Using standardized methodologies to explore impacts of future systems

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Integrating sustainability into 6G by (technology) design

Sustainable 6G

TRIPLE BOTTOM LINE SUSTAINABILITY

Environmental

Social

Macroeconomic

6G for sustainability

Exploring the sustainability landscape

Sustainability requirements, actors and developments

Deriving technology Implications and requirements

Studies to derive associated technology requirements

Develop methodologies Monitor progress

Follow the how the project activities enable a beneficial outcome

Work with the ecosystem for best effect

Work together to make sure to maximize benefits and suppress adverse effects

Three orders of effects

First order effects –

the direct life cycle impact of technology

(environmental footprint)

Example:

Manufacturing, operation and disposal of equipment needed for a virtual meeting

Sustainable 6G

Second order effects –

the impact of using technology

(avoided or added emissions)

Example:

Avoiding transports due to virtual meeting participation

Higher order effects –

the side effects of using technology

(rebound and societal change)

Example:

Making an extra trip to the shop due to not going to the office or an extra vacation trip due to saved money from not commuting

6G for sustainability

Standardized methodologies – do we need them?

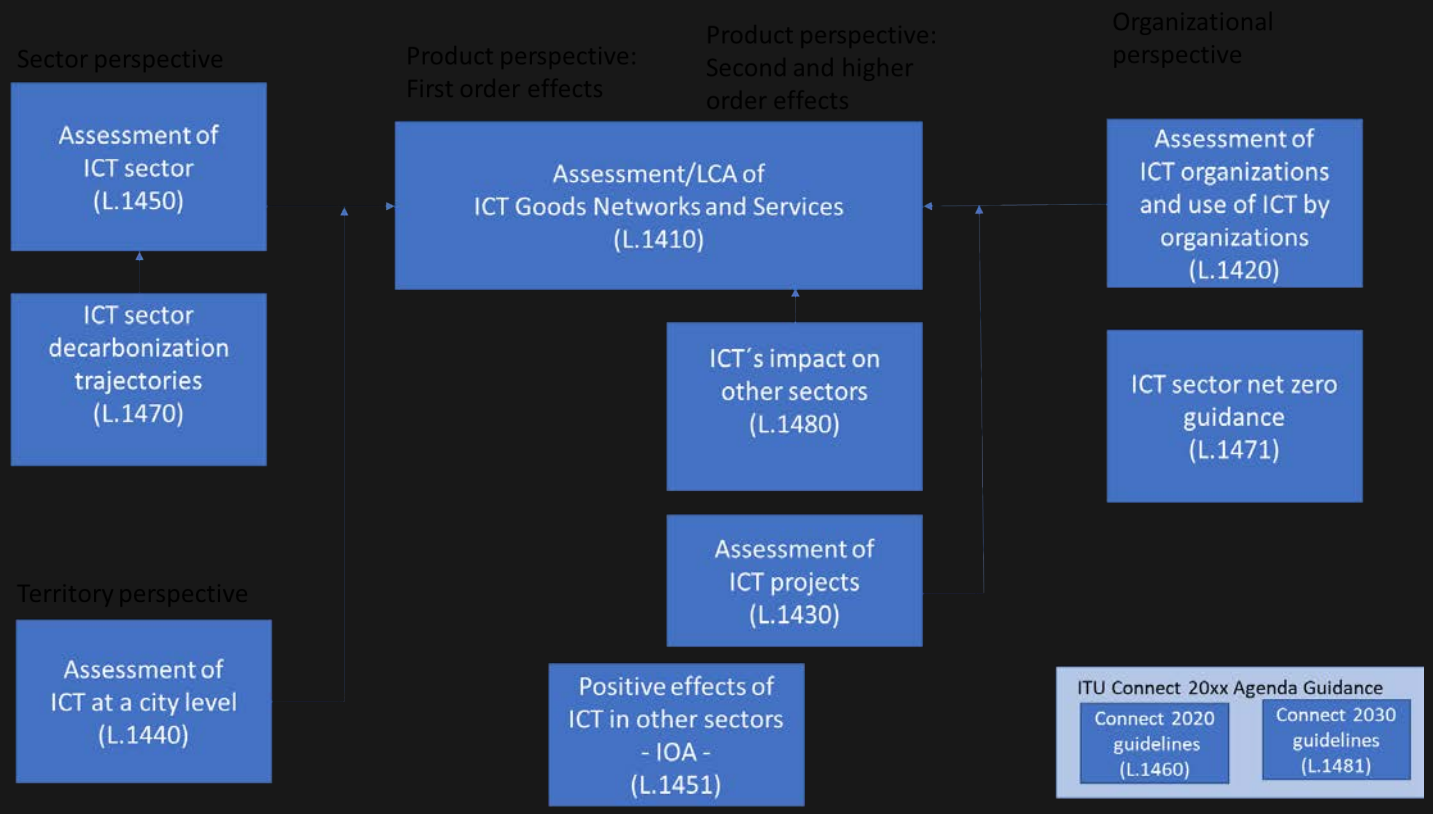
Transparency and credibility

Making the right choices

.Bridging communities and learning

Increasing requirements on sustainability communication

Standards mainly aimed to assess existing systems

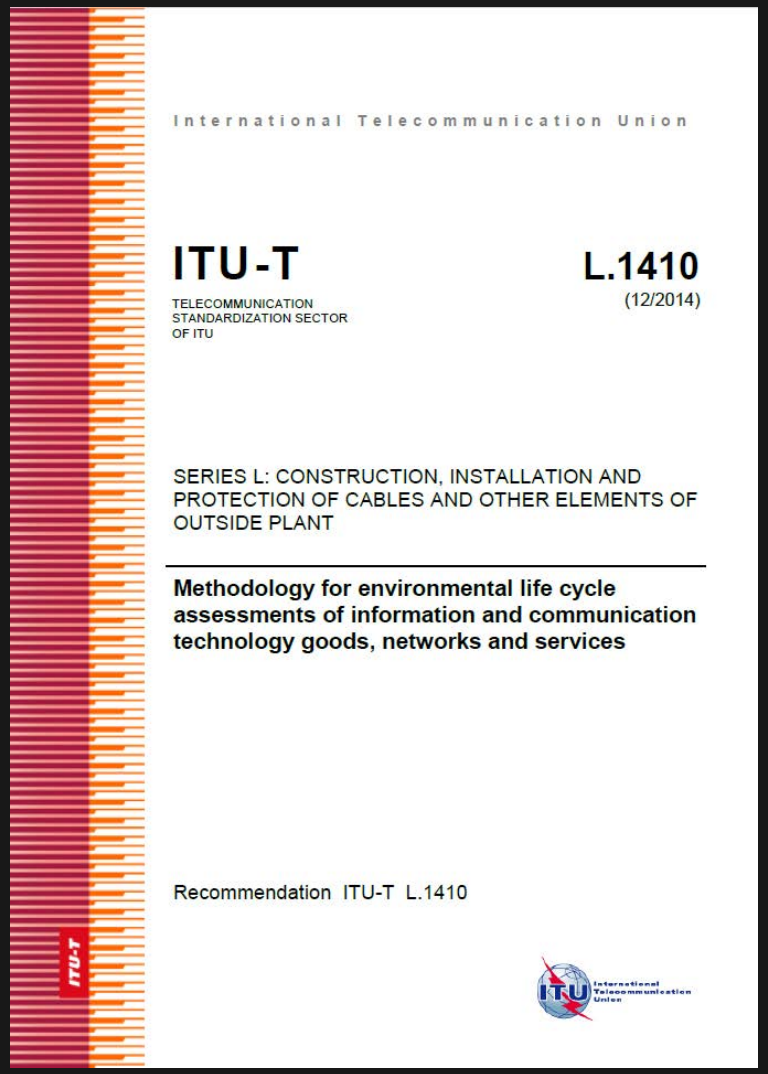


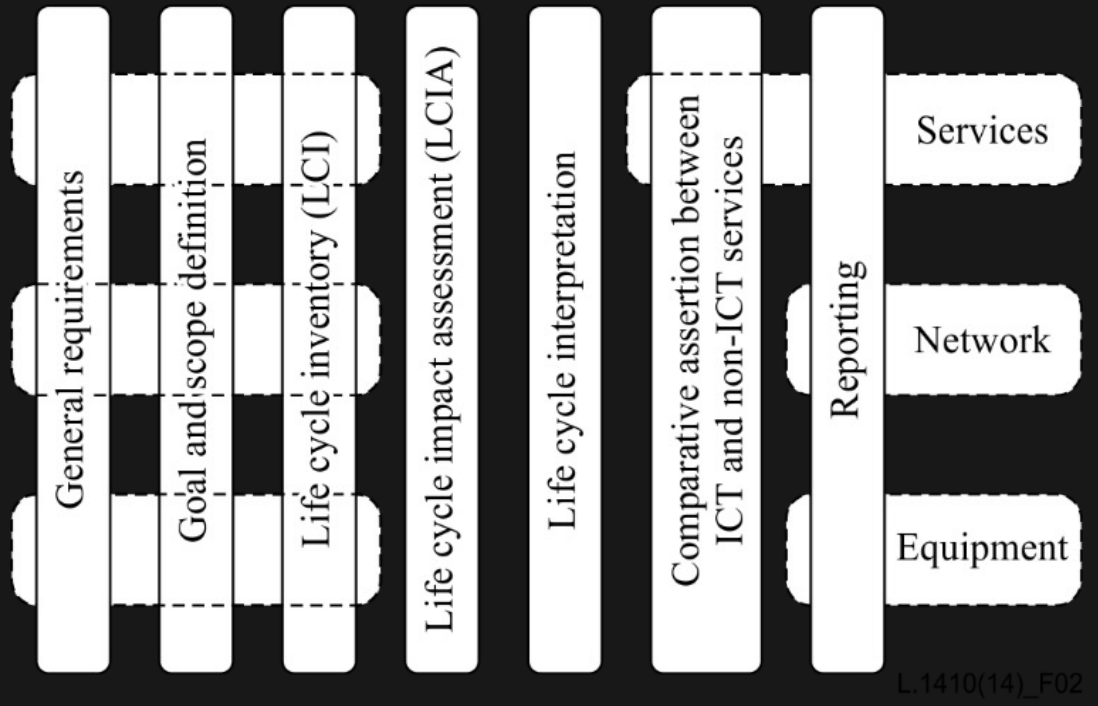
ITU L.1400-series overview

What are the additional needs for future systems/ technologies?

Assessing Sustainable 6G

L.1410: footprints and enabling effects



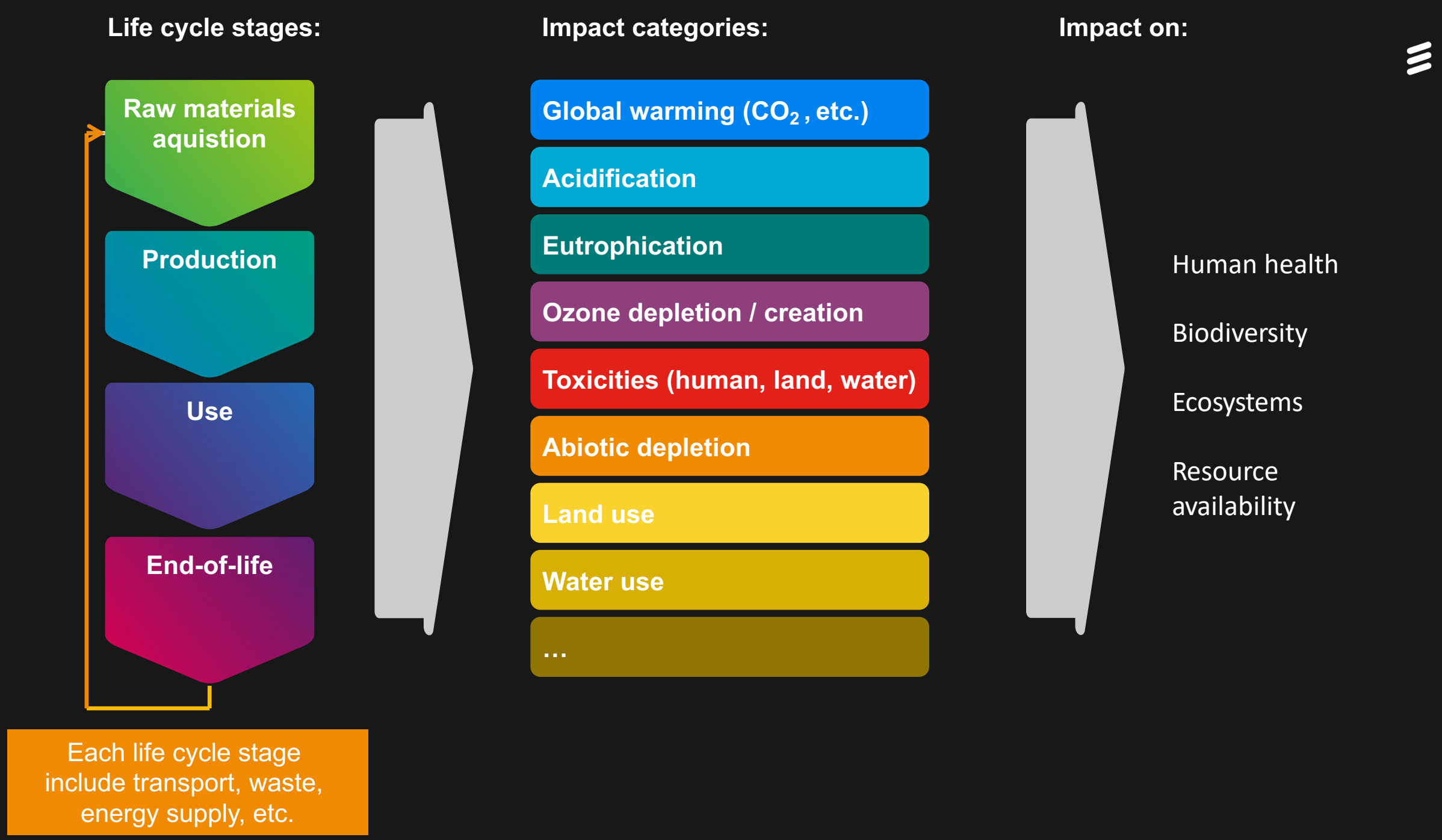


Part I:

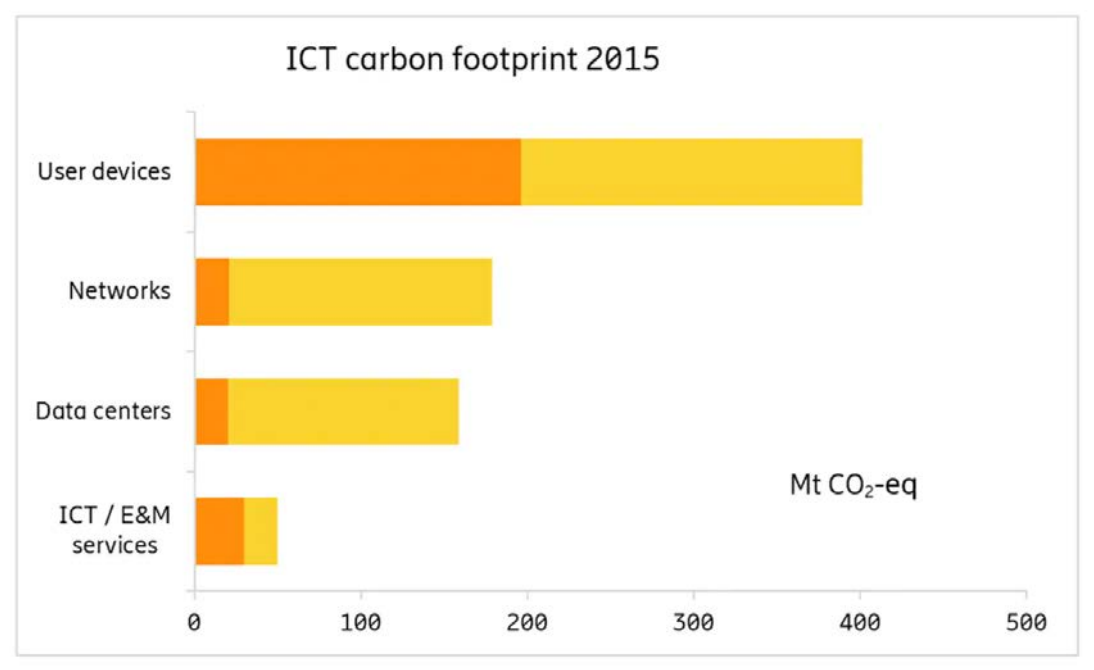
ICT life cycle assessment: framework and guidance for assessing goods, networks and services.

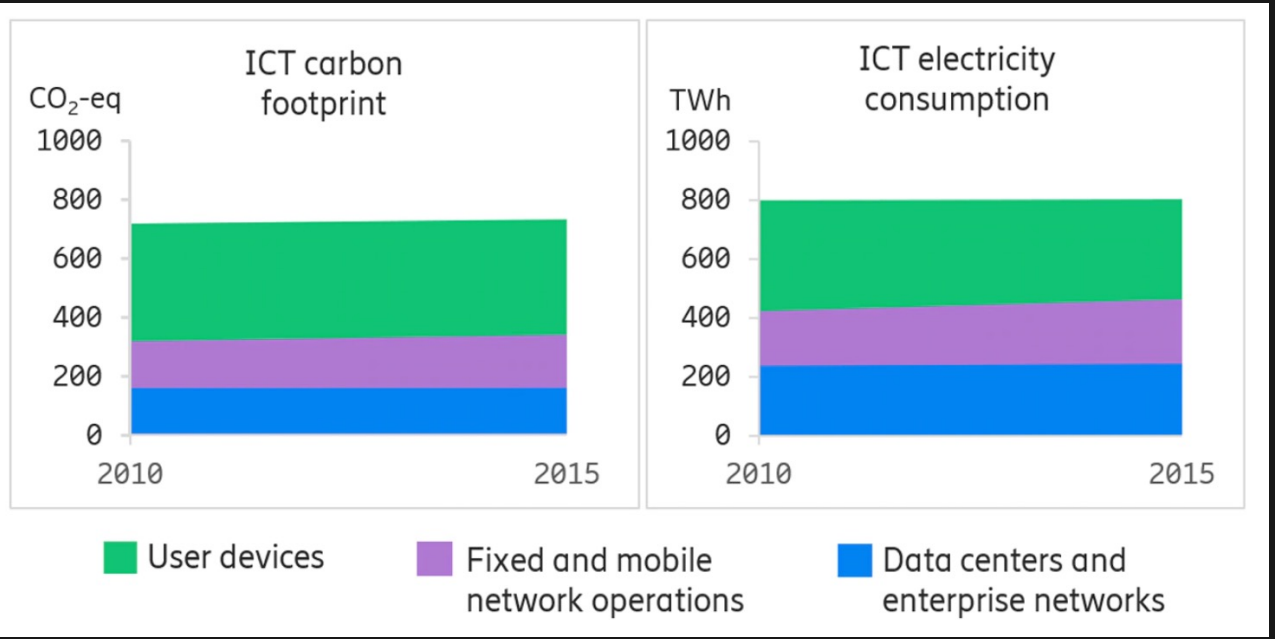
Part II:

Comparative analysis between an ICT product system and a reference product system: framework and guidance.


Life cycle stages:
Raw materials aquistion
Production
Use
End-of-life
Each life cycle stage include transport, waste, energy supply, etc.
Impact categories:
Global warming (CO_2, etc.)
Acidification
Eutrophication
Ozone depletion / creation
Toxicities (human, land, water)
Abiotic depletion
Land use
Water use
...
Impact on:
Human health
Biodiversity
Ecosystems
Resource availability

Distribution of ICT carbon footprint (traditional)





~80% of the ICT sector footprint is due to the use of electricity

Assessment challenges during technology development for Sustainable 6G

Impacts scale with use of materials, energy and fuels –
materials more complex and becomes more prominent

Too limited knowledge about the system

- Qualitative methods
- Focus on critical elements
- Scenarios (close collaboration with system architects)
  - Estimating from delta towards current systems
  - Estimating from performance requirements
  - Backcasting starting from sustainability impact restrictions

- Iterative approaches

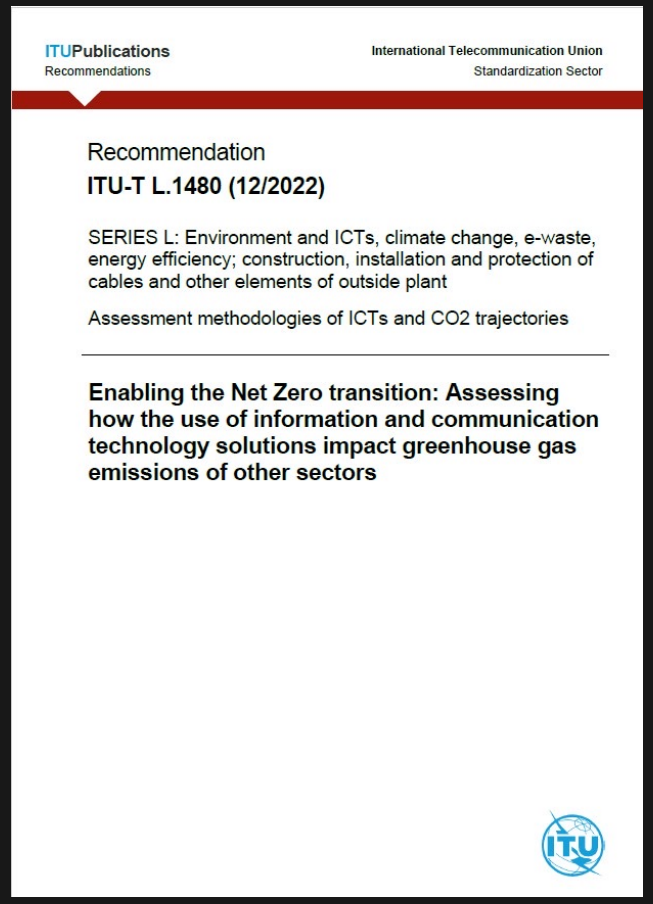
Not only the system changes – the electricity mix is likely to change

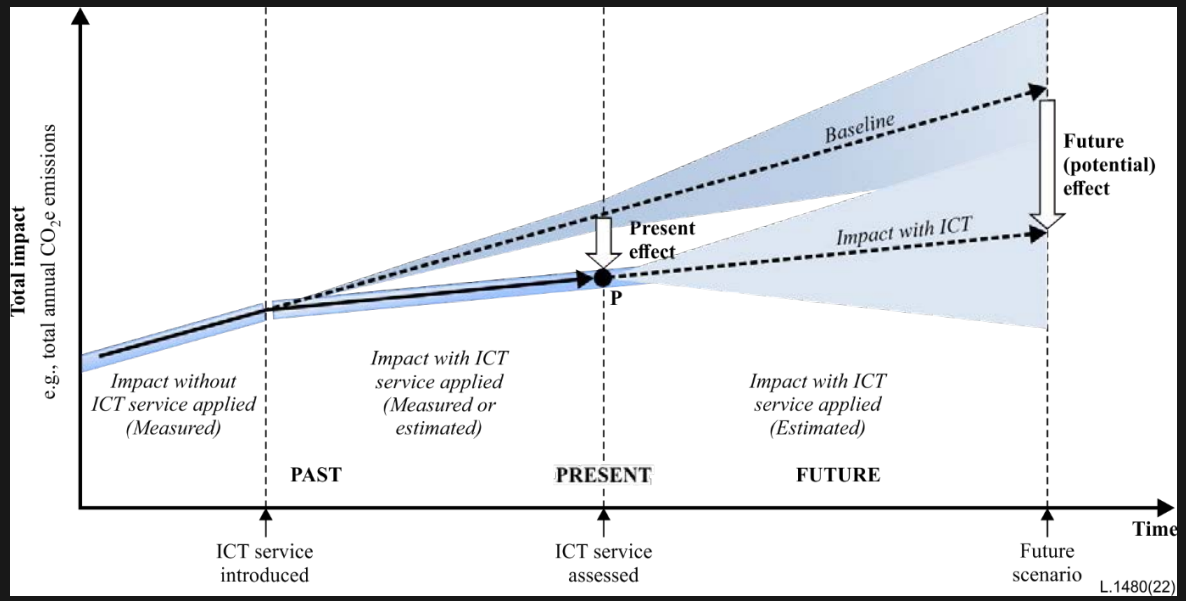
Simulators would be possible in principle

Further guidance needed on when and how to model future systemsc

Standards for 6G for sustainability

L.1480: assessing impacts from using ICT – a hypothetical approach





Assessment of the second order effect of one or several ICT solution(s)

- specific implementation
- generic implementation at different scales

by a contributing organization

…while considering also higher order effects.

Assessment challenges during technology development for 6G for Sustainability

Too many unknowns both for the system itself and for addressed sector – L.1480 mocelling not possible to apply at this stage

Identifying different types of impacts and contextual factors a first step

All society impacts the outcome – not only ICT and the energy system

Simulators might be used in principle –
but very complex to mirror the overall society

Look into other disciplines: Prospective LCA, Future studies,
Actor-based modelling

Social aspects – the consequence tree approach may be helpful

Further guidance needed on when and how to model future systemsc

Key Value Indicators – E-health for all (example)

Need to focus on indicators that are measurable during technology design

SDG 3.8 Achieve universal health coverage
SDG 5.6 Universal access to reproductive health and rights
SDG 3C Increase health financing and support health workforce in developing countries

Optimization for different user categories leads to different system requirements

- Basic healthcare for all
- 2030+ state-of-the-art health-care for remote areas
- Advanced healthcare during emergencies

Coverage of IoT

Coverage of video connections

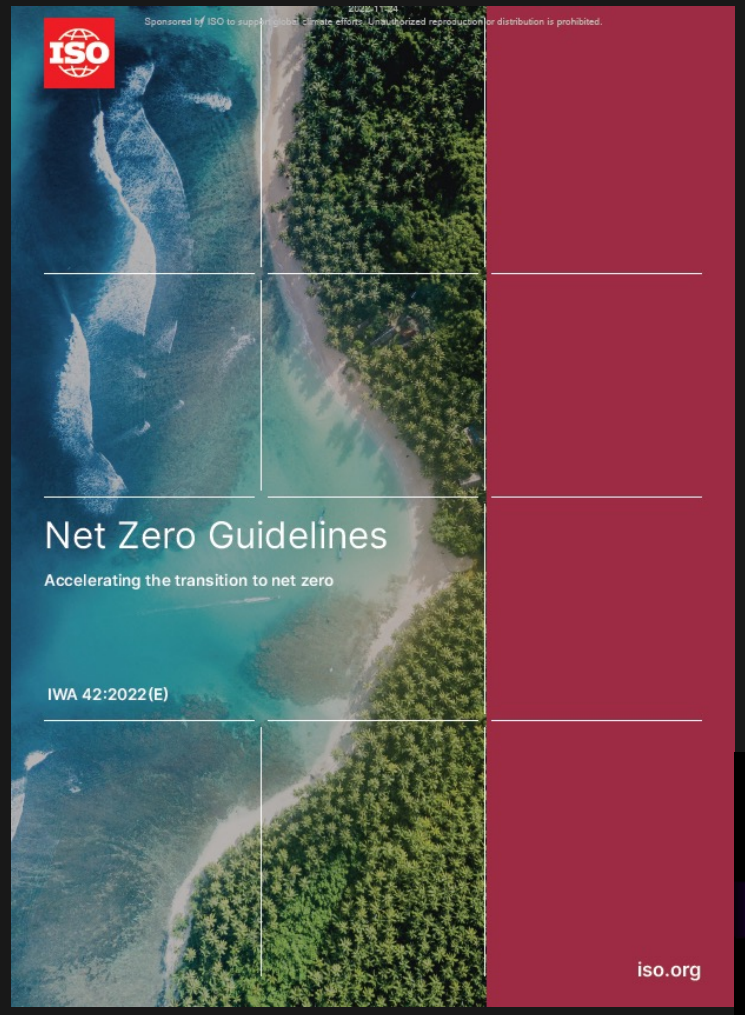
Coverage of xR

Cost aspects

Data integrity

System resilience

The Net Zero concept substantially strengthened
ISO Net Zero Guidelines & HLEG report



our 2050 world

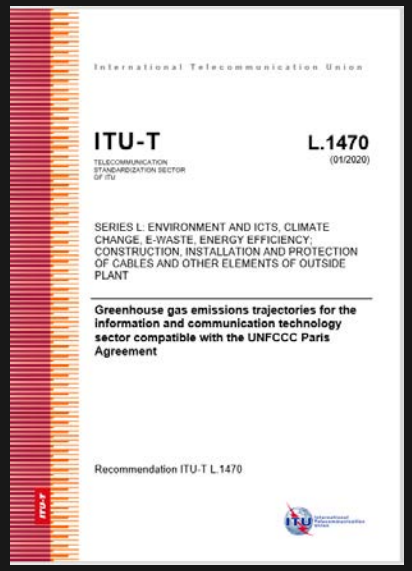
A collaboration to accelerate the transition to net zero using standards and enable the planet to halve emissions by 2030 and achieve net zero by 2050 at the latest.

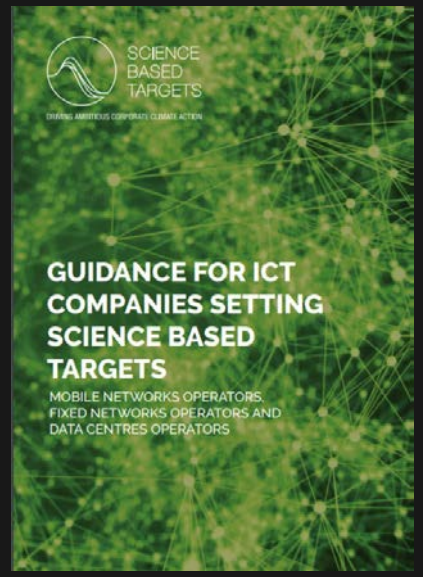
Building on:

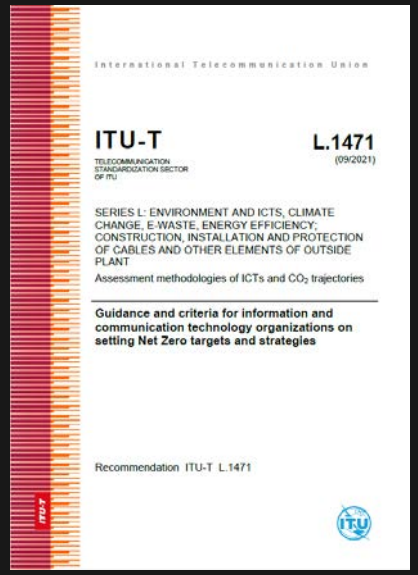
SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

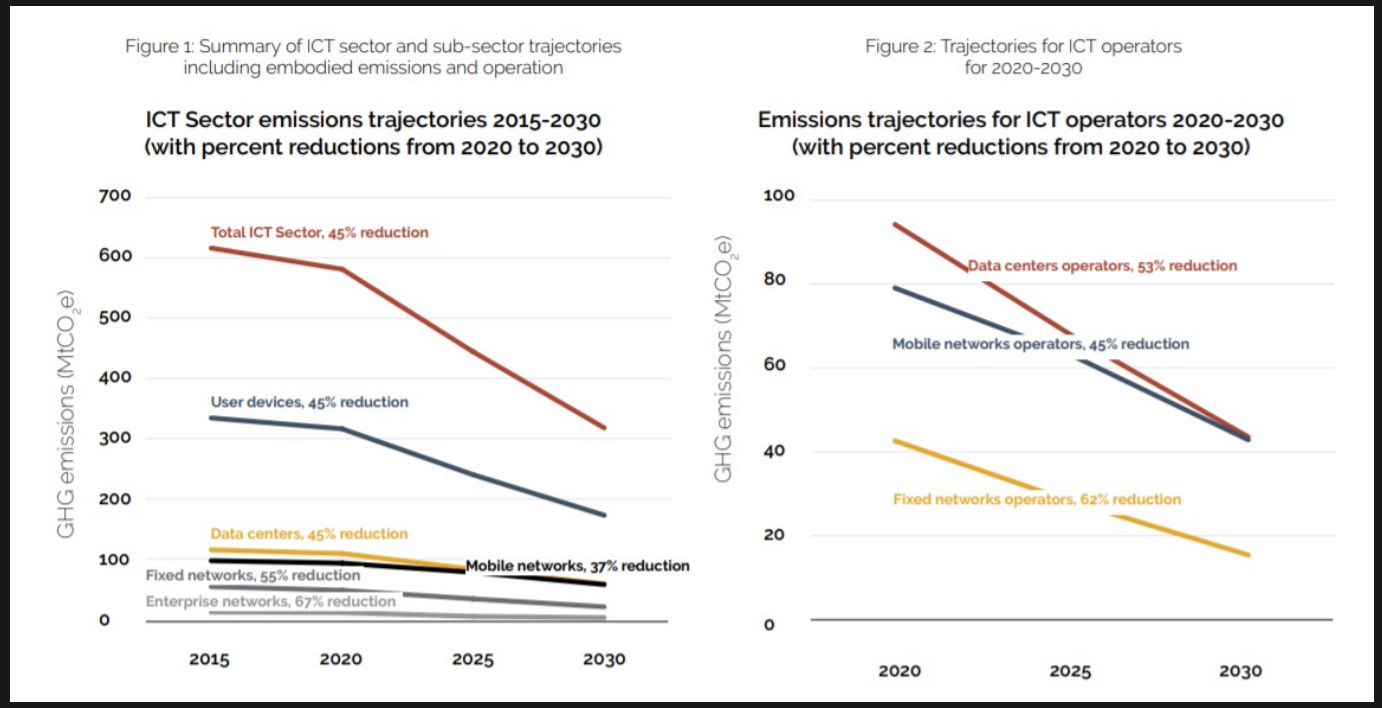
RACE TO ZERO

1.5C aligned trajectories for the ICT sector towards Net Zero









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