BEFORE STARTING

HOUSEKEEPING

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- **Questions?** Submit them into the question box!
- The webinar on Twitter @ICTFOOTRPRINTeu

ICTFOOTPRINT.EU

European Framework Initiative for Energy & Environmental Efficiency in the ICT Sector

Webinar: Industrial approach & support from standards in minimising ICT carbon footprint

In parternship with:

Tuesday, 20th December 2016

ITU

the green grid™

vmware®

Speakers

Lance Reütimann
Vice President of
The Green Grid

Joe Baguley
Vice President & CEO,
EMEA at **VMware**

Jean Manuel Canet
Vice Chairman Working Party "ICT and climate change" at **ITU**

Silvana Muscella - Moderator
Founder & CEO
Trust-IT Services

The ICTFOOTPRINT.eu initiative -In a nutshell

Mission

Become "THE" consolidated effort that, at European level, raises awareness on metrics, methodologies & best practices in measuring the energy and environmental efficiency of the ICT-sector, to facilitate their broad deployment & uptake.

Stakeholders

- **ICT Intensive SME**
- **ICT Suppliers**
- **Cities & Public Administration**
- **Standard Development Organisations**

Helping you choose your Low Carbon & Energy Efficiency in ICT

Main Outputs for our stakeholders

ictfootprint.eu

Marketplace	**Buyer: Find sustainable ICT suppliers & publish ICT sustainable needs. Seller: publish ICT sustainable services or procurements & search for clients.**
Webinars	**Know more on sustainable ICT: get practical guides from a highly qualified experts in the Sustainable ICT sector and learn how to apply them in your organisation.**
Help Desk In 5 languages	**Get support about how to decrease your carbon footprint & implement ICT energy efficiency standards with Online Assistance (ENG, FR, ES, DE, IT).**
Success Stories	**Best practices in Sustainable ICT. Search how players like you got energy savings & carbon footprint reduction. Or even showcase your success story!**
Self Assessment Centre	**Measure your own carbon footprint and start learning how to become sustainable thanks to ICT standards & methodologies. AVAILABLE SOON**

Join us and get energy savings by choosing low carbon ICT

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European Framework Initiative for Energy & Environmental Efficiency in the ICT Sector

EN 50600 Data Centre Standard Series for Infrastructure and Facilities

Lance Rütimann
Vice President of The Green Grid

Tuesday, 20th December 2016

the green grid™

Contents

- Motivation for a comprehensive EN Standard for Data Centres
- The standard focuses on the infrastructure and facilities
- Key Aspects of the EN 50600
- Availability Classes
- Protection Classes
- Energy Efficiency Levels
- Structure of EN 50600 “Data centre facilities and infrastructures”
- Timetable
- Summary
- Additional Information

Motivation for a comprehensive EN Standard for Data Centers

Situation

- Exponential growth in ICT means exponential growth
  in data centres
- Increasing demand on energy and water resources require appropriate countermeasures
- Designing, building and operating efficient data centres (digital factory) requires holistic approach
- Significant expertise in cooling, fire safety, security and energy efficiency standards available
- Rapid development in technology and methodology affecting all aspects of the data centre
- One room to multiple building facilities and diverse business models with individual complexities exist

Conclusion

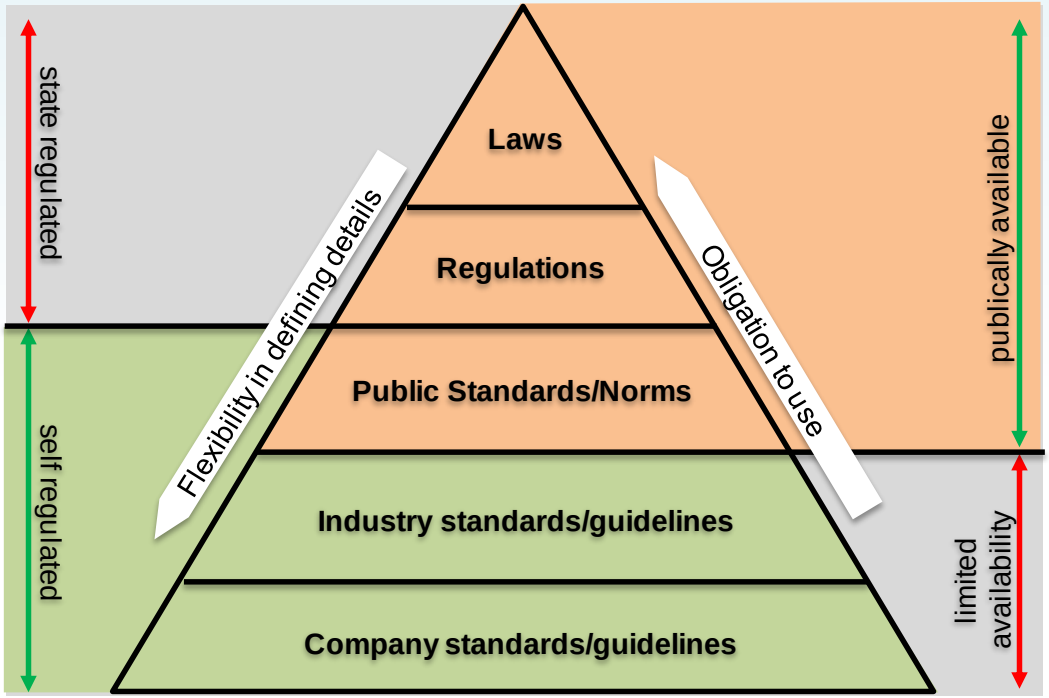
The industry needs a comprehensive solution that covers the above, whilst at the same time allowing for continuing development and best practice sharing. By making this standard series an EN, it automatically replaces any national standards of European Standards Organization members. ESOs are CEN, CENELEC and ETSI

EN Standards

Positioning in the market and impact

- **European Standards (EN)** are documents that have been ratified by one of the 3 European Standards Organizations, CEN, CENELEC or ETSI. They are designed and created by all interested parties through a transparent, open and consensual process.

- Members of the European Standards Organisations (EU, EFTA, Turkey and others) commit to replacing national standards with an EN.



The series focuses on the infrastructure and facilities of data centres

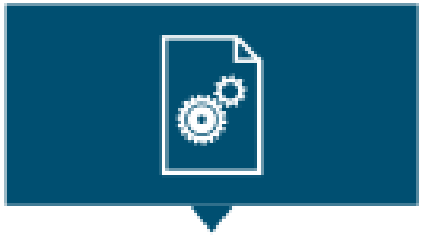
The series includes in its scope

- Issues for business risk and operating cost analysis
- General aspects required to support effective operation of telecommunications
- Classification system for “availability”, “security” and “energy efficiency”
- Lifetime of the data centre
- General design principles including symbols, labels, coding in drawings, quality assurance and education

The series does not cover

- Information technology and network telecommunications equipment, software and associated configuration
- Safety and electromagnetic compatibility (EMC) requirements (covered by other standards and regulations)

Target Groups



Owners, facility managers, ICT managers, project managers, main contractors

Consultants, architects, building designers and builders, system and installation designers

Suppliers of equipment

Installers, maintainers

Key Aspects of the EN 50600

The EN 50600 series provides a framework for consultants, designers, installers, services providers as s well as owners and operators that encompasses the key aspects to be considered during the life time of a data centre

- Availability of the facilities and infrastructure to support data centre functionality
- Measures to supervise and protect the data centre from unwanted events
- Method and process to address energy efficiency (and sustainability)

The series pulls together expertise from existing CEN and CENELEC for topics such as fire safety, building automation
and security. European best practices such as the EU Code of Conduct for Data Centre efficiency have been added
to the series. From ISO/IEC Standards comes the integration of international KPI's such as PUE and REF.

Future developments will be Environmental Sustainability, Assessment of Conformity and the integration of more international KPIs

Availability Classes

The business risk and downtime cost analysis defines the required availability of the data centre

Examples	Class 1 (low)	Class 2 (medium)	Class 3 (high)	Class 4 (very high)
Power Distribution	Single-path (no redundancy)	Single-path (redundancy via components)	Multi-path (redundancy via systems)	Multi-path (fault tolerant incl. maintenance)
Environmental Control	Single-path (no redundancy)	Single-path (redundancy via components)	Multi-path (resilience and concurrent repair/operate)	Multi-path (resilience and concurrent repair/operate and fault tolerant)
Telecommunication Cabling	Single-path using direct connections	Single-path using fixed infrastructure	Multi-path using fixed infrastructure	Multi-path using fixed infrastructure with diverse pathways

Availability Classes

The risk analysis defines the required active and passive measures for security and protection

Examples	Class 1 (low)	Class 2 (medium)	Class 3 (high)	Class 4 (very high)
Access Control	Public or semi-public area	Area Restricted to authorised personnel and visitors	Area Restricted to specific personnel and visitors. Class 2 to be accompanied by Class 3 personnel	Area Restricted to specific personnel. Class 2 and 3 to be accompanied by Class 4 personnel
Fire Safety	No specific requirements	Fire detection, alarm and fire fighting in area. Secures DC function during fire in Class 1 area	Fire detection, alarm and fire fighting in area. Secures DC function during fire in Class 1 or 2 area	Fire detection, alarm and fire fighting in area. Secures DC function during fire in that area or else-where in the data centre

Energy Efficiency Levels

The data centre owner/operator defines the required/desired level of energy efficiency based on operating costs analysis, legislative/regulatory requirements or internally defined guidelines. From there the required measures can be selected and implemented

	Description
Level 1	Measurement regime providing simple global information for the data centre as a whole
Level 2	Measurement regime providing detailed information for specific facilities and infrastructures within the data centre
Level 3	Measurement regime providing granular data for elements within the spaces of the data centre

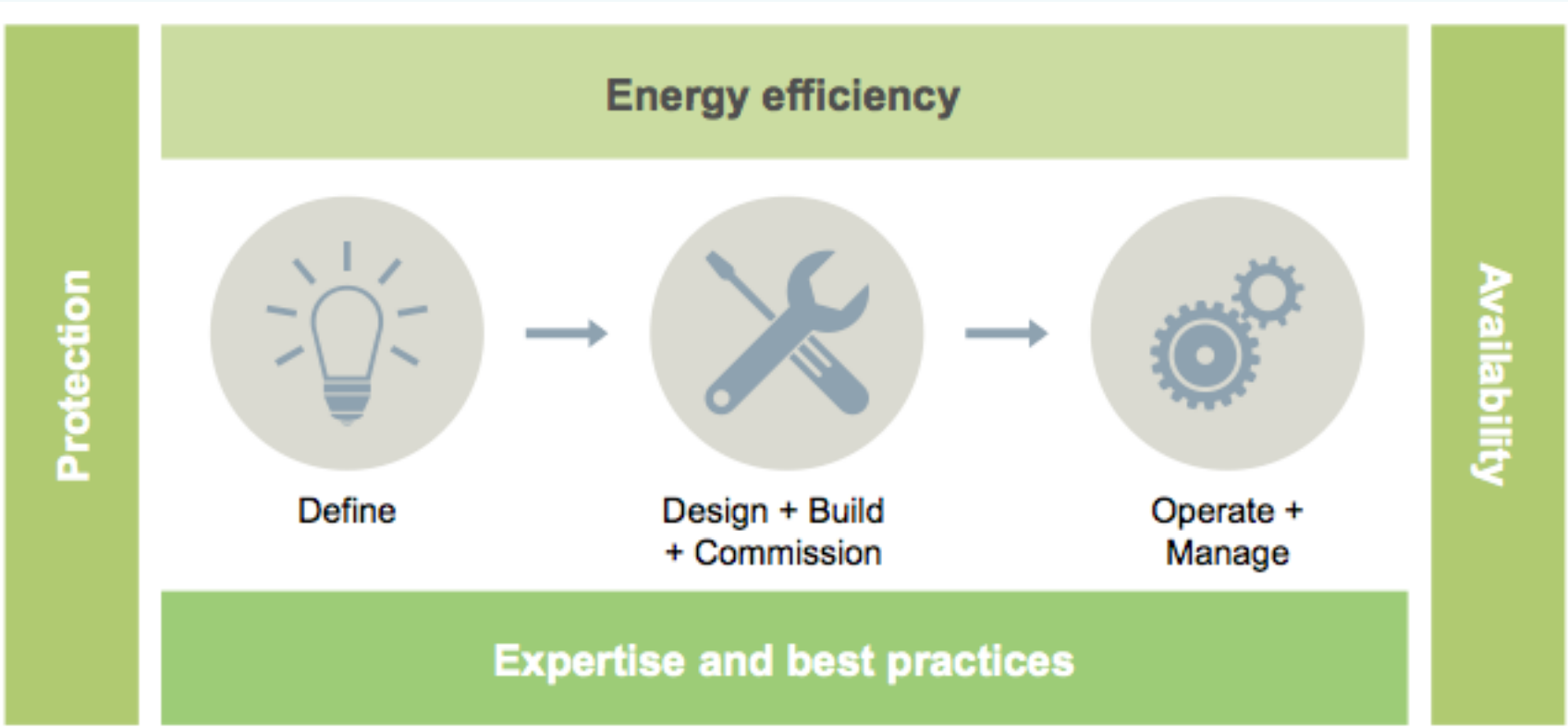
Structure of EN 50600 "Data centre facilities and infrastructures"

Concept	Design and Build	Operation	KPIs	Best Practices
Part 1 General Concepts	**Part 2.1 Building Construction**	**Part 3.1 Management and Operational Information**	**Part 4.1 Overview**	**Part 99-1 (TR) Recommended Practices**
	Part 2.2 Power Distribution		**Part 4.2 Power Usage Effectiveness**	**Part 99-2 (TR)** Environmental Sustainability
	Part 2.3 Environmental Control		**Part 4.3 Renewable Energy Factor**	**Part 99-3 (TR)** Assessment of Conformity
	Part 2.4 Telecommunications Cabling Infrastructure			
	Part 2.5 Security Systems			

Work in progress

Summary

The key aspects Availability, Protection, Energy Efficiency along with existing Expertise plus Best Practices provide the framework for this holistic Data Centre standard



Comparison Table

The key aspects Availability, Protection, Energy Efficiency along with existing Expertise plus Best Practices provide the framework for this holistic Data Centre standard

	EN 50600	TIA-942A	ANSI/BICSI 002	Commercial Assessors
Scope	All DC facilities and infrastructures	Cabling only	All DC facilities & infrastructures	Mainly Power & Environmental Control
European Standard	✓	✗	✗	✗
Regional Application	Europe/internationally applicable by using ISO/IEC standards as references	United States	United States	International
Energy Efficiency Enablement	✓	✗	✗	✗
Management and Operation	✓	✗	?	?
Inclusion of global KPIs (ISO/IEC 30134-x)	✓	✗	✗	?
Commercially neutral	✓	✓	✓	✗
Independent Assessment	✓	(Cabling only) ✓	?	✗
Business Approach (design vs. cost)	✓	✗	✗	✓

Additional references on Standards focussed on Environmental and Sustainability aspects of ICT

Green Data Centres

The development of the digital economy has led to an increasing demand for data supported by the continuing construction, across Europe, of data centres of all sizes serving a large variety of business applications. This has resulted in increased energy demand. It is necessary to manage this demand and to consider the related environmental and economic impacts.

A data centre encompasses a great variety of products and systems. Many different industries are involved in the design and the operation of a data centre. Within the framework of the complicated and challenging objective to manage energy consumption there is a need to give guidance to stakeholders in the industry for energy management and environmental viability by providing a foundation of standards on data centres.

The CEN/CENELEC/ETSI Coordination Group on Green Data Centres (CEN/CLC/ETSI CG GDC)

Over the last few years, all European Standardization Organizations (ESOs) have been involved in developing standards related to data centres. In 2010 CENELEC BT/WG 132-3 made the recommendation to establish a joint European coordination group with the task to manage and coordinate European activities and standardization works related to data centres energy efficiency.

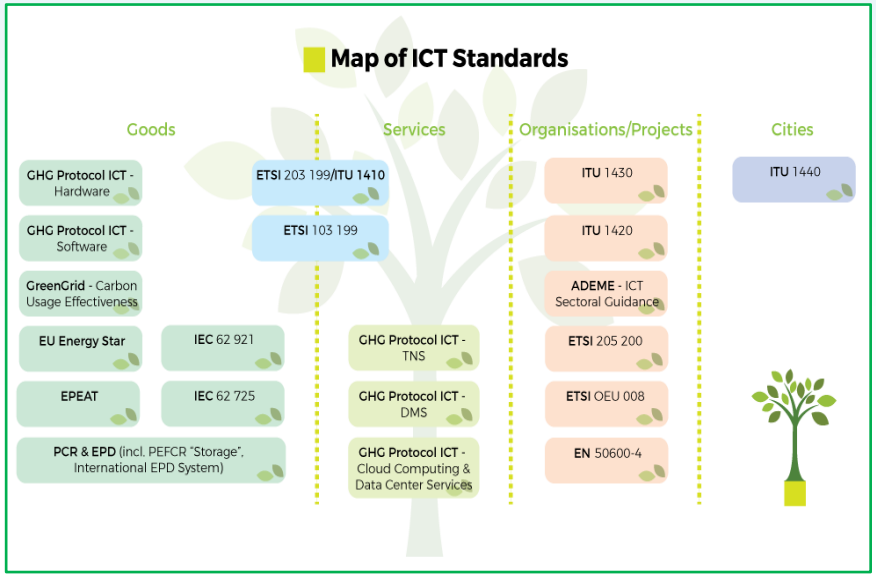
The CEN/CENELEC/ETSI Coordination Group on Green Data Centres (CEN/CLC/ETSI CG GDC) is a joint activity of the three ESOs which comprises representatives of the ESOs together with stakeholders of industry and EU projects.

The CG GDC developed a report entitled 'Standardization Landscape - Energy management and environmental viability of data centres' (pdf format, 2016 version) which records existing standards addressing energy management of data centre and identifies standardization gaps.

The CG GDC also provides an 'Executive Summary of the Standardization Landscape' (pdf format, 2016 version). The recommendations and guidance contained in the document are the result of the close cooperation of all stakeholders jointly with the ESOs.

Source:
http://www.cencenelec.eu/standards/Sectors/ICT/Pages/GreenDataCentres.aspx

ftp://ftp.cencenelec.eu/EN/EuropeanStandardization/HotTopics/ICT/GreenDataCentres/GDC_landscape_Ed3(2016).pdf



Source: https://ictfootprint.eu/en/ict-standards

Additional Information

Committee	CENELEC Technical Committee 215 Workgroup 3 (CLC/TC 215 WG 3)
Website	https://www.cenelec.eu/dyn/www/f?p=104:7:250760021784801
Secretary	DKE (German Electrotechnical Commission) 60596 Frankfurt am Main, Germany

the green grid™

Thank you for your attention

Contact

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European Framework Initiative for Energy & Environmental Efficiency in the ICT Sector

Changing the Way we Build, Deliver, and Consume Applications and Content

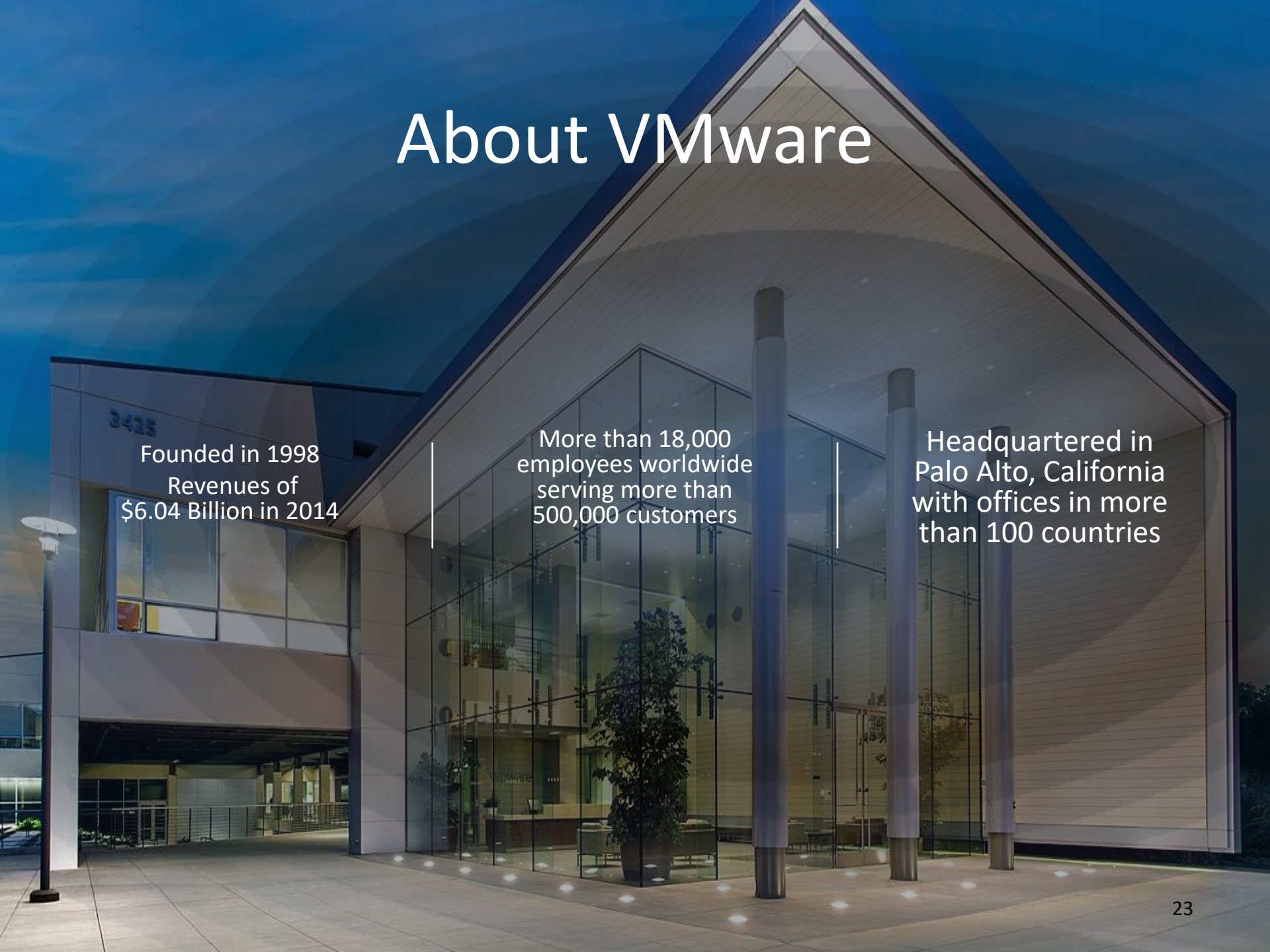
Who Has the Energy for That?!

Joe Baguley
Vice President & CEO, EMEA at VMware

Tuesday, 20th December 2016

vmware®

About VMware



Founded in 1998

Revenues of $6.04 Billion in 2014

More than 18,000 employees worldwide serving more than 500,000 customers

Headquartered in Palo Alto, California with offices in more than 100 countries

ENERGY

US SITES 100%

CARBON NEUTRAL

First voluntary purchase of RECs to offset carbon

100%

RENEWABLE ENERGY

powers Palo Alto and Wenatchee Data Center

GREEN BUILDINGS

Palo Alto - Headquarters
Bangalore - Kalyani Vista
Wenatchee Data Center


WE STRIVE TO BE A FORCE FOR GOOD IN THE WORLD.
Overlooking VMware's Ribbon Cutting ceremony of our campus expansion at Palo Alto HQ.
VMWARE GLOBAL IMPACT REPORT 2015
FORCE FOR GOOD
vmware

VMWARE 2020

SUSTAINABILITY PILLARS

PRODUCT

Drive sustainable business practices and create technology that contributes long-term net positive value to our customers and partner ecosystem.

PLANET

Do more than our fair share toward environmental and social sustainability in our business practices and operations.

PEOPLE

Build an inclusive business environment that enriches people's lives at work, at home and in the community, to inspire people to give more than they take.

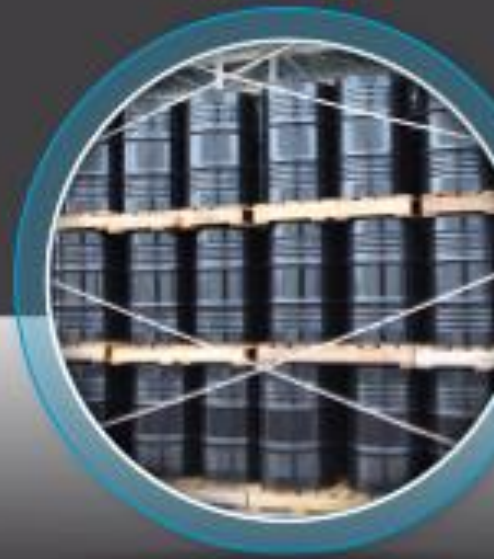
ASPIRATIONS

4 Metric Tons of CO_2 =

One Server

One Car Driven 9,000 Miles

9 Barrels of Oil



Biggest Impact: Through our Customers

340 Million MTCO2e
603 Million MWh

Executive Summary

Green IT: Virtualization Delivers Energy and CO2 Emissions Reductions

Sponsored by: VMware Inc.

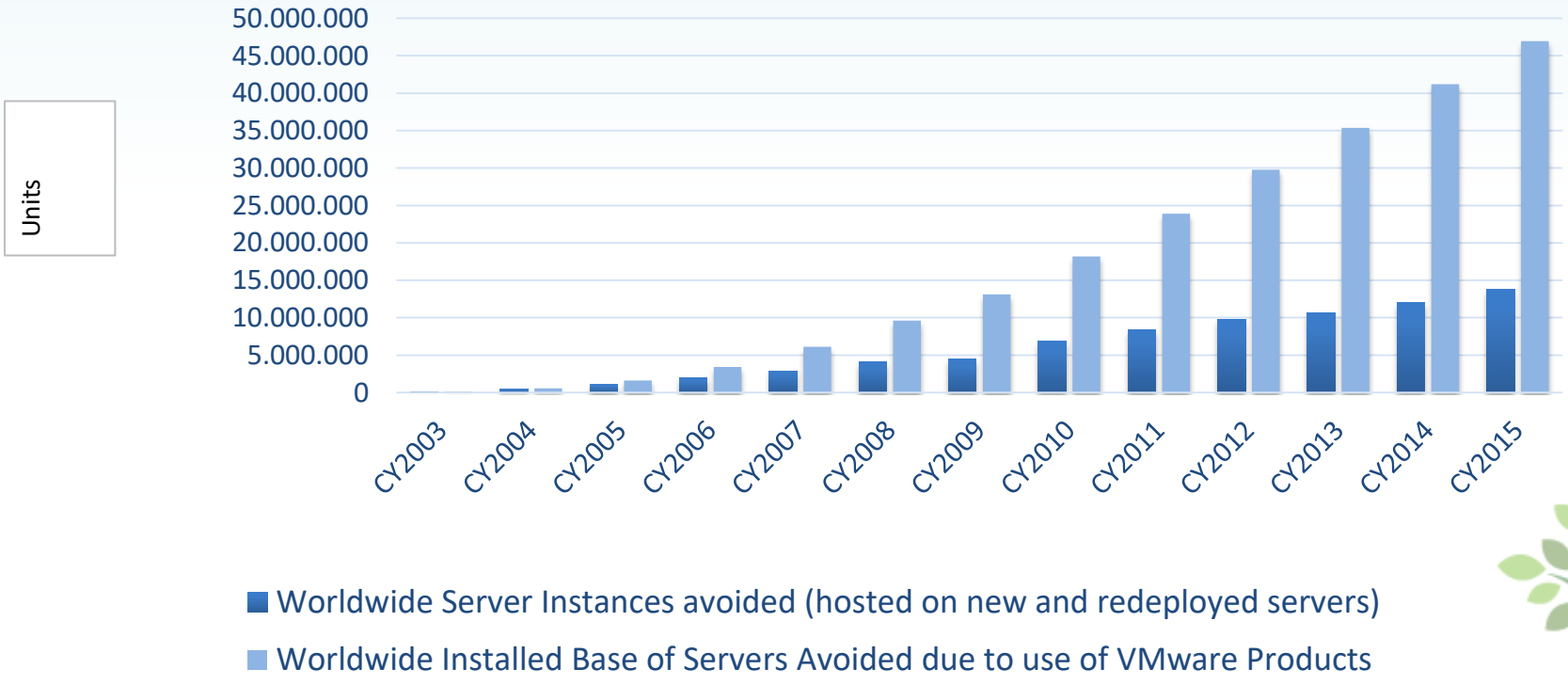
Al Gillen
September 2016

Jorge Vela

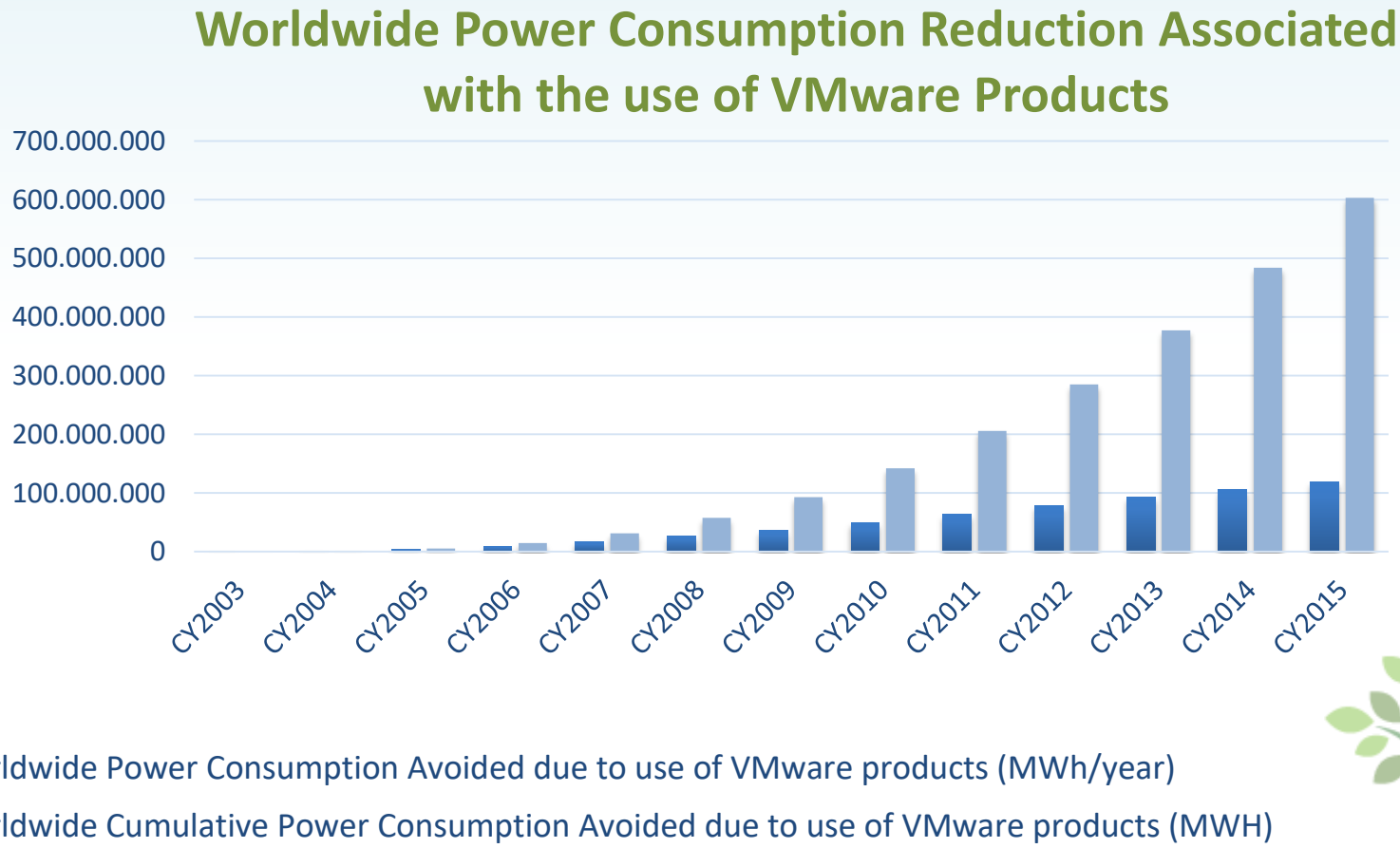
What is Virtualization?

Why Virtualization and Consolidation Matter

Worldwide New Server Shipments Avoided due to the use of VMware Server Virtualization Software

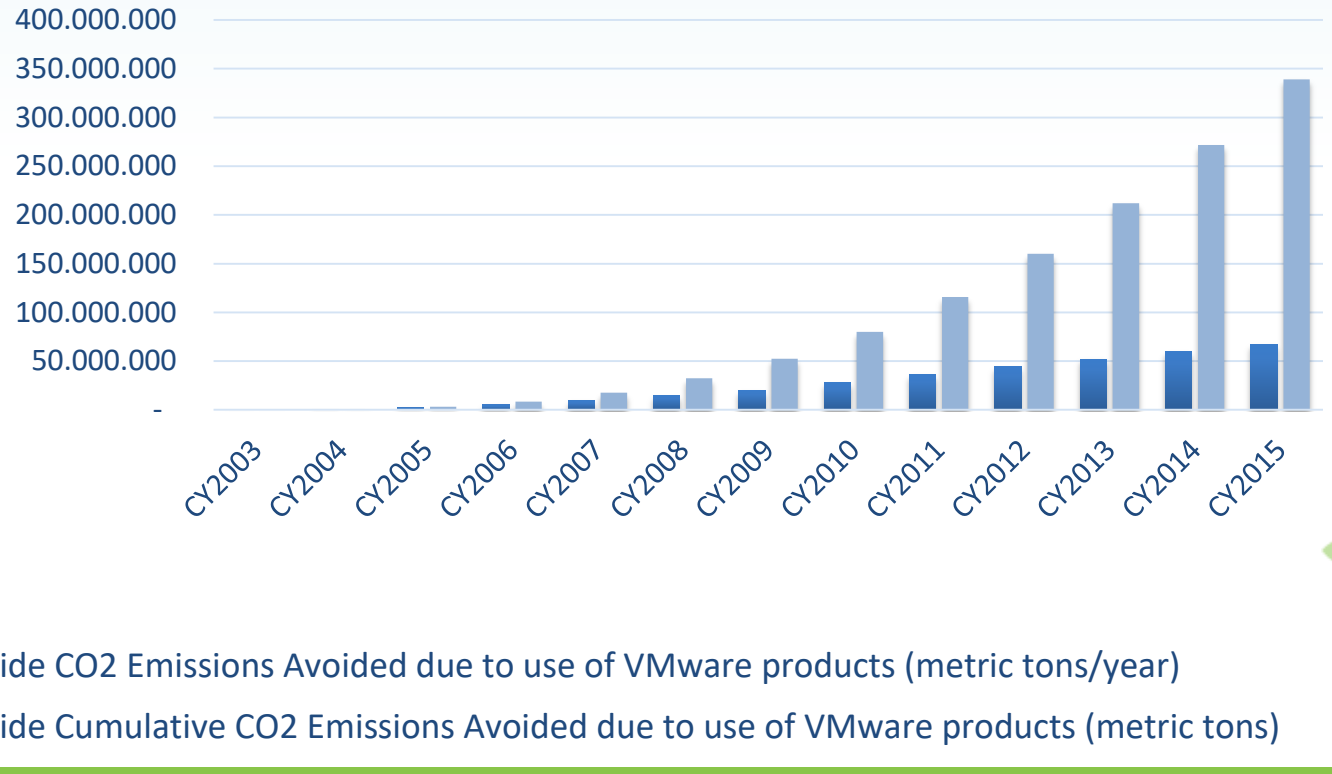


Reduction in Global Power Consumption



Massive CO2 Emission Reduction

Worldwide CO2 Emission Reduction Associated with the use of VMware Products




We Are Just Getting Started!
Distributed Power Management
Host Power Management
30%
Virtual Desktops
35%
VSAN, NSX
More on the Way!
12

2010: 2%

2020: 5% - 10%

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Thank you for your attention

Contact

email: jbaguley@vmware.com

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European Framework Initiative for Energy & Environmental Efficiency in the ICT Sector

Overview of ITU-T methodologies to assess the environmental impact of ICT

Jean-Manuel Canet
Vice-Chairman, Study Group "Environment and Climate Change"
ITU-T International Telecommunication Union

Tuesday, 20th December 2016

Development of ITU-T methodologies : a cooperative effort

ETSI World Class Standards

ISO Organisation internationale de normalisation

GeSI GLOBAL e-SUSTAINABILITY INITIATIVE

United Nations Framework Convention on Climate Change

IEC

The Greenhouse Gas Protocol Initiative
The foundation for sound and sustainable climate strategies

- Mitigation purposes : Methodologies related to the assessment of footprint
- Adaptation purposes : framework, best practices, adapting infrastructure

ITU-T Energy and carbon footprint methodologies (1/2)

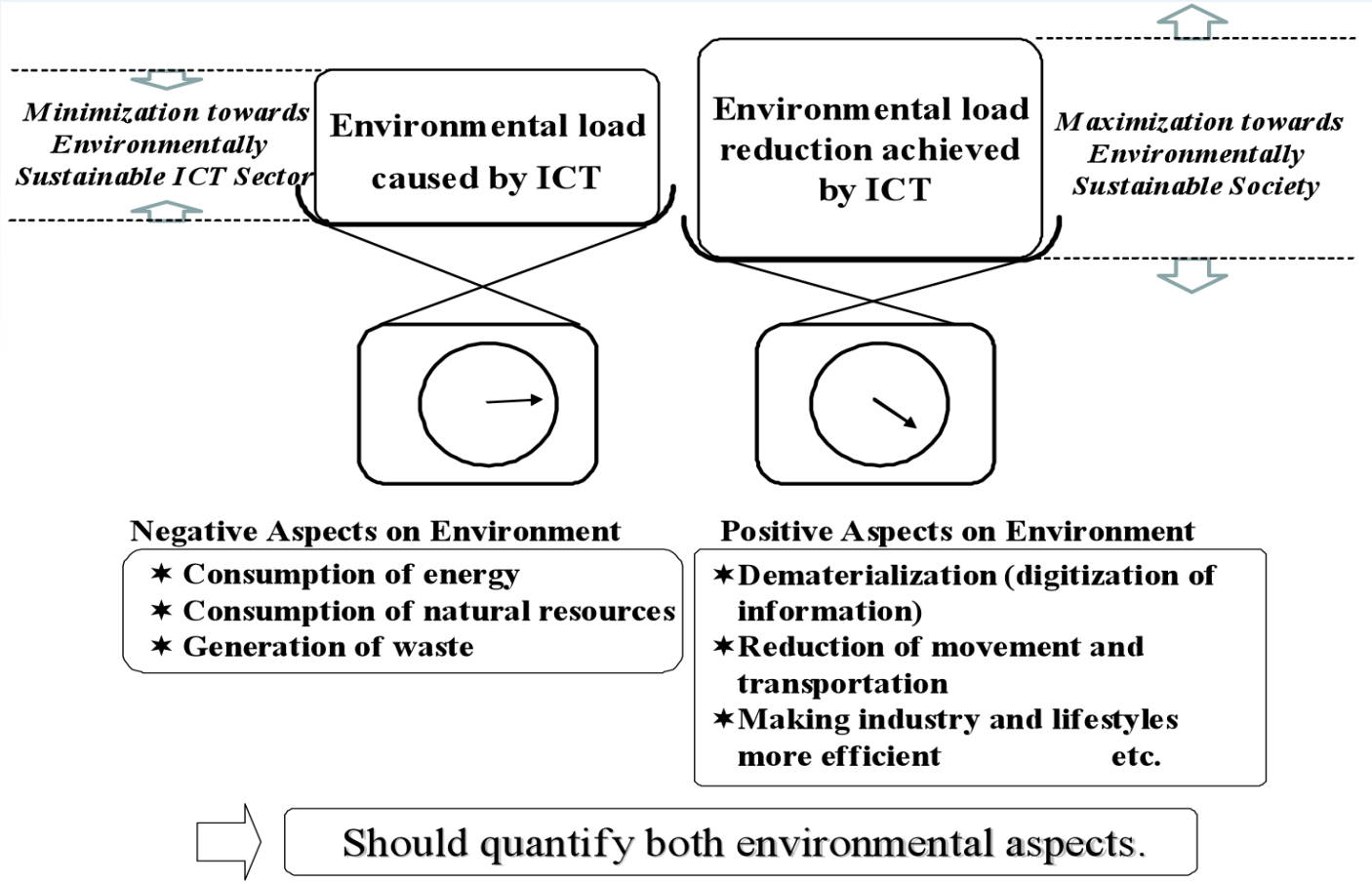
- **L.1400**- Overview and general principles
  - https://www.itu.int/rec/T-REC-L.1400
- **L.1410** - Environmental impact of ICT **goods, networks and services**
  - 2 Parts : cover **first order and second order effects of ICT**
  - **Revision 1 in force prepared jointly with ETSI**
  - https://www.itu.int/rec/T-REC-L.1410
- **L.1420** - Environmental impact of ICT in **organisations, published**
  - Includes 3 scopes of ISO 14064-1
  - Covers both ICT sector organisations and ICT in other organisations
  - https://www.itu.int/rec/T-REC-L.1420

ITU-T Energy and carbon footprints methodologies (2/2)

- **L.1430** Environmental impact of **ICT projects**
  - a complement to ISO standard ISO 14064-2 and the Project Protocol of the Greenhouse Gas Protocol (GHG Protocol)
  - it provides guidance for the application of a specific methodology to assess the environmental impact of information and communication technology (ICT) greenhouse gas (GHG) and energy project
  - https://www.itu.int/rec/T-REC-L.1430

- **L.1440** Environmental impact of **ICT in cities**
  - 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.
  - https://www.itu.int/rec/T-REC-L.1440

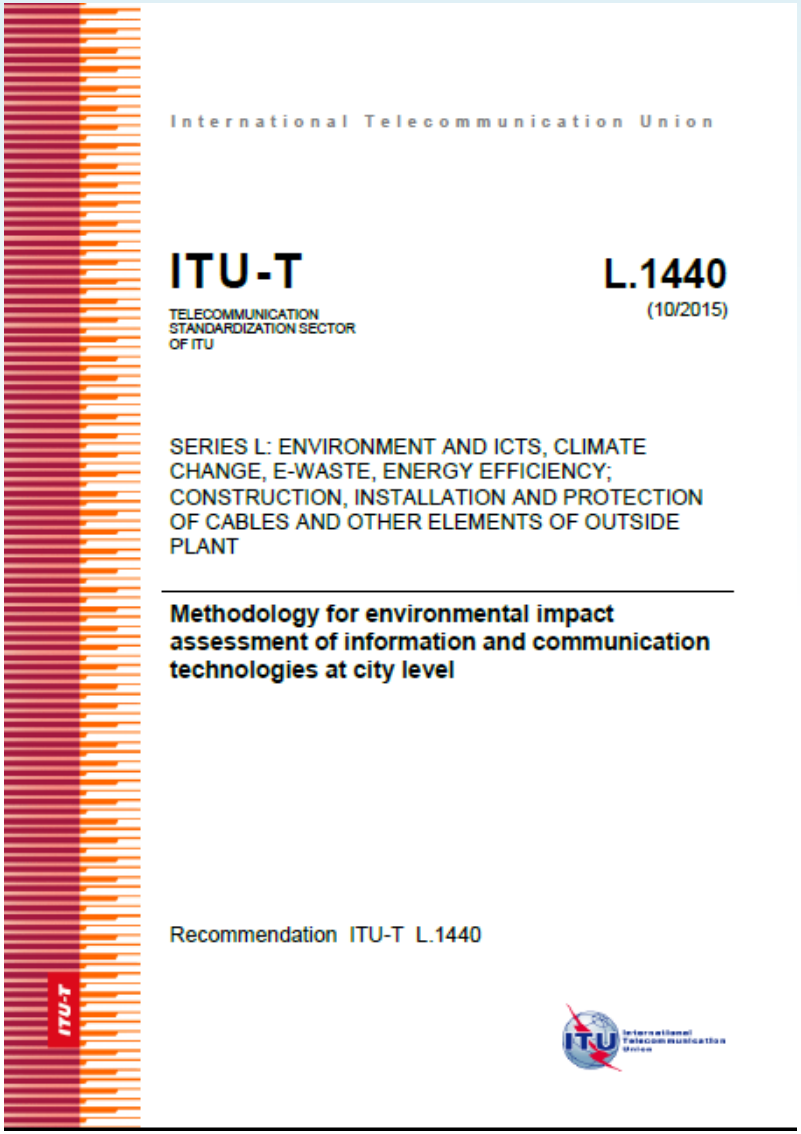
Environmental aspects of ICT



General principles

- Relevance
  - Select GHG sources, data and methods appropriate to the assessment of the GHG emissions of ICT activities and organizations.
- Completeness
  - Include all specified GHG emissions that provide a material contribution to the assessment of GHG emissions arising from products.
- Consistency
  - Enable meaningful comparisons in GHG-related information.
- Accuracy
  - Reduce bias and uncertainties as far as practicable.
- Transparency
  - The organization shall disclose the information sufficiently to allow a third party to make decisions with confidence.

L.1440



International Telecommunication Union

ITU-T

TELECOMMUNICATION STANDARDIZATION SECTOR OF ITU

L.1440

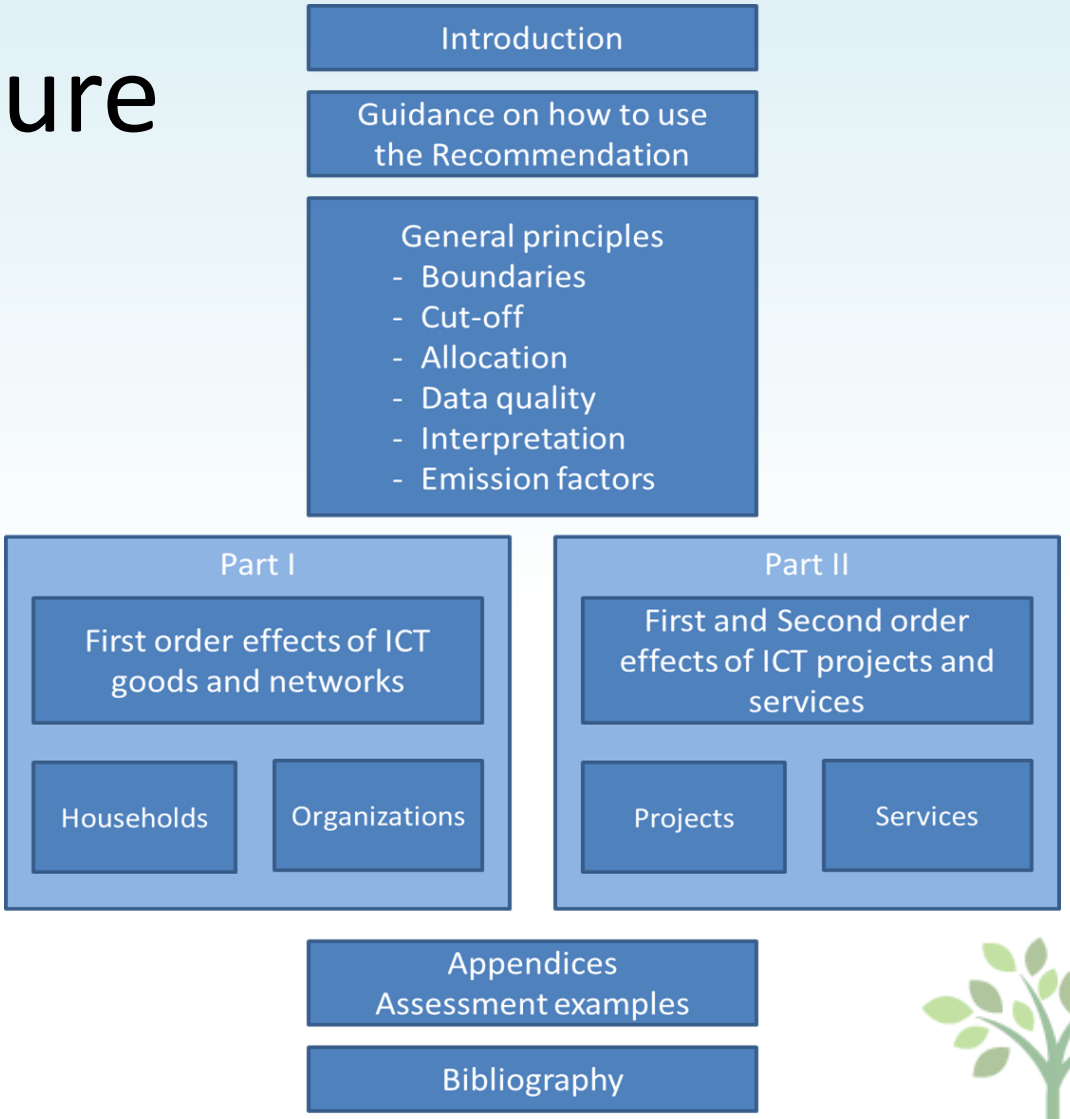
(10/2015)

SERIES L: ENVIRONMENT AND ICTS, CLIMATE CHANGE, E-WASTE, ENERGY EFFICIENCY; CONSTRUCTION, INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANT

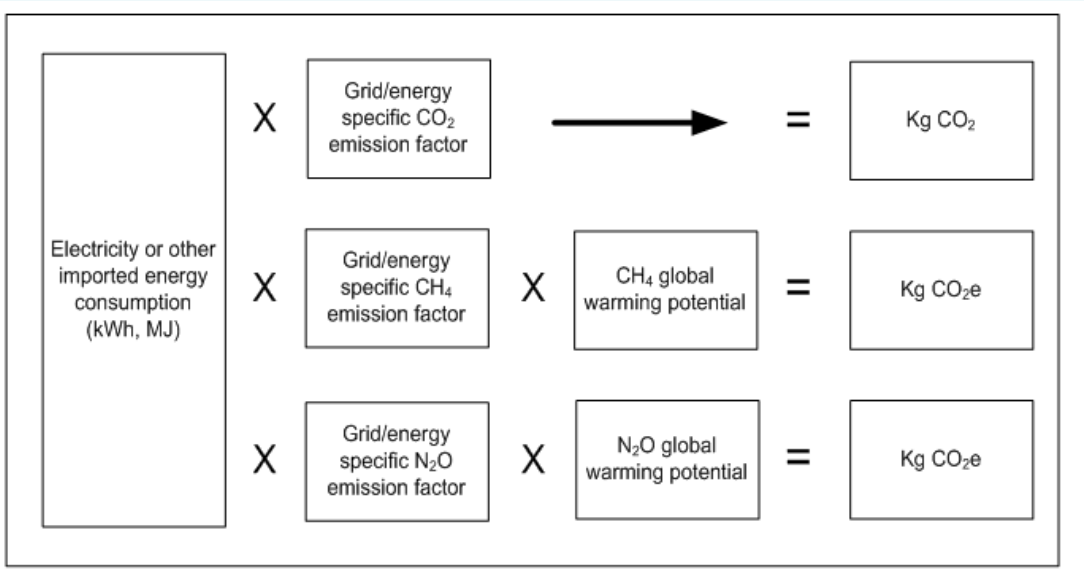
Methodology for environmental impact assessment of information and communication technologies at city level

Recommendation ITU-T L.1440

L.1440 structure

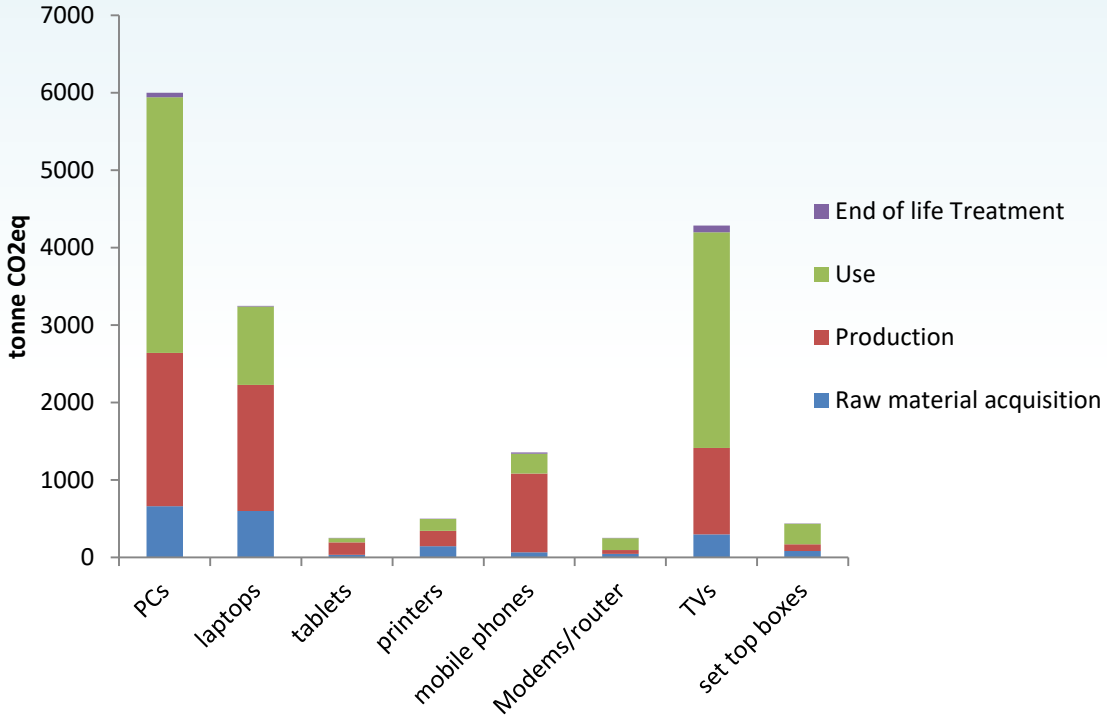


Quantification methodologies



GWP factors for GHG taken from IPCC Time frame of 100 years

GHG Emissions in a city : example of results



Yearly city level life cycle GHG emissions related to ICT goods in all households, city with 77 500 inhabitants, Italy
source : Appendix I, L.1440

Thank you for your attention

Contact

email: jean-manuel.canet@orange.com

THANK YOU!

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the future is *sustainable*!

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