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| **03 January 2024** |
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| ITU-T STUDY GROUP 5 |
| LiaiSon statement on the activities and studies on sustainable digital transformation |

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| SummaryThe attached document presents a liaison statement from ITU-T SG 5 on the activities and studies on sustainable digital transformation.RAG is invited to consider and comment the attached liaison statement. |

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| Title: ITU logo | INTERNATIONAL TELECOMMUNICATION UNION**TELECOMMUNICATION STANDARDIZATION SECTOR**STUDY PERIOD 2022-2024 | SG5-LS100 |
| STUDY GROUP 5 |
| **Original: English** |
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| **Source:** | ITU-T Study Group 5 |
| **Title:** | LS/r on the activities and studies on sustainable digital transformation (reply to [TSAG-LS22](http://handle.itu.int/11.1002/ls/sp17-tsag-oLS-00022.docx)) |
| **LIAISON STATEMENT** |
| **For action to:** | TSAG RG DT |
| **For information to:** | ITU-R RAG, ITU-D TDAG, ITU-R SG 1, ITU-R SG 5, ITU-R SG 6, ITU‑R SG 3, ITU-R SG 4, ITU-R SG 7, ITU-D SG 2, ITU-D SG 1, ISO/IEC JTC1/SC40, SG2, SG3, SG9, SG11, SG12, SG13, SG15, SG16, SG17, SG20, IEEE P2023, IEC SMB SG12 |
| **Approval:** | ITU-T Study Group 5 meeting (Geneva 22 November 2023) |
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| **Abstract:** | The liaison statement answers at the request from TSAG RG DT to provide information on the activities and studies related to sustainable digital transformation. |

This liaison answers [TSAG-LS22](http://handle.itu.int/11.1002/ls/sp17-tsag-oLS-00022.docx).

ITU-T Study Group 5 would like to answer a TSAG RG DT request to provide studies related to sustainable digital transformation.

ITU-T SG5 would like to clarify that Study Group activities dealing with energy efficiency, climate change and circular economy are not always categorized in a simple way assigned at a particular sector (*e.g. health, education, transportation, standardization*) but are of transversal or horizontal application at more sectors.

Below you can find the information requested regarding ITU-T SG5 activities.

**Annex 1
Activities and studies related to sustainable digital transformation**

| **Sector/Domain** | **Study group or SDO** | **Title of deliverable** | **Scope of deliverable** | **Current status** | **Reference/URI** |
| --- | --- | --- | --- | --- | --- |
| ICT | ITU-T SG5 | [L.1333: Carbon data intensity for network energy performance monitoring](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=15028) | The deliverables define a KPI and the measurement methodologies for the GHG emission of a network based on energy consumption. The intention is to give at stakeholder a simple tool to check the status and the evolution of network based on emission and user data traffic managed by the network. It is applicable at any type of network: private not public and enterprise. | Published | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=15028>  |
| ICT and services | ITU-T SG5 | [L.1410: Methodology for environmental life cycle assessments of information and communication technology goods, networks and services](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=12207) | Recommendation ITU-T L.1410 deals with environmental life cycle assessments (LCAs) of information and communication technology (ICT) goods, networks and services. It is organized in two parts:• Part I: ICT life cycle assessment: framework and guidance• Part II: "Comparative analysis between ICT and reference product system (Baseline scenario); framework and guidance".Part I deals with the life cycle assessment (LCA) methodology applied to ICT goods, networks and services. Part II deals with comparative analysis based on LCA results of an ICT goods, networks and services product system, and a reference product system. | Publishedcurrently under revision | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=12207>  |
| Cities | ITU-T SG5 | [L.1440: Methodology for environmental impact assessment of information and communication technologies at city level](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=12431) | Recommendation ITU-T L.1440 gives general guidance on city level environmental assessments related to information and communication technologies (ICT), and provides a description of the methodologies to be used for the assessment of the environmental impact of ICT in cities.In this first edition of this Recommendation, the assessment is limited to energy consumption and GHG emissions.The present Recommendation is divided into two parts.Part I relates to the first order effects from the use of ICT goods and networks in a city´s organizations and households.Part II relates to the first and second order effects from ICT projects and services applied in the city.This Recommendation provides specific guidance on setting city boundaries, preparing and performing the assessment of ICT-related GHG emissions and energy consumption at city level. | Published | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=12431>  |
| All | ITU-T SG5 | L.1480: [Enabling the Net Zero transition: Assessing how the use of information and communication technology solutions impact greenhouse gas emissions of other sectors](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=15030) | Recommendation ITU-T L.1480 provides a methodology for assessing how the use of information and communication technology (ICT) solutions impacts greenhouse gas (GHG) emissions of other sectors. More specifically, the methodology provides guidance on the assessment of the use of ICT solutions covering the net second order effect (i.e., the resulting second order effect after accounting for emissions due to the first order effects of the ICT solution), and the higher order effects such as rebound. By providing a structured methodological approach, it aims to improve the consistency, transparency and comprehensiveness of assessments of how the use of ICT solutions impacts GHG emissions over time.Guidance is provided to assess the net second order effect and higher order effects of the following cases:– ICT solution(s) implemented in a specific context by the user of the ICT solution(s).– ICT solution(s) implemented at different scales, including at an organizational level (whether private or public organizations), at a city level, at a country level or at worldwide level.– ICT solution(s) seen from the perspective of an ICT organization contributing to the ICT solution(s).This includes:• Assessment of the aggregated effect of all ICT solutions provided by an ICT organization across all its customers;• Assessment of the aggregated effect of one or several ICT solutions provided by an ICT organization across some of its customers;• Assessment of the effect of one or more specific ICT solutions implemented in an actual context for a specific customer. | Publishedcurrently under revision | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=15030>  |
| Energy | ITU-T SG5 | [L.1383: Smart energy solutions for city and home applications](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14719) | Recommendation ITU-T L.1383 focuses on smart energy solutions in different application scenarios facilitating energy saving and carbon emission reduction. Besides their application in the field of ICT, such as in base stations, data centres and telecom centres, smart energy solutions have been applied in cities and homes as an advanced update to ICTs. Cities play a different role in different parts of the world. With the development of smart energy technologies, it is becoming possible to answer key issues in cities worldwide, prompted by the urgent necessity of GHG emissions reduction.This Recommendation includes specific smart energy applications in cities and homes, such as energy sources and energy management functions. | Published | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14719>  |
| Energy  | ITU-T SG5 | L.VMPS: Virtual micro power station scheme based on carbon emission reduction of telecommunication base station | This Recommendation describe how to integrate energy storage system, telecommunication base stations and other power loads scattered at the user end through energy interconnection technology. It also realizes coordination optimization to participate in power grid dispatching as a special power plant. To reduce the carbon emissions of telecommunication base stations and improve the energy efficiency of base stations.A solution for building a virtual micro power station with telecommunication base station energy storage system it is provided, so as to significantly reduce the construction cost of power feeding system for the base station, reduce carbon emissions, and achieve optimal energy scheduling. The solutions provided in this Recommendation should consider how to consider further technical enhancements and innovation. | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=18566>  |
| ICT infrastructure | ITU-T SG5 | L.1305: [Data centre infrastructure management system based on big data and artificial intelligence technology](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14080) | Recommendation ITU-T L.1305 contains technical specifications of a data centre infrastructure management (DCIM) system, with the following aspects being covered: principles, management objects, management system schemes, data collection function requirements, operational function requirements, energy-saving management, capacity management for information and communication technology (ICT) and facilities, other operational function requirements and intelligent controlling on systems to maximize green energy use.Other aspects such as maintenance function requirements, early alarm and protection based on big data analysis and intelligent controlling on systems to decrease the cost for maintenance are also considered. | Published | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14080>  |
| ICT  | ITU-T SG5 | L.1024: [The potential impact of selling services instead of equipment on waste creation and the environment – Effects on global information and communication technology](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14564) | Recommendation ITU-T L.1024 utilizes information compiled from stakeholders that provides insights into cases in the information and communication technology (ICT) ecosystem, in which ICT goods are sold as services or subscriptions rather than products. Currently, these cases are not clearly understood from an environmental point of view.Current estimates are that billions of new ICT goods – smartphones and others – are sold annually and sales are expected to be higher in 2025 than in 2020.Business models based on servitization, which would – most effectively – improve the circularity of these ICT goods are not well understood, e.g., prolonging the lifetime or increasing the e-waste collection rate. | Published  | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14564>  |
| ICT | ITU-T SG5 | L.1070: Global digital sustainable product passport opportunities to achieve a circular economy | This Recommendation provides an overview of global and common opportunities to represent sustainability, mainly environmental-related, details about digital technology products, either collective ICT product models, batches or individual ICT product items. These product details are intended to be represented in digital format instead of paper-based. The details can represent design-related information, products at the time of manufacturing, including relevant information for product transparency and a potential for a circular lifecycle, such as details related to the origin of materials composition, design, manufacturing, energy consumption, maintenance, repair, preparation for reuse, final recycling, and may include links to related documentation. Product details can include or relate to details that change over the lifespan of a product as a result of reconfiguration events, including repair, upgrade, usage, sale, and final recycling. The details should exclude any personal or business-sensitive information.The Recommendation provides an overview of sustainability opportunities, environmental related, about product-related digital information common to all ICT products, with global scope for harmonisation, i.e. relevant to any region, that can support the development of the circular economy of ICT products. The product-related digital information can be represented under digital technology, such as product identifiers, data formats, linked data, and system architectures. It relates to and can complement regional and global standards. | Pre-published | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=15598>  |
| Building | ITU-T SG5 | [L.1370: Sustainable and intelligent building services](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=13724) | The concept of sustainable intelligent building (SIB) is closely related to efficiency and environmentally aware practices. The concept is, therefore, the key enabler of the sustainability of the building itself and of the city as a whole. Recommendation ITU-T L.1370 sets the minimal requirements for the efficient and sustainable management of the building as a unit. The sustainability of human activities in urban areas cannot be addressed without taking into consideration the building, which is the most basic unit of which cities are composed.This Recommendation also defines the services enabled by the SIB concept, the way it contributes to the aforementioned goals of sustainability, its features, its different possible functioning modes, or its internal architecture and requirements with the Internet of Things (IoT) node at its core.Interoperability deserves a special mention among these requirements and specifications as most of the added value that the SIB provides comes into action when it interacts with other parts of the building, other buildings, city elements, or the city itself. Protocols, semantics and normalization are key as a part of this interaction, and the SIB with its IoT node is required to be compliant with all of them.Extensibility is another key feature for the SIB and the IoT node. The technology behind smart and sustainable cities is currently evolving very quickly, as it is a state-of-the-art technological arena. That is the reason why one of the most important architectural patterns to take into consideration is to design a SIB and an IoT node that support not only upgrading, but also the capacity to accommodate new technologies, protocols, services and applications that may be relevant for the industry in the future.In addition to these clear advantages for the technical durability of the SIB infrastructure, this will enable the creation of an open "smart ecosystem", with third parties being able to integrate their own developments, expanding the capacities of the SIB, and ultimately contributing to improve the quality of life of citizens. | Published | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=13724>  |
| Building | ITU-T SG5 | [L.1371: A methodology for assessing and scoring the sustainability performance of office buildings](https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14304) | Recommendation ITU-T L.1371 provides a consistent framework for building owners, managers and operators to critically assess, score and improve the sustainability performance of office buildings in 10 key areas: energy; water; air; comfort; health and wellness; purchasing; custodial; waste; site; and stakeholders.The framework described in Recommendation ITU-T L.1371 provides a set of concrete and measurable steps to reduce environmental impacts, and specifically greenhouse gas emissions, of existing office buildings, thus contributing to the achievement of Sustainable Development Goal 11 "Sustainable cities and communities – Make cities inclusive, safe, resilient and sustainable".The annex to Recommendation ITU‑T L.1371 specifies an assessment scoring methodology to allow owners and managers to undertake a self-assessment to evaluate their building's current status and track progress going forward. | Published | <https://www.itu.int/ITU-T/recommendations/rec.aspx?rec=14304>  |
| computing | ITU-T SG5 | [L.IEDL](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18967): Energy saving strategy for deep learning computing | Deep-learning models perform calculations on GPUs. The number of GPUs in current AI computing centre is increasing rapidly, and the energy consumption of large-scale parallel GPU clusters is extremely high. If GPU resources are not properly scheduled, it causes IT hardware such as GPUs to idle for a long time and wastes power. And there will be constantly increasing carbon emissions of the whole AI computing centre. Therefore, it is necessary to formulate relevant standards that reasonably match GPU computing resources according to the performance and energy consumption requirements of deep-learning computing tasks, to improve the efficiency of GPU computing power in the process of large-scale AI computing, to realize the maximum re-use of GPU computing resources, and then to reduce the energy consumption and carbon emissions of the entire AI computing centre. This draft Recommendation analyses the energy consumption for deep- learning computing scenarios; consequently, related strategies are proposed to save the IT server, including virtual pooling management capability, real-time monitoring of hardware resources, and AI task- scheduling orchestration. This draft recommendation will also define the energy saving best practice for deep- learning computing scenarios and energy efficiency evaluation metric for deep-learning computing. | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=18967>  |
| general | ITU-T SG5 | [L.SDT](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17711): Definition of Sustainable Digital Transformation | This Recommendation will provide a definition for sustainable digital transformation. The definition will take into consideration the environmental and sustainability aspects of digital technologies, starting from the design phase, and the way in which circular principles can be implemented; emphasis is placed on the role of environmental sustainability in digital transformation. This Recommendation will also provide an overview on the current state of digital transformation and the lack of discussion on its environmental cost. It will also highlight a series of recommendation for achieving sustainable digital transformation, from leveraging renewable energy to power digital infrastructure to reducing the energy demand while improving energy efficiency of ICT equipment, as well as the material effects of ICT equipment across their lifespan, from the extraction of primary and secondary materials, their lifespan, and final recycling and e-waste management. | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17711>  |
| ICT  | ITU-T SG5 | L.D4PI: An information model for digital product information on sustainability and circularity | This work relates and builds on and complements the ITU-T L.GDSPP work item that defines requirements for a global digital sustainable product passport/information (and any information items there will be moved to this work item).This proposed new work item aims at the definition of an information model for the description of details about ICT products, with a focus on the environment: circularity, environmental sustainability, and human health. This work will determine the information items, to be represented in digital format, about ICT product information, either as individual products or grouped by model, batch, etc. common to all ICT products or specific to certain product categories. The information details can represent products at any time of their circular lifespan: design, manufacturing, through the usage phases and changes over the lifespan, until final recycling as e-waste.An information model can help inform relevant actors involved with ICT products. The goal of the recommendation is to define the semantics required to represent the relevant information in a feasible digital form, related and building on existing digital data formats, linked data, and data system architectures, as well as relating to, and complementing, upcoming regional (e.g. European digital product passport) and global (ISO PCDS, IEC 82474-1) standards.This Recommendation relates to and builds on other ITU-T Recommendations and work items such as the L.1023 recommendation on an assessment method for circular scoring that can translate into information items. It can facilitate the calculation of environmental impacts of different ICT products according to L.1400-1451, and mobile phones according to L.1015.  | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=18559>  |
| Biodiversity | ITU-T SG5 | [L.Biodiversity\_opportunities](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17740): Development of guidance on how to assess the second order effects of ICT solutions on biodiversity, including positive effects | The Recommendation shall provide guidance on how to assess the benefits brought by ICT solutions on biodiversity preservation and restoration. | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17740>  |
| Biodiversity | ITU-T SG5 | L.Biodiversity\_footprint: Methodology for the assessment of the footprint of an ICT organization on biodiversity | The Recommendation will provide guidance on how to assess the impact of ICT on biodiversity, considering the whole value chain involved in the provision of ICT solutions. | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17739>  |
| Manufacture | ITU-T SG5 | [L.GHGemissions\_IP](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17743): Methodologies for accounting Greenhouse Gas Emissions of Industrial Parks | This Recommendation provides guidance on how to account for GHG emissions from manufacturing activities with the application of ICT technology, which includes their use of energy from various sources. It will, moreover, provide specific methods to assess the GHG emissions from industrial parks associated with direct emissions and those occurring due to the use of energy. Hence, direct GHG emissions (scope1), indirect GHG emissions (scope2) and other indirect GHG emissions scope 3 (value chain) followed by GHG Protocol are included. | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17743>  |
| Events | ITU-T SG5 | [L.VirtualMeetings](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17713) Methodology for estimating GHG emissions in the frame of virtual meetings and events | The global pandemic has increased our reliance on digital technologies. A recent study indicates that many countries have reported at least a 20% increase in Internet use since March 2020.[[1]](#footnote-1) Digital events and videoconferencing systems are among the digital activities that have seen a significant surge since the global lockdown was in place. The GHG emissions of this increase in digital gatherings has been difficult to estimate. This includes, but is not limited to, the use of data centres networks and devices. Similarly, emissions reduction related to the reduced use of transport and venues needs also consideration. To address this situation, this Recommendation will develop a standardized methodology for estimating GHG emissions in the frame of virtual meetings and events. | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17713>  |
| cities | ITU-T SG5 | [L.](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18397)1640: Methodology for dynamic monitoring and analysis of greenhouse gas emissions in city | In 2015, the UN approved the 2030 Agenda for Sustainable Development, which contains global sustainable development goals (SDGs), including addressing climate change. In the era of economic globalization, cities consume a large amount of raw materials and energy, resulting in negative environmental effects such as greenhouse effect and ozone depletion. Therefore, low-carbon urban development and analysis of greenhouse gas (GHG) emissions have gradually become an important factor for strategy and policy making. This document proposes a methodology for dynamic monitoring and analysis for urban low-carbon development through multivariate data, data collection, data processing, data fusion and application methods are specified.Based on ground observation data, satellite remote sensing data, annual statistical data and other data, this document proposes to calculate near-real-time urban GHG emissions by using Atmospheric remote sensing quantitative inversion emission model, non-intrusive load monitoring (NILM) system based on deep learning and other methods, and track the temporal and spatial changes of regional GHG emissions. At the same time, Granger causality analysis, multi-industry attribution analysis and other algorithms are used to evaluate and predict the changes of GHG emission to support the sustainable development strategy and planning of the city. | Consented | <https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=18397>  |
| Environmental control | ITU-T SG5 | L.SMART: Impact assessment framework for evaluating how ICT-based subsea infrastructure could support climate, environmental and biodiversity monitoring in the oceans | Information and communication technologies can be used to monitor subsea climate, environmental and biodiversity indicators, including water temperature, pressure and the level of sea rising. Among those, ocean sensing technologies, and, in particular, SMART Cables, can play a pivotal role in this effort. This monitoring capacity, will also generate new data streams that could be used for scientific, research and policy development purposes, leveraging the role of SMART Cables to support global climate and environmental action.However, there is no scientific and effective impact assessment framework for evaluating how ICT‑based subsea infrastructure could support climate, environmental and biodiversity monitoring in the oceans. In other words, there is a lack of uniform capability assessment methodologies for ocean sensing technologies in monitoring subsea climate, environmental and biodiversity indicators.This Recommendation will help countries in becoming more resilient for climate change as it will help to create metrics to assess how SMART Cables are helping to monitor, in real time, key climate indicators such as (but not limited to): temperature of the bottom of the sea, level of sea rising, salinity, and even biodiversity. It will also develop a metric related to the impact of SMART Cables on Climate change resilience in a given region or area | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=18961>  |
| General | ITU-T SG5 | L.SRDT-adaptation: Sustainable and Resilient Digital Technologies for Adaptation to Climate Change | This Recommendation is aimed at identifying the Sustainable Resilient Digital Technologies (SRDT) that can be deployed in critical sectors in society for adaptation to effects of climate change. The document will identify and give requirements for solution “best practices” applicable to different sector to obtain sustainability, resilience, and adaptation of ICT to the effects of climate change. This recommendation is supported by the Supplement  [L.Suppl.oa2cc](https://www.itu.int/ITU-T/workprog/wp_item.aspx?isn=17138) “Overview on Adaptation to Climate Change for ICT Networks” that gives an overview on published documents on climate change adaptation | Under study | <https://www.itu.int/itu-t/workprog/wp_item.aspx?isn=17715>  |

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1. <https://www.sciencedirect.com/science/article/abs/pii/S0921344920307072?via%3Dihub=>. [↑](#footnote-ref-1)