BEFORE STARTING

HOUSEKEEPING

- Turn on your system's sound to hear the streaming presentation
- **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: Sustainable ICT - Achieve more with Less: The experience of CircularComputing, CATALYST & best practice data centres

In parternship with:

circular computing

CBRE Data Centers

Catalyst

Wednesday, 14th November 2018

Speakers

Steve Haskew
Strategic Commercial Manager
CircularComputing

Mark Acton
Head of Data Centre Technical Consulting
CBRE's Global Data Centre Solutions

Vasiliki Georgiadou
Project Manager
Catalyst Project

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.

Partners

Trust-IT Services
Communicating ICT to markets

Deloitte.

EUROCITIES

Stakeholders

- ICT Intensive SME
- SDOs (Standard Development Organisations)
- Cities & Public Administration
- ICT Suppliers

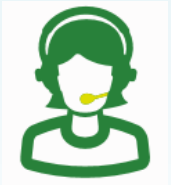
Helping you choose your Low Carbon & Energy Efficiency in ICT

ICTFOOTPRINT.eu Results so far

5.000+ Community Members

26 ICT Sustainable Suppliers from 11 different countries

14 Advisory Group members from 7 different countries

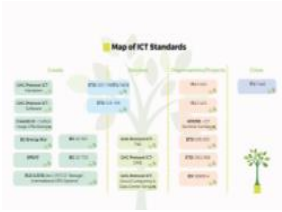


5 languages helpdesk (EN, FR, DE, IT, ES)

1 Paper published in Scientific Event proceedings

1 user-friendly Self-Assessment Tool (SAT-O)

44 Success Stories on Green ICT



Map of ICT Standards with 20 factsheets

11 webinars with +30 different speakers & +400 registrations

Active Presence in 20 ICT & energy-aware events, plus visibility in 5 events

Consolidated community of 5,000+, through an effective marketplace, help desk, dynamic Map of ICT Standards, and communication & dissemination actions

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 (EN, 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!**
SAT-S & SAT-O	**Measure your own carbon footprint and start learning how to become sustainable thanks to ICT standards & methodologies.**
Map of ICT Methodologies	**20 downloadable fact-sheets of ICT methodologies & standards, understand & measure your ICT goods, services organisations & cities' carbon footprint.**

Join us and get energy savings by choosing low carbon ICT

A Low Carbon ICT engaged community

Social Media followers, Newsletter subscribers, Webinars registrations , Marketplace sellers & buyers, Journalists, Synergies

★ > 5.300 members ★

ICTFOOTPRINT.eu COMMUNITY

ICTFOOTPRINT.eu Community 3.750 members

- *SMEs 53%*
- *Large Enterprises 12%*
- *Public Administration 5%*
- *NPO 24%*
- *SDO 0,6%*
- *Media 2,20%*
- *Academia & Research Centre 3,3%*

Amongst the connections that count (multipliers/influencers)

10 webinars with reputable speakers

CARBON TRUST · ETSI · the green grid · ITU · Greenit amsterdam region · DATA CENTER eureca PROJECT · vmware · BUREAU VERITAS · Sustainability for London Your Future In Your Hands · Microsoft

26 sustainable ICT sellers

VERNE GLOBAL · The Planet Mark · networkdna · ELe Extreme Low Energy · eden project · Enervalis · greengage IT · caelus consulting · Carbon IT · circular computing · Certics · CELESTE · GREENSPECTOR · Green Web

How sustainable is your ICT company?

https://ictfootprint.eu/en/services/self-assessment-tool-organisations

SAT-O (for Organisations) – Free & simple tool to calculate the overall carbon footprint of your organisation

- Digital services provided & used by the organisation
- Structural impact of the building and personnel's
- Your own personalised report, with a light reading style, that shows the approximate climate change and primary energy footprint of your ICT-intensive organisation assessed over one year

SAT-O

Assess the ICT carbon footprint of your organisation, for sustainable ICT decisions

TRY "SAT-O" TOOL & MAKE INFORMED DECISIONS ON HOW TO MAKE YOUR ICT SUSTAINABLE & ENERGY EFFICIENT

Get to action! Joins us at ICT2018

What?

Networking session 4th December

Hall L5 – 17:00 to 17:45

Exhibition Stand from 4th to 6th December

Exhibition Area X3 | Stand I22

Who?

Public Authorities & cities, ICT companies, NGO on sustainability & ICT, Standard Development Organisations and and ICT

Key priorities, insights, networking, green tools, sustainable IT suppliers & further activities at our exhibition stand & networking session

REGISTER ON https://ictfootprint.eu/user/register TO GET OUR NEWSLETTERS

ICTFOOTPRINT.EU

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

Sustainable IT – Do you know the true cost?

Name Steve Haskew

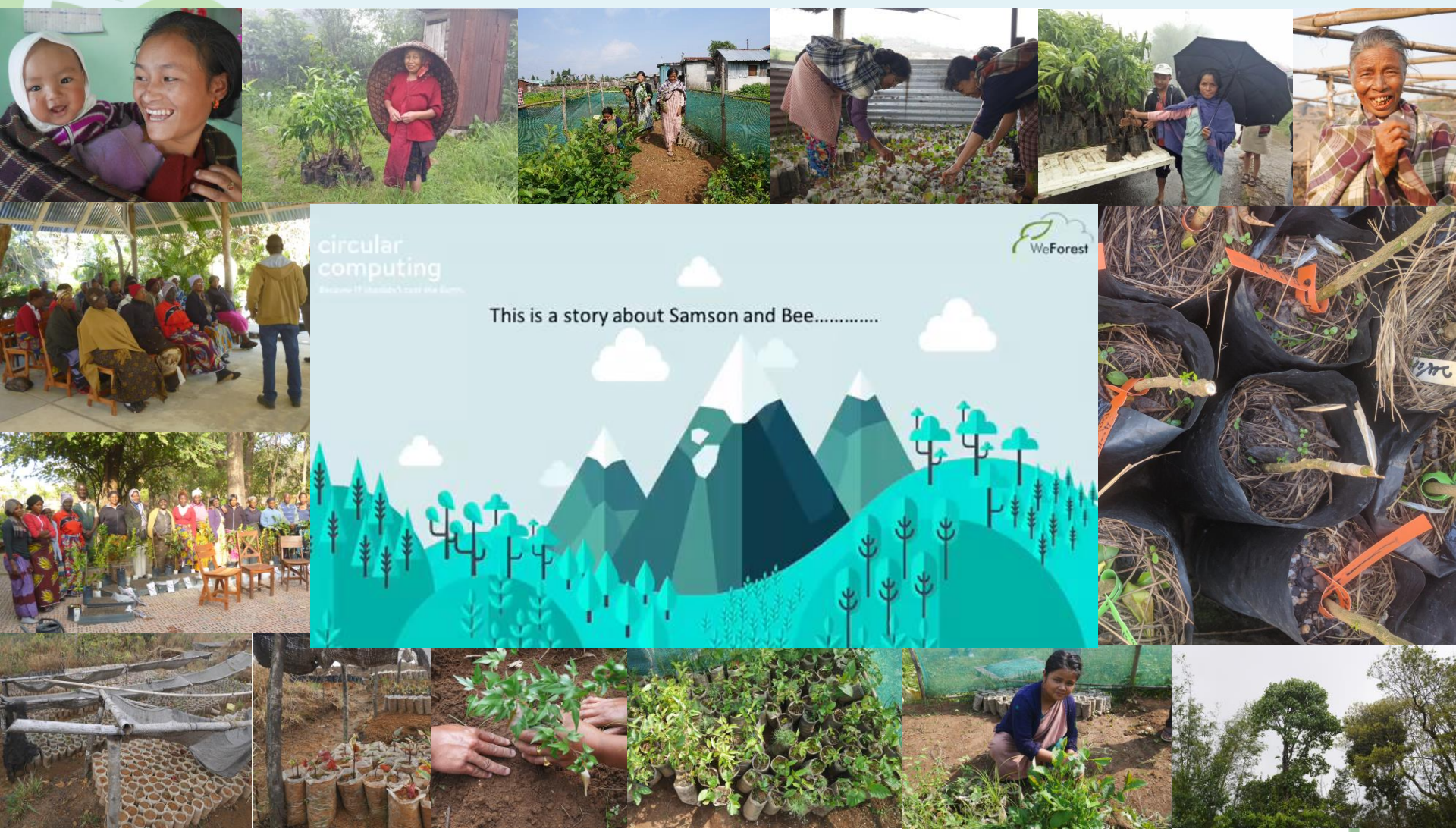
circular computing

Because IT shouldn't cost the Earth.

14-11-18

Who we are?

- The business was established before the Internet
- We offer 3 year old laptops and make them new again
  - Complete cosmetic overhaul
  - SSD as standard
  - New Duracell battery
  - 3 year warranty
  - Distribution through Circular Partners
  - We deliver a new Grade of IT
- We are a Secondary Equipment Manufacturer.
- We support reforestation programmes.


circular
computing
WeForest
This is a story about Samson and Bee.....

Sustainability?

- What does it mean to you and your company?
  - Are you aligned, or pulling in a different direction?

One topic - Energy

Which do you value most?

1. Energy in Product Production
2. Energy In Use
3. Energy in Disposal

If "in use".....then this is a small % of the total

Component	HP 9470M	HP 840	Lenovo T440	Dell Lattitude E7240	Dell Lattitude E7440
EPEAT	EPEAT GOLD	EPEAT GOLD	EPEAT GOLD	EPEAT GOLD	EPEAT GOLD
ENERGY STAR	ENERGY STAR 6.0	ENERGY STAR 6.0	ENERGY STAR 6.0	ENERGY STAR 5.2	ENERGY STAR 5.2
Average energy consumption per year TEC	35.57 kWh/year	35.83 kWh/year	26.84 kWh/year	21.65 kWh/year	26.84 kWh/year
Average cost to run per year**	€ 5.07	€ 5.10	€ 3.81	€ 3.09	€ 3.81
User Carbon Footprint per year*	13 kgCO2eq /year ***	13 kgCO2eq /year ***	9 kgCO2eq /year ***	8 kgCO2eq /year ***	9 kgCO2eq /year ***
OEM Carbon Footprint Declaration	255kg CO2eq ***	255kg CO2eq ***	330.96kg Co2eq ***	252kg Co2eq ***	242kg Co2eq ***

Production + 3 years use

Consider usage and cost *versus* product saving and production CO2

Compromise

- Are you being asked to compromise when buying Sustainable IT?
  - Is this relevant?
  - Are you qualified to answer?
  - Do you know how to define the question?

Cost

- Only when you have defined "what is in it for me and my company" will you be able to answer: -
- Can I afford to consider sustainability?
- Can I afford not to consider sustainability?

The Circular Lens

Circular Computing

Sustainable IT
Environmentally friendly
Ethically manufactured
Carbon neutral footprint
5 x Tree's for every laptop
Buyback & Reloop

Sustainability Teams

Sustainability
Environment
Ethics & welfare
Employee affinity
Brand affinity
Corporate values
Compliance
Accountability

IT & Finance Teams

Performance hardware
EOL optimized solution
Total cost of ownership
Value for money
Service & quality
Compliance
Existing supply chain

User Experience

Creates positive social, ethical & environmental impact that unites and aligns the goals of employees, companies and the environment.

Thank you for your attention

Contact: Steve Haskew @steve_haskew

email: steve.haskew@circularcomputing.com

@CircularIT

www.circularcomputing.com

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

Standards and Best Practices Supporting ICT Sustainability

Mark Acton – Head of Data Centre Technical Consulting, CBRE

Wed, Nov 14, 2018

CBRE Data Centers

CBRE

STANDARDS AND BEST PRACTICES SUPPORTING ICT SUSTAINABILITY

Mark Acton – Head of Data Centre Technical Consulting, CBRE

2018

CENELEC and emerging European Standards

- CENELEC is the European Committee for Electrotechnical Standardization and is responsible for European standardization in the field of electro-technical engineering.
- Designated as a European Standards Organization by the European Commission.
- Works alongside CEN, the European Committee for Standardisation.
- CENELEC are a member of the CEN / CENELEC / ETSI Coordination Group: Green Data Centres (GDC). http://www.cencenelec.eu/standards/Sectors/ICT/Pages/GreenDataCentres.aspx
- CENELEC TC 215 WG3 (EN 50600 series), is responsible for the development of EN50600 series of standards.

EN 50600 BACKGROUND

- EN 50600 (Information technology - Data centre facilities and infrastructures)
- CENELEC TC 215 WG3 (EN 50600 series), are responsible for the development of EN50600 series of standards (data centre facilities and infrastructures)
- Includes sections for building construction, power distribution, environmental control, telecoms cabling, security systems, management and operations
- Now incorporated into ISO/IEC JTC 1 Study Group on Energy Efficiency of Data Centers (SD-EEDC) as ISO/IEC TS 22237 series

CENELEC

ISO JTC1 IEC
INFORMATION TECHNOLOGY STANDARDS

CBRE

EN 50600 series of standards

- **EN 50600-1**: *Information technology - Data centre facilities and infrastructures Part 1: General concepts*
- **EN 50600-2-1**: *Building construction*
- **EN 50600-2-2**: *Power distribution*
- **EN 50600-2-3**: *Environmental control*
- **EN 50600-2-4**: *Telecommunications cabling infrastructure*
- **EN 50600-2-5**: *Physical security*
- **EN 50600-3-1**: *Management and operational information*
- **EN 50600-4-1**: *KPIs - Overview and general requirements*
- **EN 50600-4-2**: *KPIs - Power Usage Effectiveness (PUE)* ISO/IEC 30134-2
- **EN 50600-4-3**: *KPIs - Renewable Energy Factor (REF)* ISO/IEC 30134-3
- **EN 50600-4-4**: *KPIs - IT Equipment Energy Efficiency for Servers*
- **EN 50600-4-5**: *KPIs - IT Equipment Energy Utilisation for Servers*
- **TR 50600-99-1:** *Energy management - Recommended Practices*
- **TR 50600-99-2:** *Environmental sustainability - Recommended Practices*

(*Note:* **TR 50600-99-4 -** *Data Centre Maturity Model is in development***)**

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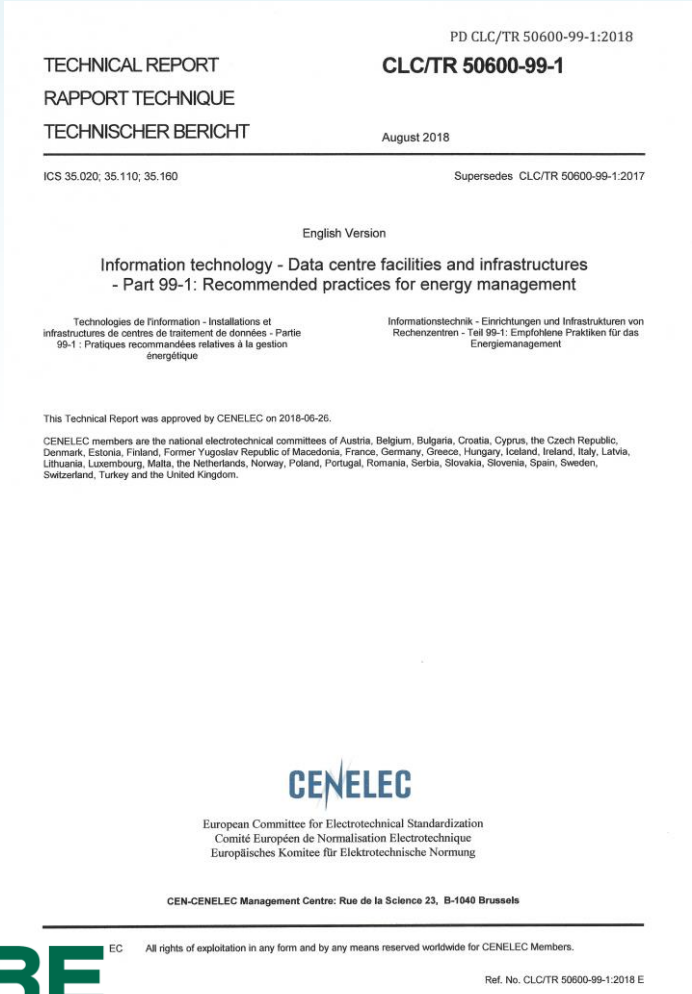
EN 50600 series 99-1 and 99-2



PD CLC/TR 50600-99-1:2018

TECHNICAL REPORT
RAPPORT TECHNIQUE
TECHNISCHER BERICHT

CLC/TR 50600-99-1

August 2018

ICS 35.020; 35.110; 35.160

Supersedes CLC/TR 50600-99-1:2017

English Version

Information technology - Data centre facilities and infrastructures - Part 99-1: Recommended practices for energy management

Technologies de l'information - Installations et infrastructures de centres de traitement de données - Partie 99-1 : Pratiques recommandées relatives à la gestion énergétique

Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 99-1: Empfohlene Praktiken für das Energiemanagement

This Technical Report was approved by CENELEC on 2018-06-26.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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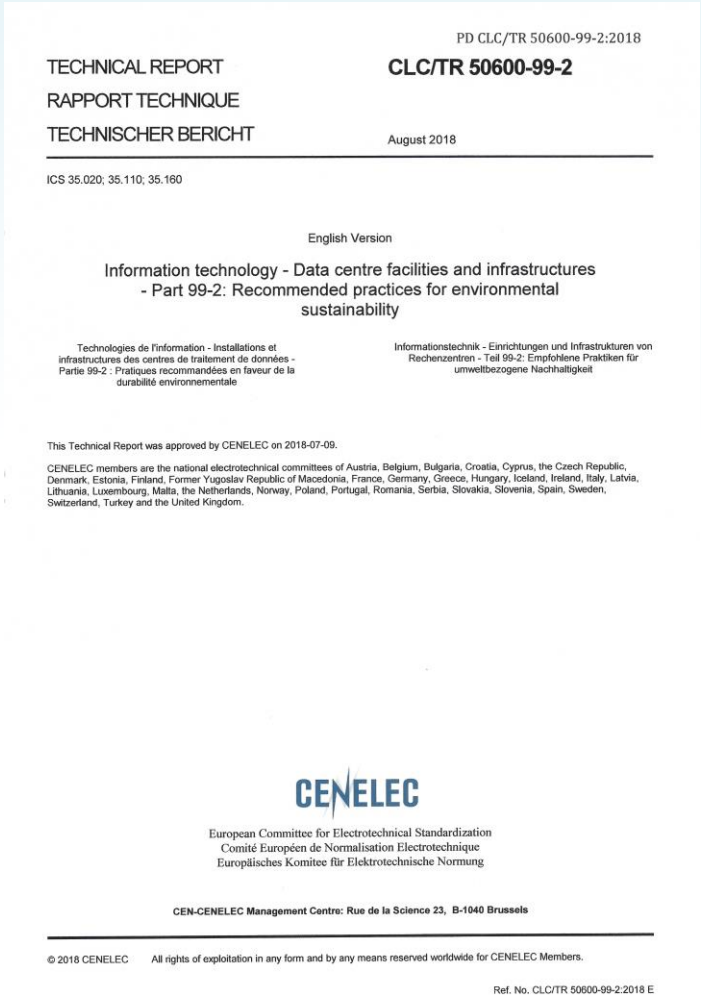
Ref. No. CLC/TR 50600-99-1:2018 E



PD CLC/TR 50600-99-2:2018

TECHNICAL REPORT
RAPPORT TECHNIQUE
TECHNISCHER BERICHT

CLC/TR 50600-99-2

August 2018

ICS 35.020; 35.110; 35.160

English Version

Information technology - Data centre facilities and infrastructures - Part 99-2: Recommended practices for environmental sustainability

Technologies de l'information - Installations et infrastructures des centres de traitement de données - Partie 99-2 : Pratiques recommandées en faveur de la durabilité environnementale

Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 99-2: Empfohlene Praktiken für umweltbezogene Nachhaltigkeit

This Technical Report was approved by CENELEC on 2018-07-09.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Ref. No. CLC/TR 50600-99-2:2018 E

CBRE EC

International Standards Institute (ISO)

- ISO is an independent, non-governmental membership organization and the world's largest developer of voluntary International Standards
- Members are the national standards bodies of the 163 member countries around the world. Based in Geneva, Switzerland
- Works alongside International Electrotechnical Commission (IEC), in the development of emerging international data centre standards
- ISO/IEC JTC1 SC39 WG1 are responsible for the development of the ISO/IEC 30134 series of standards (data centre resource efficiency KPIs)
- PUE / DCiE from The Green Grid now falls under ISO/IEC JTC1 SC39 and is now defined as ISO/IEC 30134-2
- A key development is the adoption of EN50600 as the ISO/IEC TS 22237 series under ISO/IEC JTC1

ISO JTC 1 IEC
INFORMATION TECHNOLOGY STANDARDS

CBRE

Standards based Data Centre KPIs

- CUE (Carbon Usage Effectiveness) , WUE (Water Usage Effectiveness), ERE (Energy Re-Use Usage Effectiveness) are used in many data centres to indicate some areas of performance against building load.
- These either have been, or are being developed into ISO/IEC KPIs by ISO/IEC JTC1
- The current internationally agreed data centre KPIs are: ISO/IEC 30134-2 (EN 50600-4-2) Power Usage Effectiveness (PUE) and ISO/IEC 30134-3 (EN 50600-4-3) Renewable Energy Factor (REF)
- Note that neither of these are measures of data centre energy efficiency.
- A full list of ongoing data centre standards efforts can be obtained from CEN/CENELEC/ETS Coordination Group for Green Data Centres (CG GDC)

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Eco-management and audit scheme (EMAS)

- A system for environmental management in the workplace published by JRC
- Aligns with the international environmental management standard ISO 14001 as well as ISO 14040 and ISO 14044 relating to Lifecycle Assessment (LCA)
- EMAS is open to every type of organisation eager to improve its environmental performance
- Supported by JRC documents published as 'best environmental management practices' (BEMPs) , referred to as Sectoral Reference Documents (SRDs)
- References the use of The Best Practices from both EU CoC and TR 50600-99-1

http://ec.europa.eu/environment/emas/register/

http://susproc.jrc.ec.europa.eu/activities/emas/

EMAS
Verified environmental management
EL-000072

CBRE

ISO 14001

- ISO 14001 sets out the criteria for an environmental management system and can be used for certification. It seeks to map out a framework that a company or organisation can follow to set up an effective environmental management system.
- Using ISO 14001 can provide assurance to company management and employees as well as external stakeholders that environmental impact is being measured and improved.
- The benefits of using ISO 14001 can include:
  - Reduced cost of waste management
  - Savings in consumption of energy and materials
  - Lower distribution costs
  - Improved corporate image among regulators, customers and the public

CBRE

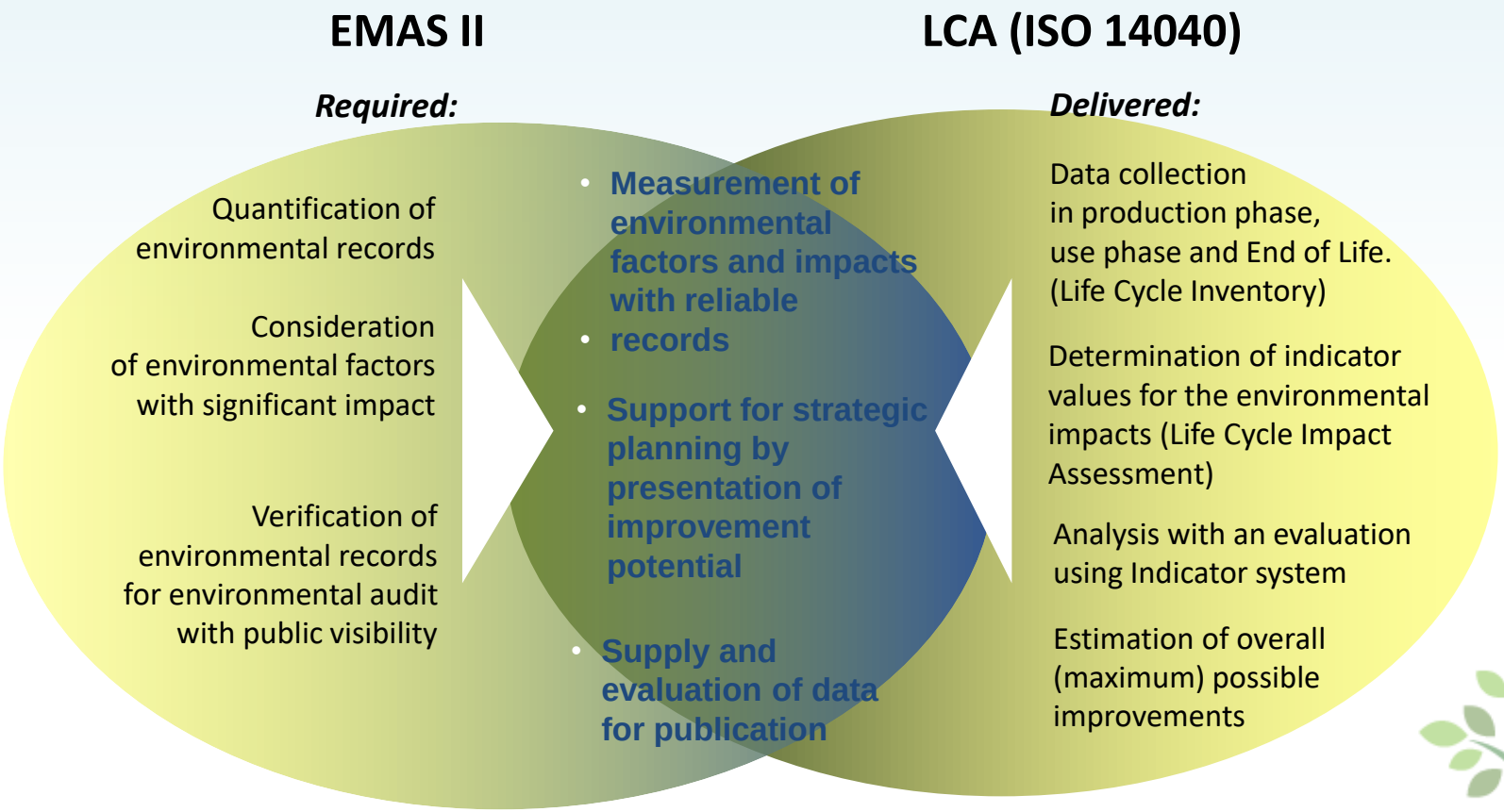
Comparison of EMAS and ISO 14001

Criteria	EMAS I	ISO 14001
Goal	Continuous improvement of companies environmental protection	Continuous improvement of environmental records
Scope	EU	World
Target group	All organisations	All organisations
Reference framework	Site-specific (including other companies working on site) or organisation-related	Organisation-related
Environmental regulations	Compliance obligatory	Commitment
Public participation	Environmental statement (yearly), integration of employees	Environmental policy, no further obligation for publication
Environm. aspects	Focus on direct aspects	Focus on direct aspects
Validation	Obligatory all 1 to 3 years	Voluntarily by ISO–Auditor

ISO 14040

- ISO 14040 (second edition) details the requirements for conducting a Lifecycle Assessment (LCA) in conjunction with ISO 14044.
- ISO 14040 covers LCA studies and life cycle inventory (LCI) studies.
- LCA addresses the environmental aspects and potential environmental impacts (e.g. use of resources and the environmental consequences of releases) throughout a product's life cycle from raw material acquisition through production, use, end-of-life treatment, recycling and final disposal (i.e. cradle-to-grave).
- Intended to fully align with ISO 14001 and ISO 9001
- The EU CoC includes a commitment to “Introduce a plan for Life Cycle Assessment (LCA) in accordance with emerging EU guidelines and internationally standardised methodology (ISO 14040)”.

Comparison of EMAS II and Life Cycle Assessment (LCA)



CBRE

Gracias. Thank You. 謝謝. Salamat. Obrigado. شكرا

Спасибо. 감사합니다. ขอบคุณ. Danke. ありがとう. Merci.

Mark Acton

Head of Data Centre Consulting
CBRE Data Centre Solutions
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DATA CENTER SOLUTIONS

@CBREdatacenters

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RISE
RESPECT/INTEGRITY/SERVICE/EXCELLENCE

toward a greener tomorrow

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ICTFOOTPRINT.EU

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

CATALYST introduces the Green Data Centre Assessment Toolkit

Vasiliki Georgiadou
Green IT Amsterdam

Wed, Nov 14, 2018

Catalyst

More Data, Less Gas

ICT converts electricity to heat

There were there is a supply or demand in data

Supporting the grid for sustainability

Local consumption of locally produced energy

Produce and use heat

Contribute to energy flexibility

We Are Green IT Amsterdam

NEDERLAND ICT
VOOR DE DIGITALE ECONOMIE

datacentre dca alliance

DUTCH DATACENTER ASSOCIATION

FHI IT ROOM INFRA

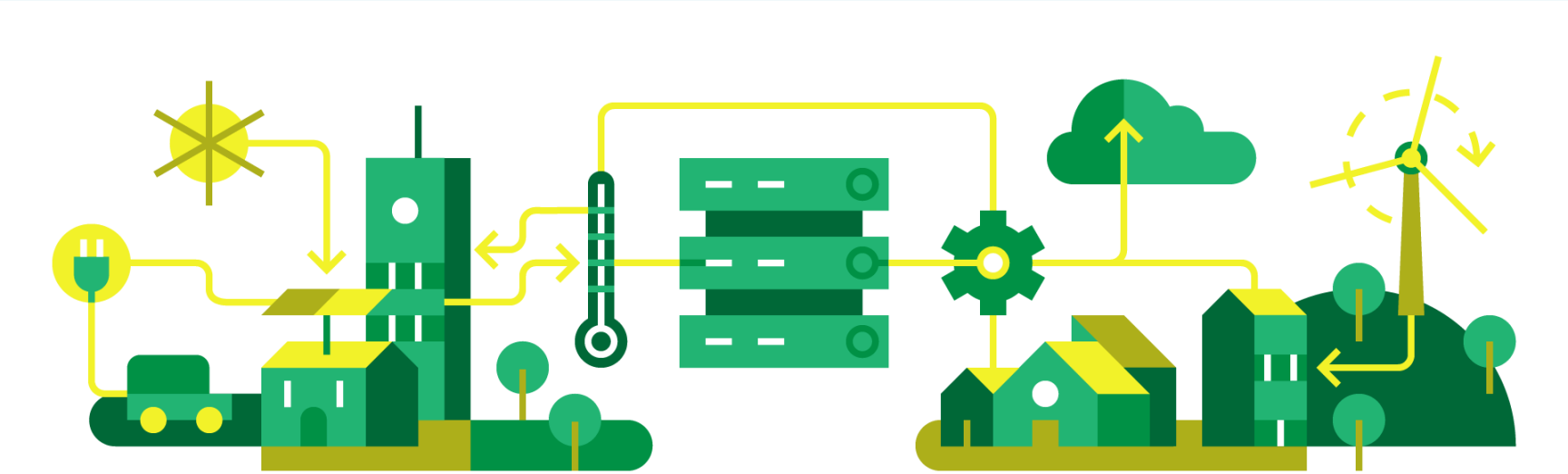
amsterdam smart city

Gemeente Amsterdam

amsterdam economic board

Catalyst

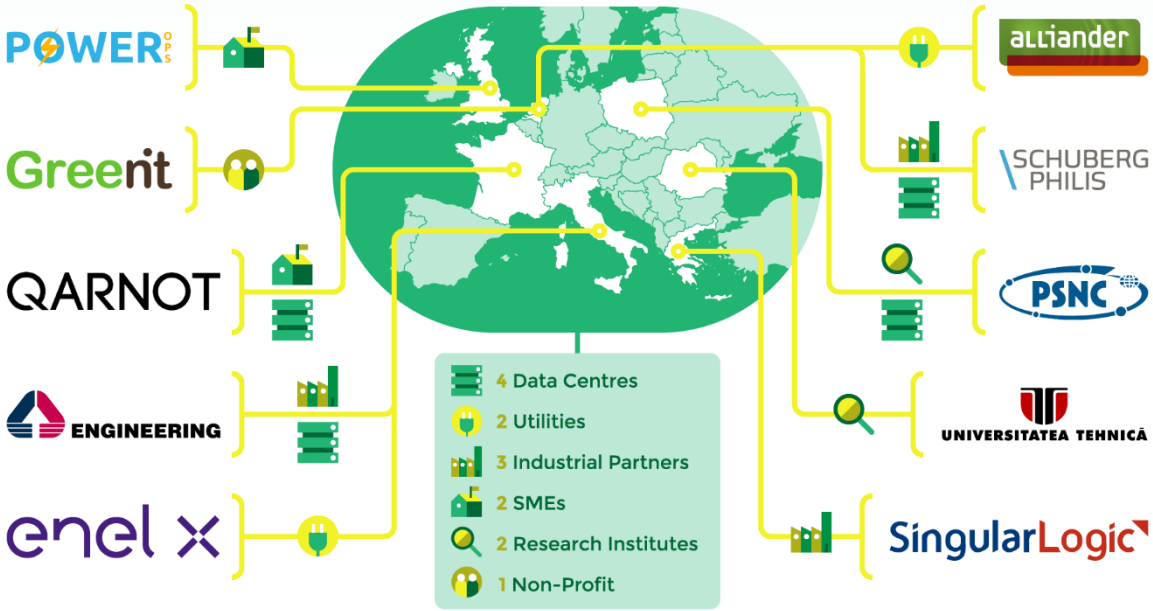
"Data Centres can and should offer energy flexibility services to their smart grid and district heating networks"



Catalyst

CATALYST at a glance

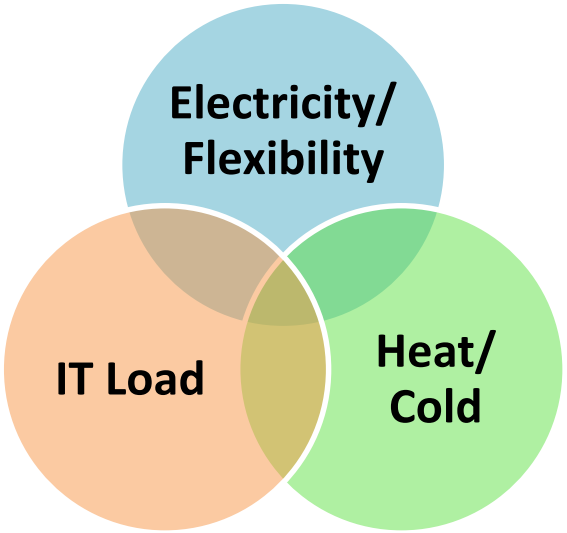
- **Converting Data Centres in Energy Flexibility Ecosystems**
- **H2020-EE-2017-20 Innovation Action**
- **October 2017 – October 2020**
- **2.982.805 Euro (EU 2.299.103,5 Euro)**



Catalyst

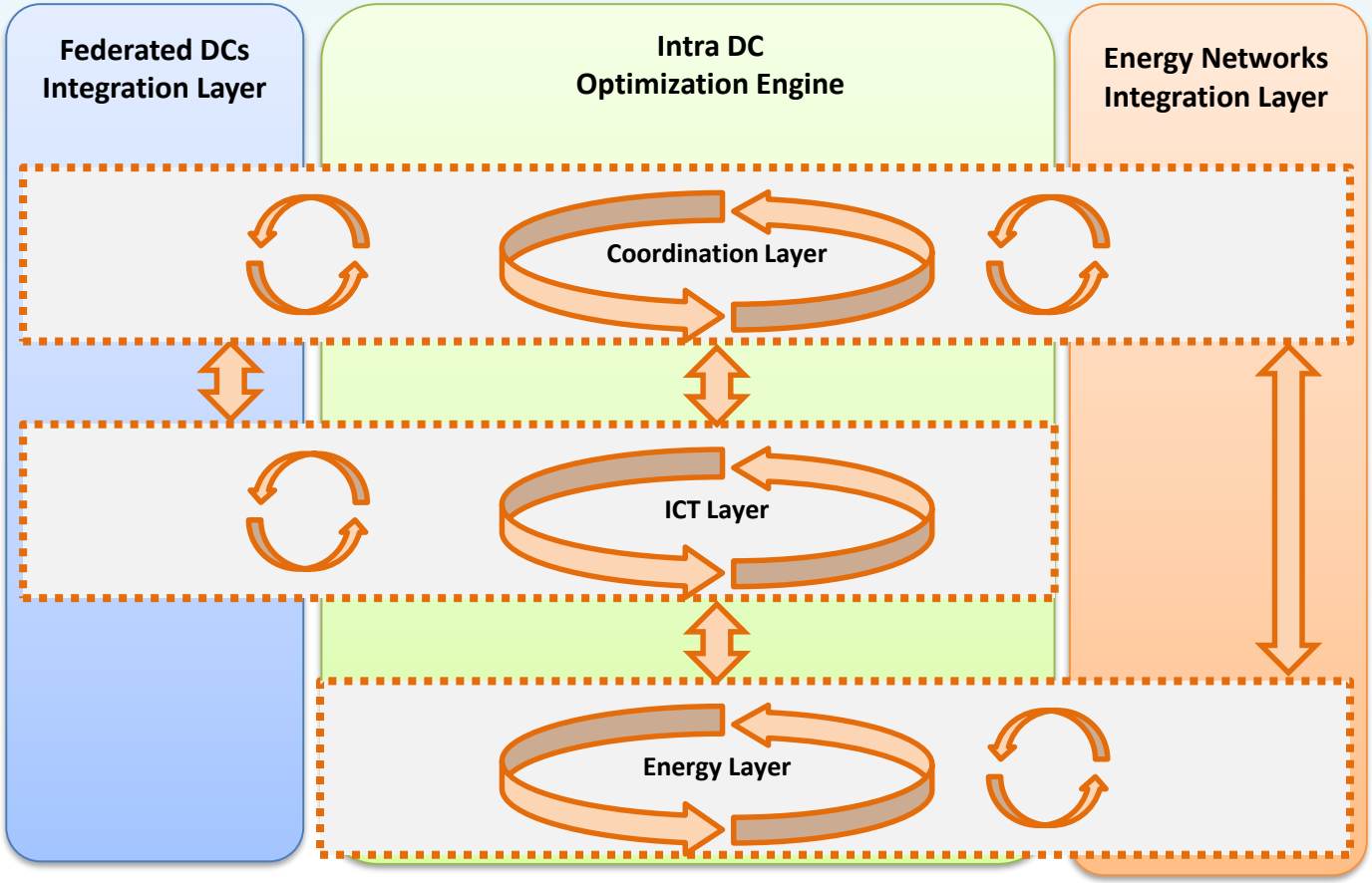
Marketplace as a Service

Scenarios are built up from the **premise** that ***electricity (incl. flexibility), heat and IT load*** are nothing but **commodities** that data centres can **transfer, exchange and trade** in their corresponding emerging markets either individually or combined to achieve **synergies** whenever applicable.



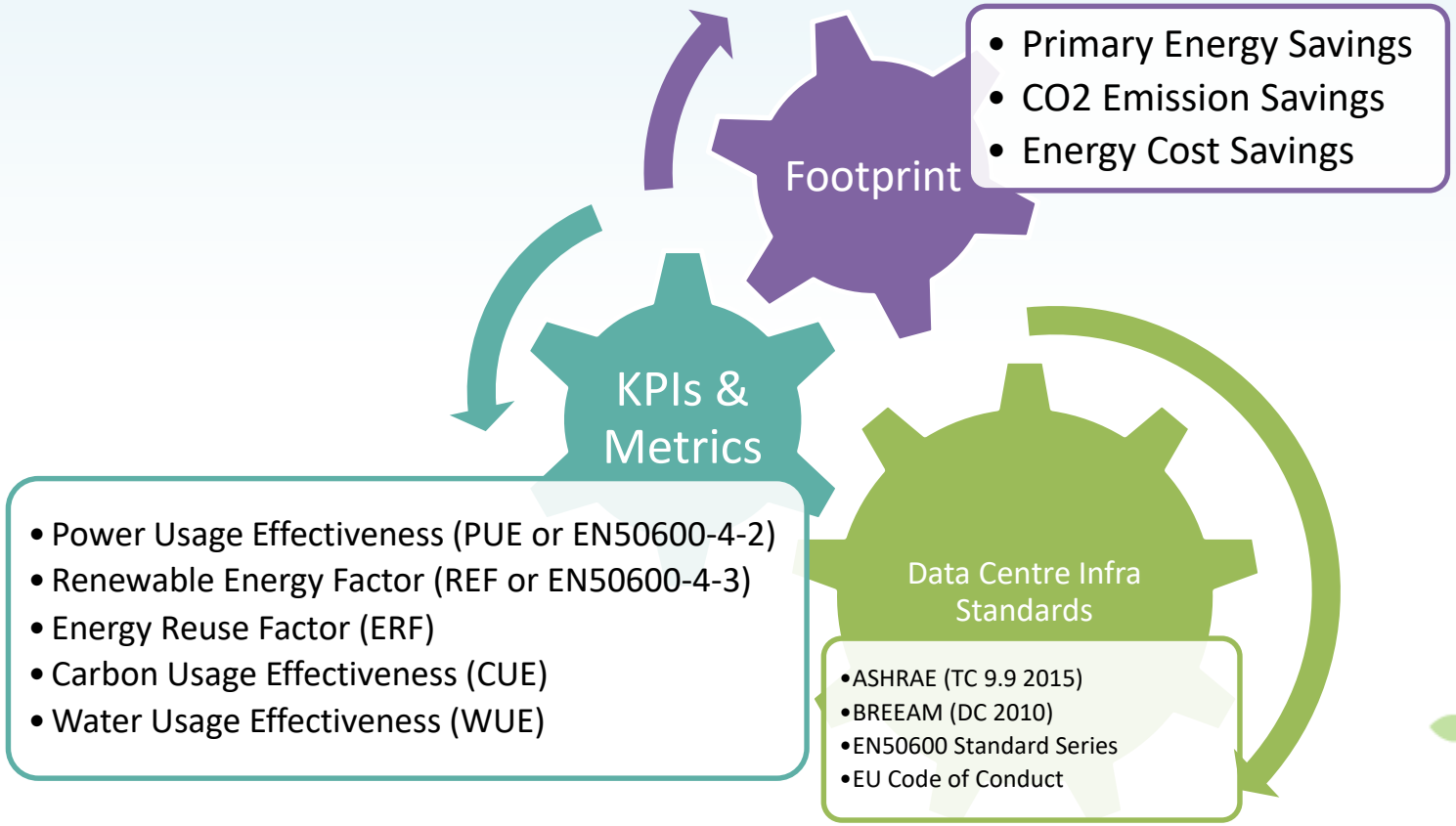
Catalyst

"Follow the Energy"



Catalyst

Data Centre Metrics Landscape: A Snapshot



Catalyst

Selected Metrics & KPIs (1/2)

Metric	Description	Formula	Unit / Range	Optimal Value	Source
Power Usage Effectiveness – PUE	% of energy spent powering ancillary equipment	$\frac{Total\ Facility\ Energy}{IT\ Equipment\ Energy}$	N/A 1<PUE	As close to 1 as possible	EN 50600-4-2; ISO/IEC 30134-2
Renewable Energy Factor – REF	% of renewable energy over total DC energy	$\frac{RE\ owned\ \&\ controlled\ by\ DC}{Total\ Facility\ Energy}$	N/A 0≤REF≤ 1	1 = DC powered 100% by RE	EN 50600-4-3; ISO/IEC 30134-3
Energy Reuse Factor – ERF	% of energy exported for reuse outside of DC	$\frac{Reuse\ X\ SourceFactor}{Total\ Facility\ Energy}$	N/A 0≤ERF≤ 1	1 = all energy is being reused	ISO/IEC 30134-6; Cluster
Water Usage effectiveness – WUE	Operational water usage associated with DC	$\frac{Annual\ Water\ Usage}{IT\ Equipment\ Energy}$	L/kWh 0≤WUE	0 = no water use	The Green Grid; whitepaper #35

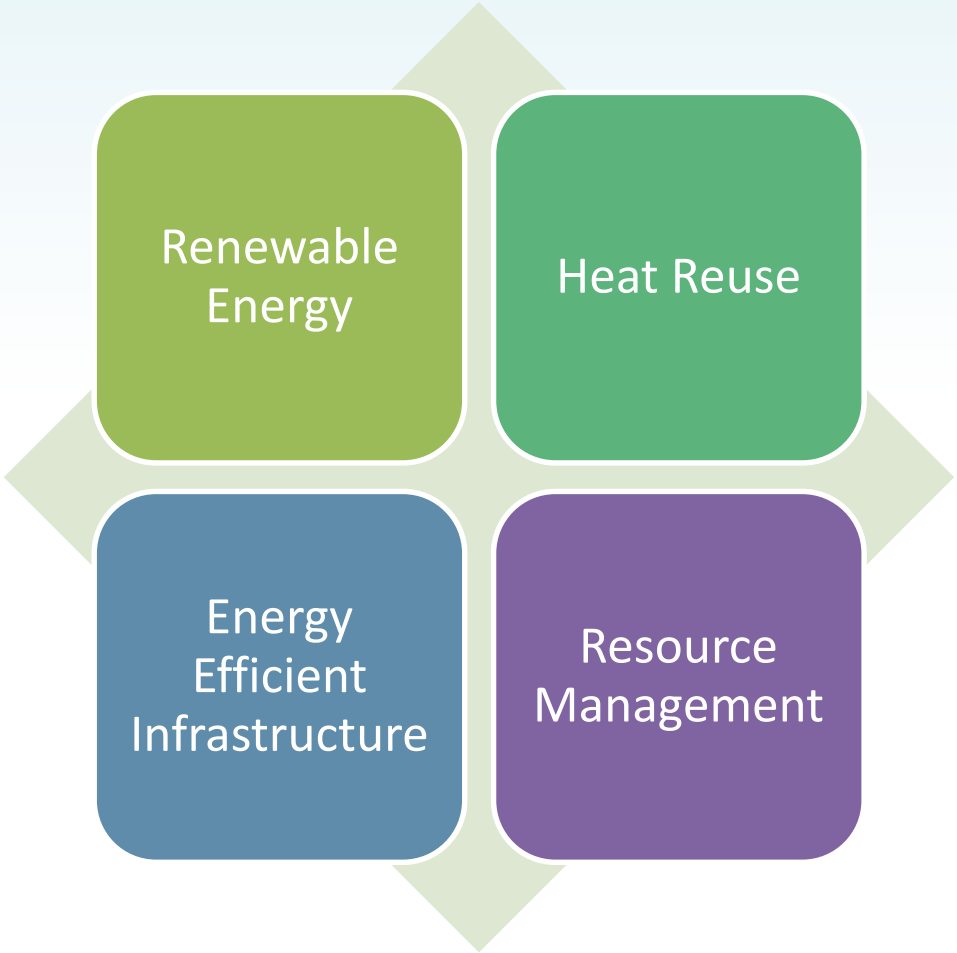
Catalyst

Selected Metrics & KPIs (2/2)

Metric	Description	Formula	Unit / Range	Optimal Value	Source
Adaptability Power Curve at RES – APC_{ren}	Ability of a DC to adapt to the production curve of RES	$1 - \frac{\sum_{i=1}^{n} \lvert K_{APC_{ren}} \cdot E_{Ren\,i} - E_{DCi} \rvert}{\sum_{i=1}^{n} E_{DCi}}$	N/A $0 \leq APC_{ren} \leq 1$	1 = full adaptation	Cluster
Data Centre Adapt - DCA	Ability of a DC to change its energy consumption behaviour	$1 - \frac{\sum_{i=1}^{n} \lvert K_{DCA} \times E_{DCReal\,i} - E_{DCBasel} \rvert}{\sum_{i=1}^{n} E_{DCBaseline\,i}}$	N/A $0 < DCA \leq 1$	The closer to 0, the more flexible the DC is	Cluster
Primary Energy Savings – PES	% of savings in terms of primary energy associated with DC operations	$1 - \frac{PE_{Current,\Delta t}}{PE_{Baseline\_adjusted\,\Delta t}}$	N/A $0 \leq PES < 1$	As close to 1 as possible	Cluster
CO2 Savings	% of savings in terms of CO2 emissions associated with DC operations	$1 - \frac{CO2_{current\,\Delta t}}{CO2_{baseline\_adjusted\,\Delta t}}$	N/A $0 \leq CO2\ Savings < 1$	As close to 1 as possible	Cluster

Catalyst

The Green Data Centre Assessment Toolkit



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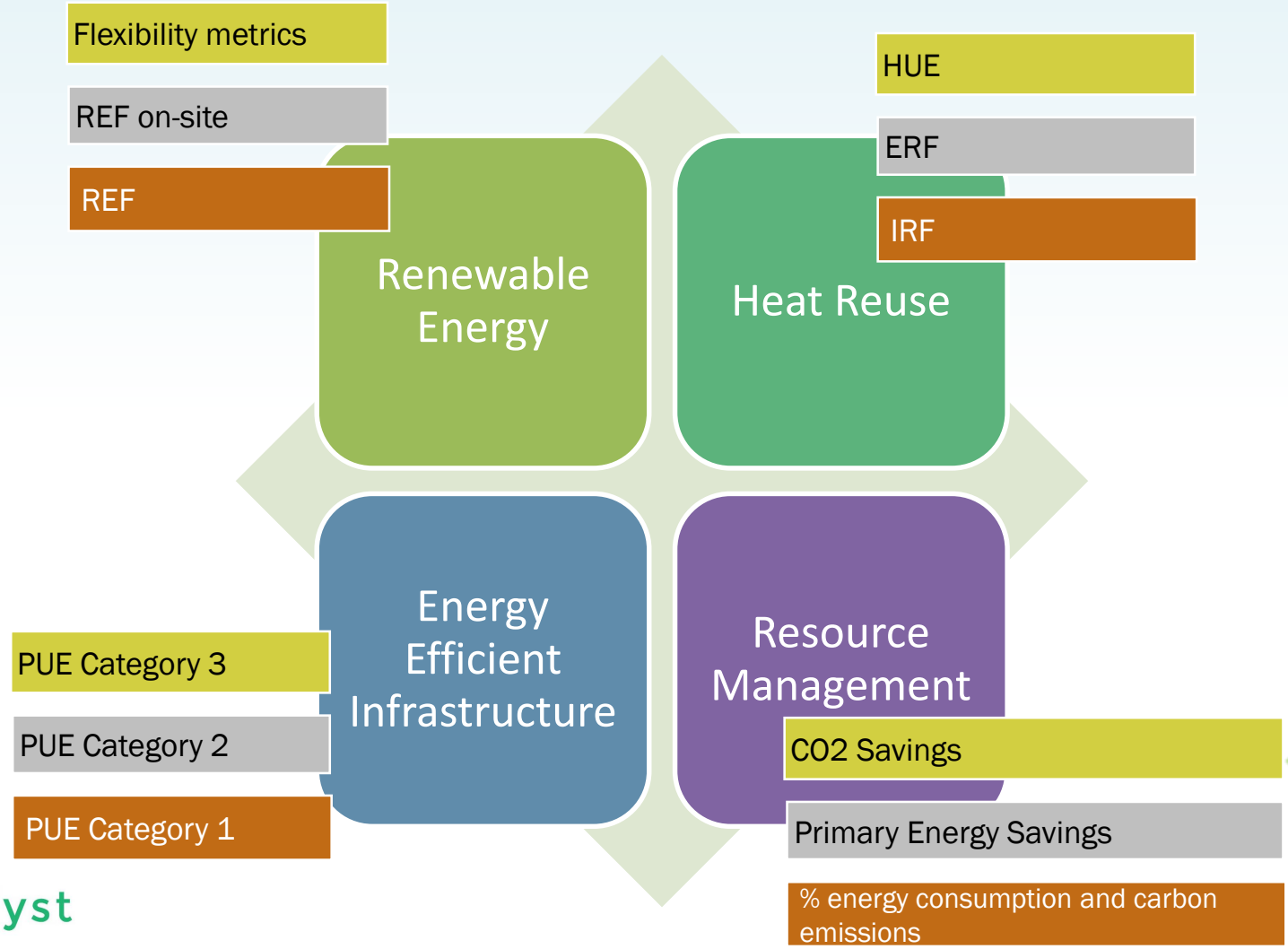
The Toolkit: Building Blocks



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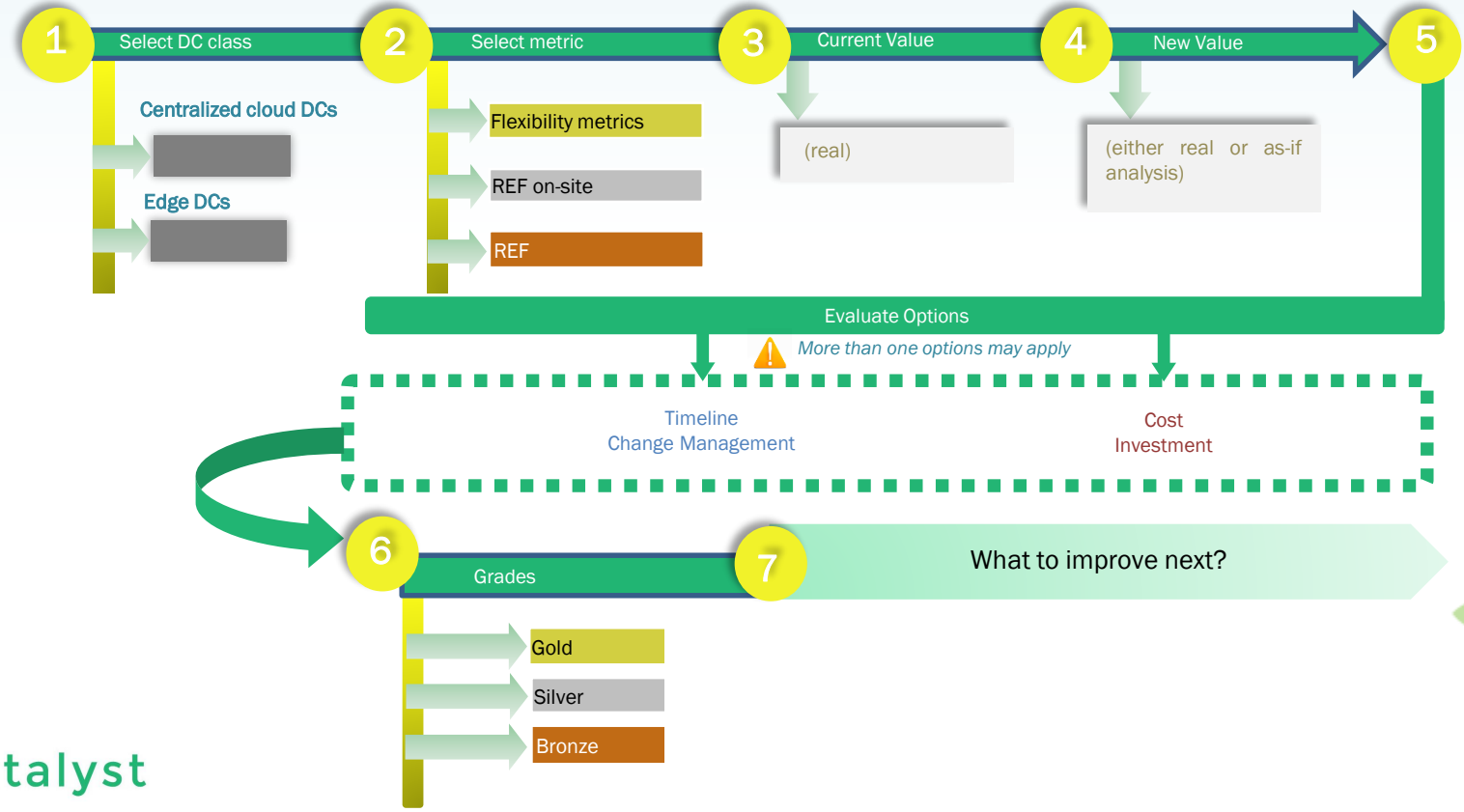
An example: Renewable Energy

- The energy consumed by the DC facility should come solely from renewable energy sources



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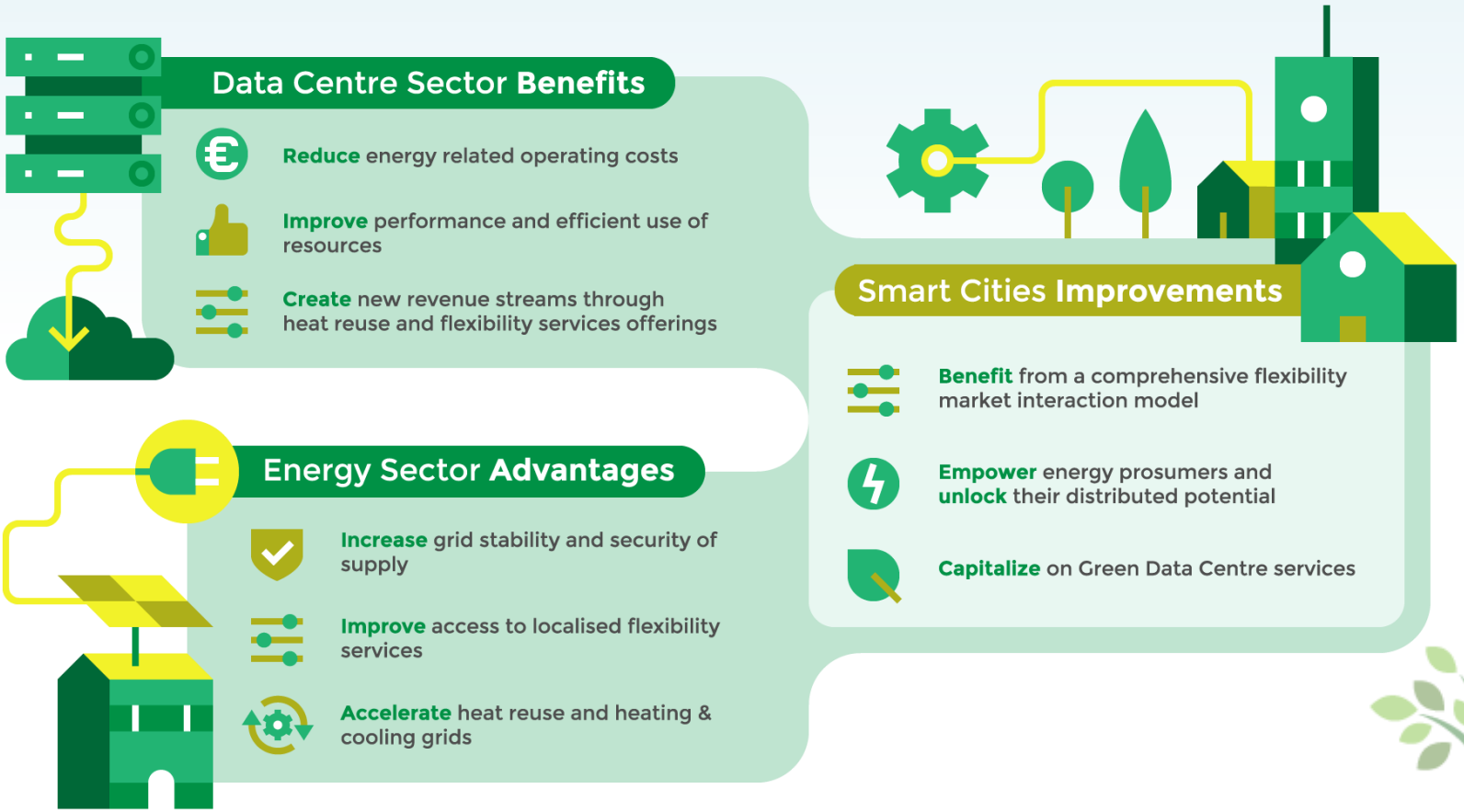
Value Proposition



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The Green Data Centre Stakeholders Group (#GDCSG)

We bring together Energy, Data Centre and Smart City ecosystems to enable the integration of Data Centres as active players in the Smart Energy Infrastructures of the future.

Download the manifesto.

Become the catalyst to energy transition!

Support Green Data Centres in Europe!

Join the Green Data Centre Stakeholders Group!

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Thank you for your attention

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