

Electricity use and GHG emissions from the ICT sector

and a first high-level estimate of the
land and water use of the ICT sector

Presentation at SweWIN, 14 April 2026

Nina Lövehagen, Ericsson Research



Reasons for investigating

Forbes.com
U.S. EUROPE ASIA HOME PAGE FOR THE WORLD'S BUSINESS
HOME BUSINESS TECH MARKETS ENTREPRENEURS LEADERSHIP
Video Blogs E-mail Newsletters Org Chart Wiki People Tracker Portfolio
E-mail | Print | Comments | Request Reprints | E-Mail Newsletters | My Yahoo! | RSS

Dig more coal -- the PCs are coming

Peter W. Huber and Mark P. Mills, 05.31.99

Southern California Edison, meet Amazon.com. Somewhere in America, a lump of coal is burned every time a book is ordered on-line.

The current fuel-economy rating: about a pound of coal to create, package, store and move 2 megabytes of data. The digital age, it turns out, is very energy-intensive. The Internet may someday save us bricks, mortar and catalog paper, but it is burning up an awful lot of fossil fuel in the process.

CLIMATE CRISIS: THE UNSUSTAINABLE USE OF ONLINE VIDEO

The practical case for digital sobriety

Report led by Maxime Efovi-Hess for the think tank *The Shift Project*

THE SHIFT PROJECT
THE CARBON TRANSITION THINK TANK

The Shift Project - July 2019

Environment ► Climate change Wildlife Energy Pollution

Guardian Environment Network

This article is more than 1 year old

'Tsunami of data' could consume one fifth of global electricity by 2025

nature
Explore content ▾ About the journal ▾ Publish with us ▾ Subscribe

nature > news > article

NEWS | 10 April 2025

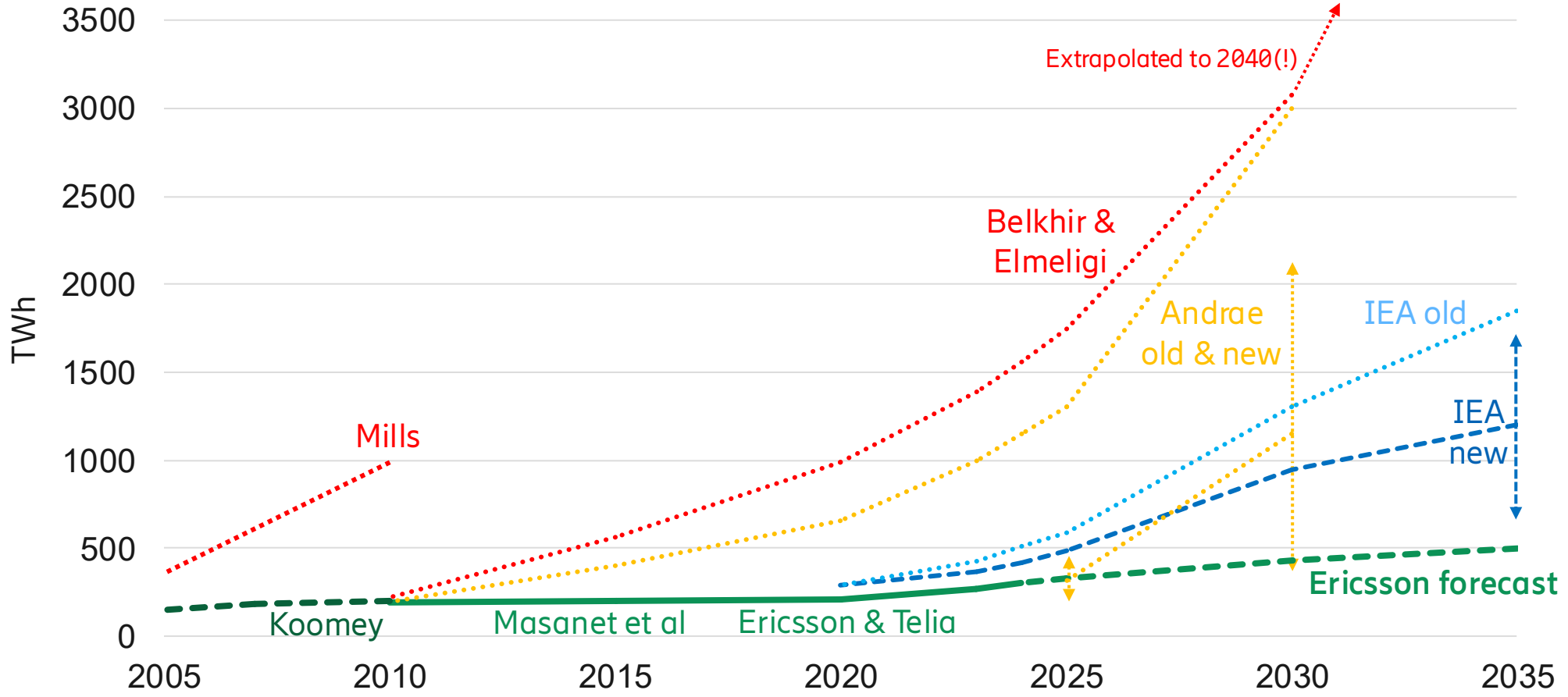
Data centres will use twice as much energy by 2030 – driven by AI

These facilities accounted for roughly 1.5% of global electricity consumption in 2024.

By Sophia Chen

✉ 🐦 📘 🌐 📧 📱

Correct baseline is important



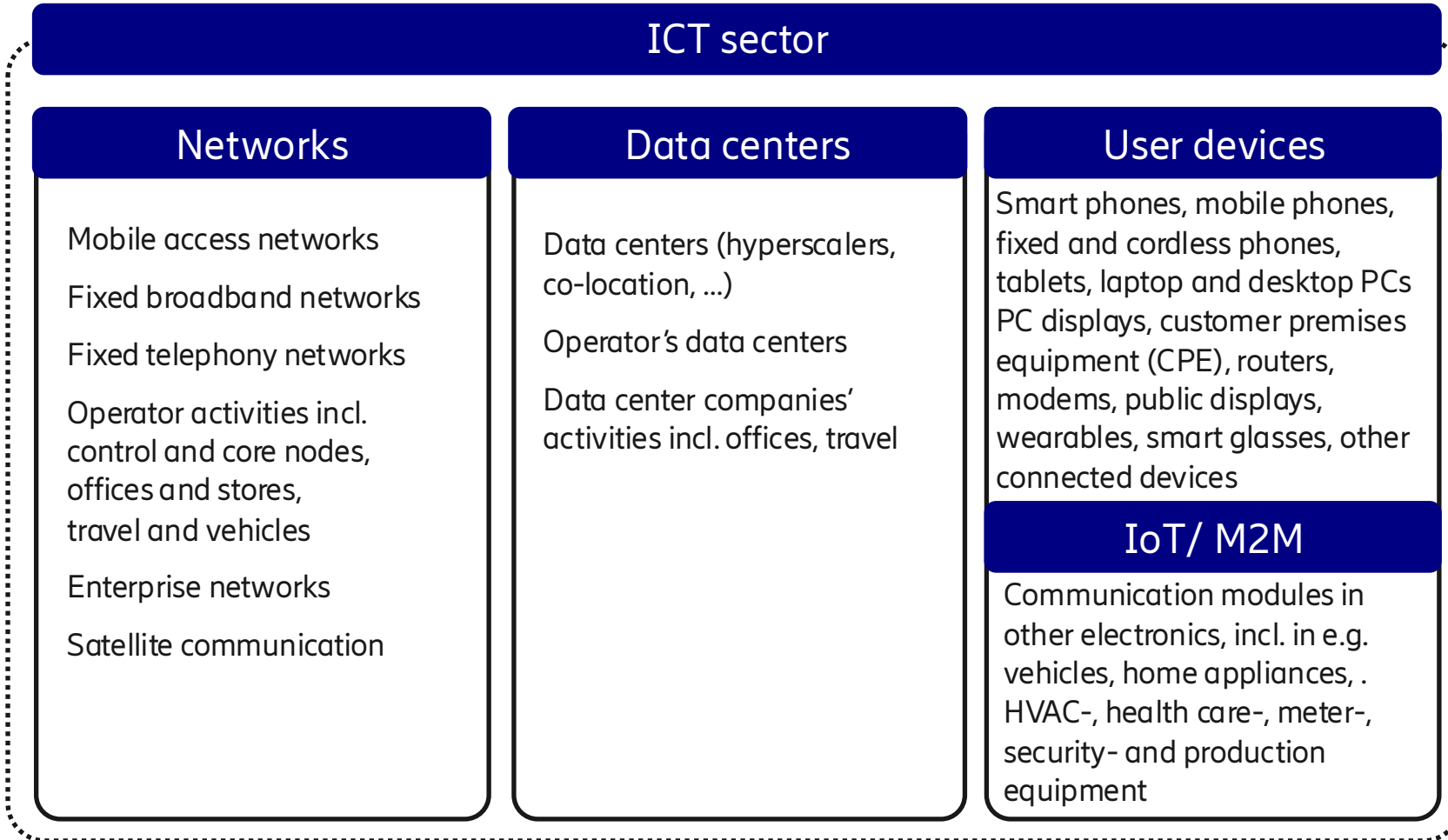
Global data centers' electricity consumption studies and forecasts

Outline

- ICT sector electricity use and carbon footprint 2024
- Development since 2007
- Electricity use and GHG emissions in 2035
- Other environmental impacts



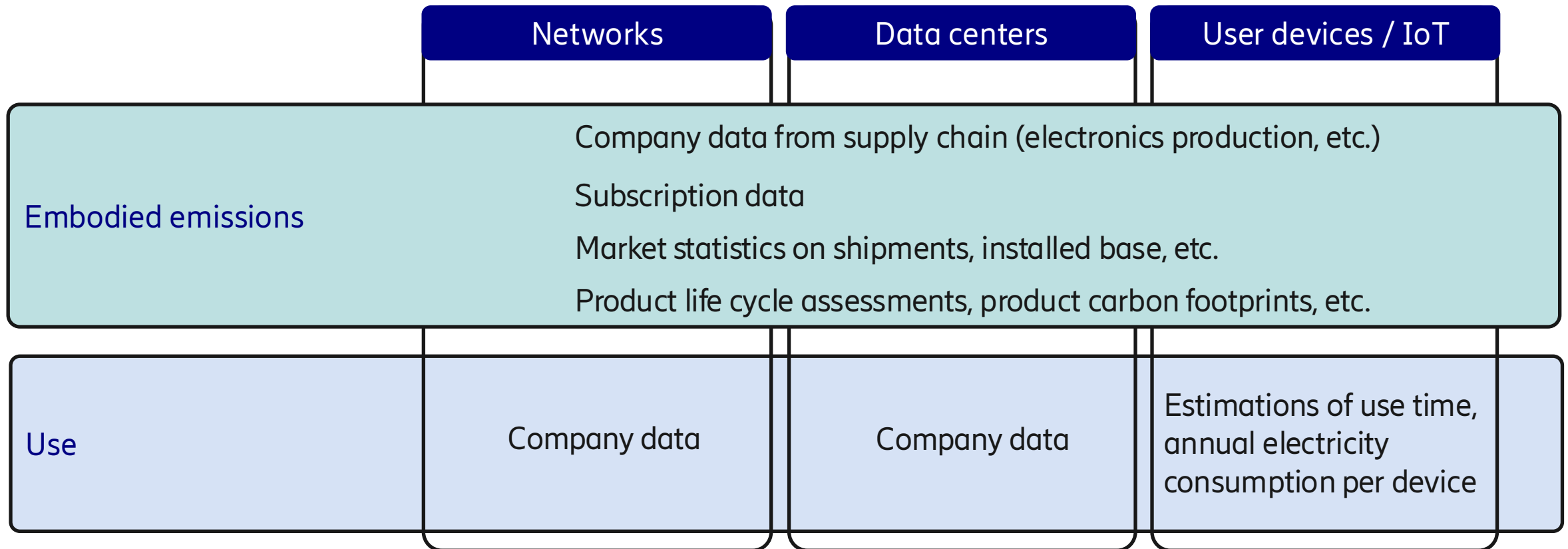
The ICT sector



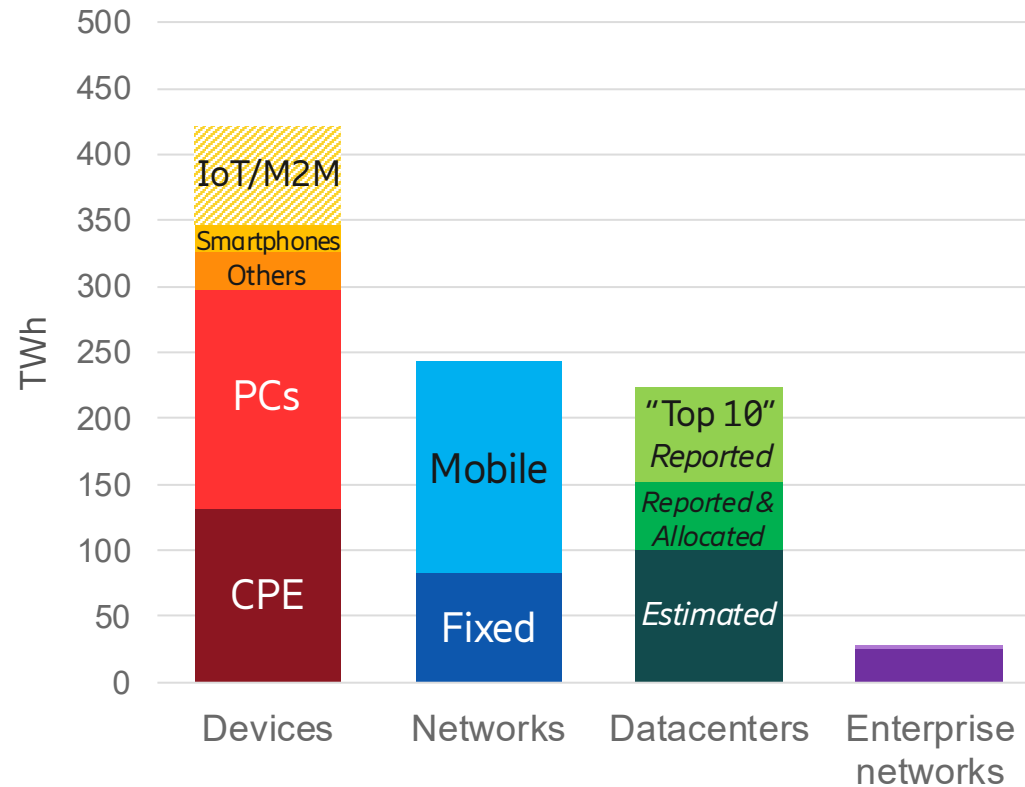
Life cycle stages

	Networks	Data centers	User devices / IoT
Raw material acquisition			
Production			
Use			
End-of-life treatment			

Data collection



ICT sector 2020 use stage electricity consumption



IoT/M2M: Surveillance cameras, smart meters, payment terminals, smart home devices, other IoT/M2M ("communication modules")

CPE: Customer Premises Equipment ("home routers")

Networks: About 80% of network subscriptions covered by reported data

"Top 10": About 2/3 of global data traffic
Google, Amazon Web Services, Microsoft, Facebook, Digital Realty, Equinix, Lumen, CyrusOne, Netflix, Akamai

ICT sector 2020 total carbon footprint



RE = Renewable Electricity

RE emission factor: 0.03 kg CO₂e/kWh

Global average electricity: 0.54 kg CO₂e/kWh

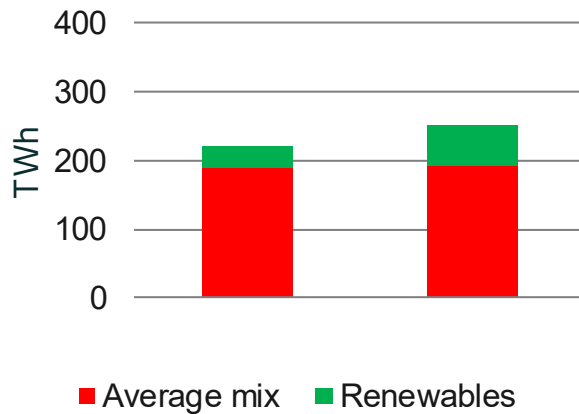
ICT sector company data 2020 / 2024

155 companies

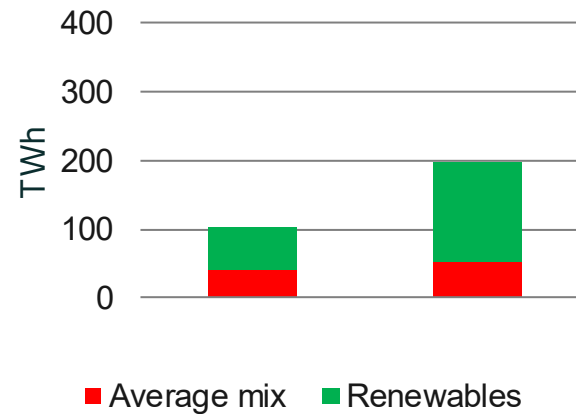


Electricity consumption reported

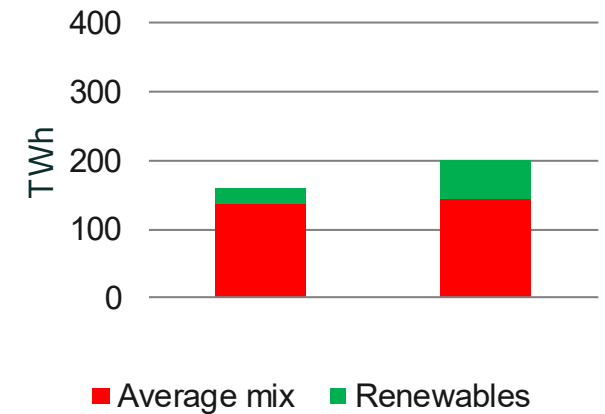
Networks (57 companies)



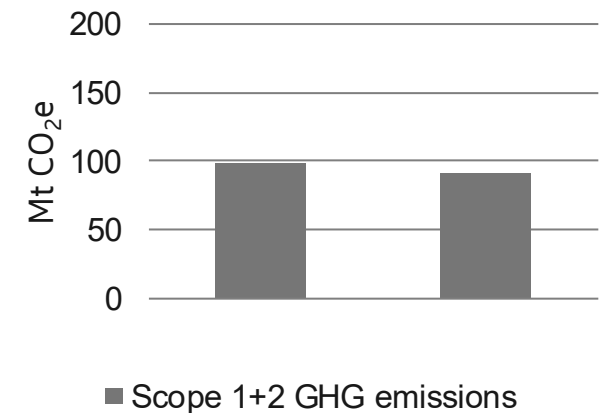
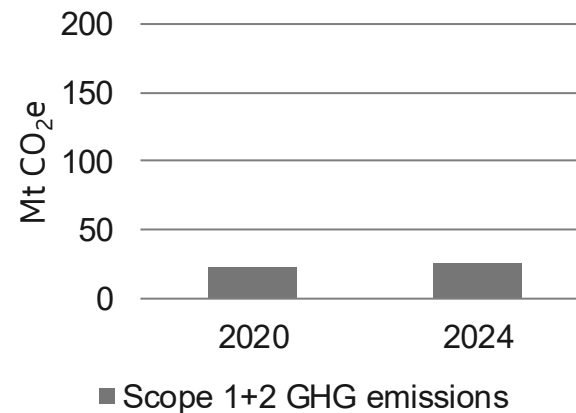
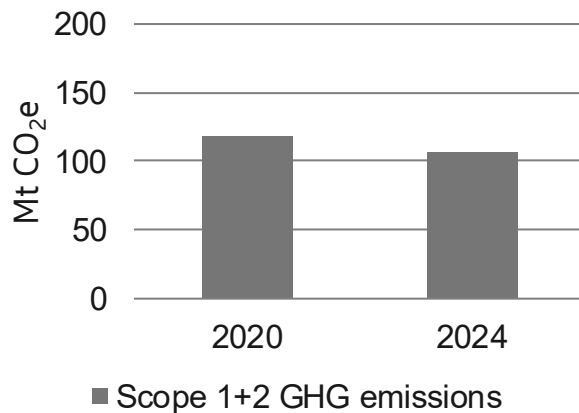
Data centers (46)



Production (52)

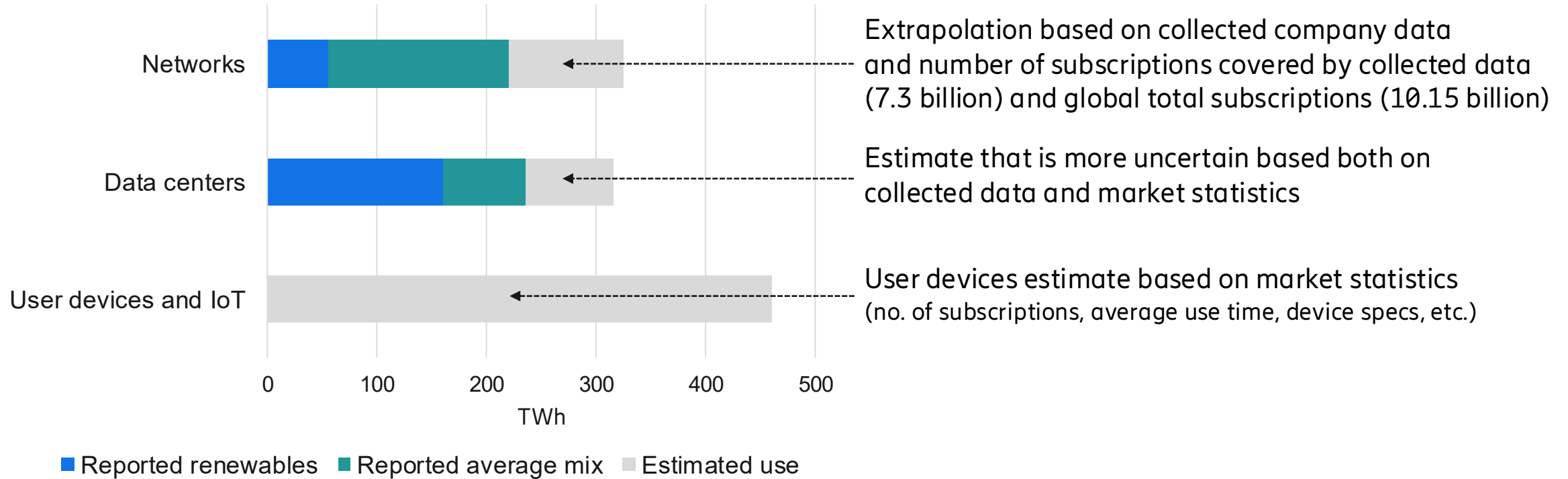


GHG emissions reported



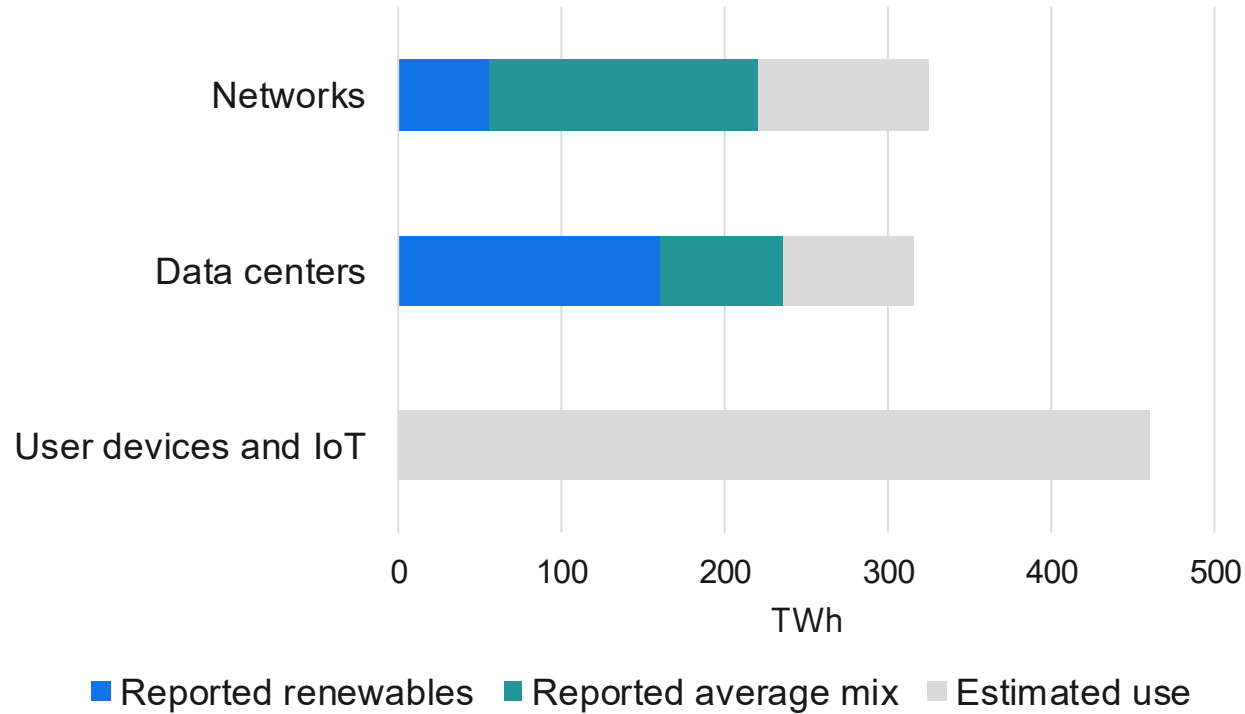
ICT sector electricity consumption 2024

Use stage electricity consumption

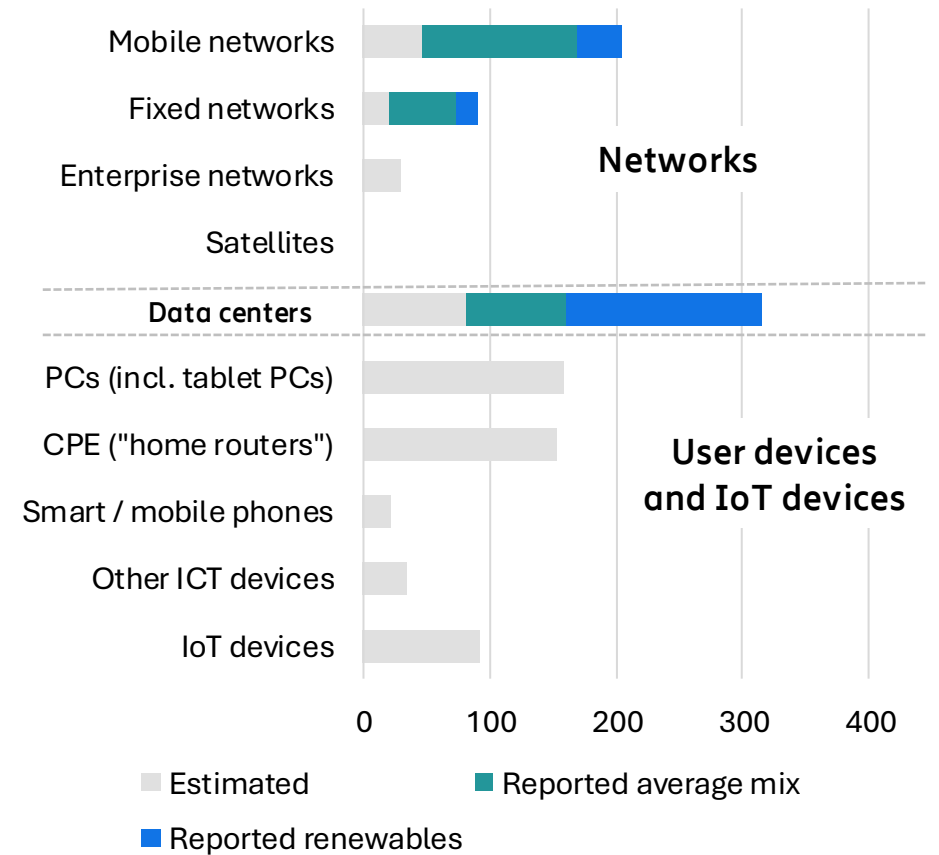


ICT sector electricity consumption 2024

Use stage electricity consumption

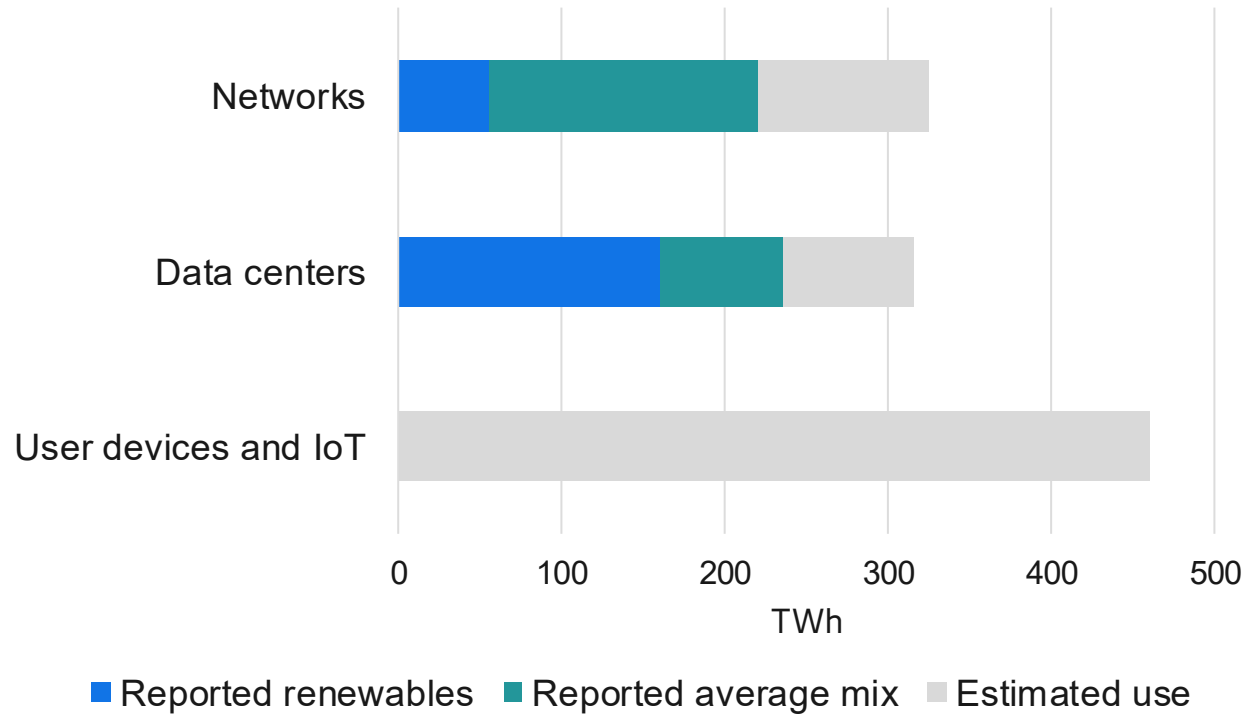


ICT sector use stage electricity consumption 2024 (TWh)



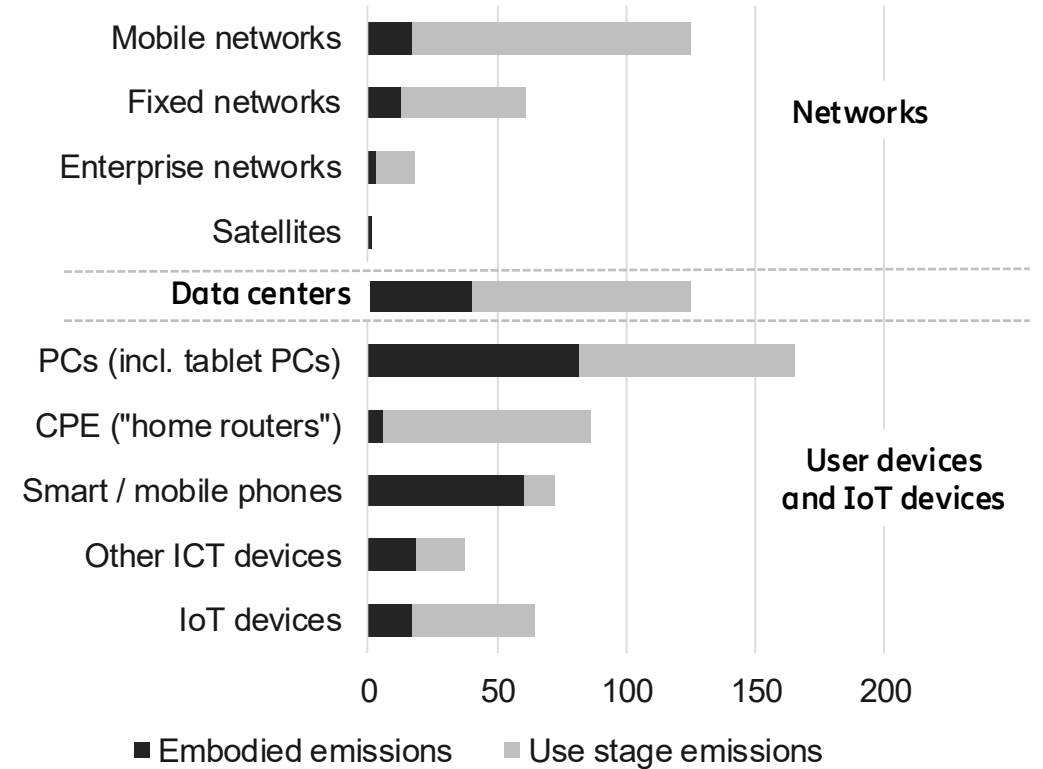
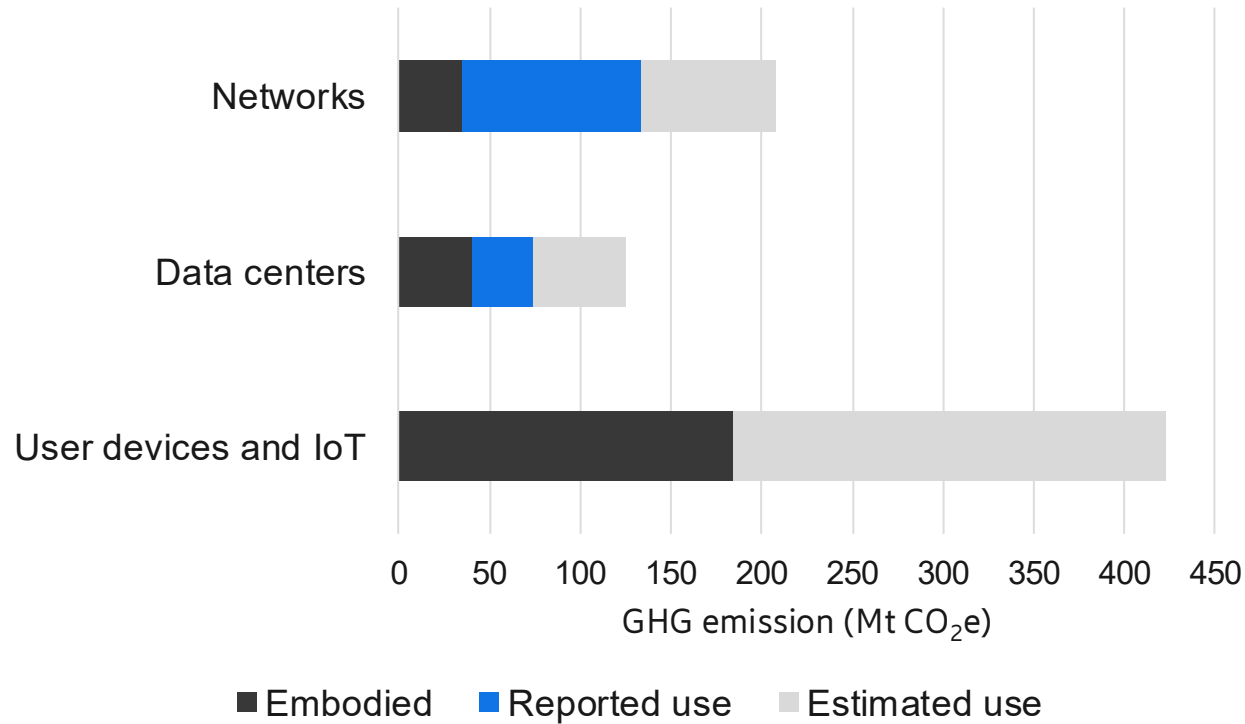
ICT sector electricity consumption 2024

Use stage electricity consumption

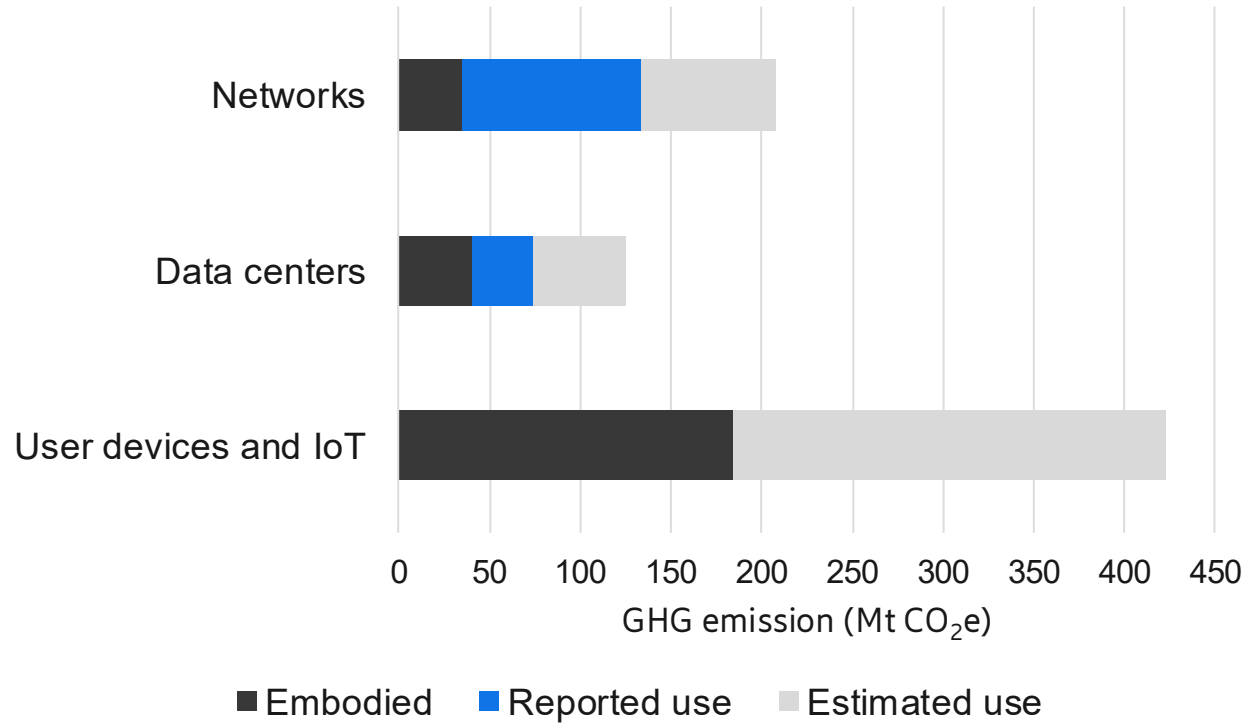


ICT sector use stage key parts	(TWh)
User devices and IoT use	~ 460
Networks use	~ 328
Data centers use	~ 315
Double counting adjustment	-12
Total use stage electricity consumption	~ 1090

ICT sector carbon footprint 2024



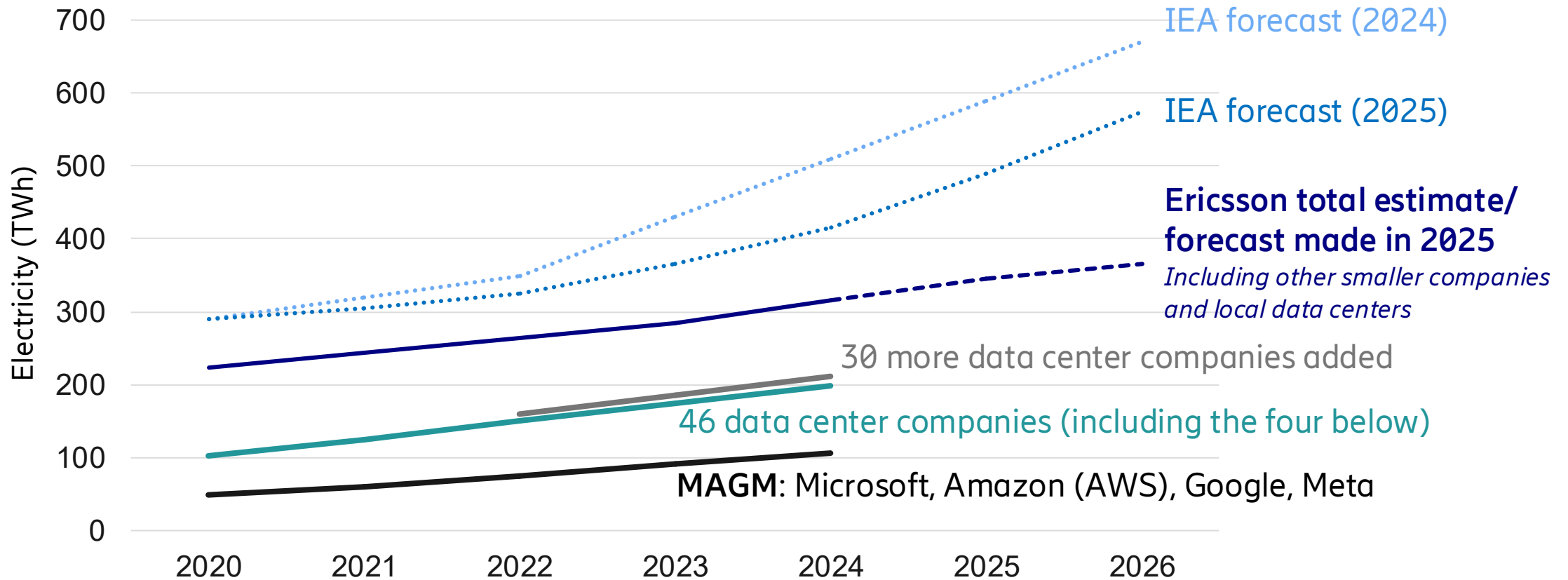
ICT sector carbon footprint 2024



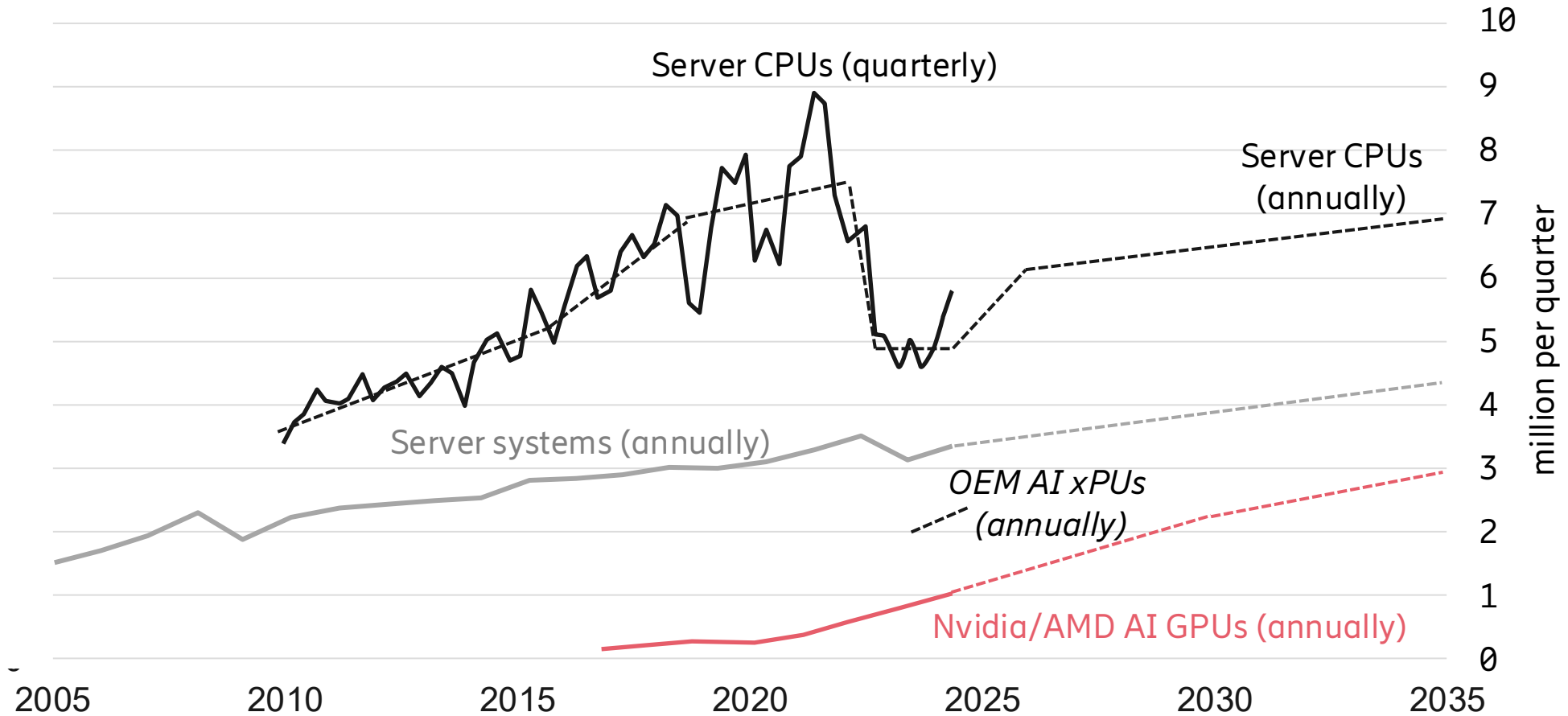
ICT sector key parts	(Mt CO ₂ e)
User devices and IoT use	~240
User devices and IoT embodied	~185
Networks use	~170
Data centers use	~85
Total ICT sector GHG emissions	~750

Electricity consumption of data centers and AI

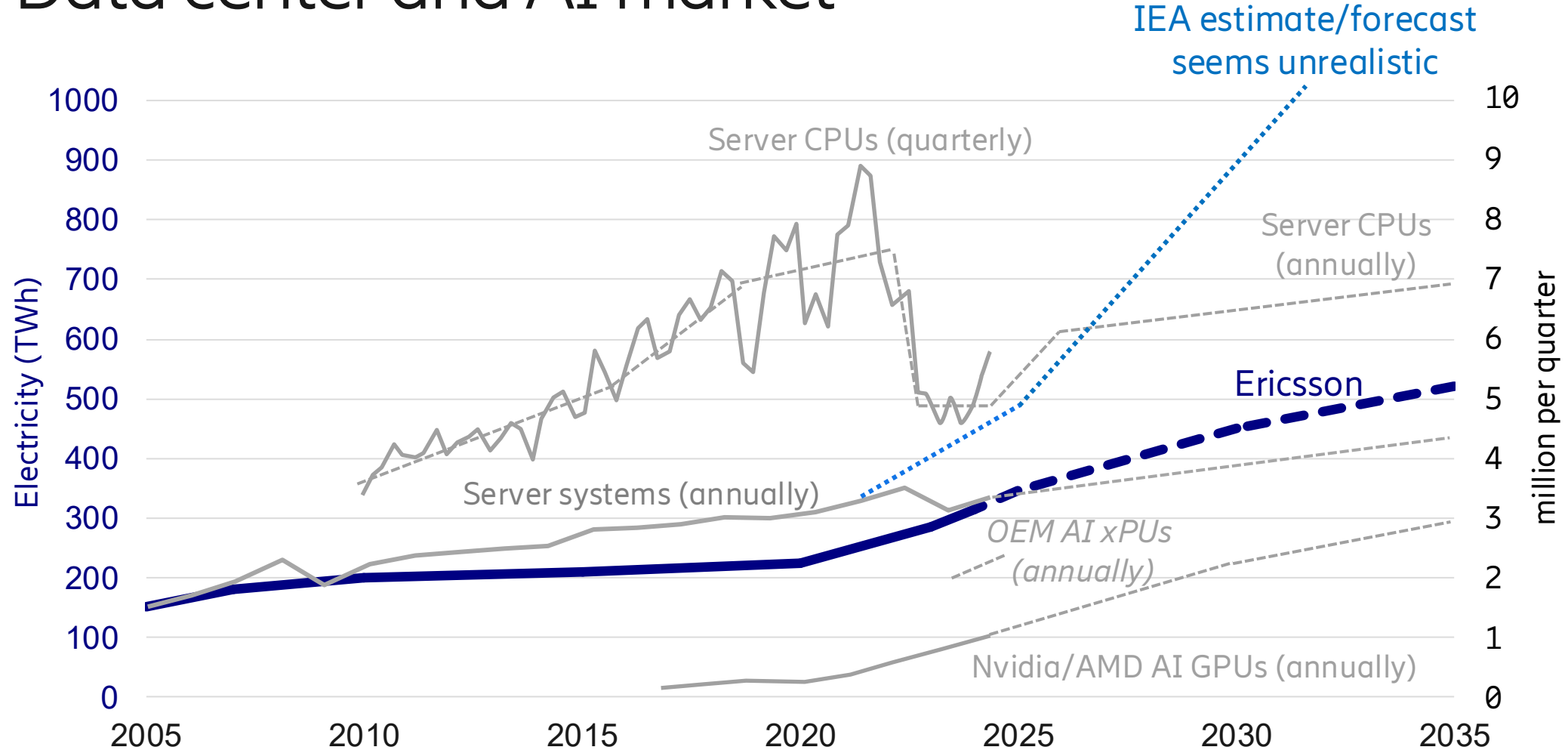
Real data beat models and assumptions



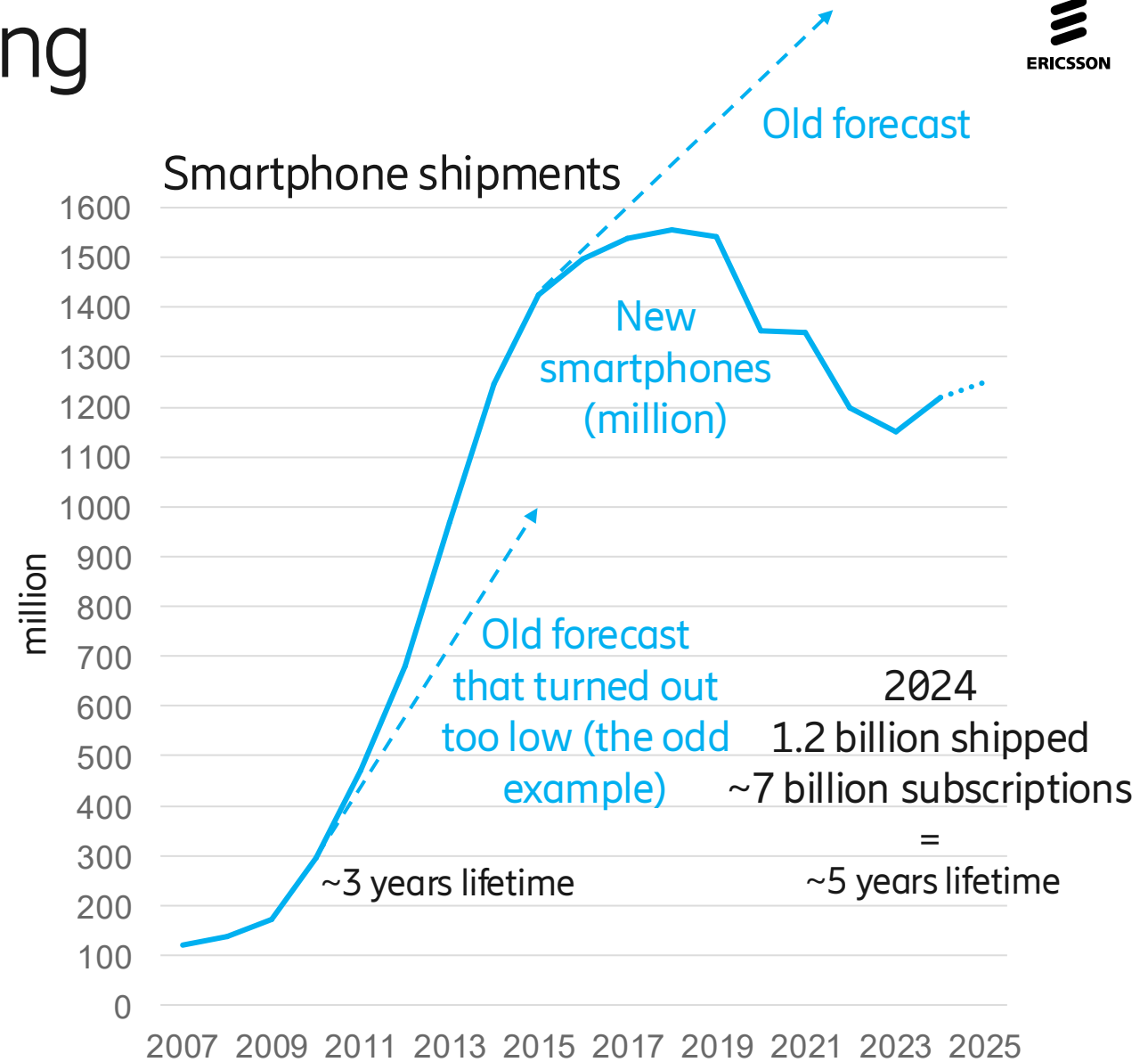
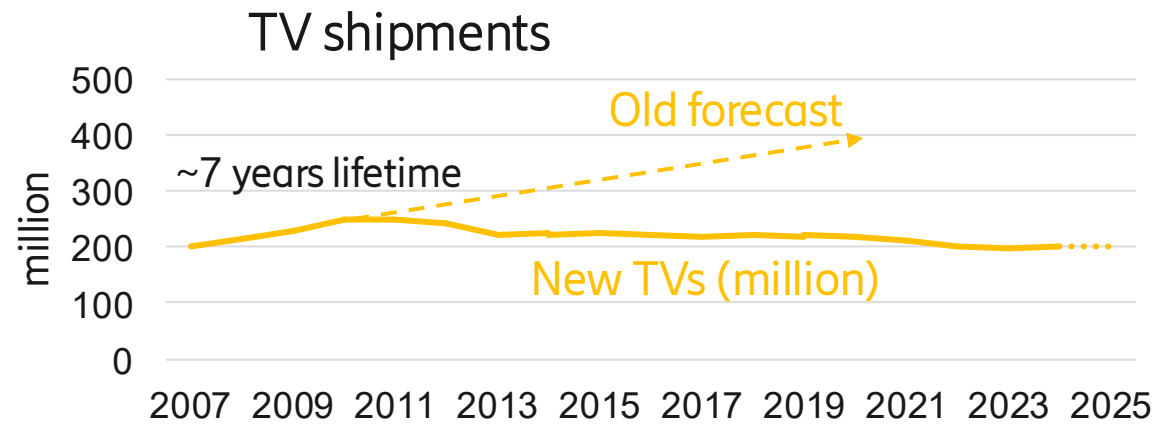
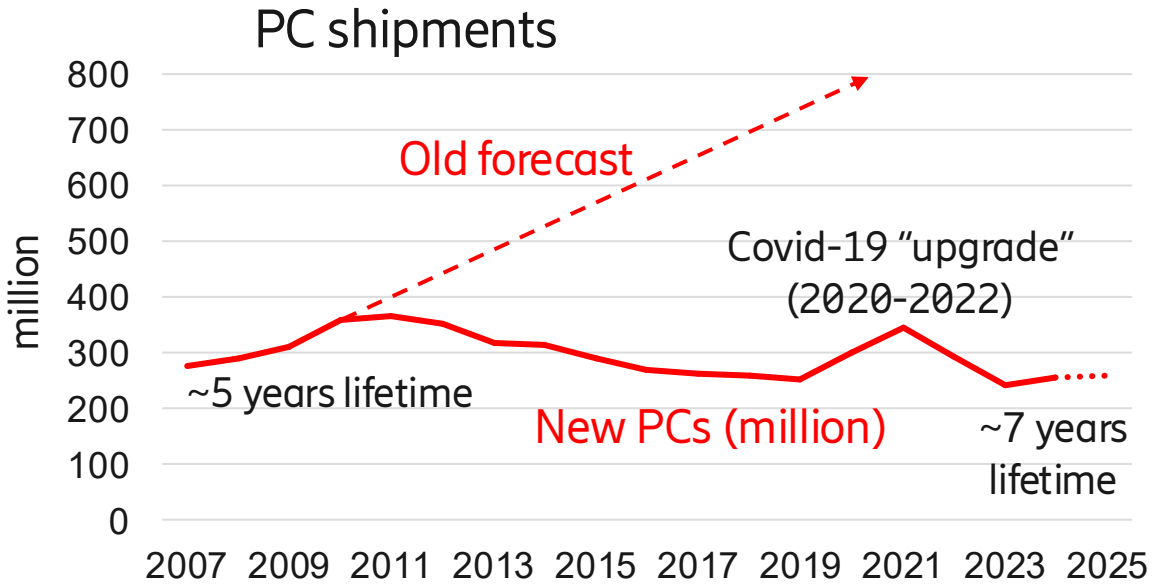
Data center and AI market



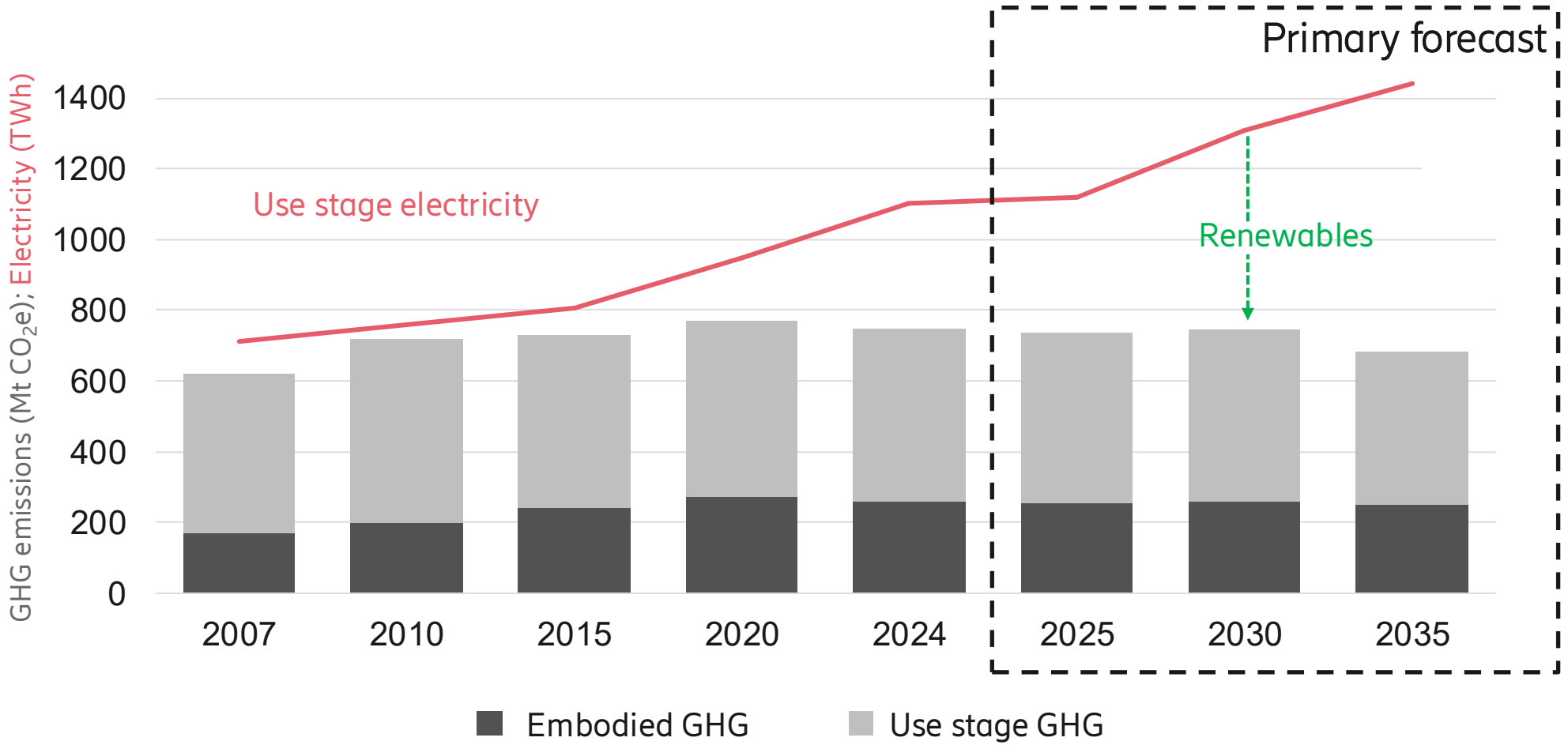
Data center and AI market



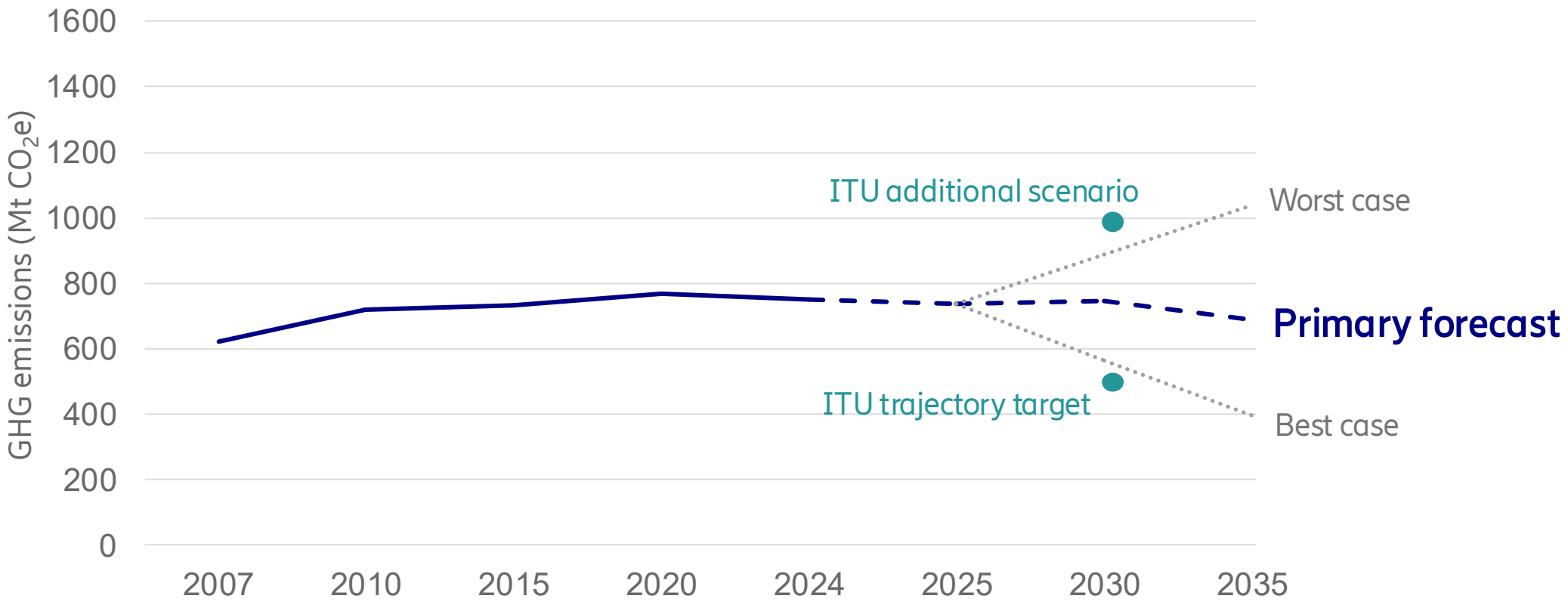
Most forecasts turn out wrong



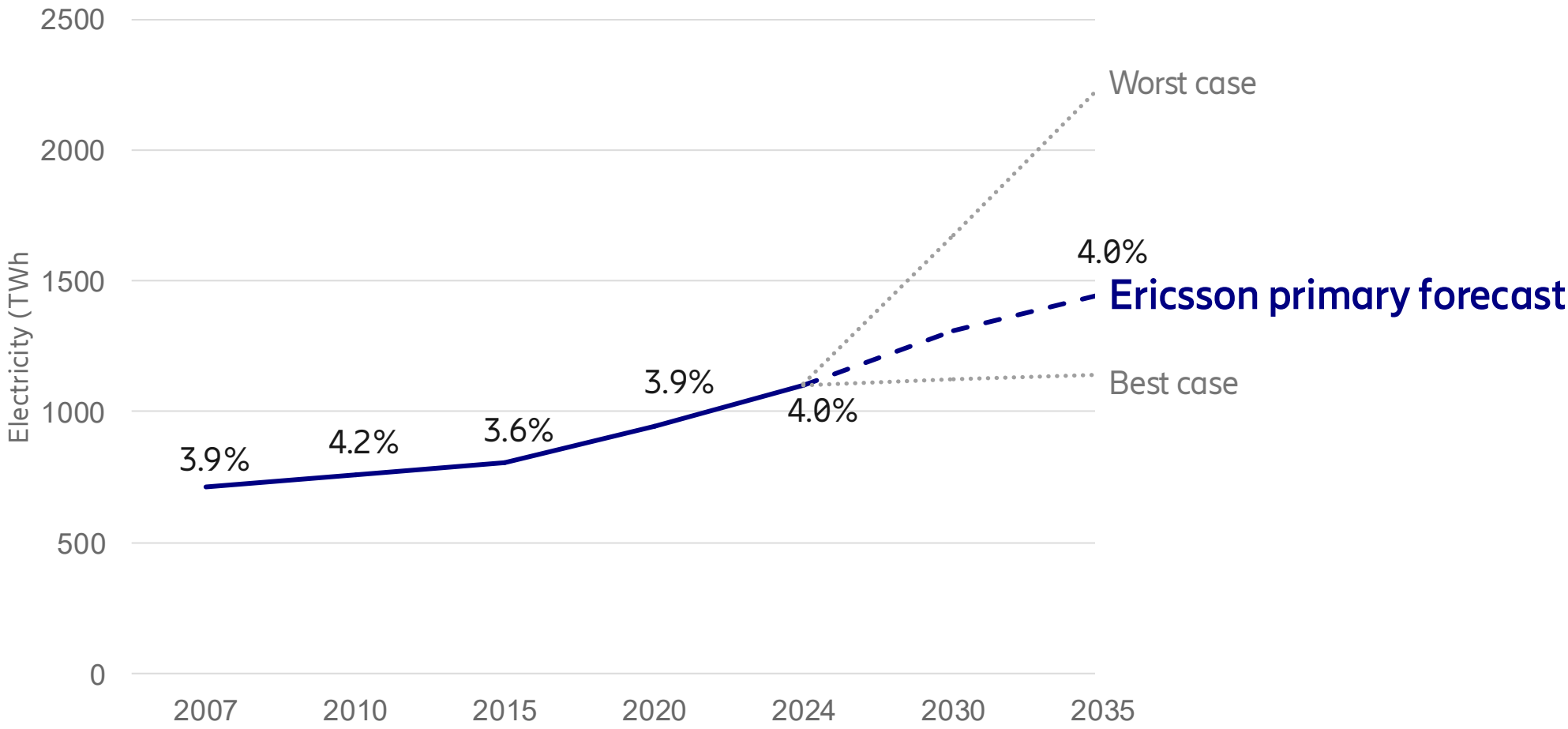
ICT carbon footprint and electricity use until 2035



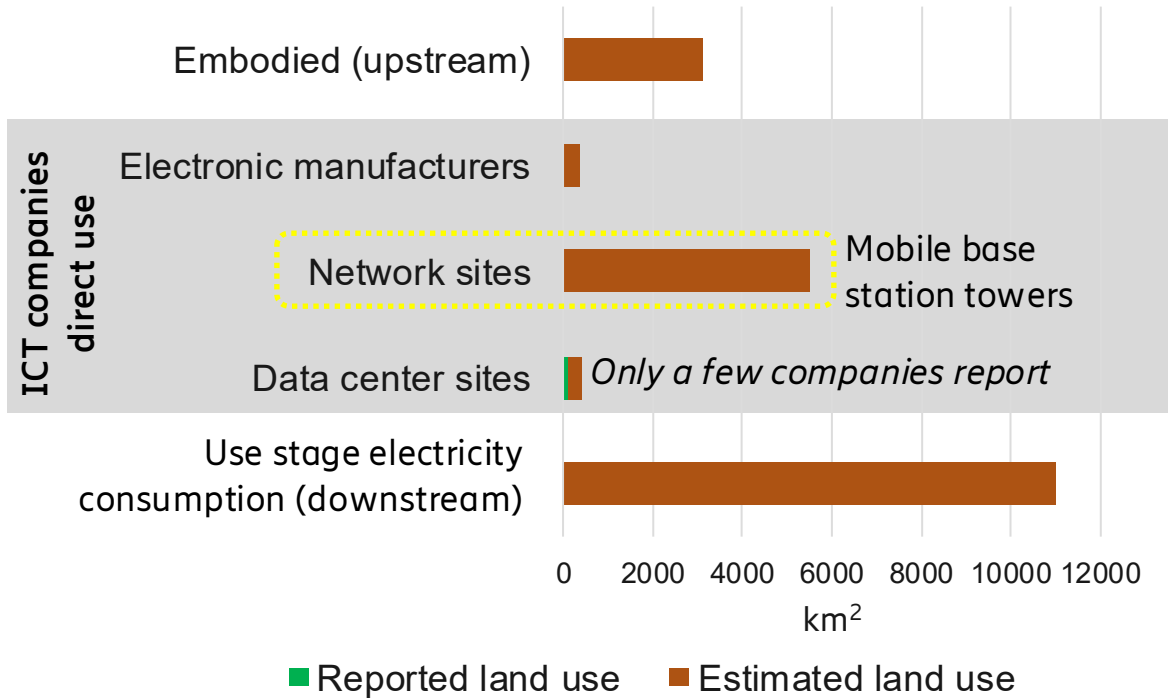
ICT sector GHG development vs ITU trajectory



ICT sector electricity development



ICT land use 2024



PLOS One Publish About Browse Search advanced search

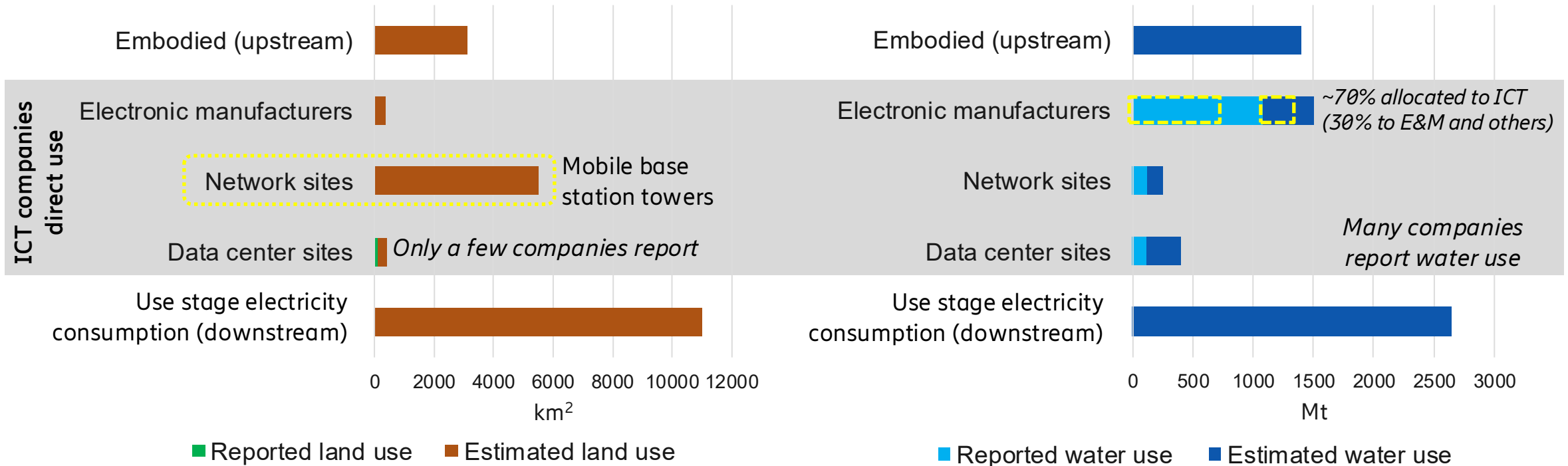
OPEN ACCESS PEER-REVIEWED
RESEARCH ARTICLE


Land-use intensity of electricity production and tomorrow's energy landscape

Jessica Lovering, Marian Swain, Linus Blomqvist, Rebecca R. Hernandez
Published: July 6, 2022 • <https://doi.org/10.1371/journal.pone.0270155>

0 Save	101 Citation
21,183 View	0 Share

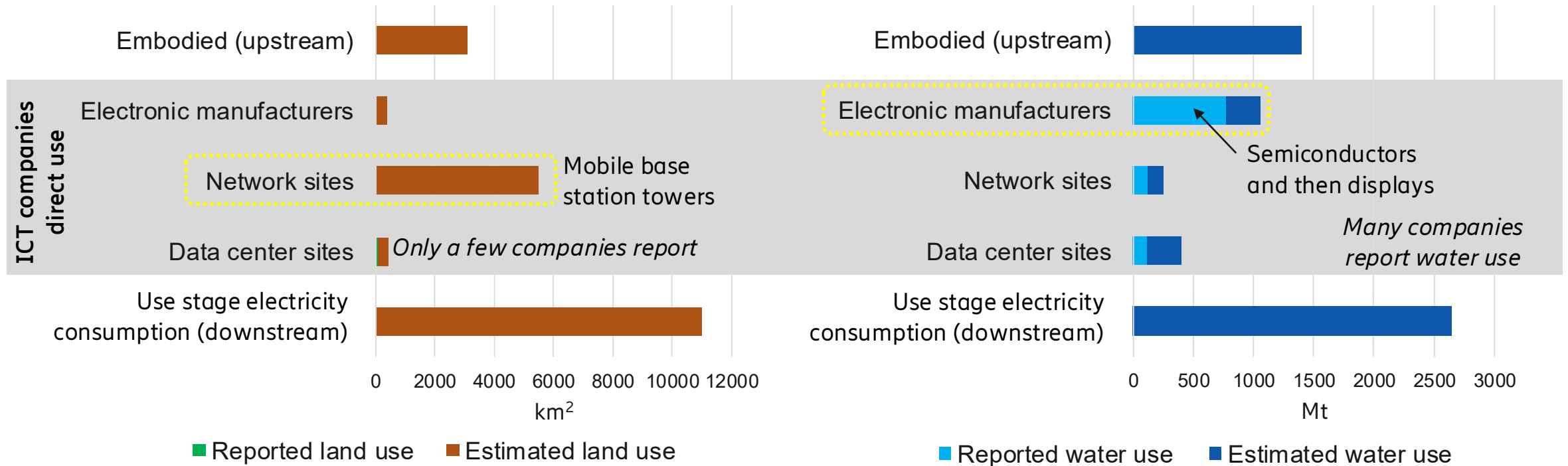
ICT sector land and water use 2024



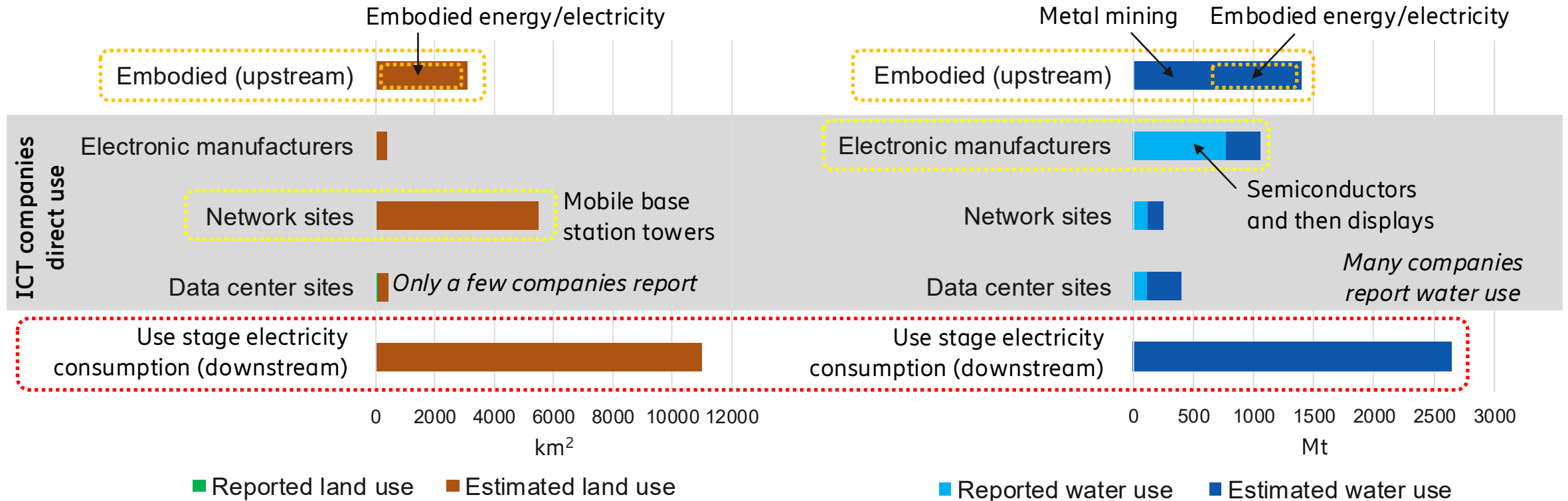

 Renewable and Sustainable Energy Reviews
 Volume 115, November 2019, 109391

Water use of electricity technologies: A global meta-analysis
 Yi Jin ^a, Paul Behrens ^{a,b}, Arnold Tukker ^{a,c}, Laura Scherer ^a

ICT sector water and land use 2024



ICT sector water and land use 2024

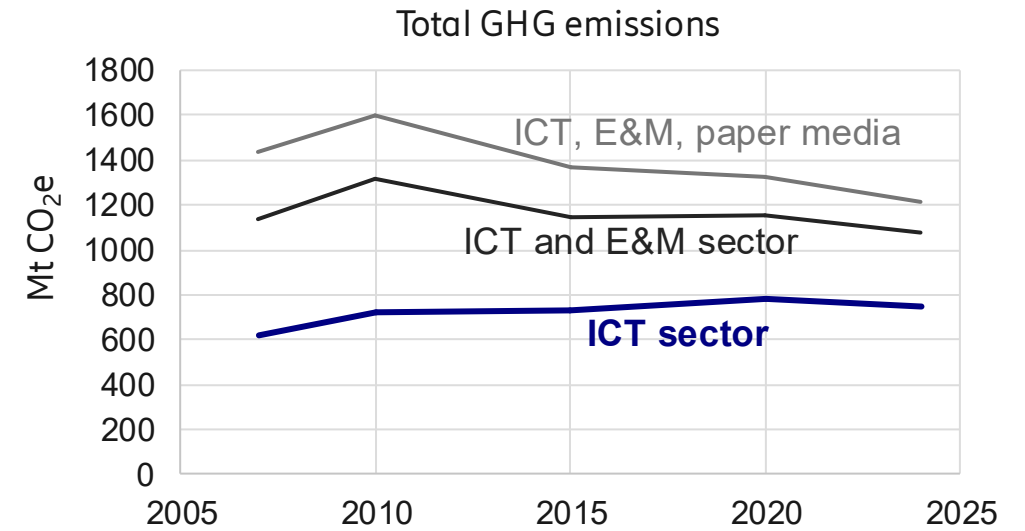
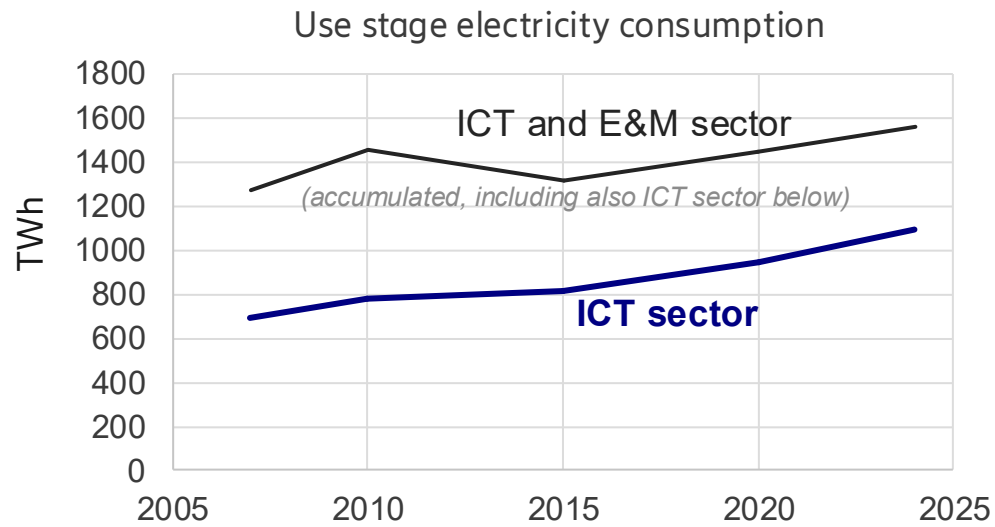


ICT sector global share

Land use	0.03%
Water use	0.13%
Carbon footprint	1.3%

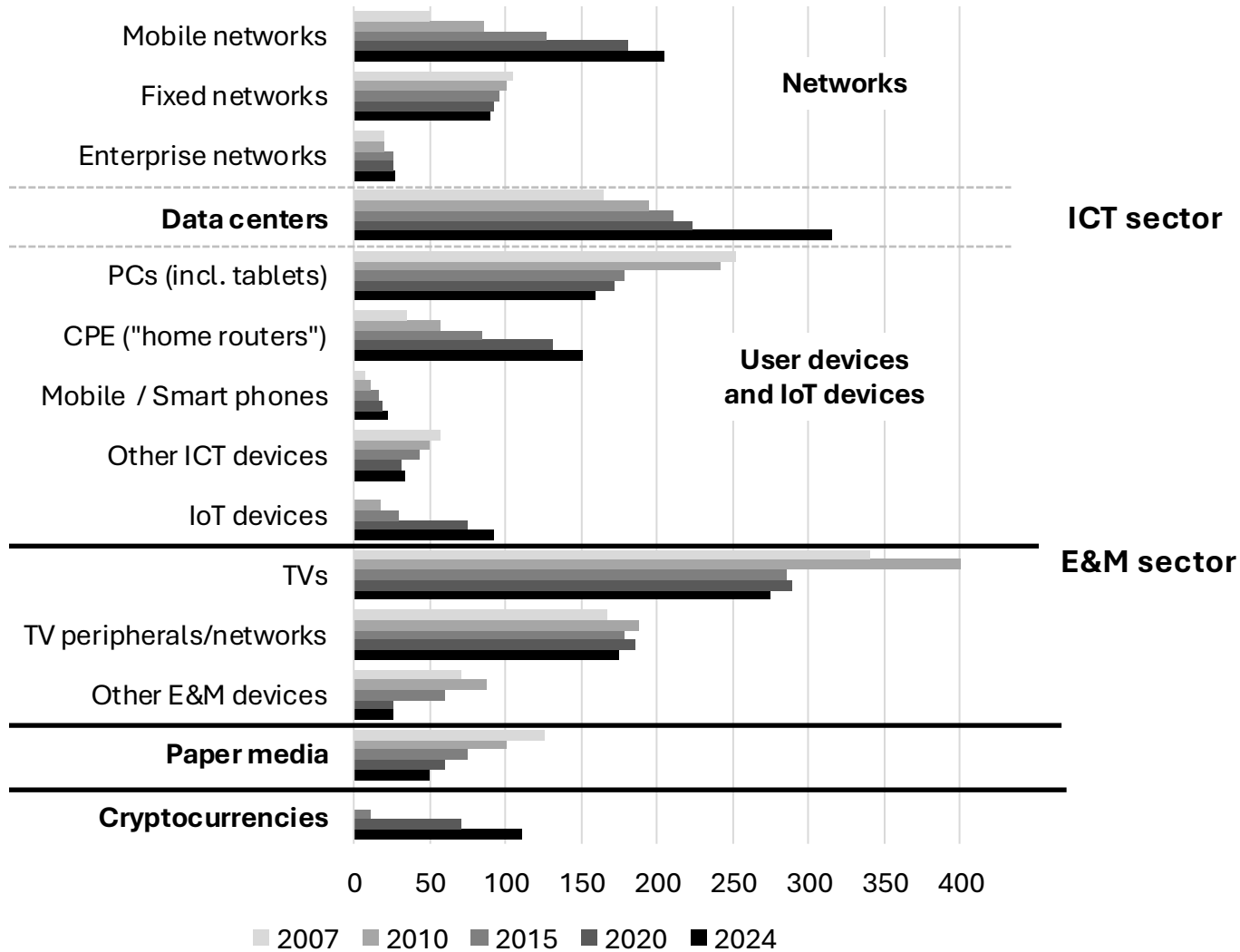
Use stage electricity consumption priority 1

ICT and related sectors' total results over time



ICT and related sectors' total results over time

Use stage electricity consumption (TWh)



30 years of development – More with less!

Fixed phone(s):
~5 W



Mobile phone:
~3 W



Smartphone:
~0.4 W



1995: ~10 W fixed

~12 W mobile



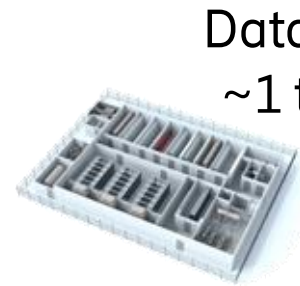
2024: ~4-5 W



PSTN / POTS
network: ~5 W



Mobile network:
~9 W



Data centers:
~1 to ~2 W

Mobile network:
~2.7 W



Concluding remarks



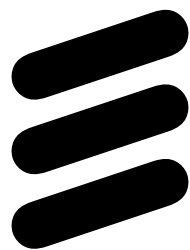
ICT sector uses about 4% of the global electricity in its use stage
For the total life cycle, the sector is responsible for about 1.3% of the global GHG emissions
Estimates of land use result in 0.03% and water consumption 0.13% of global use



Decrease environmental impacts by lowering the electricity consumption as well as increasing the use of renewables



ICT is an enabler, a multi-purpose technology able to be a key player in developing into a more sustainable world
Transparently sharing successful and less successful implementations



ERICSSON