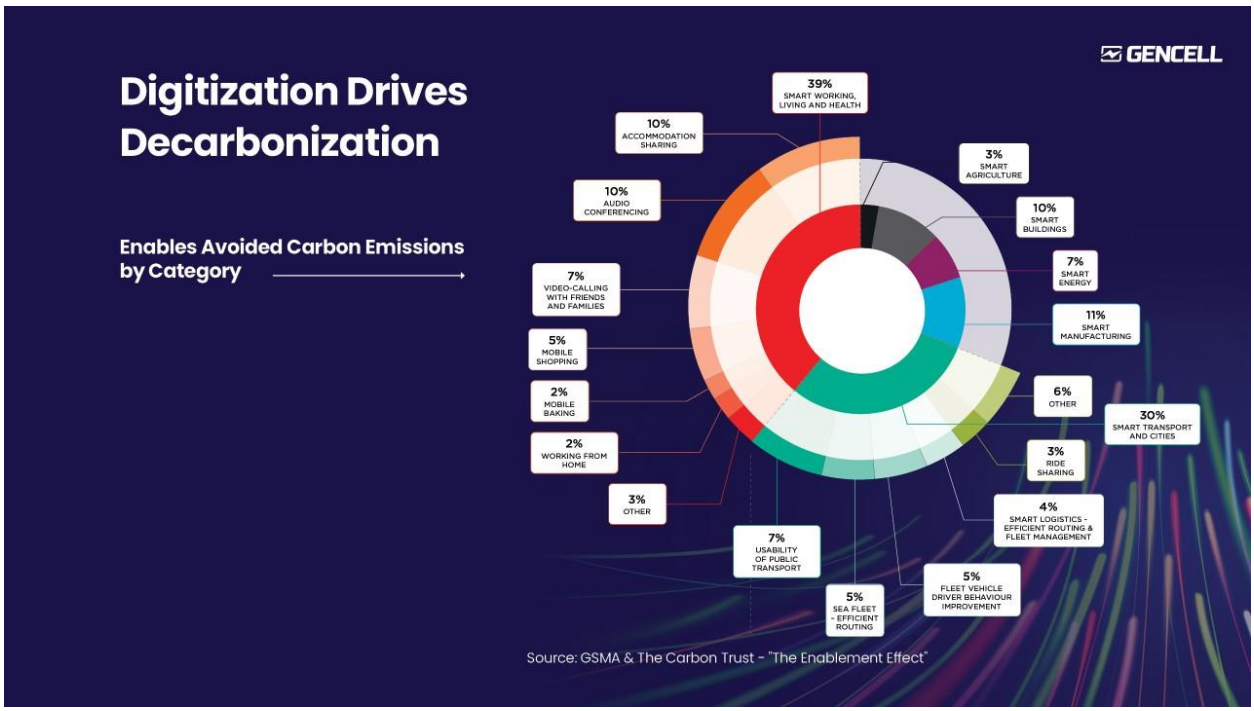
To transmit higher volumes and types of content, next generation networks are increasing **densification** and traffic. While 4G is still growing in many regions, according to a recent report, 5G will reach 75% of the world's population and 62% of global smartphone traffic by 2027.

Networks are expanding across geographies and digital formats, communicating with industrial sensors, autonomous vehicles, medical devices and more.

Digitization and IoT have made the telecom network **a key part** of every commercial and industrial scenario: e-commerce and m-commerce; industrial IoT; smart farming – in every walk of life, **digitization is creating value.**

This growing phenomenon needs uninterrupted power to keep operations running everywhere, **all the time**.

For example, DT's aims for one connectivity, perfect service, integrated networks, secure ICT solutions and big IoT – u**nderlying all of these,** is the need for uninterrupted power **everywhere, all the time.**



The telecom industry is well-aware of the huge volumes of power it must consume to run and expand this digital network. Sourcing this added power from fossil fuels would of course raise carbon emissions and put our environment in danger. In other words, powering digitization causes more CO_2 emissions. How can we overcome the gap between the need to increase digitization and the risk of harming Mother Nature?

The good news, however, shows that the net impact of digitization on carbon emissions is in fact positive. Using the term coined by the GSMA, digitization has an “enabling effect”, enabling the telecom industry to drive broad indirect carbon emission reduction, wider than the emissions caused by the power consumed.

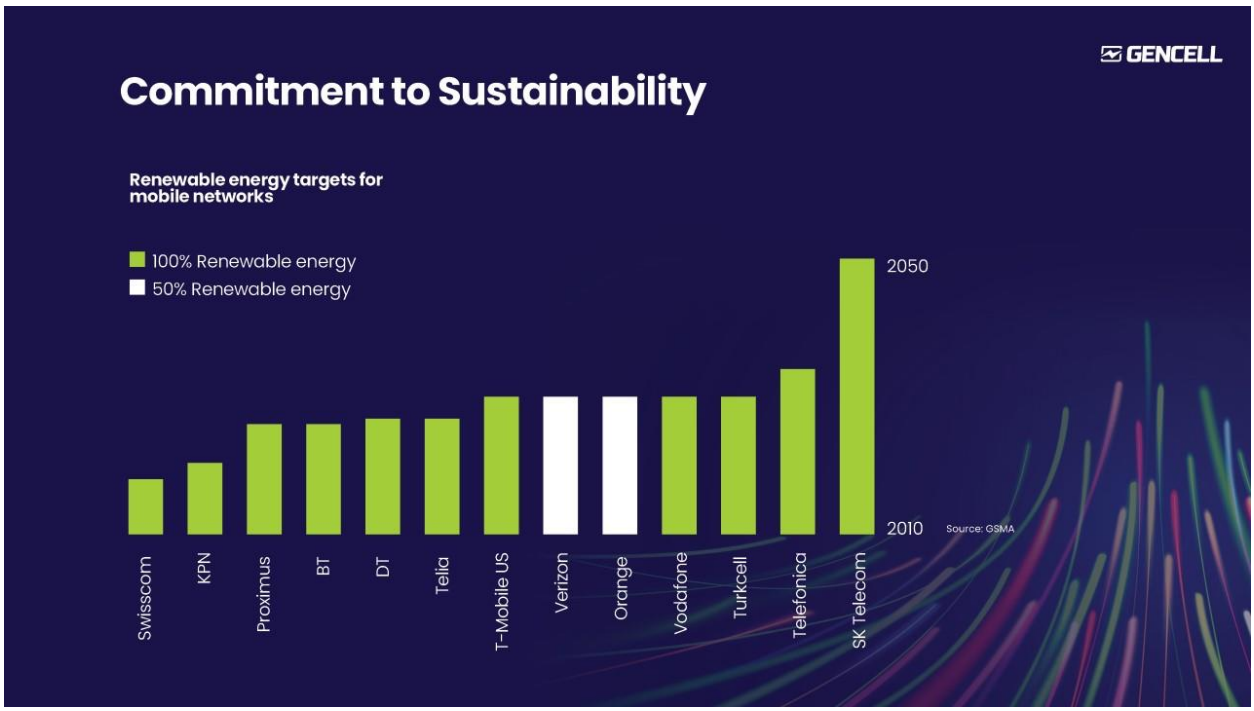
For example, as was reported in the DT press release last week, in 2021 DT - including its Scope 1-2-3 supply chain - emitted 4.9 million metric tons of CO2. But in the same year, DT’s solutions enabled customers to save **23.35 million metric tons** C02, at a factor of 4.8 to 1.

We definitely can say it is another reason to extend the use of 5G as the backbone of our digital life.

During the pandemic, while digital networks have kept us connected and coronavirus slowed down global economic activity, we saw a clear benefit – to the environment. The air in Beijing was cleaner and CO_2 levels in places like New York City were slashed in half.

It's become obvious that carbon emissions from fossil fuel combustion are destroying our environment.

Finally, the world has committed to the transition to green energy, and the telecom industry is no exception.



The industry has made a strong commitment, and global telecom providers, equipment suppliers and industry associations have taken **strong initiative** and assumed responsibility to achieve ambitious sustainability targets for carbon neutrality by 2050.

Through many cross-industry initiatives in which DT is taking a leadership role, the telecom industry is joining together to make decarbonization and sustainability goals its **highest priority**.

What does this mean in terms of day-to-day operations? **It means that the industry must move to GREEN POWER.**

Where can telecom get all the green power it needs in the short window we have against climate crisis? Today telecom providers are contributing financially by carbon offsetting and renewable power purchasing.

Also, they are working to eliminate the carbon from power in their own core operations, in smart buildings, clean fleet management and powering mobile towers.

To demonstrate an authentic commitment to sustainability targets, telcos have been among the first companies in the world to use renewable electricity to **connect the unconnected** and to advance important social goals such as **digital inclusion**.

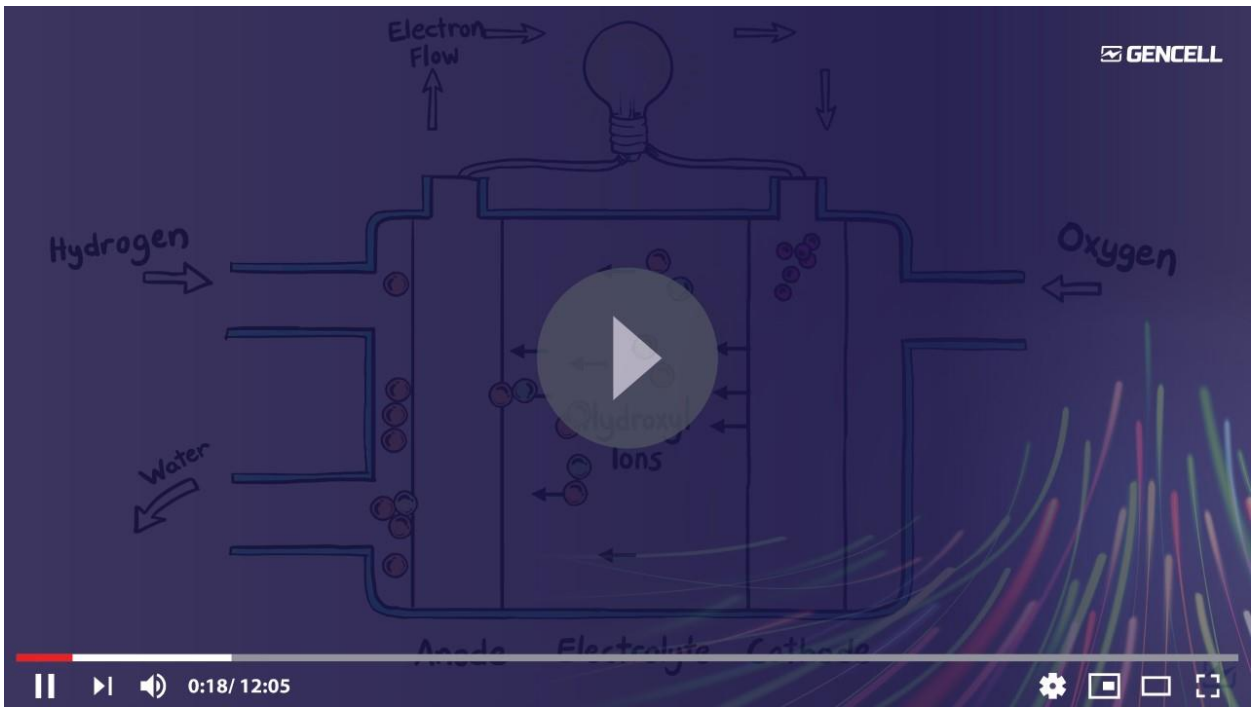
Renewable solar and wind power are a step in the right direction. They're green and their prices are falling, but they are at the mercy of Mother Nature. When there's sun or wind, you'll have electricity, but if you have cloudy or windless days, you won't. And then you'll also need batteries or fuel cells as a supplement.

Telcos around the world such as Turkcell, Telenor and Orange are doing different pilot projects to power towers with solar power. In 2021, DT tested an independent energy supply for mobile phone sites with solar power in Germany; the tests showed that solar energy was able to contribute over 2/3 of the site's total power during peak hours. This project proves the **potential of renewables as alternative power for mobile sites** and sets the stage for expanded hybrid renewable configurations, but **the solar energy resources must be paired with energy storage.**

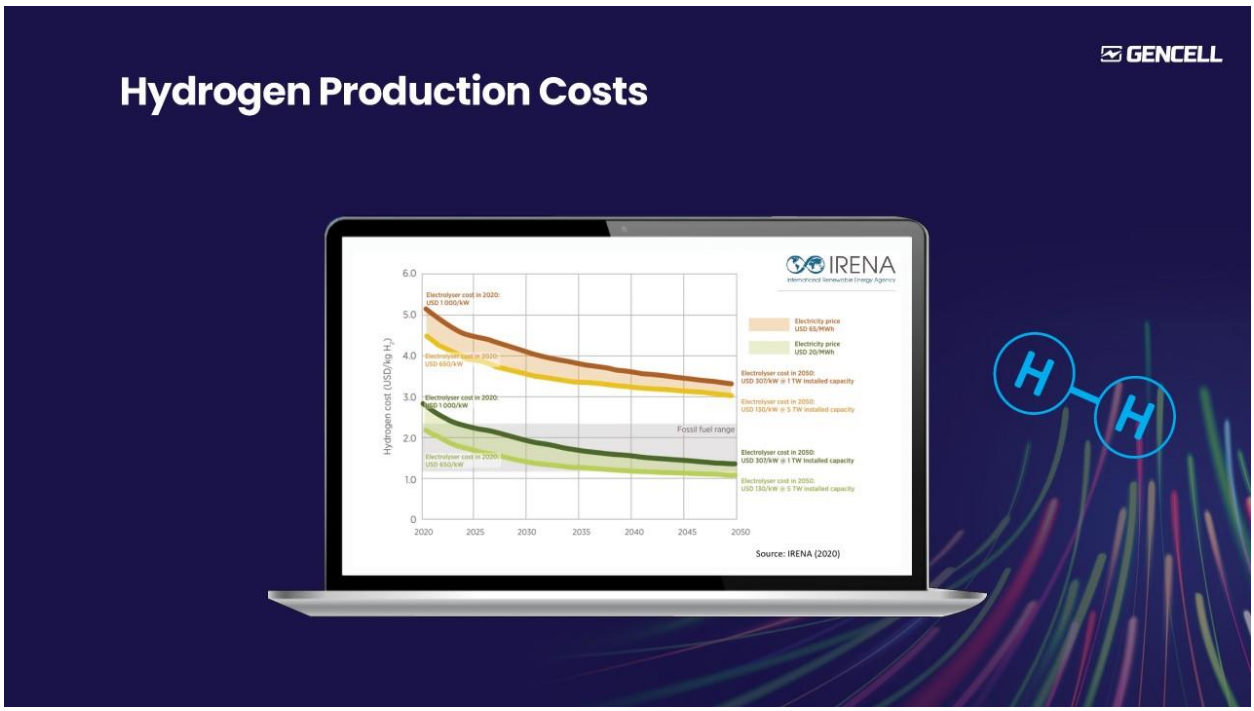
There are various technologies for energy storage, the most common being batteries, which **store energy but have limitations**. First of all, their duration is limited, and their **charges decline** over time. Battery lifespan is impacted by temperature and charge cycles, and battery end-of-life involves challenging recycling issues.

To overcome these limitations, **we need clean energy storage alternatives**. And that is where hydrogen comes in.

The lightest molecule in the world, a versatile, clean, and safe energy carrier that can be **used as feedstock for power**, hydrogen is a key enabler of the energy transition that enables decarbonization of the most difficult to decarbonize sectors, including transportation, industrial processes and heat and power. It can be stored and transported at high energy density in liquid or gas form. It can power fuel cells to generate electricity with heat and water as the only by-products.



For a bit more background, we invite you to play this video [“How Hydrogen Fuel Cells Work”].



While most of the hydrogen in use today is derived from natural gas and as such is not carbon-free, hydrogen can be produced from renewable electricity with zero emissions at point of use.

The world is investing in the hydrogen economy to increase availability and reduce costs. Substantial investments are being made to expand and reduce the costs of producing green hydrogen, mainly via electrolysis which is today still complex and costly.

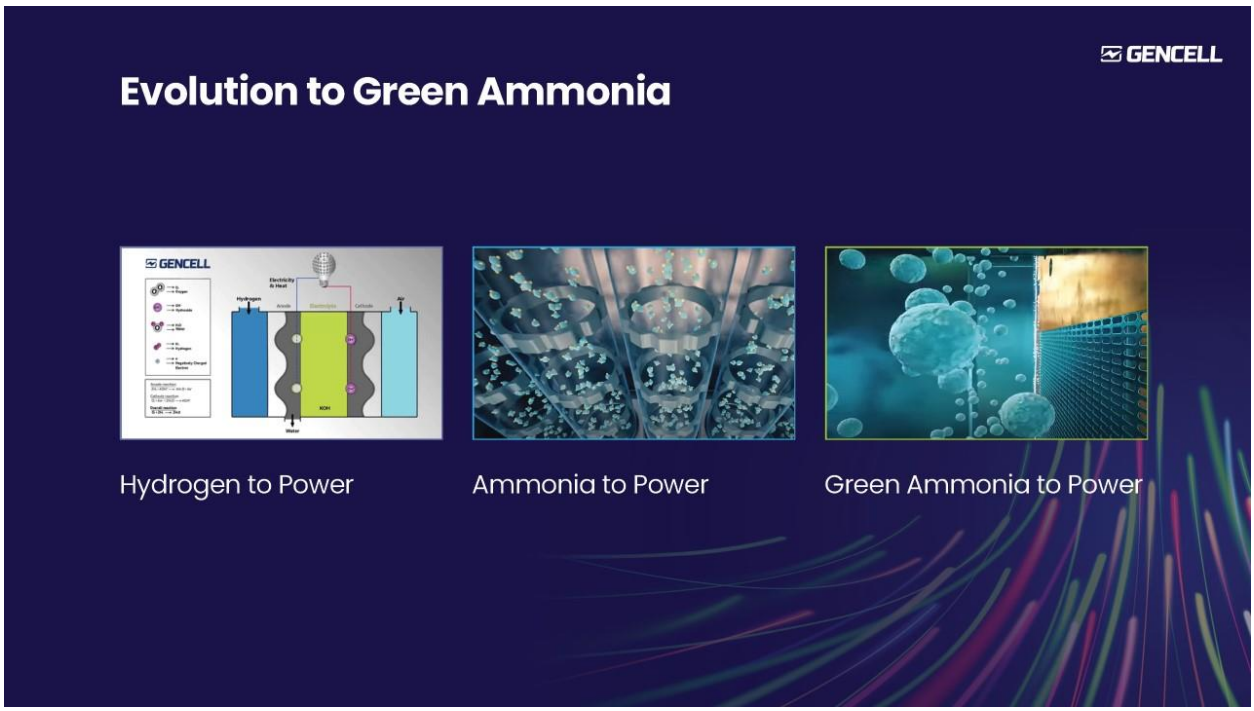
Telecom providers are considering hydrogen and fuel cells to run network operations and edge computing scenarios as well as for powering towers and base stations.

While hydrogen has many positive benefits, at the same time it poses many limitations. Industrial hydrogen is not carbon-free, green hydrogen is expensive to produce and all hydrogen is complex and expensive to transport and store.

To overcome these challenges and still take advantage of hydrogen's values, ammonia makes an **excellent alternative source and carrier of hydrogen. Ammonia** is energy dense and is economical and easier to transport and store than pure hydrogen.

Ammonia is the second most widely produced inorganic chemical that can be found all over the world. Using a revolutionary process to extract hydrogen from liquid ammonia (NH3), – without requiring any grid power, the ammonia-to-power solution acts as a **“nano power plant”** that operates fully independently to create power wherever needed.

To see an example of how Ammonia to Power can work, play the video: Ammonia the Next Big Thing in Energy Production.



But as the world is committed to transitioning to **fully clean well-to-wheel clean energy**, the ammonia to power solution is not a complete answer to the clean energy challenge because its production is not carbon-free.

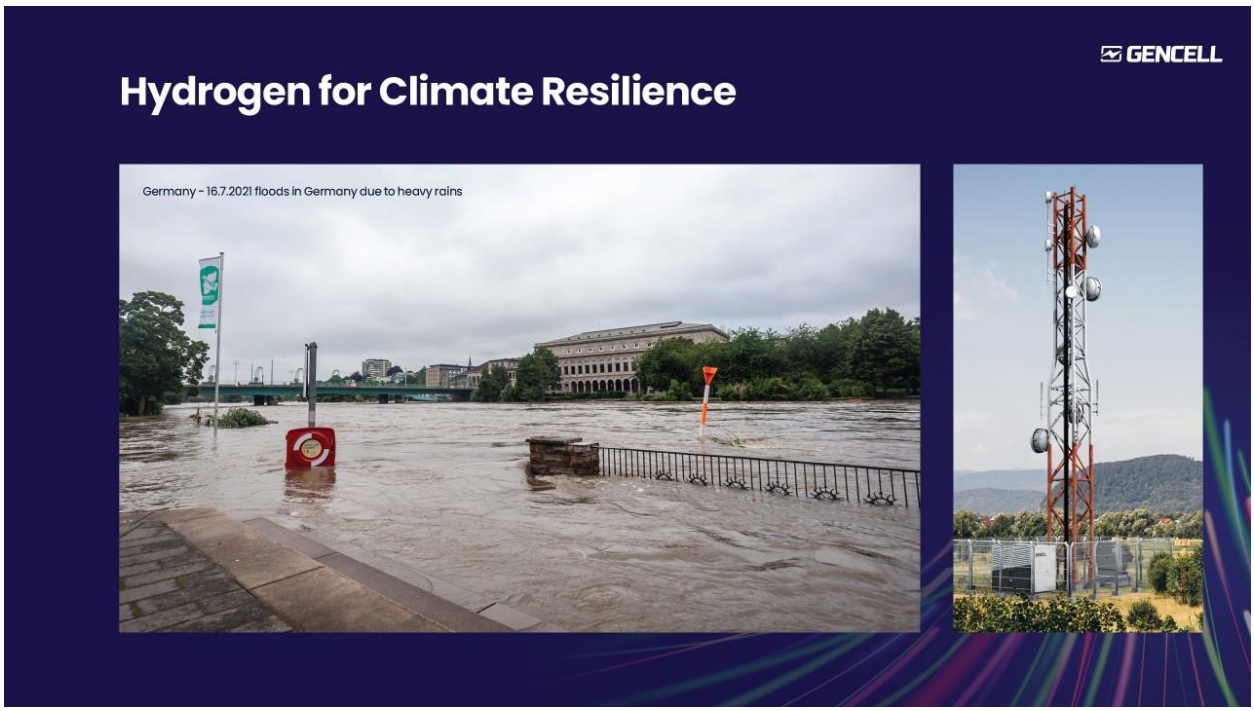
Therefore, we address the issue of how to produce green ammonia fuel at point of use to enable an entirely emission-free process.

To this end we have undertaken a new R&D project we call **Total Green Power Anywhere.**

The new project uses a novel approach to synthesize green ammonia from sun, water, and air – effectively cultivating clean power like grass.

This new approach may sound like science fiction, but it is simply science. Science allows us to produce power from **water, air, and sunshine**. That's all. We don't mean air in the sense of strong wind or big turbines. We don't mean sunshine in the form of giant fields of solar PV panels. Not at all.

In line with the trend of utilities transitioning to distributed energy resources worldwide, these solutions use small and self-reliant units that produce power **on-site** and are fueled by green ammonia fuel produced **on-site**. Together the equipment runs as an independent, **well-to-wheel climate-resilient green circular economy**.



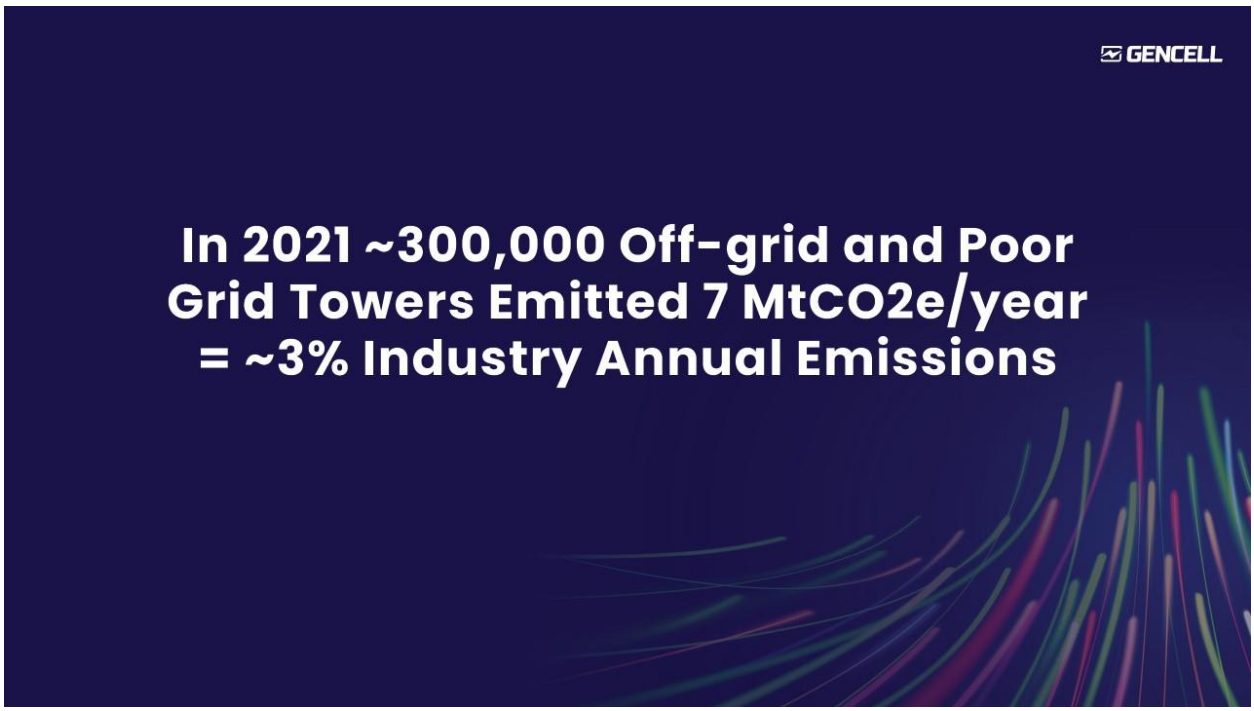
In his keynote at the Telecom TV Green Network Summit in January, Deutsche Telekom SVP Group Technology Innovation and Chairman of the Board of the NGMN Alliance Arash Ashouriha illustrated the impact of climate change on DT's business when flash floods in Germany caused damage to thousands of DT's fixed and mobile sites.

The lesson he shared with the audience – **we must act NOW! And we must act TOGETHER – with the whole industry, with our entire supply chain… To achieve NET ZERO – we must use Every Clean Technology available.**

Therefore, going forward, when constructing telecom sites, zero-emission backup power is a prerequisite.

Fuel Cell solutions help to bridge between the need for continuous connectivity to drive digitization and the need for resilient green power to withstand extreme weather conditions caused by climate crisis.

After all, what is the most crucial need during weather-related disasters? **Emergency Response** – **Emergency Response based on Critical Communications – critical communications that rely on continuous connectivity.**



According to the GSMA, 88% of the off-grid and bad-grid towers in operation in 2021 – **over 300 thousand towers** - are still running on diesel generators – these towers emit almost **7 million metric tons** of CO2 per year – **equal to some 3%** of the industry's annual emissions. Renewable energy solutions could eliminate these emissions.

Fuel cells offer these towers a reliable, resilient, and stable source of power that can withstand severe weather conditions.

So, we see that as the telecom industry expands 5G and moves to 6G and beyond, ensuring zero-emission power to drive network equipment has become a fundamental requirement.

In conclusion, ***to bridge the gap between the need for continuous connectivity to drive digitization, the need to connect the unconnected and the need to protect our environment from climate change*** - the telecom industry must continue to adopt every green technology available – including hydrogen and ammonia fuel cells - to maximize resilience, say NO to diesel, drive green power for towers and going forward – to deliver total green power anywhere.

Thank you.

For more information, visit us at gencellenergy.com.