

GLOBAL REPORT

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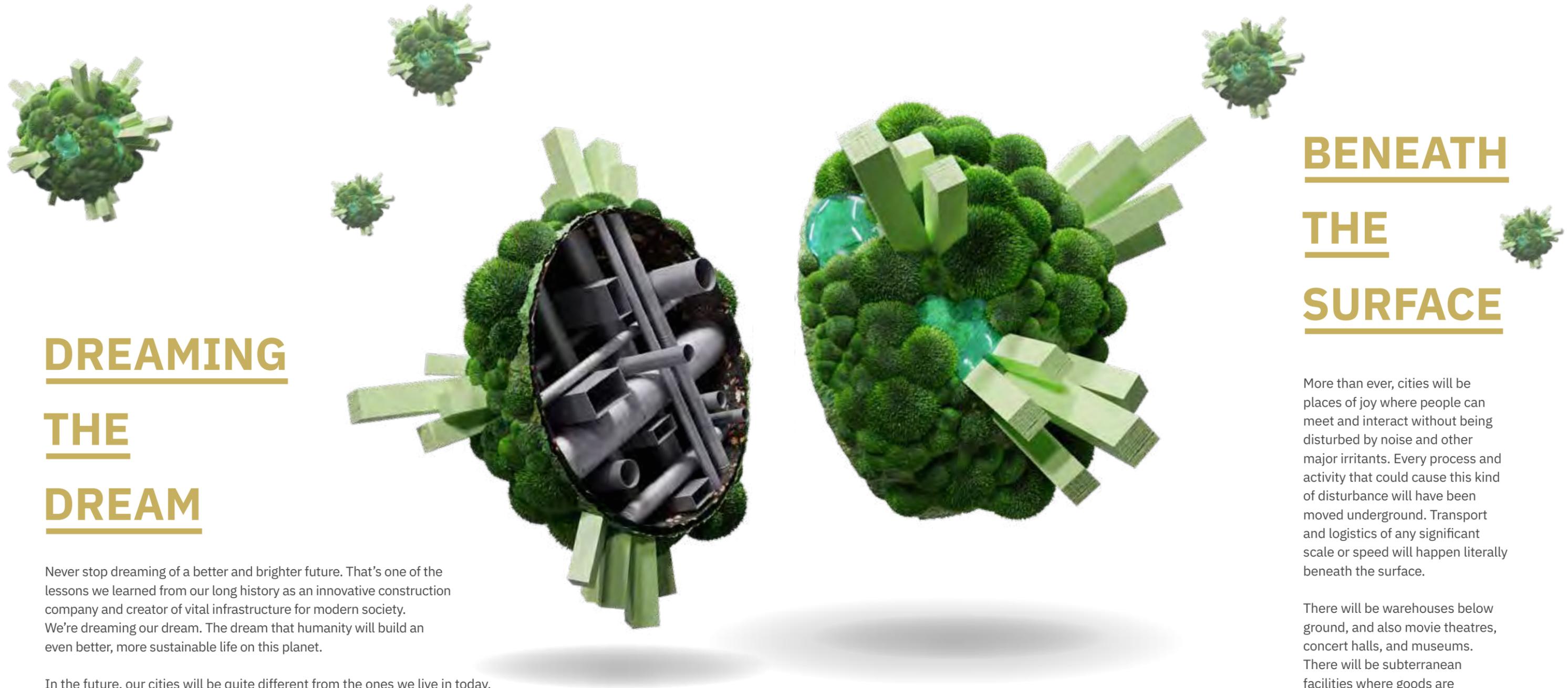
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DOING

THE

DREAM





DREAMING THE DREAM

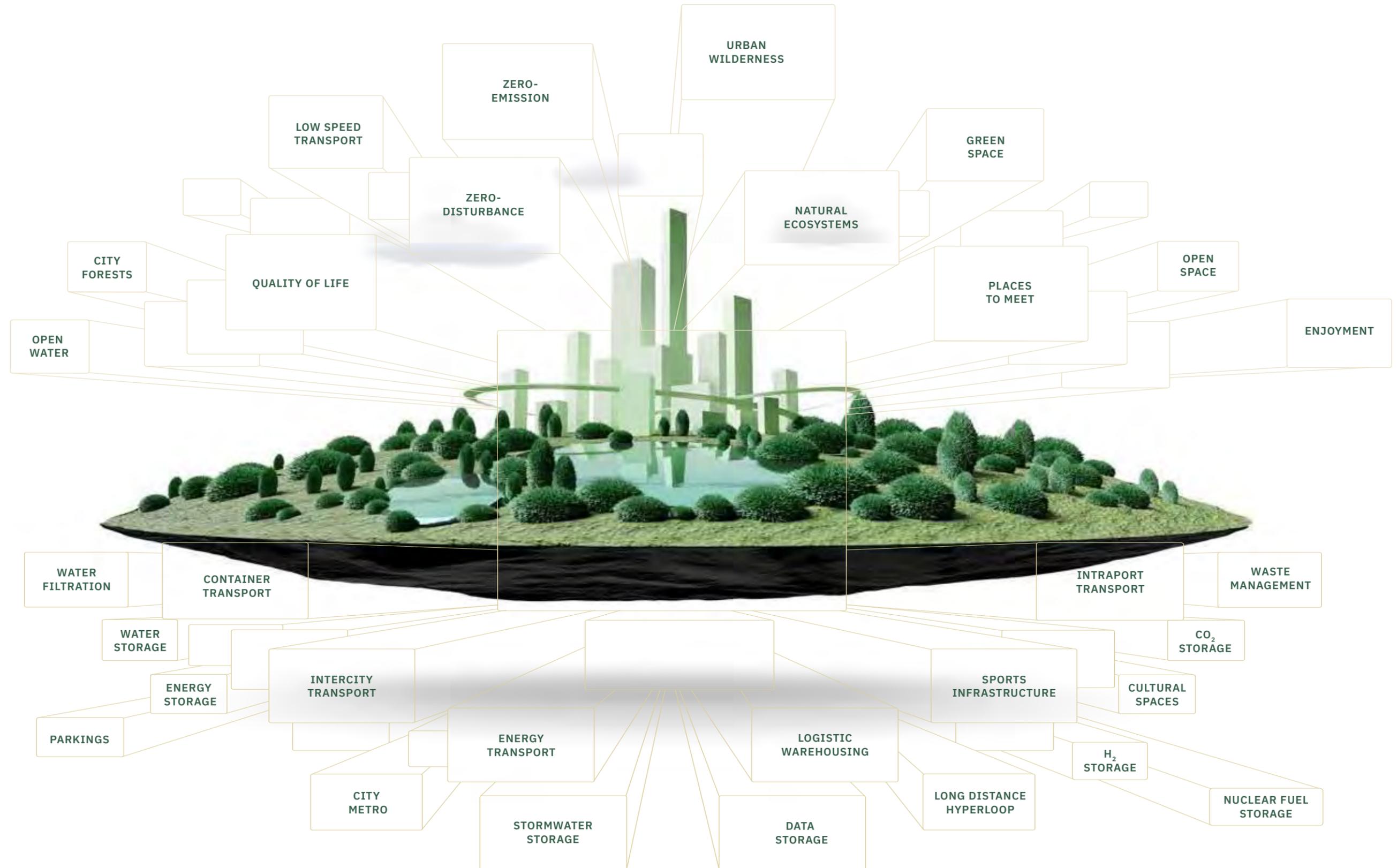
Never stop dreaming of a better and brighter future. That's one of the lessons we learned from our long history as an innovative construction company and creator of vital infrastructure for modern society. We're dreaming our dream. The dream that humanity will build an even better, more sustainable life on this planet.

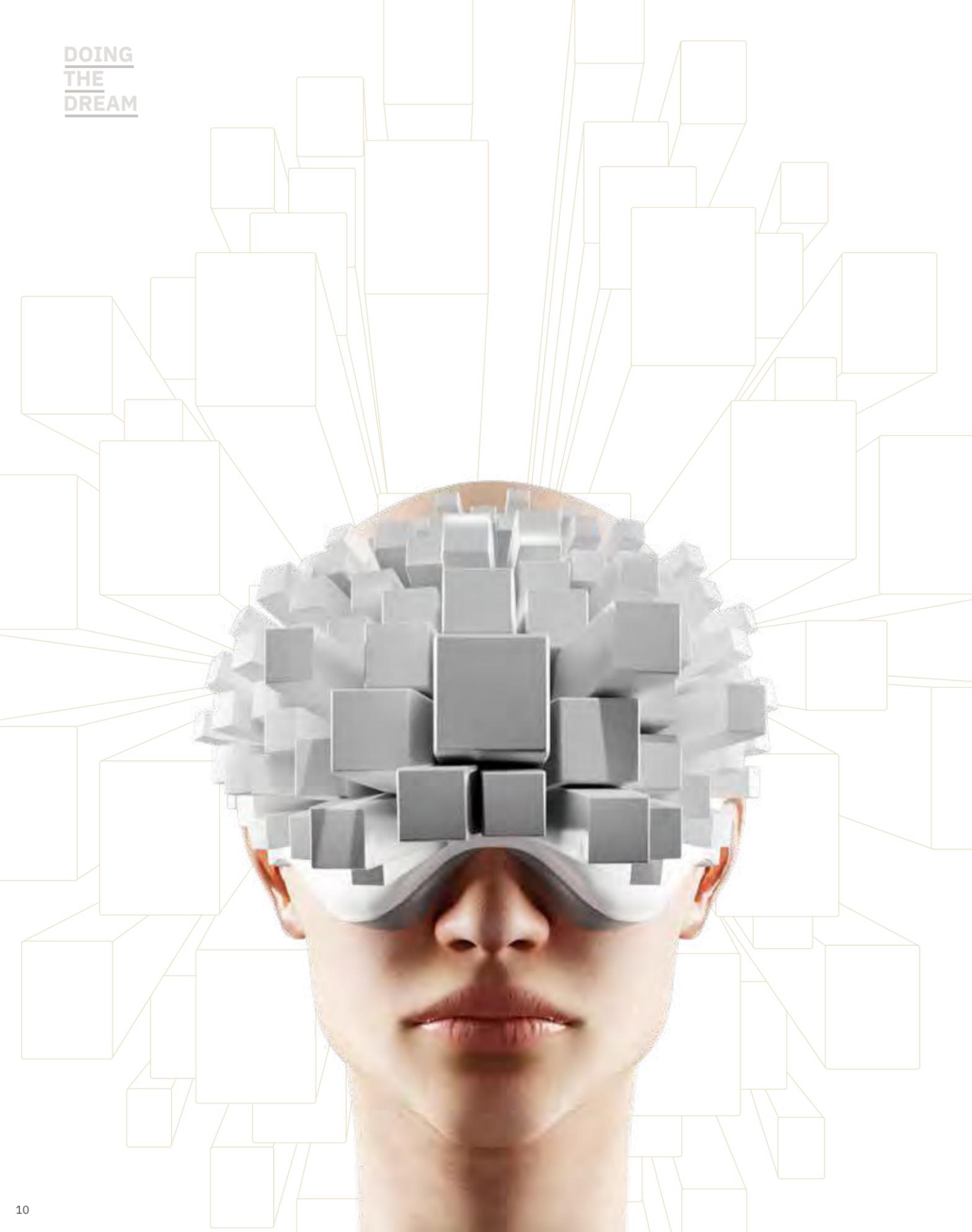
In the future, our cities will be quite different from the ones we live in today. There will be small cities and big cities, but all of them will have plenty of open space. There will be trees and open water with flora and fauna flourishing throughout the city, and not only in specially reserved areas.

BENEATH THE SURFACE

More than ever, cities will be places of joy where people can meet and interact without being disturbed by noise and other major irritants. Every process and activity that could cause this kind of disturbance will have been moved underground. Transport and logistics of any significant scale or speed will happen literally beneath the surface.

There will be warehouses below ground, and also movie theatres, concert halls, and museums. There will be subterranean facilities where goods are produced, recycled, and stored. Energy and water will be stored below ground too.

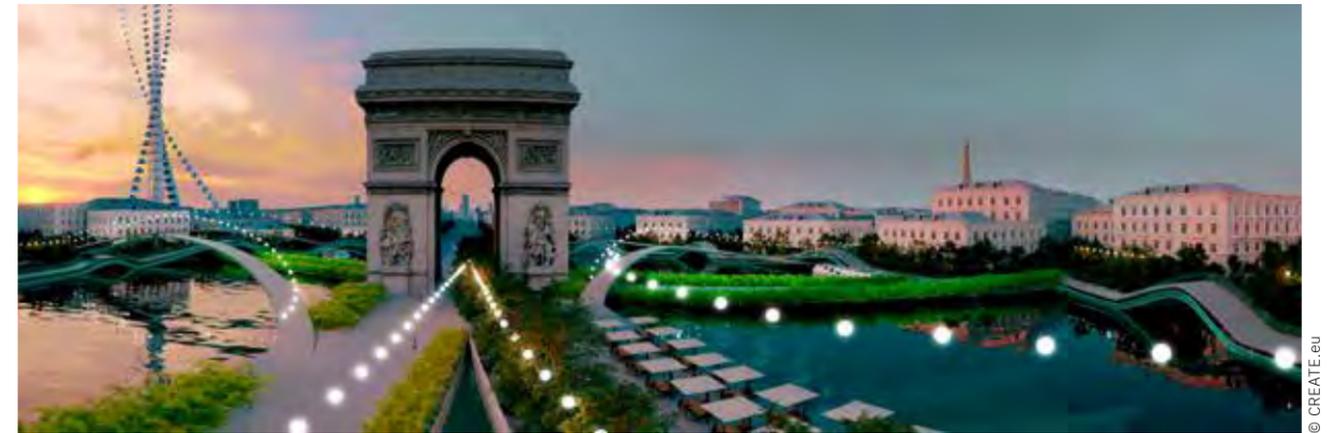




LOW SPEED

LOW ENERGY

ZERO DISTURBANCE



There will be no more cars, trucks, buses, or any traffic of significant speed in the streets. Public space above ground will be reserved for people resting, walking, cycling, or travelling using novel low-speed, low-energy, zero-emission, and zero-disturbance transportation. Free public transportation such as hop-on-hop-off conveyances or capsules will be commonplace. Need to travel more than 500 metres? There will be many high-quality, high-speed, sustainable options for everyone, below ground.

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WHAT REALLY MATTERS

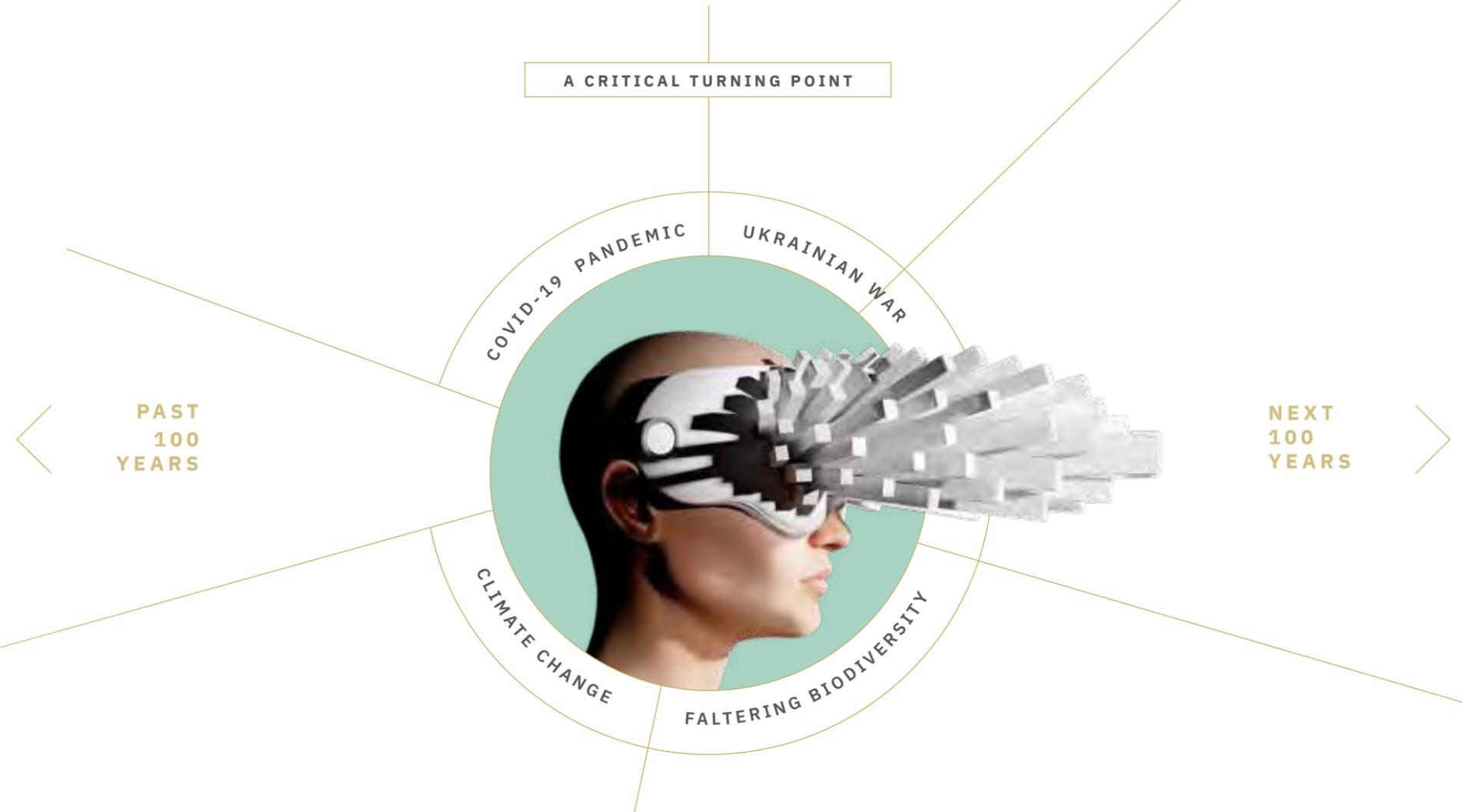
And here's the thing. If the quality of life is to keep improving, it won't be because of TikTok, 5G, Elden Ring, or the likes of ChatGPT. In his excellent 2022 book *How the World Really Works*, Professor Vaclav Smil kindly reminds us that 'we could have an accomplished and reasonably affluent civilization that provides plenty of food, material comforts, and access to education and health care, without any semiconductors, microchips, or personal computers.'

The things that really matter are the fundamental pillars of our civilization: healthful food, comfortable housing, and reliable infrastructure. These are the foundations that the world needs so that we can lead a good life, enjoy high-quality education, connect with each other physically and emotionally, and dream of what tomorrow can bring. These are the vital ingredients of our civilization.

The new reality calls for action

Denys has been helping to provide some of these vital ingredients for precisely 100 years now, and we're committed to doing so for at least another 100. Some might say that our centenary and our ambitions are overshadowed by the recent series of troubling events. Yes, a pandemic has raged through our lives and our economy, the world is facing the global crises of climate change and faltering biodiversity, and there's a brutal war being fought on European soil. All of this severely impacts what we do and how we should do it.

But that doesn't mean we're going to stop dreaming of a better life. Some authors have argued that humanity should take a step back and stop manipulating the planet, whatever that may mean. Really? How could the future of humanity depend on an unwillingness to act? We believe that our duty is to act, which undoubtedly will involve 'a mixture of progress and setbacks, of seemingly insurmountable difficulties and near-miraculous advances,' as Vaclav Smil concludes in his book.



World map of CO₂ emissions



This world map highlights the areas where CO₂ emissions take place. Such emissions result in climate change, one of the major events impacting what we do and how we should do it.

Source: https://edgar.jrc.ec.europa.eu/dataset_ghg60

The number one priority above everything else

When talking about the fundamental pillars, it's clear that creating and maintaining these pillars will need energy - a lot of it - and it's going to be energy of non-fossil origin. In this context, it is quite remarkable that the authorities and investors in every sector suddenly agree about the number one priority for our world civilization: to provide sufficient clean energy in the face of climate change, biodiversity loss, geopolitical turmoil, and irrational human behaviour.

Energy markets are undergoing fundamental change, the energy transition has suddenly shifted into top gear. In every sector, innovative solutions are being tested and implemented at an unprecedented rate.

SHAPING THE FUTURE TODAY

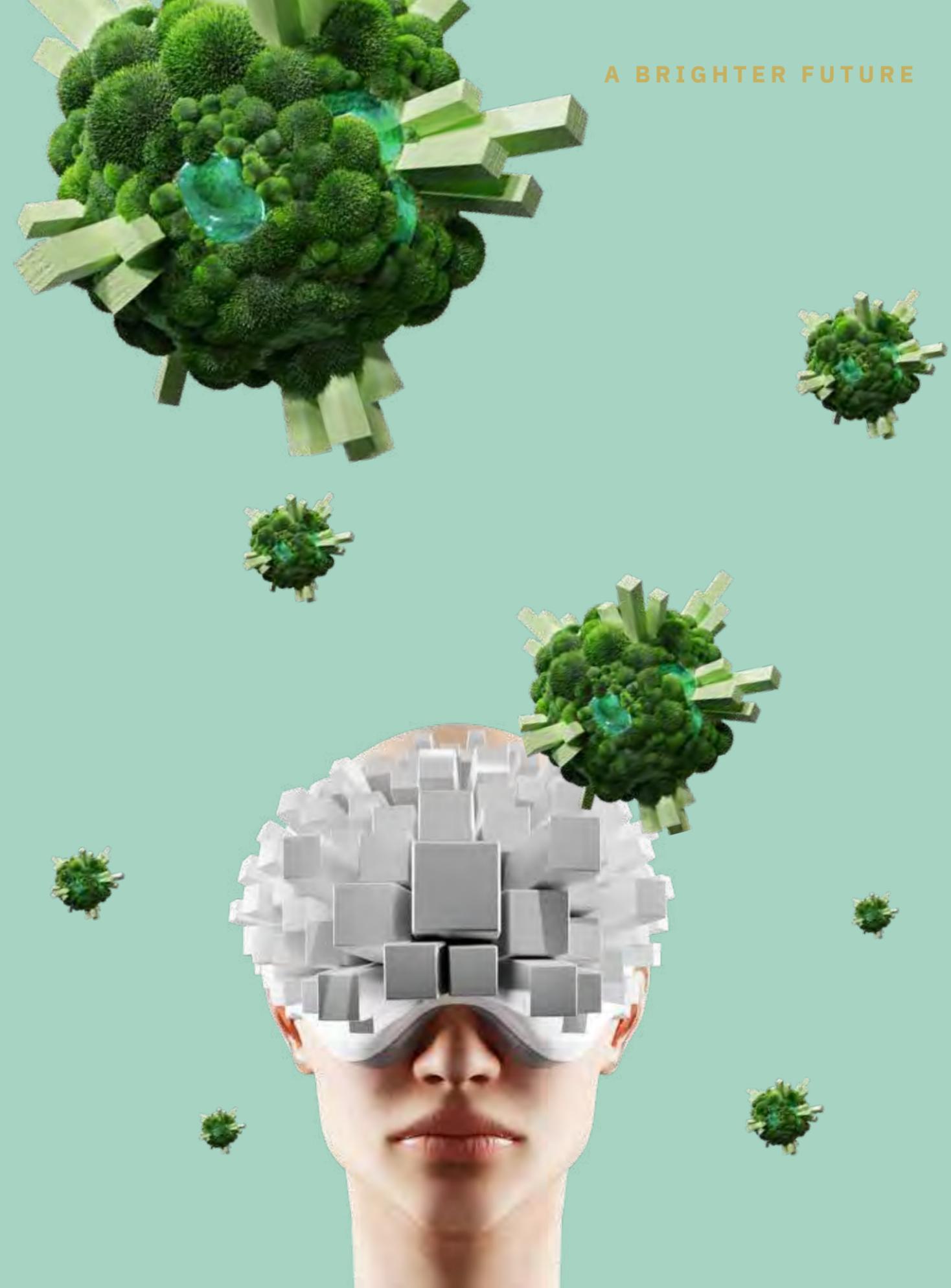
The future of humanity depends on our willingness to act.
If we care about this future, more ingenuity is needed, not less.

And that's what we're going to do in the next 100 years. We're set for a journey with even greater engineering ingenuity in harmony with the planet. A journey requiring even more potent entrepreneurship and decisive attitudes. A journey in which all of us will seek new ways of harnessing clean energy for the cause.

We're shaping this journey today. We have a reputation to live up to. We're a company that doesn't stop when it gets hot. We're doing the dream.



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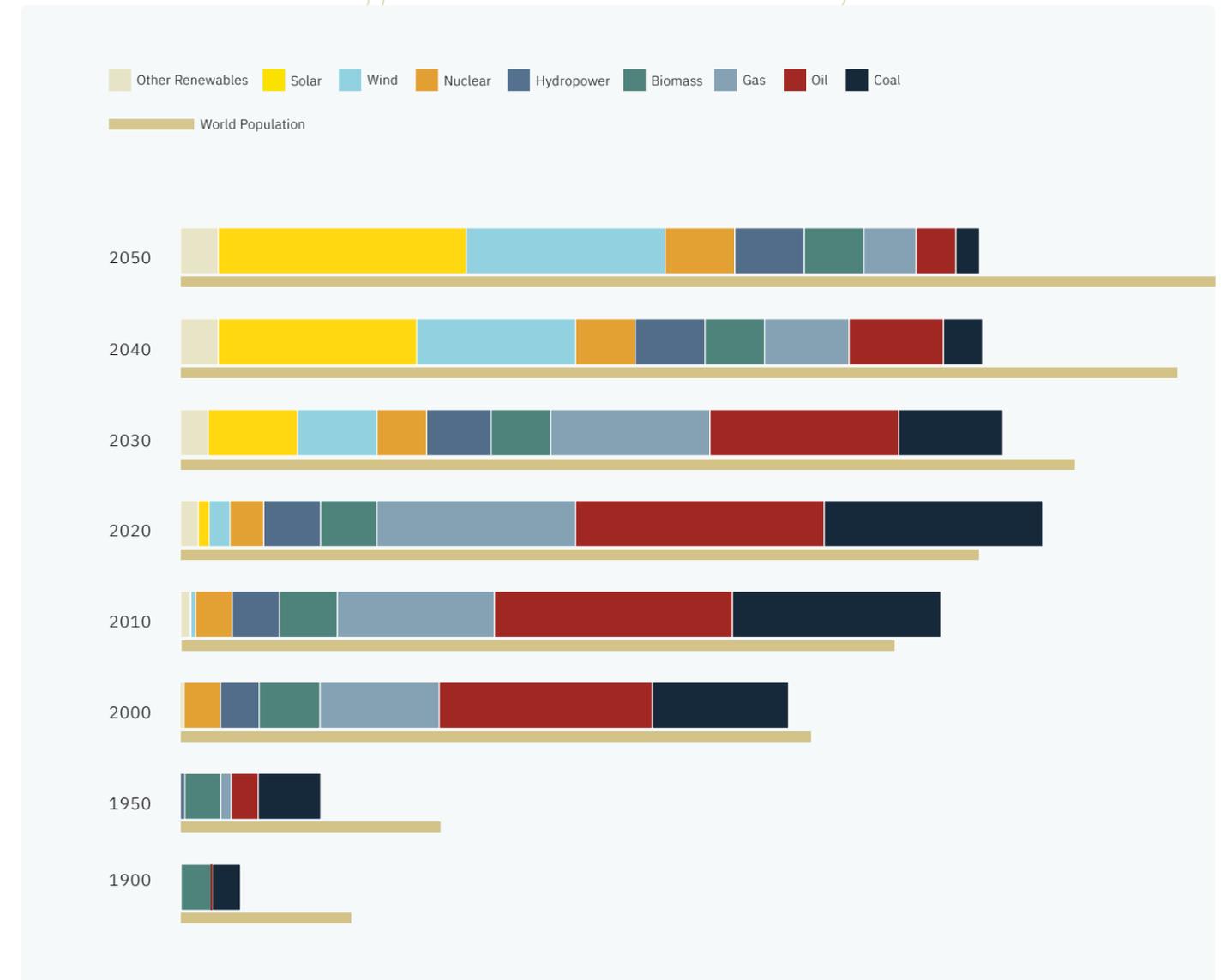


FUELING HUMANITY'S JOURNEY

Here's the challenge: where will humanity find sufficient clean energy to fuel all human activity in the future? The world's total primary energy supply is a little under 170,000 TWh according to the International Energy Agency (IEA). Driven by population growth, economic development, and the increasing adoption of energy-intensive technologies, global demand for energy is not expected to decrease significantly except in the most optimistic sustainable development scenario.

'It is difficult to make predictions, especially about the future,' goes the old Danish proverb sometimes attributed to Niels Bohr. But, based on the investment projects currently being launched in Europe and the rest of the world, it seems safe to say that leading roles will be set aside for electricity, hydrogen, carbon-dioxide, and water.

History and forecast of the world energy mix and global population 1900-2050



In the sustainable development scenario, energy demand will decrease despite further population growth. The share of zero-emission energy will increase to above 85% by 2050, and nuclear energy will be crucial to make ends meet.

Source energy mix: ourworldindata.org & IEA - Energy scenarios 2030-2040-2050 based on a sustainable development scenario
Source world population: European Environment Agency (projected world population based on a constant fertility scenario)

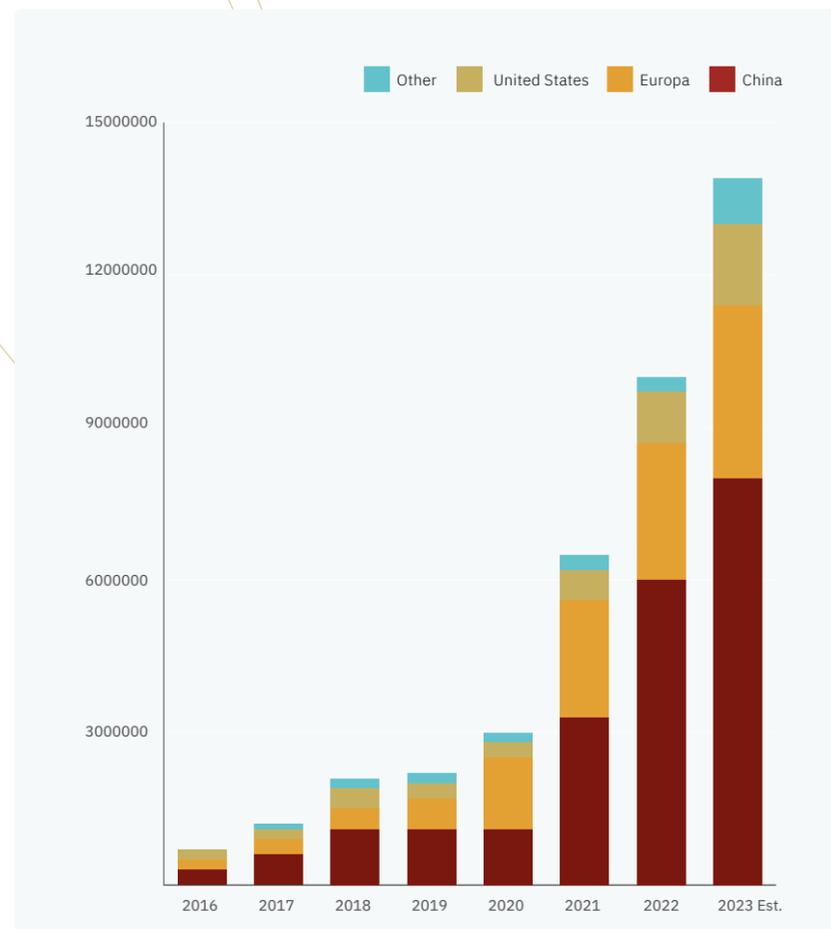
ELECTRONS FLOATING THROUGH COPPER CABLES

Electricity is already a clear winner and will become even more important. Phasing out fossil fuels means that processes that can be electrified will be electrified. This is happening in every sector. While the combustion engine is not dead and buried, electric cars will become the norm. Today, at least 1 in 8 new cars in the EU is an EV, and this figure is bound to increase rapidly. Public transport is electrifying too. And there's the boom in electric bicycles and scooters.

The heating and cooling of air, water, and steam is also electrifying. The technological options are well-developed in the buildings sector and heat pumps have become the most common heating technology in new-build houses.

In industry, electrification is occurring mainly in the lower-temperature heat segments. But even heavy industries are electrifying some of their processes. Some steel manufacturing sites, for example, are swapping out their traditional coal-fired blast furnaces for equipment producing direct reduced iron (DRI) and treating it in electric arc furnaces.

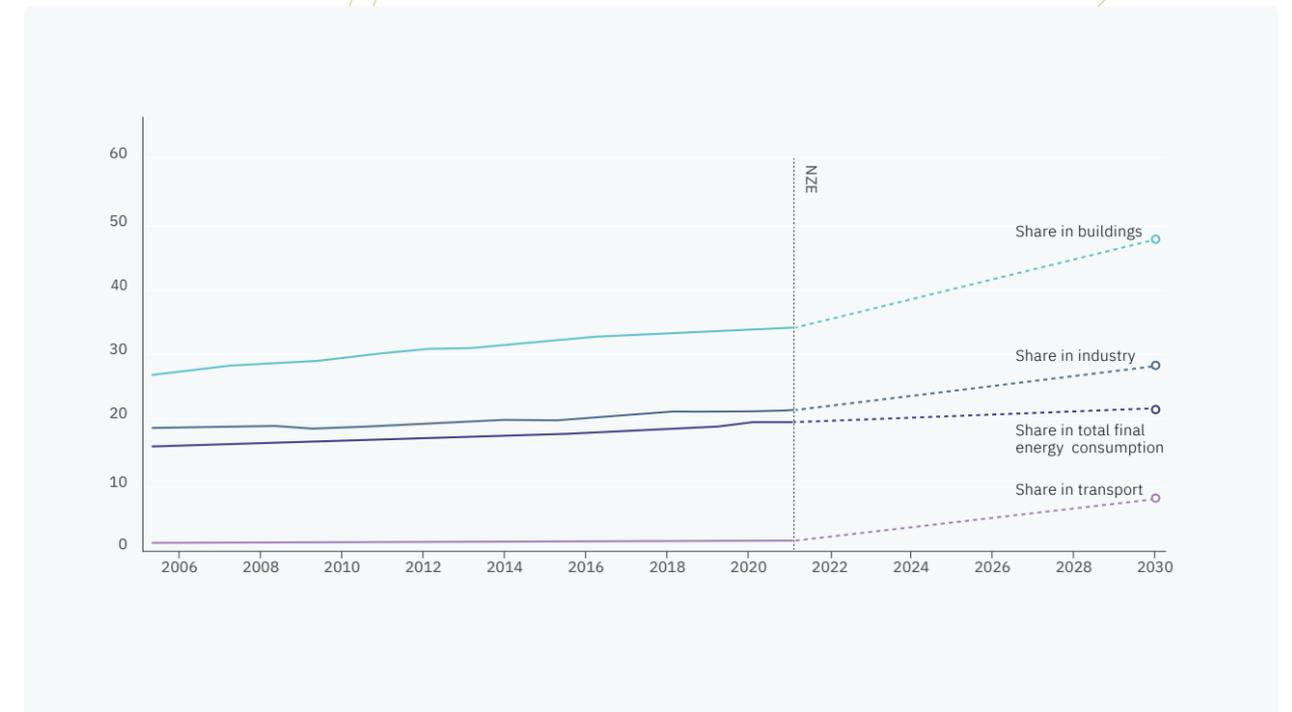
Electric vehicle sales 2016-2021



Global EV sales doubled in 2021 to 6.6M units with China leading the change in absolute numbers. Norway even wants all new car sales to be zero emission by 2025.

Source: IEA analysis based on EV volumes

Share of electricity in total final energy consumption 2005-2030



The share of electricity in total final energy consumption is expected to increase, especially in buildings, the industry, and transport.

Source: IEA

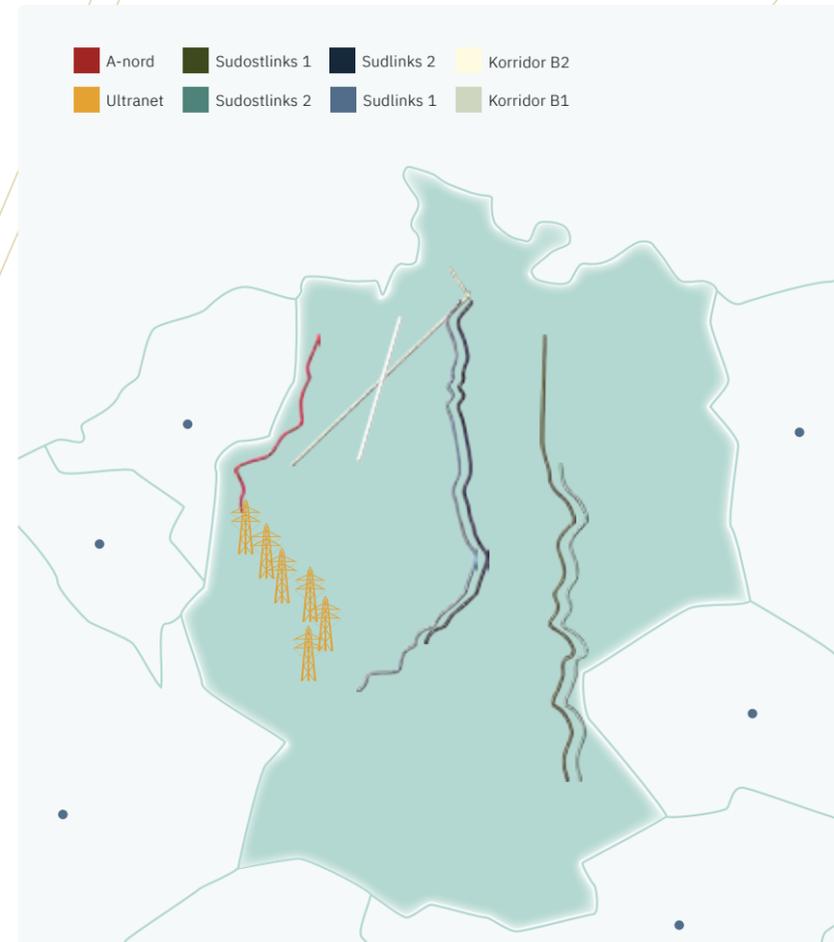
MORE ELECTRICITY, MORE HV CABLES



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Innovative trenchless or small-trench techniques such as E-Power Pipe and Pipe Express allow us to keep the environmental impact of pipeline projects very low.

Massive investment in new HVDC cables in Germany



Eight new HVDC cable systems will be developed over the next years to bring wind power from the north to the south of Germany.

Source: Die Zeit Nr. 17/2022

Electricity production will increase significantly as a consequence. Booming PV and wind power will have to be supplemented by reliable non-fossil baseload power such as hydropower, nuclear power, and biomass. Within the European Union, countries clearly have varying strategies in this respect, with Germany still committed to getting it all done without nuclear power and France basically opting to go in the opposite direction. Expectations are that advances in nuclear fusion will profoundly alter the landscape in the long term, but then we're probably talking 2050 and beyond.

Whatever happens, the growing share of intermittent sources in the power production mix will further increase the need for high-voltage transmission capacity within and between countries.

Denys is doing its share in that area too, having completed a few challenging but successful underground HVDC cable projects in Germany. What's more, our consortium was recently selected to realize almost 2000 km of the new HVDC cables needed in Germany, a scope of work that includes cable design, engineering, delivery, project management, and installation. Talking about being a trusted partner.

Remember our vision of pipes and ducts and transport going underground in the future? It means we clearly advocate putting the bulk of HV cables under the surface, but we understand that authorities will still opt for aboveground solutions in certain circumstances. High-quality construction capacity for both types of cabling will be dearly needed across Europe in the coming years and decades. So, we'll qualify for aboveground cabling too.



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EQUIPMENT GOING ELECTRIC

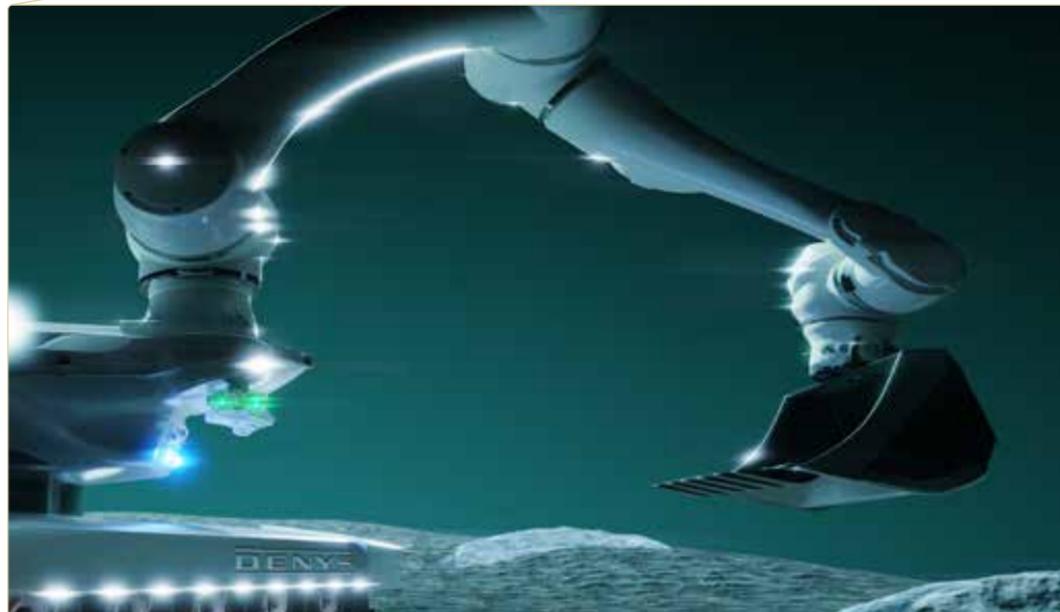


By 2030, we will reduce the CO₂ emissions of our fleet of cars and minivans by 50% compared to 2021.

Our construction sites are connecting to the grid wherever they can. If not, we supplement the generator with a battery and a PV installation. If PV is not possible, we implement Stage V generators to charge the batteries.

By 2030, 20% of our construction equipment should either be electric or run on sustainable fuels. Battery packs alongside tower cranes will be standard to reduce peak demand. We also expect to use flywheel energy storage wherever it is useful. We're currently testing these kinds of solution in various configurations for short-term storage and peak shaving.

We're also introducing electric construction vehicles and equipment, such as small electric excavators and shovels, and we're achieving good results with them. Processes that do not require a constant supply of energy are excellent candidates for electrification. Our electric bending machine is a good example. We're now looking at all our processes for additional opportunities to electrify.

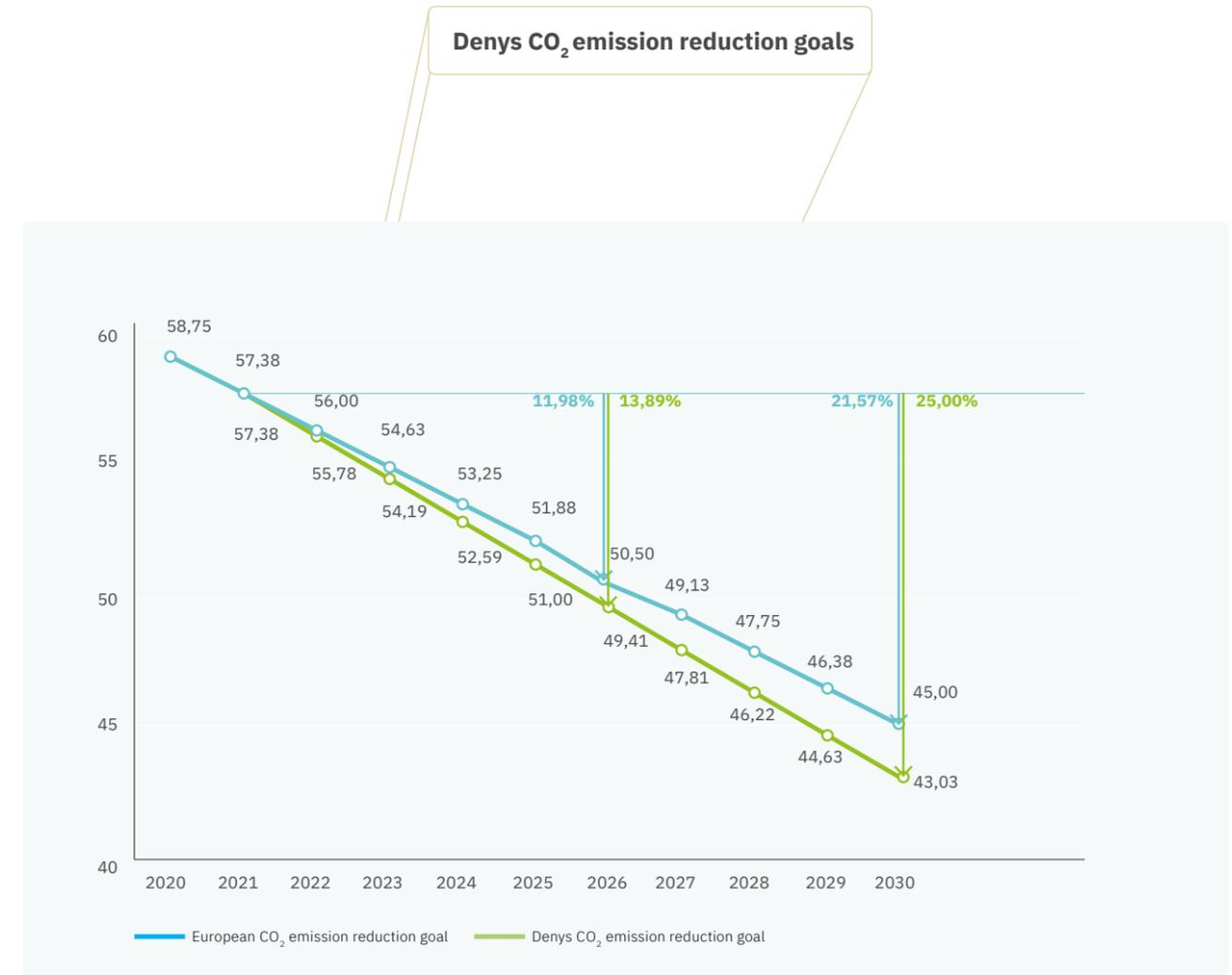


AWARENESS RAISED, AMBITIONS HONED



Changing over to electric equipment requires some changes in attitude because batteries need to be charged in time if work is to be completed according to plan. But hey: shouldn't we all be more conscious about our energy use? There's no good letting diesel generators run for no reason. At Denys, we're constantly raising our people's awareness of energy use, regardless of the type of energy they're using.

What does this all mean in terms of reducing CO₂ emissions? We made a pretty precise calculation of our ambitions towards 2030, where we want to achieve a 25% reduction compared to 2021. This goes a little further than the European target of reducing by 55% since 1990.



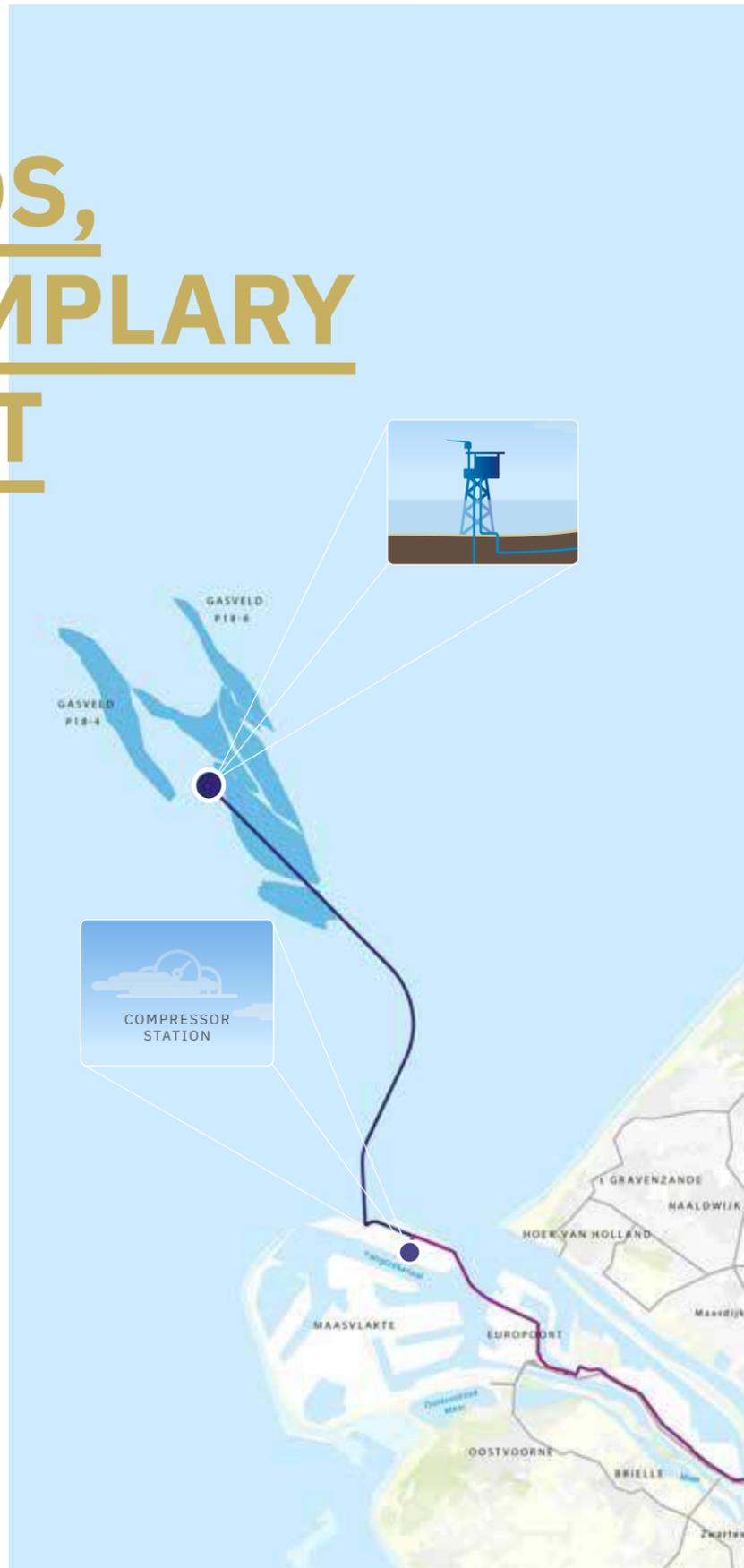
Denys has launched a comprehensive plan to steadily reduce CO₂ emissions by 25% by 2030, doing significantly better than the goal set forward by the EU.

Source: Sustainability department Denys

It will also mean that we take further steps forward in the CO₂ Performance Ladder qualification. We're currently qualified at Level 3 but that accounts for just around 10% of our carbon emissions, the remainder arising from construction materials, transportation, and other Scope 3 sources. We're therefore investing a lot in measuring and acquiring reliable data.

PORTHOS, AN EXEMPLARY PROJECT

There's one project where all our CO₂ reduction and other sustainability efforts come together and that is the Porthos carbon capture and storage (CCS) project in the port of Rotterdam. It's unfortunate that it's been delayed due to court rulings, but we're nevertheless determined to make it our sustainability demonstrator project.



HERE'S AN OVERVIEW OF WHAT WE'RE DOING:



Monitoring and coaching

An energy coach will be present on site full-time to organize meetings related to energy consumption and CO₂ and N₂ emissions. Workers will be made aware of the impact of working habits. A software platform will allow all energy consumption to be monitored. Arrangements are made to let workers who live more than 50-km from the site stay overnight in the area.



An office building instead of shelters

We will be using well-insulated office spaces close to the construction site for all meetings and administrative work. This will reduce energy losses and allow us to use existing EV charging equipment. We will install PV panels and wind turbines alongside the building. We're even investigating whether we can harness some of the wind abundantly available at the site using the existing wind shields.



Electric vehicles

At least 50% of all private cars used at the site will be electric. Shared vehicles will all be electric and will be charged as much as possible using electricity produced at the site. We'll also be using Maxus electric pickup trucks.



Electric trucks

We'll be using electric trucks to transport materials from the storage space to the construction site.



Electric equipment

We'll be using small electric excavators and shovels. Our fully electric bending machine, which we retrofitted ourselves, will be making its premiere in the Porthos project.



Stage V equipment

All non-electric equipment will be at Stage V to reduce N₂ emissions. All diesel engines will run on 100% hydrotreated vegetable oil (HVO), reducing CO₂ emissions by 89%.



Protective mats

All equipment susceptible to oil leakage will be placed on protective mats with raised sides to avoid oil polluting the soil.



Clothes drying

Clothing will be left to dry in ventilated closets, so that workers don't leave the heating on when they are not present.



Optimized planning

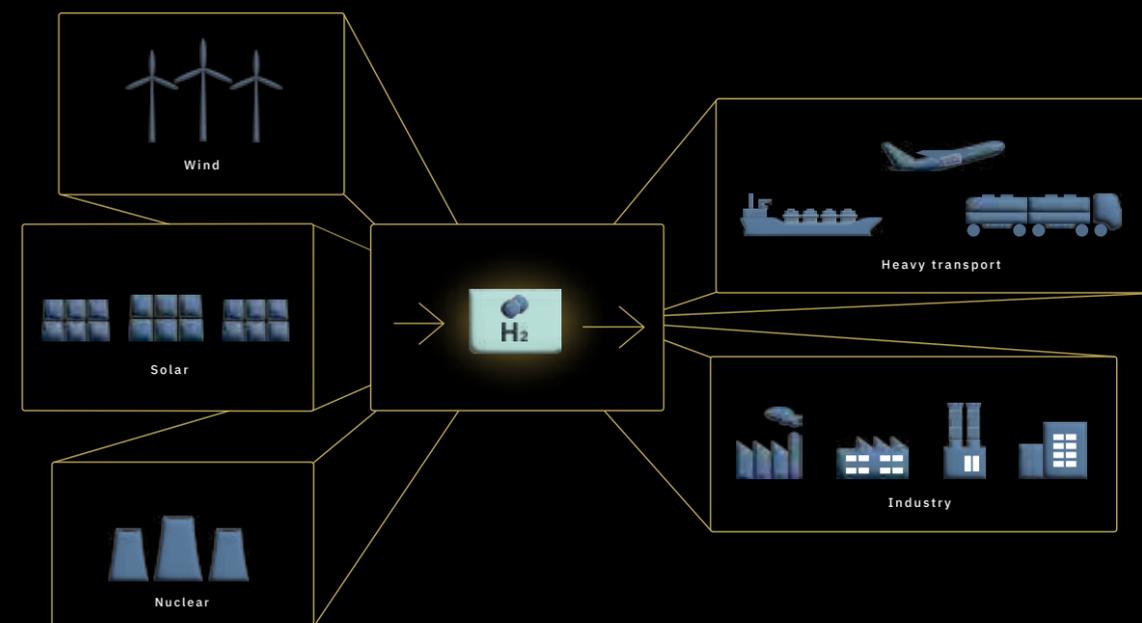
We'll be optimizing the planning of groundworks and transportation from an environmental point of view.

And so on. We'll grasp every opportunity we can to reduce the environmental impact.

MOLECULES AND COMPOUNDS TO STORE, TRANSPORT, AND USE ENERGY



There's more to the energy transition than the increased reliance on electrons floating through copper or aluminium cables. A significant part of the journey is about upscaling the renewable production, storage, transportation, and use of molecules and compounds that can act as energy carriers.



Green, zero-emission hydrogen manufactured using excess zero-emission energy can fuel industrial processes and heavy transport.

The smallest molecule on earth

Hydrogen (H_2) is a prime candidate to become an energy carrier of choice for many reasons. Numerous industrial processes, including heavy transport, can be converted to run on hydrogen instead of fossil fuels. Hydrogen is the smallest molecule on earth, a gas that can be sourced from water (which is abundantly available on the planet). It turns back into water during combustion, producing no harmful by-products at all. And to some extent it can be transported through existing pipelines intended for natural gas.

But there are significant downsides. Hydrogen production is extremely energy intensive. Most hydrogen plants currently use natural gas as an energy source and thus emit a lot of carbon dioxide. Hydrogen can also ignite very easily, requiring stringent safety measures. And it has a relatively low volumetric energy density (one third of natural gas), which means it has to be compressed, cryogenically liquefied, or converted into ammonia (NH_3) for storage and transport. This is one of the reasons why significant adaptations are needed

if the existing infrastructure of gas pipelines and storage tanks is to be a fit for hydrogen.

There are solutions for all these issues. Green, zero-emission hydrogen can be manufactured using electrolysis powered by renewable energy. This provides an opportunity for solar and wind power plants to convert their excess power into valuable energy-carrying molecules or compounds instead of feeding it into the grid for a low price. France is even planning to build new nuclear power stations equipped with H_2 electrolyzers.



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FRONTRUNNER IN THE HYDROGEN ECONOMY

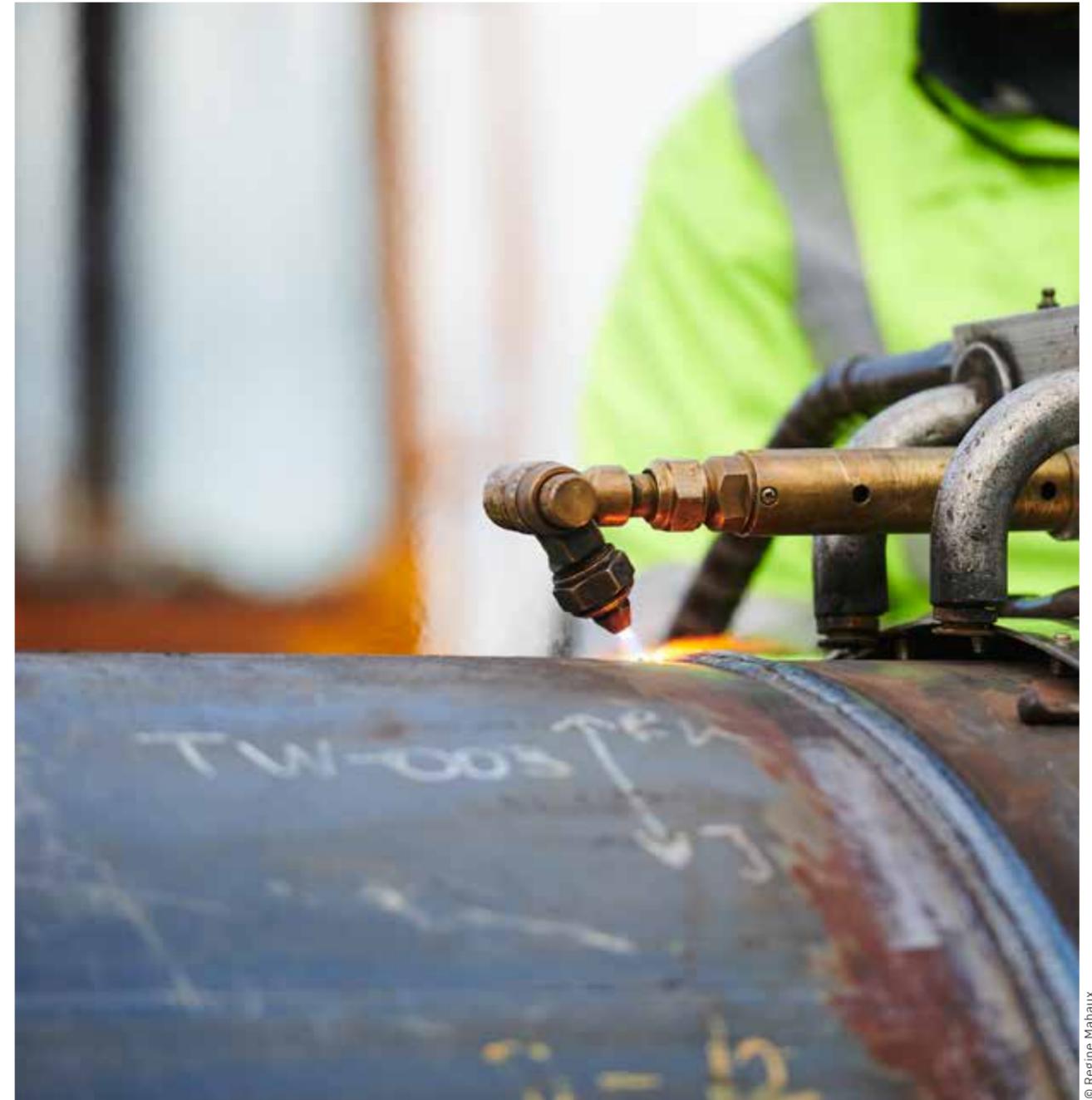
And there you go: Denys is a frontrunner in making gas pipeline infrastructure hydrogen-proof. An example is the pipeline we're currently laying between Desteldonk and Opwijk for energy infrastructure group Fluxys. It's the first part of the Zeebrugge-Opwijk pipeline project, which aims to reinforce gas supply for Belgium and the surrounding countries in the face of geopolitical change.

The decision was made to make this steel pipeline 100% hydrogen-proof as an important step in the implementation of the Belgian and Flemish hydrogen vision. We anticipated the development of related standards by finetuning our welding procedures to make the pipes less sensitive to brittle fracture, among other things. Construction of the 44-km pipeline started in March 2023 and will take six months to complete.

This marks the beginning of a great infrastructure project involving the construction of 600-km of hydrogen-proof pipelines across Belgium and the Netherlands over four or five years. The network will allow the energy-carrying molecules and compounds of the future, such as hydrogen and ammonia, to be safely transported between the ports of Antwerp, Ghent, Terneuzen, Rotterdam, Amsterdam, and Eemshaven. Vital.



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We're creating the first Belgian hydrogen-proof gas pipelines. This feature should become standard if pipeline infrastructure is to be future proof.

THE ILL-REPUTED COMPOUND

Being the major contributor to climate change, carbon dioxide (CO₂) is probably the most ill-reputed compound on the planet. Which is a pity because it is an energy carrier in its own right and it can be put to good use in the energy transition, for example to produce alternative fuels and chemicals with lower life-cycle carbon emissions than their fossil counterparts. CO₂ can also be used to produce alternative building materials that retain the carbon permanently. And it can be used to enhance the yields of biological processes.

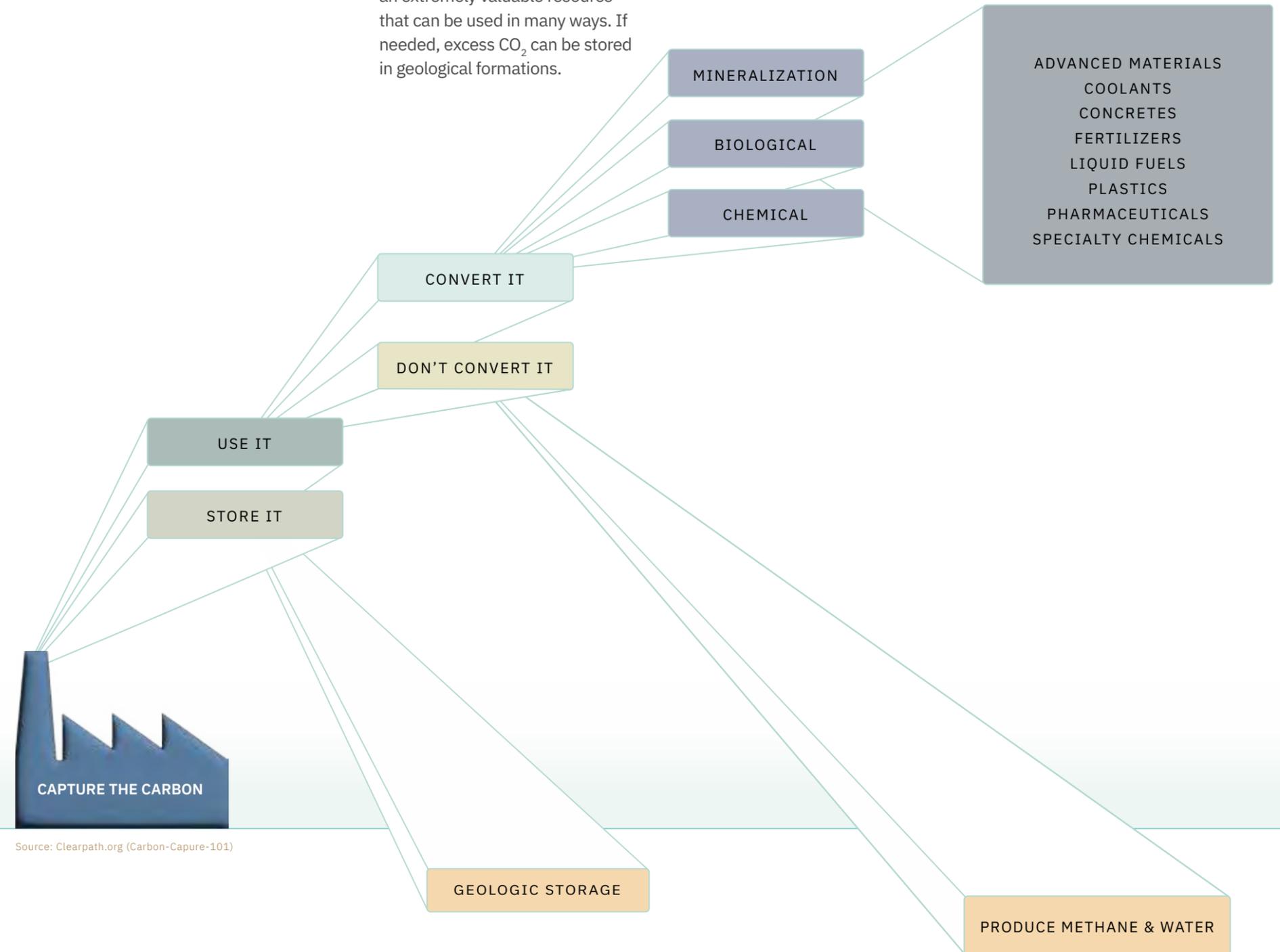
All the more reasons why humanity needs to capture as much CO₂ as possible and either use it (CCU) or sequester it for good (CCS). Capture should best take place before emission, as part of the process by which the CO₂ is produced. But solutions are also underway to filter CO₂ directly out of the air where it currently resides at the very low but arguably harmful concentration of about 420 parts per million (ppm).

EVACUATING CO₂

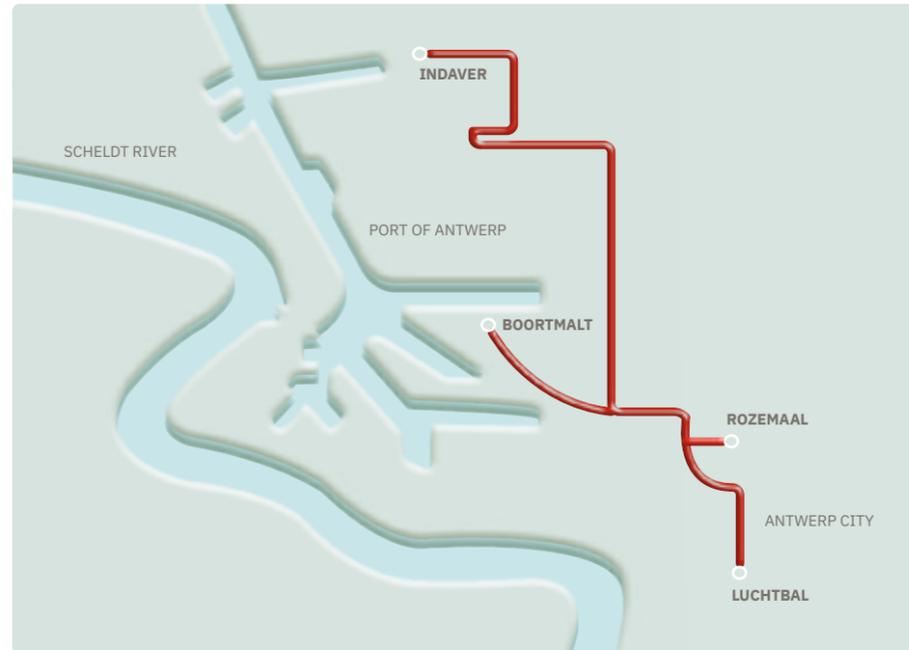
Denys engages in quite a number of these projects as a pipeline specialist. Unfortunately, the ground-breaking Porthos CCS project in Rotterdam, for which we have been hired to build the onshore pipelines, has been delayed due to court rulings related to the project's nitrogen (N₂) emissions, as if one molecule is being tackled by the other. Nevertheless, CCS and CCU projects will undoubtedly form a significant part of our activities in the foreseeable future. In the port of Antwerp, for example, seven leading chemical and energy companies are on a mission to reduce CO₂ emissions through the Antwerp@C CCS project piloted by the port authorities. By 2030, 18 million tonnes of CO₂ produced in the port will have been captured, temporarily stored locally, and then transported by pipeline and vessels to be sequestered in empty gas fields in the North Sea and in the Netherlands.

VALORISING CAPTURED CO₂

Despite its bad reputation, CO₂ is an extremely valuable resource that can be used in many ways. If needed, excess CO₂ can be stored in geological formations.



Source: Clearpath.org (Carbon-Capture-101)



The district heating network in the north of Antwerp will connect the Indaver waste plant with the Boortmalt production facility, and will provide heat supply to schools, public buildings, and households.

Source: boortmalt.com (heat network Antwerp)

A rapidly expanding market is that of district heating networks, providing opportunities to use excess heat from industrial processes to heat houses and local businesses. Denys is currently building such a network in the north of Antwerp, the first open-access network of its kind in Belgium.

In a first phase, this network will connect the Indaver waste plant with the malt production plant at Boortmalt, where the residual heat from Indaver's rotary kilns will be used in the industrial process. In a second phase, a district heating network will bring heat to schools, public buildings and 3,200 households in two districts in the north of Antwerp to source their heat supply more sustainably. In total, the grid will have a capacity of around 150 GWh per year.

It's just the newest undertaking in an already long list of successful district heating projects we carried out in Belgium, the Netherlands, and Germany.



WATER BRINGING EXCESS HEAT TO WHERE IT'S NEEDED



SUSTAINABLE SUSTAINABLE SUSTAINABLE

Sustainability is not just about climate and the environment. At Denys, we believe that solutions must be viable and sustainable from an economic and social perspective too.

These are tough challenges. The post-pandemic world is at the crossroads of many troubling events and evolutions. War is raging on European soil and the threat of nuclear conflict is probably greater than ever before. Climate change and biodiversity loss are threatening human existence in unprecedented ways. In the midst of this, social media, artificial intelligence, and cybercrime are growing at rates and on a scale that can no longer be controlled.



Standing true to our vision

This Global Report is not the place to discuss every challenge faced by humanity. But we want to stand true to our vision and convictions as a builder of vital infrastructure. Huge investments are being made in our sector to face up to the challenges of climate change. Since this is part of a magnificent energy transition, the need to create and adapt infrastructure will likely remain for many years to come. You could say that this provides golden opportunities for construction firms and other contractors.

But supply shortages and legal issues are already hampering some of the most vital projects. Will humanity succeed in completing all these vital projects? Much will depend on how the authorities, private investors, and innovative companies are able to work together towards common goals, as we'll be discussing in this report's final chapter.

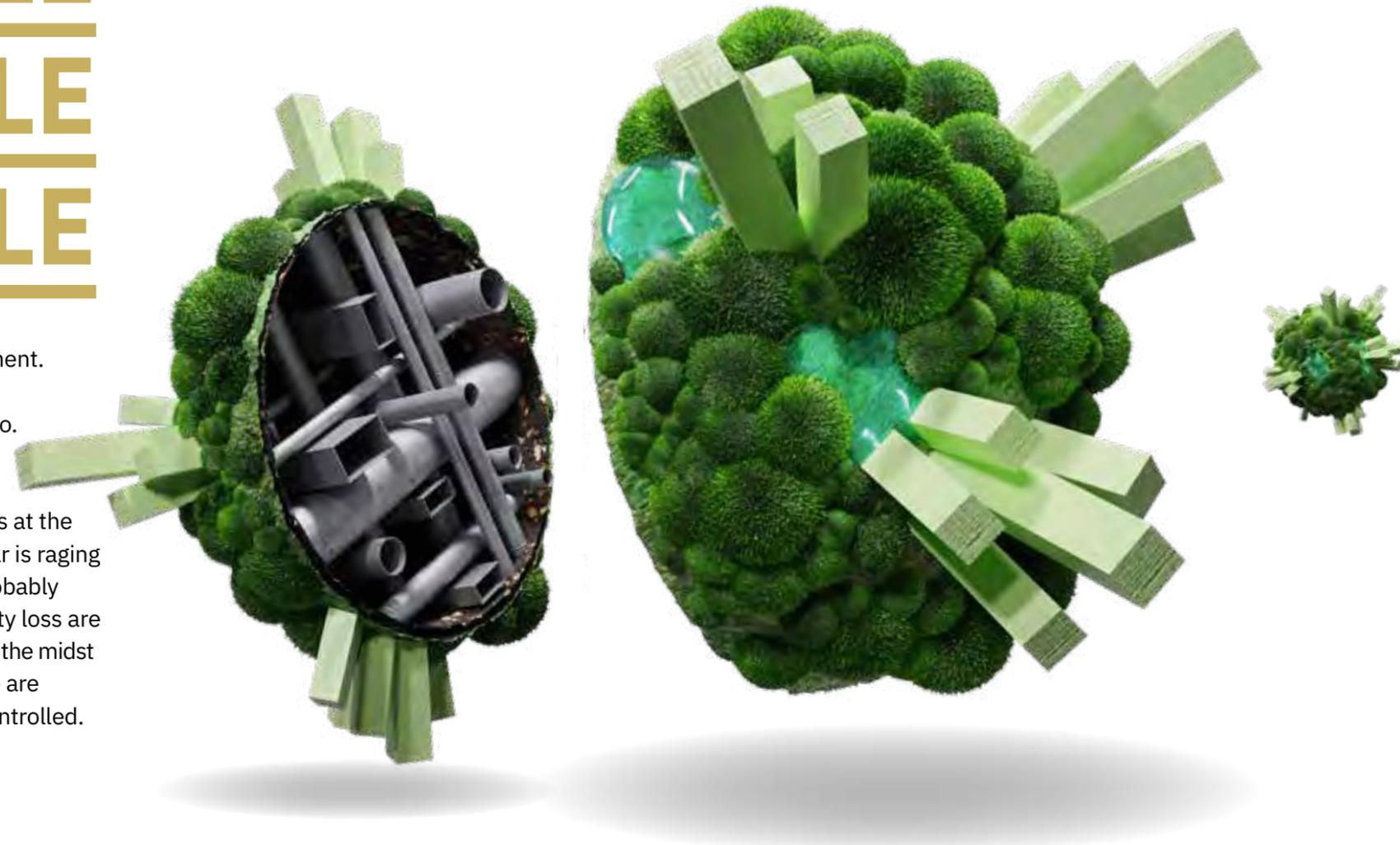
A transition that benefits everyone

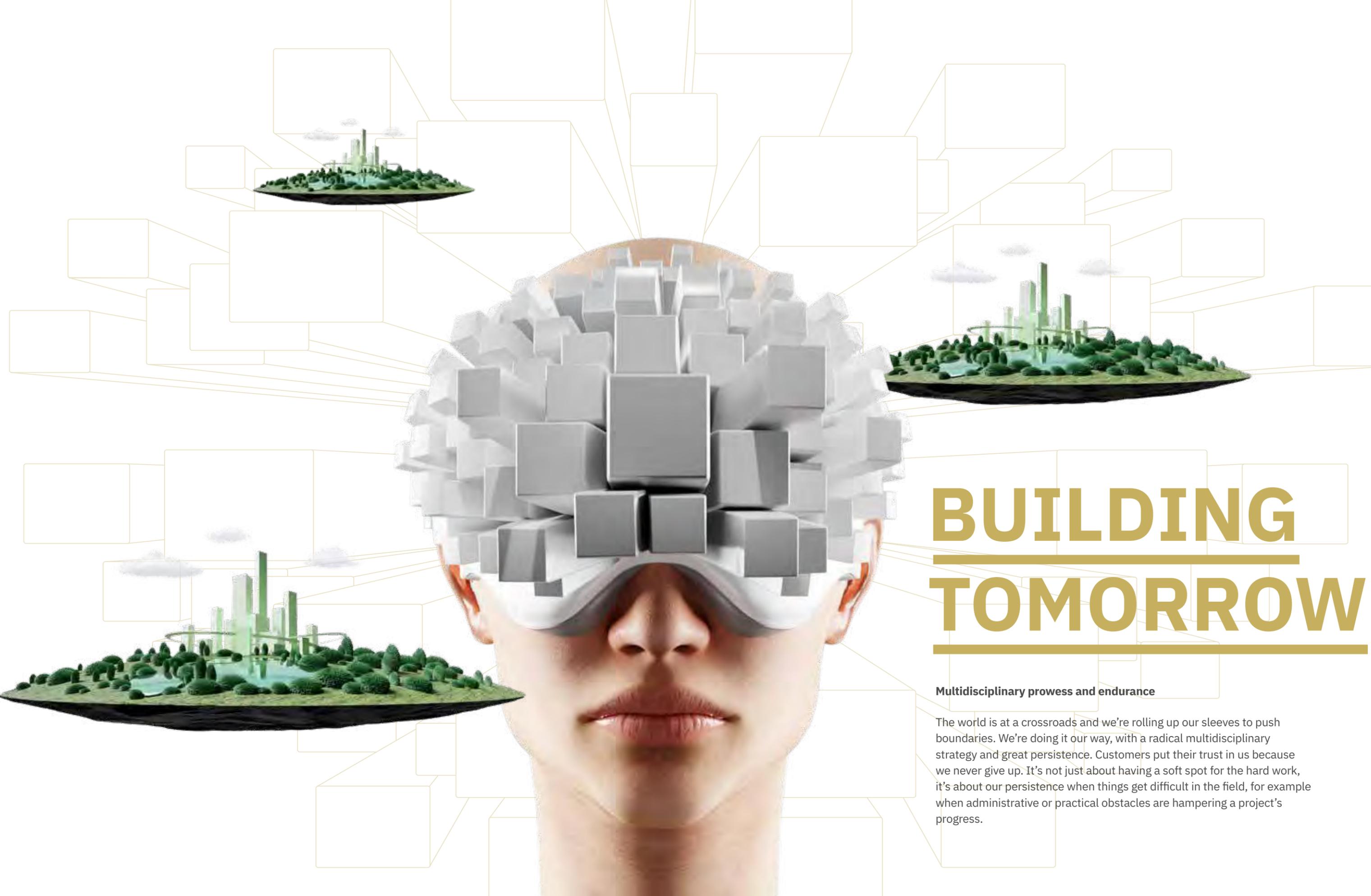
Meanwhile, authorities need to take care that everyone will benefit from the energy transition. The gains of solar and wind power, for example, should not only be for the people who can afford to invest in it, they should also benefit tenants and homeowners who don't have that kind of budget. District heating networks should serve all types of neighbourhoods with affordable energy. New power production facilities and transmission and distribution infrastructure should contribute to reducing energy prices and energy scarcity for all. These issues are all on the social sustainability agenda.

And an unforgettable journey for us all

At Denys, we're also working on our internal social sustainability. We are a company of over 1000 people and we're eager to make it an unforgettable journey for everyone joining us as much as we want it to be for our customers. Last year, we decided to launch a comprehensive HR program to further strengthen our internal collaborative spirit. This includes making individual arrangements for a better work-life balance, actively supporting diversity, and reinforcing and valorising the soft skills of our leaders and team managers.

Because we want to encourage everyone to share our vision. Our vision of dreaming the dream. Our vision of doing the dream.





BUILDING TOMORROW

Multidisciplinary prowess and endurance

The world is at a crossroads and we're rolling up our sleeves to push boundaries. We're doing it our way, with a radical multidisciplinary strategy and great persistence. Customers put their trust in us because we never give up. It's not just about having a soft spot for the hard work, it's about our persistence when things get difficult in the field, for example when administrative or practical obstacles are hampering a project's progress.

KEEP ON GOING, RIGHT TO THE FINISH LINE

For example, we successfully handled the many challenges presented by Open Grid Europe in Leverkusen, Germany. This very complex project involved constructing 24 km of pipeline between Horrem and Bergisch-Gladbach with no fewer than 40 crossings. Multiple last-minute changes were issued, many of them due to environmental or social considerations. This meant that very often we had to rethink the construction method to be used. But we never complain, we keep on going, right to the finish line.

OBTAINING PERMITS FASTER AND GETTING THE WORK DONE QUICKER

Flexibility and persistence is one thing, being able to switch or alternate methods is another, and it's why our customers appreciate our multidisciplinary strategy. We're mastering almost the whole gamut of techniques available for pipeline or underground cable construction, including HDD, Pipe Express, E-Power Pipe, micro-tunnelling, small segment lining, and more. Take Germany, where thousands of kilometres of new underground ductwork for HVDC cables are to be constructed from the north to the south of the country. Our ability to alternate techniques helps us to reduce disturbance to the social and natural environment, obtain permits faster, and get the work done quicker.



No fewer than 40 crossings were completed in this 24-km pipeline project near Leverkusen. 





Micro-tunnelling is the method of choice in the heterogeneous subsoil of the Loire near Nantes. —

**RISK AVOIDED
THROUGH
TECHNICAL
PROWESS AND
VERSATILITY**

A prime example is the water supply line we're constructing for Atlantic'eau between Le Pellerin and Couëron passing under the Loire through a DN1800 micro-tunnel a dozen kilometres downstream of Nantes in France. The drilling tests we carried out from a platform on the river's south bank revealed that the subsoil is somewhat heterogeneous. Our analysis led us to conclude that it was better to apply micro-tunnelling instead of HDD. A story of how technical prowess and versatility avoids risk.



GEARING UP TO PLUG INTO THE POWER BANK OF EUROPE

ROLLING UP OUR SLEEVES

The accelerating transition means that everyone needs to gear up for an unprecedented volume of infrastructure projects in the coming years and decades. Authorities and grid operators are crying out ‘all hands on deck!’ The Dutch-German transmission system operator TenneT, for example, are making their plans more than ten years ahead. They’re already securing the necessary construction capacity to make sure the HVDC cable projects will be realized in time.

And look to whom they’re turning to place their trust. A Denys joint venture was recently awarded the construction of the BalWin 4, LanWin 1 and 5, and NordOstLink grid extensions to bring power from offshore wind farms in the North Sea (increasingly dubbed the ‘power bank of Europe’) to the German mainland. Due to be completed about ten years from now, the combined portfolio represents nearly 2,000-km of HVDC cables, of which we will be engineering and constructing the onshore elements. It’s arguably the biggest commission in our 100 years of existence.

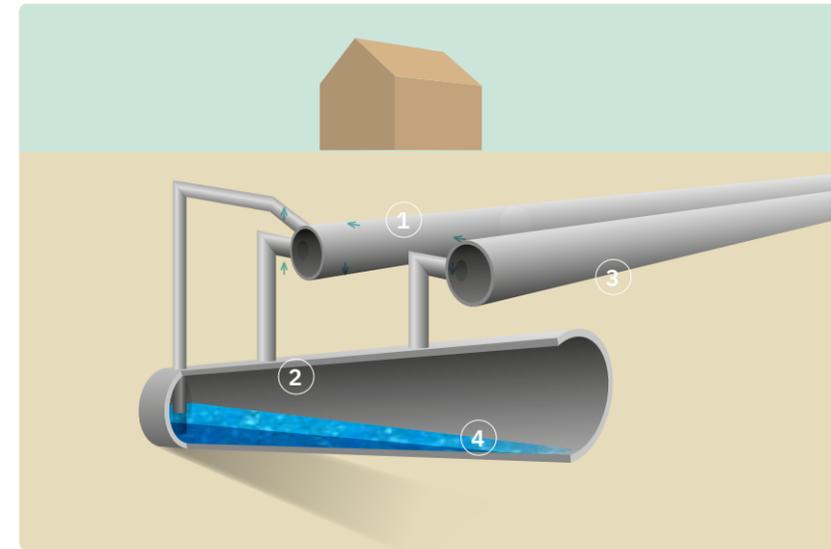
Driven by trust and transparency

And it’s such a beauty in many ways. TenneT clearly understands how important it is to engage the construction firm early in the project. It allows us to fully optimize the plans, taking into account issues arising from the difficult subsoil or from passing through nature reserves or other protected areas. We can cut costs, reduce carbon and nitrogen emissions, and keep the impact of construction works on the environment as low as possible.

It’s a project driven by trust and transparency. Our long history of successful projects carried out for TenneT means that they know us well and trust us to be committed to their goals without ever giving up. They also clearly appreciated the fact that we were offering an integrated joint venture covering the entire scope of onshore and offshore cabling as well as cable manufacturing. And there’s one more remarkable thing about the tendering process: it was concluded in just six months. Talk about gearing up.



Source: TenneT.eu



- 1 Sewer pipe draining water under normal conditions
- 2 Sewer overflow activated in the event of heavy rainfall
- 3 8000 m³ stormwater detention
- 4 Reinjection pump activated after the storm

Our almost legendary versatility and multidisciplinary prowess allows us to help innovative ideas get off the ground. One example is the underground rainwater basin we built for Vivaqua in Brussels a few years ago. We simply combined our expertise in tunnelling and pipeline construction to create a 470-metre segmented tube with a capacity of 8000 m³ connected to the existing sewage collector. Similar projects are underway in Spain.

We believe we can provide valuable contributions to a wide range of innovative solutions such as gravity rainwater storage, water desalination projects, and underground micro-hydropower, to name just a few paths being explored and developed.



**ENTHUSIASM
AND MASTERY
IN THE SERVICE
OF INEOS
PROJECT ONE**

And here's another opportunity to demonstrate our enthusiasm, engineering knowhow, and technical mastery in, for us, a familiar setting. In the port of Antwerp, Denys just started phase 2 of Project One for Ineos, the creation of the most sustainable ethane cracker in Europe.

In a Team One collaborative effort with a local partner, we'll be creating the basic infrastructure for the project. Infrastructure worth almost 100 million euros will be installed and constructed within two years, including underground sewer, drainage, drinking water, and extinguishing water pipes, foundations for temporary buildings, roads, parking spaces, footpaths, and bus stops. Intriguing!



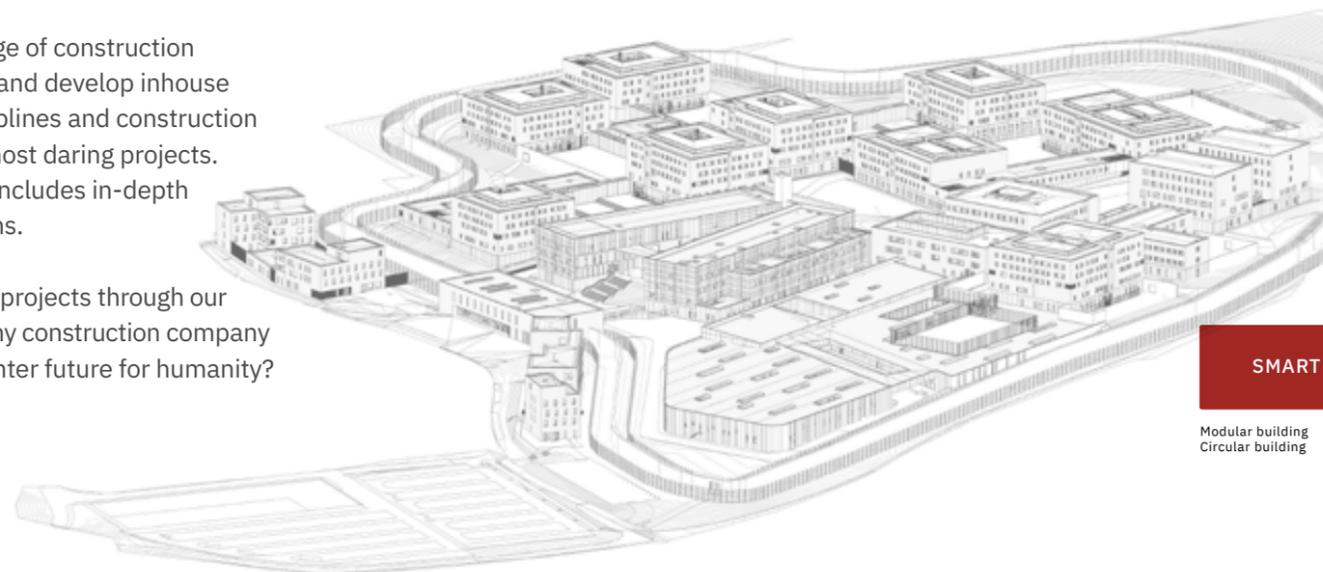
UNDERPINNING THE MOST DARING PROJECTS



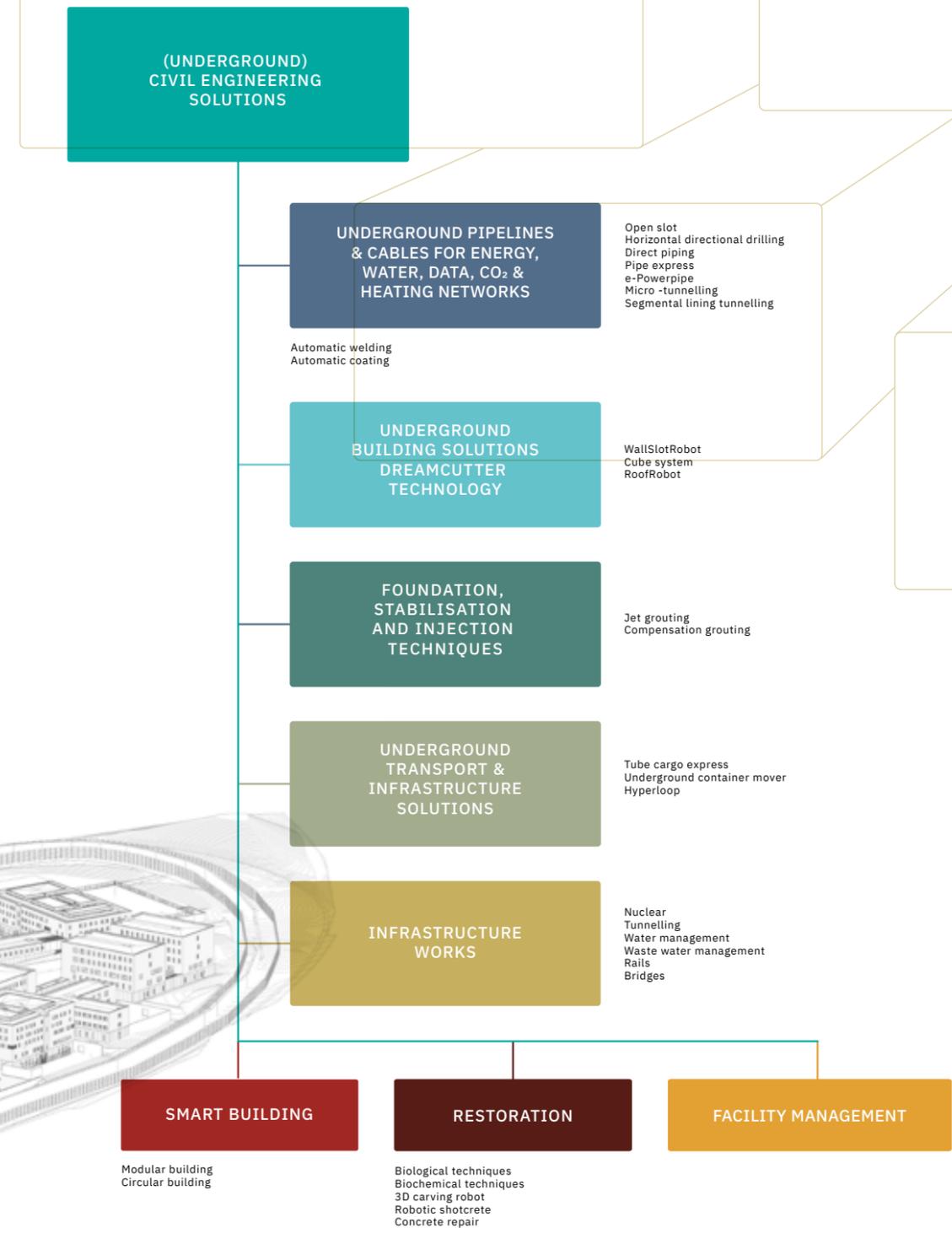
Customers find it convenient that Denys can operate as a one-stop-shop in complex, multidimensional projects.

The fact that we cover an enormously wide range of construction and renovation areas and continue to maintain and develop inhouse expertise in so many relevant engineering disciplines and construction techniques makes us a one-stop shop for the most daring projects. The rich panoply of our areas of expertise also includes in-depth knowledge of environmental and social concerns.

What's more, we're able to financially underpin projects through our Denys Global network. How much more could any construction company be prepared for the challenge of building a brighter future for humanity?



ROLLING UP OUR SLEEVES



STANDING FIRM AFTER MANY INTENSE YEARS



© Regine Mahaux



© Regine Mahaux

Look at what we've done in Brussels-Haren, the DBFM project for the largest prison in Belgium! Our consortium won the bid years ago with an ambitious design, a radical alternative to the outdated star-shaped prison layout.

After many intense years of designing, permitting, and building, the prison now stands proud as the most sustainable and environmentally friendly building complex of its kind. Perfectly integrated within its surroundings, it can boast impressive sustainability figures.

There's 22,000 m² of green roof and 37,000 m² of soft landscaping created using local species of grass, hedges, and shrubs. 650 trees were planted within and outside the perimeter wall. 150 solar panels and a 250-borehole thermal energy storage system (BTES) contribute to an impressive K18 energy performance level. More than 500,000 litres of rainwater can be buffered in water basins for toilet flushing and to provide water for the garden.



© Regine Mahaux

LOVE FOR THE GOOD AND THE BEAUTIFUL

Remember the Handelsbeurs project in the centre of Antwerp, a true masterpiece combining multiple technologies and crafts to transform a worn-out historical building into a contemporary urban jewel. Once a symbol of urban neglect, the Handelsbeurs is now a vibrant venue for events of all kinds where people enjoy the good and the beautiful.

It was one of these projects where fast thinking and swift decision-making was required to keep things moving forward. What a glorious combination of construction, renovation, and restoration it was, where we could deploy our outstanding engineering skills applying advanced foundation techniques, and with appropriate monitoring. This was love at first sight and it's love forever.



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CHEERS TO ANOTHER RADIANT RENOVATION

We're convinced that more of such overwhelmingly beautiful but inherently complex projects will keep coming our way in the second century of our existence. In terms of complexity, the renovation and restoration of the former Brussels Stock Exchange comes close. After a fascinating journey during which our problem-solving attitude was much appreciated, the refurbished neo-classical building will be opening its doors to the public this summer with, as the major tenant, the much-anticipated Belgian Beer World experience centre. Cheers!

THE GOOD AND THE BEAUTIFUL



© Tim Fisher

A CLEAR VISION ON WHAT'S NEEDED AND NECESSARY



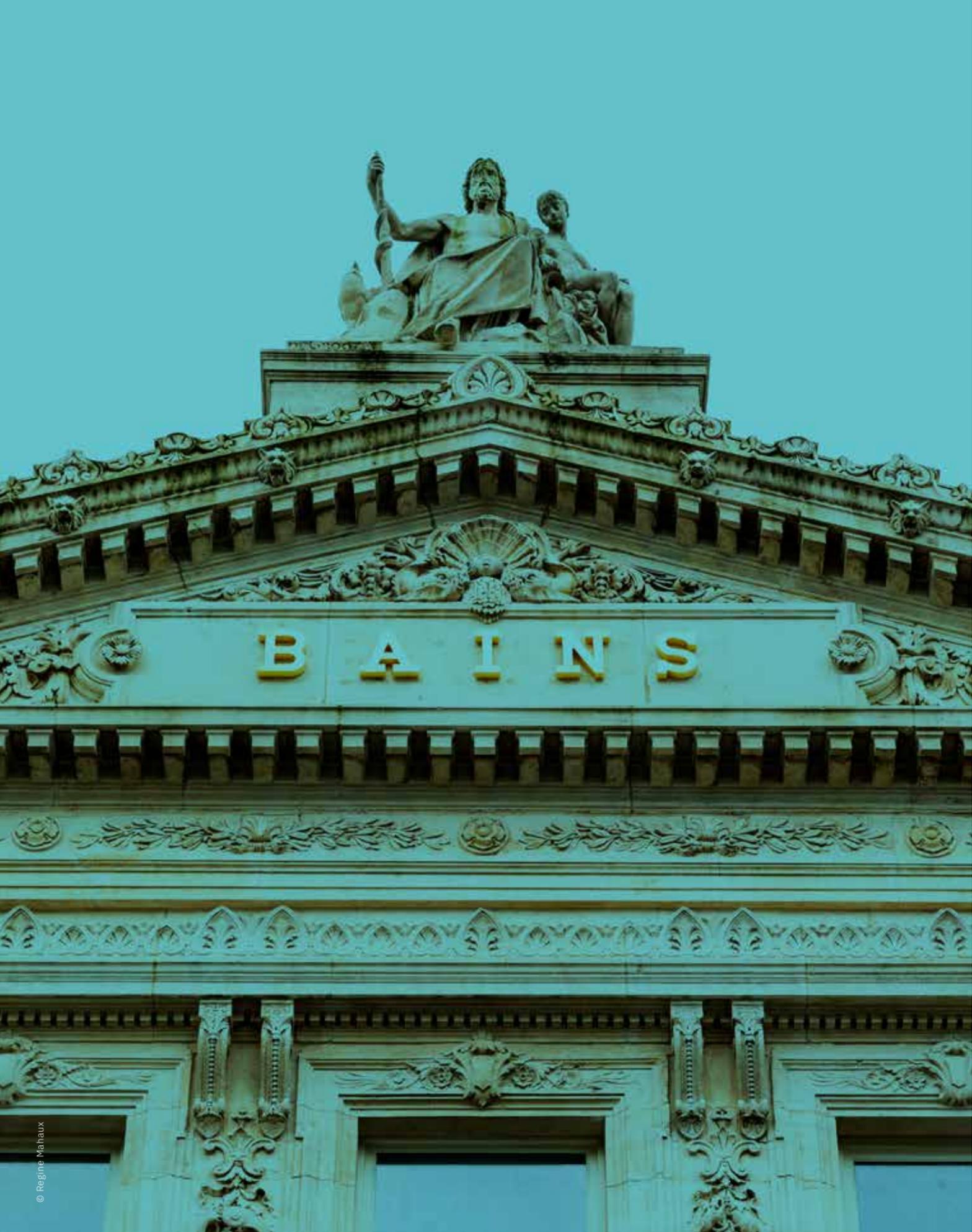
© Regine Mahaux

Here are two examples. We're currently completing the interior of the Thermes de Spa, our renovation of the distinguished 19th century building in the city that gave its name to wellness. In Liège, we started renovating the former building of the Montefiore Institute, the city university's engineering faculty. Certain elements will be restored with great care for authenticity, but others will be dramatically updated, and a four-storey building will be added.

The most beautiful projects are the ones sponsored by enlightened customers with a clear vision of what's needed and what's indispensable. This is one of the reasons why we're increasingly taking the initiative ourselves, acting as financial sponsor as well as maintenance outfit, and in some cases even operational partner.

More fascinating journeys ahead

And here are a few other renovation projects in our pipeline. Some 20-km to the east of Liège, we'll be renovating the Grand Theatre de Verviers. In Brussels, we'll be restoring the magnificent glass cupolas of the Royal Greenhouses in Laeken. In Antwerp, we're completing the restoration of the façade of Den Bell tower. In Leuven, we're continuing our work on the Park Abbey. And we have multiple restoration and renovation projects in our hometown of Ghent.



© Regine Mahaux

BUILT HERITAGE IN THE HOTSPOTS OF THE FUTURE

Brussels, Liège, Antwerp, Ghent, Leuven: just a few examples of how built heritage is so important for city centres. We believe that historical buildings will be even more decisive in defining the vibrant hotspots of society in the future. City centres are the only places where such buildings will still be abundantly present, to be cherished, maintained, and regularly updated to serve the evolving needs of contemporary society.

Secularisation is one such evolution. A significant number of religious buildings (churches, abbeys, mosques, and more) have already been transformed into public places with a non-religious character. Much more of this will happen, despite the opposition it sometimes engenders. For example: the Saint Anna Church in Ghent, of which we restored several bays as well as the impressive rose window and other stone works more than 10 years ago, will soon host a small neighbourhood supermarket, a wine bar, and a restaurant. Sacrilege? Not in our view. As we said, economic viability is a key component of sustainability.

Cherishing the past with futuristic techniques



© Regine Mahaux

Our built heritage is taken much better care of through using advanced techniques. That's actually a funny thing about renovation and restoration: more than ever before, we'll be cherishing the past by using astoundingly futuristic techniques. The range of non-destructive investigation techniques is still expanding, which means that we'll soon be able to quickly scan old murals and clearly distinguish the different layers of

paint applied over the centuries. Which of course doesn't immediately settle discussions about which layer needs to be exposed and which ones should be removed or left concealed. Should we preserve the baroque murals in the Saint Nicholas Church in Ghent, or should we restore the church interior to its Gothic origin as much as possible? AI bots are not going to provide conclusive or even sage answers to such questions.

THE GOOD AND THE BEAUTIFUL



Parasitic wasps, enzymes, and bacteria

A kind of compromise was found in the restoration of the Leuven Park Abbey interior, where we exposed older layers in some areas while leaving more recent murals intact elsewhere.

In the St. Catherine's Church project in Mechelen, we also used parasitic

wasps to kill woodworm that were damaging the fine historic artisan-ship. It's just one example of the kind of biological techniques that are being developed today and will increasingly be used in the future. Another is concrete that can heal itself of cracks through bacterial action.

And then there's the technique of using enzymes to remove old layers of varnish, for example varnish that was applied to protect paintings decades ago but proved to be ill resistant to UV light. We recently sponsored a master's thesis to investigate this technique.

ON ROBOTS AND HUMANS



We need to talk about robots too. They are becoming increasingly important, but we don't believe that they will ever do the job completely by themselves. Yes, robots will become better and better, even in everyday tasks such as pouring a glass of water and handing it to a person, a classic case described in robot studies. When looking at a craft such as stone carving, we see that robots are invincible doing the rougher cuts but, if we continue to care about detail, applying the finishing touches will still be a job for humans.

With one caveat: the human job might involve using a robot as a practical aid. Technology does not replace humans. It refocuses the role of humans towards more creative and genuinely intelligent work. How's that for creating a better future?

Artificial intelligence has its place

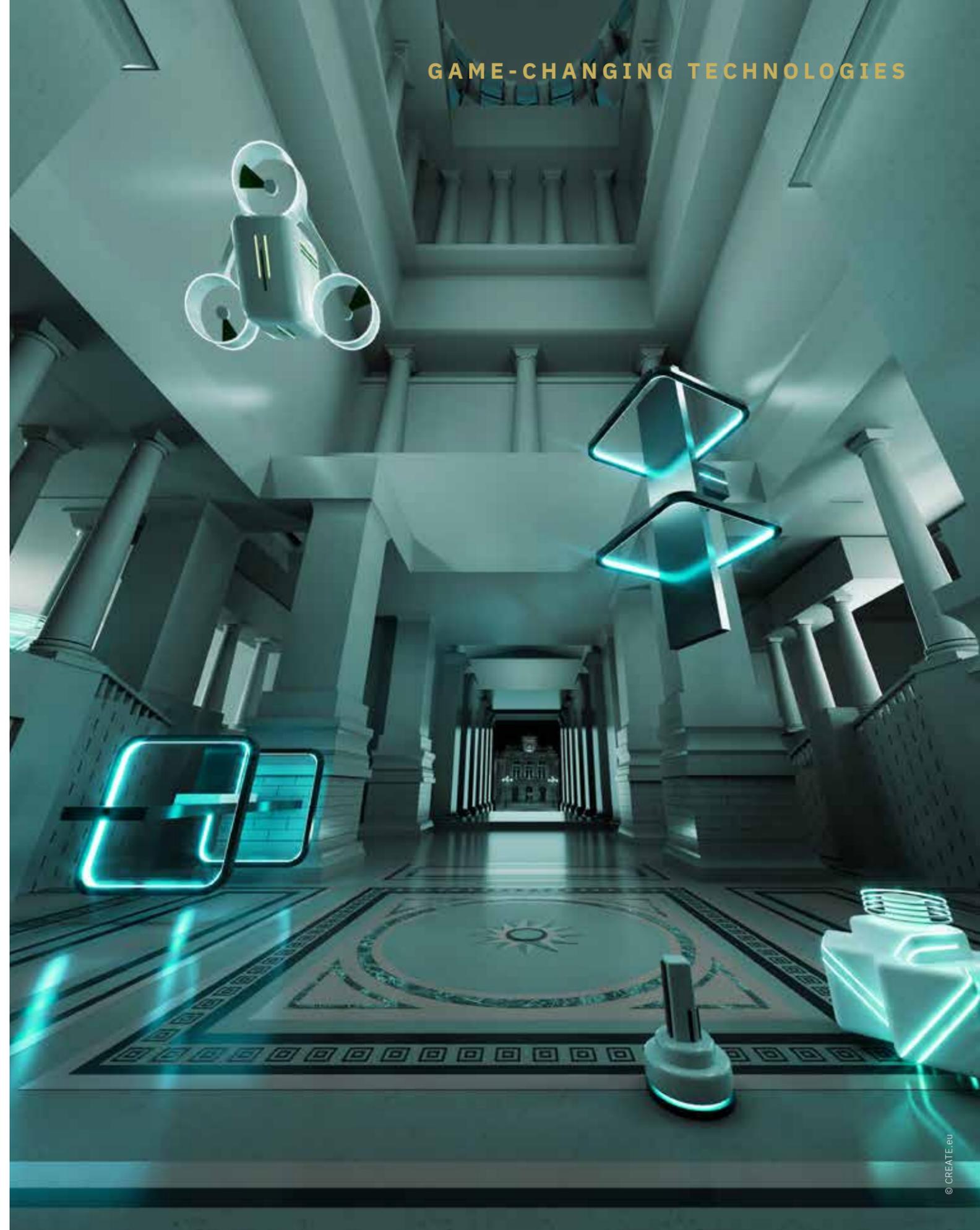
And what about artificial intelligence in the construction industry? It's found its place already, although not as imagined in the kind of dystopian movie series the streaming platforms want us to binge-watch. Denys already uses AI on a daily basis, in the process of linking huge amounts of data from different sources to support our engineers in analysing project constraints and optimizing designs. AI solutions are also being deployed to monitor large concrete structures to identify possible signs of wear and degradation at an early stage.

Other technologies still need to be more mature before they can be introduced on a massive scale. Prototypes of 360° cameras, advanced sensing, and other technologies to support safety are being tested and will probably enter the arena pretty soon. No doubt, in the near future, tower cranes will be controlled by people on the ground, and pipeline welding will increasingly be carried out remotely, much like keyhole surgery in the medical world.

Human behaviour remains critical

The shortage of appropriately trained drivers also encourages us to carry out tests with remote-controlled bulldozers. But will we be seeing driverless cranes and other machinery any time soon? Prototypes have already won awards, but we don't want to rush anything.

The digital transformation of the construction industry also increases the need for reliable and robust cybersecurity measures. And these measures should not only focus on technology, but probably even more on the related human behaviour.



TECHNOLOGIES DESIGNED TO FACILITATE UNDERGROUND CONSTRUCTION



GAME-CHANGING TECHNOLOGIES



Our Dreamcutter technology allows underground walls and roofs to be constructed with virtually no disturbance of life up there.

Creating subterranean spaces hidden from view

Then there's this new kid in our Dreamcutter family, the RoofRobot. This is a fantastic way to construct a complete arched roof below the surface with only very limited disturbance to aboveground life. The idea is to dig two tunnels at a distance equal to the intended roof width, each tunnel requiring just one access shaft. Then, a machine that pretty much resembles our WallSlotRobot cuts its way through the soil from one tunnel to the other, along the way putting in place concrete formwork to be reinforced and filled later.

We've already tested the system on a limited scale at our own premises and we'll be testing it on a real-world scale in the summer of 2023, constructing a 20-metre roof under an abandoned sand quarry in Flobecq. It will be a major step forward in our adventure of doing the dream.

Thumbs up for the subterranean hyperloop

Meanwhile, we continue to engage in the Hyperloop Development Program, Europe's audacious project to develop a network of autonomous cargo vehicles travelling through near-vacuum tubes. We're particularly interested in hyperloop systems designed to be constructed below the surface, because it fits our vision of moving fast mobility solutions underground. We're now engineering the tunnel for a 2.6-km test tube to be built in the Netherlands.

Denys is actively involved in some of the most game-changing technologies under development today. And taking the lead too.

Expectations are high for our Dreamcutter technology, the collection of solutions we're developing to facilitate the construction of underground spaces with very low aboveground disruption. Demonstrations of our Cube system have excited the interest of major players in the construction industry. We're now outlining how we plan to deploy these solutions in some of the challenging projects currently underway in Brussels.

Dreamcutter could, for example, unblock the situation at the Palais du Midi, where tunnel construction had to be stopped due to technical issues. Using our vast expertise in this kind of subterranean job and deploying our Cube system, we could safely create slurry walls 22 metres deep, two metres into the over-consolidated clay, and supplement this with a series of micro-piles beneath. In general, the Cube system could provide a safer and faster alternative for much of the excavation work in the Metro 3 project.

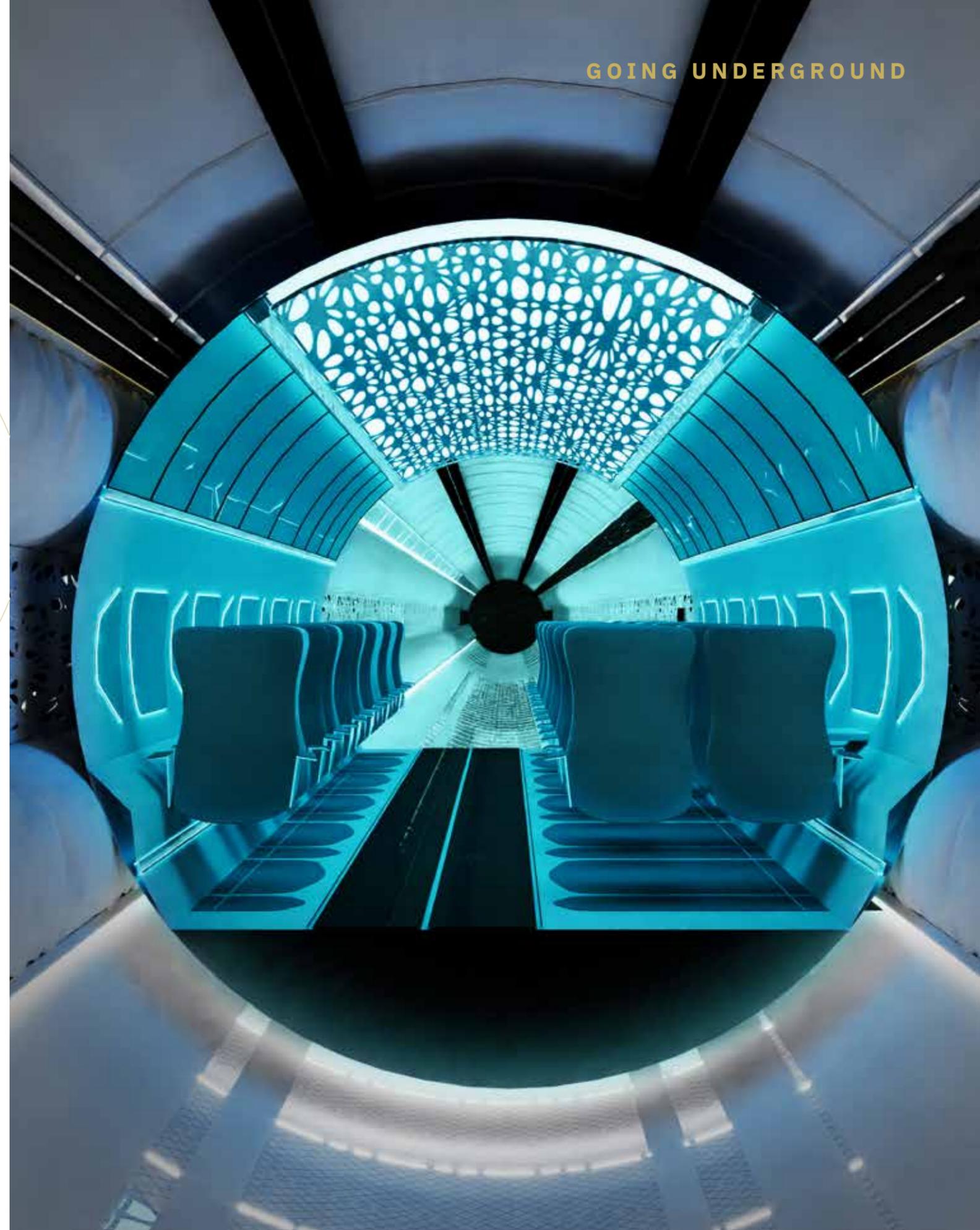
ORCHESTRATING THE COLOURFUL MIX OF TRANSPORTATION MODES

What about mobility? Strictly private transport will be less common in the future. A significant number of the younger generation living in cities has already abandoned the idea that they need to own a car. They complement the use of public transportation with a mix of shared vehicles - scooters, bicycles, cars, and vans of different sizes and types depending on what they need that day.

This colourful mix already profoundly changes the inner-city mobility landscape and needs to be highly orchestrated. A lot of infrastructure reserved for cyclists and pedestrians is already being built but new types of conflict still arise. As we said, the faster modes of transportation will eventually find their place below the surface, reserving the public open space for people resting, walking, cycling, or travelling in novel low-speed vehicles. Hopefully we do not have to wait another 100 years for this to happen.



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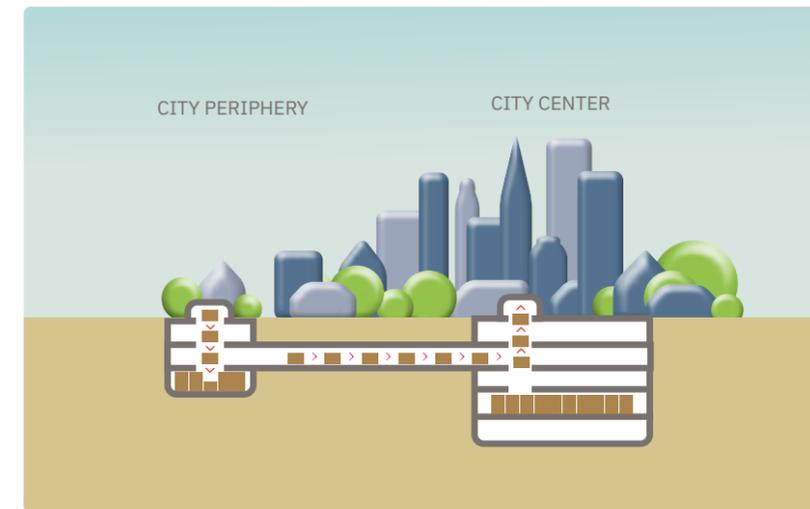


PUBLIC TRANSPORT WITH A CLEAR VISION

Public transport could be crucial in tomorrow's better life, at least if the authorities, operators, and investors can pursue a shared vision of efficient and comfortable transportation using adequately dense and well-connected networks. Here's an opportunity for innovative leaders. And for people doing the dream.

Much of the public transport will be electrified as part of phasing out fossil fuels. Electric trains, trams, and underground systems will continue to be vital ingredients of the mobility mix, and they will increasingly be controlled remotely.

Fleets of inner-city buses are also being electrified, which means that depots need to be equipped with charging stations. The brand new Wissenhage depot that we'll be building soon not far from our headquarters is the first in Belgium to be designed with e-mobility in mind. It can't come too soon.



Parcels could be transported through pipes from the city periphery to inner-city warehouses for last-mile delivery.



© CREATE.eu

Fresh ideas for future inner-city dynamics

Talking about innovation in mobility, Denys is currently brainstorming with owners of inner-city parking lots to see how their infrastructure could be repurposed in the future if cars are no longer allowed into the heart of the city. A possible solution might be to use these underground spaces as warehouses where goods can be stored, handled, and prepared for last-mile delivery to their destination. These hubs could be served through tunnels to be created from outside the city perimeter. A similar idea called Smart City Loop is being developed in Hamburg. Future inner-city dynamics could benefit from more such fresh ideas.



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STRATEGIES TO RE-USE CONSTRUCTION MATERIALS

In addition to phasing out fossil fuels, the society of the future will need to embrace a circular economy model. This model is a huge challenge in the construction industry, considering the fact that, on average, 90% of a project's carbon emissions are in so-called Scope 3, which includes purchased goods and services, and waste disposal. An estimated 5 to 12% of the world's carbon emissions are due to the production of building materials. 35% of all the waste produced in the EU stems from construction work.

This calls for a strategy where energy consumption and recycling opportunities are considered when choosing materials and methods.

Enablers of circularity

Modular building can be a key element in such a strategy. Denys has been experimenting and achieving excellent results with modular construction in recent years. Remember the extension of the Jan Palfijn Hospital we built a few years ago. While the prime benefit of the method is speed of construction - we completed this work in just four months - it also allows modular units to be re-used. That's what we'd like to see happen in 2027 in Brussels with the container-sized modules we used in 2021 to construct the temporary International School of Brussels building.

Last year, we used the same modular construction method for the Centre Neuro Psychiatrique extension in Namur. We're now using it to build a temporary outpatient clinic in Roeselare, creating 1,115-m² of examinations rooms, waiting areas, office space, and sanitary units in just seven months. Modular construction: it's fast, it's high-quality, and it's a great enabler of circular construction.

Circularity principles have been taken as far as possible in the project for the remarkable Walcheren-Middelburg police station we built in the Netherlands. A maximum of materials used can be dismantled and fully recuperated, either when the building undergoes refurbishment or at its end of life.



© Regine Mahaux



© Regine Mahaux



WORKING AS ONE

AN ESTEEMED INTERNATIONAL FORCE

What a magnificent international group Denys has become in recent decades.

Here are a few facts and figures. Our workforce reached the one thousand mark in 2021 and it's still growing steadily. While Belgians are by far the largest grouping, we've become increasingly international, with talent from almost 30 nations in our teams.

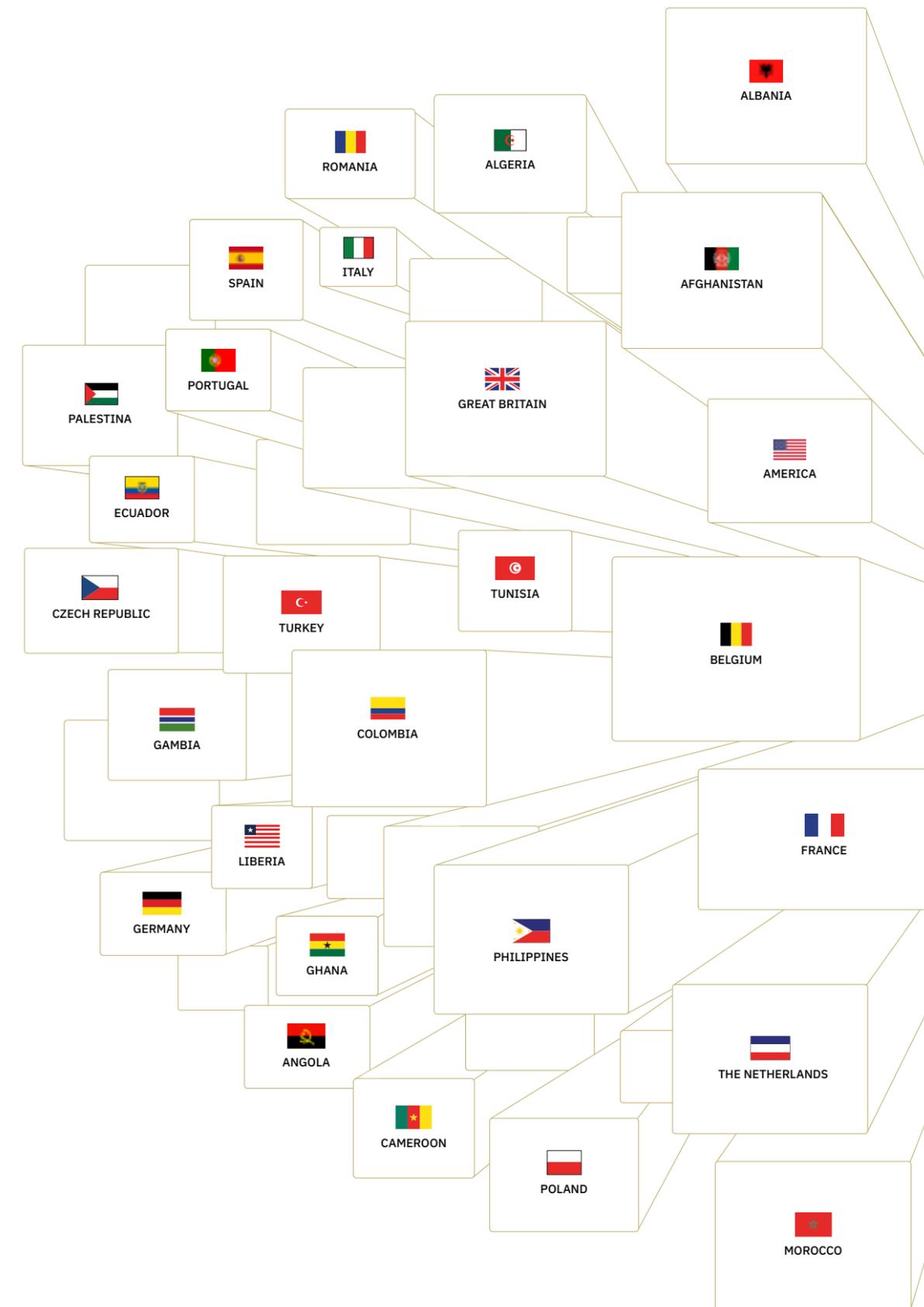
And counting. Because we're continuing to export our successful business model to our neighbours and beyond. For example, our businesses in France, the Netherlands, Germany, and Italy have grown significantly, each now employing up to 60 people. It's just a matter of time (and perseverance of course) before they become as diversified and multidisciplinary as the Belgian business. Our other branches will soon be following in their footsteps.

Spreading our wings across Europe and beyond

Judging by our projects, we're clearly spreading our wings across the entire European and African continents, sharing our expertise, entrepreneurial spirit, enthusiasm, and persistence with people in countries as diverse as Poland, the UK, Ghana, Algeria, Ethiopia, and more.

Wherever we appear, we hear the same thing: how convenient it is that we master such a wide range of disciplines, from restoration to tunnelling, from special foundation techniques to innovative low-disturbance excavation works, from challenging inner-city renovation to complex industrial projects involving pipes and ducts of every kind.

That's why we're confident that we're going to be playing an important role in the ongoing transition, paving the way for so many fascinating infrastructure projects in Europe. The continent dearly needs companies like ours: agile, flexible, no-nonsense, and purposeful. It's been our nature for our first 100 years; and we'll be continuing along that same path for the next.



Denys employs talent from almost 30 nations, a number bound to increase further.

READY TO ROLL, AS ONE



© Regine Mahaux

The next 100 years? Something else for sure! Saying goodbye to the age of oil we've lived in for more than 150 years, now in a phase of energy transition, to fully embrace the age of renewable energy eventually. We are ready to roll. We're also energized by the prospect of this magnificent future we're imagining. Sparkling green cities with plenty of space for people to enjoy. Smart infrastructure beneath the surface. A close-to-zero-disturbance world.

Are we being too naïve? If that's the case, so were the forward-thinking leaders who put an end to slavery, stopped child labour, or phased-out CFCs. Just saying. We should never stop dreaming of a better world, because what's the use of doing anything if you stop dreaming?

More rational decision-making is needed

But here's the thing. Over the past few years, we've seen a lot of projects delayed or even downright cancelled due to a lack of rational, efficient, and sound decision-making.

How sad is it to see a major project designed to reduce carbon emissions being hampered due to a by-the-book interpretation of regulations on nitrogen deposits? Why does it take nine months to be given a drainage permit for a renovation project that will reinstate a whole neighbourhood, just because there's one tree that could go short of water during construction? Why are even more niche-focused permit authorities being established if what we need is a more powerful holistic vision?

Pragmatism and trust

Administrative burdens are holding back projects that are vital for the future of humanity. Legal proceedings are initiated whenever anyone wants to put a shovel in the ground, especially in city centres. This leads to delays, personal frustrations, verbal battles, and unplanned costs, but it hardly ever brings us a single inch closer to the dream of a better world.

There's also the phenomenon of unrealistic or unpragmatic designs. Things that look good on paper but cost the earth to build. Or designs that are contrived with just short-term functionality in mind, ignoring circularity principles and best practices.

And then there's the reality of 500-page contracts being written for every project of any significant size, based on the false belief that any issue that could arise during a project should be covered by an article in the contract. No, such hefty contracts are just an indication that there's not enough pragmatism and a distinct lack of trust.

Like a handshake

Here's a better idea. How about creating one-page contracts? The contract should just clearly outline the common goal as well as the roles and responsibilities of the parties involved, and the principles of conduct. It would be like a handshake. And it would allow main contractors to engage subcontractors along similar lines. Wouldn't this mean that we could all work together towards achieving that one goal?

Industrial companies wanting to create new production plants have a no-nonsense attitude: here's what we need, show us what you can do, then do it, and do it right. That's the kind of collaborative spirit we need from the authorities too. This spirit is already becoming more commonplace in the world of energy infrastructure projects, where the tide is high, solutions are needed urgently, and contractors are trusted and respected once they've qualified.

Look at the huge HVDC project we're going to carry out for TenneT in a spirit of true partnership and trust. It's a project of unprecedented size with a time horizon of at least ten years, and it was negotiated within six months. Thank you, TenneT, for this responsible attitude and vision. It's efficient, straightforward, and effective.

Bringing the dream within reach

That's the entrepreneurial collaborative spirit we need. The spirit of working towards a common goal, with mutual trust, holding each other in great esteem, and committing to keep promises. If that's the spirit, the dream is within reach.

Johan Van Wassenhove
CEO Denys Global

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