SCIENCE BASED TARGETS

DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

GUIDANCE FOR ICT COMPANIES SETTING SCIENCE BASED TARGETS

MOBILE NETWORKS OPERATORS, FIXED NETWORKS OPERATORS AND DATA CENTRES OPERATORS

SCIENCE BASED TARGETS

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• The International Telecommunication Union (ITU) is the United Nations specialised agency for information and communication technologies (ICTs). Founded in 1865, ITU's global membership includes to date 193 Member States as well as some 900 companies, universities, and international and regional organisations. Its community covers more than 20000 professionals. ITU-T Study Group 5 on Environment, Climate Change and Circular Economy is responsible for developing methodologies to evaluate the impacts of ICTs on climate change. ITU-T Study Group 5 produces international standards (also known as ITU-T Recommendations) that provide guidance for using ICTs in an eco-friendly manner and methodologies to reduce the adverse environmental effects of ICTs. ITU-T Study Group 5 membership consists of member states, ICT experts and a wide range of ICT stakeholders. Built based on consensus and collaboration, ITU-T Study Groups 5 standards provide the essential tools for using ICTs sustainably and they have made significant contribution to the progress of climate-related Sustainable Development Goals and other global commitments.

• GeSI works with a range of international stakeholders committed to ICT sustainability and supports member initiatives in countries which tackle: climate change, energy and resource efficiency, privacy and security, digital literacy and digital divide, human rights, as well as foster collaborative and innovative approaches, ideas and joint initiatives. With these partnerships, GeSI is able to work towards its global vision of a greater evolution of the ICT sector to best meet the challenges of sustainable development.

• The GSMA represents the interests of mobile operators worldwide, representing more than 750 operators.

• SBTi is a collaboration between CDP, the United Nations Global Compact (UNGC), World Resources Institute (WRI), and the World Wide Fund for Nature (WWF) and one of the We Mean Business Coalition commitments.

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CONTENT

1

ABOUT THIS GUIDANCE

1.1 SCOPE

This document supports information and communication technology (ICTs) companies in setting science based targets for greenhouse gases (GHGs) according to a set of new decarbonisation pathways, described in detail in Recommendation ITU-T L.1470 *'GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement'*[1] and aligned to the IPCC Special Report on 1.5˚C and developed to be used as a sectoral target-setting approach by the Science Based Targets Initiative (SBTi).

Currently the guide focuses exclusively on ICT companies operating mobile networks, fixed networks and/or data centres. Guidance for further ICT sub-sectors will be covered in the next release.

Note: the trajectories for data centres may also be applied by companies in any other sectors that are operating their own data centres for the data centres component of their science based target.

1.2 STRUCTURE

The Guidance is divided into 3 chapters plus annexes. Chapter 1 covers a general introduction. Chapter 2 briefly explains the trajectories and how the target setting methodology was developed. Chapter 3 provides instructions to assist companies setting targets. The annexes give more detailed explanations of the underlying methodologies and additional reference material.

1.3 PRACTICAL APPLICATIONS

Companies wishing to set a science based target recognised by SBTi need to consider the greenhouse gas emissions associated with their internal operations including their direct emissions (Scope 1) and the emissions related to the energy used for their operation (Scope 2) as defined by the GHG Protocol Corporate Standard. If a company has significant value chain (Scope 3) emissions - over 40% of total Scope 1, 2 and 3 emissions - it is also required to set a Scope 3 target which should be ambitious, measurable and clearly demonstrate how a company is addressing the main sources of value chain GHG emissions in line with current best practice.

This Guidance supports ICT companies in the process of setting science based targets associated with their use of electricity to run their ICT operations (Scope 2) and the use of diesel to generate electricity used to run their ICT operations (Scope 1). It will also support companies in including the use of electricity, energy and fuel for support activities (including service facilities such as offices, transport fleet etc).

Since most ICT companies have significant Scope 3 emissions it will also give general guidance to help ICT companies establish Scope 3 targets.

1. https://www.itu.int/rec/T-REC-L.1470/en

If an ICT company has operations covered by more than one sub-sector (for example a mobile operator may also run fixed networks, as well as data centres) it can split its emissions accordingly and then add the resulting sub-sector targets together to obtain a company-wide target.

It is recognised that there are significant geographic differences among ICT operators – implying there are differences in electricity grid factors, and differences in availability of renewable electricity markets with robust certificates. However, in line with other sectoral target-setting approaches, no consideration is given for different geographical operations in the first release of this guidance document.

Definitions

- ICT organisation: an organisation, the core activity of which is directly related to the design, production, promotion, sales or maintenance of ICT goods, networks or services.
- Operator: an organisation operating networks or data centres.
- ICT manufacturer: Organisation which has the financial and organisational control of the design and production of ICT goods.
- Telecommunication network: connects computers and related devices to each other and to the internet
- ICT supplier: Organisation that provides ICT products or services to an ICT organisation
- ICT end-user: a company or consumer which is the user of an ICT good
- ICT goods: Tangible goods deriving from or making use of technologies devoted to or concerned with:
    - the acquisition, storage, manipulation (including transformation), management, movement, control, display, switching, interchange, transmission or reception of a diversity of data;
    - the development and use of the hardware, software, and procedures associated with this delivery; and
    - the representation, transfer, interpretation, and processing of data among persons, places and machines.

2

TRAJECTORIES

2.1 HOW THESE TRAJECTORIES WERE DEVELOPED

The underlying methodologies and pathways were jointly developed by the Global Enabling Sustainability Initiative (GeSI), the GSMA, the International Telecommunication Union (ITU), and the Science Based Targets initiative (SBTi).

The International Energy Agency (IEA) has also been closely involved and their support and guidance are gratefully acknowledged.

The work has been performed within an open working group populated by the involved organisations and in discussion with their wider memberships.

This publication is based on Recommendation ITU-T L.1470 *'GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement'* developed by ITU-T Study Group 5 *'Environment, Climate Change and Circular Economy'* in cooperation with GeSI, the GSMA and the SBTi.

The science underlying global GHG scenarios is being continually updated. The trajectories used for this ICT sectoral target-setting approach will be reviewed in the future as benchmarks and scenarios are updated.

2.2 ICT SUB-SECTOR TRAJECTORIES

Sub-sector trajectories to 2030, consistent with a climate scenario limiting global warming to 1.5˚C, have been developed for mobile network operators, fixed network operators, data centre operators, user devices and manufacturers of ICT equipment. These trajectories underpin the ICT sectoral target-setting approach described here and are described in detail in Recommendation ITU-T L.1470 '*GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement*'. This Recommendation also recommends an approach to long-term ambitions for 2050.

At the start of this work, possible trajectories were considered using three separate, normative approaches:

- IPCC 1.5˚C P2 scenario requiring a halving of emissions between 2015 and 2030
- SBTi 1.5˚C trajectory demanding 42% reduction over 10 years
- A 1.5˚C scenario, carbon budget approach based on the ICT sector maintaining a fixed share of overall electricity usage (based on IEA ETP)[2]

The final, published pathways, as illustrated below, have been shown to be consistent with the level of emission reductions determined by all three approaches.

Figure 1 below summarises the resulting 1.5˚C trajectories for the ICT sector and its sub-sectors based on Recommendation ITU-T L.1470 '*GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement*'.

2. The third normative approach considers the global need for electricity as outlined by IEA for different scenarios and develops an interim 1.5˚C scenario within which ICT should not expand its current share of electricity. This electricity budget uses the IEA trajectories for 2DS and B2DS to derive a 1.5˚C trajectory for world electricity usage through doubling the difference between them and subtract it from 2DS [b-IEA ETP]. This is an interim approach as IEA has not yet defined a 1.5DS scenario. The budget is then used to define the amount of electricity that could be used by the sector if keeping its share at the current level.As the IEA are planning to include a specific 1.5˚C scenario, the trajectories will be reviewed when the new IEA scenarios are published.

Figure 1: Summary of ICT sector and sub-sector trajectories including embodied emissions and operation

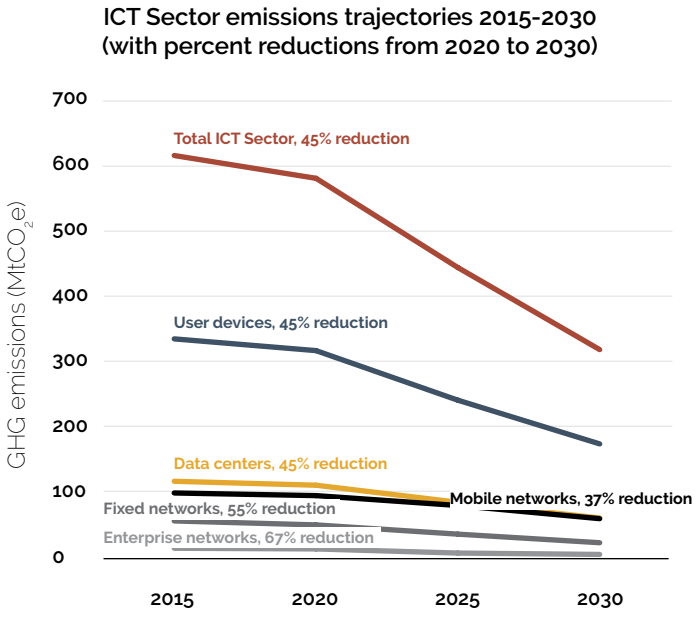
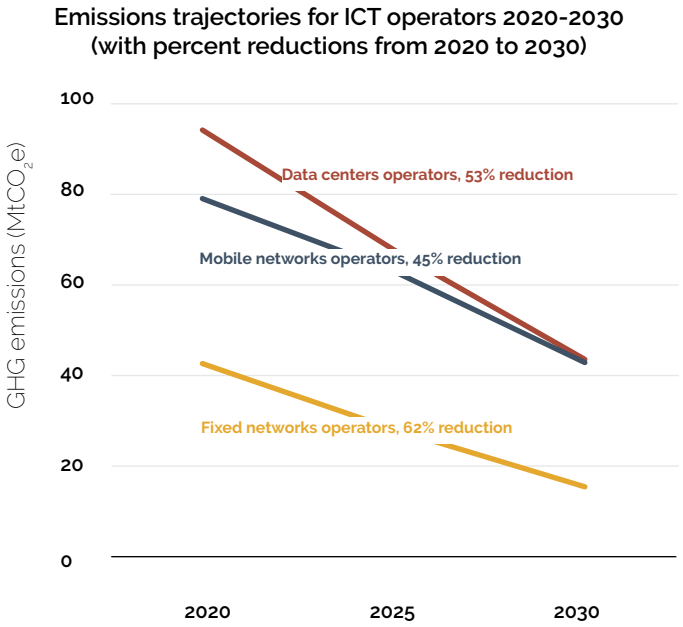


Figure 2: Trajectories for ICT operators for 2020-2030



Note: This graph is showing the ICT sector life cycle based emissions from a company accounting perspective. Hence it does not include emissions related to electricity grid losses and electricity supply chain. Values including those are about 20% higher. This is described in Recommendation ITU-T L.1470 *'GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement'*.

To apply these trajectories for operational emissions of ICT operators (i.e. company Scope 1 and 2 emissions), the following figure (Figure 2) shows the trajectories for operational emissions only.

These trajectories include both operation of networks and data centers and supporting activities of these companies but excludes the embodied emissions.

Similar trajectories for ICT manufacturers will be included in the next revision of this Company Guidance.

2.3 RELATIONSHIP WITH EXISTING SBTI METHODS

Up until now there has been no SBTi approved sectoral target-setting approach for companies in the ICT sector. This guideline fills that gap and supports ICT companies in setting 1.5˚C aligned targets in line with climate science.

Because of the diverse nature of devices and applications covered by the ICT sector, a separate pathway has been developed for each of the main ICT sub-sectors.

The ICT sectoral target-setting approach follows an absolute contraction approach. This contrasts with the SDA which applies a convergence approach to calculate targets along intensity decarbonisation pathways.

The reasons for this are explained in the technical detail contained in Annex B which shows how the usual intensity approach reduces down to an absolute contraction in the case of ICT applications.

This does not restrict those companies who may like to present their targets as intensities, so long as the absolute reduction is in line with the trajectories defined in this sectoral target-setting approach.

In this case, companies need to monitor at regular intervals to ensure that their intensity metric does not deviate from the absolute trajectory.

2.4 ACHIEVING TARGETS

The ICT sector is a dynamic one and the demands for faster transmission and more capacity are ever growing. Historically, the sector has been able to meet these demands through technological advancement and purchase of renewable electricity. However, as new technologies continue to increase in both size and complexity, this approach needs further efforts. Hence the 1.5˚C trajectory is a challenging task, one that will not be able to achieve without significant commitment and ambitious action.

For the period 2020 – 2030, the main strategy to decarbonise the ICT sector, at the pace necessary to align with 1.5˚C trajectories, includes the implementation of simultaneous, vigorous and urgent actions in the following fields:

- Continued implementation of energy efficiency plans
- Switch to renewable / low carbon electricity supply
- Encouragement of carbon consciousness among end-users

To decarbonise the ICT sector at this speed requires the sector to utilise all of these mechanisms. To continuously improve energy performance is fundamental and is also driven from a cost perspective. However, the ICT sector is based on the use of electricity and energy efficiency measures alone would not be sufficient. Thus, all three mechanisms need to be addressed to decarbonise in line with 1.5˚C trajectories.

3

HOW TO CALCULATE AN ICT SUB-SECTOR TARGET

An extensive and detailed general guidance on setting science based targets is already provided in the SBTi Manual[3] and is not reproduced here. For example, the manual describes the SBTi criteria for determining many aspects of a target including the boundaries of included emissions, the determination of baseline and target years, recalculation to reflect significant changes in company structure and specific exclusions such as offsets and product related emission reductions.

3.1 SETTING AN ICT COMPANY SUB-SECTOR TARGET FOR SCOPE 1 AND 2 EMISSIONS

The following steps should be adopted to set a science based target by a company with ICT operations.

3.1.1 Select a baseline year.

The SBTi recommends using the most recent year for which data is available.

Note: 2015 is the baseline year for the sector and sub-sectors trajectories. Thus, companies may also be interested in monitoring their yearly emissions compared to 2015 levels if these 2015 emissions are readily available.

3.1.2 Select a target year.

Targets must cover a minimum of 5 years. Due to the fast-changing nature of digital technologies, this guidance recommends that ICT company should set a target year no further ahead than 2030. In any case, it is worth noting that the SBTi criteria require companies to review, and, if necessary, revalidate their targets every five years from the date of the original target approval.

3.1.3 Measure Scope 1 and 2 Emissions

Scope 1 and 2 emissions need to be measured for the baseline year. They need to be measured according to the GHG Protocol using a common boundary approach across all company operations.

Most companies will have activities in addition to their ICT operations, such as office buildings and / or a transport fleet. In such cases, companies may choose to combine all of their scope 1 and 2 emissions and derive a single SBT following the ICT sector method, thereby allowing the overall trajectory to stay within an ambitious 1.5˚C trajectory. This is the simplest approach and at this point it is the recommended alternative as it keeps the company consistent with a 1.5˚C trajectory for its overall operation.

However, companies may also wish to establish a separate SBT associated with the scope 1 and 2 emissions arising from their support activities using, for example, the SBTi's existing relevant SDA methodology and tools.[4] In this case, only the Scope 1 and 2 emissions associated with operating the ICT equipment should be used in the next step.

3. Ref. *Science based Target Setting Manual* https://sciencebasedtargets.org/resources/
4. Note that currently the SDA does not include a 1.5˚C pathway, however this will be included in a future update to the SDA methodology.

3.1.4 Calculating the science based target

A sub-sector science based target (SBT_s) is then calculated by multiplying the combined Scope 1 and 2 emissions in the base line year (CC_b) by an emissions reduction factor (ERF). The emissions reduction factor is based on the appropriate sub-sector emission reduction pathway (see section 2.2 Figure 2) and the baseline and target years.

Emission Reduction Factor values for mobile, fixed and data centre sub-sectors, and for different baseline and target years compatible with section 2.2 are listed in Annex C. Annex A explains how these factors were derived and provides further guidance on Scope 1-2 emissions.

$$SBT_s = CC_b \cdot ERF \quad (1)$$

3.1.5 Worked examples on calculating an ICT sub-sector target

3.1.5.1 Target calculation

Consider a company with both mobile and fixed line operations.

The company selects 2019 as its baseline year and 2025 as its target year.

For both sub-sectors, the company decides to combine electricity related Scope 1 and 2 emissions with those associated with support activities such as office buildings and / or a transport fleet.

The combined Scope 1 and 2 emissions from running the mobile operations were 250 ktonnes CO_2e in the baseline year.

The combined Scope 1 and 2 emissions from running the fixed operations were 150 ktonnes CO_2e in the baseline year.

Referencing the 2019 baseline and 2025 target years in the tables in Annex C, the Emission Reduction Factor for the mobile operations is found to be 0.794, and for the fixed operations 0.652.

The company's resulting science based target (SBT) for 2025 is then given by:

$$SBT(2025) = 0.794 \times 250 + 0.652 \times 150 = 296.3 \text{ ktonnes } CO_2e$$

3.1.5.2 Expressing a target as an intensity.

A fixed line telecommunications operator has Scope 1 & 2 emissions in the base year of 2019 of 150 $ktCO_2e$ and has 5 million subscribers. This is equivalent to an intensity metric of 30 $kgCO_2e$ per subscriber. For the target year of 2025 the absolute emissions target is 0.652 x 150 = 97.8 $ktCO_2e$. The forecast number of subscribers for 2025 is 6 million, then the intensity target for 2025 is 97.8/6 = 16 $kgCO_2e$ per subscriber.

3.2 SETTING A TARGET FOR SCOPE 3 EMISSIONS

The criteria for setting Scope 3 targets are as described in the most recent SBTi criteria document. This ICT sector guidance does not set any additional criteria for Scope 3 beyond the standard SBTi criteria. However, it encourages companies to refer to the ICT sector trajectories in section 2.2 for associated Scope 3 categories.

SBTi criteria require that a company sets a Scope 3 target when its Scope 3 emissions are 40% or more of its total Scope 1, 2, and 3 emissions. The Scope 3 target must cover at least 2/3 of total Scope 3 emissions. For most ICT companies it is likely that the 40% criterion will be met and the company will need to set a Scope 3 target. Further, the most significant Scope 3 categories for an ICT company are likely to be:

- Category I – Purchased Goods and Services; and
- Category II – Use of Sold Products.

Companies can set either a Scope 3 emissions reduction target, or a supplier or customer engagement target, or a combination of the two.

For these categories, companies are encouraged to consider the trajectories given in section 2.2 and Recommendation ITU-T L.1470 'GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement' as references to define a Scope 3 ambition level in line with the 1.5˚C trajectories of the ICT sector and its sub-sectors.

A full list of Scope 3 categories described from an ICT sector perspective is available in ANNEX D.

A

ANNEX A:
The ICT sectoral target-setting Methodology

A.1 INTRODUCTION TO SBTI'S STANDARD SECTORAL DECARBONISATION APPROACH

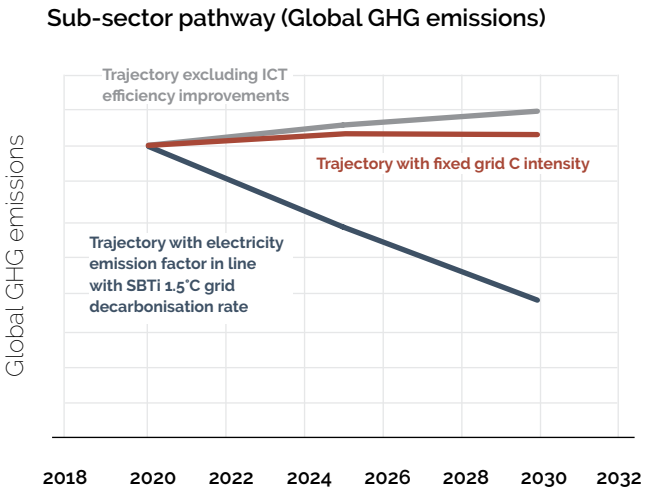
SBTi's standard Sectoral Decarbonisation Approach (SDA) is a method for establishing sectoral decarbonisation pathways using physical intensity metrics that converge to a common emissions intensity. An intensity target is then defined by a reduction in emissions relative to a specific business metric, such as production output of the company (e.g., tonnes CO_2e per tonne product produced). However, the ICT sectoral target-setting method follows an absolute contraction approach as explained in ANNEX B.

A.2 FACTORS INFLUENCING AN ICT SUB-SECTOR PATHWAY

Sectoral target-setting approaches extend an existing sector baseline data into the future. This requires an evaluation as to how the sector will develop including its energy performance. This can be illustrated by the following schematic diagram.

In this illustrative, schematic diagram, the lower blue line represents a final ICT 1.5˚C trajectory which considers both efficiency improvements and reduced carbon intensities of electricity generation. The red and grey lines represent worse case situations. The red line shows what would happen if the power sector fails to decarbonise as required to comply with its own 1.5˚C trajectory and the ICT sector fails to mitigate that through Power Purchase Agreements or investments in renewable supply. On top of that, the grey line shows what would happen if expected efficiencies in the ICT sector also fail to materialise.

Figure A1. Trajectory development



A.3 APPLYING A SECTORAL TARGET-SETTING APPROACH TO ICT

Until now, the existing sectors covered by SBTi's SDA tools exclude any reference to ICT. Instead the SBTi Manual refers to Computer, Electronic, Optical Products and Electrical Equipment and places their manufacture in the 'All Other Industry' category and recommends this ICT sub-sector to set an absolute/intensity target in line with the absolute contraction approach.

With the publication of this guideline, SBTi establishes trajectories for the ICT sector which considers the situation of the following sub-sectors: Mobile networks, Fixed networks, Data centres, user devices and manufacturers of ICT equipment.[5]

A.4 THE MAIN SCOPE 1-2 EMISSIONS CONTRIBUTIONS

For ICT operators, emissions associated with the generation and subsequent use of electricity dominate their combined Scope 1 and 2 footprints. The pathway associated with these emissions would therefore be expected to be similar to that of the power sector which actually reaches a zero-convergence point by 2050 as shown in Table A1.

Annex B offers a mathematical analysis of the implications of such a zero-convergence point which results in the following absolute, rather than intensity-based, target trajectory according to:

$$C_{SBT,y} = CC_b \cdot SC_{s,y} \,/\, SC_{s,b} \qquad \text{(A1)}$$

Where CC_b CO_2 emissions of company in base year *b* (tCO_2)
$SC_{s,b}$ CO_2 emissions of sub-sector "*s*" in base year *b* (tCO_2)
$SC_{s,y}$ CO_2 emissions of sub-sector "*s*" in year *y* (tCO_2)

A.4.1 Power Sector Carbon Emission Intensity

The grid emission intensities used for the period 2015-2020 reflect actual conditions of the ICT sector including its geographical distribution in line with [b-Malmodin and Lundén 2018b]. The intensities for 2025, 2030 and 2050 are in line with the [b-IEA ETP] B2DS scenario remodelled by SBTi to align with [b-IPCC 1.5] 1.5˚C pathways.

Table A1 1.5˚C pathway electricity emission factors used by SBTi

Year	2025	2030	2050
Emission factor (kg CO_2e/kWh)	0.281	0.160	0.000

More details on the selection of electricity emission factors are provided in ITU Recommendation ITU-T L.1470 *'GHG emissions trajectories for the ICT sector compatible with the UNFCC Paris Agreement'*.

A.4.2 Company Power Generation

In addition to using electricity delivered over the grid, ICT companies, and most particularly those in the mobile sub-sector, often generate their own power on-site (for example, using diesel fuelled generators, PV panels etc). The ICT emission pathways have incorporated this aspect on the assumption that, similar to grid electricity, all emissions from such generation will be eliminated by 2050. This allows such generation to be covered by the simplified sectoral target-setting approach identified above.

A.4.3 Emission Reduction Factors

Equation A1 shows how a company's sub-sector SBT in target year 'y' is derived by multiplying its emissions in base year 'b' (CC_b) by the ratio of the sub-sector's emissions in the target ($SC_{s,y}$) over the sub-sector's emissions in the base year ($SC_{s,b}$). This ratio is termed the Emission Reduction Factor (ERF).

The sub-sector pathways presented in Section 2.2 are based on emission figures from Recommendation ITU-T L.1470 '*GHG emissions trajectories for the ICT sector compatible with the UNFCC Paris Agreement*' for 2015 to 2030 in five year intervals. In order to calculate an ERF for every year between 2015 and 2030 a linear interpolation was taken across each five year period.

The resulting ERFs are provided in Annex C.

5. However, the first revision will only give guidance at a company level for operators of networks and data centres

B

ANNEX B: Establishing an ICT Sub-Sector Pathway

B.1 INTRODUCTION

This annex is a technical explanation as to why the ICT sectoral target-setting approach does not follow the usual intensity approach but follows a simplified absolute approach. The reader is recommended to be familiar with the SBTi SDA methodology document before progressing this section.

B.1.1. Principles

Usually the first step in establishing a sectoral target-setting approach is to identify an appropriate activity metric. For example, in the case of the power sector, activity levels are measured by the number of MWhrs of electricity generation in a given year. For commercial buildings it is the floor area in m^2 of real estate for a given year.

Initially it was assumed that the ICT sector would also adopt an intensity model. As it was considered very unlikely that there could be a single form of activity metric relevant to all ICT sub-sectors, a sub-sector approach was adopted.

Based on the mathematical equations presented in the SBTi SDA methodology report, an ICT sub-sector pathway associated with use-phase electricity would follow:

$$SC_{s,y} = SA_{s,y} \cdot SE_{s,y} \cdot PI_y \qquad \text{(B1)}$$

Where
- $SA_{s,y}$ Activity in year *y* (Activity units) for ICT sub-sector *s*
- $SE_{s,y}$ Energy intensity in year *y* (MWhrs/activity) for ICT sub-sector *s*
- PI_y Carbon Intensity for the power sector in year *y* (tCO_2/MWhr)
- $SC_{s,y}$ Carbon emissions in year *y* (tCO_2)

B.2 CALCULATING A COMPANY TARGET

According to the SBTi SDA methodology a company-specific carbon intensity trajectory would be derived from the sub-sector intensity trajectory. Such a company pathway will depend on its initial performance 'd', and its expected future market share. The initial performance 'd' is defined as the difference between the company's carbon intensity in the base year and the sub-sector carbon intensity in the year 2050. It is calculated using equation B2.

$$d = CI_b - SI_{s,2050} \qquad \text{(B2)}$$

Where
- d Initial company performance in the base year relative to the 2050 sector target (tCO_2/activity)
- CI_b CO_2 intensity of the company in base year *b* (tCO_2/activity)
- $SI_{s,2050}$ CO_2 intensity of the sub-sector *s* in year 2050 (tCO_2/activity)

The company's expected future activity levels are then combined with the sub-sector's predicted activity levels to calculate the company's market share parameter[6] for any given year following equation B3.

$$m_y = (CA_b / SA_{s,b}) / (CA_y / SA_{s,y}) \quad \text{(B3)}$$

Where
m_y Market share parameter in year *y* (%)
CA_b Activity of the company in base year *b*
$SA_{s,b}$ Activity of sub-sector s in base year *b*
CA_y Activity of the company in year *y*
$SA_{s,y}$ Activity of sub-sector s in year *y*

To preserve the integrity of the necessary carbon budget, SBTi introduced a safeguard to the market share parameter such that when a homogeneous company projected a decrease in their activity levels leading to a reduced market share then the market share parameter is capped to 1.0. This is achieved through the following adjustment.

$$= if\ (m_y <= 1,\ m_y,\ 1) \quad \text{(B4)}$$

As described above, the standard SDA method assumes that the CO_2 intensity for the companies in all homogeneous sectors tends to converge in 2050. This convergence is represented by an index of the sector's decarbonisation, being equal to 1 in the base year and 0 in 2050. This index is calculated following equation B5.

$$p_{s,y} = (SI_{s,y} - SI_{s,2050}) / (SI_{s,b} - SI_{s,2050}) \quad \text{(B5)}$$

Where
$p_{s,y}$ Decarbonisation index of sub-sector *s* in year *y*
$SI_{s,y}$ CO_2 intensity of sub-sector *s* in year *y* (tCO_2/activity)
$SI_{s,2050}$ CO_2 intensity of sub-sector *s* in target year 2050 (tCO_2/activity)
$SI_{s,b}$ CO_2 intensity of sub-sector *s* in base year *b* (tCO_2/activity)

Combining the company's initial performance parameter 'd' with its market share 'm' and the sectoral decarbonisation index 'p' for year 'y' results in an equation that provides the company's intensity target for any year 'y' between the base year and the target value in the year 2050 (equation B6).

$$CI_y = d \,.\, p_{s,y} \,.\, m_{s,y} + SI_{s,2050} \quad \text{(B6)}$$

Where
CI_y Intensity target of the company in year *y* (tCO_2/activity)

A company's target for any year y ($C_{SBT,y}$) will now be given by equation 7.

$$C_{SBT,y} = CI_y \,.\, CA_y \quad \text{(B7)}$$

B.3 ICT APPLICATION

As the principal part of the ICT footprint is dependent on electricity consumption it is reasonable to expect that the ICT pathway will be strongly influenced by that of the power sector.

In that case, as the carbon intensity of the power sector essentially reaches zero by 2050 as shown in Table A1, it follows that the electricity component of an ICT sub-sector will do the same.

6. Note: that m_y is not the change in market share, but rather the inverse, resulting in a decreasing parameter when the company's market share is increasing.

This makes $SI_{s,2050} = 0$ thus allowing a dramatic simplification of the equations given above as follows:

Equation (B2) now becomes:

$$d = CI_b \quad \text{(B2a)}$$

Equation (B5) becomes:

$$p_{s,y} = SI_{s,y} / SI_{s,b} \quad \text{(B5a)}$$

Equation (B6) becomes:

$$CI_y = d \,.\, p_{s,y} \,.\, m_{s,y} \quad \text{(B6a)}$$

In the case when the conditionality statement (B4) is true ($m_y <= 1$), then equation (B7) now extends to:

$$C_{SBT,y} = CI_b \,.\, (SI_{s,y} / SI_{s,b}) \,.\, (CA_b / SA_{s,b}) / (CA_y / SA_{s,y}) \,.\, CA_y$$
$$C_{SBT,y} = (CI_b \,.\, CA_b) \,.\, (SI_{s,y} \,.\, SA_{s,y}) / (SI_{s,b} \,.\, SA_{s,b}) \quad \text{(B7a)}$$

Otherwise written as:

$$C_{SBT,y} = CC_b \,.\, SC_{s,y} / SC_{s,b} \quad \text{(B8a)}$$

Where
CC_b CO_2 emissions of company in base year *b* (tCO_2)
$SC_{s,y}$ CO_2 emissions of sub-sector *s* in base year *y* (tCO_2)
$SC_{s,b}$ CO_2 emissions of sub-sector *s* in year *b* (tCO_2)

Or, in the case when the conditionality statement (B4) is false ($m_y > 1$), then equation (B7) extends to:

$$C_{SBT,y} = CI_b \,.\, (SI_{s,y} / SI_{s,b}) \,.\, CA_y$$
$$C_{SBT,y} = (CC_b / CA_b) \,.\, (SC_{s,y} / SA_{s,y}) / (SC_{s,b} / SA_{s,b}) \,.\, CA_y \quad \text{(B7b)}$$

Otherwise written as:

$$C_{SBT,y} = CC_b \,.\, SC_{s,y} / SC_{s,b} \,.\, (CA_y / SA_{s,y}) / (CA_b / SA_{s,b}) \quad \text{(B8b)}$$

Where
CC_b CO_2 emissions of company in base year *b* (tCO_2)
$SC_{s,b}$ CO_2 emissions of sub-sector *s* in year *b* (tCO_2)
$SC_{s,y}$ CO_2 emissions of sub-sector *s* in base year *y* (tCO_2)

This has re-introduced the $m_{s,y}$ term such that equation (B8b) can be re-written as:

$$C_{SBT,y} = CC_b \,.\, SC_{s,y} / SC_{s,b} / m_{s,y} \quad \text{(B9)}$$

But in this case $m_{s,y}$ has already been forced to one which makes equation (B9) the same as equation (B8a).

In conclusion, equation (B8a) describes the decarbonisation pathway of the electricity component of an ICT sub-sector for both logical outcomes of the conditional statement B4.

C

ANNEX C:
Emission Reduction Factors

These Emisson Reduction Factors were derived from the trajectories described in Section 2.2. and can be used by operators to set an SBT in line with this company guidance.

C.1 Mobile Networks

		Target Year							
		2023	2024	2025	2026	2027	2028	2029	2030
Base Year	2018	0,863	0,824	0,786	0,736	0,686	0,636	0,587	0,537
Base Year	2019		0,833	0,794	0,744	0,694	0,643	0,593	0,543
Base Year	2020			0,803	0,752	0,701	0,650	0,599	0,548
Base Year	2021				0,783	0,730	0,677	0,624	0,571
Base Year	2022					0,761	0,706	0,651	0,595
Base Year	2023						0,737	0,680	0,622
Base Year	2024							0,712	0,651
Base Year	2025								0,683

C.2 Fixed Networks

		Target Year							
		2023	2024	2025	2026	2027	2028	2029	2030
Base Year	2018	0,764	0,701	0,638	0,582	0,526	0,470	0,415	0,359
Base Year	2019		0,717	0,652	0,595	0,538	0,481	0,424	0,367
Base Year	2020			0,668	0,609	0,551	0,493	0,434	0,376
Base Year	2021				0,653	0,590	0,528	0,465	0,403
Base Year	2022					0,636	0,568	0,501	0,434
Base Year	2023						0,615	0,543	0,470
Base Year	2024							0,592	0,512
Base Year	2025								0,563

C.3 Data Centres

		Target Year							
		2023	2024	2025	2026	2027	2028	2029	2030
Base Year	2018	0,809	0,755	0,700	0,651	0,603	0,554	0,505	0,456
Base Year	2019		0,765	0,710	0,660	0,611	0,561	0,512	0,463
Base Year	2020			0,720	0,669	0,619	0,569	0,519	0,469
Base Year	2021				0,709	0,656	0,603	0,550	0,497
Base Year	2022					0,698	0,641	0,585	0,528
Base Year	2023						0,684	0,624	0,564
Base Year	2024							0,669	0,605
Base Year	2025								0,652

D

ANNEX D:
ICT sector Scope 3 categories

Recommendation ITU-T L.1420 *'Methodology for energy consumption and greenhouse gas emissions impact assessment of information and communication technologies in organizations'* gives guidance to ICT companies wanting to report their Scope 1 to 3 emissions. It builds on the ISO 14064-2 standard and the GHG Protocol. The table below taken directly from ITU-T L.1420 summarises the different Scope 3 activities from the GHG Protocol which are material from an ICT company perspective.

Note : "based on LCA" below means that the full life cycle should be considered.

	Category	ICT application	Comments
S3A (Note 1)	Purchased goods and services	• Production-related procurement cradle-to-gate • Non-production related procurement: Paper usage cradle-to-gate Use of hotels • Related fuel and energy supply chain Optional • Other non-production related procurement of goods and services (Note 2) • Manufacturing of vehicles, facilities and infrastructure • Manufacturing of office equipment • Product take-back services for sold products (as a purchased service not handled by the organisation itself)	Based on LCA (Note 3)
S3B	Capital Goods	• Computer-ware cradle-to-gate (Notes 4,5) • Related fuel and energy supply chain Optional: • Machinery (Note 6) production • Cradle-to-gate emissions from vehicles, facilities and infrastructure	Based on LCA
S3C	Fuel- and energy related activities not included in Scope 1 or 2	• Fuel supply chain (Note 7) including transports. Infrastructure when data becomes available (Note 8) for fuel consumed by the reporting company. • Energy supply chain including transport. Infrastructure when data becomes available (Note 9) for energy consumed by the reporting company	The whole supply chain has to be taken into account for electricity including infrastructure, land use; diffuse emissions of methane from oil and coal extraction; SF6 from transformer stations and handling of waste from electricity production. Based on LCA. Electricity is of high importance for ICT industry. The fuel supply chain is also of great importance for other forms of energy (e.g., district heating) and for fuels consumed (incinerated) at sites.

	Category	ICT application	Comments
S3D	Upstream transportation and distribution	• Transports of products purchased by the organisation (Note 10) (from supplier to the organisation; between organisation's facilities; to customer if paid by the organisation) • Transports purchased by the organisation • Related fuel supply chain Optional: • Manufacturing of vehicles, facilities and infrastructure • Storage during distribution • Consultants (Note 11) working outside facilities used by the organisation	
S3E	Waste generated in operation	Optional: • Scope 1 and 2 emissions waste generated in operation that occur during disposal or treatment	Considered to be of low significance for ICT and does also have a high uncertainty
S3F	Business travel	• Air, road, rail and boat travel • Related Fuel supply chain Optional: • Manufacturing of vehicles, facilities and infrastructure	Over time the effects of teleworking are likely to affect these emissions and also results for employee commuting and other energy indirect GHG emissions (Note 12).
S3G	Employee commuting	• Air, road, rail and boat travel including public transports • Related fuel supply chain Optional: • Manufacturing of vehicles, facilities and infrastructure	Based on behavior statistics Over time the effects of teleworking are likely to affect these emissions and also results for employee commuting and other energy and/or indirect GHG emissions (Note 13).
S3H	Upstream leased assets	• Computer-ware cradle-to-gate (Notes 14,15) • Related fuel and energy supply chain Optional • Leased cars (Note 16) • Manufacturing of office equipment • Manufacturing of vehicles, facilities and infrastructure	
S3J	Downstream transportation and distribution	• Outbound transports ordered by the customer (Note 17) • Related fuel supply chain Optional: • Manufacturing of vehicles, facilities and infrastructure	
S3K	Processing of sold intermediate products	• Scope 1 and 2 during processing	

	Category	ICT application	Comments
S3L	Use of sold products	• Scopes 1 and 2 of use • Scopes 1 and 2 impact from use of support equipment necessary to operate the equipment (power supply and cooling) • Related fuel and energy supply chain Optional: • Support activities (indirect use phase emissions) including repair, servicing and maintenance of sold products	
S3M	EoLT of sold products	• Own disposal/treatment • Related fuel and energy supply chain Optional (due to uncertainty) • Scopes 1 and 2 during disposal/treatment	Based on LCA
S3N	Downstream leased assets	• Scopes 1 and 2 during operation • Related fuel and energy supply chain Optional • Manufacturing and construction	
S3O	Franchises	• Scopes 1 and 2 during operation • Related fuel and energy supply chain Optional: • Manufacturing and construction	
S3I	Investments	Optional: • Partially owned companies	Recommended that the legal unit reports its own emissions to avoid double accounting

NOTE 1 – *Also, goods and networks, as defined in [Recommendation ITU-T L.1410 Methodology for environmental life cycle assessments of information and communication technology goods, networks and services], are examples of indirect GHG emission sources*
NOTE 2 – *Services, e.g., finance, marketing, consultants and data traffic, could potentially be of interest for further studies in the future, but for the time being very little input data are available as a basis for inventories.*
NOTE 3 – *See 8.3.5.1.3 [in Recommendation ITU-T L.1420 Methodology for energy consumption and greenhouse gas emissions impact assessment of information and communication technologies in organizations]*
NOTE 4 – *Use of PCs accounted for as "energy indirect GHG emissions"*
NOTE 5 – *Computerware includes PCs, servers, printers and copy machines etc. May in some organisations be part of leased assets*
NOTE 6 – *Machinery for production, development, test and repair*
NOTE 7 – *Lack of LCA data for district heating notified*
NOTE 8 – *Lack of data so far*
NOTE 9 – *Lack of data so far*
NOTE 10 – *It is assumed that other Scope 3 (e.g., S3A, S3B) emissions contain their own transports*
NOTE 11 – *Consultants located in the organisation facilities should be accounted for as employees for practical reasons*
NOTE 12 – *Energy use in visited organisation neglected due to methodological problems/ uncertainty in data*
NOTE 13 – *Energy use in visited organisation neglected due to methodological problems/ uncertainty in data*
NOTE 14 – *Use of PCs accounted for as Scope 2 GHG emissions*
NOTE 15 – *May in some organisations be part of Capital goods*
NOTE 16 – *Not recommended for inclusion because already included in commuting/business travels*
NOTE 17 – *It is assumed that other Scope 3 emissions contain their own transports*

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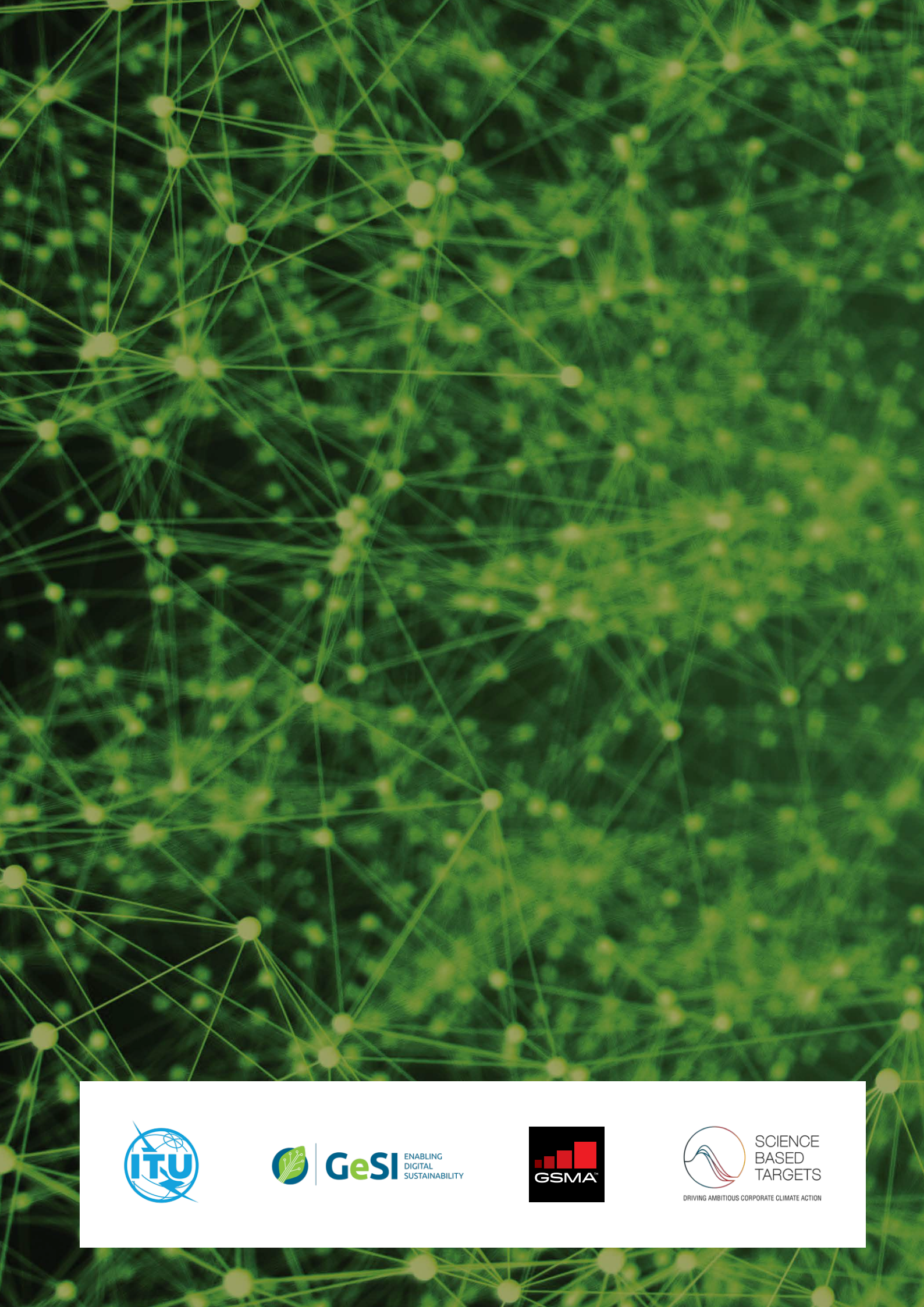
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