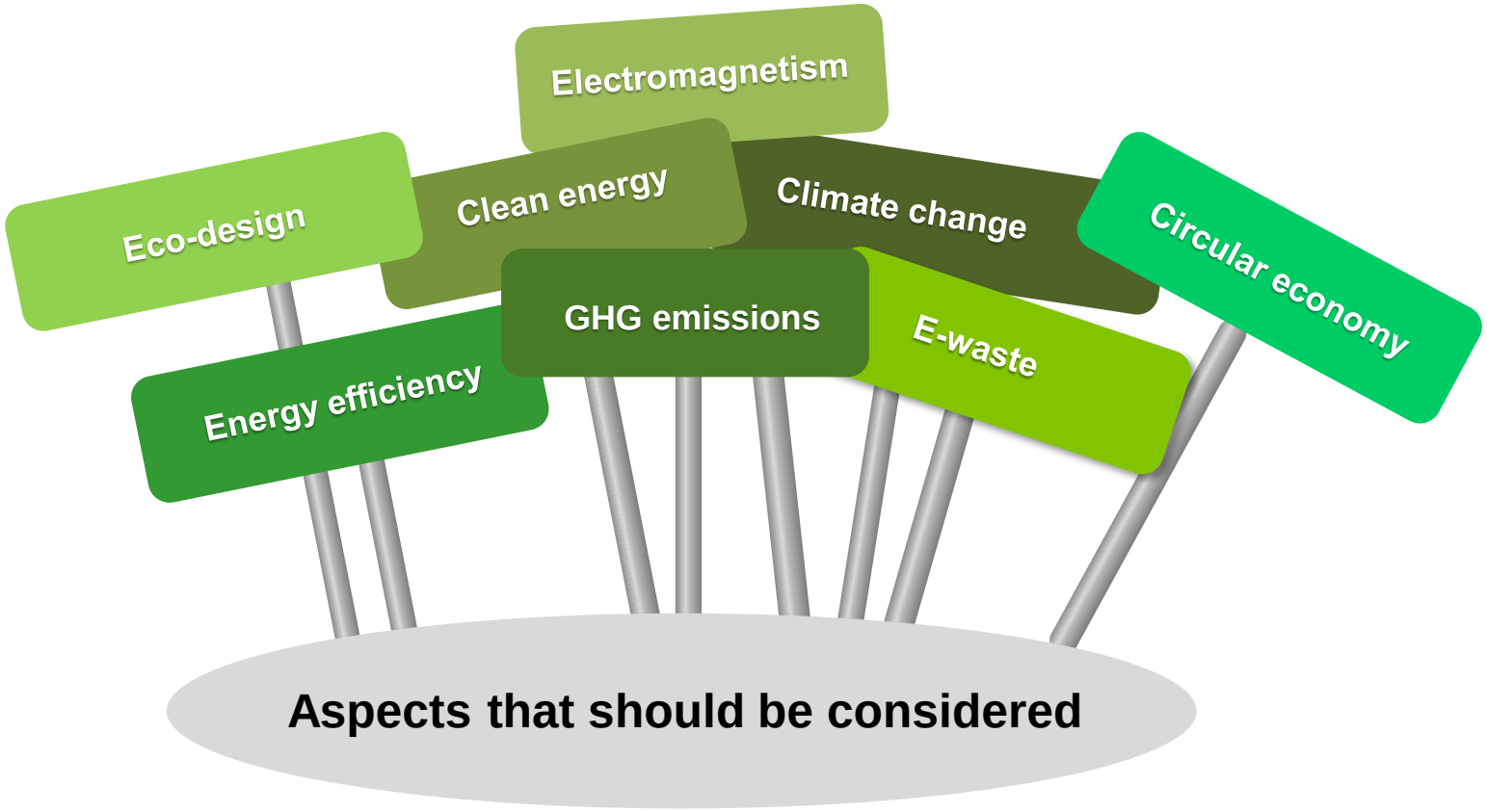
ITU-T Study Group 5 “Environment, Climate Change and Circular Economy”

Using ICT solutions in an environmentally sound manner



ITU Resolutions on Environment, Climate Change and Circular Economy (1)

ITU Resolution 182 – "The role of ICTs on climate change and the protection of the environment" (Busan, 2014)

ITU Resolution 176 – "Human exposure to and measurement of electromagnetic fields" (Rev. Dubai, 2018)

ITU-T Resolution 79 - "The role of telecommunications / ICT in handling and controlling e-waste from telecommunication and information technology equipment and methods of treating it" (Dubai, 2012)

ITU-T Resolution 72 – "Measurement and assessment concerns related to human exposure to electromagnetic fields" (Rev. Hammamet, 2016)

ITU-T Resolution 73 – "Information and communication technologies, environment and climate change" (Rev. Hammamet, 2016)

Connect 2030 Agenda: Sustainability Targets

Resolution 200 (Rev. Dubai, 2018)
Connect 2030 Agenda for global telecommunication / information and communication technology, including broadband, for sustainable development

Goal 3 – Sustainability: Manage emerging risks, challenges and opportunities resulting from the rapid growth of telecommunications / ICT

Target 3.2: By 2023, increase the global e-waste recycling rate to 30%

Target 3.3: By 2023, raise the percentage of countries with an e-waste legislation to 50%

Target 3.4: By 2023, net telecommunication / ICT-enabled Greenhouse Gas abatement should have increased by 30% compared to the 2015 baseline

How ITU supports the Environment, Climate Change and Circular Economy

Connect 2030

ITU:
International Telecommunication Union – the UN specialized agency for ICTs

2

FG-AI4EE: Focus Group on Environmental Efficiency for Artificial Intelligence & other Emerging Technologies

1

ITU-T Study Group 5:
Environment, climate change and circular economy

ITU-T SG5 - Management Team

Acting Chairman:	**Shuguang Qi** (CAICT)	
Vice-Chairmen:	**Jean-Manuel Canet** (Orange)	**Shuguang Qi** (CAICT)
	Samyoung Chung (National Radio Research Agency)	**Leonid Rabinovich** (CISCO Systems)
	Vincent Urbain Namrona (Agence de Régulation des Télécommunications (ART))	**Nevine Tewfik** (Ministry of Communications and Information Technology (MCIT))
	Josef Opitz (Federal Network Agency)	**Kazuhiro Takaya** (NTT)
	Eiman Farouk Mahmoud Osman (National Telecommunication Corporation (NTC))	

WP1/5 Chairman:	**Fryderyk Lewicki** (Orange Polska)
WP1/5 Vice-chairmen:	**Beniamino Gorini** (NOKIA)
	Michael Maytum (Bourns Limited)
	Xia Zhang (MIIT of China)
WP2/5 Chairman:	**Paolo Gemma** (Huawei Technologies, Co., Ltd)
WP2/5 Vice-chairman:	**Nevine Tewfik** (Ministry of Communications and Information Technology (MCIT))
Advisor	**Reyna Ubeda** (ITU)

ITU-T’s focus on the Environment, Climate Change and Circular Economy

Responsible for studies relating to:

- protection of telecommunication networks and equipment from interference and lightning;
- electromagnetic compatibility (EMC), particle radiation effects, and assessment of human exposure to electromagnetic fields (EMF) produced by ICT installations and devices, including cellular phones and base stations;
- the existing copper network outside plant and related indoor installations;
- achieving energy efficiency and sustainable clean energy in ICTs;
- methodologies for assessing the environmental impact of ICT, publishing guidelines for using ICTs in an eco-friendly way, dealing with e-waste issues (also including the environmental impact of counterfeit devices), enhancing rare-metal recycling and energy efficiency of ICT, including infrastructures.

ITU-T Study Group 5: Environment, Climate Change and Circular Economy

- **Lead Study Group 5 Roles:**
  - electromagnetic compatibility, lightning protection and electromagnetic effects
  - ICTs related to the environment, climate change, energy efficiency and clean energy
  - circular economy, including e-waste

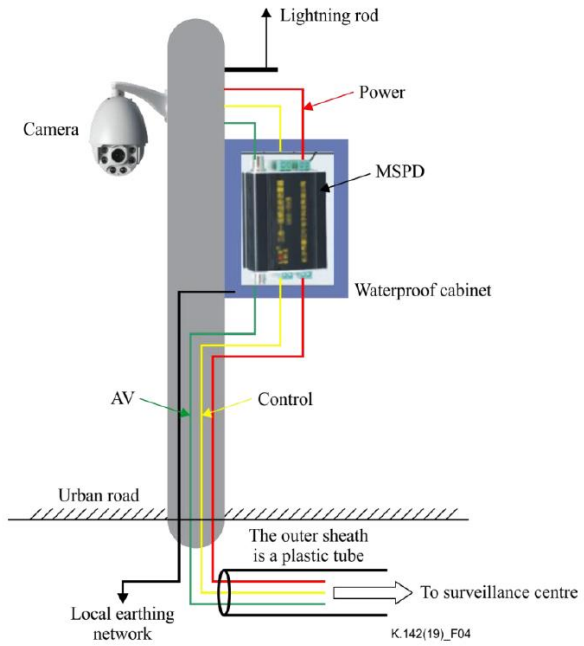
WP1/5 EMC, lightning protection, EMF
Q1/5 Electrical protection, reliability, safety and security of ICT systems
Q2/5 Protecting equipment and devices against lightning and other electrical events
Q3/5 Human exposure to electromagnetic fields (EMFs) due to digital technologies
Q4/5 Electromagnetic compatibility (EMC) aspects in ICT environment

WP2/5 Environment, Energy Efficiency and the Circular Economy
Q6/5 Environmental efficiency of digital technologies
Q7/5 E-waste, circular economy and sustainable supply chain management
Q9/5 Climate change and assessment of digital technologies in the framework of the Sustainable Development Goals (SDGs) and the Paris Agreement
Q11/5 Climate change mitigation and smart energy solutions
Q12/5 Adaptation to climate change through sustainable and resilient digital technologies
Q13/5 Building circular and sustainable cities and communities

PLEN
Q8/5 Guides and terminology on environment

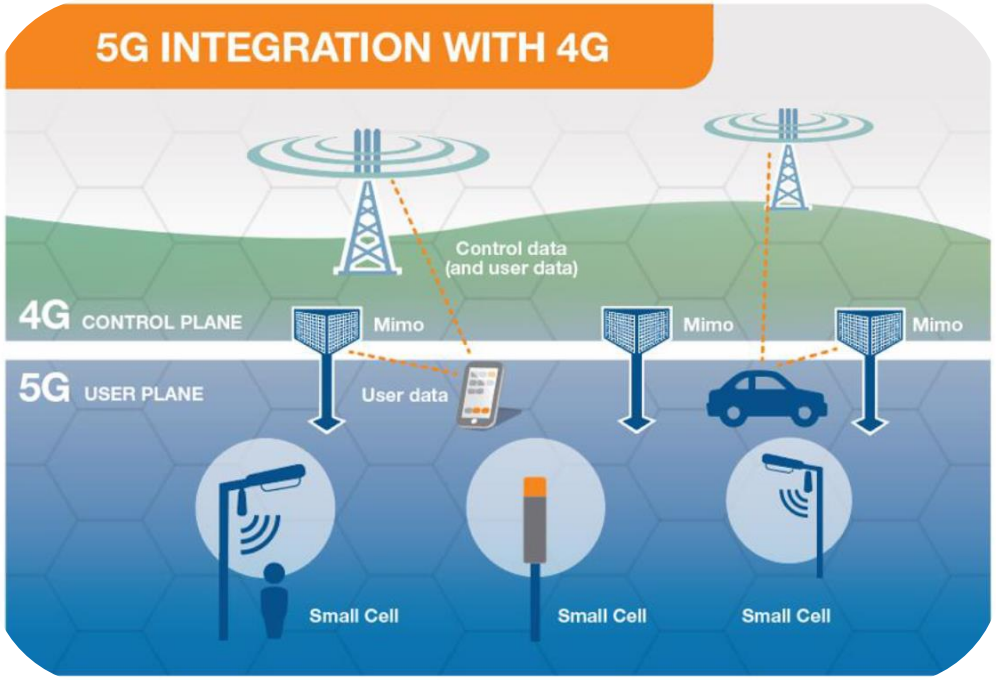
ITU-T SG5: Resistibility, EMC, and Lightning protection

Main protection scheme applied to a video surveillance system



- **Recommendation ITU-T K.146:** Management of interferences on telecommunication transmissions on copper other than speech
- **Recommendation ITU-T K.142:** Lightning protection and earthing of video surveillance system
- **Recommendation ITU-T K.140:** Surge protective component application guide – Fuses
- **Recommendation ITU-T K.144:** Surge protective component application guide - Self-restoring thermally activated overcurrent protectors
- **Recommendation ITU-T K.133:** Electromagnetic (EM) environment of body worn equipment in the 2.4 GHz and 13.56MHz industrial, scientific and medical band
- **Recommendation ITU-T K.136:** Electromagnetic Compatibility requirements for radio telecommunication equipment
- **Recommendation ITU-T K.138:** Quality estimation methods and application guidelines for mitigation measures based on particle radiation tests
- **Recommendation ITU-T K.139:** Reliability requirements for telecommunication systems affected by particle radiation

ITU-T SG5: Human exposure to Electromagnetic fields



- **Recommendation ITU-T K.121**: Guidance on the Environmental Management for Compliance with Radio Frequency EMF Limits for Radiocommunication Base Stations
- **Recommendation ITU-T K.122**: Exposure levels in the close proximity of the radiocommunication antennas
- **Recommendation ITU-T K.145**: Assessment and management of compliance with RF EMF exposure limits for workers at radiocommunication sites and facilities
- **ITU-T K.Suppl.14:** The impact of RF-EMF exposure limits stricter than the ICNIRP or IEEE guidelines on 4G and 5G mobile network deployment
- **ITU-T K.Suppl.16:** Electromagnetic field compliance assessments for 5G wireless networks

ITU-T SG5: Energy efficiency, Smart Energy and Sustainable Buildings

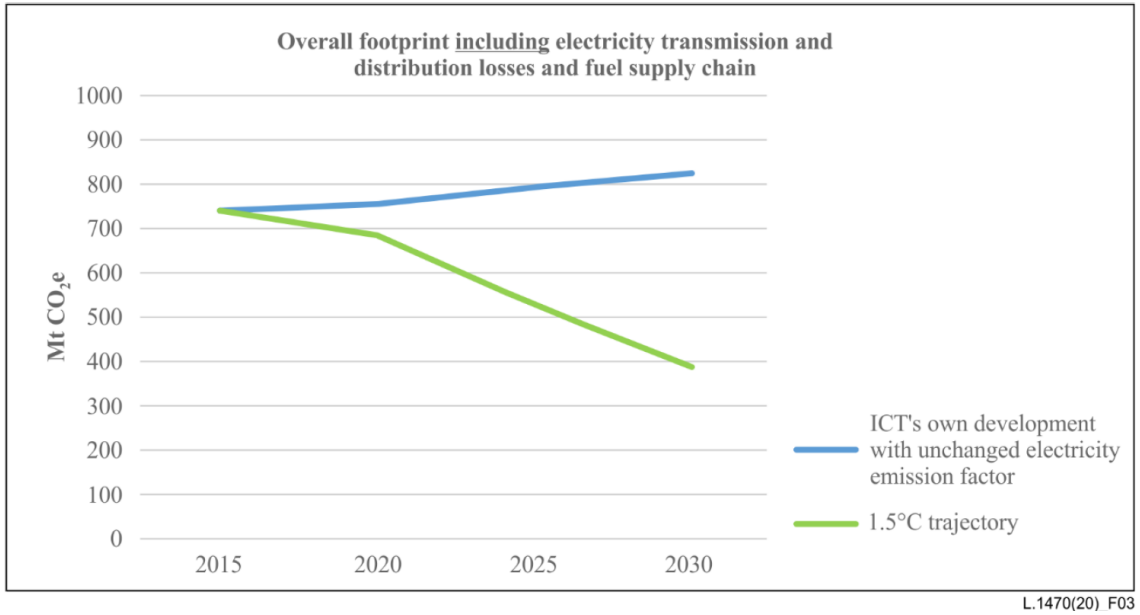
- **Recommendations ITU-T L.1220, ITU-T L.1221, and ITU-T L.1222**: Innovative Energy storage technology for stationary use:
  - Part 1: Overview of energy storage
  - Part 2: Battery
  - Part 3: Supercapacitor technology
- **Recommendation ITU-T L.1305:** Data centre infrastructure management system based on big data and artificial intelligence technology
- **Recommendations ITU-T L.1380, ITU-T L.1381, and ITU-T L.1382**: Smart Energy Solutions for:
  - Telecom sites
  - Data Centre
  - Telecommunication rooms
- **Recommendation ITU-T L.1370:** Sustainable & intelligent building services
- **Recommendation ITU-T L.1371**: A methodology for assessing and scoring the sustainability performance of office buildings

ITU-T SG5: E-waste and Circular Economy

- **Recommendation ITU-T L.1020:** Circular Economy: Guide for Operators and Suppliers on approaches to migrate towards circular ICT goods and networks
- **Recommendation ITU-T L.1021:** Extended producer responsibility - Guidelines for sustainable e-waste management
- **Recommendation ITU-T L.1022:** Circular Economy: Definitions and concepts for material efficiency for Information and Communication Technology
- **Recommendation ITU-T L.1023:** Assessment method for circular scoring
- **Recommendation ITU-T L.1032:** Guidelines and certification schemes for e-waste recyclers

ITU-T SG5: Climate Actions to reach Net Zero

ICT sector trajectory including electricity grid losses and supply chain



L.1470(20) F03

- **Recommendation ITU-T L.1450:** Methodologies for the assessment of the environmental impact of the information and communication technology sector
- **Recommendation ITU-T L.1451:** Methodology for assessing the aggregated positive sector-level impacts of ICT in other sectors
- **Recommendation ITU-T L.1470:** GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement
- **ITU-T L.Suppl.37 to ITU-T L.1470:** Guidance to operators of mobile networks, fixed networks and data-centres on setting 1.5°C aligned targets compliant with Recommendation ITU-T L.1470
- **ITU-T L.Suppl.38 to ITU-T L.1470:** Guidance for information and communication technology manufacturers on setting 1.5°C aligned targets compliant with Recommendation ITU-T L.1470

(NEW!) Question 11 - Climate change mitigation and smart energy solutions

Fact: This Question will act in line with SDG 7,9,11 and 13

This Question aims to support …

1. Developing smart energy solutions for ICTs and digital technologies
2. Applying smart energy solutions to achieve a low-carbon economy
3. Promoting energy efficiency for overall Co2 reduction

(NEW!) Question 12 - Adaptation to climate change through sustainable and resilient digital technologies

Fact: This Question will act in line with SDG 7,9,11 and 13

This Question aims to support …

1. Using digital technologies to accelerate climate actions
2. Using ICTs and digital technologies to adapt to the impacts of climate change, particularly rural communities
3. Implement climate resilient ICTs

(NEW!) Question 13 - Building circular and sustainable cities and communities

Fact: This Question will act in line with SDG 7, 9, 11, 12 and 13

This Question aims to support …

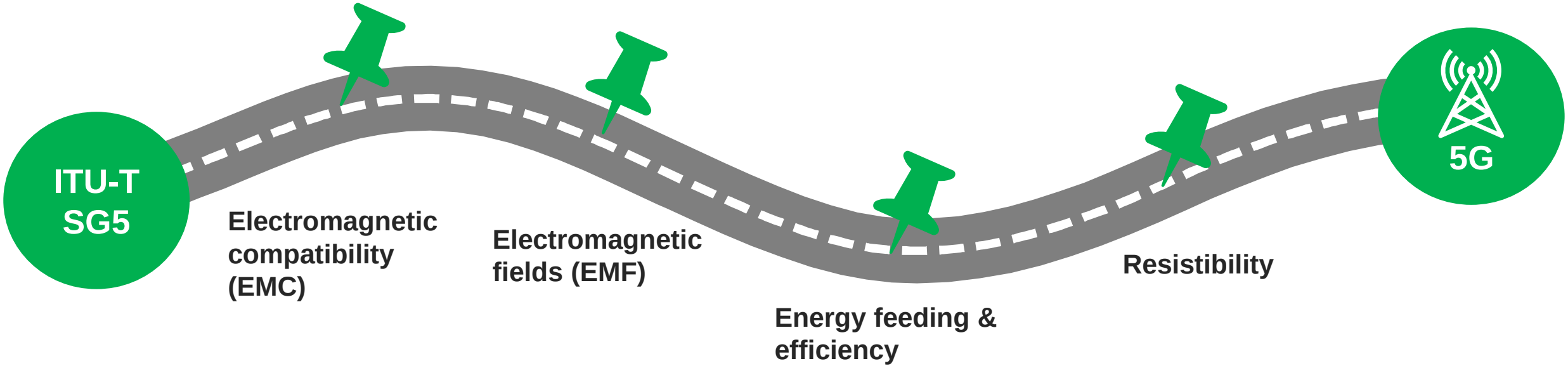
1. Implementing circularity in cities and communities
2. Embedding circularity in key aspects of cities and communities including, buildings, public spaces, water etc.
3. Developing guidance and framework for transitioning to a circular city

Setting environmental requirements for 5G

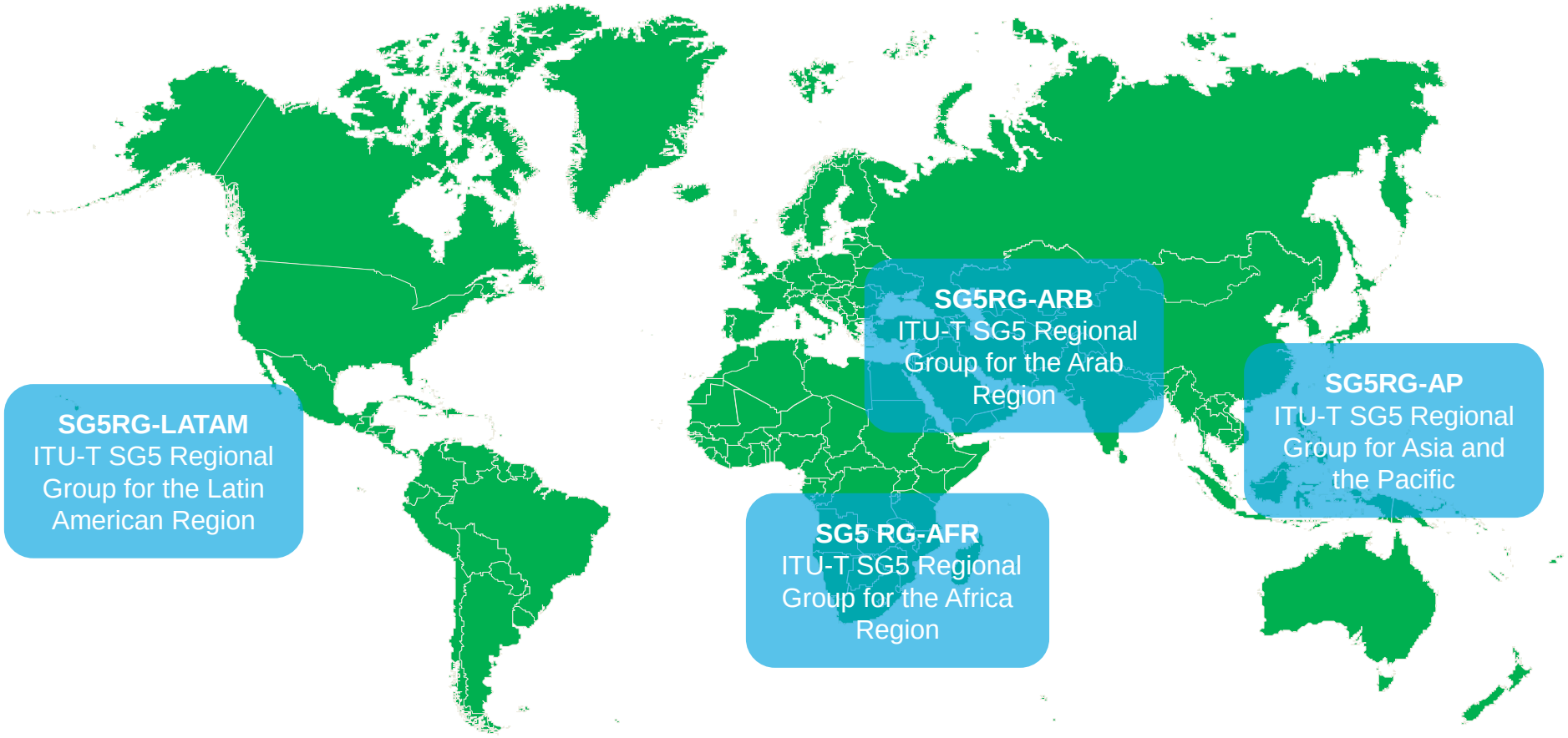
International Standards

Supplements

Technical Reports



ITU-T SG5 - Regional Groups



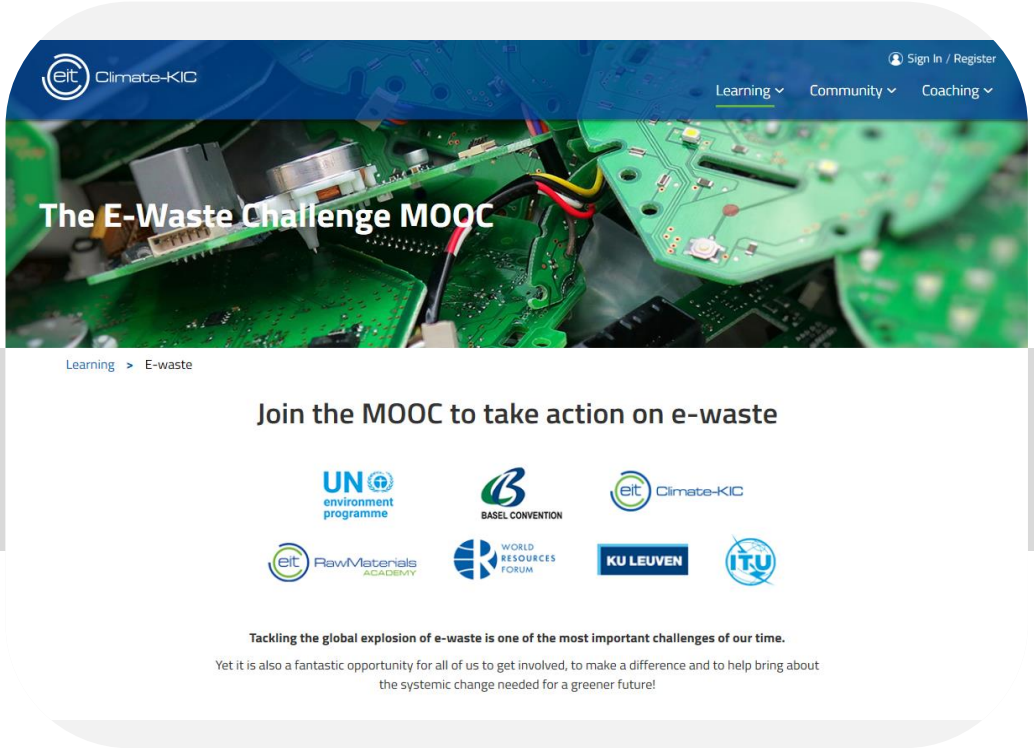
FG-AI4EE: Environmental efficiency for AI and other emerging technologies

Co-Chairmen:	**Paolo Gemma** (Huawei Technologies Co., Ltd., China)	
	Neil Sahota (Technossus, IBM & University of California)	
Vice-Chairmen:	**Barbara Kolm** (Austrian Economics Center & Austrian National Bank)	**Claudio Bianco** (Telecom Italia)
	Kari Eik (Organization for International Economic Relations (OiER))	**Peter Ulanga** (Universal Communications Service Access Fund, United Republic of Tanzania)
	Joel Alexander Mills (AugmentCity AS)	**Stefano Nativi** (European Commission - Joint Research Centre)
	Mats Pellbäck Scharp (Ericsson)	**Mandar Deshpande** (Ministry of Communication, India)
	Alice Charles (World Economic Forum (WEF))	**Xiao Wang** (Copenhagen Centre on Energy Efficiency, UNEP DTU Partnership)

FG-AI4EE Working Groups (WGs):

- **WG 1**: Requirements of AI and other Emerging Technologies to Ensure Environmental Efficiency
- **WG 2**: Assessment and Measurement of the Environmental Efficiency of AI and Emerging Technologies
- **WG 3:** Implementation Guidelines of AI and Emerging Technologies for Environmental Efficiency

The E-waste Challenge MOOC



The Massive Open Online Course (MOOC) on e-waste has been developed to encourage:

- Environmentally sound management of hazardous chemicals and wastes.
- Cleaner production processes to minimize use/emissions of hazardous waste.
- Protection of human health, communities and the environment from the impact of hazardous waste and climate change.
- Design, circular economy, mitigation and adaptation activities to lower the impact on climate change and natural resources.

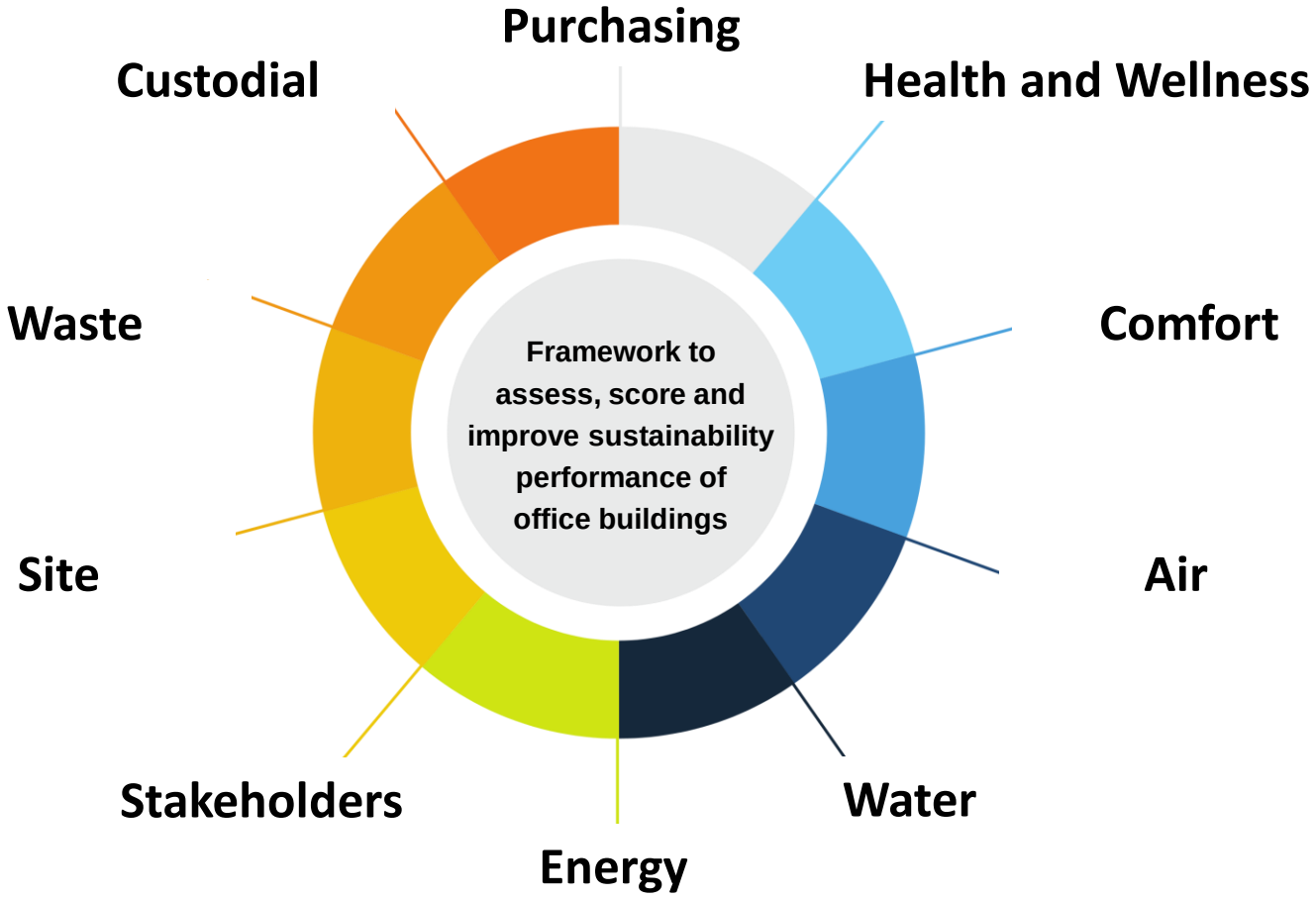
E-Waste Project in LATAM

ITU is assisting Costa Rica and Argentina in the implementation of two ITU standards (ITU-T L.1031 and ITU-T L.1032) as part of the UNIDO-GEF project on “Strengthening of National Initiatives and Enhancement of Regional Cooperation for the Environmentally Sound Management of Persistent Organic Pollutants (POPs) in waste electrical and electronic equipment (WEEE) in Latin American Countries.

Project on Implementation of Recommendation ITU-T L.1371

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.

The assessment scoring methodology allows owners and managers to undertake a self-assessment to evaluate their building's current status and track progress going forward.



Digital technologies to help the environment and curb climate change

Thank you!

Questions? Interested in learning more?
Let us know!

Email

tsbsg5@itu.int

Website

SG5: Environment, climate change and circular economy

ITU’s global portal on Environment and Smart Sustainable Cities

Smart sustainable cities

Cities’ actions to tackle COVID-19

Frontier technologies

Energy efficient ICTs

E-waste and circular economy

Climate Actions

Additional Slides

ITU-T SG5: Setting the environmental requirements for 5G

Taking into consideration the development of 5G systems, ITU-T SG5 is developing a series of technical reports and international standards that study the following environmental aspects of 5G:

- **Electromagnetic compatibility (EMC):**
  - Recommendation ITU-T K.116: "Electromagnetic compatibility requirements and test methods for radio telecommunication terminal equipment"
  - ITU-T K.Suppl.10: "Analysis of electromagnetic compatibility aspects and definition of requirements for 5G systems“
- **Electromagnetic fields (EMF):**
  - ITU-T K.Suppl.1: "Guide on electromagnetic fields and health"
  - ITU-T K.Suppl.4: "Electromagnetic field considerations SSCs"
  - ITU-T K.Suppl.9: "5G technology and human exposure to RF EMF"
  - ITU-T K.Suppl.14: "The impact of RF-EMF exposure limits stricter than the ICNIRP or IEEE guidelines on 4G and 5G mobile network deployment"
  - ITU-T K.Suppl.16: "Electromagnetic field compliance assessments for 5G wireless networks "
- **Energy feeding and efficiency**:
  - Recommendation ITU-T L.1210: "Sustainable power-feeding solutions for 5G networks"
  - Recommendation ITU-T L.1220: "Innovative energy storage technology for stationary use - Part 1: Overview of energy storage"
  - Recommendation ITU-T L.1221: "Innovative energy storage technology for stationary use - Part 2: Battery"
  - Recommendation ITU-T L.1222: "Innovative energy storage technology for stationary use - Part 3: Supercapacitor technology“
  - Recommendation ITU-T L.1331: “Assessment of mobile network energy efficiency”
  - Recommendation ITU-T L.1380: “Smart energy solution for telecom sites"
  - Recommendation ITU-T L.1381: “Smart energy solution for data centres"
  - Recommendation ITU-T L.1382: “Smart energy solution for telecommunication rooms"
  - ITU-T L.Suppl.36 to ITU-T L.1310: "Study on methods and metrics to evaluate energy efficiency for future 5G systems"
- **Resistibility:**
  - ITU-T K.Suppl.8: "Resistibility analysis of 5G systems"

ITU-T SG5 Regional Group for the Arab Region (ITU-T SG5RG-ARB)

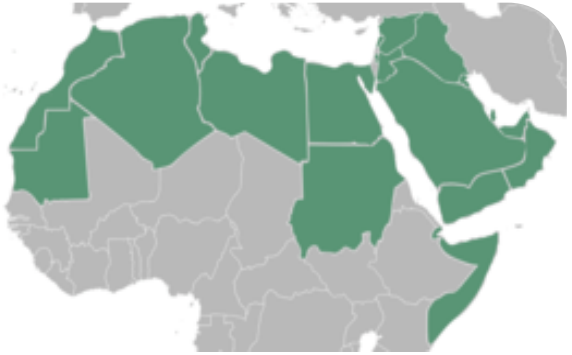
ITU-T SG5RG-ARB - Management Team

SG5RG-ARB Chairman:	**Eiman Farouk Mahmoud Osman** (National Telecommunication Corporation (NTC))
SG5RG-ARB Vice-chairmen:	**Salma AL Sulaiti** (Communications Regulatory Authority Qatar)
	Khaled Alsaleem (Communication & Information Technology Regulatory Authority (CITRA))
	Ahmed Rguigue (Autorité de Régulation)
	Nevine Tewfik (Ministry of Communications and Information Technology (MCIT))

Last Meeting:

18 December 2018

Kuwait city, Kuwait



ITU-T SG5 Regional Group for Latin America (ITU-T SG5RG-LATAM)

ITU-T SG5RG-LATAM - Management Team

SG5RG-LATAM Chairman:	**Miguel Felipe Anzola Espinosa** (Agencia Nacional del Espectro (ANE))
SG5RG-LATAM Vice-chairmen:	**Jorge Mateo** (Instituto Dominicano de las Telecomunicaciones (INDOTEL))
	Maria Cecilia Pérez Araujo (Ministerio de Modernización, Secretaría de Tecnologías de la Información y las Comunicaciones)

Last Meeting:

10 November 2020

Virtual via MyMeetings

ITU-T SG5 Regional Group for Africa (ITU-T SG5RG-AFR)

ITU-T SG5RG-AFR - Management Team

SG5RG-AFR Chairman:	**Helen Cynthia Nakiguli** (Uganda Communications Commission)
SG5RG-AFR Vice-chairmen:	**Jean Baptiste Yetondji Houeyetongnon** (Autorité de Regulation des Communications Electroniques et de la Poste)
	William Mnyippembe (Tanzania Communication Regulatory Authority (TCRA))
	Nevine Tewfik (Ministry of Communications and Information Technology (MCIT))

Next Meeting:

24 June 2021 (TBC)

Virtual

ITU-T SG5 Regional Group for Asia and the Pacific (ITU-T SG5RG-AP)

ITU-T SG5RG-AP - Management Team

SG5RG-AP Chairman:	**Shuguang Qi** (CAICT)
SG5RG-AP Vice-chairmen:	**Byung Chan Kim** (ETRI)
	Kazuhiro Takaya (NTT)

Next Meeting:

15-16 April 2021

Virtual

List of Approved Recommendations (2017-2020)

Work item	Subject / Title
K.20 (rev)	Resistibility of telecommunication equipment installed in a telecommunication centre to overvoltages and overcurrents
K.21 (rev)	Resistibility of telecommunication equipment installed in customer premises to overvoltages and overcurrents
K.35	Bonding configurations and earthing at remote electronic sites
K.39	Risk assessment of damages to telecommunication sites due to lightning discharges
K.40 (rev)	Protection against lightning electromagnetic pulses in telecommunication centres
K.44 (rev)	Resistibility tests for telecommunication equipment exposed to overvoltages and overcurrents - Basic Recommendation
K.45 (rev)	Resistibility of telecommunication equipment installed in the access and trunk networks to overvoltages and overcurrents
K.50 (rev)	Safe limits for operating voltages and currents in telecommunication systems powered over the network
K.52 (rev)	Guidance on complying with limits for human exposure to electromagnetic fields
K.61	Guidance on measurement and numerical prediction of electromagnetic fields for compliance with human exposure limits for telecommunication installations
K.64	Safe working practices for outside equipment installed in particular environments
K.66	Protection of customer premises from overvoltages
K.70	Mitigation techniques to limit human exposure to EMFs in the vicinity of radiocommunication stations

List of Approved Recommendations (2017-2020)

Work item	Subject / Title
K.73	Shielding and bonding for cables between buildings
K.77	Characteristics of metal oxide varistors for the protection of telecommunication installations
K.83	Monitoring of electromagnetic field levels
K.90	Evaluation techniques and working procedures for compliance with exposure limits of network operator personnel to power-frequency electromagnetic fields
K.91 (rev)	Guidance for assessment, evaluation and monitoring of human exposure to radio frequency electromagnetic fields
K.93	Immunity of home network devices to electromagnetic disturbance
K.99	Surge protective component application guide - Gas discharge tubes
K.100 (rev)	Measurement of radio frequency electromagnetic fields to determine compliance with human exposure limits when a base station is put into service
K.112	Lightning protection, earthing and bonding: Practical procedures for radio base stations
K.116	Electromagnetic compatibility requirements and test methods for radio telecommunication terminal equipment
K.117	Primary protector parameters for the surge protection of equipment Ethernet ports
K.118	Requirements for Lightning Protection of Fibre To The distribution point (FTTdp) Equipment
K.119	Conformance Assessment of Radio Base Stations Regarding Lightning Protection and Earthing

Work item	Subject / Title
K.120	Lightning Protection and Earthing of Miniature Base Station
K.121	Guidance on the Environmental Management for Compliance with Radio Frequency EMF Limits for Radiocommunication Base Stations
K.122	Exposure levels in the close proximity of the radiocommunication antennas
K.123	Electromagnetic compatibility requirements for electrical equipment in telecommunication facilities
K.124	Overview of particle radiation effects on telecommunications systems
K.125	Dangerous effects and protective measures against electromagnetic disturbances when internet data centre is co-sited with high-voltage substation
K.126	Surge protective component application guide - High frequency signal isolation transformers
K.127	Immunity requirements for telecommunication equipment in close proximity use of wireless devices
K.128	Surge protective component application guide - metal oxide varistor (MOV) components
K.129	Characteristics and ratings of silicon PN junction voltage clamping components used for the protection of telecommunications installations
K.130	Neutron irradiation test methods for telecommunications equipment
K.131	Design methodologies for telecommunication systems applying soft error measures
K.132	EMC requirements of electromagnetic disturbances from lighting equipment located in telecommunication facilities

List of Approved Recommendations (2017-2020)

Work item	Subject / Title
K.133	Electromagnetic (EM) environment of body worn equipment in the 2.4 GHz and 13.56MHz industrial, scientific and medical band
K.134	Protection of small-size telecommunication installations with poor earthing conditions
K.135	Technical parameters for residual current operated protective devices with automatic reclosing feature for telecom applications
K.136	Electromagnetic Compatibility requirements for radio telecommunication equipment
K.137	Electromagnetic compatibility requirements and measurement methods for wire-line telecommunication network equipment
K.138	Quality estimation methods and application guidelines for mitigation measures based on particle radiation tests
K.139	Reliability requirements for telecommunication systems affected by particle radiation
K.140	Surge protective component application guide - Fuses
K.141	Electromagnetic compatibility requirements for Information Perception Equipment
K.142	Lightning protection and earthing of video surveillance system
K.143	Guidance on safety relating to the use of surge protective devices and surge protective components in telecommunication terminal equipment
K.144	Surge protective component application guide - Self-restoring thermally activated overcurrent protectors
K.145	Assessment and management of compliance with RF EMF exposure limits for workers at radiocommunication sites and facilities

Work item	Subject / Title
K.146	Management of interferences on telecommunication transmissions on copper other than speech
K.147	Ethernet port resistibility testing for overvoltages and overcurrents
L.1000	Universal power adapter and charger solution for mobile terminals and other hand-held ICT devices
L.1006	Test suites for assessment of the External universal power adapter solutions for stationary information and communication technology devices
L.1007	Test suites for assessment of the External universal power adapter solutions for portable information and communication technology devices
L.1015	Criteria for evaluation of the environmental impact of mobile phones
L.1020	Circular Economy: Guide for Operators and Suppliers on approaches to migrate towards circular ICT goods and networks
L.1021	Extended producer responsibility - Guidelines for sustainable e-waste management
L.1022	Circular Economy: Definitions and concepts for material efficiency for Information and Communication Technology
L.1030	E-waste management framework for countries
L.1031	Guideline on Implementing the E-waste Reduction Target of the Connect2020 Agenda
L.1032	Guidelines and certification schemes for e-waste recyclers
L.1205	Interfacing of renewable energy or distributed power sources to up to 400 VDC power feeding systems

List of Approved Recommendations (2017-2020)

Work item	Subject / Title
L.1206	Impact on information and communication technology equipment architecture of multiple AC, -48 VDC or up to 400 VDC power inputs
L.1207	Progressive migration of a telecommunication/information and communication technology site to 400 VDC sources and distribution
L.1210	Sustainable power-feeding solutions for 5G networks
L.1220	Innovative energy storage technology for stationary use - Part 1: Overview of energy storage
L.1221	Innovative energy storage technology for stationary use - Part 2: Battery
L.1222	Innovative energy storage technology for stationary use - Part 3: Supercapacitor technology
L.1303	Functional requirements and framework of green data centre energy-saving management system
L.1305	Data centre infrastructure management system based on big data and artificial intelligence technology
L.1310	Energy efficiency metrics and measurement methods for telecommunication equipment
L.1315	Standardization terms and trends in energy efficiency
L.1316	Energy efficiency framework
L.1325	Green ICT solutions for telecom network facilities
L.1331	Assessment of mobile network energy efficiency
L.1332	Total network infrastructure energy efficiency metrics
L.1351	Base station site energy parameter measurement methodology
L.1360	Energy control of SDN architecture
L.1361	Measurement method for energy efficiency of Network Function Virtualization
L.1362	Interface for power management in network function virtualization environments – Green abstraction layer version 2

Work item	Subject / Title
L.1370	Sustainable and intelligent building services
L.1371	A methodology for assessing and scoring the sustainability performance of office buildings
L.1380	Smart energy solution for telecom sites
L.1381	Smart energy solution for data centre
L.1382	Smart energy solution for telecommunication rooms
L.1450	Methodologies for the assessment of the environmental impact of the information and communication technology sector
L.1451	Methodology for assessing the aggregated positive sector-level impacts of ICT in other sectors
L.1460	Connect 2020 greenhouse gases emissions – Guidelines
L.1470	GHG emissions trajectories for the ICT sector compatible with the UNFCCC Paris Agreement
L.1504	ICT and adaptation of agriculture to the effects of climate change
L.1505	Information and communication technology and adaptation of the fisheries sector to the effects of climate change
L.1506	Framework of climate change risk assessment for telecommunication and electrical facilities
L.1507	Use of ICT sites to support environmental sensing

List of Agreed Supplements and other informative texts (2017-2020)

Work item	Subject / Title
K.Suppl.8	Resistibility analysis of 5G systems
K.Suppl.9	5G technology and human exposure to RF EMF
K.Suppl.10	Analysis of EMC aspects and definition of requirements for 5G mobile systems
K.Suppl.13	Radiofrequency electromagnetic field (RF-EMF) exposure levels from mobile and portable devices during different conditions of use
K.Sup.14 to ITU-T K-series Recommendations	The impact of RF-EMF exposure limits stricter than the ICNIRP or IEEE guidelines on 4G and 5G mobile network deployment
K.Suppl.14	The impact of RF-EMF exposure limits stricter than the ICNIRP or IEEE guidelines on 4G and 5G mobile network deployment
K.Supp.16 to ITU-T K.series	Electromagnetic field compliance assessments for 5G wireless networks
K.Supp.16 to ITU-T K.series	Electromagnetic field (EMF) compliance assessments for 5G wireless networks
K.Sup.19 to ITU-T K-series Recommendations	EMF strength inside subway train

Work item	Subject / Title
K.Suppl.20	RF Exposure evaluation around base station installed underground
K.Suppl.7 to ITU-T K.44	AC supply configurations
K.Sup.17 to ITU-T K.44	Test conditions and methods information
K.Sup.18 to ITU-T K.44	Causes of telecommunication system overvoltage and overcurrent conditions and their expected levels
K.Suppl.12 to ITU-T K.51	Narrow pin spacing in connectors potential hazards
K.Suppl.1 to ITU-T K.91	ITU-T K.91 - Guide on electromagnetic fields and health
K.Suppl.4 to ITU-T K.91	Electromagnetic field considerations in smart sustainable cities
K.Suppl.15 to ITU-T K.20, K.21, K.44	Internal DC powering interface surge testing factors
K.Suppl.11 to ITU-T K.131	Soft error measures for FPGA
K.Suppl.11 to ITU-T K.131	Soft error measures for field programmable gate arrays
L.Suppl.36 to ITU-T L.1310	Study on methods and metrics to evaluate energy efficiency for future 5G systems
L.Suppl.37 to ITU-T L.1470	Guidance to operators of mobile networks, fixed networks and data-centres on setting 1.5°C aligned targets compliant with Recommendation ITU-T L.1470
LSTR.5GEE	Study on methods and metrics to evaluate energy efficiency for future 5G systems