



SUSTAIN-6G

A Telco Perspective on Sustainable 6G Public Networks for a
Sustainable Consumer Market

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Context and motivation

									
Net Zero	2040	2040	2040	2041	2040	2035	Decision in progress	2040	2040
2030 Target	Reduce scope 1-3 by 55%	Net zero emissions scope 1 & 2	Zero waste	Net zero emissions scope 1 & 2 by 2031	• Net zero emissions scope 1 & 2 • -42% scope 3	2025 climate neutral	Net zero emissions scope 1 & 2	• Net zero emissions scope 1 & 2 • Zero waste	-45% reduction all scopes vs. 2020
Renewable Energy	100%	100%	100%	100%	72% 100% by 2025	100%	>90%	100%	75% by 2025
Circular Economy	• 100% by 2030 • Sustainable packaging	Reuse, recover or recycle 100% of network waste	Eco-design, recycle, reuse 100% by 2025	Partnership with Cisco	✓	Swisscom Buyback, Mobile Aid, & Swisscom Recycling	• Refurbished boxes • Recycled plastics used	Zero waste by 2030	• Refurbished equipment • Eco-design approach
SBTi Net-Zero Target	✓ 2024	✓ 2023	✓ 2022	Near-Term targets set (2017), committed to net-zero targets (2019)	Only Near-Term targets set 2022	✓ 2024	Only Near-Term targets set 2020	✓ 2023	Near-Term targets set (2021), committed to net-zero targets (2019)
CDP A	✓	✓	✓	✓	✓	✓	✗	✗	✗
Nature Projects	Reforestation & protection from deforestation	• Partnership with WWF • High quality Carbon offsets	High quality Carbon offsets (nature-based projects)	✗	Planting	• High quality Carbon offsets • Projects	✗	Industrial and biological removal programs	Orange Nature

Telecom operator's commitments to sustainability, Capgemini Invent, Analysis June 2024

- ICT ≈ 4% of global CO2 and growing ~6% per year
 - Networks/infrastructure ≈ 25% of ICT emissions
- European MNOs, like most of the major industry players, have **committed on Net Zero* Green House Gas (GHG)** targets for the 2040-time horizon where 6G will have been deployed.
- The **economic viability** of the business should also be kept, bringing sustainable value to the society while accommodating the **mobile traffic growth** at acceptable **financial costs** and favorable economic conditions for **all the stakeholders**.

Consumer (B2C) market will be the **main economic driving market sector for 6G** (as it has been for the previous generations) → **Need for an MNO perspective on consumer market and public mobile networks**

* Net Zero includes Scope 3; Carbon Neutrality often only Scopes 1–2

Key Challenges

- Current sustainability objectives of the MNOs go well beyond CO2 reduction: **reduce energy consumption, digital inclusion, sustainable business...** → **Simultaneously !!!**
 - MNOs, like other actors, face **conflicting** sustainability objectives across **design, deploy, run, end-of-life**, e.g.
 - **Reduce GHG** vs **maintain business viability and performance differentiation** (current volume-growth models often conflict with env. sustainability goals)
 - **Extend equipment lifetime** vs **competitive renewal cycles/aggressive rollout**
 - **Digital inclusion via NTN** vs **high environmental impacts (GHG, space waste)**
 - Data gap: limited traceability and reliable **sustainability data** across the value chain
 - **Reporting** and alignment needs: CSRD, EU Code of Conduct for telecom sustainability, SBTi
- ➔ Need to **reconcile** environmental, societal and economic goals across the **lifecycle** and the **value chain** (MNOs, suppliers, policymakers, end users...) through efficient and transparent **reporting/use of data**.



Environmental sustainability

Typical Key Values :

- Reduction of the Green House Gas (GHG) emissions of the MNO networks & infrastructures (scopes 1,2 & 3).
- Limiting energy consumption.
- Preservation of biodiversity (protection of species, land use, ...).
- Preservation of natural resources (i.e. limiting the use of mines/metals, water, land, ...).
- Minimizing e-waste.
- Reduction of pollution (water, land, air, space, ...).
- ...



Economical sustainability

Typical Key Values :

- Sustainable economic viability of the telecommunications sector, including all the stakeholders (i.e. creating sustainable economic value)
- Revenues
- Employment/job creation
- Investment capacity
- Affordability of the ICT solutions.
- Reducing OPEX/CAPEX.
- ...



Social sustainability

Typical Key Values :

- Digital inclusion
- Trust
- Confidentiality
- Resilience
- Privacy
- Dignity
- Transparency
- Sustainable employment capacity of the ICT sector
- Respect of human rights across the entire value chain (e.g. child labor, working ethics/conditions during extraction/mining)
- ...

Sustainable 6G Public Networks → Sustainable 6G
Sustainable Consumer Market → 6G for sustainability

Mobile Network Operator (MNO) Perspective – a transversal use case (starting point)

As a pragmatic approach the indicators/metrics can be identified in a step-by-step approach, e.g. starting from GHG emissions, business viability, and employment capacity.



Environmental sustainability

Reduction of the Green House Gas (GHG) emissions of the MNO networks & infrastructures (scopes 1,2 & 3), with identified target values for different milestones.

- Identified major environmental Key Value (KV) is reduction of GHG emissions which is associated with the **UN SDG #13 Climate Action**.
- Possible levers/solutions are circular economy principles, infrastructure mutualization, reduction of energy consumption, lifetime extension of equipment, decoupling of hardware-software, energy efficiency etc.



Economical sustainability

Sustainable economic viability of the telecommunications sector, including all the stakeholders.

- Identified major economical KV is the economical/business viability of the telecommunications sector which is associated with the **UN SDG #8 Decent Work and Economic Growth & UN SDG #9 Industry, Innovation and Infrastructure**.
- Possible levers/solutions are innovative business models, marketing strategies, affordability, cost reduction, new revenue sources etc.



Social sustainability

Sustainable employment for the society.

- Identified major societal KV is the sustainable employment capacity of the telecommunications sector which is associated with the **UN SDG #8 Decent Work and Economic Growth & UN SDG #9 Industry, Innovation and Infrastructure**.
- Possible levers are similar to those of the economical sustainability pillar.

Sustainability Impact Analysis

	Environmental	Economic	Societal
1st order effects	• Climate change through GHG emissions. • Energy consumption. • Contribution to non-renewable natural resource depletion through consumption (rare metals, materials, water, land...). • Contribution to pollution (water, land, air, space...). • Preservation on biodiversity and species (land use...).	• ICT solution CAPEX, OPEX, Total Cost of Ownership (TCO). • Job opportunities throughout the whole value chain of the ICT solution.	• Work ethics throughout the whole value chain of the ICT solution (e.g. ethical sourcing of materials). • Job opportunities throughout the whole value chain of the ICT solution. • Value-based design to embed societal values into technology
2nd order effects	• Reduction of GHG emissions thanks to the use of the ICT solution (e.g. increase in home office work and decrease in home-work commute).	• Mobile subscription charges (affordability). • Job opportunities due to the use of the ICT solution.	• Feeling of security thanks to the trusted and resilient ICT solution (driven by values-based design). • Possible increase in leisure time due to increase in efficiency and automation in daily tasks (attention to the rebound effect). • Changes in the nature of social interaction and human relationships, and related risks (e.g. screen addiction; social isolation)

Ecosystem, technical assumptions and next steps

Stakeholder ecosystem (ongoing work)

1. Provisioning actors: MNOs, equipment suppliers, integrators, software/IT platforms, cloud/DC, testing and measurement, industry associations, research
2. End users: consumers; public sector; IoT/robotics/cloud sectors
3. Enablers: policymakers, standardization bodies, funding agencies, IP offices, OSS communities, marketplaces

Technical baseline

- IMT-2030 framework (capabilities, requirements, spectrum)
- Nationwide deployments; macro base stations with varied antenna configurations
- Environments: dense urban to rural; typical MNO subscription volumes

Critical need: traceable, accessible **sustainability data** across the **value chain**

Next steps

- Consolidation of **needs, Key Values (KVs), Key Value Indicators (KVIs) and requirements**
- Identification of the evaluation/assessment **methodology** framework

Thank you

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