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**Empower
Energy
Evolution**

Ever since humans harnessed fire, energy has been evolving. Initially this happened very slowly, but the more recent pace has been breathtakingly swift. At the same time, energy generation technology has moved away from carbon, resource extraction and subordinate environmental protection, and towards decarbonization, resource conservation and proactive environmental stewardship.

Although only 25 percent of global CO₂ emissions are related to power-generation activities, Uniper's expertise and customer closeness can help other sectors – like the steel, chemical and road mobility industries – take dramatic steps on decarbonization.

We will decarbonize Uniper by:

- Steadily evolving our business portfolio. This includes delivering our coal-exit plans; expanding our gas activities to cope with Europe's increasing import demands; and scaling our existing hydrogen pilot cases, which were the first of their kind in Germany and some of the first in Europe. We will expand or maintain our hydro and nuclear power plants, and introduce new CO₂-efficient revenue streams without abandoning our core businesses
- Making 1.2 billion euros available over the next three years for investing in low-emissions new growth
- Only approving projects that create financial value for the company, are part of our core business, and contribute to reducing CO₂ emissions.

This strategy will not only ensure Uniper reaches **carbon neutrality in Europe by 2035** – ahead of EU Commission plans for reaching a carbon neutral Europe – but it will also help other companies in carbon-intensive sectors achieve their carbon reduction targets. It will also enable renewable energy companies to prosper as they deal with the new reality of a subsidies-free business environment.

We aim to tell it like it is. For too long, the energy sector has been seen as a faceless entity that is perpetuating climate change. But Uniper comprises innovators, skilled workers and engineers who understand that sustainable and effective change takes time. We will actively promote change by being transparent and sharing insights from our people, putting a face to our innovation and making our work tangible.

Uniper is in a unique position to promote credible and sustainable change

Climate awareness has never been higher and decarbonization has moved to the top of the public and political agenda.

However:

- Between now and 2040, global population and energy demand are expected to increase by roughly a quarter
- The electricity used for transport will more than quadruple
- Electricity generation is forecast to increase by more than half
- Global gas demand will increase by almost 40 percent

In the face of relentless population and energy-demand growth, producing more energy while achieving the meaningful emission reductions that the world needs will require pragmatism and a willingness to promote evolution.

In short, making the world greener requires what companies like Uniper offer:

- The right assets, infrastructure, and technologies to help make carbon neutrality a reality
- The right people. Their industry-leading experience, expertise, and innovativeness are crucial to our ability to make decisive strides in energy efficiency and decarbonization
- The right ideas. Building even more wind and solar farms won't do much to decarbonize big-emitting industries like chemicals and heavy road, marine, and air transport. Enabling these industries to evolve will require a massive increase in the availability of synthetic, carbon-neutral fuels and chemicals.

Uniper combines visionary thinking and relentless optimism with a grounded mindset, which is what will achieve meaningful carbon savings and safeguard our planet.

The energy system's decarbonization deadlock and how to break it

The green energy paradox

Limiting the rise in global temperatures to well below two degrees Celsius is one of humanity's most urgent challenges. Governments' main response to climate change has been to subsidize green energy sources (like wind and solar) and penalize grey ones (like coal). Combined with the economic sense of energy generation activities, this response has been a success: renewables now provide about 19 percent of Europe's energy, 14 percent of North America's, and 14 percent of China's. These percentages are expected to grow steadily but, given its intermittency, renewables providing 100 percent of these markets' energy is not possible.

The fastest way to achieve deep carbon savings in the energy sector is to complement renewable energy sources with gas-fired assets, the cleanest-burning fossil fuel with the lowest carbon-abatement costs, while developing hydrogen technology. The latter can fuel existing gas turbines, be stored and transported using the current gas infrastructure in the future.

Despite these laudable achievements, however, global carbon emissions keep increasing and show no sign of abating, partly because only 25 percent of global emissions come from energy generation:

- Many growing sectors of the economy—like chemicals, transport and heating—continue to rely predominantly on fossil fuels. As these sectors grow, so do their carbon emissions
- Their reliance on carbon won't change. Many essential chemicals can't be made without it and big emitters in the transport sector – such as jet airplanes, heavy trucks, and ships – currently have no viable alternatives to fossil fuels.

Many of the technologies developed by Uniper – such as hydrogen (Uniper was one of the first companies to develop hydrogen production, storage and transportation), synthetic fuels, carbon capture, LNG filling stations and energy efficiency solutions – can be applied to helping decarbonize other industries as well. Climate neutral fuels come primarily from green hydrogen produced with renewable power and from carbon dioxide captured through power generation and industrial processes.

Concerted action, visionary policies, massive investment

These processes will require the concerted action of key players: the energy sector, heavy industry, transport, technology companies, policymakers, governments and NGOs. And, just as importantly, it will require far-sighted policy and regulatory changes – along with trillions of euros of investment – to scale up the necessary technologies and infrastructure.

Uniper is best placed to facilitate this concerted action. If the key players work together and share expertise, we are much more likely to find solutions on a scale necessary to meet the world's growing global energy needs while safeguarding the planet for future generations.

Uniper's role in the energy evolution

Uniper's assets, people, and ideas have the potential to empower energy's evolution toward carbon neutrality in six crucial areas:

1. Coal phaseout and decarbonization
2. Conversion to gas
3. Renewables
4. Innovation
5. Energy efficiency
6. Upskilling people

1. Coal phaseout and decarbonization

In January 2020, Uniper put forward an ambitious timeline to exit coal-fired power generation in Germany:

- We'll close about 1.5 GW of capacity by year-end 2022 and intend to submit another 1.4 GW to the federal government's shutdown scheme by 2026
- Including previous closures, this will yield total carbon savings of up to 18 million metric tons per year, the equivalent of 20,000 jumbo jets flying roundtrip between Frankfurt and Sydney.

After careful consideration, the German federal government, came to a decision regarding the Uniper coal plant Datteln 4 and its role in enabling faster decarbonization:

- Datteln 4 is dramatically more efficient than older coal-fired power plants. When cogenerating heat for 100,000 households in the region it will have a fuel efficiency of about nearly 60 percent, similar to that of a gas turbine
- Datteln 4 will be a high-tech paradox: a clean coal-fired power plant. With the existence of Datteln 4 we will be able to reduce our carbon emissions in Germany by 40 percent reduction by the end of 2025.

Roughly two-thirds of our total electricity and heat output already comes from low-emission hydro, nuclear and gas-fired assets. As we close coal-fired plants, this proportion will increase and our carbon intensity will decrease, bringing us steadily closer to our ultimate goal of carbon neutrality.

The coal exit in Germany won't leave behind industrial blight. Some coal-fired assets, such as Scholven power station in west-central Germany, will be converted to gas:

- At Scholven, two state-of-the-art gas turbines will supplement and replace the existing coal-fired plant
- Other decommissioned plants could be transformed into energy hubs with critical infrastructure for tomorrow's economy.

2. Conversion to gas

Gas – the cleanest fossil fuel – has a unique ability to deliver deep and rapid emissions reductions across many sectors:

- Gas is the fastest way to decarbonize the power industry. On average, gas-fired power plants emit just 350g of carbon per kwh compared with more than 700g for coal in modern plants
- Shifting from coal and petroleum products to gas will rapidly reduce emissions in heavy industry, space heating, and transport. Multi-sector conversion to gas is the fastest and cheapest way for Europe to reduce its carbon emissions by up to 65 percent in the next two decades
- Gas will also serve as a vital emissions-reducing technology today while transformative innovations like synthetic fuels are developed and scaled up.

As one of the largest gas traders in the world, Uniper is ideally placed to play a leading role in gas conversion:

- In 2018, we procured some 38 billion cubic meters (bcm) of gas under long-term contracts, enough to heat approximately 22 million single-family homes (based on average consumption in Germany)
- From 2022, the LNG storage and regasification unit Uniper plans to build in northwest Germany will be able to send out roughly 10 bcm of gas per year. This important asset will further diversify Europe's supply of low-carbon gas
- Uniper is Europe's fourth-biggest gas storage company, with a total of more than 8 bcm of underground storage capacity in Germany, Austria, and the United Kingdom. As the conversion to gas leads to continual increases in gas consumption, these facilities will become even more essential for ensuring a reliable supply.

3. Renewables

In addition to hydroelectricity, which accounts for approximately 13 percent of our installed generating capacity in Europe, Uniper is active in the renewables sector. Our engineering and project-planning expertise has been instrumental in enabling other companies to add more than 6 GW of wind capacity.

Going forward, we will:

- Continue to help propel renewables growth with our engineering and commercial capabilities by investing significantly in power purchase agreements (PPAs). This will provide solar and wind energy developers with the financing they need, as well as access to energy markets
- Make significant strategic investments in renewables programs and develop new business models in specific regions and technologies.

4. Innovationen

Today, almost all hydrogen is produced with fossil fuels. Displacing this with green hydrogen produced by renewables-powered electrolysis equipment – a technology known as power-to-gas (P2G) – would dramatically reduce the hydrogen industry's carbon emissions.

- P2G would make it possible to avoid 90 percent of the greenhouse gases emitted by the conventional production of hydrogen
- Green hydrogen can be used in fuel cells to power cars, locomotives, and ships. Because fuel cells only emit water, not CO₂, this would make transportation dramatically climate-friendlier
- Combined with captured CO₂, green hydrogen can produce climate-neutral chemicals and synthetic fuels, such as synthetic diesel and synthetic aircraft fuel
- Uniper already operates two small P2G plants that run on wind power and will soon start building an industrial-scale green-hydrogen plant and underground storage facility.

Carbon recycling involves transforming CO₂ into a valuable green resource. It could permanently bind large amounts of CO₂ in building materials and other products, preventing it from entering the earth's atmosphere.

For our own plants, we're identifying neighboring companies that need CO₂ for their production processes. We're also actively engaged in developing our carbon recycling businesses and partnering with other companies to create a global carbon recycling industry. The potential for reducing net carbon emissions in this way is huge.

5. Energy efficiency

Energy efficiency is decarbonization's low-hanging fruit. Uniper helps power generators and industrial enterprises harvest this fruit – for their own benefit and the planet's. We do this with our deep expertise across the entire asset lifecycle and our vast storehouse of knowledge and expertise.

- We know how to build, run and maintain power plants safely, as well as how to raise their efficiency, reduce their emissions and convert them to burn carbon-neutral fuels like biomass
- We use this knowledge and expertise to help other companies systematically improve their energy efficiency and climate performance
- Our individually tailored solutions may include other energy services – like conversion to hydrogen or renewable power-purchase agreements/guarantees of origin – that make a customer's energy use even more sustainable.

6. Upskilling people

The evolution of Uniper and the energy sector cannot happen without upskilling those that develop and execute that change: our people. We take training incredibly seriously and, at Uniper's Ratcliffe Academy in the UK, many colleagues are trained to work with and operate modern technologies that will help shrink our carbon footprint.

In Ratcliffe alone, Uniper ran 600 courses in 2019, training 4,000 employees and recruiting and training 80 new apprentices for the organization.

