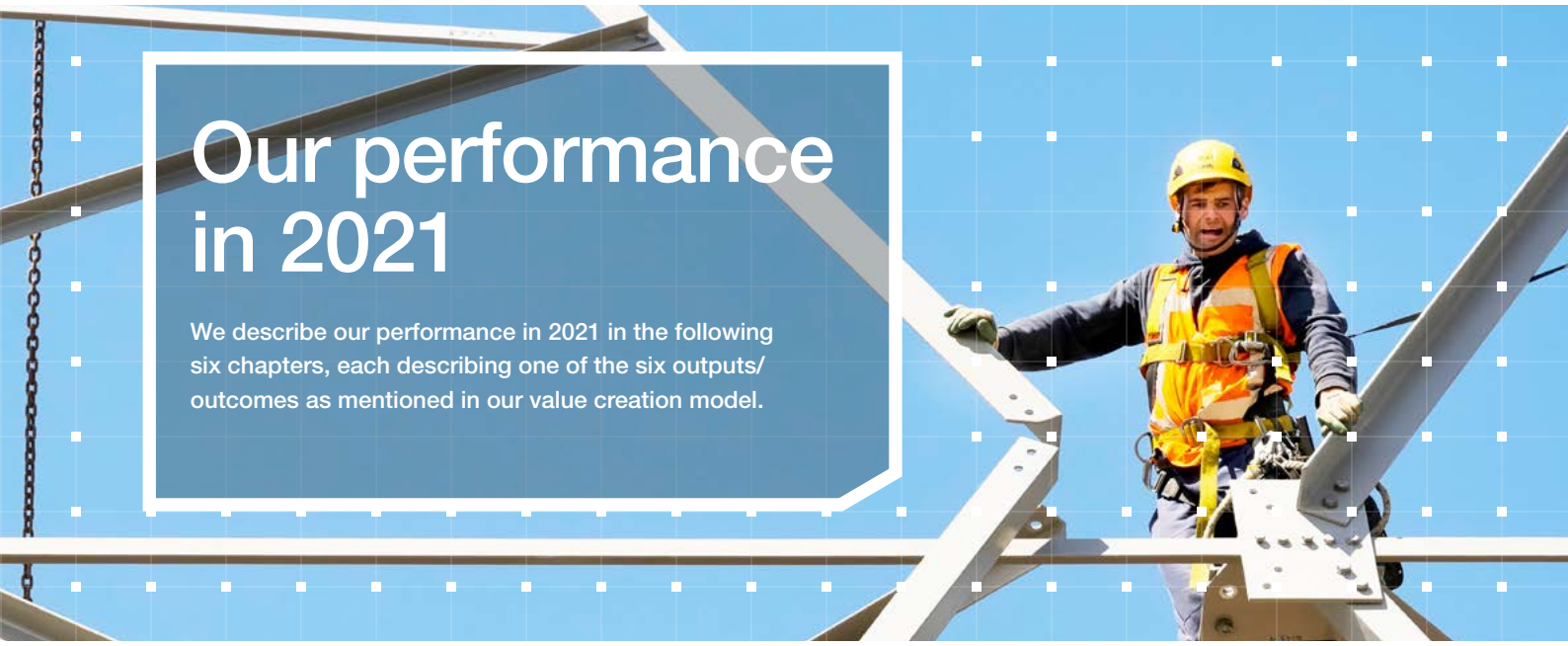


Our performance in 2021

We describe our performance in 2021 in the following six chapters, each describing one of the six outputs/ outcomes as mentioned in our value creation model.

Deliver a high security of supply

TenneT has a clear and critical task: to ensure the continuous supply of electricity for almost 43 million end-users across the Netherlands and Germany, 24 hours a day, 365 days a year. This goal has inspired us since the company was founded in 1998. Our commitment to provide a high level of security of supply continues to drive us today, but we must do so in a far more complex, dynamic and challenging energy landscape.

With our knowledge and experience built over the last decades, we are dedicated to providing a secure supply of electricity, today and for decades to come. Our end-users expect a near-perfect 99.99% supply of electricity. But maintaining this level is challenging in combination with the European roadmap to achieve climate-neutrality by 2050.

The targets to reach this goal continue to grow. For example, in July, the European Union announced its “Fit for 55” package of legislation, committing to a 55% reduction in overall carbon emissions by 2030. As a large share of total greenhouse gas emissions in the EU comes from the energy sector, TenneT can play a key role in enabling this goal.

While green electricity has many advantages and will be key to achieving Europe’s climate goals, its supply by nature is intermittent. The volumes are steadily increasing in terms of wind energy – especially from the North Sea – as well solar power. But we cannot just simply connect more and more renewable energy production facilities to the grid. The characteristics of renewable energy sources (RES) concerning variability and uncertainty impacts generation dispatch, system balancing, system stability and the power flow pattern in the network. As a result, the challenge is not just to build a RES-dependent grid, but also to keep it in balance and stable at all times so we can continue to provide a high security of supply - today and tomorrow.

It is important to make responsible choices when building a greener energy future. We do not only need to make sure our grid is prepared for more RES to be connected, we also have to find flexible solutions and ensure the stability of our grid. We aim to secure supply of electricity when the sun does not shine or the wind does not blow and at the same time making the transition to a climate neutral economy.

Our performance in 2021

Onshore grid availability	Performance	Target	Status	Trend
	99.99999% 2020: 99.99995% 2019: 99.99982%	99.99962%		Our onshore grid availability was again one of our best performances in the past decade.

Offshore grid availability	Performance	Target	Status	Trend
	94.09% 2020: 94.03% 2019: 93.20%	95.10%		Despite recording a grid availability higher than 2020, we did not meet our target as we have increased our target compared to last year.

Secure supply today

We are proud to have been able to have kept our grids available 99.99999% of the time in all of our supply areas. Although we are pleased with this performance, we regret some instances of interrupted supply. An example of this relates to an interruption at the Soest substation which impacted over 50,000 households for about 20 minutes. A root cause analysis was performed to learn from this incident and for future references. Despite the interruptions that occurred in our grid, we are pleased to have been able to sustain our level of grid availability onshore grid in 2021 with a comparable availability performance we had in 2020.

We report our onshore and offshore grid availability separately, as these grids are constructed differently. There is less built-in redundancy in our offshore connections compared to our onshore grid. This means availability in the offshore grid is typically lower compared to onshore. In 2021, we achieved 94.09% offshore grid availability compared to 94.03% in 2020. Despite this being a slight improvement of our offshore grid availability, we did not manage to meet the target for 2021, which we updated to raise the bar for ourselves in this area.

Although our onshore grid availability in 2021 is among the highest reliability levels in the world, we do not take it for granted. Around the clock, TenneT has many dedicated people working to make a high security of supply possible. The focus of this work takes place at our four control centres (two in Germany and two in the Netherlands) where we operate the grid, monitor the stability and performance of the system and coordinate across borders.

As a European TSO, we are part of an interconnected European electricity grid. This ensures a stable electricity supply throughout the continent. In 2021, there were two events that split the European interconnected system in two, where the European cooperation was essential to control and minimise the impact of these events. The 2021 system splits were a warning sign that the integrated European system is being stretched close to its stability limits by the increased demands of the energy transition. These usually rare events occurred twice in 2021 – on 8 January and 24 July. The 8 January split caused a temporary separation of the South-Eastern part of Europe from the rest of the Continental European grid, while the event on July 24th temporarily disconnected the Iberian peninsula and a small part of the French grid from the rest of the Continental European grid.

Fortunately, TSOs across Europe – including TenneT – are prepared for such events with emergency and restoration plans. Following a larger disturbance in Continental Europe on 4 November 2006, new awareness and stringent countermeasures have been introduced to mitigate the consequences of system splits. These include the European Awareness System (EAS), whereby TSOs exchange real-time information in order to be able to react immediately in case of unusual system conditions.

This allows TSOs to rapidly manage such events in a coordinated manner and limit their consequences. On 8 January and 24 July, TSOs resynchronised the separated areas within very short time frames.

The learning from these events in 2021 is not only that the increased pressure on our system can destabilise security of supply, but also that cross-border collaboration between TSOs and a European interconnected system is essential for our security of supply. It also shows the need for new, strategically located and reliable flexible demand and supply solutions to balance increased volatility in the grid.

The effects of changing climate and weather patterns also stressed our grid and the security of supply. The extreme weather events in the summer of 2021 caused four of our pylons in the Netherlands to collapse, while not leading to a disruption of our supply. This is due to the way we operate our grid as we secure our grid based on the n-1 principle. This ensures that in the event of one unplanned outage, our supply remains secure.

In 2021, we faced additional challenges in our grid due to growing congestion. This occurs when a high feed-in of renewable energy sources – for example on very windy days – cannot be fully accommodated due to the limited available transmission capacity of the high-voltage grid. This endangers our security of supply as electricity cannot be transmitted across overloaded powerlines.

In these instances of congestion, TenneT needs to activate remedial actions, including costly redispatch measures. This means we ask electricity providers from e.g. conventional power plants to change their power feed-in specific locations to ensure that we do not have overloads and that the system balance is maintained. This upward and downward regulation in the network takes place on almost a daily basis.

As the amount of RES being connected to the grid grows and conventional power plants such as coal-fired units are being decommissioned, temporary congestion scenarios become more common and redispatch costs tend to rise. To illustrate this, over the past decade, our redispatch volumes have increased in parts of our German grid by a factor of approximately 10 between 2011 and 2020, due to the increasing role of renewables in the energy mix and the longer distance between generation and the use of electricity. Managing these challenges, while also securing supply and driving the energy transition, is all part of the balancing act TenneT has to perform.

Securing supply tomorrow

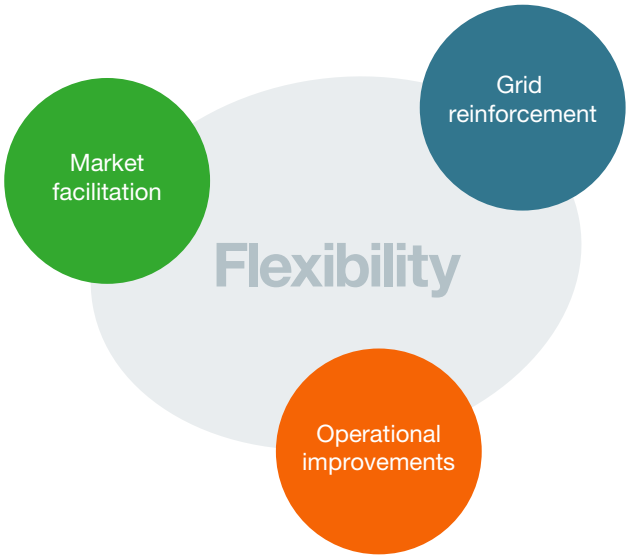
As we look ahead, we must continue to ensure a high security of supply, despite the increasing complexity of running a climate neutral energy system. Innovation will be critical to meet this challenge, not only related to more effective and efficient use of our assets, but also to boost our system operations and improve market design. To achieve this, there are three focus areas that will be essential for securing supply in the future.

Societal value of the availability of our grid

Transmitting electricity to large industries and via DSOs to millions of households powers and empowers society. This is our main task and also our main societal impact as a company. Designing, building, maintaining and operating a grid that is available all the time is the most important impact TenneT can have for society. To ensure that the people living in the areas we serve are able to live their lives and organisations can do their work. Achieving this impact requires each part of the energy supply chain to work together, therefore this achievement is not just the result of our own actions, but this societal impact we make together with others in the supply chain, such as electricity generation companies, other TSOs and distribution system operators. Regardless, an electricity grid that is available to supply electricity to its customers for 99.99999% of the time creates value.

Our assessment, based on academic research, shows that the estimated societal value created by the availability of our Dutch grid surpasses the gross domestic product (GDP) of the Netherlands, which was over EUR 800 billion in 2020. This is because the supply of electricity does not only create economic value, but also direct and indirect benefits, such as being able to enjoy leisure time. For more information on this assessment and our methodology, please refer to the Additional CSR data document on our website. We will continue to further develop societal impact indicators during the next years and invite others to help us with this.

Our three focus areas



Grid reinforcement

To cope with the increased complexity and volatility of the energy system we must strengthen the grid. Currently, in several parts of our serving area, including provinces in the Netherlands, some sections of our grid do not have the capacity to connect more renewable energy sources. For example, in September 2021 the Dutch regulator ACM was notified that the grid capacity in the province of Gelderland and the Flevopolder region reaches its limits. The rapid growth of wind farms and solar farms in these areas is leading to congestion in the system. With additional transformers and adjustments to the regional high-voltage grid, we aim to create structural solutions, with plans to invest up to EUR 450 million on measures to reinforce the grid in these regions. Also in December 2021, we announced that we will invest up to EUR 650 million in the Amsterdam area to reinforce the grid. Going forward, we expect to identify more of these bottlenecks which we will resolve to ensure that our grid is future-proof and can support the energy transition. We have created a 'grid capacity map' in 2021 to identify such bottlenecks in the Netherlands, which can be found on our corporate website. These measures however can take considerable time, particularly in the permitting and licensing phase, and are faced with increasing scarcity of hardware and other resources from our suppliers. For more on this, please refer to our 'Ensure a critical infrastructure' chapter.

Market facilitation

To secure supply now and in the future, an integrated European grid is a key requirement. To this end, we have been working closely with other European TSOs and power exchanges for the past 15 years to connect electricity markets, both physically as well as commercially. A connected grid and integrated market has many advantages, such as a more reliable supply of electricity at a fair price. Interconnected cross-border grids allow electricity to be imported and exported, which helps to maintain affordable prices in a dynamic market and helps TSOs to balance supply and demand.

Cross-border interconnections play a particularly important role in the import and export of green electricity. When there is less demand than supply of renewable electricity, the excess supply can be exported. Vice versa, in situations when there is more demand for renewable energy sources than can be supplied at any particular time or location, international interconnectors make imports of electricity from other areas of the grid possible as an alternative to balance the grid.

The delivery of the NordLink cable (see 'Ensure a critical infrastructure for society' chapter) is an example of what we have achieved in 2021 to create cross-border connections that facilitate the exchange of renewable electricity. This 623 km interconnector between Germany and Norway was commissioned in May 2021 and has a capacity of 1,400 MW.

Next to that TenneT is working together with other European TSOs to further harmonise and improve the functioning of the markets and develop new products being valuable for market participants as well as support further cross-border energy exchanges. All these developments are continuously being aligned with ministries, regulators and market participants.

To further facilitate a smooth functioning of the market in Germany and the Netherlands we work together continuously with DSO's and market parties to improve data exchange processes. This improves security and efficiency of these processes, but it also to paves the way for new market activities in the field of flexibility.

Operational improvements

As well as building new assets, we must also invest in new concepts for operating the grid, making a more efficient and optimised use of our system through new digital solutions. With our Control Room of the Future project, we aim to fundamentally redesign our grid control systems to make them fit for the future. Another example of how to make use of digital innovation to secure future supply is the InnoSys2030 project. TenneT's development of digital innovations and partnerships is growing rapidly.

It helps to strengthen our capacity for data analysis and exchange, improves our ability to calculate capacity across Europe and enhances decision support and the stability and efficiency of the system. For more examples see our 'Solve societal challenges with stakeholders and through partnerships' chapter.

Flexibility in demand and supply of electricity

At the centre of these three priorities is flexibility. Feeding more RES into the electricity system creates a challenge to keep the grid balanced and ensure security of supply. Traditionally, Transmission System Operators have used fossil-fuelled power plants to provide the flexible power needed to keep the grid balanced. Now, we are looking for new sources of flexibility.

Flexibility is a key requirement of future energy markets. The broader we facilitate the market to unlock flexibility at the right location, through innovation and partnerships, the more stability and security we will build into the grid. Hence, we are exploring multiple innovations through our focused Flexibility, Innovation and Digital Portfolio approach. Through these, we intend to unlock flexibility technologies by market parties. This will enable us to drive, develop and integrate partnerships, participations and projects for new and data-driven business opportunities. For example, we have engaged in crowd balancing platforms, collaborating with multiple partners to unlock flexibility from electricity stored in consumer-owned devices, such as electric vehicles and heat pumps. Our participation in GOPACS platform (Grid Operators Platform for Congestion Solutions) together with the DSOs and the Equigy platform, with fellow European TSOs – are examples of this engagement.

System resilience

Delivering a high security of supply is only possible when all steps to ensure the integrity and stability of our grid have been taken. This requires us to consider many risk scenarios, including potential security threats ranging from copper theft to cyber-attacks. Extreme weather events are another increasingly common threat to our system resilience, requiring us to take risk mitigation measures related to the design and construction of our assets, as well as providing system back-up of IT systems in the event of failure. We treat the possibility of a severe outage resulting from extreme weather and all types of security incidents very seriously. Protection against them is an essential aspect of our security of supply resilience. We cannot rule out these types of events entirely, despite prevention measures that are continuously assessed, optimised and tested. In addition, we develop, align and carry out contingency plans together with national authorities to mitigate these risks.

What could prevent us from realising our goals?

As our grid becomes more reliant on renewable energy being weather-dependent electricity sources, we face more challenges for how we operate our grid in its current form and also plan for its expansion in the future. In parallel, there is uncertainty about the future strategy on the phase out of conventional energy production and the future expansion of renewables could lead to adaptions and shortages in electricity production and reduced leeway for TSOs. We must ensure our grid is future-proof and remains stable to limit congestion scenarios, cost of redispatch. We have defined and started multiple strategic initiatives to ensure our system is up to the task and back-up in the event of failure are available.

However, our strategic plans are challenged with uncertainty on a national and/or European level concerning ambitious climate targets entailing a surge of renewable expansion, political decision-making and the phase-out of conventional energy sources. In the short-term, these uncertainties can hinder investment decisions in the European grid. Furthermore, the climate targets lead towards an increase of the grid connection requests. Due to this increasing demand, for some areas in the Netherlands our capacity to connect customers is limited and requests cannot be met on time. To mitigate this situation TenneT works intensively with all relevant stakeholders, such as but not limited to the Dutch State, customers and constructors, to plan appropriately, to inform what is achievable including our ability to grow and to set the right priorities to all stakeholders as well as to assess the investment plans for the coming years.

New technologies help us mitigate risks related to security of supply, particularly digitalisation has a potential to make optimal use of our grid. For example, data analytics can help us gain insights on how we can use weather predications, assess real-time electricity demand, survey our assets and also help us to keep the grid in balance by connecting to an increasing number of producers and consumers. However, although technology will play a crucial role in realising the energy transition, there are currently no decisive breakthroughs that will simultaneously guarantee security of supply, affordability for society and competitiveness of industry prices.

We foresee that the technological answers will be a mix of technologies, use of digital solutions and data, market design and price models, sector coupling, standardisation, new types or functionality of cables and lines, transformers as well as other assets to transmit energy. However, as innovations are used in the market, the risks connected to the use of innovations relate to an increased risk of outages due to new and unforeseen technical failures that has not been observed before with older but familiar technology. Some of our older assets require more maintenance work and downtime and present a growing logistical challenge and cost. As such, TenneT is actively involved in defining high quality standards from suppliers and service providers and builds rigorous test procedures into its project planning and guarantee periods into its supplier contracts.

These uncertainties do not only concern the application of new technologies, but also the social environment, the level of European collaboration to foster cross-border solutions, the progress with sector coupling, the integrated decarbonisation and the ongoing politics of the green industry. This is relatively new territory for players in the European energy system, it carries great opportunities, but also risks that need to be appropriately managed.

As mentioned, extreme weather, vandalism, theft and cyber security incidents present ongoing threats on our system resilience across our sector. To ensure we are prepared for these risks and any repercussions, we continuously work on understanding them and how best to handle them internally and in partnership with other parties.

In terms of our cyber-security resilience, an important moment in 2021 was the successful recertification of ISO 27001 ISMS in Germany. The ISO 27000 standards are designed to assist companies in managing cyber-security risks. TenneT is preparing itself for the upcoming EU legislation, Network Code for Cyber Security, which will bring new requirements the Netherlands and Germany.

Lieve Declercq

CEO of SPIE Nederland

SPIE Nederland is a key partner for TenneT in the design, construction and implementation of energy assets, including power lines and substations. We need to tackle large projects in energy and infrastructure in parallel, working faster by being smarter.

"The Netherlands has a lot of smart minds working together on the energy transition.

The energy transition is an enormous challenge and, as a partner of TenneT, we are at the heart of the action. Technical services companies like SPIE play a crucial role, and good cooperation among all partners in the chain, including with TenneT, is essential to achieving the goals of the energy transition. The Netherlands has a lot of smart minds working together on this, but all their activities need to be linked together. We need to tackle large projects in energy and infrastructure in parallel, working faster by being smarter. If we continue in the old traditional ways, we will never complete the renewal of the Dutch infrastructure in time. However, as all players accelerate their work, safety must remain our top priority. I don't lose sleep over many things, but safety is something that is always on my mind. Our people often work in special circumstances, at great heights and with high electrical voltage. My principle is simple: you work safely, or you don't work at all. I am guided by a clear principle: 'I am uncompromising on safety and the project will be finished on time."

"The Netherlands has a lot of smart minds working together on the energy transition."

Ensure critical infrastructure for society

Building, maintaining and operating the high-voltage electricity grid that millions of homes and businesses depend on is the most important business activity of TenneT. As Europe strives to become climate neutral by 2050, the electricity infrastructure at the heart of the energy transition is undergoing a fundamental redesign, which presents significant challenges for TenneT in the years ahead.

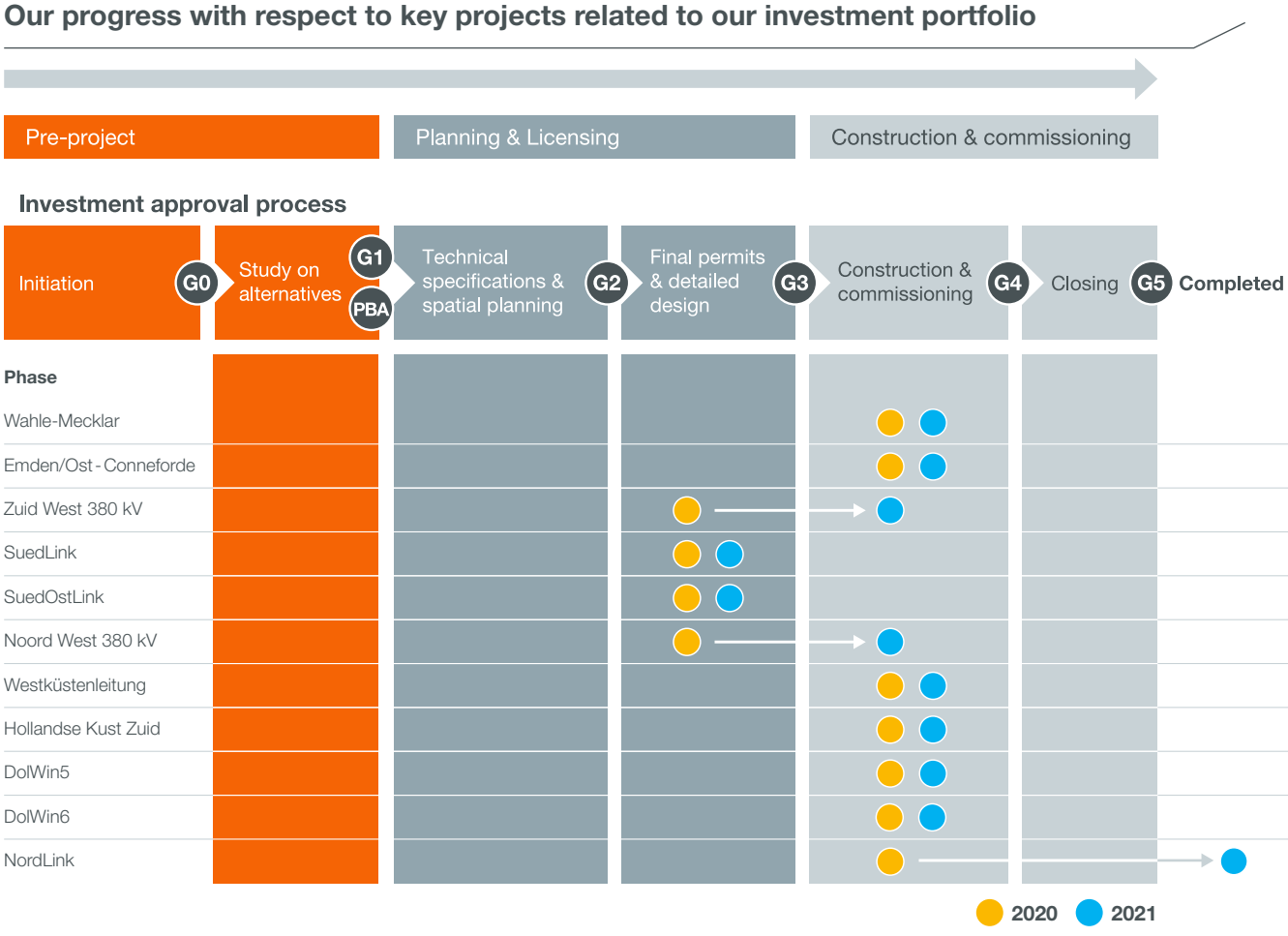
TenneT has a clear and constant societal task: to provide society with a secure supply of electricity, while driving the energy transition and facilitating the European cross-border electricity market. Our extra high-voltage electricity grid transmits electricity over long distances, across sea and land, to help power homes and businesses. With the materials and products we use to build and maintain our grid, such as our cables, pylons, (sub)stations and interconnectors, we create the critical infrastructure that people and businesses depend on every day.

While providing power supply is crucial today, the development and transformation of our electricity system will play an even more critical role in the next decades in the transition to a clean, climate-neutral world.

The European energy transition is one of the biggest challenges of our times with a goal to make Europe the world's first climate-neutral continent by 2050 and reduce emissions by 55% by 2030. Germany aims to be climate-neutral already by 2045, while the Netherlands aims to be climate-neutral in 2050.

To prepare the infrastructure that will help to reach these goals, TenneT aims to have realised thousands of kilometers of new high-voltage overhead lines, substations and cables and have connected nearly 30 GW of offshore wind energy by 2030. To achieve this, we plan to increase our average annual investment volume to at least EUR 6 billion while increasing the maintenance of our network in the coming years.

Our progress with respect to key projects related to our investment portfolio



The scale of this challenge means that we must step up to expand our grid and grow our organisation more rapidly. At the same time, we need to consider how we can grow in a responsible way. This not only includes building assets to reinforce our grid to make it future-proof, but also means exploring other solutions, such as making smarter use of our existing assets. By using new technology, engaging in partnerships and using agile working methods and other innovative approaches, we can build a greener energy future through other means than grid expansion alone.

We must consider how to develop our critical infrastructure in a sustainable manner. That means acting responsible when it comes to the materials we use to build and maintain our assets, especially if they are scarce, such as virgin copper. In addition, the number of new employees we can onboard and integrate into our organisation within a single year is finite. Furthermore, there is limited space to build our assets in the natural landscape.

Realising our grid investments is characterised by three different phases. The Initiation phase starts with identifying capacity constraints in the electricity grid. At this stage, it is decided to either accept the capacity constraint or to solve it with new or upgraded infrastructure. Thereafter, the planning and licensing phase begins, where other aspects are considered, such as the spatial planning of the project. After a final investment decision has been made, permits are requested and final design details are formalised. Several tenders are issued or framework contracts are used to award a contract for the engineering, construction and commissioning phase of the project. When the project is administratively closed, it is formally completed. The majority of the project time currently relates to the first two phases, particularly planning & licensing, which may take up to eight years. The actual construction of assets takes significantly less time, usually two to four years. In order to reach the 2030 and 2050 CO_2 reduction targets primarily the planning and licensing phase needs to shorten significantly.

Our performance in 2021

Future proof grid Investments in EUR million	Performance	Target	Status	Trend
	3,969 (2021) / 3,412 (2020) / 3,064 (2019)	3,905		We are again in the fortunate situation that we have succeeded in reaching our 2021 investment target and recorded a higher investment amount than last year.

We have maintained strong progress with our investments, as we continued to stay on track with the majority of our critical infrastructure projects during 2021, with 3,967 million invested in the Dutch and German high-voltage grids – a 16% increase compared to EUR 3.4 billion in 2020. There were some areas of our portfolio where this was not the case, such as our DolWin5 offshore project, where the effects of the pandemic caused delays. Construction of the platform at the Singapore shipyard is currently behind schedule due to restrictions related to the COVID-19 pandemic, including labor and travel restrictions to Singapore. Against this background, in December 2021, TenneT asked the BNetzA for approval to postpone the expected completion date of the grid connection system from October 1, 2024 to October 1, 2025. Despite the challenging circumstances, 2021 was still another record year of investment for TenneT. We are proud that we have been able to meet our investment target, thanks to the efforts of many colleagues and contractors helping us to realise these projects.

Stakeholder engagement

In order to construct and maintain the critical infrastructure required to drive the energy transition, it is crucial to engage with local communities, NGOs and politicians at the earliest stage of a project to address their concerns and gain their understanding. As we expand our network, we must do so responsibly, by building a dialogue and gaining acceptance with local communities.

As a result, our work involves a delicate balance: what is desired on a national level is not always welcomed by local communities. To meet this challenge, we aim to do this in a responsible, engaged and connected way. We act responsibly in how we fulfil our role in society, engaged in how we build acceptance for our actions and connected in our dialogue with stakeholders. When we start a new project, we engage with the stakeholders affected, listen to their concerns and needs, and provide information about the project to evaluate and discuss.

Although we take the opinions of stakeholders seriously, receiving new opinions after we have already followed a due process to include opinions in an earlier stage might cause additional delays. We benefit from clear outcomes of our stakeholder engagement which enable us to plan and move ahead with certainty. The planning and licencing phases of our projects take up by far the most time in the realisation of our assets and with that, can slow the progress we need to drive the energy transition and achieve climate goals.

An example of the challenges we face in this regard is the offshore project 'Ten Noorden van de Waddeneilanden', which involves laying underground cables across the island of Schiermonnikoog – as part of a project to connect to a wind farm north of the island at Eemshaven. The planning of the project required extensive stakeholder engagement, as the proposal to bury cables across natural landscapes of the island met strong opposition from local citizens and environmental organisations. A decision on the final routing of the cable is therefore delayed and expected in 2022 at the earliest.

In most projects, we have observed a strong preference for underground cabling compared to overhead lines, despite this being generally more costly and less reliable. Together with project stakeholders, we aim to find the best solutions for each situation and consider the viewpoints of all involved. That is why we organise meetings and workshops during the early stages of a project. In the case of the project on Schiermonnikoog, a number of meetings were held with several stakeholders such as landowners and other local communities, in-person and also digitally. We informed them about the plans and status of the project and provided them with the opportunity to ask questions.

Offshore

Offshore wind plays a crucial role in the energy transition as the European Commission aims to connect 300 GW by 2050. The North Sea will play a crucial role, acting as a wind energy powerhouse for Europe. Germany and The Netherlands thus have set ambitious offshore energy goals: by 2030 alone, they want to achieve a capacity of 30 GW and approximately 11.5 GW respectively. To ensure that we can deliver the infrastructure that supports these goals, we are striving to connect increasing volumes of offshore wind energy to the onshore grid in the most environmentally friendly ways. To guarantee optimal efficiency, we use standardised building blocks of 2 GW HVDC connections.

In 2021, we made important progress in several areas of our offshore portfolio, including the developments with respect to our 2 GW programme, the launch of the Windstrom Booster concept, the opening of NordLink and in our offshore grid connections for Hollandse Kust (Zuid) and Hollandse Kust (Noord). These examples underpin the advantages of being a cross-border TSO as this helps us to share knowledge and best practices in offshore activities. We will further elaborate on this in the sections below.

2 GW programme and the Windstrom-Booster

To be able to connect larger offshore wind farms and thus bring more energy onshore, TenneT has adopted a new offshore grid concept for future grid connections. TenneT expects to build at least six offshore grid connections with a transmission capacity of 2 GW each in Germany and the Netherlands by 2030 – three in each country.

The new concept is based on a new 525 kV HVDC cabling system, developed in co-operation with our cable suppliers with whom we are closely collaborating to ensure this ground-breaking technology is available in time.

The 2 GW programme also uses a standardised grid connection design and a standard contract model, allowing us to realise these projects faster and at lower cost. The 2 GW standard will more than double the capacity in comparison to the previous 900 MW HVDC standard used in Germany and almost triple the 700 MW AC standard applied in the Netherlands.

TenneT has already started the tender for the offshore grid connection and HVDC system in the Dutch IJmuiden Ver wind area. It is expected that this contract will be awarded by the end of 2022. The engineering for the land station was tendered recently and the cable contract will follow during 2022. The first 2 GW IJmuiden Ver connection is planned to be operational in 2028.

Building on the standards from this 2 GW programme, our insights from the North Sea Wind Power Hub consortium and supplemented by additional technological developments, we presented a new concept: our '6 GW Windstrom-Booster' concept. This concept aims to connect three offshore grid connection systems in such a way that 6 GW of power is bundled together, with an accelerated offshore planning, less spatial use and with the potential to efficiently link onshore customers as well as offshore interconnections. 2022 the further implementation will be elaborated in cooperation with the government and other offshore TSO's.

NordLink opening

A key milestone in our 2021 critical infrastructure programme was the official opening in May of NordLink – the first interconnector between Germany and Norway. The high-voltage subsea cable took five years to complete, at a cost of EUR 1.8 billion. NordLink is a landmark project as the 623 km DC link will enable the exchange of 1,400 MW of renewable electricity– wind power from Germany and hydropower from Norway – thus contributing to the energy transition in Germany and Europe. This capacity would be enough to power the equivalent of around 3.6 million German households with green electricity.

Hollandse Kust (Zuid) and Hollandse Kust (Noord)

TenneT is building two transformer platforms, Hollandse Kust Zuid Alpha and Beta, for the offshore grid connection of the wind farm Hollandse Kust Zuid. In June, the second jacket (Beta) of TenneT's offshore connection system was installed, 22 kilometres off the coast of The Hague. The almost 3,000-tonne jacket, anchored to the seabed by six approximately 60-metre piles, is the foundation for one of two transformer stations for the Hollandse Kust (Zuid) windfarm, each with a capacity of 700 MW. The connection for the wind farms will be ready for use in 2022, when offshore wind energy will be fed into TenneT's onshore Randstad 380 kV Zuid ring for further transmission to electricity consumers.

In the final quarter of 2021, the jacket of Hollande Kust (Noord) was installed, an offshore transformer grid connection system, 18 kilometres from the coast of Egmond. The planning for this project is to be completed in 2023.

In January 2022, due to the weather events related to storm Corrie, a adrift cargo vessel collided with the jacket of Hollandse Kust Zuid Beta. Fortunately there were no people working there at that moment. We are currently investigating the effects of this collision, to get a clear picture of the exact damage to the jacket so that we can make a plan for necessary repairs.

Onshore

As part of our onshore portfolio, we realise projects to help secure supply and drive the energy transition. Many of these projects concern building new connections and substations as well as are reinforcement of the grid in order to connect more renewable energy sources. All of these lines help us transmit the increasing amount of green electricity over the long distances from where it is generated to where it is consumed.

TenneT onshore grid expansion projects met a challenge during 2021 with a new law in Germany that affects our long-distance DC cable corridors. These are strategically important as they carry wind-generated electricity from the North Sea into the heavily populated and industrialised southern part of Germany. A new clause in the Energy Industry Act (EnWG) stipulates that the TSO responsible for the area in which the DC cable ends, is now responsible for the whole project. The aim of the legislation is to create

a better balance of responsibility for strategically important DC interconnectors between the four Germany TSOs. As a result, we handed over the responsibility of the southern part of the NorthwestLink project (B-Korridor) to Amprion.

SuedLink and SuedOstLink

Despite the uncertainties of the legal changes, the strategically important SuedLink and SuedOstLink DC projects reached an important phase in 2021 as for both projects the so called corridors are approved by the German regulator BNetzA. SuedLink is a 700 km, EUR 10 billion DC connection, carrying wind-generated electricity from Germany's north coast to energy-intensive industry in the southern part of the country. The SuedOstLink will also carry wind-generated electricity to southern Germany, running from Saxony-Anhalt to Bavaria. Both projects are facing some delays in the current licensing phase due to various issues, such as changes in scope, additional routing alternatives and shortages in the service provider markets. The plan approvals for first sections are expected for 2023 which means that the preparations for the construction phase are now up and running. The cables and converter stations for both projects have been procured and the production of the cables has been planned for early 2022.

Wahle-Mecklar

The increasing amount of renewable energy fed into the grid in Schleswig-Holstein has made it necessary to expand the existing grid structure. The planned Wahle-Mecklar extra high voltage line aims to connect the transformer substation in Wahle near Braunschweig in Lower Saxony with Mecklar near Ludwigsau transformer substation in Hesse at a voltage of 380 kV. A line with a length of around 230 km will be realised and includes a 380 kV overhead line with three underground cabling sections as well as five substations (UW). The aim is to realise this project by 2024. In 2021, the construction works for the last section was put out to tender and partly awarded and the construction continued in three sections. The planning approval decision for the remaining fourth section has already been received. Furthermore, construction activities were completed at one substation, and another station substation will be finished in 2022.

Westküstenleitung

The Westküstenleitung in Schleswig-Holstein relates to a 380 kV line to be realised between Brunsbüttel and the federal border with Denmark and has a total length of around 140 km. Next to this, also five substations are part of the realisation of this project. The third section of this line has been commissioned in September 2021 and with that the first three out of five sections have already been commissioned. The entire project is planned to be realised in 2023.

Zuid-West 380 kV West

We started the construction of a new 380 kV connection between Borssele and Rilland. This power highway is essential for transmitting electricity from existing and future wind farms in the North Sea to the southwest of the Netherlands. In addition, the new connection is important for the exchange of electricity with Belgium. The Borssele to Rilland section is one half of a longer corridor that will extend to Tilburg.

Noord-West 380 kV

This project relates to the construction of the new 380 kV overhead connection between Eemshaven and Vierverlaten (Groningen) and a new 380 kV substation in Vierverlaten. The project is well on track to realise the scheduled ISD in 2023. After a long and intense planning and permitting phase, the construction is developing in accordance with the best case project schedule.

Maintain the grid to meet reliability targets

In addition to investment in new infrastructure, we are increasing our investments in maintenance. Ensuring that our grid is fit to operate at its maximum capacity is key to our ongoing commitment to secure supply today and in the future and to our maintenance strategy. However, as our grid becomes larger and more complex, and considering that some of our older assets were installed in the 1950s and 60s and even before, our maintenance work presents a growing logistical challenge and at increasing costs. The focused application of our maintenance efforts is helping to maintain the availability of our grid and to do more with scarce resources.

We are developing smarter ways to assess the condition and performance of our assets, which allows us to forecast more accurately when maintenance and replacement work is needed. We also use data analytics to predict failures, which helps us manage the right timing for planned outages to perform maintenance work. By maximising the accuracy of knowing when and where maintenance is needed, we can minimise our outage windows and match it with the appropriate people and available equipment. This reduces the likelihood of unplanned failures in the system, which cause a reduction in the available windows for planned maintenance.

Supply chain management

Given the volatile supplier market and our ambitious investment portfolio we are looking to improve our relationships with our contractors. Joint growth is required as both TenneT and our contractors need to grow to meet the challenges of tomorrow. Contractors are one of our key stakeholders, bringing valuable expertise and capacity to make the energy transition happen. Our unit Supply Chain Management uses the so-called integrated Supply Chain Management programme to mitigate the risks of increasing scarcity of materials and services, the price increases of raw materials and the unpredictability of global logistics. The goal of this programme is to build partnerships with our most important suppliers based on trust, transparency, and mutual respect. Understanding each other's interests, wanting to learn from each other, to improve operations and to jointly work on improvement projects, all on the basis of equality. This should result in increasing the reliability of our supply chains, efficient co-operation and a good safety performance. This philosophy is now piloted in the EU-303 framework contract with the scope of building and maintaining substations onshore NL, with nine of our international supply chain partners. Further EU-30x and other framework contracts will be developed in the course of 2022.

As we rely on our suppliers to provide essential services, components and materials for our work, such as pylons, transformers, HVDC technology and power lines, we want to ensure that none of them are, directly or indirectly, involved in conduct that does not meet our policies and quality standards. This can relate to product specifications, environmental performance or human rights. Our policy is to visit suppliers and ask them detailed questions on these issues. If improvements are necessary, we discuss with them how these can be made. In 2021, we performed 24 supplier visits. It is our policy to not accept suppliers who fail to meet our standards. In 2021, 20 suppliers met our standards, or were given the opportunity after taking corrective actions. 3 suppliers were not approved and 1 supplier is awaiting the result of this visit. In 2021, we made progress to embed human rights in our supply chain management and building a broader coalition to work on human rights and finetune our ambitions.

We are also working with our contractors to make progress towards our climate, circularity and nature ambitions. An example is the standardisation of a CSR tender toolbox, which we started and aim to finalise in 2022. We use an environmental cost indicator (ECI) for evaluation purposes. This is based on the methodology of a Life Cycle Assessment (LCA) which allows us to calculate the environmental impact directly into each project's cost evaluation. This includes the entire lifecycle assessment, including factors such as materials used and transport. The first pilot using this method was conducted in 2019-2020 related to our Hollandse Kust Noord grid connection system. Another large scale offshore tender IJmuiden Ver has also been published implementing this methodology. The offshore projects within our 2 GW programme will use this process as well. In addition, in 2023 a new framework agreement will be set up for various supply chain categories. Therefore, certain categories within TenneT's supply chain will become more sustainable and fairer, as it also focuses on human rights and working conditions. Further CSR tender tools include our 'raw material passport', gaining insights into aspects such as raw materials, specific human rights requirements and nature inclusive design.

TenneT employs a systematic approach to i.e. optimising maintenance efficiency, using integrated activity planning. The aim is to get the most out of our resources and people and to find the smartest balance between building and maintaining the grid.

Integrated activity planning involves a wide range of departments at TenneT, ensuring that all key stakeholders with an impact on outage planning are involved. Through close cross-functional team involvement, detailed plans are made for outage windows where essential maintenance needs to be performed.

The Supply Chain Management team is involved to gain knowledge about the market availability of critical materials. technologies and skilled resources. The results are collated and a priority is assigned to each task. This enables us to plan and execute our maintenance in an optimal way, both internally and also with our suppliers and contractors.

Next to integrated activity planning there are other initiatives on an operational level that support optimal execution of our activities, such as the Delivery Booster. This initiative is focused on boosting the efficiency of resource allocation and people for each maintenance project, by taking a holistic view across the year and taking the smartest approach based on availability of people, resources, project priority and location. Our analytical approach to maintenance is proving to have a positive effect, as 2020 and 2021 were excellent years for overall availability of our infrastructure.

Substations replacement

An important part of our work to modernise our onshore grid is to replace our ageing substations. To that end, we are engaged in a programme to replace around 140 high-voltage substations by 2031 in the Netherlands. In addition, a further 210 high-voltage substations will be upgraded or expanded. The use of EU-303 framework contracts with our suppliers aims to enhance the speed and efficiency of this work, allowing for faster procurement, standardisation, innovation and joint growth. After an approved design, we started in 2021 realising 4 of the 6 Proof of Concept stations. Including these lessons learned, we have also started the preparations for 6 of the 12 testphase stations where we will apply this approach.

What could prevent us from realising our goals?

However, there are obstacles that threaten our progress. Extreme weather events are an increasingly damaging factor, especially visible during 2021 with severe flooding and storms that hit our home markets in Germany and the Netherlands. Heavy winds caused damage to our infrastructure with 4 pylons collapsed in the province of Gelderland. Although we managed to avert a serious outage, the event forcefully illustrated the potential impact of extreme weather on our assets. It illustrates the need for an increased focus on system resilience, which we are pursuing.

Acute weather conditions are mitigated during the design, construction and maintenance of our assets, e.g. in the choice of location and the choice of materials we use. We therefore monitor developments in weather patterns to gain more experience and insights related to the scenarios and effects of extreme events. Examples of mitigation work include our Krimpen aan de IJssel substation and one of our pylons in a flood area. Both have been elevated to reduce risk. Furthermore, TenneT insures all substations and buildings during construction and operation against risks from natural catastrophes.

Another factor that continues to delay our progress is licensing and permitting. Limited space is available to build and expand our grid in the natural landscape. In the current political and regulatory climate, the majority of the duration of a critical infrastructure project can be spent on planning and licensing, which reduces time left for the actual construction. It often takes eight years to achieve the necessary permitting for a project that takes two years to construct. If we can only move at this speed, the projects needed to achieve the targets of 2030, even 2040, are already running against a tight deadline.

We need to move to a reduction of the permitting time with the political support and consensus that this requires. Therefore, we invite our stakeholders to participate and consider their viewpoints involved. Whereas, economic developments could influence the acceptance of costs associated with the energy transition. In turn, together with policy making authorities we need to build public acceptance for our critical infrastructure work by leading the debate on the energy transition and the steps needed to achieve it.

The increased competition for talent and our ongoing need to hire more people every year, continues to be a key challenge. Our headcount grew over the past year, and with a need to continue recruiting, we are reaching the limit of the number of new people we can integrate into the company each year. Also, when we hire people to work on our growing portfolio of critical infrastructure, it can take two to three years to train them for the needed specialist skills and to deploy the full impact of their work. Rather than simply getting larger with linear growth, we need to get smarter, finding new ways of working, new partnerships with our suppliers and tools, that help us deal with the challenges in front of us.

Similar to the scarcity of talent, we face more competition to reach the essential products, materials and suppliers from outside TenneT that we need to perform our work. Precise management and demand planning across our supply chain, as well as close relationships with key suppliers, will be increasingly critical to delivering our projects on time.

In order to achieve our goals and realise the energy transition, we need governments to help us. We require decisive green industry policy and a European collaboration and system integration.

In addition, our progress depends on closer cooperation between governments, other TSOs, DSOs, large customers, and key suppliers. Only jointly we can develop innovative ways to provide reliable, clean, and affordable electricity for a sustainable future. It also requires appropriate European and national legislation and regulations and an investment framework that enables us to meet the needs and objectives of society, economy and politics.

Stakeholder's acceptance for our infrastructure work is another challenge we face, especially in the communities where our work is taking place. The expansion of our high-voltage electricity grid and investments in sustainable energy solutions may significantly alter landscapes and affect a large number of people and interests. The debate on potential health risks related to our overhead transmission lines and electro-magnetic fields is still ongoing. TenneT aims to comply with rules and regulations and take sufficient caution in the construction and operation of our assets. We are also currently working together with the respective authorities and other involved stakeholders in the process of updating our policy with respect to electro-magnetic fields.

Holger Lösch

Deputy Director General of the Federation of German Industries (BDI)

BDI works together with TenneT to ensure German industry remain export-driven and innovative and promotes a climate-neutral industrialised future.

"Tackling climate change is a national and global challenge. We will not succeed without unprecedented levels of collaboration and cooperation between countries, companies and consumers.

Transforming our energy system to be CO_2-neutral is key to this ambition and industry must play a key role, both as an enabler and as a consumer. As an enabler, we must facilitate the development of renewable energy technologies, such as sun, wind, smart grids, electricity storage and green hydrogen, making them ever-more cost efficient.

As consumers, we must create processes and products that customers want, with a view to achieving climate-neutrality by the middle of this century. The level of climate ambition set out in the European and German 2030 targets does not allow us to move at a moderate speed in those sectors which are crucial to the energy transition. We will have to act much faster on renewable energy, grids and other infrastructure which help consumers reduce their CO_2 emissions. This unique transformation of the energy system offers many opportunities, but also brings risks in the short and mid-term. Minimising these risks is a challenge for industry and politics."

"Tackling climate change is a national and global challenge."

Technical data:

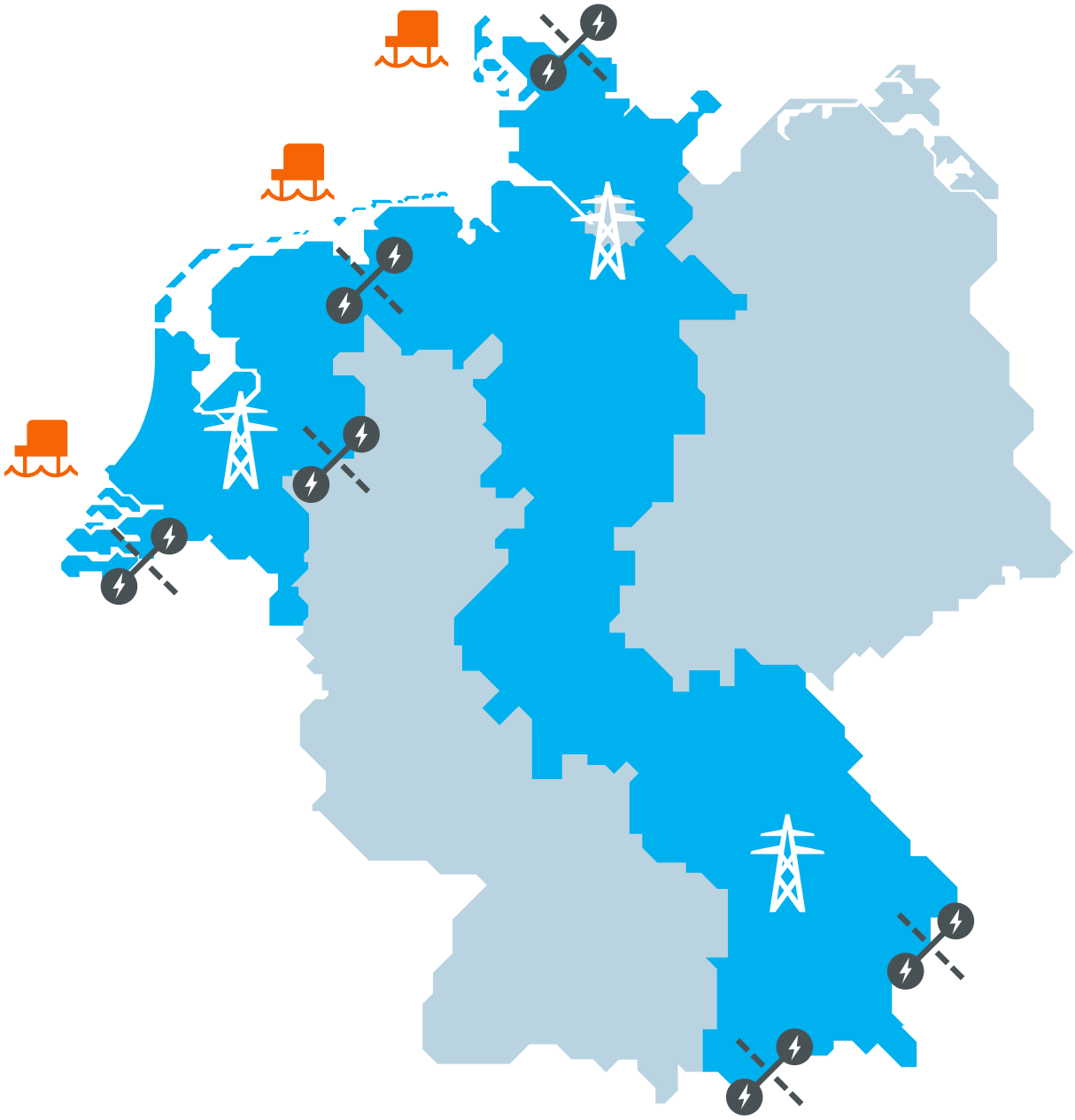
interconnectors
17
2020: 16
2019: 15

substations
475
2020: 468
2019: 462

completed offshore connections
14
2020: 14
2019: 13

Circuit length (kilometers)
24,518
2020: 23,866
2019: 23,232

pylons
approximately 27,500
2020: 27,000
2019: 26,000



Create a sustainable workplace

We regard our 6,620 dedicated internal and external employees as our most valuable assets. Our talented teams are at the heart of our efforts to meet the challenges ahead of us, as we accelerate on our path to contribute to the European energy transition targets of 2030 and 2050.

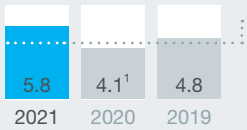
However, the scale of work required to achieve these targets and ultimately build a climate-neutral Europe, requires the deployment of a large amount of new talent. The scale and urgency of this need will grow particularly fast in the second half of this decade.

Already, our growth story has been remarkable. Since 2008, we have grown from approximately 600 to 5,168 internal employees, helping us realise annual investments that have increased from approximately EUR 275 million in 2008 to EUR 3,969 million in 2021. And, with ambitious targets ahead of us, this growth will continue.

We must be responsible in the way we grow, especially regarding our people. We can't simply keep adding more people to our organisation, as more people doing the same will not transform TenneT's ways of working to the next level. Our growth needs to be realised in a responsible manner and at a pace that achieves the output we want to deliver in the best possible way.

Not only does the demand for talent make it increasingly hard to find the people we need – especially in specialist technical roles – but it is also becoming more challenging to properly onboard and integrate new people into the organisation.

Our performance in 2021

	Performance	Target	Status	Trend
Safe workforce TRIR (including contractors)	**5.8**  	**4.5**		Regrettably, there were three fatal incidents in 2021. This also impacted our overall performance and we did not meet our target this year.
Healthy workforce Absentee rate Netherlands / Germany	**NL 3.1%** **GE 2.6%** 2021 NL 3.1, GE 2.6 2020 NL 2.7[2], GE 2.5 2019 NL 3.0, GE 3.0			We recorded a higher absentee rate than in 2020, mainly due to the impact of the pandemic. Considering these unusual circumstances, we understand the reason behind a higher absentee rate as a result of this.
Diverse workforce Diversity (% female inflow of total inflow)	**31%**	**30%** in 2023		Our efforts to attract a diverse workforce have resulted in reaching our target for a diverse workforce.

1 The 2020 TRIR is presented based on the previous definition. When applying the updated definition the 2020 TRIR is 5.4.
2 The 2020 absentee rate for the Netherlands is presented based on the previous definition. When applying the updated definition the 2020 absentee rate is 2.7.

Organise for our people to perform at their best and to work as one company

The TenneT transformation that was initiated a few years ago helps to enable us to drive the energy transition in a better way and become a more effective, innovative and exciting place to work. Responsible growth is important in this process, as it is about enabling TenneT to achieve its business and societal objectives in a way that is future proof. In the years following the transformation, we have worked hard to achieve this and significant efforts have been undertaken to create further integration of our operations in both Germany and the Netherlands. The effects of this are visible on many levels in our organisation with integrated teams and leadership.

We are convinced that now is the time to use our ingenuity and entrepreneurial spirit to increase our delivery capacity and capability. We aim to reduce bureaucracy and administrative burdens, streamline our business, attract the right talent and install better performance management processes. We want to build leadership that empowers, inspires, and creates opportunities for growth and learning. This will allow us to attract more and diverse talent and become the preferred customer of our supply partners.

And as we progress, we aim to ensure more efficient structures for onboarding new talent at a sustainable rate. This will prepare the foundation we need in the years ahead.

In addition, we are evaluating how we will manage new ways of working post-COVID-19. The current 'new normal' way of working provides an opportunity to assess the approaches that will deliver the most engagement and satisfaction for our employees and the most value for TenneT. This includes both plans for remote work and smart ways of collaborating virtually. These topics and the social implications on our employees and organisation are regularly discussed with the respective works councils and TenneT leadership.

In 2021, our cultural transformation continued to ensure that our people are engaged in our strategy, collaborate in the most productive way, and that our leadership teams are equipped to support in this process.

Employee engagement index

As we transform TenneT and create a future-oriented and sustainable workplace, it is important for us to track our progress through regular employee surveys. Our currently annual employee survey measures our employees' emotional and behavioural attachment to TenneT, the extent to which their work environment supports their productivity and performance and their overall wellbeing at work.

We pay close attention to this survey as we realise that in a fast-growing organisation, cultural change and engagement are not easy to come by. The latest survey was performed at the end of 2021 and will set the new baseline for the next two years. The result is a slight decrease as we recorded an 80% employee engagement score in 2021, compared to 82% in 2020. The insights obtained from this survey will help us in the next months to progress in areas where there is room for improvement.

Future-proof our organisation by recruiting the best talent

Despite the challenges to recruit a significant number of people in a highly competitive labour market and the difficulty of onboarding and integrating large numbers of people during COVID-19, we were able to welcome 1,316 new internal employees to TenneT in 2021. Nearly all needed to be onboarded virtually, posing a significant challenge that we mastered well considering the circumstances. We expect to continue this pace of recruitment, while keeping in mind the importance of safe and effective onboarding. We have set a maximum of around 700 additional FTEs for 2022 and expect a similar number of employees to join us annually for the upcoming years.

In certain roles finding talent can be especially difficult. For some specific technical functions, talent is extremely scarce. In other roles, such as technicians working in the field, it can take up two to three years to train someone to the required level, not to mention the recruitment time itself.

The challenge of recruitment makes it even more essential to bring out the best in our current workforce, with additional training for their current role and to help them develop to new positions. This also helps to retain the right people.

To access talent we continue relations with universities and other educational institutes and establish new ones. In Germany, we partnered up with the University of Bayreuth in October 2021 to facilitate knowledge exchange and joint research projects. In the Netherlands we have a programme called Power Minor. This is a unique partnership between TenneT and the Hogeschool van Arnhem en Nijmegen, The Hague University of Applied Sciences and the Hogeschool van Amsterdam. It takes students behind the scenes of electricity production, transmission and distribution, with guest lectures from experts in the energy sector and helps to make the link between engineering theory and its application in a career at TenneT. In 2021, approximately 30 students participated in this program.

We also expand the geographic reach of our search, using our International Trainee Programme, and targeting candidates to train for our skilled field operations roles, such as our High-Voltage Trainee programme.

Build leadership that empowers

Central to the success of TenneT is embedding and broadening our leadership capabilities to enable our leaders to be in the driver seat of our transformation, building new ways of working that are open, curious, courageous, and focused on learning and growing. To this end, we have commenced our Lead Your Team programme. With an emphasis on people and change management, this programme is based on the competencies our leaders and all employees will need to meet the challenges ahead. A mandatory requirement for all leaders of the new TenneT departments, Lead Your Team is designed to be a shared journey, helping to embed our principles of ownership, courage and connection, and collaborating with leaders towards a new culture with new behaviours and ways of working.

In 2021, five additional learning blocks were included in the programme: Health & Vitality, Inclusion & Diversity, Leading in Complex Environments, Feedback and Magic Mirrors. Safety is fully integrated into our leaders training, as all skills learned within the learning blocks of Lead Your Team can be put into practice in the Safety Leadership Programme.

As part of a learning organisation, we run several campaigns that immerse our people in our culture and strategy and build a full understanding of our purpose, promise and principles. To further embed our company strategy within all layers of our organisation, we also organised a strategy event where we engaged employees in each pillar of TenneT's strategy.

Safety at TenneT

TenneT has an important role to play with respect to the energy transition. The ambitions of the governments and society we serve are very high, and TenneT and others in the energy sector need to deliver in an increasing rapid pace. The transition towards a brighter energy future comes with new demands, more complicated services and projects and an accelerating growth of our organisation and involved contractors. In this context, safety needs our energy, now more than ever before. To do this, we are launching a new safety strategy with concrete actions for the upcoming years. The strategy does not only focus on occupational safety, but also on psycho-social, external and electrical safety.

Our safety strategy 2026 consists of four pillars: solid basis, safety culture, contractor management and continuous improvement. For each of these pillars, focus areas with corresponding actions have been defined. These actions include the enhancement of a pro-active safety culture and the implementation of an occupational health and safety management system. Furthermore, attention will be paid to contractor management with focus on creating partnerships and improving safety performance within supply chains. Another pillar aims at increasing the learning potential from positive and negative events in order to ensure continuous improvement.

To push our safety culture, we introduced our Safety Leadership Program, with the motto 'Safety needs our Energy', to enhance a pro-active safety culture within TenneT. We see this as an essential step. It provides a behavioural framework in order to develop a positive and stimulating environment in which all our employees and (sub)contractors can work safely. This is supported with a program to make it an integral part of our leadership, behaviour and processes.

We continue to measure our own safety culture using the Safety Culture Ladder (SCL). This is a NEN standard for assessing safety culture within organisations and indicates the maturity of a company in the field of safety awareness, attitude and behaviour. TenneT has been recertified at level 3 (out of 5) in 2021. We aim for level 4 within the next years. Some pilot projects, for example, Noord-West 380 kV from the Large Projects Netherlands unit, are already taking actions in this regard. We aim to achieve 100% coverage of our order volume which is executed by our contractors executing high and medium safety risk activities. We are proud to state that per year-end 2021 almost 92% of our order volume relates to contractors that were certified or were in the process of getting certified.

Bring out the best in our people in an inclusive and safe environment

Safety

We measure our safety performance by means of the Total Recordable Incident Rate (TRIR) KPI, which represents the number of accidents per million hours worked. All incidents, near misses and unsafe situations are recorded via a central reporting and documentation system. Incidents that require medical treatment, affect the ability to work or result in at least one day of absence, as well as fatal accidents are included in the TRIR. Regarding these types of incidents, we recorded a TRIR (related to our internal and external employees) of 5,79 in 2021, which was unfortunately above our target value of 4.5 and also above the 4.1 recorded in 2020.

The fact that in 2021 three people working on our projects suffered fatal injuries is unacceptable and deeply regrettable.

The first fatal injury occurred on 7 April 2021, where one of our contractors died as a result of an accident during the installation of a reinforcement cage while performing foundation work on the Wahle-Mecklar overhead line project at a site located near the municipality of Woltwiesche, Germany. Another fatality occurred on 13 September 2021, one of our contractors was victim of a fatal accident during the clearing of a construction site for the Emden/ Ost-Conneforde grid expansion project in the municipality of Großefehn, Germany. And finally, on 2 December 2021, one of our contractors was fatally injured in an electrical accident while performing works on a transformer house at the Borken substation in Hesse, Germany.

Following each incident, we responded by strengthening our safety culture for all employees and (sub)contractors and conducted an incident investigation together with the involved companies. Directly after the incidents in September and December, we held a 'Safety Stand Down' at all TenneT locations, including the home-offices. During this planned work stoppage and in open dialogue, managers and employees discussed everyone's safety, working together to assess what could be improved.

We are aware that focus and effort on contractor management is key. Contractors bring in valuable expertise and capacity needed to make the energy transition happen. This requires partnerships based on trust, transparency and mutual respect to achieve efficient operations and a good safety performance. Aligned with our vision 'Safety needs our Energy', we are building a pro-active safety culture. This philosophy is now piloted in the EU-303 framework contract, with the scope of building and maintaining substations onshore NL, with nine of our international partners.

Dealing with the COVID-19 pandemic also posed challenges in 2021. TenneT's prevention team and internal working groups performed risk assessments defined measures, such as hygiene concepts to protect the employees and ensure business continuity. This has successfully prevented the spread of infections among the workforce.

Inclusion & Diversity

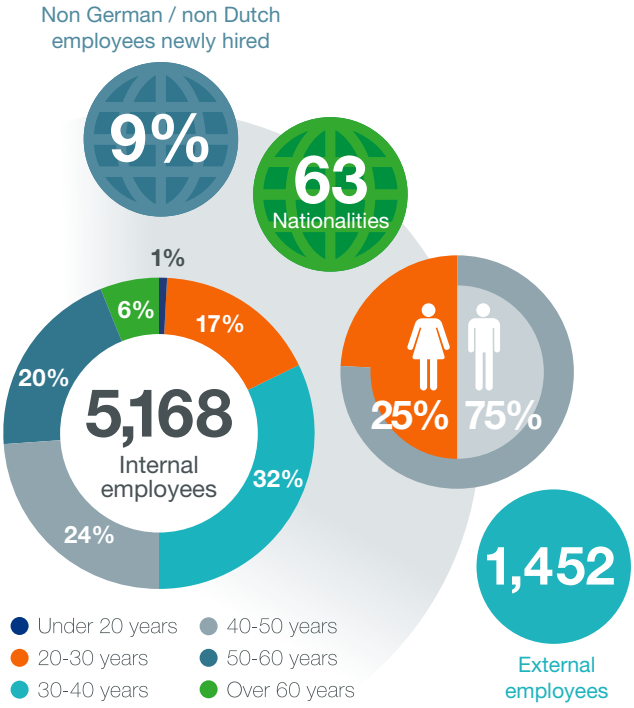
Inclusion and diversity (I&D) is critical for TenneT to attract, retain and develop talent and ensure future success. TenneT aims to reflect the society it serves, by being inclusive as an employer, promoting diversity and making our people feel safe and supported at work. In our sector, where we face the technological and engineering challenges of the energy transition, diverse talents and perspectives help us find the solutions and responsible growth we need.

We believe that an inclusive workplace culture is the prerequisite for diversity. We also strongly believe and experience that inclusion and diversity leads to more innovation and creativity as well as sustainable success. Employees feeling accepted, heard, worthy and safe are emotionally more engaged.

Moreover, we are becoming a more diverse organisation as we extend our recruitment efforts beyond the Netherlands and Germany. We have a target to hire at least 10% non-Dutch and non-German staff. As we need to recruit hundreds of new employees every year, we have to hire from a more diverse pool to find the talent we need.

Recruiting professionals with non-Dutch and non-German passports is challenging as national tax laws inside and outside Europe are not conducive to hire international employees, unless they are willing to settle in the Netherlands or Germany.

Diversity at TenneT



As of this 2021, inclusion and diversity is part of the leadership development program in the Lead Your Team program. This learning block shows that for TenneT inclusive leadership is the standard unleashing the potential of contrasting perspectives and backgrounds due to different gender, ethnicity, personality, education and age mix.

In addition, we also took steps to embed an I&D focus into every step of the employee journey. This goes all the way from how we attract candidates and how we remove unconscious bias from our recruitment process, to how we remove bias from job selection promotion decisions and take learnings from exit interviews. We have requested the Dutch Central Bureau of Statistics to research the cultural diversity of our Dutch workforce via the 'Barometer Cultural Diversity'. In decisions with consequences for rewards and benefits, we strive for equal pay for equal work. This is why in 2021 TenneT has conducted its first investigation into a gender salary gap. The first results of this assessment indicate that a potential gender salary gap might exist in the Netherlands and in Germany. This gender salary gap could have been created over the years by legal and cultural differences in both countries. In 2022, we will continue to monitor this gender salary gap and gain more insight in which areas it is more likely to occur.

Diversity charter

In 2021 our CEO Manon van Beek and COO Tim Meyerjürgens signed a new diversity charter on behalf of TenneT in the Netherlands and in Germany. This is a manifesto in which organisations declare their commitment to more diversity in the workplace. The aim is to overcome differences between employees and to recognise and utilise the talents of all individuals. The diversity charter also gives us a platform where we can exchange ideas and learnings with other companies. Thus, we are committed to continuously working on I&D and also to transparently report on our I&D progress through Key Performance Indicators (KPIs), such as percentage new hires with non-Dutch and non-German nationality, percentage female new hires and percentage women in leadership positions. Our KPIs related to I&D have been updated in 2021 to better align internal and external reporting.

For example, we promote diversity through our partnership with TENT Partnership for Refugees (in Germany), and Refugee Talent Hub and Talent for Transition (in the Netherlands). Talent for Transition launched 'Diverse Energy Talent', which supports diverse energy talents in a traineeship in the energy industry. We employed three trainees from 'Diverse Energy Talent' in 2021. In addition, we employed seven newcomers via Refugee Talent Hub on work experience positions. Of the newcomers starting on such position in 2019, two have found permanent employment at TenneT in 2021.

Additionally, we have made the first steps working together with Stedin and Alliander on I&D. This was kicked-off during events in Arnhem, Bayreuth and Lehrte on Coming Out Day.

What could prevent us from reaching our goals?

The need for projects that build, maintain and replace the grid is expected to intensify. A conflicting situation could arise where (sub)contractors intendedly or unintendedly have to balance safety requirements versus on-time project delivery. Not inhering to TenneT's safety protocols could increase the risk of unfortunate injuries or preventable fatalities. TenneT has zero tolerance for harm to people from exposure to health and safety threats. Hence education is intensified to educate all stakeholders, making no difference between internal and contractors, about the importance and adherence to all safety regulations whether working at a construction site or at the office. At construction sites the safety regulation of TenneT supersedes the one of the (sub) contractor and if an unsafe situation is about to happen, we speak up and stop.

The COVID-19 pandemic is unfortunately a risk factor still to consider. While TenneT always aims to provide a safe work environment, mental health related problems, such as a burnout, are emerging as a potential risk. Working from home for the last two years significantly reduced social interactions or potentially introduced a more complicated work/life balance. TenneT continuous to provide numerous social engagements online, education and offers specialised help for employees experiencing problems. When national regulations allow for it, in conjunction with TenneT's own policy, more physical options will be available for social interactions while still maintaining the safety for all employees.

To realise our projects, a further growth of the organisation is required by hiring and retaining new talent. This could lead towards two potential limiting factors. Firstly, general scarcity in the market and limited availability of specialised skills could lead to a highly competitive market. A significant shift is noticeable in which traditional energy related competences are replaced by new competences that most organisations, unrelated to energy, also require because of instance the increasing digitalisation. Considering the competitive market, applicants do not only consider the primary benefits, but give more weight to internal succession and ambition chances, company image and the implementation of the new way of working (e.g. partially working from home). Secondly, it is a delicate balance of growing responsible. Growing too fast could result into operational inefficiencies, overcapacity of the onboarding process or potential loss of the TenneT culture. TenneT continuously aims to improve its image as an attractive employer, now and in the future, by listening to applicant feedback and to act on changing market conditions. Furthermore, active participation in career events and reaching out to students at universities creates awareness, stronger commitment and helps to attract new competences other organisations are in competition with Lastly, the 'International Trainee Programme' and the 'High Voltage Trainee Programme' are successfully continued.

“Ensuring health and safety for our people is vital.”

Frank Westphal

Managing Director at VINCI Energies Deutschland Industry & Infrastructure GmbH.

VINCI is a world leader in energy and construction and partners with TenneT in planning services, erecting overhead lines, building transformer stations and maintaining North Sea offshore plants.

“We are proud to work closely with TSOs such as TenneT – they are making the Energiewende possible. Our people are at the centre of our everything we do. Ensuring their health and safety is vital. We have worked closely with TenneT on improving safety for many years. In November we became the first overhead line fitter company in Germany to achieve Safety Culture Ladder Level 4.

At our Omexom Institute in Korbußen, all our overhead line fitters and subcontractors’ complete extensive annual safety trainings. These are developed in partnership with the Chamber of Industry and Commerce. TenneT’s junior project managers and construction inspectors also have regular trainings at our institute. This is part of our commitment to ensure everyone goes home safely every day. We are guided by VINCI Energies’ ‘SAFETY Excellence’ initiative, launched in 2017. This combined with our progressive safety culture, means we openly share lessons learned and encourage everyone to lead by example. Occupational accidents and illnesses are not a twist of fate, they are preventable.

We are committed to ensure the health and safety of everyone at VINCI Energies and our partners. This is a core value for us.”

Create value to transition to a climate neutral economy

As a European TSO, we contribute to a greener energy future by driving the energy transition and ensuring our high-voltage grids are future proof. This allows us to operate an electricity system relying on renewable energy sources which is the core of our purpose: to connect everyone to a brighter energy future.

We want to achieve this by delivering a grid that contributes to a climate neutral economy. We have chosen to report on our progress in this area by disclosing the equivalent number of households that in theory would have been able to receive 100% renewable electricity. This is one of our key metrics to measure our societal impact. For more information on our impact in this area, please see the box-out in this chapter. Next to our ambition to drive the transition towards a greener future, we also aim to lead as a green and responsible grid operator in how we conduct our own business. This is an integral part of our strategy and includes climate, circularity, and nature friendly ambitions, which we aim to achieve by 2025.

For us, a greener energy future does not mean just building more assets on land and sea. The sharp increase in demand for renewable electricity, the required pace and conditions of a grid that facilitates these developments, challenge us to consider how to realise growth in a responsible way. On the one hand, we need to deliver a decarbonised energy system to drive the energy transition, with the assets that enable a clean energy future. On the other hand, we need to build, maintain and operate our assets in a responsible way, taking into account our impact on nature, climate and social aspects. We aim to make responsible choices to ensure that we drive the energy transition as well as lead as a green grid operator.

Our performance in 2021

Climate	Performance	Target	Status	Trend
	CO_2 footprint of our grid losses, substations, offices and mobility (net emission in tonnes of CO_2)	Climate neutral in 2025[1]		We have made steps to become more climate-neutral in 2021, by increasing our percentage greened of our carbon footprint from 62.0% to 69.0% compared to last year.

Circularity	Performance	Target	Status	Trend
	• Reduction of virgin copper use • Reduction of non-recyclable waste	25% reduction in 2025[2,3]		This year, we have made progress on gaining more insights on the use of virgin copper and the percentage of non-recyclable waste.

Nature	Performance	Target	Status	Trend
	• (Net) impact on nature • Environmental incidents	Zero impact on nature in 2025		We consider every incident to be one too many. However, we are pleased with the positive nature measures and a reduction of almost 66% of oil leakages.

[1] To be fully climate neutral (SF_6 emissions, grid losses, energy use offices, stations and mobility of our employees) in 2025.
[2] In 2025 25% less impact of virgin copper use.
[3] In 2025 25% less impact of non-recyclable waste.

Societal impact we enable by driving the energy transition

The largest impact that TenneT has in terms of climate action is to enable the switch from a fossil fuel-driven economy to a climate neutral economy by connecting renewable energy sources and transmitting the produced electricity. We define our key impact metric in this area as the equivalent number of households that in theory would have been able to receive 100% green electricity. We have chosen this metric since it is a metric that is understood by many. It is important to realise the majority of the electricity consumption comes from industry.

We estimate that by the end of 2021 we have enabled the theoretical equivalent of 9.2 million households to receive green electricity. The total volume includes renewable electricity generated for industrial sectors and export.

These climate figures are not just achieved by our own operations, but also by our partners in the value chain, such as electricity generation companies and distribution system operators (DSOs). By working together, we avoided 10.7 million tons of CO_2 equivalents in 2021. More information on these impact metrics (such as the methodology) is included in our additional CSR data document.

Climate

As a responsible grid operator, we aim to reduce our own carbon footprint. This is why we have clear targets for 2025 and next to this, we have developed additional targets for 2030. Our reported carbon footprint mainly relates to emissions from our own operations, where grid losses are the largest source of emissions. We also report on emissions that are outside our own operations, such as elsewhere in our value chain. In 2021, 69.03% of our carbon footprint has been 'greened', which exhibits our progress in achieving our goal to be carbon neutral by 2025. In addition to this, we took a major step forward in our climate ambitions by formulating so-called 'Science-Based Targets' for 2030. These targets are in alignment with- and an extension of our current 2025 climate targets.

The Science-Based Targets initiative (SBTi) helps companies to align their CO_2 emission reduction goals with the Paris Agreement. In 2021, we committed ourselves to reducing direct emissions (scope 1 and 2) by 95% by 2030, from base year 2019. We also committed ourselves to reducing our indirect emissions (scope 3) from purchased goods and services and our capital goods by 30%. This means we are taking responsibility for scope 3 carbon emissions that arise in our supply chain, as a result of what we purchase and contract, starting from 2021. This relies on supplier engagement and a collective outlook on how we can collaborate with our value chain to reduce our collective emissions. We have identified three particular 'hotspots' for attention: purchased capital goods (such as cables and transformers); the services we procure to do our own work (including construction and civil works) and the energy used in our value chain (including fuel used by contractors and raw-material suppliers).

In 2021 we have already started to reduce our scope 3 emissions with other partners in the supply chain. As part of a Netbeheer Nederland partnership and the Groene Netten coalition, we set up an internal carbon price (ICP) mechanism along with other infrastructure parties. We started at 50 euros/tonne for the year 2021 and analysed the impact of our investment decisions and procurement. The impact analysis indicated that taking penalties into account related to SF_6 are a potential area where there ICP instrument could be effective.

Grid losses

As approximately 95% of TenneT's CO_2 footprint is due to grid losses, this is a priority area for our CO_2 reduction efforts. Grid losses inevitably occur during power transmission and are equal to the difference between electricity fed into the grid and the withdrawal. As the length of our high-voltage connections increases, the amount of grid losses grows. There is a trade-off here, as we need to develop and build more and longer high-voltage connections, such as Westküstenleitung or Zuid-West 380 kV, which function as green electricity 'highways' that support the energy transition, but this could have an adverse impact on the amount of grid losses. This effect is based on several variables, such as the technology at hand.

Also, while grid losses might increase, the impact of these grid losses on our gross carbon footprint could be limited due to a higher amount of renewable energy sources in the grid mix. In 2021, our grid losses increased to 5,604 GWh in 2021, compared to 5,530 GWh in 2020.

To reduce our gross carbon footprint, we 'green' our electricity consumption with the use of guarantees of origin. In 2021, we compensated for 100% of the grid losses in the Netherlands. In Germany, to continue with our efforts to green our grid losses, we have extended a pilot project from 2020 into a benchmark: each year certificates of origin are to be bought in the amount corresponding to at least 55% of the prognosed German grid losses. In 2021, we purchased certificates of origin equal to 55% of our German grid losses. The purchase and cancellation of those certificates is done in the Netherlands, since its currently not legally possible to do both in Germany. By doing this we green our grid losses on an overall company level. By having a dialogue with our regulator in Germany, we aim to reduce our carbon footprint related to our grid losses in Germany directly in the future.

Mobility

Our approach to reduce our carbon footprint is to decrease emissions where possible, to 'green' our emissions where this is not possible and to compensate for our carbon footprint as the final option. To reduce our carbon footprint we have adopted a new action plan to lower the environmental impact of our mobility, encouraging our employees to travel less and if they do, to use green transportation. Due to the COVID-19 pandemic our employees have travelled less and many have worked from home, which resulted in mobility emission savings. For employees working on our projects in the field, we are making our vehicle fleet more sustainable with electric vehicles and plug-in hybrids. We have introduced a new mobility policy to incentivise our employees to lease electric cars in both the Netherlands and Germany, encouraging them to reduce their emissions. In Germany, we are developing a bike-lease scheme and, if successful, we will add it to the existing bike policy in the Netherlands. Promoting sustainable travel is part of a wider commitment through the "Anders Reizen" initiative to halve the CO_2 emissions of all TenneT's business travel by 2030.

Offices and substations

The use of our offices and substations has an impact on our carbon footprint. To mitigate this carbon impact, we have purchased green gas for our German offices as of January 2021. With this, we have been able to green the gas use of our offices in both the Netherlands and Germany, next to the electricity use which we already greened. For the replacement of our substations we strive to decrease the carbon footprint by reducing climate impact in design, for example by using solar panels, insulation measures and LED lighting where possible. We have installed solar panels on our land stations at Hollandse Kust Noord and will use the generated electricity for own consumption.

SF_6 gas

Sulphur hexafluoride (SF_6) is a gas used by TSOs in high-voltage (sub)stations and distribution systems. This gas is used as a highly effective insulator and extinguisher in switching installations, allowing these installations to be more compact which is often necessary in built-up environments. SF_6 is also a greenhouse gas, over 23,500 times more polluting than CO_2. Although SF_6 accounts for approximately 1% of our climate footprint, any leakage is damaging to the environment, which is why we try hard to minimise and avoid leakages across our grids. We have also accelerated our efforts to explore alternative solutions in some of our projects. For example, substation Maasbracht will include alternative SF_6 solutions for some assets that are being developed in close consultation with the market.

Carbon footprint

Net carbon footprint
716,063
tonnes CO_2e

Gross carbon footprint
2,312,139
tonnes CO_2e

69.0%
Percentage greened of our carbon footprint

Scope 1
1.27%
Direct
Own operations

- **1.02%** SF_6 leakage
- **0.18%** Lease vehicles
- **0.08%** Gas consumption

Scope 2
98.34%
Indirect
Upstream

- **94.35%** Grid losses
- **3.80%** Electricity use stations
- **0.19%** Electricity use offices

Scope 3
0.38%
Indirect

- **0.38%** Travel and transport

As such, we are also working with some of our suppliers to develop SF_6 free Hybrid-Gas Insulated Switchgear (H-GIS) solutions for our extra high voltage connections. We stimulate this research as the market needs to be stimulated to find an alternative for SF_6.

This year, we have announced additional targets for reducing SF_6, starting from the year 2022. These include the stipulation that new assets will be two-thirds SF_6-free by 2030, while we maintain our leakage rate for all installed assets at less than- or equal to 0.28% per annum. We are also developing a roadmap with intermediate targets for 2030 at different voltage levels. In 2021, we were able to meet our target (0.28%) this year, with a leakage rate of 0.22%, which was lower than the SF_6 leakage rate in 2020 (0.24%).

Linking finance to our climate performance

To make progress against our climate ambitions even more visible, we have linked our financing costs to our climate performance. Secure access to finance is essential to ensure that we maintain the pace of our investment portfolio. An example of this is our EUR 3.3 billion sustainable Revolving Credit Facility (RCF), which is linked to sustainability performance indicators and targets. In practice this means that, depending on the realisation of our climate-related KPIs, a discount is applied to the interest margin on the RCF. This is related to the green percentage of energy use of our stations (100% in 2021 vs 100% in 2020) and our offices (100% in 2021 vs 81% in 2020). It is also linked to SF_6 (refer to SF_6 section above) and to the net carbon impact of mobility per employee against the total number of employees (1.2 in 2021 compared to 2.1 in 2020). We compensated for a part of our leaked SF_6 to reduce our CO_2 footprint through carbon offset certificates. We chose for a project that helps to phase-out fossil fuels in Colombia by opting for energy created from renewable biomass.

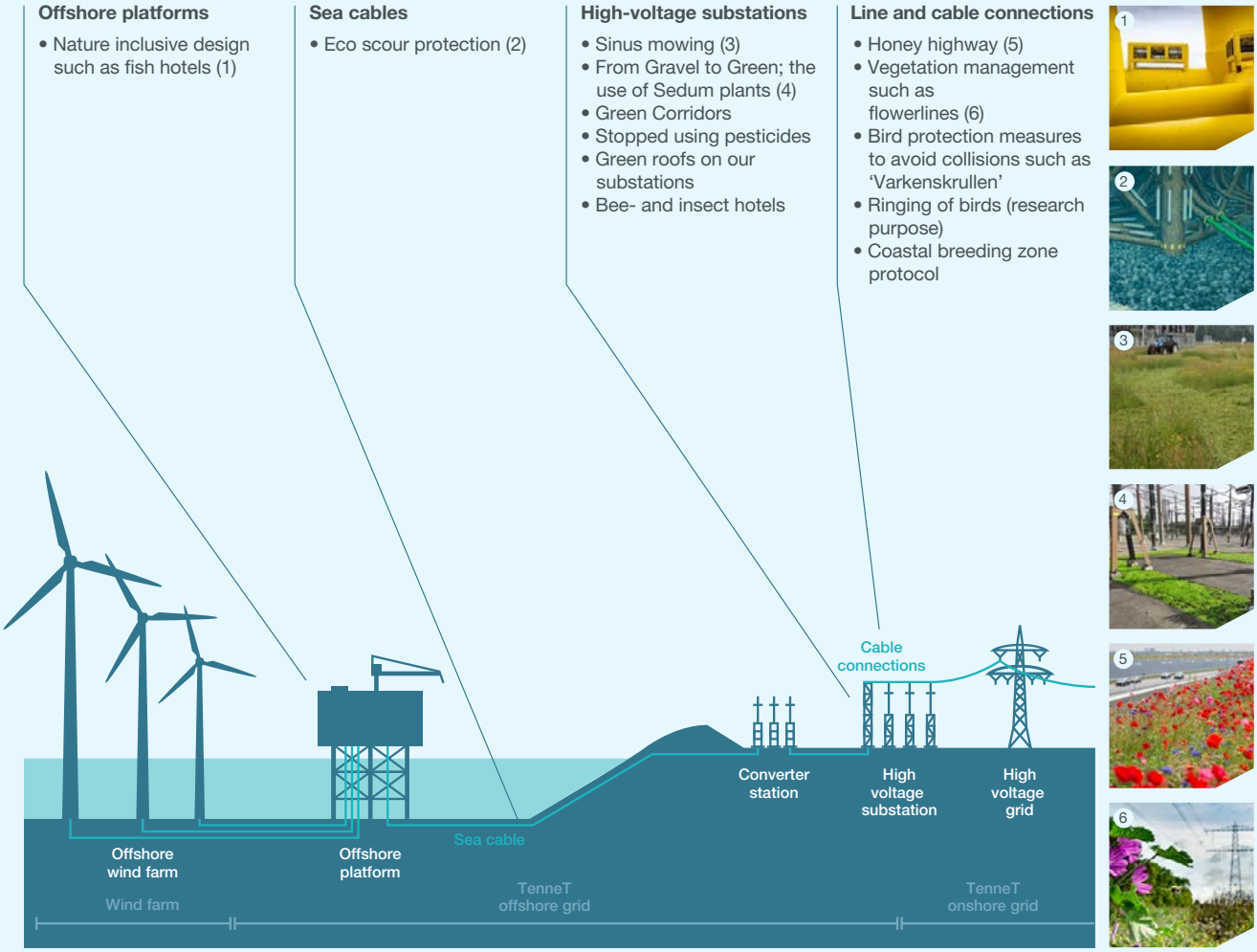
Nature

As we build, maintain, and operate our assets in the natural landscape, we have an unavoidable impact on nature. However, we put in significant effort to reduce our negative impacts and create positive impacts as well, aiming to reduce our net impact to zero. To aid this process, we developed a new code of conduct in 2021 which sets out rules and guidelines on how our maintenance and construction works must be carried out in accordance with the Nature Protection laws, to ensure species of flora and fauna are protected. We track the number of environmental incidents and the litres of oil leaked from our cables. We monitor and track our environmental incidents, which includes incidents except for SF_6 related incidents as we gain more meaningful insights from that perspective by the total volume of leaked SF_6. Unfortunately, in 2021 there were instances where we had a negative impact on the natural environment in areas where our assets are located. During the year, we recorded 81 environmental incidents and 1,798 of litres of oil that leaked from our cable systems. An example of an environmental incident is related to the fire that occurred near our Louwsmeer station in the Netherlands, where also oil leaked and where we needed to remediate the soil. This is why we developed a metric related to the repair time of these cable systems, which we aim to start reporting on from 2022 onwards. We regret that these incidents occur. We strive to follow up on these incidents appropriately and aim to learn from the root causes to avoid them happening again. This will provide us with more information that can help us to take appropriate actions.

We are developing a roadmap for nature to support us in identifying opportunities where positive nature measures can be implemented. The roadmap makes it easier for us to identify high impact positive measures and thereby scale up our positive impacts to reach our nature ambition.

Furthermore, in our ambition to mitigate our negative impacts and where possible also create positive impacts, we request in our investment plans to include biodiversity a ‘Commitment to Nature’ paragraph. This includes a description of the anticipated impact on nature, mitigating actions to minimise impact and measures to create a positive impact on nature. We are pleased that in 2021 more investment documents for our projects contained a paragraph on their ‘Commitment to Nature’. In 2021, 87.5% of our G2 documents included a ‘Commitment to Nature’ paragraph.

Nature measures



Highlights on our high voltage stations

In 2021 we stopped using weed-killing pesticides (such as RoundUp) on our high voltage stations and replaced them with new and experimental solutions, such as lawn tiles that allow vegetation to grow through them or succulents (for example in our Hengelo-Oele station). The use of succulents inhibits the growth of weeds, but also lowers the site temperature and stimulates biodiversity.

Another biodiversity-boosting measure is the use of sinus mowing for the grasslands at our sites. This method of phased mowing was developed with the Dutch Butterfly Conservation and aims to increase the biodiversity of insects and pollinators. With sinus mowing the vegetation is mowed in a pattern that follows the sinus wave leaving a part of the vegetation (ca. 40%) intact. We are now using this method at 36 stations covering a total surface space of 43 hectares.

Highlights on our cable and line connections

Birds are an important concern for biodiversity around our assets which is why we have several bird-proofing measures along the entire length of new and upgrades lines. As our land stations near the coast can be a fenced and predator-free safe haven for birds, we have developed a coastal breeding birds' protocol. We are also assisting Staatsbosbeheer and SOVON Dutch Centre for Field Ornithology with their research on rare species that breed in our high-voltage pylons. Furthermore, Specialists from SOVON identified the most risky high voltage connections for bird collisions which helps us gain insight.

We aim to boost habitat development around our cable and line connections. For example, we are adapting some cable corridors to accommodate low-growing heather in Boxmeer which fosters the habitat of a rare butterfly species called Ilex Hairstreak. Along the A7 motorway between Bolsward

and Heerenveen, where TenneT is laying a cable connection of approximately 30 km long, we have sowed flowers on several strips to create a 'honey highway'. In Germany, along the Stade-Landesbergen trajectory ecological vegetation management helps to create new habitats and foster biodiversity. In the planning phase of the new line, we introduced this concept to the landowners of forests affected and persuaded several of them to participate.

In addition, and in close cooperation with local governments and private stakeholders, Stade-Landesbergen created a landscape plan for the new Mehringen substation. This creates a green corridor around the station that will also be enriched with other nature measures. Consequently, the substation will be more integrated in the landscape and create a green zone between villages and the station.

Highlights offshore

Offshore, we aim for nature inclusive design when constructing our assets. For example, we have installed fish hotels at the foundation of Hollandse Kust Noord. We have also implemented Eco scour protection as a pilot in our Hollandse Kust Zuid project. We have replaced the layer that is usually made of granite with calcareous rocks, which provides a safe breeding space for fish.

Circularity

We need copper, steel, aluminium, and many other raw materials to expand our grid. Although we cannot do without these materials, we aim to reduce our impact through circularity, re-using raw materials and components as much as possible, and minimising waste. We focus on copper, as it is becoming increasingly scarce, and we have a high dependency on it in our operations.

We have raised our circularity requirements in some of our tenders. For example, our suppliers must provide evidence of which percentage of their materials are recycled. Circularity requirements like these will also be part of our sustainable tendering toolkit.

In 2021, we continued to work on gaining more insights into the use of virgin copper and our non-recyclable waste. Last year, we learned more about the main categories of assets where we make use of virgin copper (such as cables and transformer stations) and on the different data sources to collect data on copper purchases. This helped us to assess a range related to the percentage of purchased virgin copper in 2020. This year we have been able to refine this assessment and we were able to gain more insights by collecting more information, such as raw material passports from suppliers for more categories. Our assessment now includes insights of transformers and cables.

Our analysis includes assumptions and extrapolations, and is partially based on data points from our base year assessment. We estimate that in 2020 around 37.5% of our purchased copper was recycled and in 2021 this was slightly less, around 34%. We believe that based on the results of both years' assessment, that, when the full analysis is completed, it will indicate that the percentage of recycled copper will range from 25-40% of our total copper purchases. In the next years we will aim to further improve our analysis and use these insights to discuss with our suppliers how we can increase the use of recycled copper in our assets. An important step was taken in 2021, when the requirement to deliver recycled copper in our assets was included in one of our 2 GW tenders.

For waste we have performed a similar analysis, where we were able to gain insights into more parts of our waste in more parts of our organisation. This year's assessment includes insights for our offices, onshore- and offshore operations, and onshore projects. Our next step is to include data of our offshore projects and to get a complete picture of our onshore projects. This year's analysis includes actual waste reports and, for some of our onshore projects, it also includes assumptions and extrapolations based on proxy data.The results of this year's assessment show that in both years our non-recyclable waste is around 11%. We believe that, when we have completed the full analysis, this aligns with our understanding that 10-25% of our waste is non-recyclable.

These steps help us in our journey to embed circularity in our organisation to a greater extent. To meet our goals to reduce 25% of our non-recyclable waste and virgin-copper purchases by 2025 will be challenging, however we are determined to meet our goal.

An example of how we progressed with our efforts to reduce non-recyclable waste is our Noord-West 380 KV project. Based on meetings with contractors to discuss the causes of non-recyclable waste, an important source was identified – the heavy-duty fabric used to create temporary roads at construction sites. After usage, these fabrics can be difficult to reuse or recycle. However, with BAM and the University of Delft, we investigated new applications for this waste stream, which can help further reduce our non-recyclable waste from this type of project.

Furthermore, we aim to boost the recycling of key materials so they can be re-used for our assets, in particular copper and oil. For example, we are exploring circular solutions with our transformers, allowing us to re-use certain parts of transformers when they are decommissioned, including the re-use of transformer oil.

What could prevent us from reaching our goals?

TenneT delicately balances projects resulting into achievements of the energy transition while still being able to fulfil the core tasks of maintaining the grid. This balance becomes even more complex if one considers important influences like protecting the natural environment or reducing the carbon footprint. European and national ambition is intensifying not only in the number of projects required but likely in the time to deliver as well. This infers that due to the increasing number of projects, combined with our core task of maintaining the grid, project delay could become a possibility.

To actively participate as TenneT in the energy transition, investing in upcoming technological developments and innovations is an important prerequisite to be able to deliver on the energy transition targets. These investments could vary from physical changes, for instance applying a substitute for the SF_6 gas, to process and data driven applications like artificial intelligence to improve grid inefficiencies. These technologies, physical or non-physical, are costly and complex to develop, significant amount of time is required to test safety and reliability requirements and scarcity of the competences and equipment limits the development. In this context, it is important to be aware that suppliers are scarce and in high demand, presenting an additional challenge. As a TSO it is not possible to develop all new technology required in-house and therefore a relationship with innovation partners is crucial. TenneT is actively participating and working together with stable partners on new innovations benefitting the grid as well as the energy transition. Since the image as leading TSO with the green ambition and financial stability, the risk of a fierce competition with competitors concerning partner resources is not considered likely to happen.

When considering risks to the ambition as a green and responsible grid operator, one should consider the global economic and political context. These include a potential economic slowdown, regulatory changes, geopolitical conflicts, financial market turmoil and rapid advances in technology. While these would affect the costs on macro-economic level, on micro-economic level it is as important to consider to what extend society is willing to pay the cost of the energy transition. Ultimately, this could impact the regulatory framework, financing options and the availability and prices of products and services for both the consumers as organisations.

"Close cooperation between society, politics and business is essential for success."

Gunnar Groebler

CEO of the Salzgitter AG

As one of Europe's largest steel producers, the Salzgitter AG has a roadmap to achieve low-CO_2 steel-making, but its decarbonisation ambitions rely on collaboration across industry and politics: TenneT has an important role in facilitating the process.

"Infrastructure providers such as TenneT are taking on a great responsibility, by seeking the balance between demand of society versus economic and technical necessities.

The energy transition is a major task for our entire society. The steel industry has the capability and also wants to be part of the solution. Hydrogen-based technologies for CO_2 – neutral steel production are already fully developed today. With "SALCOS – Salzgitter Low CO_2-Steelmaking", we have a path towards a virtually CO_2-free steel production. However, we still need appropriate economic and political conditions to develop a demand for "green steel". Additionally, we need capacity and infrastructure to enable the generation and distribution of green hydrogen. We will only reach the objectives of the energy transition, if all players from the economic, political, business, and civil society work closely together and find solutions for their occasionally conflicting interests. I am impressed how this interplay between society, politics and business has developed so far. The excellent cooperation of TenneT and Salzgitter AG is exemplary for joint projects in this context."

Secure sustainable financial performance and investor ratings

The energy transition is accelerating and the electricity infrastructure at its heart needs to be prepared. The European Union raised its climate ambitions and presented a new legislative package of proposed measures – "Fit for 55" – aimed at reducing greenhouse gas emissions by 55% in 2030. This raises the bar from the 49% reduction previously announced. Among the Member States, Germany raised its target to even 65% from 55% and plans and ambitions in the Netherlands now far exceed the earlier ambitions of the Dutch Climate Agreement. In the context of these ambitious targets, it is up to us to make the right investments for sustainable long-term growth.

In order to reach these climate goals, our electricity infrastructure is undergoing a fundamental redesign, requiring substantial investment. To safeguard our financial health, we need to maintain a solid balance between equity and debt.

To maintain broad and sustainable access to – green – financing, we will continue our efforts to report transparently on our sustainable performance. In 2021, we have determined our eligibility in line with the EU Taxonomy. For more information on this, please read the box out on this topic on the next page.

Our performance in 2021

	Performance	Target	Status	Trend
Healthy financial operations Adjusted underlying EBIT group[1] (EUR milion)	**801** 801 (2021), 796 (2020), 753 (2019)	778		Adjusted underlying EBIT group is in line with the target and 2020.
Satisfied capital providers ROIC group (%)	**4.2%** 4.2 (2021), 5.1 (2020), 5.1 (2019)	4.0%		The ROIC group is slightly above target due to higher EBIT compared to target.
Safeguarded capital structure[2] Adjusted FFO/ Net debt group	**10.5%** 10.5 (2021), 11.3 (2020), 12.9 (2019)	8.5%		FFO to net debt has developed according to expectation. The FFO remained stable, while the net debt position increased.

[1] Reference is made to next page.
[2] Reference is made to Note 17 of the financial statements.

Eligibility of TenneT's activities with the EU Taxonomy

Our primary tasks are to provide electricity transmission services, system services and facilitating the energy market. Those economic activities are linked to NACE code D35.12 and are concluded to substantially contribute to climate change mitigation, since TenneT is transmitting and distributing renewable energy in line with Directive (EU) 2018/2001, including necessary reinforcement or extension of the grid. In line with the technical screening criterium 4.9 “Transmission and distribution of electricity” on climate mitigation, we have calculated the percentages of investments, revenues and operating expenditures that are eligible.

Most of our activities (the regulated business of the TSOs in the Netherlands and Germany) are eligible, since our grid is part of the interconnected European system. We have excluded our non-regulated activities and the infrastructure which is dedicated to a direct connection between our substation or network and a power production plant that is more greenhouse gas intensive than 100 gCO_2e/kWh measured on a life cycle basis.

Total group eligible turnover: 97%
Total group eligible CAPEX: 100%
Total group eligible OPEX: 99%

Underlying EBIT decreased from EUR 910 million in 2020 to EUR 834 million in 2021, which can be explained by higher revenues, higher grid expenses, higher personnel expenses and higher depreciation due to increasing assets. In 2021 we faced higher grid expenses, largely caused by increased electricity prices at the end of the year. Since a huge part of those higher grid expenses will be settled in future tariffs, this also results in an increase in underlying revenue. Under IFRS future settlements are not included in revenues and therefore the IFRS revenues and IFRS EBIT are significantly lower in 2021.

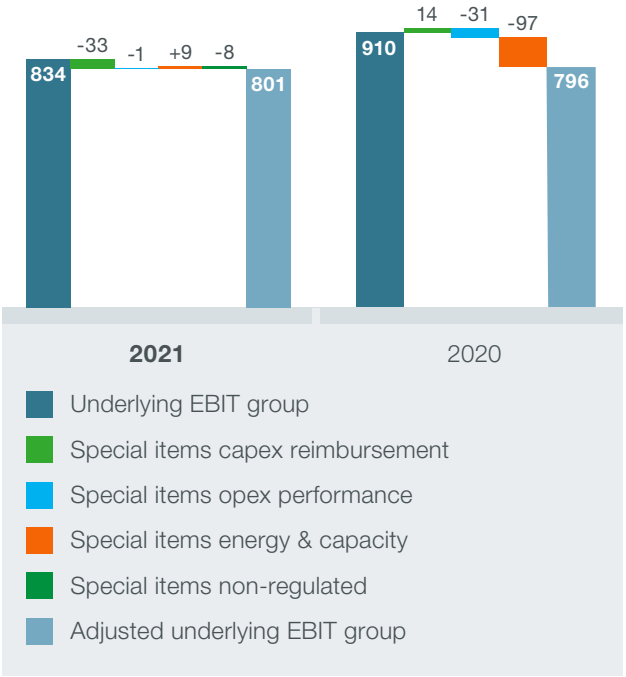
For 2022, we expect an EBIT which is in line with the 2021 EBIT. It is expected that the investments will further grow to EUR 4.2 billion, which requires additional financing. The resulting increase in debt is expected to result in a decrease of the ROIC and a decrease in the FFO / Net debt in 2022.

Deliver a return on capital in line with the expectations of our capital providers

Special items Capex reimbursement are mainly related to reimbursement adjustments of prior years. Special items other mainly relate to additional provisions of doubtful debtors. Special items non-regulated related to the fair value adjustments of our minority interests in investment funds.

Underlying EBIT group*

EUR million



*Refer to note 2 of the financial statements.

Raising the necessary external financing

The infrastructure we need for a secure and reliable electricity grid – today and in the future – requires constant vigilance, efficient operations, and sustainable investments. Our task is clear and critical: to ensure a continuous availability of electricity for almost 43 million end-users connected to our grids across the Netherlands and Germany, 24 hours a day, 365 days a year. Broad and sustainable access to financing is a pre-requisite for implementing our strategy and realising our investment portfolio that meets political and societal sustainability requirements. We need to ensure that this is financed with the right mix of equity and debt, always balancing affordability, the demand for security of supply and sustainability.

We made some strides in 2021:

The budget for the Netherlands, presented on the third Tuesday of September ("Prinsjesdag"), details the equity contributions the Dutch State intends to make to TenneT for investments in the Dutch electricity grid: EUR 4.25 billion over the 2023-2030 period. The equity contributions are conditional and will only be made available when TenneT needs them to maintain its credit ratings.

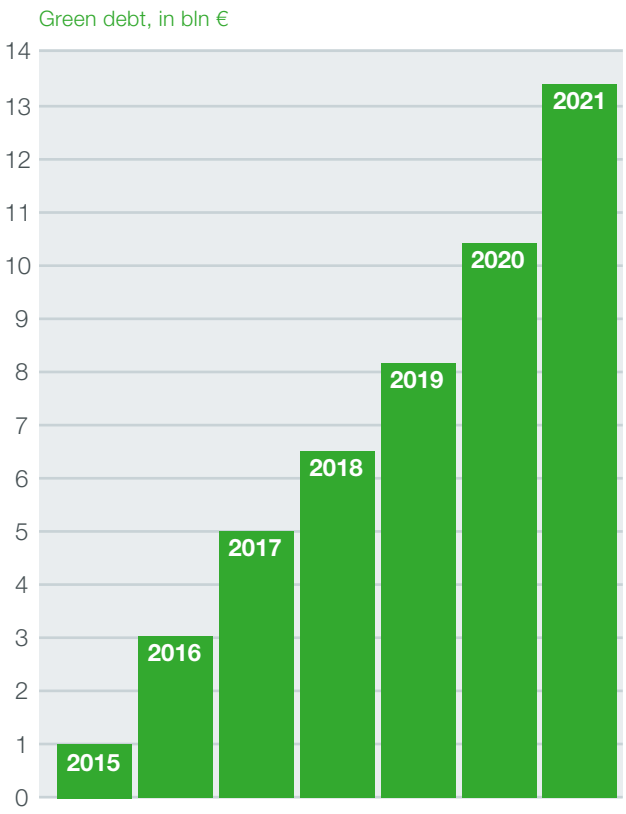
Regarding our remaining equity requirements for our German activities, we are exploring several alternatives, including the participation of reputable Western private investors. TenneT is confident it will be able to raise the necessary funds in a timely manner and does not expect these equity requirements to arise before 2024.

In May, TenneT successfully issued its first and largest ever green triple tranche Euro bond, raising EUR 1.8 billion. Investors from 20 European countries placed orders worth EUR 4.0 billion, underlining TenneT's international appeal and strong financial profile. In November, TenneT issued an additional green Eurobond, raising another EUR 1.0 billion. Proceeds from these bonds will be used to invest in eligible green power transmission projects in the Netherlands and Germany.

The focus is on connecting large-scale offshore wind farms to the onshore electricity grid and enhancing the onshore transmission capacity for renewable energy.

In September, we signed a new loan agreement of EUR 250 million with the EIB to finance a project involving the construction of a 41 km electricity transmission≈corridor from Eemshaven to Vierverlaten, in the north of the Netherlands.

Green Bonds



Together with the other three German TSOs, TenneT is responsible for the management of Erneuerbare Energien Gesetz (EEG) in Germany. In 2020, TenneT had to raise additional financing to cover significant unforeseen variations in renewable energy volumes and wholesale electricity prices. In 2021, TenneT received EUR 3.5 billion from the German government under the Climate Programme 2030 ("Klimaschutzprogramm 2030") to finance payments made to renewable energy producers as part of a nation-wide support to reduce the so-called renewable energies levy ("EEG levy").

Our financial strategy is focused on maintaining our credit rating at a minimum of A-/A3 and generating returns on investment in accordance with our risk profile. In 2021, our A- credit rating from Standard & Poor's and our A3 rating from Moody's were reaffirmed again – underpinning our ability to secure financing for the future. Also, our Environmental, Social and Governance (ESG) evaluations were reaffirmed by external rating agencies. For example, Standard & Poor's again classified us as "strong" with a score of 84/100 and Sustainalytics indicated that TenneT is at low risk of experiencing material financial impacts from ESG factors.

Our societal financial impact on households in our serving area

As we are serving society with trusted resources, safeguarding our financial health is of paramount importance. Our revenue consists of the regulated income we receive for costs we incur to fulfil our task of securing supply today and tomorrow. Designing, building, maintaining, and operating a future-proof grid comes at a cost which – among other customers - households contribute to via the payment of grid fees. Our financial health, a solid financial performance as well as a solid investor rating are directly impacted by our cost reimbursements set by the regulator. We have calculated our societal financial impact on households in our serving area.

We have assessed our impact on the electricity invoice (retail of electricity; taxes, charges and levies; grid fees) of an average household in the Netherlands and in Germany. In Germany, our share is around 5.6%, in the Netherlands, our share is approximately 9.0%. The main reason why this differs relates to a tax discount households receive in the Netherlands, which have a lowering effect on the total electricity invoice. As both the electricity retail price and our part of the grid fees are approximately the same in both countries, the result is that TenneT's grid fees therefore represent a higher share of the electricity invoice in the Netherlands compared to the German electricity invoice of an average household. We expect that our share both in the Netherlands and in Germany might increase over the coming years, as our costs for driving the energy transition may rise, amid increasingly ambitious German, Dutch and European climate goals.

Contribute to achieve a reliable and predictable regulatory framework which supports our financial strategy

The nature of our business and the scale of the energy challenge require us to think decades ahead to determine how and where to invest. The technical and regulatory lifetime of our investments can range from 20 to 50 years. Our investments need to be supported by a regulatory framework with a long-term focus and a high degree of reliability and predictability. While regulatory periods are typically only established for a period of three to five years, the underlying methodologies in principle provide a stable long-term regulatory framework in both the Netherlands and Germany. This relates amongst others to the recognition of investments in the Regulated Asset Base (RAB), methods used to determine the cost of capital, and the fact that TSOs for instance are not exposed to volume risk.

In 2021, the Autoriteit Consument & Markt (Authority for Consumers and Markets (ACM)), set the Dutch tariff method for TenneT for the new regulatory period 2022-2026. Going forward, the ACM changed the methodology for establishing the risk-free rate of the Weighted Average Cost of Capital (WACC). Although the ACM decided to maintain the current real WACC system, due to financing issues grid operators face in relation to the energy transition, it lowered its inflation estimate from 1.8% to 0.9%. This means a 0.9% lower asset inflation and an additional adjusted real WACC of 0.9%-points. The adjusted real WACC for new assets will be 1.9% over 2022-2026.

The ACM increased the beta factor which is a measure for the systematic risk of assets of TenneT's Dutch offshore investments to reflect the risk of the size of the investment portfolio in relation to the existing regulated asset base. This increases the WACC for TenneT TSO NL's offshore investments by 0.5%, resulting in the adjusted real WACC for new assets offshore of 2.4% in the years 2022-2026.

The ACM conducted a European Benchmark study (TCB18) resulting in an 89.1% efficiency score. The ACM also decided to honour the grace period of 15 years that started in 2010. This means TenneT's efficiency score will decline from 97.28% in 2022 to 89.1% in 2025, amounting to an average efficiency percentage of 92.37%. TenneT appealed, among others, the ACM's efficiency decision in 2021, due to several flaws contained in the benchmark according to our assessment.

In Germany, the Ministry of Economic Affairs and Energy changed the current investment measure application (IMA) regime into the so-called 'capital cost pass-through system' ("Kapitalkostenabgleich;" KKA). This is a pass-through of rising investment costs while reducing the revenues by the value of declining net book values. The changes will become effective as of 2024. Essentially, revenues for investments are to be aligned with the annual capital costs ("pass through"). This will eliminate time lags, clawbacks, and plateau effects of the previous system. The revised Incentive Regulation Ordinance (ARegV) provides for the change of method. Transitional regulations are intended to prevent disadvantages.

The 2021 amendment of the ARegV also introduced incentives on redispatch. The incentive mechanism is designed as a limited bonus/malus scheme. From 2022 onwards, a reference value is set for all redispatch costs of all four German TSOs. If the actual costs are higher than the reference value, then TSOs must bear a 6% share of the difference between those costs and the reference value (malus) up to EUR 30 million (cap) per annum.

Vice versa, if actual costs are below the reference value, the TSOs are allowed to keep a 6% share of the difference as a bonus. For the years 2022 and 2023, the scheme is applied with an uncapped bonus. From 2024, the mechanism will be applied symmetrically with equal bonus and malus.

On 20 October 2021, the German regulator Bundesnetzagentur (BNetzA) published the final determination of imputed rate of Return on Equity (RoE, < 40%) for the fourth regulatory period (2024 – 2028). The RoE (< 40%) in the final determination is 5.07% before tax (4.13% after tax).

TenneT TSO B.V. appeals against the efficiency score applied by the ACM, the change of the remuneration method for execution costs of System Operations from a rolling-forward system to a fixed budget and the disapproved costs of the Borssele projects. In Germany TenneT TSO GmbH and the German offshore entities appealed against the determination of the return on equity.

What could prevent us from realising our goals?

TenneT's revenues depend mainly on the regulatory frameworks in the Netherlands and Germany. Adverse changes in any of the regulatory systems might impact the financial performance. The regulatory reimbursement schedules (revenue cap) in both the Netherlands and Germany aim to allow TenneT to recover the efficiently incurred costs including a market-based return. The regulatory methods underlying the revenue cap are typically established for a period of three to five years.

The main risks for TenneT are that market returns continuously decrease because of the low interest environment on the capital markets. Furthermore, it is increasingly difficult to accurately forecast efficiently incurred expenses for future periods as past expense patterns no longer reflect the future, especially with TenneT's significant growth. These developments could lead to substantial deviations between the allowed revenue in a given year of the regulatory period and the actual costs needed to run the business. Although this risk is partially mitigated by the fact that TenneT receives additional income on top of the revenue cap for specific investments it remains an area of debate between TenneT, regulators and market parties.

To meet the average annual investment requirement of EUR 6 billion, TenneT is required to finance itself by attracting funds on the capital market. By issuing bonds, thus increasing the debt position, the ratio of funds from operations to total debt decreases. Hence the financial risk increases and credit rating agencies are obligated to downgrade the credit rating if the leverage ratio is below a defined rating threshold. To maintain the current A- (S&P) / A3 (Moody's) senior unsecured credit rating, additional capital is required for the coming years.
The economic outlook could become an additional influence for the coming years. The capital market highly appreciates green investments and combined with the required projects necessary to meet the energy transition targets, an expected growth in availability of green investment opportunities is expected. Resulting into possible fiercer competition. To date TenneT has always been able to secure the required financial capital by issuing green bonds without any notable problems. Investment institutions, like investment banks, continue to appreciate investments in green businesses as highly favourable. Combined with the attractiveness of TenneT's financial stability, prospect of future grid projects both onshore and offshore, the stable credit rating and the green ambition there is no significant risk of restrictions to the capital market.

A relatively small risk could occur if shareholder values by the current shareholder are misaligned with a potential new shareholder. The Dutch State could infer additional requirements, either as shareholder or via legislation and regulation, to protect their interests in the vital part of the Dutch grid. Contrary, a new shareholder could argue to deprioritise planned projects or reorganise part of the organisation in Germany or the Netherlands. To date no significant risk is expected to materialise. TenneT is in close contact with all relevant stakeholders including the Dutch State to align the ambition, interest and requirements.

Evert den Boer

CEO of the Dutch regional grid operator, Enexis Group

The group works closely with TenneT on smart solutions to make maximum use of existing and new networks.

"I want all parties in our sector to come together with a shared ambition, agreed tasks and priorities. This is how we will shape the energy system of the future.

The energy transition has now really gained momentum and we see a need for extra capacity on the electricity grid in almost all sectors. This means that both TenneT and the regional grid operator will have to do everything they can in the coming years to expand and, where necessary, upgrade the grids. At the same time, we have to do this in a smart way and with collaboration between all players. Producers, network operators and customers must work together on smart solutions, such as storage, conversion, cable pooling and demand management. And in the meantime, we need to expand the grid significantly to realise the energy transition. In times of transition, there are many interdependencies between different players, each with their own role and specific priorities. With so many interconnected parties it is crucial that there is more coordination so that the energy transition is as efficient as possible. Therefore, more than ever, I want all parties in our sector to come together with a shared ambition, agreed tasks and priorities. This is how we will shape the energy system of the future."

"The energy transition has now really gained momentum."

Solve societal challenges with stakeholders and through partnerships

As a European TSO, the main societal challenge we can help overcome, is to mitigate climate change by enabling the energy transition. Driven by ambitious European and national goals, the energy transition will require a fundamental redesign of our energy system and radical new thinking.

The energy transition presents big challenges for the usage and expansion of the electricity grids and the dynamic stability of the power system. The scale and complexity of the task means that conventional solutions are no longer adequate. We need new ideas and fresh thinking, with multiple stakeholders collaborating to find solutions and create value. This is why TenneT works together with a wide range of strategic partners, both within and outside the electricity domain. And our collaborations are not solely focused on technical innovations. We draw on the power of partnerships to achieve each of our four strategic pillars and also to ensure we grow responsibly. To give a broad but brief overview of our collaborative efforts, we have selected a sample below of just a few partnerships per strategic pillar.

Our performance in 2021

As we invest in our grid, our workload increases and our organisation grows. Therefore we have to make responsible choices. For example, this means that we, as a regulated company, make responsible choices on our investments, which represent societal costs, and which are targeted at solutions and assets that will serve the future energy system in the long-term. We must deliver what is expected of us, but we must also find the smartest, most efficient and affordable way to do so. Our partnerships can help us in finding these solutions.

Partnerships to drive the energy transition

In our aspiration to drive the energy transition, we aim to work with a wide range of other ambitious players to find solutions that will enable us to design an energy system fit for a climate neutral Europe, while also helping us to grow responsibly by making smart use of our existing grid.

InnoSys 2030

InnoSys 2030 seeks new ways to increase grid utilisation as a valuable complement to grid extension. Today, our assets are operated with a considerable safety margin in case an element fails (n-1 security). The joint research project InnoSys 2030 searches new ways on how to optimise grid utilisation by load flow optimisation and real-time measures in case of failures.

A powerful research consortium under the lead of TenneT, with all four German TSOs, five DSOs, universities and industry partners, is currently working on five different fields of research. The starting point of InnoSys 2030 was the analysis of existing measures to increase grid utilisation. In 2019 and 2020 new concepts were developed and tested with regard to their practical suitability. Simulations, demonstrations, and field experiments were started in 2021. In the end of this project a roadmap was developed and will be published in 2022, which shows the implementation path of those concepts until 2030.

Control Room of the Future

In order to drive the energy transition while maintaining a high level of grid reliability, TenneT needs to modernise the heart of our power system – the control room – to make it fit for the future. The Control Room of the Future programme (CROF) is at the leading edge of technology in the energy transition, with a goal to move from the manual control of independent technologies to a model that combines the best of manual and automated systems. For this ambitious vision, various projects need to be defined that include methodologies and software development, grid data, grid measurements, network model, network security assessment, decision support, communication interfaces and operator training.
The CROF roadmap includes the development of these and other projects until 2031. The CROF programme will be a rich learning and development environment, combining the expertise of our subject-matter experts with the latest insights from our partners, including suppliers and universities.

Working together with other companies to lead as a green and responsible grid operator

Together with many other Dutch critical infrastructure organisations, in a coalition called ‘De Brede Welvaart’, we are working together to make the economy more sustainable and resilient and to create long-term value. The way we contribute to and report on this work is included in our value creation model. The societal impact of this work is described in the respective chapters in this report.

We are also working together with other infrastructure companies in the 'Groene Netten' coalition in the Netherlands on several topics such as biodiversity and circularity. Together with other European TSOs we have joined forces via the Renewables Grid Initiative (RGI). Here we are collaborating with them with respect to how we can develop our offshore agenda in a nature-friendly manner. Via the RGI, we are a member of the OCEaN (Offshore Coalition for Energy and Nature) coalition where we work together also with NGOs on this topic.

Partnerships to secure supply, today and tomorrow

ENTSO-E

Our partnership with the European Network of Transmission System Operators for Electricity (ENTSO-E) is important in our efforts to secure supply for today and tomorrow. ENTSO-E is a collaboration of 39 TSOs from 35 countries who work together in a number of key areas. These include drafting technical and market-related network codes, coordinating plans to develop European infrastructure and promoting technical cooperation between TSOs. As member of ENTSO-E, TenneT is helping to build a more integrated European electricity market, contributing to a sustainable energy landscape, and promoting electricity in Europe is affordable, sustainable and secure.

Data innovation: GAIA-X and energy data-X

TenneT is among the partners who participate in the international GAIA-X project. Representatives from business, science and politics collaborate to create a proposal for the next generation of data infrastructure, including the realisation of sovereign data exchange in a European cloud. This work is essential for designing an energy system of the future, because it will depend on a reliable and secure architecture for exchanging data across borders, between different energy players and with consumers. It will also need to be robust, to cope with increasing decentralisation and complexity, expansion of smart meter charging for electric vehicles, and the increasing application of artificial intelligence (AI) models. The establishment of a large and comprehensive energy data infrastructure will enable interoperability between energy systems and form a foundation for new data-driven solutions to the energy transition.

Within GAIA-X, TenneT is part of a research project funded by BMWi (the German Federal Ministry for Economic Affairs and Energy) to demonstrate new approaches for data exchange. In the only winning consortium from the energy sector, TenneT is leading a consortium of all four German TSOs, several DSOs (E.ON, enercity Netz, Energienetze Mittelrhein) and other partners to realise a new and innovative approach for data exchange ('energy data-X'), with integration into smart services and artificial intelligence (AI).

Infrastructure Outlook 3050

In April 2021, TenneT, Gasunie and the Dutch DSOs published the Infrastructure Outlook 2030-2050 (II3050). Based on broad stakeholder participation, the study provides insight into the scenarios of a future energy system until 2050 and assesses the required energy system developments to enable such a system. Some of the important conclusions: the infrastructure for electricity must be expanded on a large scale, a nationwide hydrogen transport pipeline network is needed, infrastructure for heat and CO_2 must be constructed, more speed is needed since the current lead times for investments in the grid lead to bottlenecks and a long-term perspective is needed for an efficient transition. The fact that the Dutch government announced a plan to adapt existing natural gas transport pipelines for the transport of hydrogen ('hydrogen backbone') is a direct result of the insights presented in the II3050.

"Quo vadis, electrolysis?" study

Together with Gasunie and Thyssengas, TenneT published the "Quo vadis, electrolysis?" study in 2021, taking into account the existing and future energy infrastructures and developments that serve the energy system. According to this study, the North-Western part of Lower Saxony is a preferred location for the infrastructural coupling of electrolysers. As a result of the large-scale conversion from L-gas (low-calorific) to H-gas (high-calorific), existing natural gas pipelines can be made usable for the widespread distribution of hydrogen on a short term. The existing gas infrastructure enables the transport of generated green hydrogen to the major load centres. In a second phase, large electrolysers in Schleswig-Holstein could be connected to a hydrogen network after 2025. More short-term, regional hydrogen applications could relieve the bottleneck situation in the electricity transmission grid.

Partnerships to energise our people and organisation

Cooperation with educational institutes

Sharing expertise and insights with educational institutes plays an important part in building knowledge for our sector and also educating the new generation of technical talent. It is also important to help us access the latest thinking and technology to unlock new solutions for the energy transition. TenneT builds a wide range of close partnerships with the academic world and research centres.

These include partnerships with the University of Bayreuth, TU Delft and Radboud University Nijmegen, which are focused on specific areas of research, and a wide range of further alliances with academic institutions including: FAU Erlangen-Nürnberg; TU Eindhoven; TU Ilmenau; RWTH Aachen, Hogeschool van Arnhem en Nijmegen, Hogeschool van Amsterdam and Hasso-Plattner Institut.

Refugee Talent

We provide opportunities for refugees in the Netherlands and Germany through apprenticeships and vocational training. To find qualified refugee talents, we partnered up with the Refugee Talent Hub and TENT Partnership – which link refugees and employers, with paid employment as the goal. In 2021 TenneT Netherlands employed seven newcomers through a work experience position. Of the newcomers who started in 2019 on such a position, two have found permanent employment at TenneT in 2021. TenneT Netherlands provided a learning path ('opleidingstraject') for these refugee talents to learn more about the company and gain insights into the working culture in the Netherlands. In addition to this learning path for newcomers, TenneT's leaders and teams have been made aware and enabled to be more inclusive and understand the cultural background of refugee talent.

Partnerships to safeguard our financial health

Our cooperation with co-investors

To finance the expansion of offshore grid connections, TenneT cooperates with external co-investors such as KfW-IPEX, Copenhagen Infrastructure Partners (CIP) and Chubu Electric Power. Via separate legal entities the co-investors contribute equity and receive financial participation rights in return. Their contribution helps to ensure adequate financial ratios. Furthermore, their participation strengthens TenneT's interest in a reliable and stable regulatory framework as co-investors interests have been communicated towards policymakers and regulators.

Partner banks

To secure a solid financing and ensure that we can drive the energy transition in an affordable way, we maintain strong relationships with our shareholder, the Dutch state, and with the banks that are participating in TenneT's Revolving Credit Facility (RCF) – ABN AMRO, BNG, BNP Paribas, Commerzbank, Deutsche Bank, HSBC, ING, NatWest, Rabobank, Santander, UniCredit and SMBC. The majority of these relationship banks also participated in TenneT's previous RCF, showing the strength of our long-term relationships. Through these partnerships, we are able to secure our financing.

In 2021, we issued EUR 2.8 billion of Green Bonds with the support of our banking partners and have become one of the top 3 corporate issuers of green debt financing globally. The financial importance of this model is strengthened by the growing number of investors seeking to invest in companies that contribute to the EU's Green Deal ambitions, such as companies of which their activities are eligible with the EU Taxonomy. For more information on how we as TenneT assessed how our activities are eligible with the EU Taxonomy can be found in the chapter 'Secure sustainable financial performance and investor ratings'.

What could prevent us from realising our goals?

To be able to drive the energy transition and lead as a green grid operator, it is important to consider societal acceptance of the energy transition. Extending the grid and deliver on the green ambition could directly affect the impact on nature, available ground and expansion space for the physical assets or the debate about overhanging transmission lines and the effect on health and safety. Improper alignment could result into the inability to fulfil our ambition, potential delay of the energy transition or less than promised carbon footprint reduction. While TenneT always aims to comply to all rules and regulations and while sufficient precautions are taken at planning and constructing the grid, societal acceptance remains for TenneT an important and influential stakeholder.

Both the German and Dutch government have indicated an increase in ambition with regard to the energy transition. It is expected that the number of projects could grow and therefore could impact the project delivery times. This infers that TenneT must be even more agile than before. It is important that alignment takes place between the political aspiration and the TenneT ambition to result feasible project delivery without contradicting promises. The political landscape TenneT operates in, could sometimes be considered complex. Either by different coalition agreements, a difference in local governance structure or due to national and European interests. Without proper alignment it could impact cross-border innovation.

Ultimately, TenneT relies on strong partnerships with a wide range of stakeholders to achieve the work that will enable a climate-neutral Europe. Getting there will involve collaboration, negotiation and the balancing of common and individual goals, but the destination of a clean energy future is shared by all.

Statements of the Executive Board

The Executive Board is responsible for designing and operating TenneT's risk management and internal control system, and for reviewing its effectiveness.

In control statement

The Executive Board is responsible for designing and operating TenneT's risk management and internal control system, and for reviewing its effectiveness.

The risk management and internal control system consists of the following elements:

- The enterprise risk management system aimed to identify, analyse, define mitigating measures and monitor the development of risks relevant to TenneT;
- The internal control framework aimed to manage and control critical processes, including control self-assessments to document the effectiveness of control processes;
- Business plans and quarterly reports with information on financial and non-financial objectives and their achievement;
- Internal audits of key processes and follow-up to audit findings with relevant management;
- Actions based on recommendations made in the external auditor's management letter;
- An upwardly cascading internal Letter of Representation (LOR) process, resulting in a company-wide LOR signed by the Executive Board;
- A compliance management system that enables TenneT to demonstrate its compliance with relevant laws- and regulations, industry codes and standards, as well as its commitment to good corporate governance, best practices, ethics and stakeholder expectations among others risk of internal fraud, bribery or corruption.

The Executive Board periodically reviews and analyses the strategic, operational, financial and compliance risks to which TenneT is exposed. It also regularly assesses the design and effectiveness of the risk management and internal control system. The results of these assessments are shared with the Audit, Risk & Compliance Committee, acting as a committee of Supervisory Board, the Supervisory Board itself and the external auditor.

The risk management and internal control system does not provide absolute assurance that all corporate objectives will be fully achieved, nor does it give full assurance that material errors, losses, fraud or violations of laws and regulations will not occur in the operational processes and/or the financial reporting.

Taking the above into account, the Executive Board is of the opinion that TenneT's risk management and internal control system provides reasonable assurance that TenneT's financial reporting does not contain any errors of material significance and that the risk management and internal control system has operated effectively in the year under review.

Statement of responsibility

We confirm that, to the best of our knowledge, the financial statements for the period 1 January to 31 December 2021 have been prepared in accordance with IFRS, as adopted by the EU, and with Part 9, Book 2 of the Dutch Civil Code; that the disclosures in the financial statements are a true and fair view of TenneT's assets, liabilities, financial position and results as a whole; and that the disclosures in the annual report give a true and fair review of TenneT's financial performance, results and position, together with a description of the most significant risks and uncertainties the company faces. Furthermore, we confirm that to the best of our knowledge, the Group has adequate resources to remain in operation during the next 12 months and consequently the financial statements have been prepared on a going concern basis.

Arnhem, 14 March 2022

M.J.J. van Beek
T.C. Meyerjürgens
M.C. Abbenhuis
A.C.H. Freitag

Our Executive Board

M.J.J. (Manon) van Beek

Chair Executive Board / Chief Executive Officer

51, Dutch (f)

Initial appointment:
1 September 2018

Expiry first term:
31 August 2022

T.C. (Tim) Meyerjürgens

Member of the Executive Board / Chief Operating Officer

46, German (m)

Initial appointment:
1 March 2019

Expiry first term:
29 February 2024

M.C. (Maarten) Abbenhuis

Member Executive Board / Chief Operating Officer

48, Dutch (m)

Initial appointment:
1 January 2021

Expiry first term:
31 December 2024

A.C.H. (Arina) Freitag

Member of the Executive Board / Chief Financial Officer

51, German (f)

Initial appointment:
1 January 2022

Expiry first term:
31 December 2025

O. (Otto) Jager

Member of the Executive Board / Chief Financial Officer

52, Dutch (m)

Initial appointment:
1 August 2013

Second appointment:
1 August 2017

Expiry last term:
31 December 2021

Our Executive Board

Other positions qualitate qua:
- Chair Aufsichtsrat TenneT TSO GmbH
- Member Board TenneT Verwaltungs GmbH

Other positions:
- Chair Supervisory Board Kanker.nl Foundation
- Chair Board Giving Back Foundation
- Chair Board Refugee Talent Hub Foundation
- General Member Board of German-Dutch Chamber of Commerce DNHK
- Council of the Thinktank Agora Energiewende
- Chair of the Roundtable for Europe's Energy Future (REEF)
- Co-Chair Energy Roundtable of the European Clean Hydrogen Alliance (part of EU efforts)

Other positions qualitate qua:
- Member Board TenneT TSO B.V.
- Member Board TenneT TSO GmbH
- Member Board TenneT Verwaltungs GmbH
- Member Board TenneT Offshore GmbH
- Member Board GreenNet

Other positions:
- Member Executive Board WAB (Wind Energy Association Bremerhaven)
- Member Advisory Board Offshore Wind Energy MBA
- Member Board of Trustees German Offshore Wind Energy Foundation
- Member Advisory Board Federal Association of Wind Farms Offshore
- Member Board of Directors FGH (Forschungsgemeinschaft für Elektrische Anlagen und Stromwirtschaft e. V.)
- Member Board of Trustees FGE (Forschungsgesellschaft Energie e. V.)
- Member of the German National Committee of CIGRE
- Member Supervisory Board of GreenneT

Other positions qualitate qua:
- Member Board TenneT TSO B.V.
- Member Board TenneT TSO GmbH

Other positions:
- Formal representative Vereniging Nederlandse EnergieData Uitwisseling (NEDU)
- Member Board Netbeheer Nederland (as of 14 January 2021)
- Member Cooperation Board TSCNET Services GmbH

Other positions qualitate qua:
- Member Board TenneT TSO B.V.
- Member Board TenneT TSO GmbH

Other positions:
- Member Supervisory Board of GreenneT
- Member Board Flexcess GmbH

Other positions qualitate qua:
- Member Board TenneT TSO B.V.
- Member Board TenneT TSO GmbH
- Member Board GreenNet

Other positions:
- Chair Advisory Council of the New CFO Executive Program, Erasmus University Rotterdam