Institut belge des services postaux et des télécommunications

Communication du Conseil de l'IBPT du 29 novembre 2022 concernant l'étude relative à la durabilité des réseaux de télécommunications en Belgique

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TABLE DES MATIÈRES

1. Contexte

1. La transition numérique constitue l'un des principaux piliers de la transition écologique, car elle permet à d'autres secteurs d'améliorer leur durabilité plus rapidement et plus en profondeur. Les deux transitions se renforcent mutuellement et vont de pair. L'augmentation de la consommation de données à la suite de cette transition pourrait entraîner une croissance continue de l'impact écologique des infrastructures numériques. Afin d'éviter que l'empreinte du développement de la numérisation ne contrecarre les avantages écologiques, il est important de bien comprendre l'empreinte actuelle des applications numériques et la manière dont celle-ci évolue.

2. Jusqu'à présent, peu d'analyses approfondies ont été consacrées à **la durabilité des réseaux de télécommunications en Belgique**. Ces dernières années, les différents opérateurs se sont certes engagés à améliorer la durabilité de leurs opérations, mais il manque un cadre général permettant de comparer ces efforts entre eux. Afin de mieux comprendre la situation actuelle de la durabilité du marché belge des télécommunications, l'IBPT a commandé une étude auprès de Deloitte Consulting & Advisory Belgium.

3. Cette étude se focalise sur l'impact des grands opérateurs belges, à savoir **Telenet**, **Orange** et **Proximus**, sur la durabilité. Au départ, Voo faisait également partie du champ d'application de l'étude, mais en raison des données limitées fournies, ce que l'IBPT ne peut que regretter à ce stade, les informations ne pouvaient pas être traitées de manière utile. Néanmoins, l'étude a été achevée même sans les chiffres de Voo pour pouvoir fournir une première version. À l'avenir, l'on s'efforcera de travailler sur la base de toutes les données pertinentes des principaux opérateurs, si nécessaire en utilisant les pouvoirs formels dont l'IBPT dispose en ce qui concerne la demande d'informations.

4. Plus précisément, l'on examine l'évolution de la consommation d'énergie, les émissions de CO_2, la consommation d'eau et le traitement des déchets. Sur la base des résultats de cette étude, quelques recommandations ont été formulées afin de pouvoir suivre et améliorer l'efficacité énergétique ainsi que la durabilité des réseaux de télécommunications.

5. L'IBPT s'appuiera sur cette étude afin de définir les actions pouvant être prises en matière de durabilité.

2. Résultats

6. L'étude s'est consacrée à quatre domaines en matière de durabilité, à savoir la consommation énergétique, les émissions de CO_2, la consommation d'eau et le traitement des déchets, ainsi qu'à leur évolution au cours des 4 dernières années (période 2018-2021).

7. L'étude se base sur des données obtenues auprès des opérateurs. Ces données n'ont pas été soumises à une vérification distincte par l'IBPT ou son consultant pour des raisons pratiques. Par conséquent, la qualité de cette étude et de ses résultats dépend entièrement de ces données fournies.

8. Il ressort de cette étude que la durabilité est déjà un thème important pour les trois opérateurs de télécommunications interrogés et que ceux-ci ont déjà mis au point plusieurs initiatives et fixé des objectifs.

2.1. Consommation d'énergie

9. D'un point de vue général, **la part du secteur des télécommunications dans la consommation énergétique totale de notre pays est limitée**, à hauteur d'environ 0,2 %. La consommation énergétique des entreprises de télécommunications est composée à 80 % d'électricité, le reste étant issu des combustibles fossiles (par ex. le diesel). La **consommation énergétique des opérateurs de télécommunications a baissé de 11 % au cours de la période 2018-2021**. Cela est principalement dû à la diminution de l'utilisation de combustibles fossiles du parc automobile.

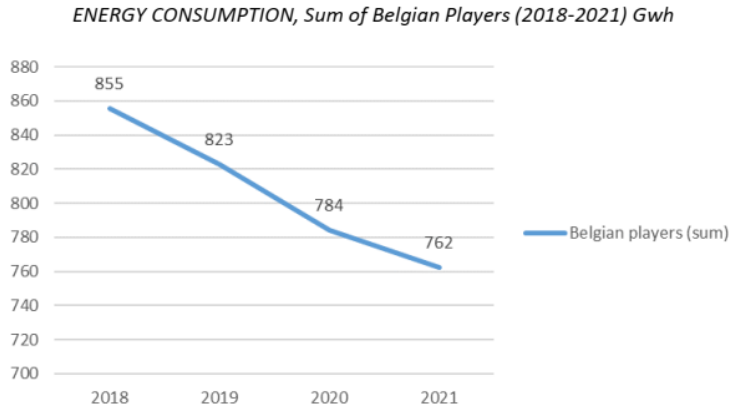

Figure 1 : Évolution de la consommation énergétique des opérateurs de télécommunications belges

10. Si l'on considère uniquement la **consommation d'électricité** totale, la part des télécommunications est inférieure à 1 %. L'électricité est issue à 81 % de sources renouvelables et est principalement achetée sur le marché. Seulement 2 % de l'énergie est autoproduite.

11. Environ 77 % de l'électricité est consommée par le réseau, 15 % par les centres de données et 7 % par les bureaux et les magasins. Dans ce cadre, la consommation

énergétique des centres de données n'a pas augmenté au cours de ces 4 dernières années et celle du réseau a même diminué, malgré l'augmentation de la quantité de données envoyées.

12. Environ la moitié de la consommation d'électricité du réseau est réalisée par le réseau d'accès mobile, 30 % de l'électricité est consommée par le réseau cœur[1] et les derniers 20 % par le réseau d'accès fixe.

13. Par rapport aux opérateurs étrangers, les opérateurs belges, selon les données qu'ils ont fournies, présentent une efficacité énergétique légèrement meilleure lorsque nous mettons en corrélation la consommation d'énergie avec les recettes. En ce qui concerne la consommation d'énergie renouvelable, ils sont conformes au benchmark européen.

14. Tous les opérateurs formulent des objectifs en matière de consommation énergétique, mais les ambitions divergent. Néanmoins, les opérateurs affirment tous vouloir utiliser 100 % d'énergie renouvelable d'ici 2030. De plus, ils passeront à des technologies présentant une meilleure efficacité énergétique comme la 5G et le FTTH.

2.2. Émissions de CO_2

15. Au cours de la période 2018-2021, **les émissions de CO_2 des opérateurs de télécommunications ont diminué de 38 %**[2]. Ces émissions sont causées à 95 % par la consommation de combustibles fossiles (pour les véhicules ou le chauffage, également appelées émissions « scope 1 ») et dans une moindre mesure par la production d'électricité (émissions « scope 2 »).

16. L'ensemble du marché belge des télécommunications est en revanche neutre en carbone si l'on tient compte de l'achat des droits d'émission. Tant Orange que Proximus sont neutres en carbone d'après leurs données, tandis que Telenet déclare poursuivre ses efforts pour le devenir. L'achat de droits d'émission est populaire auprès de tous les opérateurs.

[1] Le réseau cœur (« core network ») effectue la connexion entre tous les réseaux d'accès fixes et mobiles et les services centraux de l'opérateur, comme la connexion à l'internet.

[2] Selon le Greenhouse Gas Protocol, les émissions de CO_2 sont réparties en 3 « scopes ». Le « scope 1 » comprend les émissions de CO_2 directes causées par les propres sources par ex. le chauffage et les transports. Le « scope 2 » comprend les émissions de CO_2 indirectes causées par la création de l'électricité ou de la chaleur achetée. Le « scope 3 » comprend les émissions de CO_2 indirectes causées par les activités d'une autre organisation dans la chaîne de valeur.

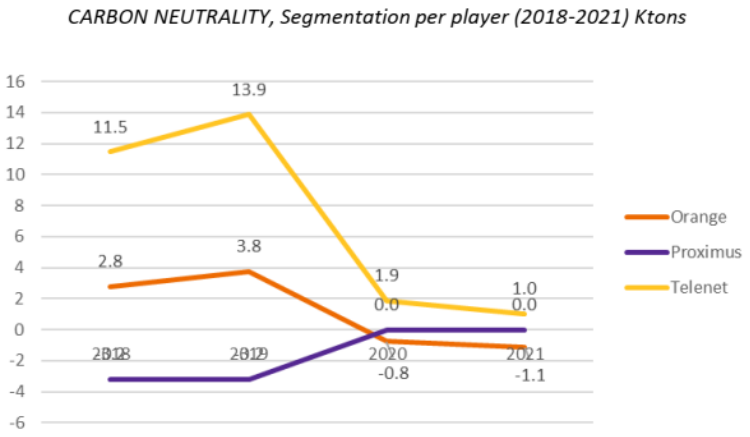

Figure 2 : Neutralité en carbone des opérateurs de télécommunications belges

17. Les opérateurs souhaitent tous atteindre le « net zero », c'est-à-dire que les émissions de CO_2 ne sont pas seulement compensées mais aussi réduites autant que possible. Pour y parvenir, les opérateurs vont verdir davantage leurs flottes et passer entièrement à l'électricité renouvelable et autoproduite.

2.3. Eau

18. Au cours de la période 2018-2021, la **consommation d'eau** a **diminué de 47 %**.

19. Selon les explications des opérateurs, il n'existe toutefois que peu d'initiatives spécifiques afin de limiter davantage la consommation d'eau, sauf dans le cadre des projets de rénovation où l'eau de pluie est réutilisée un maximum.

2.4. Déchets

20. Au cours de la période 2018-2021, la quantité de **déchets** produits (câbles, antennes, serveurs, mais aussi smartphones et modems) **a diminué de 40 %**. Parmi les déchets, 16 % ne sont pas recyclés ou réutilisés.

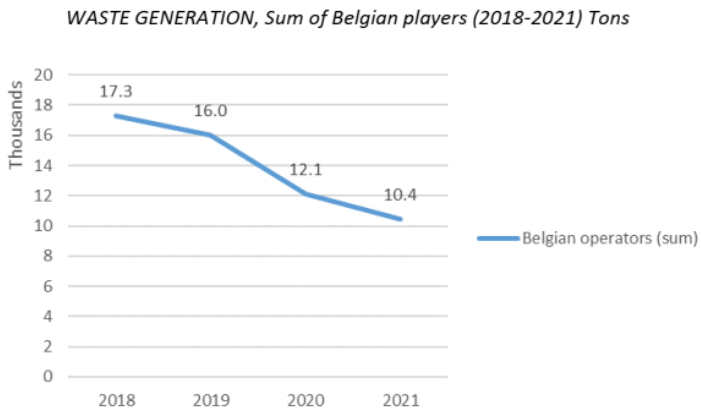

Figure 3 : Déchets produits par les opérateurs de télécommunications belges en tonnes

21. Plusieurs initiatives sont en cours auprès des opérateurs afin de réutiliser ou de recycler les smartphones, routeurs et décodeurs usagés. Le nombre de produits réutilisés a augmenté de 265 % entre 2018 et 2021 (de 500 000 unités à 1,8 million d'unités).

22. Sur la base des données des opérateurs, moins de déchets sont réutilisés ou recyclés par rapport à d'autres opérateurs européens.

2.5. Recommandations

23. Enfin, l'étude formule quelques remarques pour les différents acteurs sur le marché belge des télécommunications.

24. Ainsi, le **régulateur** peut assumer un rôle de facilitateur dans les discussions menées avec les opérateurs concernant la durabilité et introduire une analyse récurrente et étendue de l'ensemble du secteur sur la base d'une série de KPI.

25. Les **opérateurs** peuvent établir une stratégie de durabilité plus détaillée en se concentrant sur la concrétisation des objectifs en initiatives dans l'ensemble de l'organisation, dans tous les thèmes environnementaux.

26. Enfin, les **consommateurs** pourraient être davantage sensibilisés à l'impact de leur consommation de télécommunications, afin de leur permettre de faire un choix entre les différents opérateurs sur la base de la durabilité.

2.6. Conclusion

27. La présente communication contient les conclusions principales de l'analyse de la durabilité des réseaux de télécommunications en Belgique.

28. Pour des informations plus détaillées, l'IBPT renvoie au rapport complet se trouvant en annexe.

Axel Desmedt
Membre du Conseil

Bernardo Herman
Membre du Conseil

Luc Vanfleteren
Membre du Conseil

Michel Van Bellinghen
Président du Conseil

Annexe 1. Rapport descriptif

Monitor Deloitte.

bipt ibpt

Sustainability of telecommunication networks and operators in Belgium

Public Report

October 2022

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Executive summary

Executive summary

Taking actions will **stimulate the sector to become more sustainable,** whilst continuing to **act as an enabler** in consumers', its own and other industries' roads towards sustainability.

In the context of the transition towards a more digital and energy efficient industry, BIPT wishes to ob tain a **comprehensive view of the sustainability of telecommunications networks and their main operators in Belgium**. The objective of the study is to **quantify** the sustainability efforts made and be able to track progress and formulate a **set of recommendations** on how to make telecom networks more energy efficient for the sector, the government, and consumers.

The focus of the study is on the environmental efforts of **Telenet, Orange and Proximus**, focusing on four areas: **energy consumption, CO2 emissions, water consumption and waste & recycling**. Voo was not able to provide sufficient data and is thus not analyzed in this study.

Overall, the share of the telecom sector in the total Belgian energy consumption and CO2 emission **is limited**, contributing to less than 1% of both. Next to its own energy consumption and emissions, the **sector also contributes to the reduction of other industries' emissions** through its networks and activities as well as providing solutions that help **consumers** to live more environmentally consciously and connected.

A set of key recommendations was created, focusing on the role of different players. The **regulator** could take up a facilitating role in the discussion with operators on the sustainability analysis and introduce a recurring and expanded analysis of the entire sector based on the established framework and set of KPIs. On the other side, **operators** could create a more detailed sustainability strategy with a focus on translating the goals into initiatives throughout the organization, across environmental topics. **The consumers** could also build more knowledge on the impact of their consumption.

Going more into the details, **takeaways and recommendations** can be articulated around **the four environment areas** mentioned above.

The Belgian telecom market has reduced its **energy consumption** by 11% between 2018 and 2021, with 77% of the electricity consumed by the network. In 2021, 79% of the total energy consumed was renewable, reaching 100% of renewable electricity is a key priority for operators. The operators need to continue work on the efficiency of the network for all technologies and optimize their overall energy mix.

The Belgian telecom market decreased its **CO2 emissions** by 38% between 2018 and 2021, and is carbon neutral. Net zero – Scope 1, 2 & 3 objective, should be achieved in 2040 at the earliest. Additionally, operators should develop ways to report on Scope 3 Emissions. Once these emissions have been identified, actions can then be taken to reduce both upstream and downstream Scope 3 CO2 Emissions.

The Belgian telecom market has reduced its **water consumption** by 47% between 2018 and 2021. Overall, water consumption is lower on the agenda of the telecom operators, with no specific long-term goals defined. As there is limited to no knowledge of the water consumption of Belgium telecom operators, introducing clear and unified reporting will enable comparison and introduction of new initiatives to reduce water usage.

The **waste generation** of the Belgian telecom market decreased by 40% between 2018 and 2021. Operators are not moving as fast as other European operators in terms of waste reuse and recycled, with objectives that are on a 2030 or later horizon. Goals and objectives for reducing waste disposal should be introduced to reduce this share. All aspects of waste management should be considered.

02

Introduction and scope

Objective of the report

In the context of digital and energy transitions, BIPT wishes to obtain a comprehensive view on the sustainability of telecommunications networks and their operators in Belgium;

The digital transition will be one of the key elements in the realization of Europe's green pact in the coming years. Today, the digital and technology sector has a significant ecological footprint. The use of new technologies, as well as the use of related data, is expected to continue to grow and increase the ecological footprint generated.

Some initiatives have been launched by market players regarding the sustainability of their operations. However, they are often not comparable. In Belgium, few in-depth analyses have been conducted on the sustainability of telecommunication networks.

The IBPT/BIPT wants to analyze the sustainability of the telecommunications networks of the largest network operators in Belgium.

The objective of this study is to:

1. Quantify the sustainability efforts made and be able to track progress
2. Formulate possible recommendations on how to make telecom networks more energy efficient for the sector, the government and consumers

Please note that this report focuses on the **environmental** efforts made by telecom operators and analyzes the period **2018-2021** and is based on publicly available data or aggregated confidential data**.** The analysis is based on data provided by the Belgian Telecom operators and not all data has been audited by an independent entity

Scope of the study – ESG framework

The focus of the study is on the "E", being the environmental part of the ESG framework

FOCUS OF THIS STUDY

ENVIRONMENTAL

- **Environmental Footprint of Operations:** Telecom operators consume a significant amount of energy, and especially electricity. Depending on the source of energy and the efficiency of its generation, **electricity consumption by telecom network infrastructure** can contribute significantly to environmental externalities, such as climate change, creating sustainability risks for the industry. Although network equipment and data centers are becoming more energy efficient, their **overall energy consumption is increasing with the expansion in telecom infrastructure and data traffic**
- **Enabler in reducing other's environmental footprint:** telecom can use digital technologies to recognize the importance of data-driven net zero strategies and decision making, decarbonize their own operations and supply chains while supporting the sustainability goals of other industries

SOCIAL

- **Data Security:** The Telecommunication Services industry is **particularly vulnerable to data security threats**, as companies manage an increasing volume of customer data, including personally identifiable information, as well as demographic, behavioral, and location data
- **Increasing the societal impact of companies:** Telecom can help companies address their societal challenges, for example by introducing programs that foster **digital inclusion.** As customers pay increased attention to privacy issues, telecoms need to implement strong management practices and guidelines related to **data privacy and their use of customer data,** and can enable other industries to do so the same

GOVERNANCE

- **Product End-of-life Management:** Due to the rapid obsolescence of communications devices, they **represent an increasing proportion of electronic waste (e-waste)** going to landfills
- **Competitive Behavior & Open Internet:** Telcos must manage their growth strategies and production within the parameters of a regulatory landscape designed to ensure competition
- **Managing Systemic Risks from Tech Disruptions:** Telco will face growing physical threats (extreme weather) to their network, with potentially significant social or systemic impacts (systemic or economy-wide disruption may be created if the network infrastructure is unreliable)

Sources: S&P Global, Deloitte Research, Atos, SASB

Scope of the study – Operators and topics

The focus of the study is on the main Belgian operators and includes their energy consumption, CO2 emissions, water consumption and use of materials

Operators in scope

proximus

telenet

orange™

voo [1]

Topics in scope

Energy consumption

An organization can consume **energy** in various forms, such as fuel, electricity, heating, cooling or steam. Energy can be **self-generated** or **purchased** from external sources and it can come from **renewable sources** or from **non-renewable sources**.

CO2 emissions

An organization can emit **emissions** in various form. This section addresses **emissions into air**, which are the discharge of substances from a source into the atmosphere. **Greenhouse Gas (GHG) emissions** are a major contributor to **climate change.**

Water consumption

This section addresses **water consumption**. The amount of water **withdrawn and consumed by an organization** and the quality of its discharges, can impact the functioning of the ecosystem in numerous ways.

Waste and recycling

Waste & recycling can be **generated by an organization's own activities**, for example, during the production of its products and delivery of services. Circularity and thus avoidance of waste can be achieved by focusing on **reusage, refurbishing** or **recycling.**

Note: 1. Voo has been excluded from this analysis due to a lack of data provided

Scope of the study – Emission scopes

The focus of the study is on all 3 scope of emissions

NORMS

The **Global Reporting Initiative (GRI)** framework as well as **ISO norms and GHG protocols** are used as frameworks for the definition and selection of data points

Scope 1

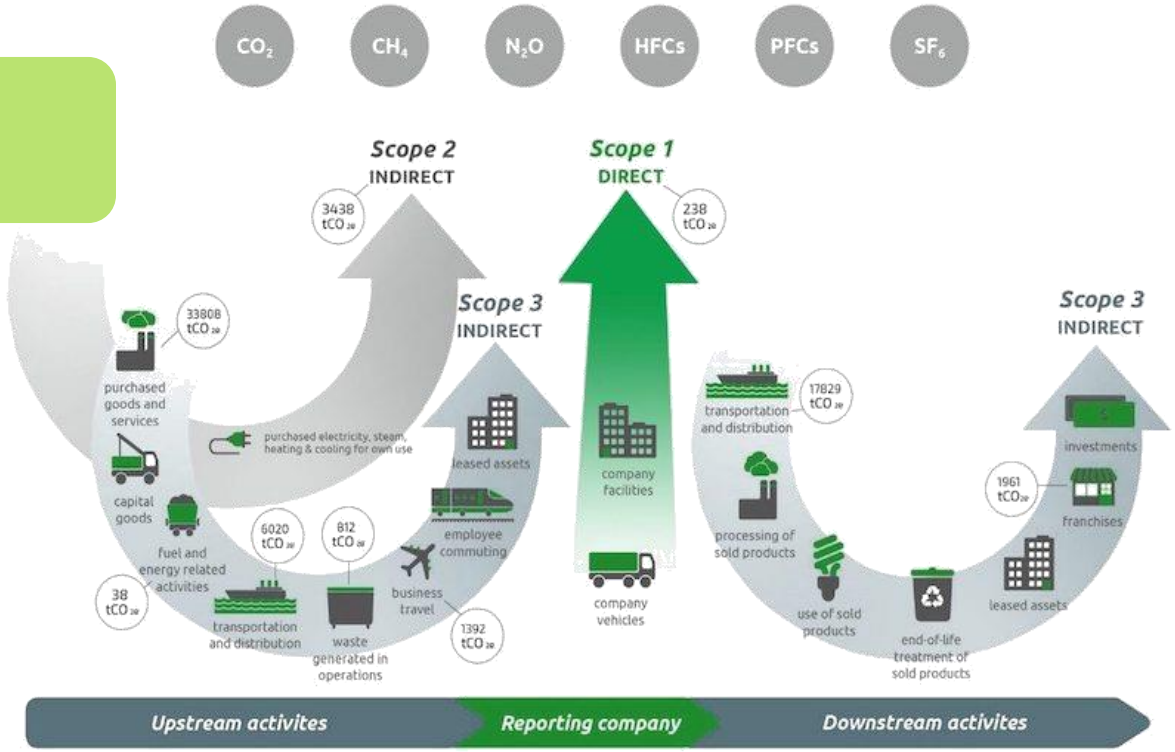
Scope 1 regroups direct emissions from owned or controlled sources. For example, the heating of buildings or the vehicle fleet is part of scope 1.

Scope 2

Scope 2 regroups indirect emissions from the generation of purchased energy consumed by the reporting company. For example, the electricity used for the data centers is part of scope 2.

Scope 3

Scope 3 regroups all other indirect emissions that occur in a company's value chain, these can be both upstream and downstream emissions. For example, the usage of set-top boxes consumers is part of scope 3.



Sources : GHGProtocol

03

Sustainability landscape and trends

Sustainability landscape

The pressure is mounting on practically all sectors of the economy to become more sustainable, leading to a shift in their operations, business model and societal impact

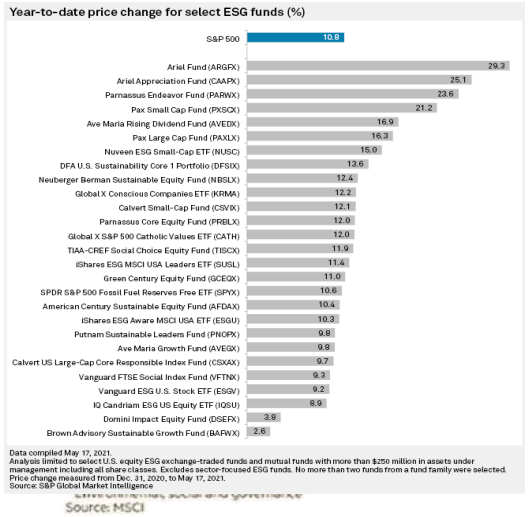
Climate change is a threat to global sustainability

Align to 2°C scenario: innovate assets and operations to enable the low-carbon energy transition.

Regulatory push

Public sector ambitions on climate and sustainability grow. Regulations & programs, such as the EU Green Deal and related policy areas, have a global reach.

Growing investor expectations



Source: MSCI

Investors will require more holistic ESG performance to allocate funds and reduce the cost of financing (e.g. according to the EU-taxonomy of green & socially sound investments).

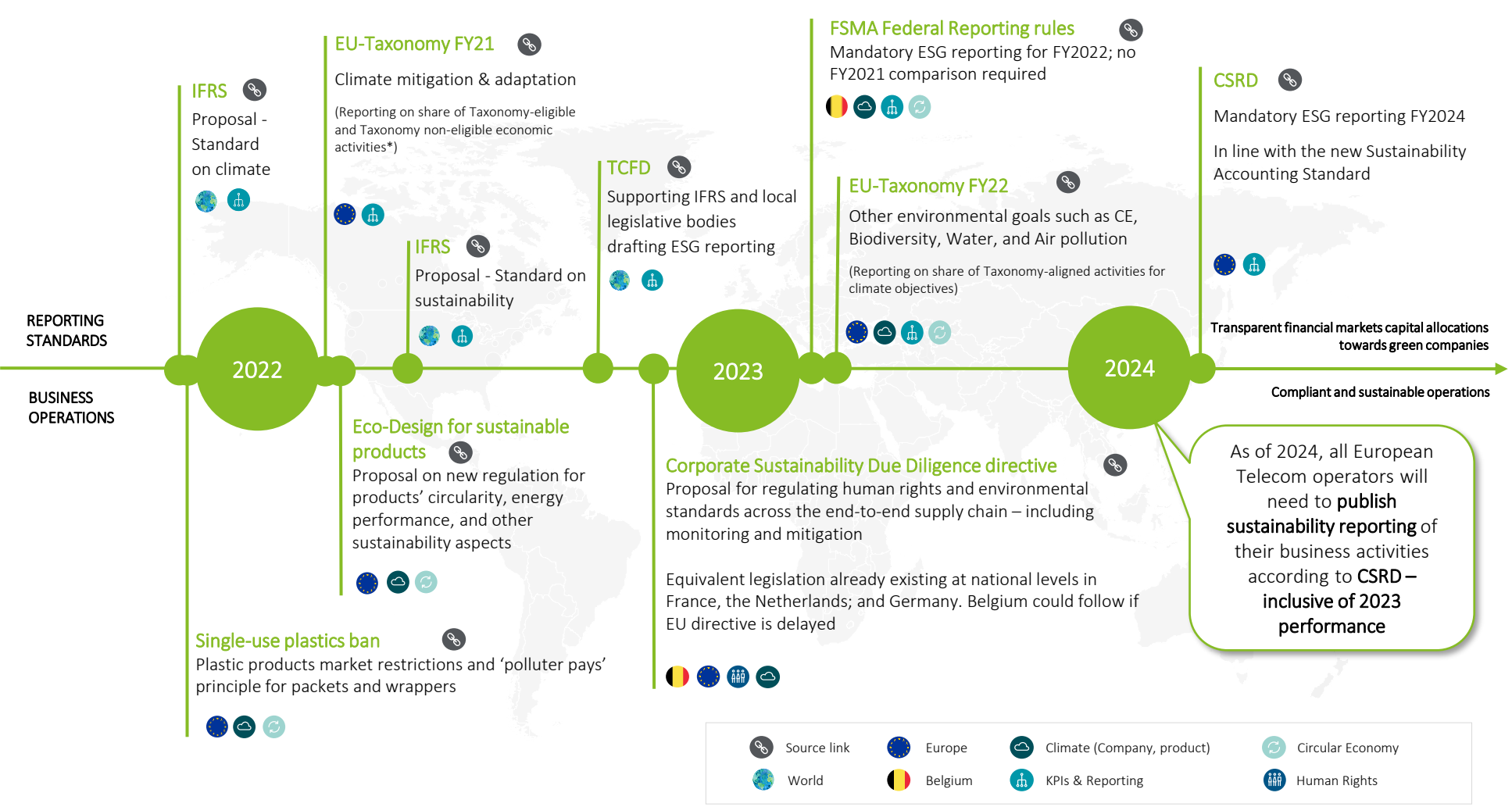
Growing societal pressure

Society, especially the young generation, is expecting more from companies regarding their impact on society and the environment.

Sustainability landscape - Regulatory push (1/2)

New regulations will be introduced on the global, European and Belgian level in the following years

The **EU** Climate Law aims to achieve a **55% reduction in emissions by 2030** (from 1990 levels) and net zero GHG emissions by 2050.



Impact on companies

Growing diversity of topics: increasing requirements for management approaches and scope of data collection

Increasing demands on data: higher granularity and quality of disclosed data

Larger need for integration: in functions and processes

Increasing investor needs: information needs and management quality

* EU-Taxonomy Article 8 Delegated Act – Article 10: From 1 January 2022 non-financial undertakings shall only disclose the proportion of Taxonomy-eligible and Taxonomy non-eligible economic activities in their total activities and the qualitative information referred to in Section 1.2. of Annex I relevant for this disclosure

Sustainability landscape - Regulatory push (2/2)

In addition to regulations, organizations and labels are supporting companies by providing sustainability guidelines and target-setting

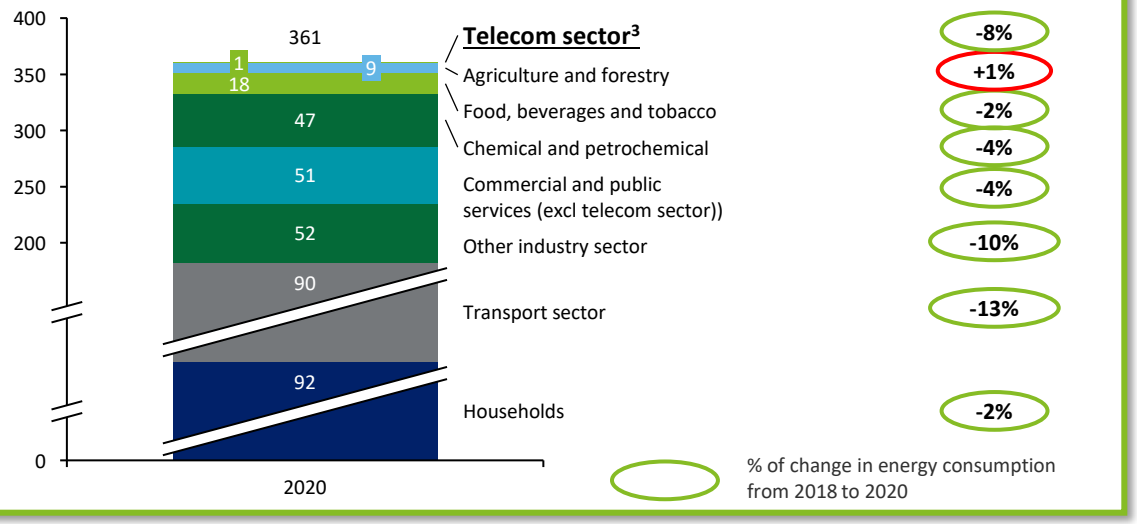
Organization	Description	Relevance for operators	Label	Description	Obtention by BE operators
United Nations Global Compact[1,2]	Non-binding pact to encourage businesses and companies to **adopt sustainable and socially responsible policies** and to report on their implementation.	• **Environment** pillar › **3 principles** are linked to this pillar[1].	Ecovadis[5]	World's most trusted provider of **business sustainability ratings**.	proximus telenet
The Sustainable Development Goals (SDGs)[3]	Collection of **17 interlinked global goals** to have a **better and more sustainable future for all**	• Relevant goals for Belgian telecoms in light of environmental efforts: › Affordable and clean **energy** › Responsible **consumption** and production › Clean water and sanitation	Bcorp[6]	B Corp Certification is a designation that a business is meeting **high standards of sustainability performance**	No operator is certified
Science-based targets (*SBTI*)[4]	Show companies how much and how quickly they need to **reduce their greenhouse gas** (GHG) **emissions**	• Defines and promotes best practices **in emissions reductions and net zero targets 2025** telenet proximus orange	ISO[7]	ISO have sustainability norms, such as the 14001:2015 that specifies the requirements for an **environmental management system**	No operator is certified

Sources: 1. United Nation - Global Compact, 2. United Nations – General Assembly, 3. United Nations – SDGs, 4. Science-Based Targets, 5. Ecovadis, 6. Bcorp, 7. Nbn. Non-exhaustive

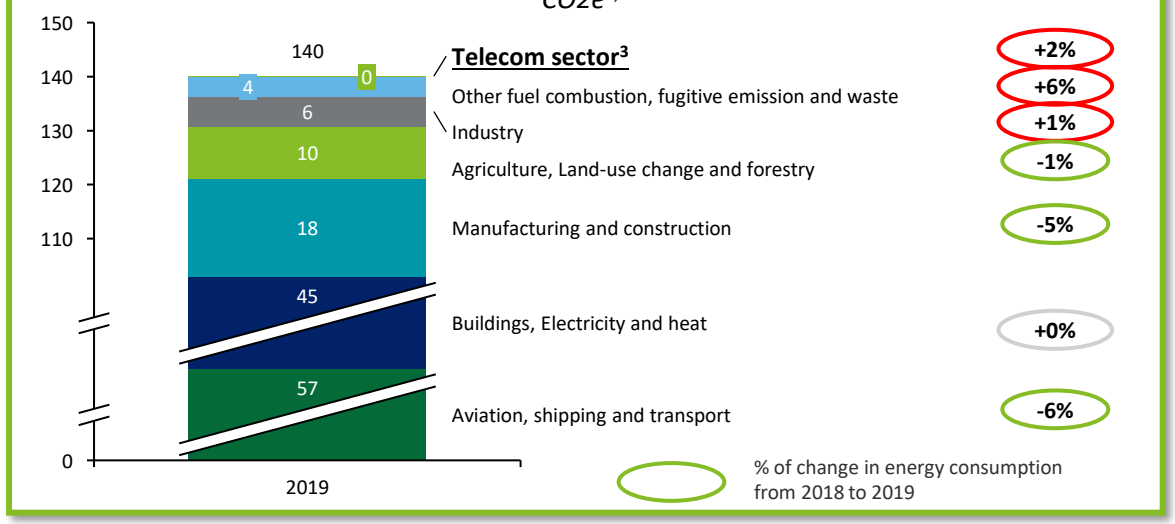
Sustainability landscape - Industry benchmark

The impact of the telecom market in the total Belgian energy consumption and CO2 emission is limited

ENERGY CONSUMPTION, Segmentation per sector in Belgium (2020) TWh[1,2]



CO2 EMISSION OF SCOPE 1 AND 2, Segmentation per sector in Belgium (2019) Mn tons of CO2e[4,5]



Insights and takeaways

The telecom sector consumes 0.2% of energy and 0.8% of electricity in Belgium:
In 2020, the share of the Belgian telecom market out of the total Belgian energy and electricity consumption equaled 0.2% and 0.8% respectively. The telecom market is therefore not a driver of the Belgian energy and electricity consumption. Due to the increase of data traffic in the following years, the telecom share of the energy and electricity consumption is expected to continue to grow if no actions are taken.

The energy consumption of the telecom market is decreasing slightly slower than the overall Belgian market:
From 2018 to 2020, the Belgian telecom market decreased its energy consumption by 8.3%, which is less than the 9.4% decrease from the overall Belgian market.

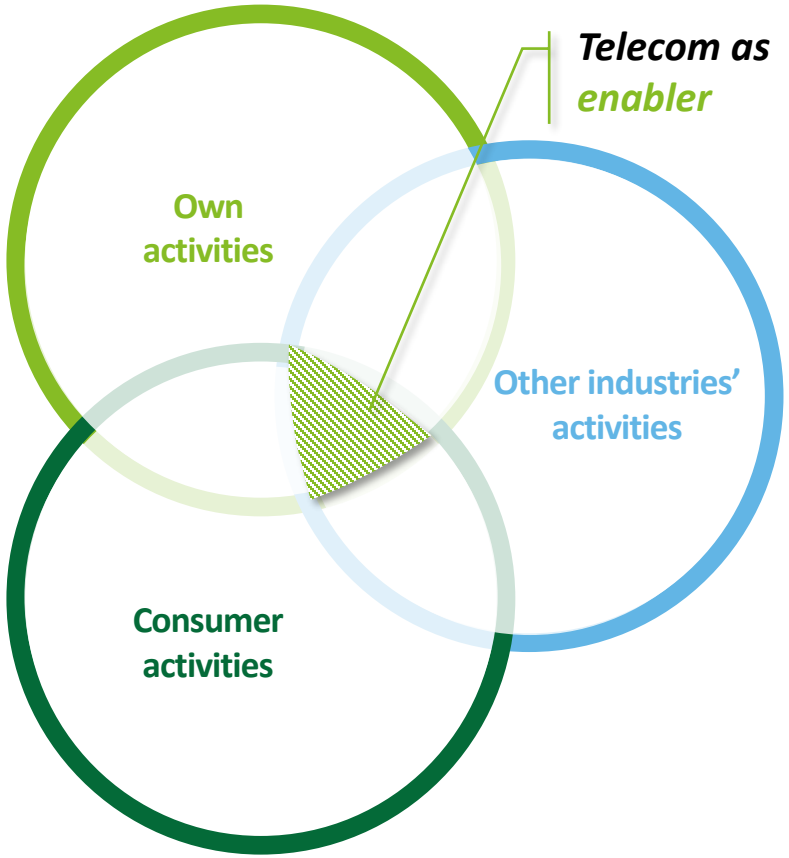
The telecom sector emits 0.04% of the CO2 in Belgium:
In 2019, the share of the Belgian telecom market out of the total Belgian CO2 emission equaled 0.04%. The telecom market is therefore not a driver of the Belgian CO2 emission. This percentage is explained by the fact that scope 2 emissions are remarkably low for the Belgian telecom market as compared to others. Indeed, the 3 main players purchased nearly entirely green electricity, leading to limited scope 2 CO2 emissions.

The transport sector and the buildings, electricity and heat sector are the two main drivers of the Belgian CO2 emission (accounting for 41% and 32% respectively)

Notes: 1. StatBel (for the energy consumption per sector excluding the telecom sector), 2. Data provided by the 3 telecom operators (for the telecom sector), 3. The telecom sector refers to Telenet, Proximus and Orange, 4. OurWorldInData (for the CO2 emission per sector excluding the telecom sector), 5. Data provided by the 3 telecom operators (for the telecom sector)

Sustainability landscape - The telecom sector as an enabler

The telecom sector acts as a sustainability enabler of its own but also of other industries and consumer activities



Own activities

- Leveraging connectivity, telecom operators can introduce predictive maintenance, avoiding **waste generation** and increasing the networks' lifetime
- Many activities and practices can now be **done virtually**. With the help of telecoms technologies, meetings, healthcare appointments and even surgery can now be done remotely, telecom operators can **eliminate the need for a large proportion of travel**[1]

Other industries' activities

- Telecom can take up its role to **help other industries cut down their emissions**
- These offerings include digitization and dematerialization, data processing, and process, activity and functional optimization. For example, savings in buildings are a result of technologies that improve energy efficiency such as **building management systems and smart meters.** In the transport sector, the use of telematics can for example **improve route optimization and vehicle fuel efficiency**[2]

Consumer activities

- Many end-consumers already apply various strategies to address their consumption habits, yet they are unaware which of these habits have the highest environmental impact. There is a role for telecom and the broader ICT sector to **guide consumers.** Telecom solutions will help consumers to live more environmentally consciously and connected. Many activities can now be done virtually. With the help of telecoms technologies, meetings, healthcare appointments and other can now be done remotely, reducing the impact of households on the environment

Sources: 1. Mobile; 2. ECS. *Non-exhaustive list*

04

Research & analysis

Methodology

A well-defined methodology has been followed to ensure the quality of the result

	PHASE 1	PHASE 2	PHASE 3	PHASE 4
	Preparation of the data collection	**Data collection**	**Analysis of the data collected**	**Preparation of recommendations and final report**
ACTIVITIES	› Meet every **operator individually** › **Desk research and subject matters interviews. Define** standardized and normalized **datapoints and KPIs** to quantify energy consumption, CO2 emissions, water consumption and waste management of telecom networks and operators › **Validate** standardized and normalized **datapoints and KPIs** with BIPT	› **Collect data** from operators › **Conduct follow-up meetings** to provide further clarification to operators › **Check** that the information is correct and **ask for clarifications** from operators	› **Clean up** the data received by the operators › **Analyze the data collected** (distinction between (i) scope 1, 2 and 3 emissions, (ii) core and access networks) › **Evaluate the efforts** of operators (benchmark) to reduce their environmental footprint (internally and with end customers)	› **Compare and rank** the most sustainable networks and initiatives › **Aggregate** confidential data in order to maintain confidentiality › **Provide recommendations** for making telecommunications networks more sustainable › **Finalize the report** on the environmental and climate impact of telecom networks and network operators
SOURCES USED	✓ Discussion with operators ✓ Deloitte Subject Matter Experts ✓ Different norms analysis (GRI, ISO 14001, GHG Protocol) ✓ Operator's reports and datasets ✓ Literature ✓ Other articles	✓ Request for information provided to operators ✓ Input from operators ✓ Discussion with operators ✓ Operator's reports and datasets	✓ Input from operators ✓ Discussion with operators ✓ Operator's reports and datasets ✓ Publicly available datasets ✓ Analysis of European telecom operator's efforts	✓ Operator's reports and datasets ✓ Analysis of European telecom operator's efforts ✓ Deloitte Subject Matter Expert ✓ Existing/new regulations

Contextualization of the units used

In order to facilitate the understanding of the analysis hereafter, the different units can be contextualized

Visualizing what a ton of CO2 or 1 kWh represents is not easy. As these terms will be used in the report, **contextualization is needed**.

- 1 kWh equals:[1]
  - Watching TV during **3 to 5 hours**
  - Using **one washing machine**
  - **49 hours** of low-energy lamps
- 1 ton of CO2 equals:[2]
  - The average emission of one passenger on a **return-flight** from Paris to New York
  - **Driving 6000 km** with a diesel car
  - **72 trips** Amsterdam – Paris with the Thalys
  - **4,289 kWh** of electricity
- To compensate for 1 ton of CO2, **31 to 46 trees** are needed during a year[3]
- The average CO2 emission of a person living in Belgium is **8 tons per year**[2]
- To limit global warming to 2°C, the average level of CO2 emission per capita on our planet **must not exceed 2,1 tons by 2050**[2]

Sources: 1.EDF, 2. Energyguide, 3. Encon

Analysis limitations

The analysis contains limitations in terms of data quality and availability

Elements to consider

- The analysis is based on data provided by the Belgian Telecom operators for the **period 2018-2021** and **not all data has been audited** by an independent entity
- The data reported by the operators has **different levels of granularity,** and this study is depending on the information and granularity shared
- While most aspects of network sharing have been taken into account, **minor double counting cannot be excluded**
- Voo has **not been able to report sufficient data** and has thus been excluded from the analysis
- The European benchmark refers to a **selection of 4 European telecom operators:** Deutsche Telekom, Telefonica, British Telecom (BT) and KPN
- As the **reporting of CO2 emission for scope 3 is limited**, our analysis is based on scope 1 and 2 emission only

Analysis takeaways

Based on the analysis, key takeaways have been identified

Energy consumption

- The Belgian telecom market has **reduced its energy consumption by 11%** between 2018 and 2021
- In 2021, **80%** of the energy used by the Belgian operators was **electricity**
- In 2021, **77%** of the electricity was **consumed by the network and 79%** of the energy **consumed was renewable**
- When comparing the energy consumption per Mn € of revenue, **the three players have similar values in 2021**
- **100% of renewable energy** is a key priority for operators
- **Every operator has energy efficiency targets,** but ambitions differ

CO2 emissions

- **CO2 emissions** of the Belgian telecom market **decreased by 38%** between 2018 and 2021
- **The Belgian telecom market was carbon neutral** in 2021
- In 2021, the Belgian players was **performing in line with European benchmark**
- **Net zero**[1] – Scope 1, 2 & 3 objective, should be achieved **in 2040, the earliest**
- More initiatives can be put in place to **grow the proportion of self-produced renewable energy**

Water consumption

- The Belgian telecom market has **reduced its water consumption by 47%** between 2018 and 2021
- Overall, **water consumption is lower on the agenda** of the telecom operators, with no specific long-term goals defined
- **Most operators,** including in Belgium, **have initiatives in place** to reduce the consumption

Waste and recycling

- **Waste generation** of the Belgian telecom market **decreased by 40%** between 2018 and 2021
- **The share of waste being disposed** by the Belgian operators **decreased** between 2018 and 2021, going from **19% to 16%**
- The **products diverted from disposal** of the Belgian telecom market **increased by 265%** between 2018 and 2021
- In 2021, the Belgian telecom operators **dispose a high amount of waste** per Mn € of revenue
- BE operators **are not moving as fast as other operators in terms of waste reuse and recycling,** with objectives that are on a 2030 or later horizon

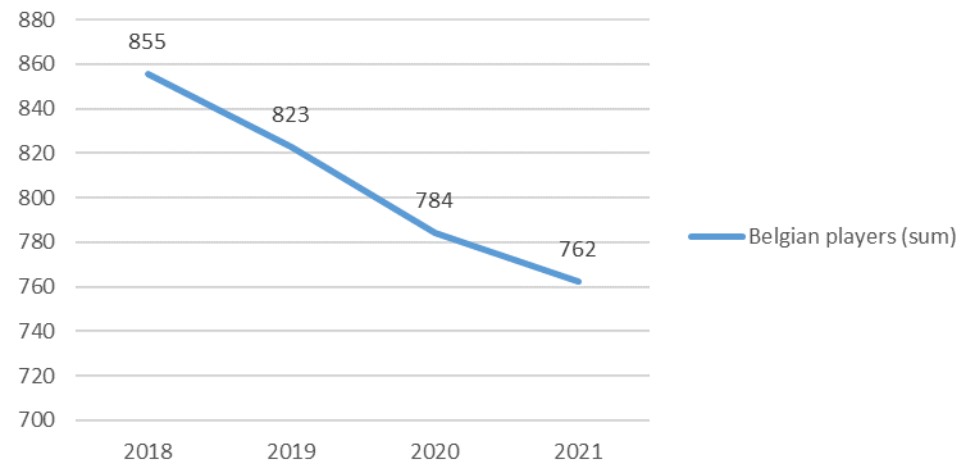
Sources: 1. Net zero refers to the amount of all greenhouse gases (GHGs) – such as carbon dioxide (CO2), methane or sulfur dioxide – that are removed from the atmosphere being equal to those emitted by human activity.

Data Analysis

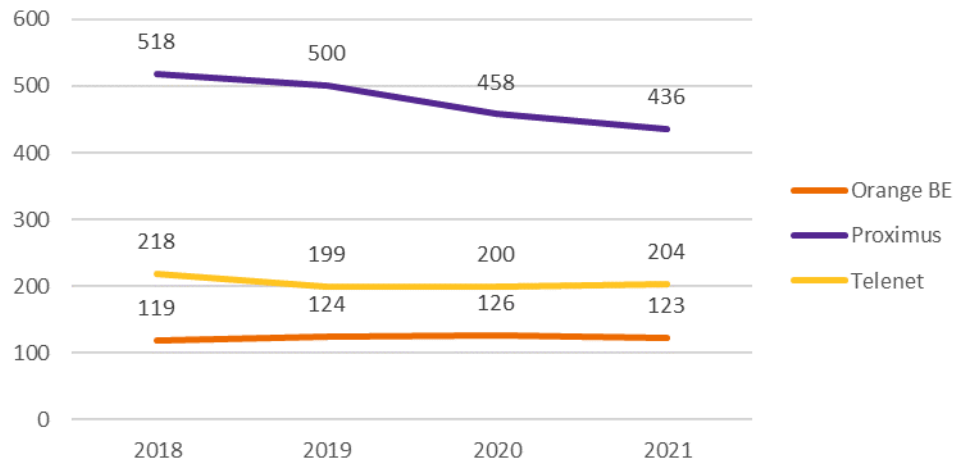
Energy

Data insights (1/4)

ENERGY CONSUMPTION, Sum of Belgian Players (2018-2021) Gwh



ENERGY CONSUMPTION, Segmentation per player (2018-2021) Gwh



Insights and takeaways

The Belgian telecom market has reduced its energy consumption:
The total energy consumption of the Belgian telecom market decreased by 11% between 2018 and 2021, going from 855 Gwh to 762 Gwh

In comparison, the telecom electricity consumption represented 0.7% of the total Belgian electricity consumption in 2021[1]

Electricity is the main source of energy consumption:
In 2021, electricity represents 80% of the energy consumed by the Belgian telecom market. The other 20% of the energy consumed is mainly fuel (diesel and petrol)

In 2021, 81% of the electricity consumed is renewable, however, this is mainly acquired renewable electricity, 2% is produced by the Belgian operators

Proximus consumes the most energy:
Due to its large network, 57% of the energy consumed in the market was consumed by Proximus in 2021, of which 75% was electricity. When analyzing the Gwh consumption per Mn € of revenue, the 3 players have similar values (0.081 for Orange and 0.078 for Proximus and Telenet)

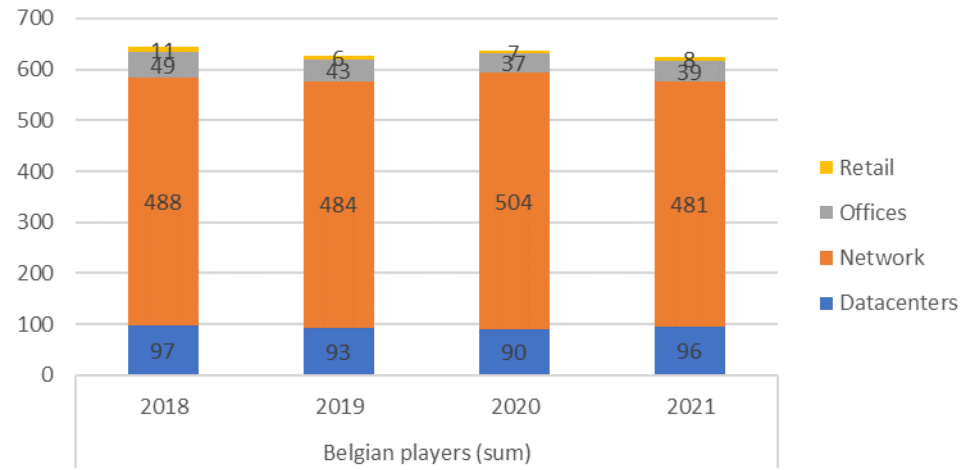
Proximus and Telenet are both reducing their energy consumption:
Proximus and Telenet decreased their consumption by 16% and 6% respectively from 2018 to 2021 while Orange slightly increased its consumption by 3% during the same period

Fuel consumption has decreased in the 3 companies. Proximus decreased its fuel consumption by 29%, Telenet by 18%, and Orange by 30% between 2018 and 2021

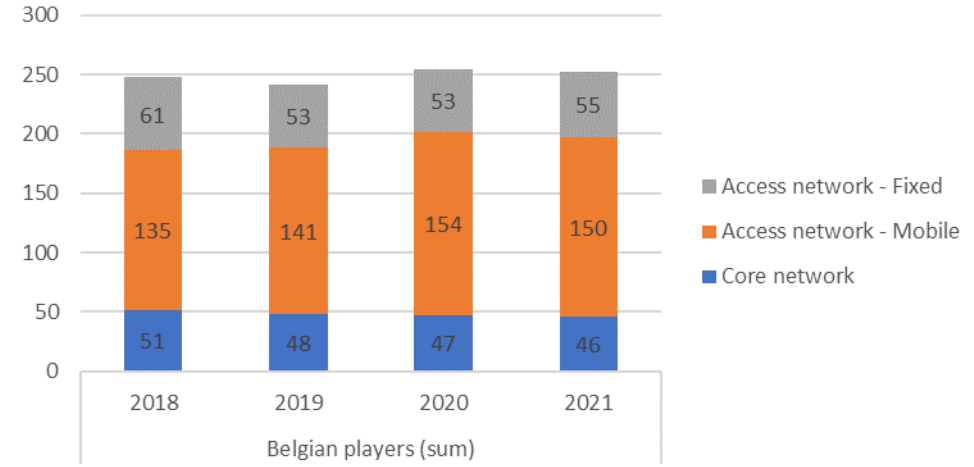
Source: 1. IEA

Data insights (2/4)

ELECTRIC CONSUMPTION BREAKDOWN, Sum of Belgian Players (2018-2021) Gwh



NETWORK ELECTRIC CONSUMPTION BREAKDOWN, Sum of Telenet and Orange (2018-2021) Gwh[1]



Insights and takeaways

The network is the main source of electricity consumption:
The telecom's networks represented 77% of the electric consumption in 2021. The telecom's network electric consumption decreased by 1% from 2018 to 2021.

Datacenters are the second source of energy consumption (15%) for the Belgian players, followed by offices (6%) and then retail (1%)

In 2021, the energy consumption distribution is similar for the three main players analyzed

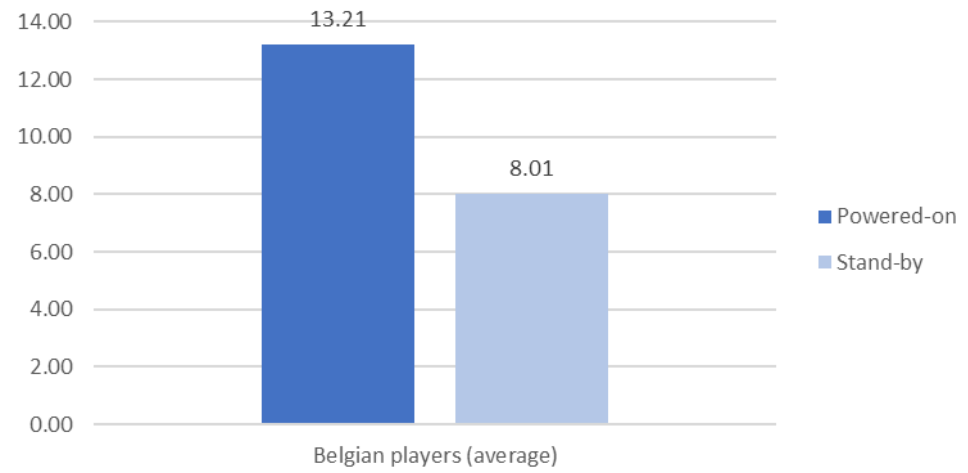
Orange and Telenet's access networks consume significantly more than their core networks:
In 2021, the access network, the part of the network that connects a subscriber to a system, consumed 3.5 times more electricity than the core network

Access network's energy consumption increased by 5% between 2018 and 2021, while core network's decreased by 10% in the same period

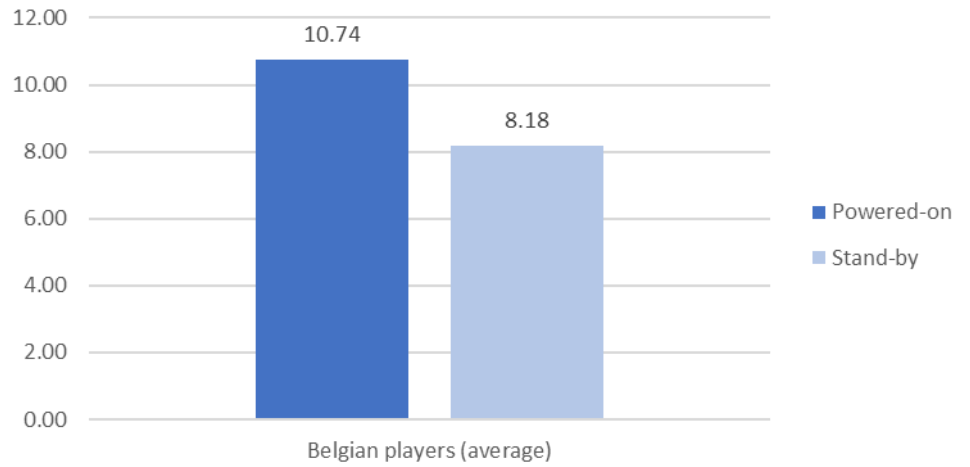
Note: 1. Proximus has been excluded from this analysis due to a lack of information

Data insights (3/4)

ROUTER/MODEM CONSUMPTION, Average consumption of Belgian players (2021) Watt



SET-TOP BOX CONSUMPTION, Average consumption of Belgian players (2021) Watt



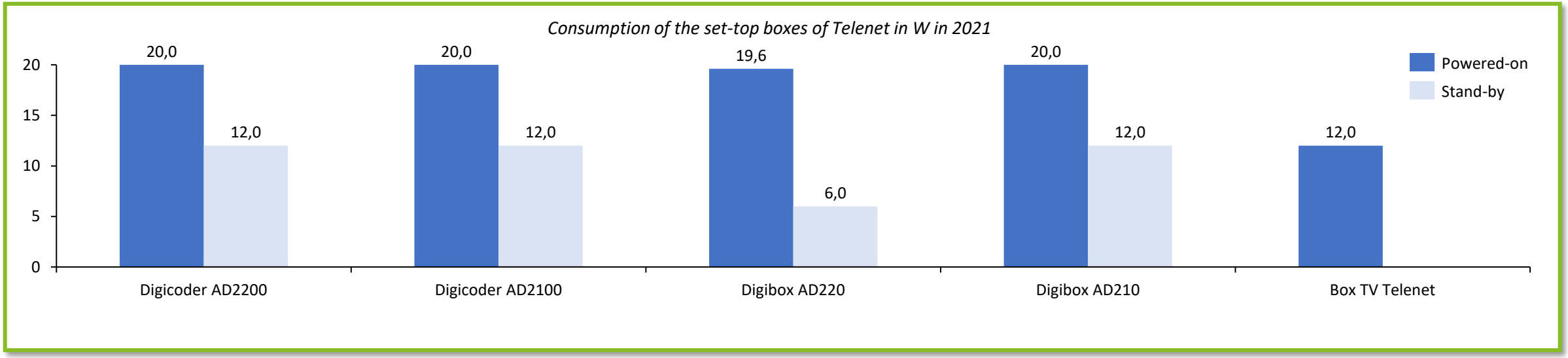
Insights and takeaways

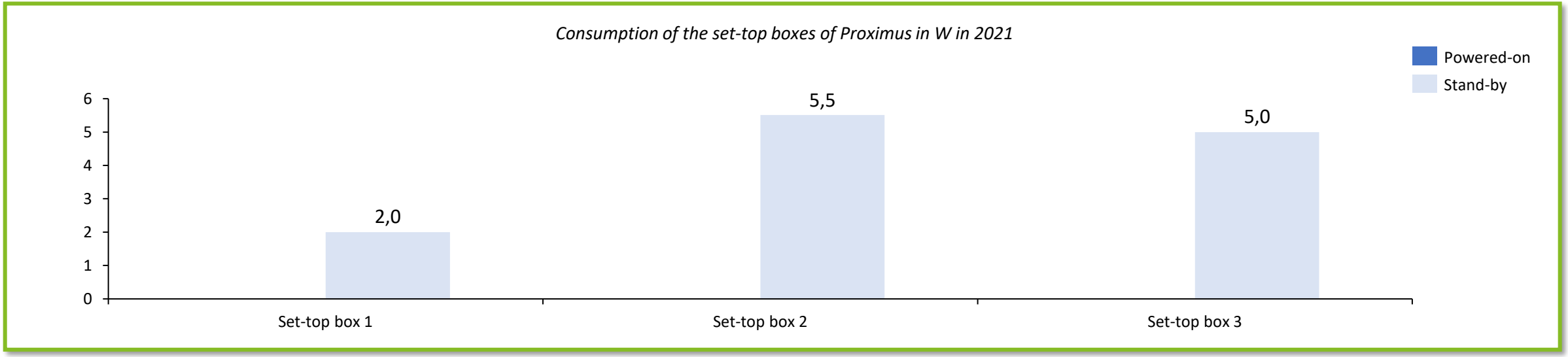
On average, a powered-on router/modem consumes 13.21 watts:
In 2021, the average consumption of the router/modem in Belgium in a powered-on mode was 13.21 watts while in a stand-by mode it consumed 8.01 watts.
On average in 2021, a router/modem in a stand-by mode consumed 40% less than in a powered-on mode. However, a router/modem is not supposed to be turned off.
On average in Belgium in 2021, if a router/modem was always in powered-on mode, it consumed 116 kWh in a year.

On average, a powered-on set-top box consumes 10.74 watts:
In 2021, the average consumption of the set-top box in Belgium in a powered-on mode was 10.74 watts while in a stand-by mode it consumed 8.18 watts.
On average in 2021, a set-top box in a stand-by mode consumed 24% less than in a powered-on mode.

Data deep-dive – Set-top boxes

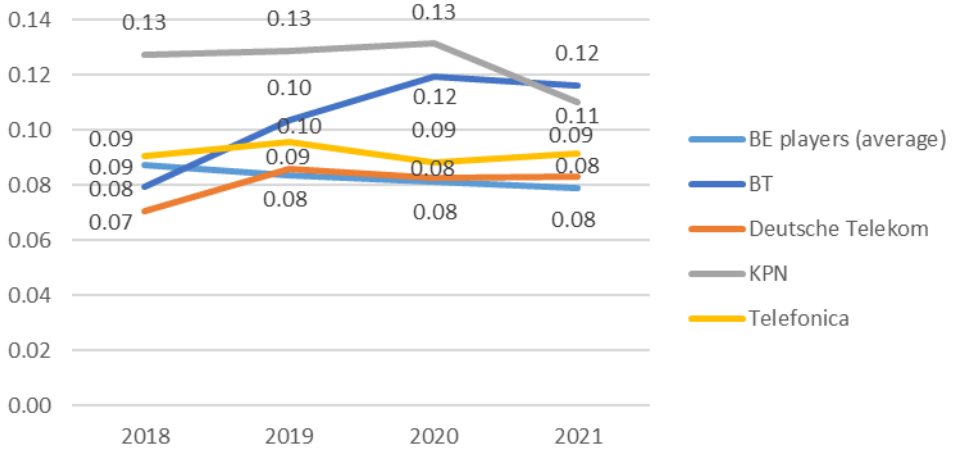
Comparing the set-top boxes of the three players is difficult as the data provided is different for all players



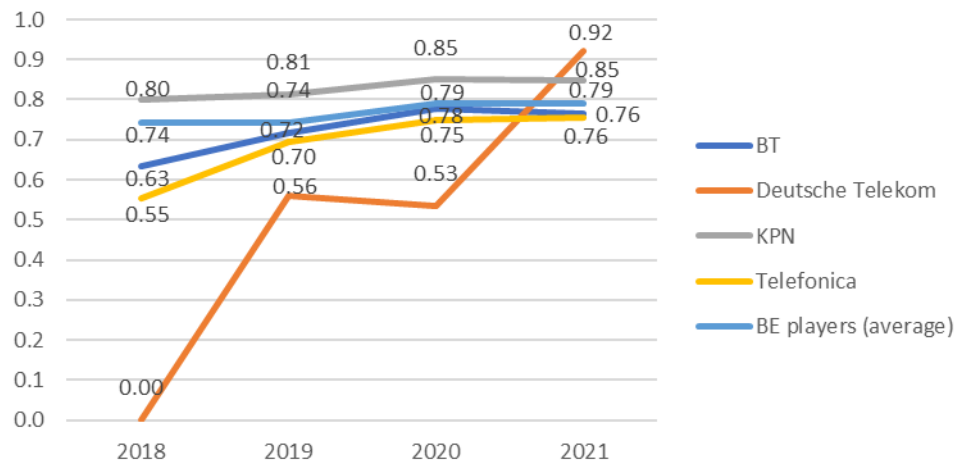


Data insights (4/4)

ENERGY EFFICIENCY, Comparison with European players (2018-2021)
Gwh per Mn € of revenue (adjusted)



SHARE OF RENEWABLE ENERGY, Comparison with European players (2018-2021)



Insights and takeaways

Compared to a European benchmark, the Belgian telecom market is slightly more energy efficient:
In 2021, when analyzing energy consumption per Mn € of revenue, adjusted to reflect differences in pricing levels in the respective countries, the Belgian telecom market was the most efficient player, closely followed by Deutsche Telekom, Telefonica, KPN and finally BT

The Belgian players are in line with the European benchmark:
In 2021, the share of renewable energy consumed in the Belgian market (79%) was in line with the European market (from 76% to 92%)

This share of renewable energy purchased is mainly caused by the renewable electricity bought by the operators, especially as electricity represents 80% of the energy consumed in the Belgian telecom market, and as 98% of the electricity comes from renewable sources

The share of renewable energy is growing for the Belgian players:
In the Belgian telecom sector, the share of renewable energy increased by 6% between 2018 and 2021. This trend can be observed for the main Belgian players. However, only 2% of the energy consumed is produced by the operators

Initiatives and objectives (1/2)

ENERGY

		telenet	proximus	orange
Goals	**100% renewable electricity**	Yes, by 2030	Yes	Yes
	Energy efficiency targets	Yes (Reduce electricity-intensity of the network by 15% per year, through to 2030 (in kWh/TB))	Yes (Internal)	Yes (Internal)
	Fuel reduction targets	No	Yes (Internal)	Yes
Initiatives	**Consumption reduction in the network**	• ANTARCTICA program (renovating and renewing cooling systems in technical locations) • Optimize power saving configuration	• Creating a more energy efficient network • Replace technical buildings with a concept of compact units & outphasing technical buildings • Outphasing of older technologies & copper	• Expansion of temperature and hygrometry ranges in technical rooms of ITN sites • All core sites are equipped with latest high efficient 48VDC system
	Consumption reduction in the datacenters	• ANTARCTICA program (renovating and renewing cooling systems DCs) • Keeping the DCs up to date with the latest technology	• Creating more energy efficient DCs	• Free cooling in DCs • Heat recovery in 1 core site and will be extended to 2 other sites
	Green mobility	• Electrification of fleet and encouragement of alternative mobility	• Invest in more sustainable transportation • Rule out fossil fuel in fleet by switching to renewables and incentivizing electrical vehicles	• Increase the number of electric or hybrid cars in the fleet and offer an incentive for commuting by public transport and bike • 60% homeworking policy
	Consumption reduction in the offices	• Relighting to led	• Topical efficiency projects	• Installation of low-energy light bulbs • Contracted Veolia to manage, maintain & optimize the energy consumption in the offices
	Green electricity	• Solar panel installations on office buildings (135MWh/year currently and increase to 290MWh/year at the end of the year) • 100% of the directly purchased electricity is renewable	• Source greener and maintain 100% renewable electricity	• Photovoltaic & Solar panels on the roof • Sign a Power Purchase Agreement in 2024 - Objective of a maximum consumption through a PPA from 2025-2026
	Other	• Energy Savings Task Force that has been active since October	• Rule out fossil fuel in buildings by switching to renewables	• Working groups created to reduce our energy consumption

Note: The list of initiatives is a selection of initiatives in each of the topics

Initiatives and objectives (2/2)

GOALS OF BELGIAN AND EUROPEAN PLAYERS

	Yes in 2021	Yes, by 2025	Yes, by 2030	No
100% renewable electricity	T · · kpn orange BT proximus		Telefónica telenet	

	Yes	No
Energy efficiency targets	T · · Telefónica BT kpn orange proximus telenet	

	Yes	No
Fuel reduction targets	T · · proximus orange Telefónica kpn	BT telenet

Insights and takeaways

100% of renewable electricity is a key priority for operators. In BE, only Telenet is not 100% renewable today, but this is linked to the electricity consumption of internal suppliers that can difficulty be controlled.

Most operators have energy efficiency targets, but ambitions differ. Telenet will reduce electricity-intensity of the network by 15% per year, through to 2030 (in kWh/TB), Proximus and Orange do not communicate targets externally

The move towards 5G and FTTH will reduce consumption but is partly compensated by traffic increase. All operators are moving towards 5G, which is more efficient and consumes much less energy per bit than 4G. However, data usage is growing fast therefore overall energy consumption will increase with 5G. Especially since 5G technology will run in parallel with 4G/3G/2G technologies for several years. FTTH is more efficient than HFC per bit, as it requires less active equipment. Again, with data usage increasing, energy consumption in FTTH will also increase.

Fleet fuel is one of the main energy drivers, with **most operators working towards electrification of fleet and encouragement of alternative mobility.**

On-site sustainable solutions will continue to grow, but are not yet put in place by BE operators. Site level renewable solutions can involve a mix of wind and solar energies to power up the towers while lithium-ion batteries give an “offline” support when the former technologies can’t supply enough energy. Vodafone is currently experimenting this in a set of sites.

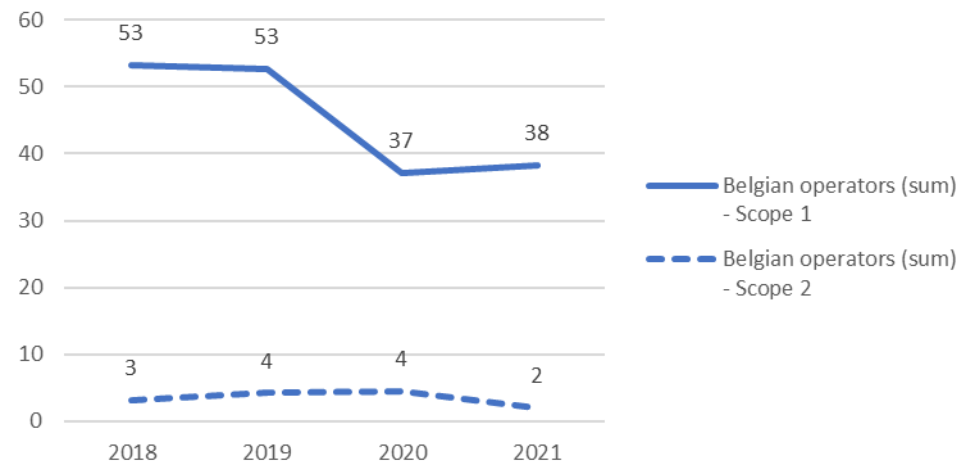
Datacenters are identified as high energy consumers and addressed by BE operators. Nevertheless, the consumption of Cloud Storage on third party data centers like AWS is not taken into consideration.

Data Analysis

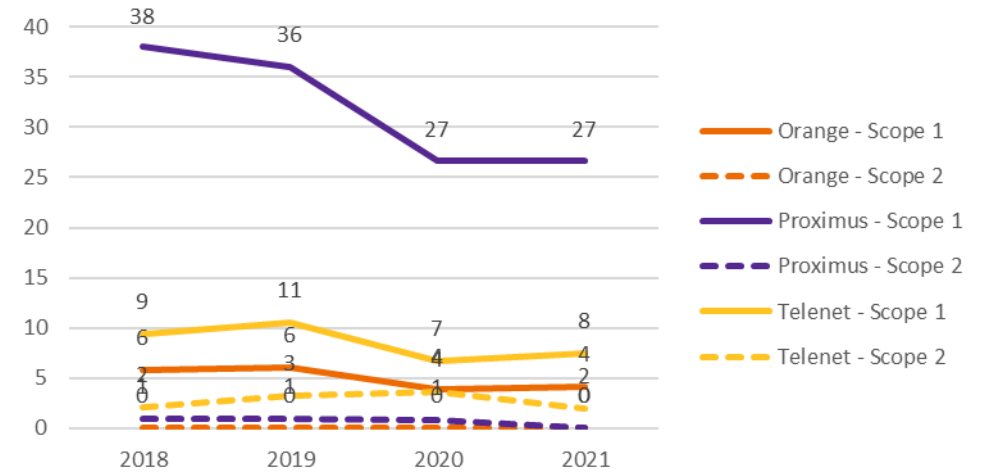
CO2 Emission

Data insights (1/2)

CO2 EMISSION SCOPE 1 AND 2, Sum of Belgian Players (2018-2021) Ktons



CO2 EMISSION FROM SCOPE 1 AND 2, Segmentation per player (2018-2021) Ktons



Insights and takeaways

The Belgian telecom market has reduced its CO2 Emission:
CO2 emissions from scope 1 and 2 from the Belgian telecom market decreased by 29% between 2018 and 2021, going from 56 Ktons to 40 Ktons. In 2021, the telecom CO2 Emission represented 0.65% of the Belgian CO2 emission.

Scope 1 is the main source of CO2 emission compared to scope 2:
In 2021, scope 1 represented 95% of the CO2 emission in the Belgian telecom market. The remaining 5% in scope 2 is generated by the non-renewable electricity

In 2021, the scope 1 CO2 emission was generated by fleet fuel (74%), heating (21%) and refrigerants (5%). As fleet accounts for the majority of CO2 emissions, the remarkable drop in CO2 emissions in 2020 can be driven by the corona health crisis, forcing people to commute less. Scope 2 represents the emission of electricity

Proximus emits the most CO2:
Given its larger network, larger employee base and thus larger fleet, Proximus emitted 66% of the CO2 in 2021 in the Belgian telecom market in 2021

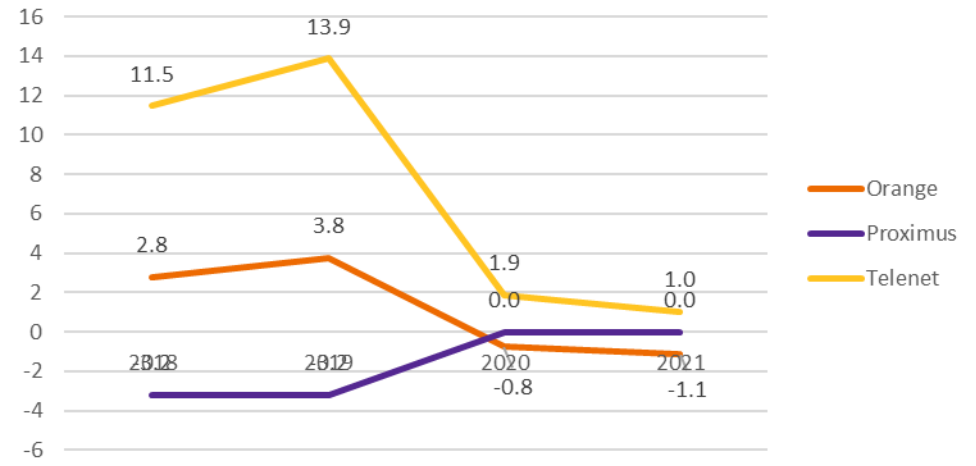
Proximus managed to reduce its CO2 emission by -31% between 2018 and 2021, followed by Orange (-29%) and Telenet (-17%)

Orange managed to decrease its fleet fuel between 2018 and 2021 by -35%, followed by Telenet (-34%) and Proximus (-27%)

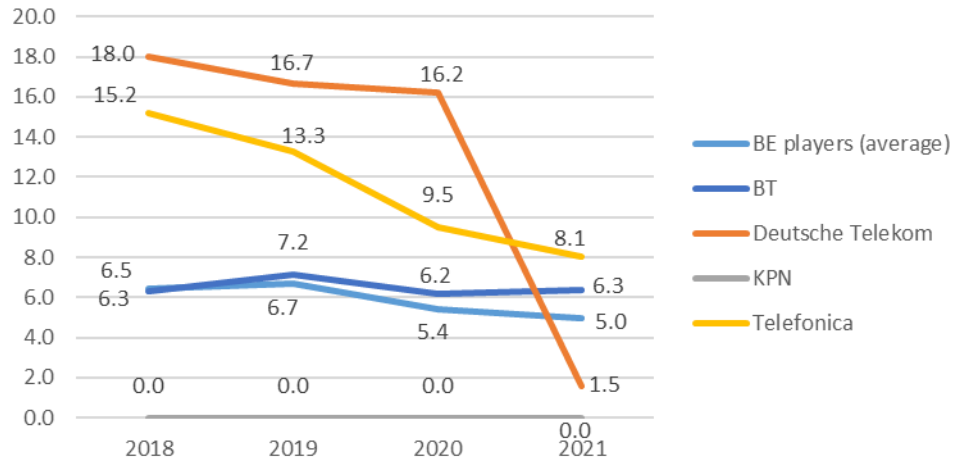
Proximus and Orange only emitted Scope 2 emission:
In 2021, Proximus and Orange had no scope 2 emissions as 100% of the electricity purchased was renewable

Data insights (2/2)

CARBON NEUTRALITY, Segmentation per player (2018-2021) Ktons



CARBON INTENSITY, Comparison with European players (2018-2021)
Tons of scope 1 and 2 emissions per Mn € of revenue (adjusted)



Insights and takeaways

The Belgian market is carbon neutral:
The net carbon emission of the 4 Belgian operators was -0.11 Ktons in 2021. This is calculated by summing up scope 1 and 2 CO2 emissions and subtracting the carbon credits

Proximus has been carbon neutral since at least 2018, and was even carbon negative in 2018 and 2019, Orange has been carbon neutral since 2020. Telenet is not yet carbon neutral, but is doing efforts to become by decreasing their CO2 emissions

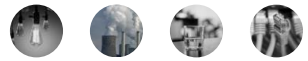
A note should be made that a growing number of experts challenge the effectiveness of carbon credits, as it does not deter people from abusing the environment. Another way to investigate this would be to analyze the way CO2 is purchased[1]

The Belgian players performing in line with European benchmark:
When dividing scope 1 and 2 emissions by the revenue in Mn €, adjusted to reflect differences in pricing levels in the respective countries, the Belgian telecom market was more efficient than BT and Telefonica but less than Deutsche Telekom in 2021

Deutsche Telekom went from the least to the most efficient player in a year:
Deutsche Telekom succeeded to divide their Scope 1 and 2 emissions 10 times in 2021. This is mainly driven by their switch from non-renewable to renewable electricity consumption

Note: 1. Energycx

Initiatives and objectives (1/2)



		telenet	proximus	orange
Goals	**Net zero – Scope 1 & 2**	Yes, by 2030	Yes, 95% of scope 1 by 2030 and 100% renewable electricity	Yes, by 2040
	Net zero – Scope 1, 2 & 3	Yes, by 2050 at the latest	Yes, by 2040	Yes, by 2040
	Carbon positive commitment[1]	No	Yes	No
Initiatives	**Emission reduction of Scope 1**	• Electrification of fleet and encouragement of alternative mobility • POCs with more energy efficient power generation systems (HVO100; battery+gen-combo)	• Invest in more sustainable transportation • Rule of fossil fuel in fleet & buildings	• Increase the number of electric or hybrid cars in the fleet and offer an incentive for commuting by public transport and bike
	Emission reduction of Scope 2	• Purchase 100% renewable energy in Telenet controlled contracts	• Source greener and maintain 100% renewable electricity	• Installation of low-energy light bulbs • Photovoltaic and solar panels on the roof
	Emission reduction of Scope 3	• Introduce innovative, low-energy CPE • Work with local partners for CPE processing • use multimodal transportation for any long-distance transportation of CPE • Participate in last-mile city logistics projects	• Supplier engagement program • Environmental sustainability by design by sourcing less & sourcing right	• Re program and continuous improvement on waste management
	Compensation of the CO2 emission	• Invest in afforestation projects in Ecuador via Bos+	• NA	• Supported mini-hydro plants in Liberia to avoid the use of polluting energy. • Financed an AGROFORESTRY project in Kenya and a project in Zimbabwe on the protection of the Kariba forest.
	Other	• NA	• NA	• €2 donated to Natagora / Natuurpunt for each collected device. Long-term project managed by Natagora / Natuurpunt. The whole project aims at the reforestation of 100 hectares of land (outside compensation)

Note: 1. Carbon positive commitment is a commitment meaning that the balance of carbon emissions for a business entity falls below zero. This commitment is not in line with SBTi new net zero standard; The list of initiatives is a selection of initiatives in each of the topics

Initiatives and objectives (2/2)

GOALS OF BELGIAN AND EUROPEAN PLAYERS

	Yes in 2021	Yes, by 2025	Yes, by 2030	Yes, by 2040	No
Net zero – Scope 1 & 2	kpn	Telefónica	proximus, telenet	orange	

	Yes in 2030	Yes, by 2040	Yes, by 2050	No
Net zero – Scope 1, 2 & 3		Telefónica, BT, kpn, proximus, orange	telenet	

	Yes	No
Carbon positive commitment	Telefónica, kpn, proximus	orange, BT, telenet

Insights and takeaways

Net zero is on the agenda of all Belgian telecom players, but it could go faster. For scope 1 & 2, KPN has already achieved this since 2021 and a few other operators will follow by 2025**, whilst the target is to achieve this by 2030 for Telenet and Proximus and by 2040 for Orange.**

Net zero – Scope 1, 2 & 3, should be achieved by 2040, the earliest. This is in line with other operators.

For scope 1, the fleet is the main emission driver and electrification is key. All operators are working towards a green fleet and sustainable transportation.

For scope 2, the purchase of renewable energy is the norm. Orange and Proximus already purchased 100% renewable energy today.

More **initiatives can be put in place to grow the proportion of self-produced renewable energy,** as today only 2% is self-produced. Deutsche Telekom has been investing in solar panels and wind farms.

Other initiatives are in place to reduce **scope 3 emissions**, with supplier programs and local partnerships that are put in place by all the operators. Telefonica for example is developing a Supply Chain program encouraging strategic suppliers to set science-based targets and reduce their GHG emissions.

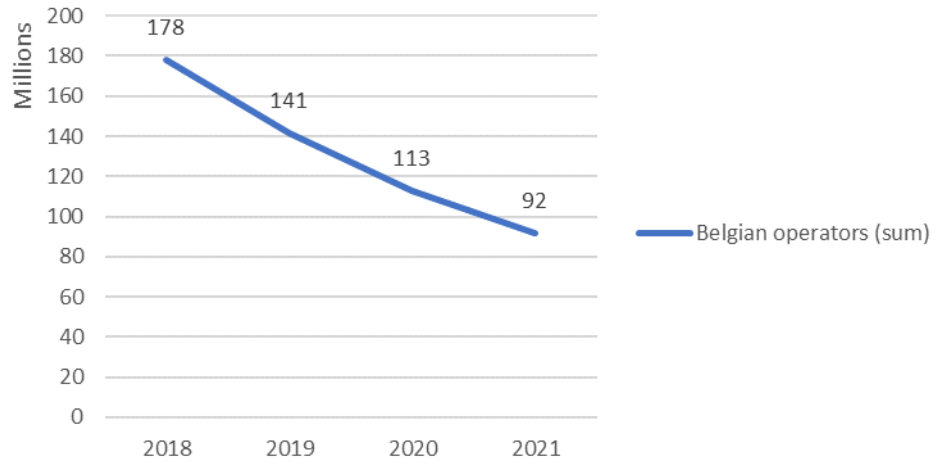
Compensation of CO2 emissions is also a popular lever within telecom companies. In BE, Telenet invests in afforestation projects in Ecuador via Bos+ and Orange invests in mini-hydro plants in Liberia and in an agroforestry project in Kenya and Zimbabwe.

Data Analysis

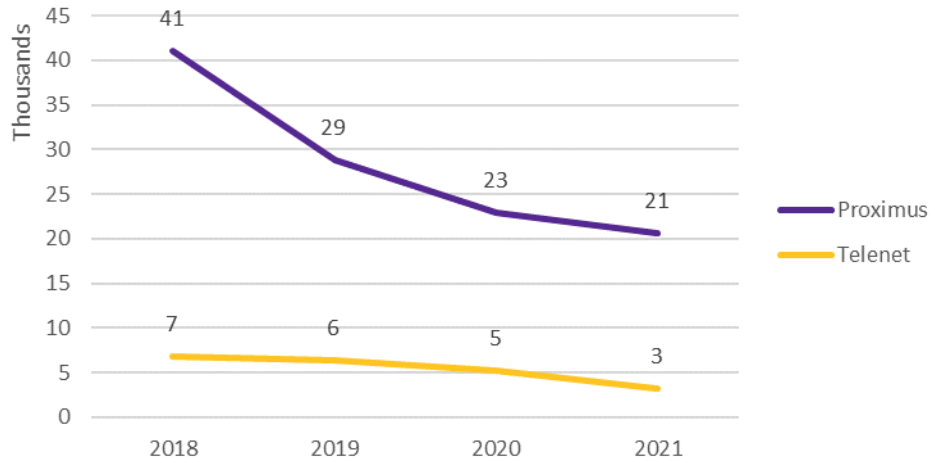
Water

Data insights (1/2)

WATER CONSUMPTION, Sum of Belgian players (2018-2021) Liter



WATER EFFICIENCY, Segmentation per player (2018-2021) Liter per employees



Insights and takeaways

The Belgian telecom market has been reducing its water consumption:
The total water consumption of the Belgian telecom market decreased by 47% between 2018 and 2021, going from 178 Mn liters to 92 Mn liters

In 2021, based on Telenet's data, 53% of the water was used in their offices, 19% for their datacenters, and 28% in other locations

As the water consumption dropped by 47% between 2018 and 2021, the water consumed by Mn € revenue and by employees followed the same decreasing trend

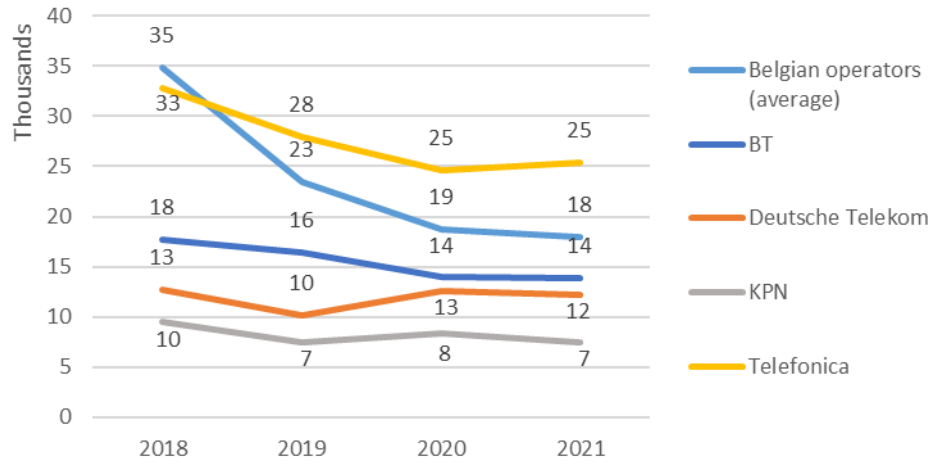
A significant water efficiency difference exists between Proximus and Telenet:
In 2021, Proximus consumed 85% of the water consumed by the Belgian telecoms

When analyzing the water consumption per employee, Proximus consumed 7 times more water per employee than Telenet in 2021

When analyzing the water consumption per Mn € of revenue, Proximus consumed 6 times more water per employee than Telenet in 2021

Data insights (2/2)

WATER EFFICIENCY, Comparison with European players (2018-2021)
Liter per employee

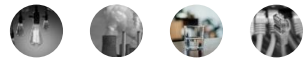


Insights and takeaways

The Belgian market is performing in line with the average of the European benchmark:
When looking at the ratio of water consumption per employee, the Belgian average was more efficient than Telefonica but less than KPN, Deutsche Telekom and British Telecom in 2021

When analyzing the decrease of this ratio from 2018 to 2021, the Belgian operators had the highest decreased (-47%) followed by Telefonica (-23%), KPN (-22%), BT (-22%) and Deutsche Telekom (-4%)

Initiatives and objectives (1/2)



		telenet	proximus	orange
Goals	**Commitment to reduce water consumption**	No	No	No
Initiatives	**Reuse of rainwater**	• NA	• Topical projects when renewing/renovating spaces	• Reuse of rainwater at the headquarter
	Reduction of the water consumption in the offices	• NA	• NA	• Water reuse system in headquarter reduce the water consumption
	Reduction of the water consumption in the datacenters	• NA	• NA	• Free cooling system in all core sites reduce water consumption
	Other	• NA	• NA	• Dry Cleaning car service proposed to employees (punctual action as a test)

Note: The list of initiatives is a selection of initiatives in each of the topics

Initiatives and objectives (2/2)

GOALS OF BELGIAN AND EUROPEAN PLAYERS		
	Yes	**No**
Commitment to reduce water consumption		Telefónica, kpn, orange, BT, telenet, proximus

Insights and takeaways

Overall, water consumption is lower on the agenda of the telecom operators, with no specific long-term goals defined.

Most operators, including in Belgium, have initiatives in place to reduce the consumption, but those remain rather limited compared to other preoccupations. Example of initiatives are the increased usage of rainwater or reuse of water.

Water usage of data centers is one of the larger aspects of water consumption (when cooling is done by water and not air). One can work on the water reduction but also on reusing the heat that is generated for local heating.

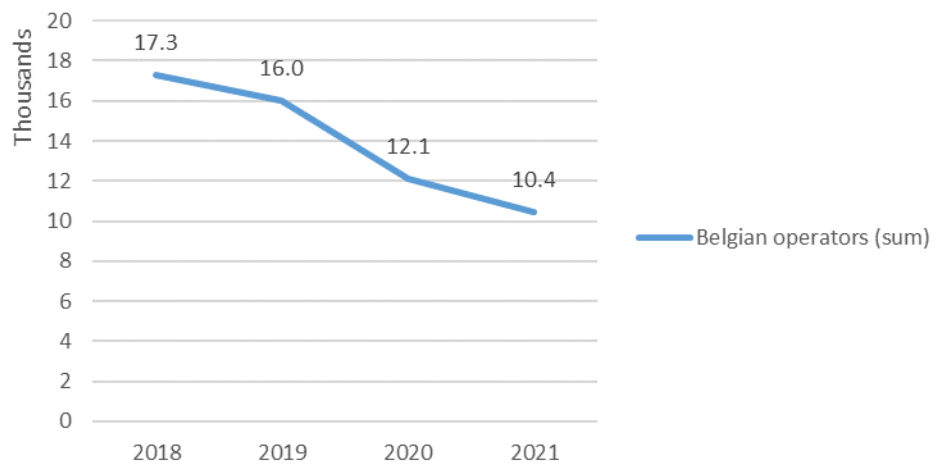
Earlier this year, Europe's data center operators have told the European Commission that they will cut water use to a maximum of 400ml per kWh of computer power by 2040.

Data Analysis

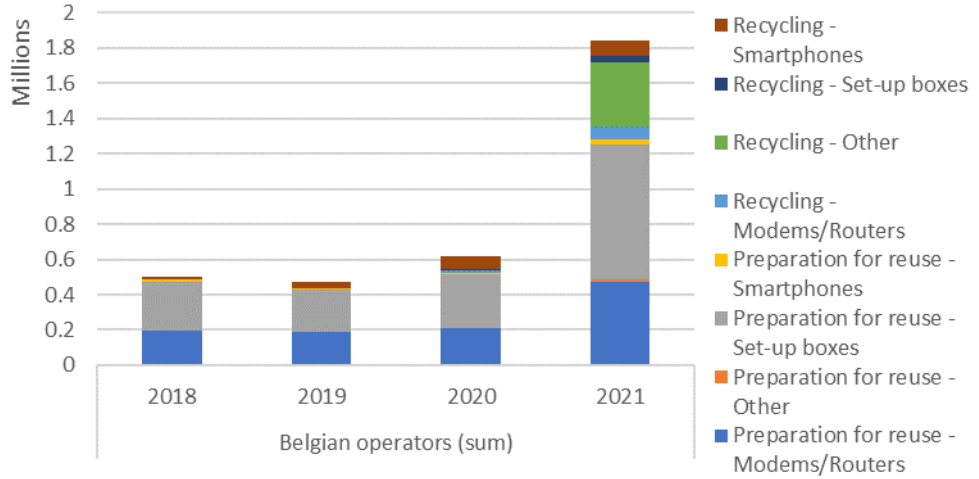
Waste & recycling

Data insights (1/2)

WASTE GENERATION, Sum of Belgian players (2018-2021) Tons



PRODUCT DIVERTED FROM DISPOSAL, Sum of Belgian players (2018-2021) Units



Insights and takeaways

The Belgian telecom market has been reducing its waste generation:
Waste generation of the Belgian telecom market decreased by 40% between 2018 and 2021, going from 17,300 tons to 10,400 tons. Examples of waste are network waste (cable, antennas, etc.) and non-network waste (modems, smartphones, etc.)

Waste disposed[1] generation in the Belgian telecom market decreased by 47% between 2018 and 2021, going from 3,200 tons to 1,700 tons. Moreover, 16% of the total waste was disposed in 2021

Waste diverted from disposal[1] generation in the Belgian telecom market decreased by 38% between 2018 and 2021, going from 14,100 tons to 8,800 tons

The number of products diverted from disposal increased between 2018 to 2021:
The products diverted from disposal of the Belgian telecom market increased by 265% between 2018 and 2021, going from 500 thousand units to 1.8 Mn units

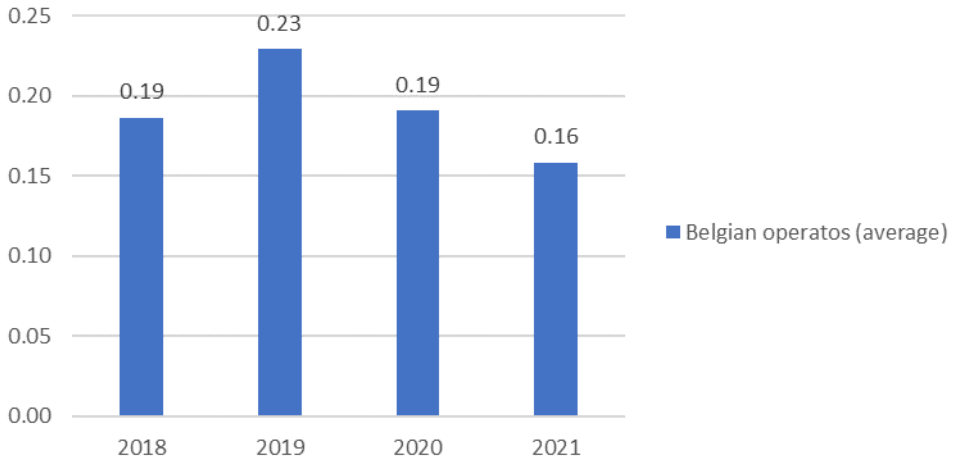
One major cause of this increase is the fact that Telenet only reports the 2021 value. When excluding Telenet from this analysis, the number of products diverted from disposal increased by 114% from 2018 to 2021. This number seems more representative of the actual increase in products diverted from disposal

Preparation for reuse is the preferred option to divert products from disposal:
In 2021, 79% of the products diverted from disposal were prepared for reuse. These products were mainly set-top boxes (58%) followed by modems and routers (39%)

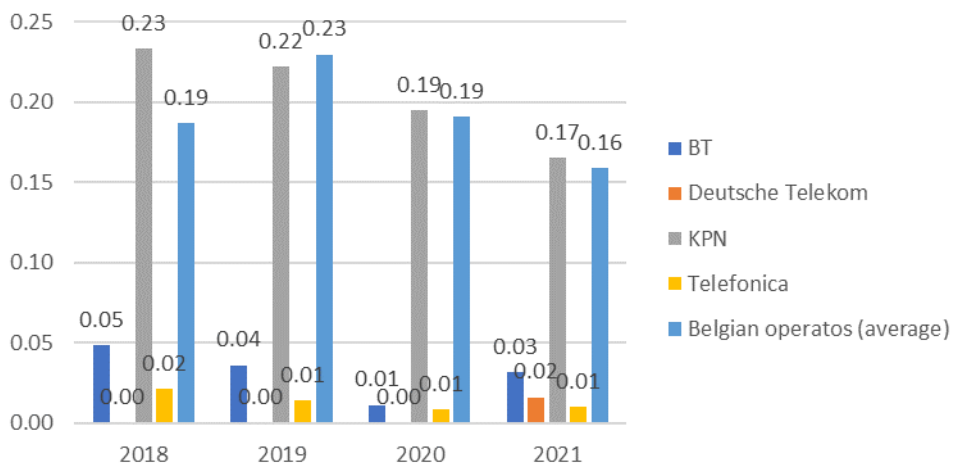
Note: 1. Waste disposed is the waste that is discarded, thrown away or destroyed. It is the opposite of waste diverted from disposal, which happens when for example recycling or refurbishing waste.

Data insights (2/2)

SHARE OF WASTE DISPOSED OUT OF TOTAL WASTE, Weighted average of Belgian players(2018-2021)



SHARE OF WASTE DISPOSED OUT OF TOTAL WASTE, Comparison with European players (2018-2021) Tons of waste disposed / Tons of Total waste



Insights and takeaways

The Belgian players decreased the share of waste disposed:
The share of waste being disposed by the Belgian operators decreased from 2018 to 2021, going from 19% to 16%

The Belgian market lags behind the European operators :
In 2021, the share of waste disposed out of total waste was 16% for the Belgian operators. When comparing with the European benchmark, KPN had a similar share of disposed waste (17%), while the other three European players report on a remarkably lower share of disposed waste (between 0.01% and 0.03% of total waste)

Except for DT, all players analyzed were able to decrease the share of disposed waste out of total waste between 2018 and 2021

Note: 1. Waste disposed is the waste that is discarded, thrown away or destroyed. It is the opposite of waste diverted from disposal, which happens when for example recycling or refurbishing waste.

Initiatives and objectives (1/2)

		telenet	proximus	orange
Goals	**All waste reused or recycled**	No	Yes, by 2030	No
	Waste reduction commitment for circularity	Yes	Yes	Yes
Initiatives	**Reduction of the waste generation**	• Replace cardboard and plastic cups with reusable cups (HQ -> Billie Cup) • Laptops-as-a-Service • Organize reverse-logistics to improve circularity through collaboration with social profit organization Vlotte (IMSIR bvba)	• Sustainable way of delivering parcel to consumers and stores • On-site refurbishment of modems in Courcelles • Eco-design of CPE • Offering refurbished phones • Smartphone as a service model • Network repair • Network sharing	• Re program: promotion of refurbished mobile devices • Repair service proposal in all shops • Promote Eco-Rating initiative • Introduced OSCAR, an internal marketplace to reuse existing equipment in our infrastructure
	Increase in the percentage of waste diverted from disposal	• Recollect CPE via lease-only model & penalization of no-return • Donate obsolete IT equipment and furniture to schools and good causes	• Proximus shops and online shop offer customers refurbished smartphones as an alternative to new devices • Recycling of CPE's & network equipment • Reuse of refurbished CPE's	• Reuse and recycle modems and set-top boxes returning from customers (Out of use partnership). • Refurbishment of mobile device (Back2Buzz partnership).
	Other	• NA	• NA	• Increase efforts on waste management • Incentives for our salespeople in shops to collect devices • €2 donated to Natagora / Natuurpunt for each collected device. Long-term project managed by Natagora / Natuurpunt. The whole project aims at the reforestation of 100 hectares of land (outside compensation)

Note: The list of initiatives is a selection of initiatives in each of the topics

Initiatives and objectives (2/2)

GOALS OF BELGIAN AND EUROPEAN PLAYERS				
	Yes in 2021	Yes, by 2025	Yes, by 2030	No
All waste reused or recycled		T-Mobile, kpn, BT	proximus, Telefónica	orange, telenet

	Yes	No
Waste reduction commitment for circularity	T-Mobile, proximus, BT, telenet, orange, Telefónica, kpn	

Insights and takeaways

Waste has since long been a central preoccupation of operators, amongst others through waste reduction commitments for circularity.

KPN has for example developed an impactful plan to “reduce and recycle in an energy efficient manner”.

Multiple initiatives have been put in place over the years, with **phone recycling and refurbishment being among the most popular actions** that operators undertake. However, not only operators need to take up this role, other distributors can equally contribute to these programs.

To reduce waste generation, Belgian operators have launched multiple initiatives, working on the entire value chain, from internal use, with Orange launching an internal marketplace, to production, with Proximus working on eco-design of CPE, and al the way to customer delivery, working a sustainable way of delivering parcels to consumers and stores.

A Sharing Instead of Owning approach is also an approach shared by multiple operators, allowing contribute significantly to resource conservation, including Telenet and its Laptops-as-a-Service offer, and Proximus and its Smartphones-as-a-service offer.

Network waste is one of the key components of waste for operators. As such, network sharing can be considered as a way of reducing this waste. Recycling and recovering valuable raw materials like copper cables is becoming a standard in the sector today.

05

Recommendations

Recommendations for different parties in the telecom market

Several recommendations can be made based on our analysis, for both the regulators, the operators as well as the consumers

Regulators

- **Take up a facilitating role** in the discussion with operators on the sustainability analysis and next steps
- Introduce a **recurring and expanded analysis of the entire sector** based on the **established framework and set of KPIs,** creating an observatory of the entire sector, including Tier 2 players and public infrastructure providers
- Introduce a **transparent comparison method** for consumers and operators to evaluate the sustainability efforts from all players
- Create a **guidebook for the telecom sector** based on concrete best practices, use cases, funding opportunities and upcoming regulations
- Set-up **knowledge sharing** with different players, such as EGDC, GSMA, EtNo, and others, and leverage best practices in guidebook
- Set **clear and nationally aligned sustainability goals** for Belgian operators, in line with or beyond upcoming regulations, such as EU regulations[1]

Operators

- Set-up elaborate **sustainability reporting** based on framework and KPIs shared, as well as on the expectations from different regulators
- Activate a **multidisciplinary sustainability squad** to leverage the guidebook and embed sustainability throughout the organization
- Take up an **educational role** towards consumers to inform them on the environmental impact of their network usage
- Leverage the opportunity for telecom operators to become **enablers towards a sustainable Future**, leveraging their network, data and technologies
- Develop **tangible sustainability goals** in line with regulators' expectations and beyond
- Create a **sustainability strategy** to translate the goals into initiatives throughout the organization, across the environmental topics

Consumers

- Learn more about the environmental impact of **network usage** and adapt usage behavior where possible
- Be able to **compare operators** from a sustainability perspective (in addition to the current options, for example comparison of network coverage)

Note: 1. More information on European regulations can be found on Legislative Train Schedule (europa.eu)

Zoom on recommendations for operators (1/4)

As part of a sustainability strategy to implement different goals and initiatives throughout the organization, several recommendations can be made on efforts to improve energy efficiency

Overall, the telecom sector represented 0.2% of the total Belgian energy consumption in 2020 and 0.8% of the total Belgian electricity consumption in 2020, this is rather limited as compared with other industries in Belgium. In order to further improve energy consumption, the operators need to continue **work on the efficiency of the network, with a focus on both access and core, for all technologies.**

When looking at the key elements in the total energy consumption composition, it is worth **investigating datacenters.** More specifically, we recommend to gain clarity on the consumption of both own datacenters and those provided by suppliers. Based on this knowledge, goals can be set to decrease or optimize the energy usage of datacenters. These goals can be translated to initiatives, which could include upgrades and consolidation of technology, air flow and water management.

Telecom operators currently have limited insights in the energy consumption by network type. Detailing out fiber and mobile energy consumption, will allow to **optimize the split and usage of different network types**, such as 2G, 3G, Coax, etc.

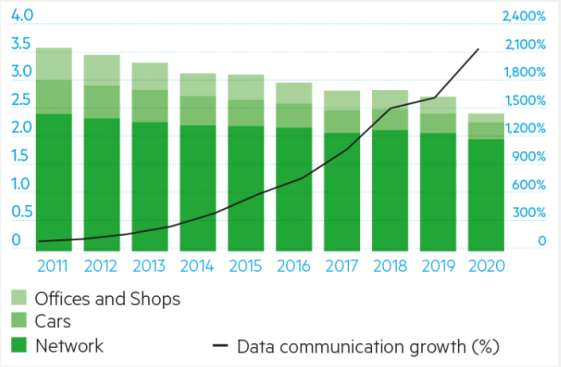
It will be important for telecom operators to **optimize their renewable energy mix**. When looking at the longer term, there is a case to be made for operators to switch towards own energy production, in addition to purchasing green energy through Power Purchase Agreements (PPA), which some Belgian operators are already doing. Operators could create a roadmap of energy consumption, which lead to CO2 Emission, detailing out the plans for optimizing this mix over the following years.

Telecom operators also encourage energy consumption on the consumer side through the **usage of modems and set-top boxes**. Operators could re-evaluate this consumption, by creating an **energy efficient approach** when it comes to **switching** from active to stand-by mode. In a later stage, this approach could be unified throughout different operators in Belgium.

Use case

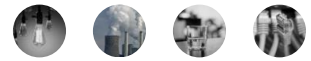
While data traffic is growing, KPN's energy consumption is not.

More than 90% of the electricity is used by KPN's fixed and mobile networks. The data traffic on their networks is growing, on average, by 40% per year. KPN is managing to expand its network without the need for more energy.[1]



Source: 1. KPN Corporate website

Zoom on recommendations for operators (2/4)



CO2 EMISSION

As part of a sustainability strategy to implement different goals and initiatives throughout the organization, several recommendations can be made on efforts to reduce CO2 Emissions

Telecom operators should develop strategies to **reduce their fleet emissions**, as these are the key drivers in the emissions. In addition to electrifying the fleet, which all telecom operators have committed to, initiatives could be created to increase the amount of self-produced electricity used to electrify the fleet, as well as revisions of mobility plans. The revision of mobility plans would allow employees to combine mobility options to commute to work and would encourage them to commute in alternative ways.

Overall, telecom operators are **performing well in terms of Scope 2 CO2 Emissions**, driven by a high percentage of purchased renewable energy. While other industries are purchasing renewable energy as well, they are not at the level of telecom yet. However, ambitious decarbonization projects focusing on the use of energy to run networks and IT, could further reduce the CO2 emissions as a whole.

Today, little to no insights exist on Scope 3 CO2 Emissions, however these can not be neglected as some experts mention scope 1 and 2 combined would only make up for one third of the total CO2 Emissions. Telecom operators should **develop ways to report on the Scope 3 Emissions**. Once these emissions have been identified, actions can be taken to reduce both **upstream and downstream Scope 3 CO2 Emissions**. Upstream initiatives could include demanding transparency on supplier's footprint, joint-target setting or even collaboration and co-investments in innovation with suppliers to reduce the upstream footprint. The downstream Scope 3 CO2 Emissions are driven by the consumption of the network by B2C and BB customers. Initiatives on downstream Scope 3 CO2 Emissions could include education of consumers to generate less energy on network and data consumption, or even encouraging consumers to use renewable energy at home.

Overall, telecoms have an **important opportunity to enable other industries and consumers** to become more energy efficient and reduce their carbon footprint. Digital and smart products and solutions, such as smart metering and smart logistics, help others reduce their carbon emissions by significant amounts. Additional initiatives can be driven by telecoms, such as simplification of IT and network infrastructure at end customers.

Use case

Telefonica's Eco Smart services help businesses become more efficient and at the same time decarbonise the economy

ECOSMART SERVICES

VERIFIED BY AENOR

The solutions are based on Telefonica's connectivity, 100% renewable and low in emissions, as well as on the Internet of Things technologies, the cloud, big data and Artificial Intelligence, with the aim of reducing energy and water consumption, CO_2 emissions and promoting the circular economy. They are being used by both cities and companies of various sizes in the key sectors, including tourism, industry, logistics and distribution, retail and banking.[1]

Source: 1. *Telefonica Corporate website*

Zoom on recommendations for operators (3/4)

As part of a sustainability strategy to implement different goals and initiatives throughout the organization, several recommendations can be made on efforts to reduce water usage

WATER

There is limited to no knowledge of the water usage at Belgium telecom operators as there are limited insights on how water is consumed for most Belgian operators. **Introducing clear and unified reporting** will enable comparison and introduction of new initiatives to reduce water usage or introduce alternatives such as rainwater.

Telecom operators could **review their data centers** operations to limit the water usage or loss of energy. In a regular datacenter, cool air or water goes in, warm(er) air or water leaves the center, which leads to a significant loss of energy. Optimized datacenters could reuse the heat generated by the datacenters to heat the surrounding buildings or facilities.

Use case

Sustainable datacenters can use the heat to reduce the consumption of the surrounding buildings

GREEN ENERGY PARK

In the Green Energy Park of Zellik, the first stone was laid of a brand-new data center, the first green one in our country. In such a center, servers are placed together and cooled to enable our internet traffic. The developers, including the Vrije Universiteit Brussel and the UZ Brussel, will use the heat from the servers and rainwater to manage the building as sustainably as possible.[1]

Source: 1. VRT

Zoom on recommendations for operators (4/4)

As part of a sustainability strategy to implement different goals and initiatives throughout the organization, several recommendations can be made on efforts to reduce waste

In terms of waste management, circularity should be the goal for telecom operators, keeping products and materials in use to rule out waste and pollution. **All-encompassing initiatives**, including e-waste, paper, network waste, etc., to drive circularity should be introduced, rather than isolated segments.

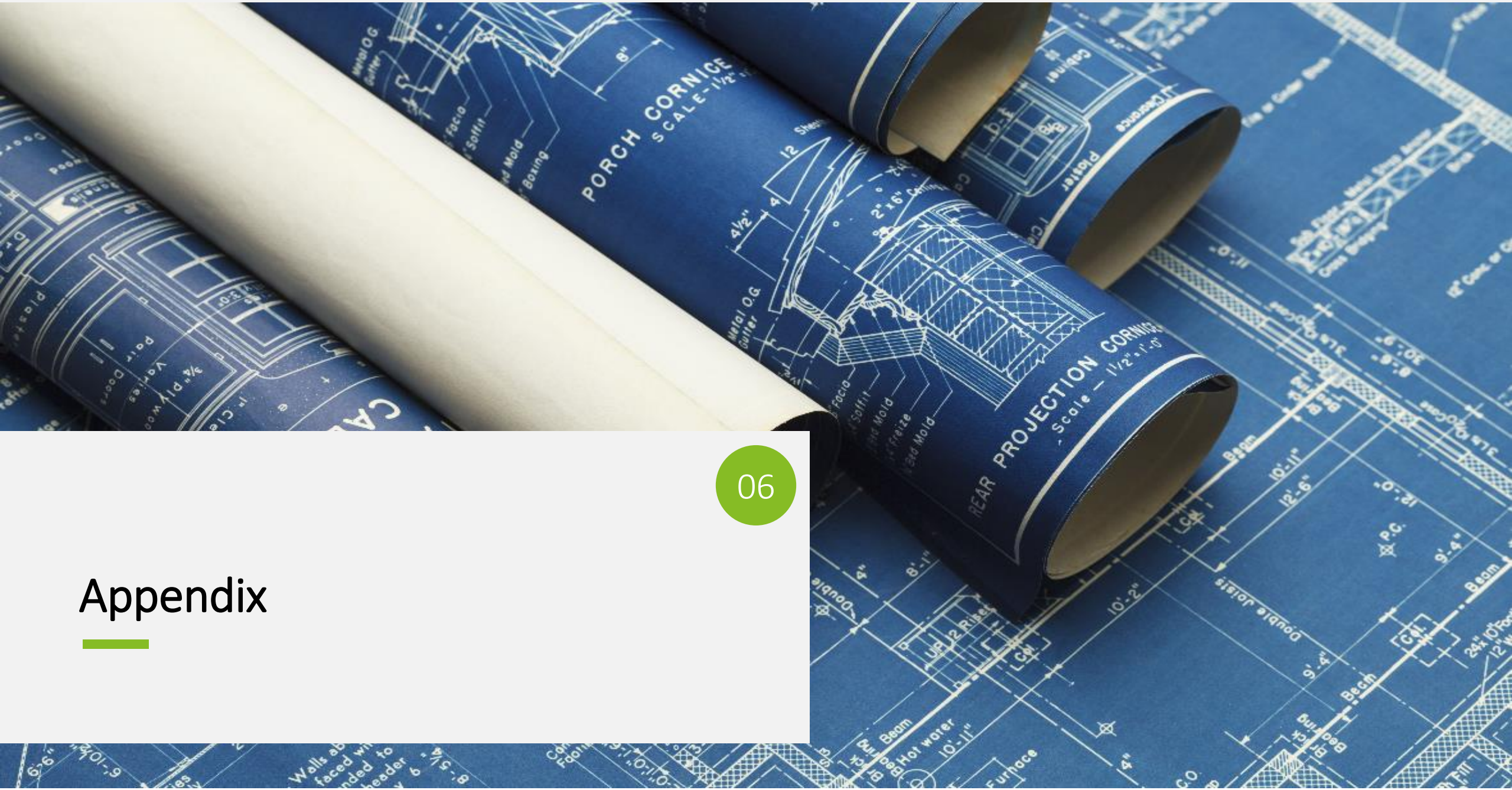
In Belgium, the share of waste disposed out of total waste remains high. **Goals and objectives on reducing waste disposal** should be introduced to reduce this share. As mentioned, when translating these goals into clear initiatives, **all aspects** of waste management should be taken into account to aim towards circularity as a whole, rather than only focusing on reducing the amount of waste disposed.

Use case

"Device-as-a-service" Model used at Deutsche Telekom

Striving to ensure compatibility with a circular economy is one of the focal points of Deutsche Telekom corporate responsibility strategy. They have a refurbishment rate of over 97% thanks to the switch to a device-as-a-service model. This model allows a better collection, exchange and repairment of devices.[1]

Source: 1. Deutsche Telekom corporate website



06

Appendix

Appendix

Glossary

Glossary (1/2)

Glossary of the terms used in the report

- **Access network:** An access network is a type of network which physically connects an end system to the immediate router (also known as the “edge router”) on a path from the end system to any other distant end system.[1]
- **Carbon Neutral:** Carbon neutrality means having a balance between emitting carbon and absorbing carbon from the atmosphere in carbon sinks. Removing carbon oxide from the atmosphere and then storing it is known as carbon sequestration.[2] The formula used in this report for the carbon neutrality is: Scope 1 + Scope 2 – carbon compensation (incl carbon credits).
- **Carbon credits:** Carbon credits, also known as carbon offsets, are permits that allow the owner to emit a certain amount of carbon dioxide or other greenhouse gases. One credit permits the emission of one ton of carbon dioxide or the equivalent in other greenhouse gases.[3]
- **Carbon compensation:** Carbon compensation is an approach which consists in implementing projects to reduce or capture and sequester carbon in another location after having attempted to reduce CO2 emissions in one location. These projects can involve energy efficiency, renewable energy production, or even reforestation.[4]
- **Core network:** A core network is a telecommunication network's core part, which offers numerous services to the customers who are interconnected by the access network.[5]
- **CO2e:** CO2e is the abbreviation for 'carbon dioxide equivalent.' CO2e is used to measure and compare emissions from greenhouse gases based on how severely they contribute to global warming. Metrics for CO2e would show how much a particular gas would contribute to global warming if it were carbon dioxide.[6]
- **GHG protocol:** The Greenhouse Gas Protocol (GHGP) is an organization that was formed through a partnership between the World Resources Institute and the World Business Council for Sustainable Development. It helps companies to reduce their greenhouse gas emissions by setting standards to help them manage their emissions.[7]
- **GRI:** GRI (Global Reporting Initiative) is the independent, international organization that helps businesses and other organizations take responsibility for their impacts, by providing them with the global common language to communicate those impacts. We provide the world’s most widely used standards for sustainability reporting – the GRI Standards.[8]

Sources: 1. GeekforGeeks; 2. Europarl; 3. Investopedia; 4. Futura-sciences; 5. Technopedia; 6. Inspirecleanenergy; 7. Worldfavor; 8. Globalreporting

Glossary (2/2)

Glossary of the terms used in the report

- **ISO norms:** ISO is the International Organisation for Standardization, founded in 1947, that establishes standards for businesses and organisations in 163 countries worldwide.[1]
- **Non-network waste:** Non- network waste means all the waste that are generated by a telecom company but is not related to the network (eg. offices waste, laptops, smartphones,…).
- **Network waste:** Network waste are waste generated by a telecom company related ton the network (eg. antennas, cable,…).
- **Net zero:** Net zero is similar in principle to carbon neutrality but is expanded in scale. Net zero refers to all greenhouse gases being emitted into the atmosphere, such as methane (CH4), nitrous oxide (N2O) and other hydrofluorocarbons.[2]
- **Renewable energy:** Renewable energy is energy derived from natural sources that are replenished at a higher rate than they are consumed. Sunlight and wind, for example, are such sources that are constantly being replenished. Renewable energy sources are plentiful and all around us.[3]
- **SBTi:** The SBTi is a partnership between CDP, the United Nations Global Compact, World Resources Institute (WRI) and the World Wide Fund for Nature (WWF). Science-based targets show companies and financial institutions how much and how quickly they need to reduce their greenhouse gas (GHG) emissions to prevent the worst effects of climate change.[4]
- **Scope 1:** Scope 1 regroups direct emissions from owned or controlled sources. For example, the heating of buildings or the vehicle fleet is part of scope 1.[5]
- **Scope 2:** Scope 2 regroups indirect emissions from the generation of purchased energy consumed by the reporting company. For example, the electricity used for the data centers is part of scope 2.[5]
- **Scope 3:** Scope 3 regroups all other indirect emissions that occur in a company's value chain, these can be both upstream and downstream emissions. For example, the usage of set-top boxes consumers is part of scope 3.[5]
- **Waste disposed:** Waste disposed is the waste that is discarded, thrown away or destroyed. It is the opposite of waste diverted from disposal.
- **Waste diverted from disposal:** Waste diverted from disposal is the waste that is recycled or refurbished. It is the opposite of waste disposed.

Sources: 1. Toolshero; 2. Nationalgrid; 3. UN; 4. Sciencebasedtargets; 5. GHGProtocol

Appendix

Methodology for data analysis

Methodology for data analysis - Input

1 *Input from the Belgian operators*

A list of **standardized and normalized datapoints and KPIs** that quantify **energy consumption**, **CO2 emissions**, **water consumption**, **waste management** and **company information** of telecom networks and operators was created and validated by the BIPT.

This list of datapoints and KPIs was created **based on different existing norms** (GRI, ISO 14001, GHG Protocol,…) **and discussion with Deloitte Subject Matter Experts.**

The four telecom operator shared their available data for all these datapoints and KPIs. As **Voo** had limited data available, it has been **excluded from the analysis.**

The scope of the data request covers the period **2018 to 2021.**

For the Belgian operators, clients are defined as:

I. The unique number of business and residential subscribers and the number of wholesale lines for the fixed number
II. The total active simcards and the total active light+full MVNO sim cards for the mobile number

Input from the annual reports of the European operators

In order to benchmark the Belgian operators with the market, a **set of four European publicly listed telecom operators** has been selected and analyzed. The selected operators are all active in markets close to Belgium and are KPN, British Telecom, Deutsche Telekom and Telefónica.

The list of standardized and normalized datapoints and KPIs created for the Belgian operators has been **shortened for the analysis of the European operators.** This list was populated by datapoints and KPIs extracted from the **annual reports** and the **ESG reports** of the European companies.

The scope of the data request covers the period **2018 to 2021.**

For the European operators, the number of clients refers to the number reported in the **annual reports**

Methodology for data analysis - Energy

2 *Calculation sheets for the 4 topics*

Energy consumption

CO2 emissions

Water consumption

Waste and recycling

Datapoints and KPIs

Energy Consumption:
Absolute value: Energy consumption [GWh].
The Belgian market refers to the sum of the values from Telenet, Proximus and Orange.

Energy efficiency:
Revenue based: Total energy consumption [GWh] divided by revenue [Mn of €].
The Belgian market refers to the weighted average of the values from Telenet, Proximus and Orange.

Share of renewable energy:
Renewable energy consumed: Renewable energy consumed [GWh] divided by total energy consumed [GWh].
The Belgian market refers to the weighted average of the values from Telenet, Proximus and Orange.

Network electric consumption breakdown:
Absolute value: Network electric consumption [GWh] of the fixed access network, the mobile access network and the core network.

Electric consumption breakdown:
Absolute value: Network electric consumption [GWh] of the network, datacenters, offices and retail.

Modems/routers and set-top boxes analysis:
Absolute value: Power [Watt] of a modem/router or a set-top in powered-on or stand-by mode

Methodology for data analysis - CO2 Emissions

2 *Calculation sheets for the 4 topics*

Energy consumption

CO2 emissions

Water consumption

Waste and recycling

Datapoints and KPIs

CO2 Emission:
Absolute value: CO2 emission [Ktons of CO2].
The Belgian market refers to the sum of the values from Telenet, Proximus and Orange.

Carbon intensity:
Revenue based: CO2 emission [Ktons of CO2] divided by revenue [Mn of €].
The Belgian market refers to the weighted average of the values from Telenet, Proximus and Orange.

Carbon neutrality:
Absolute value: (Scope 1 emission [Ktons of CO2] + Scope 2 emission [Ktons of CO2]) – Carbon credits compensation [Ktons of CO2].
The Belgian market refers to the sum of the values from Telenet, Proximus and Orange.

Methodology for data analysis - Water

2 Calculation sheets for the 4 topics

Energy consumption

CO2 emissions

Water consumption

Waste and recycling

Datapoints and KPIs

Water consumption:
Absolute value: Water consumed [Liter of water].
The Belgian market refers to the sum of the values from Telenet, Proximus and Orange.

Water efficiency:
Employee based: Water consumed [Liter of water] divided by the number of employees [number of employees].
The Belgian market refers to the weighted average of the values from Telenet, Proximus and Orange.

Methodology for data analysis - Waste and recycling

2 Calculation sheets for the 4 topics

Energy consumption

CO2 emissions

Water consumption

Waste and recycling

Datapoints and KPIs

Waste generation:
Absolute value: Waste generation [Tons], Waste diverted from disposal [Tons] and Waste disposed [Tons]
The Belgian market refers to the sum of the values from Telenet, Proximus and Orange.

Product diverted from disposal:
Absolute value: Number of product [Units] diverted from disposal.
The Belgian market refers to the sum of the values from Telenet, Proximus and Orange.
Waste diverted from disposal is the waste that is reused, refurbished or recycled.

Share of waste disposed out of total waste:
Percentage: Waste disposed [Tons] divided by the Total waste [Tons].
The Belgian market refers to the weighted average of the values from Telenet, Proximus and Orange.
Waste disposed is the waste that is discarded, thrown away or destroyed.

Methodology for data analysis - Country adjustment for the “per Mn € of revenue” ratios

Objective

In order to consider that telecom services are more expensive in Belgium than in the rest of Europe, the “per Mn € of revenue” ratios are adjusted in function of the pricing level of a representative convergent product (combining fixed and mobile services) in the respective countries, as observed in the pricing benchmark study of the European Commission. E.g., in 2021 the price of the cheapest representative triple-play product (profile: 100-200 Mbps, fixed voice and one mobile subscription comprising GB of data) amounted to 57.91€ PPP in Belgium, whereas it was sold in Spain for 34.11€ PPP.
E.g., when looking at the energy efficiency ratio [GWh/Mn€], Belgium is up to 67% more efficient than the average of the European players. With broadband price-index of 57.91€, on average, Belgium operators are also the most expensive meaning they offer less service (data, call, …) per euro than other countries. Taking this into account Belgium is still the most efficient player but the difference with the average of the European players decreased to 27%.

Data

Two inputs are used for this adjustment:

1. The data (GWh, tons of CO2, liters of water, tons of waste and revenue) provided by the Belgian and European operators
2. The differences in pricing levels in the respective countries[1]:

	UK	DE	NL	ES	BE
2018	0.56	0.58	0.91	0.63	1
2019	0.78	0.75	0.94	0.73	1
2020	0.86	0.65	1.03	0.61	1
2021	0.86	0.68	0.98	0.59	1

Method

Calculation:
Multiplying the unit (GWh, tons of CO2, liters of water, tons of waste) per Mn € of revenue by the broadband price-index in each of the countries.

Example: (for the energy efficiency ratio)
The GWh per Mn € of revenue per country multiplied by the broadband price-index in each of the countries

1. *Telefonica in 2021:* 0.16 [GWh/Mn€] multiplied by 0.59 [% compared to Belgium] = 0.09 [GWh/Mn€]
2. *Deutsch Telekom in 2021:* 0.12 [GWh/Mn€] multiplied by 0.68 [% compared to Belgium] = 0.08 [GWh/Mn€]

Assumptions

1. This method excludes the international sales
2. This method assumes broadband price-index equals to the price-index for each company in that specific country

Source: 1. own calculations, based on: *For 2021*: EC report Mobile and Fixed Broadband Prices in Europe 2021 + for UK: BIPT pricing benchmark 2021; *For 2020* : EC report Mobile and Fixed Broadband Prices in Europe 2020 + for UK: BIPT pricing benchmark 2021; *For 2019* : EC report Mobile and Fixed Broadband Prices in Europe 2019; *For 2018* : EC Report Mobile Broadband Prices in Europe 2018 and EC report Fixed Mobile Broadband Prices in Europe 2018. Prices are adjusted to reflect difference in purchasing power (PPP = Purchasing Power Parity).

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