Datacenter Efficiency/Emissions Measured, not Guessed!

Babak Falsafi

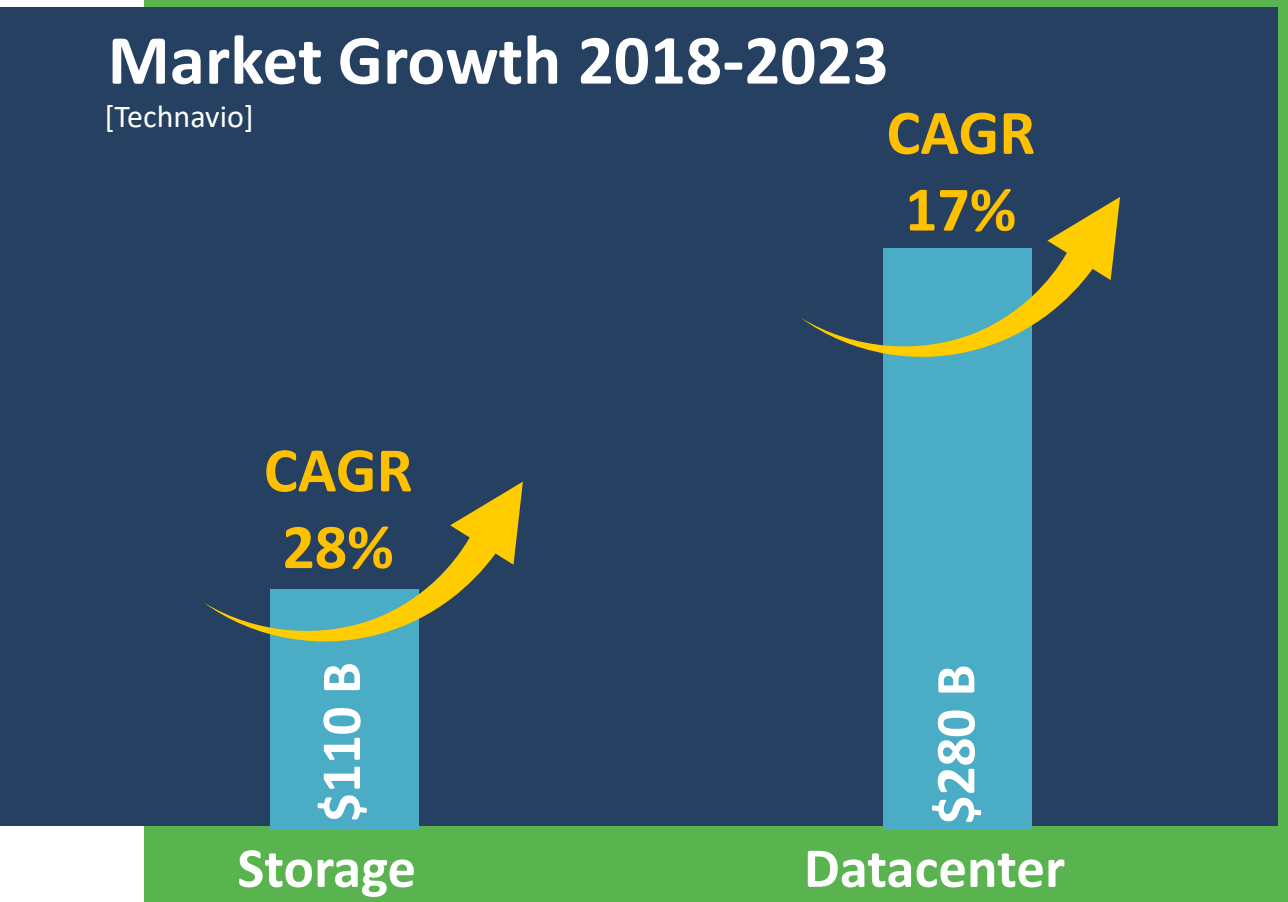
SWISS DATACENTER EFFICIENCY ASSOCIATION

SDEA (sdea.ch)

SDEA - Copyright 2023

Datacenters are…

the backbone of a digital economy



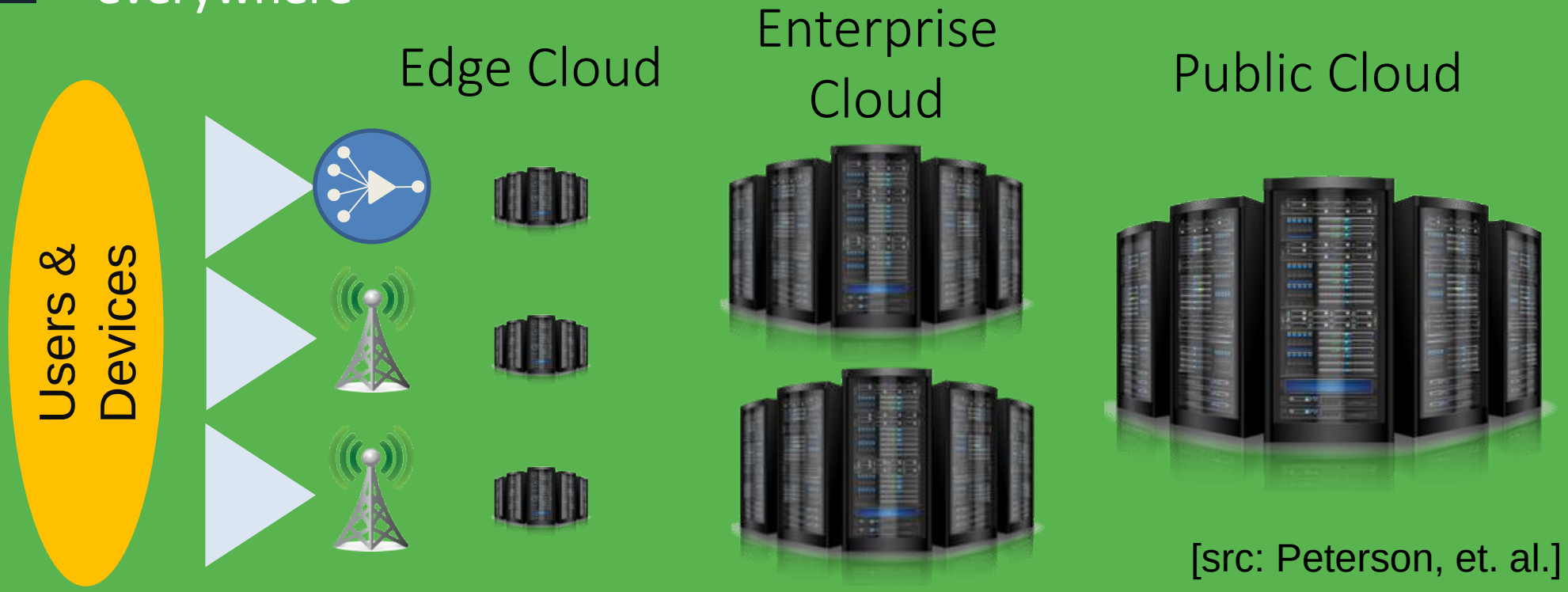
Centralized IT services

- Collection of servers to store, analyze & communicate data
- Host data-oriented services
- Commodity parts to lower cost
- Multitenancy to maximize return on investment

SDEA – Copyright 2023

Datacenters are...

everywhere



[src: Peterson, et. al.]

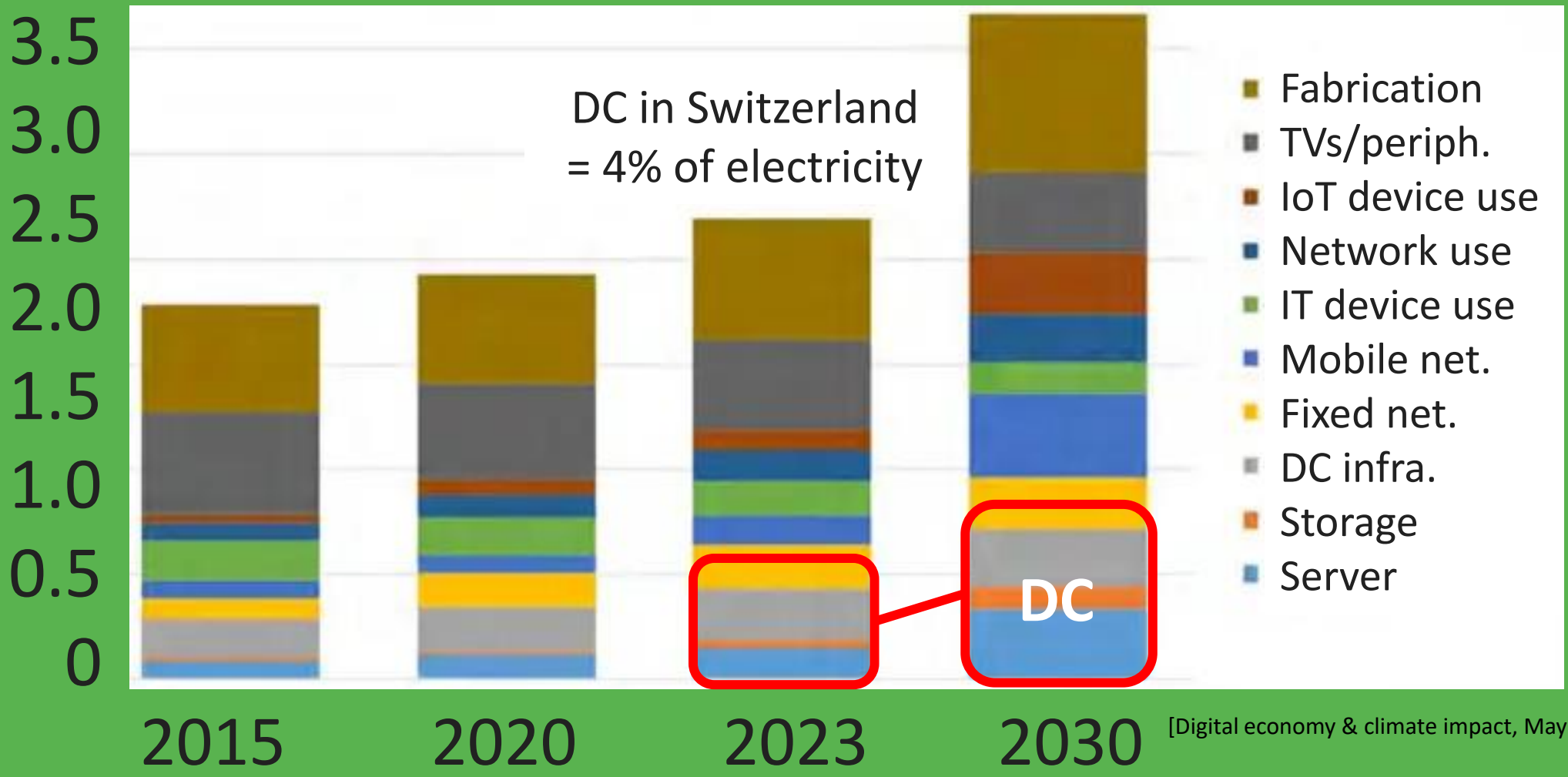
← Fast Decision Making/ Digital Sovereignty

Long-term Analytics / Global Data →

SDEA – Copyright 2023

Datacenters are…

energy hogs (in 1000 TWh)



[Digital economy & climate impact, May 2022]

Datacenters are…

boosted by trends

Proliferation of AI

- Compute density growth 6x/year

  [MIT Technology Review]

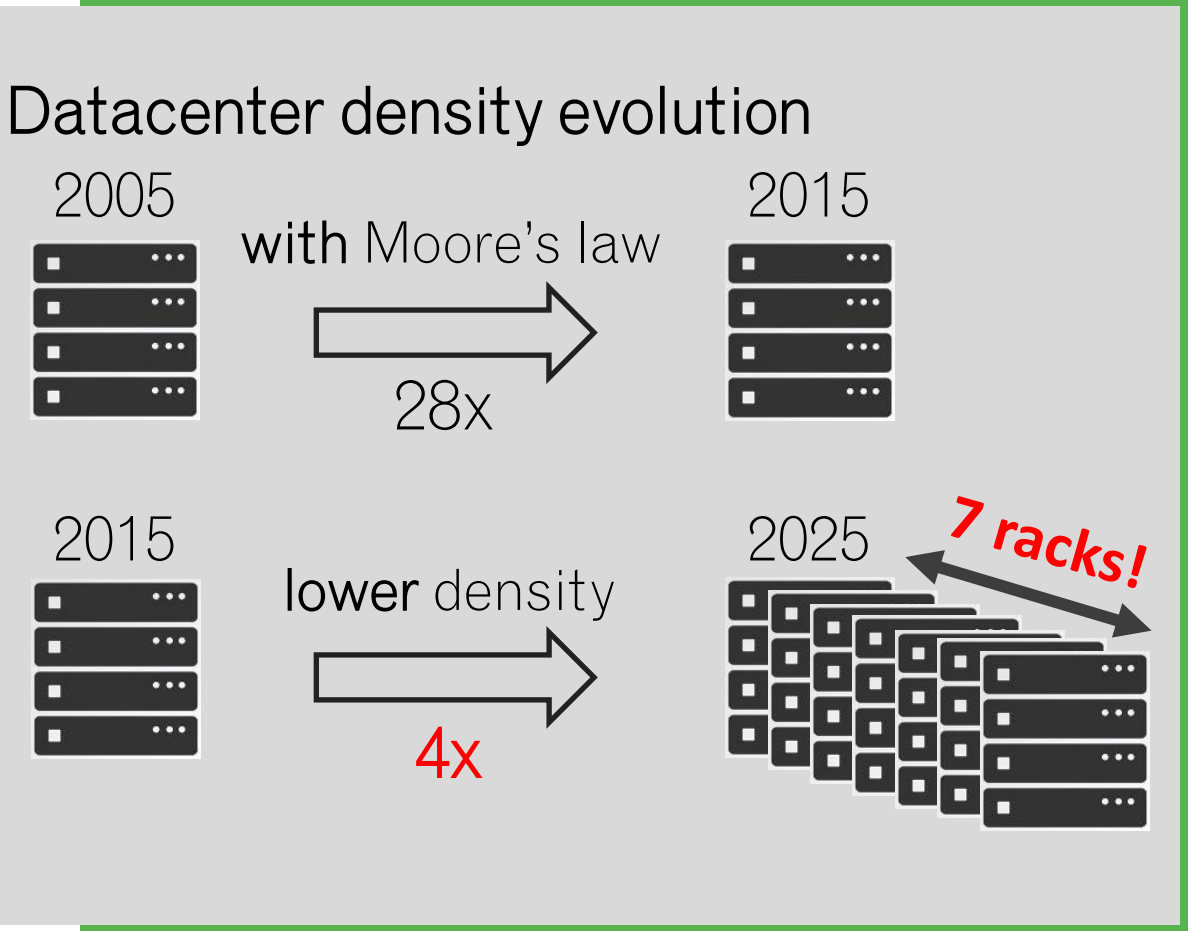
Arrival of Edge Clouds

- IoT streaming data over 5G
- Growth at 41% CAGR

SDEA – Copyright 2023

Datacenters are…

not getting denser



End of Moore's Law (of Silicon)

- Five decades of doubling density
- Recent slowdown in density
- Silicon is at limits of physics

Growth means building more

- 28x faster in ten years w/ Moore
- With lower density, 7x more DCs

SDEA – Copyright 2023

What is datacenter efficiency?

relevant metrics

A datacenter is a physical facility housing a network of servers to host data with applications and services centered around data

energy efficiency

compute, communicate, store and host with less electricity

heat recovery

recover energy from the dissipated datacenter heat

renewable energy

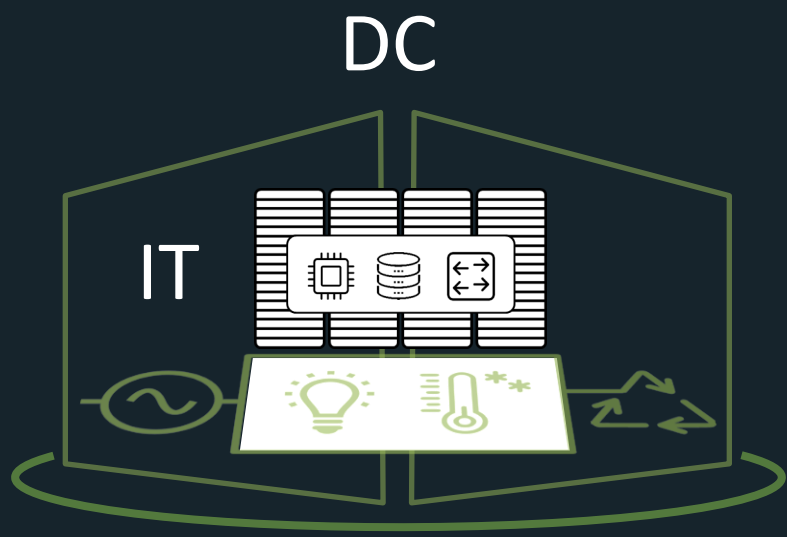
use sources of renewable energy as electricity

SDEA – Copyright 2023

Today's efficiency metric

power usage efficiency

$$PUE = \frac{\text{Total DC Power}}{\text{IT Power}}$$



PUE has been around for two decades

What is wrong with PUE?

irrelevant for new DCs

IT Efficiency
Inefficient servers make PUE look good

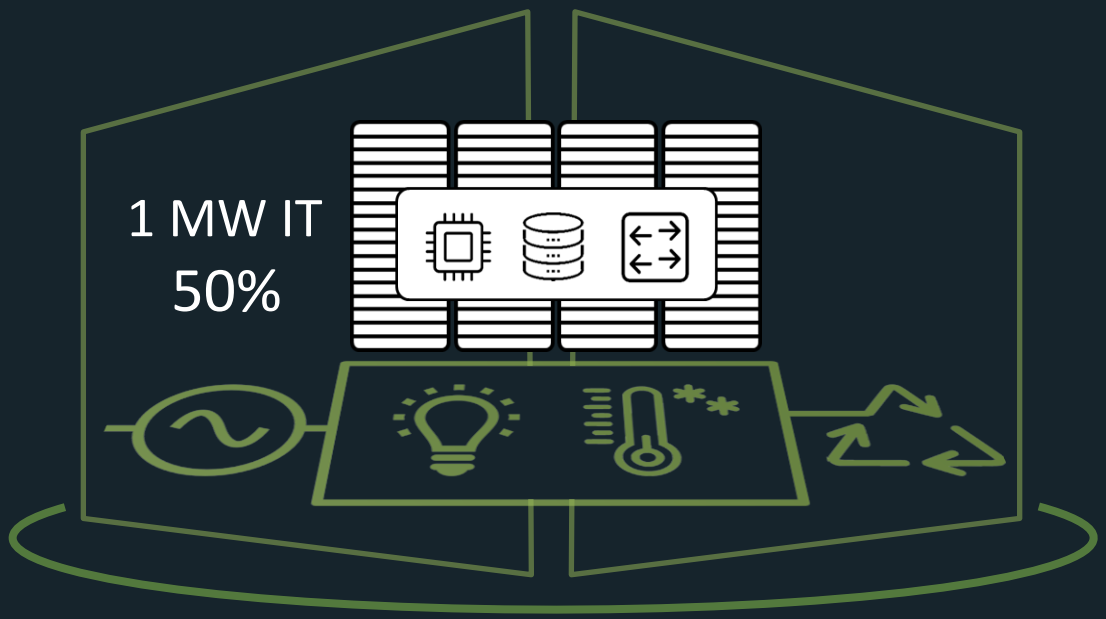
Full-stack DC efficiency
We are building DCs with PUE of < 1.2
>80% of electricity goes to IT (how efficient is your IT?)

End-to-end energy flow
Does not capture end-to-end energy (heat recycling, renewables)

What is wrong with PUE?

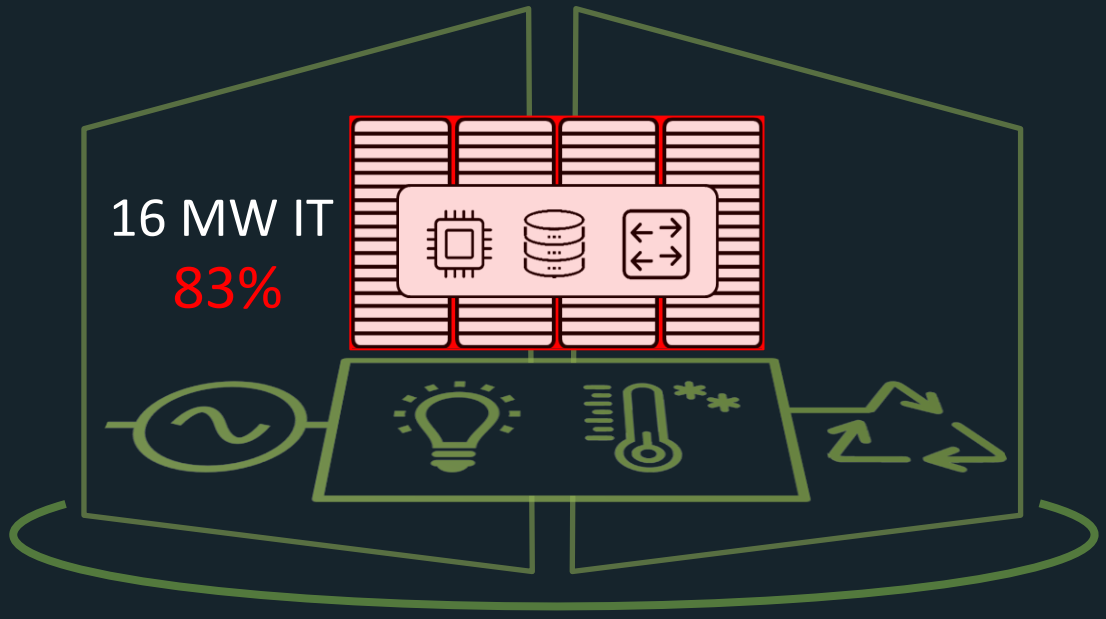
DC electricity goes to IT

2 MW DC in 2010



PUE = 2.0

20 MW DC in 2020



PUE = 1.2

SDEA – Copyright 2023

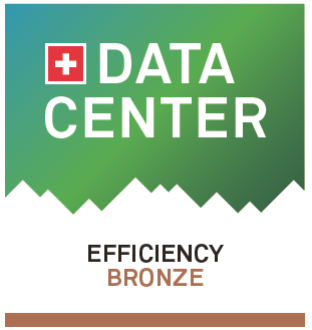
SDEA Label

certifying DC efficiency/emissions

Unique
Full-stack (w/ IT) efficiency/emissions

Timely
Projected datacenter growth & climate impact

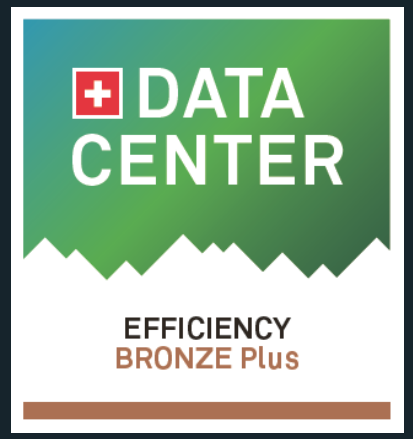
Comprehensive
Captures end-to-end datacenter energy flow

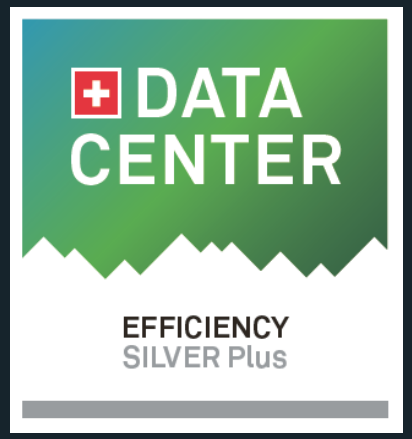


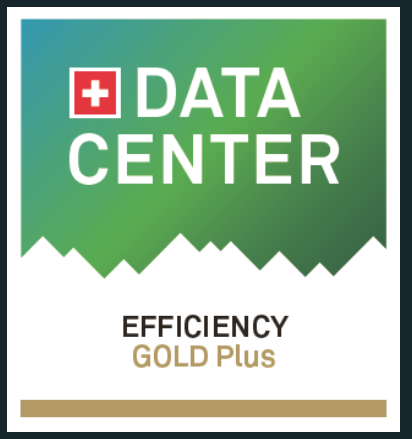
Premium variants

capture in-flow energy sources

Holistic quantification of emissions to gauge sustainability



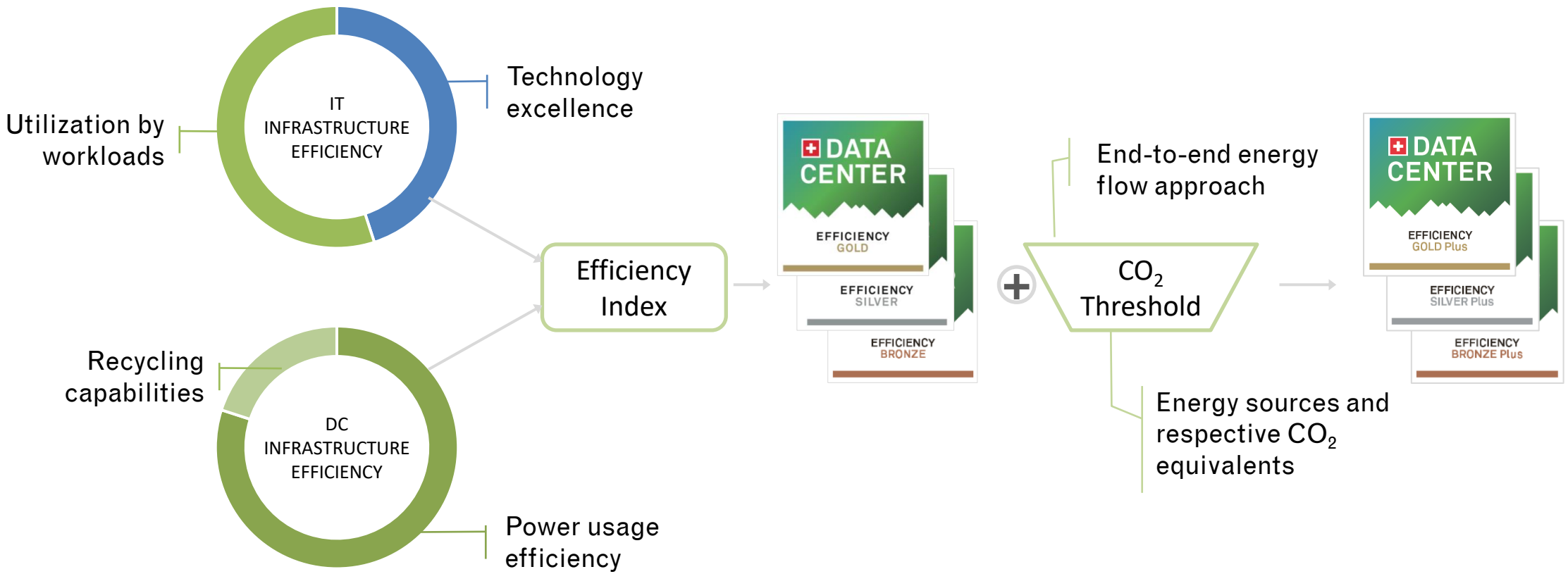




SDEA – Copyright 2023

Qualification

one combined efficiency index and eco premium



SDEA – Copyright 2023

International review of energy efficiency in Data Centres for IEA EBC Building Energy Codes Working Group

March 2022

International review of energy efficiency in Data Centres for IEA EBC Building Energy Codes Working Group

Finds SDEA Label **unique** with grades for efficiency/emissions

SDEA – Copyright 2023

Certification
process flow

Once the applicant has proven datacenter qualification during an evaluation process mandated by SDEA, the applicant will solicit an auditor's service to validate the measurements and submit an evaluation report. If the criteria for the applied label grade is fulfilled, the label will be granted.

Step 1
Register/
Receive Package

Step 2
Measure KPIs

Step 3
Calculate Index

Step 4
Recruit Auditor/
Validate

Step 5
Submit Report

Step 6
Receive Label

SDEA – Copyright 2023

Modular certification

structure type

DC Infrastructure

Co-locator housing
IT customers

IT Infrastructure

IT customer certified on
already certified DC

DC Instance

IT & DC Infrastructure
certified together

SDEA – Copyright 2023

Visit our booth!

Life Is On | Schneider Electric

SICPA

energieschweiz

DATA CENTER EFFICIENCY

Contact us

info@sdea.ch | sdea.ch

Visit us at

SDEA – Copyright 2023