
HUAWEI
Sustainable Energy Management that makes a difference is complex and requires focused innovation

Henrik Børling
Business Development Director
Huawei Digital Power Technologies Co., Ltd.
Henrik.boerling@huawei.com

Huawei: Leading provider of ICT infrastructure and smart devices

Bring digital to every person, home and organization for a fully connected, intelligent world

196.000

Employees

107.000+

R&D employees

170+

Countries and regions

68+

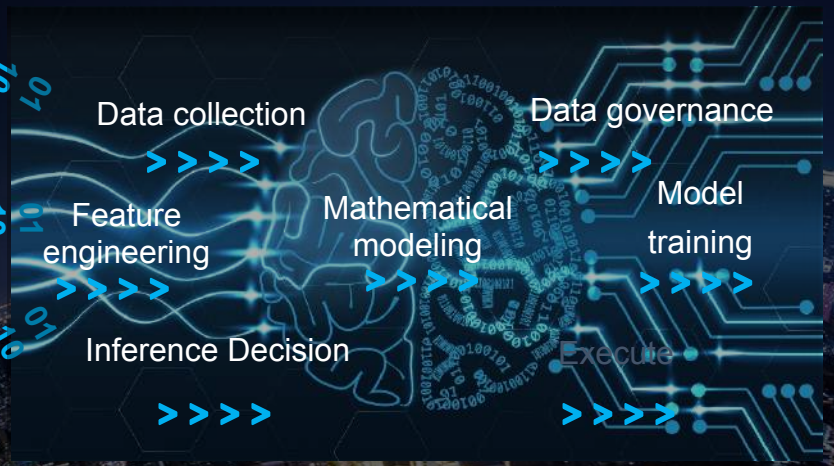
Interbrand's
Top 100
Best Global Brands

44+

Fortune Global 500

HUAWEI

Explosive Growth of Data and Computing Power in the Intelligent Era Drives the High-Density and Large-Scale Development of Data Centers



Intelligent diagnosis

Early warning and early prevention

Intelligent optimization

Further improvement in energy efficiency

Intelligent collaboration

Manual to automatic, reducing Opex

IT
OT

HUAWEI

Explosive Growth of Data and Computing Power in the Intelligent Era Drives the High-Density and Large-Scale Development of Data Centers

Smart manufacturing

AVIC (40P@2020) ->100P@2025)

Weather forecast

Metheorological Administration (8.2P@2017->80P@2023)

AR/VR

Optimal experience, 24K, 1.3 Gbit/s, 20 minutes < 190 GB

Autonomous driving

Level 4 autonomous cars 100 TB/day per car

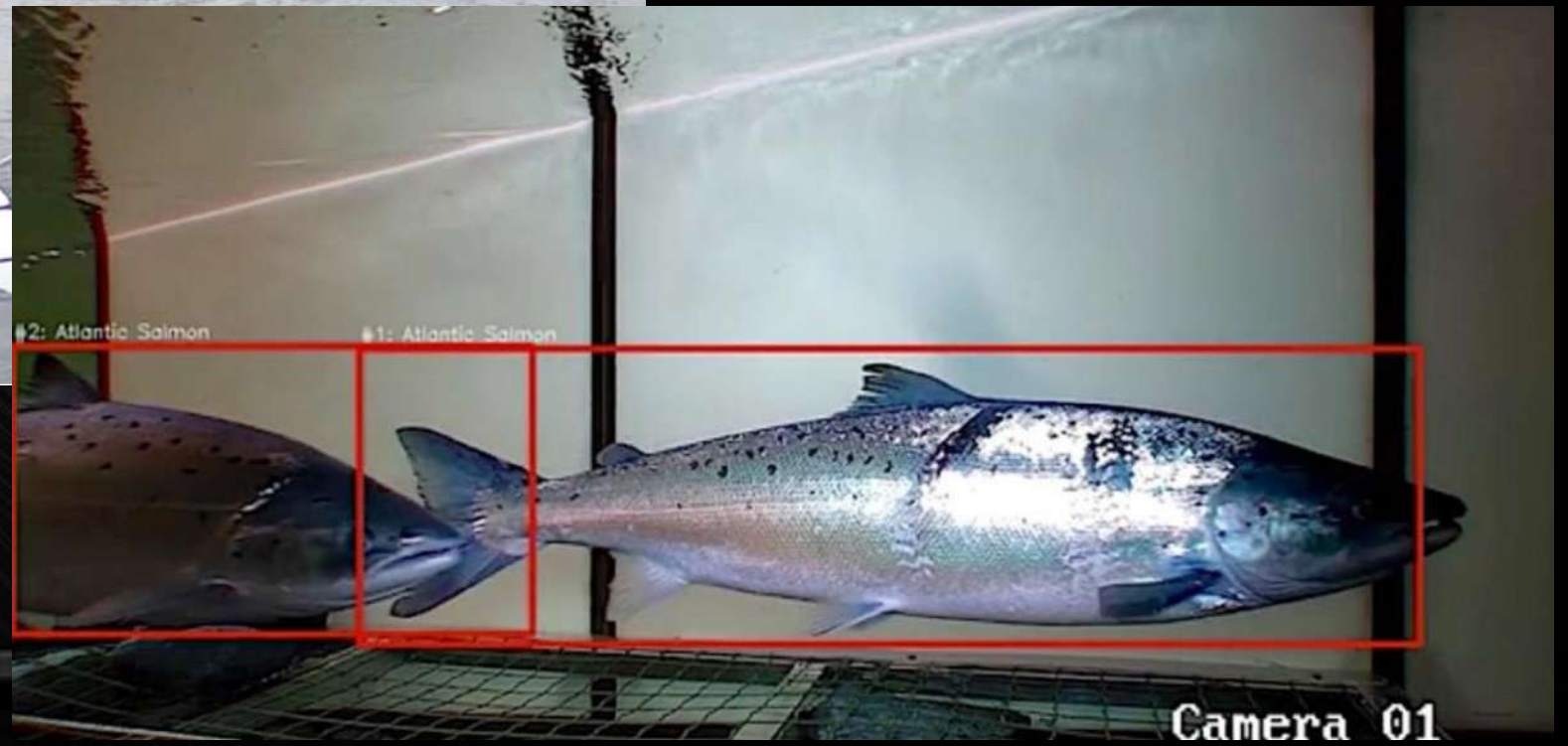
HUAWEI

Huawei: Tech4All, Environments and Development

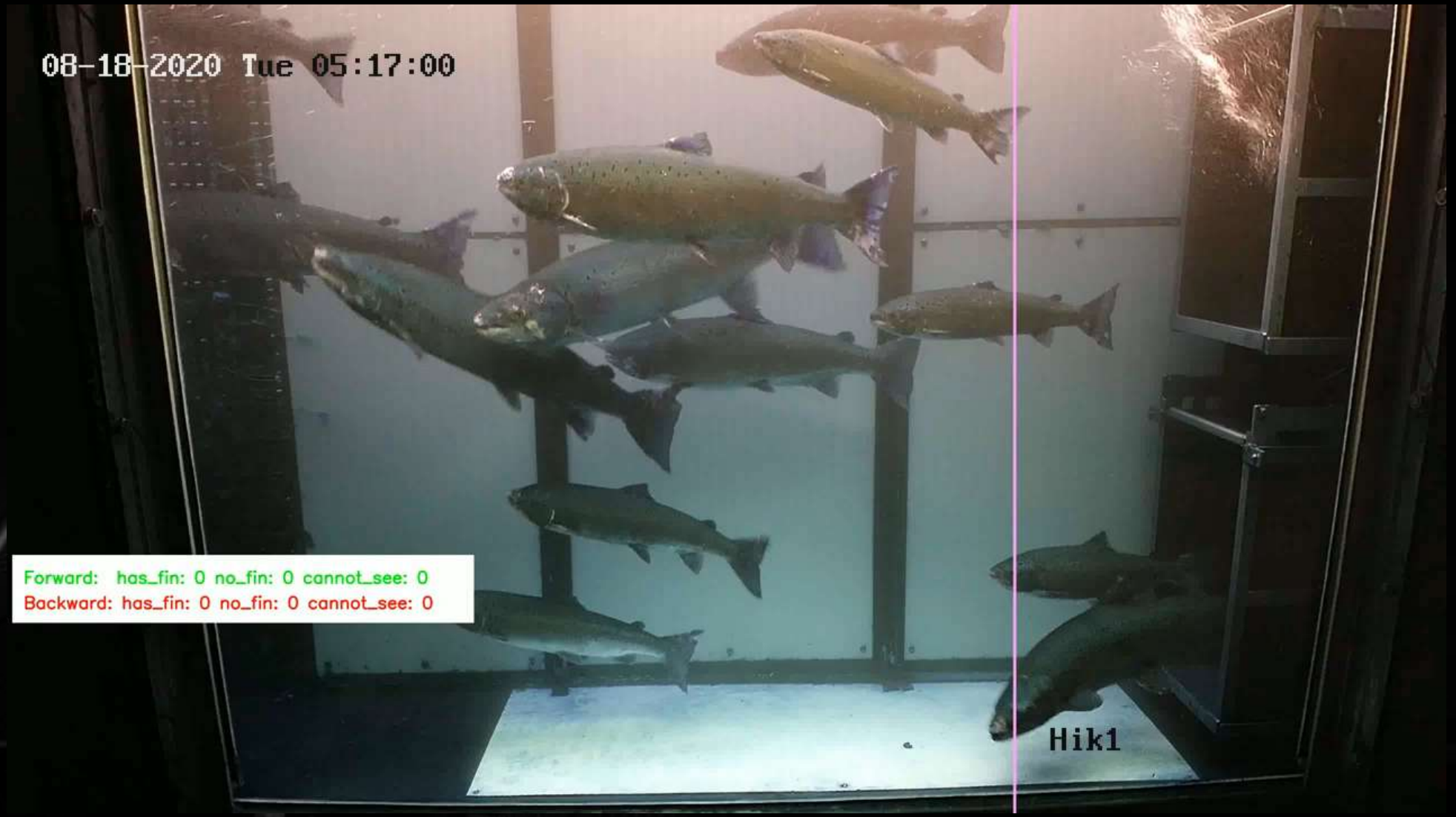
Examples for Projects and Programs

HUAWEI

AI project for Humpback salmon in Norway



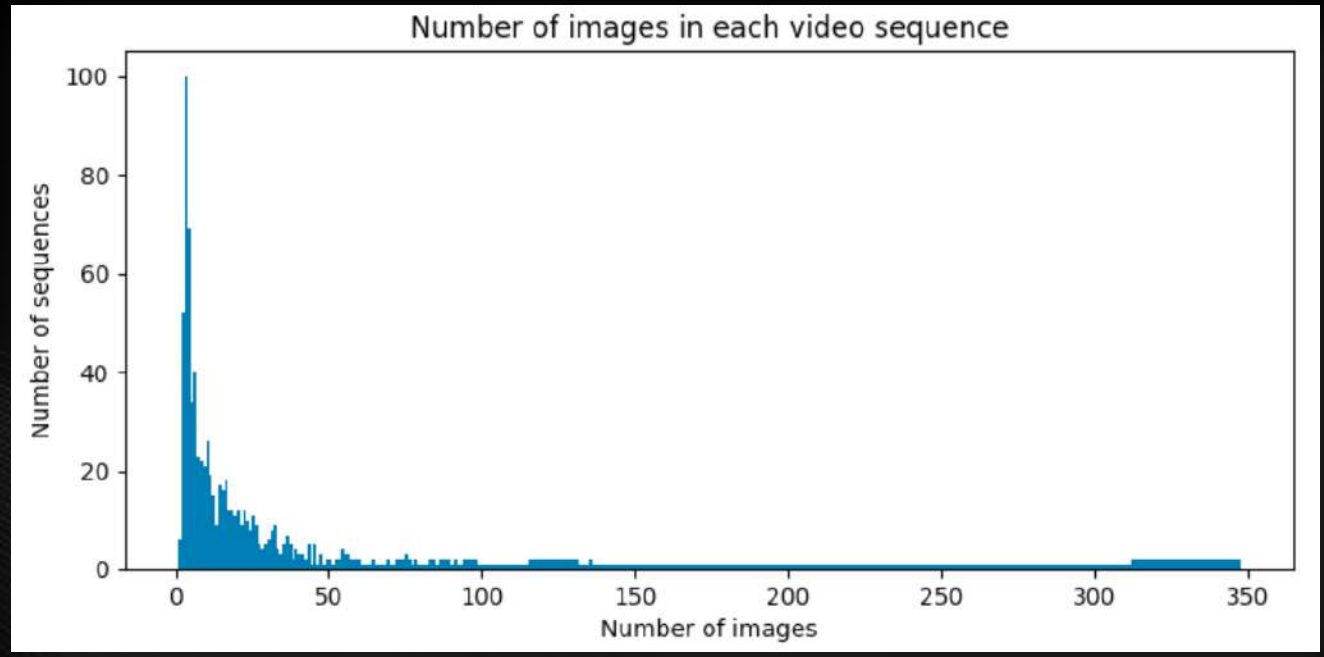
AI project for Humpback salmon in Norway



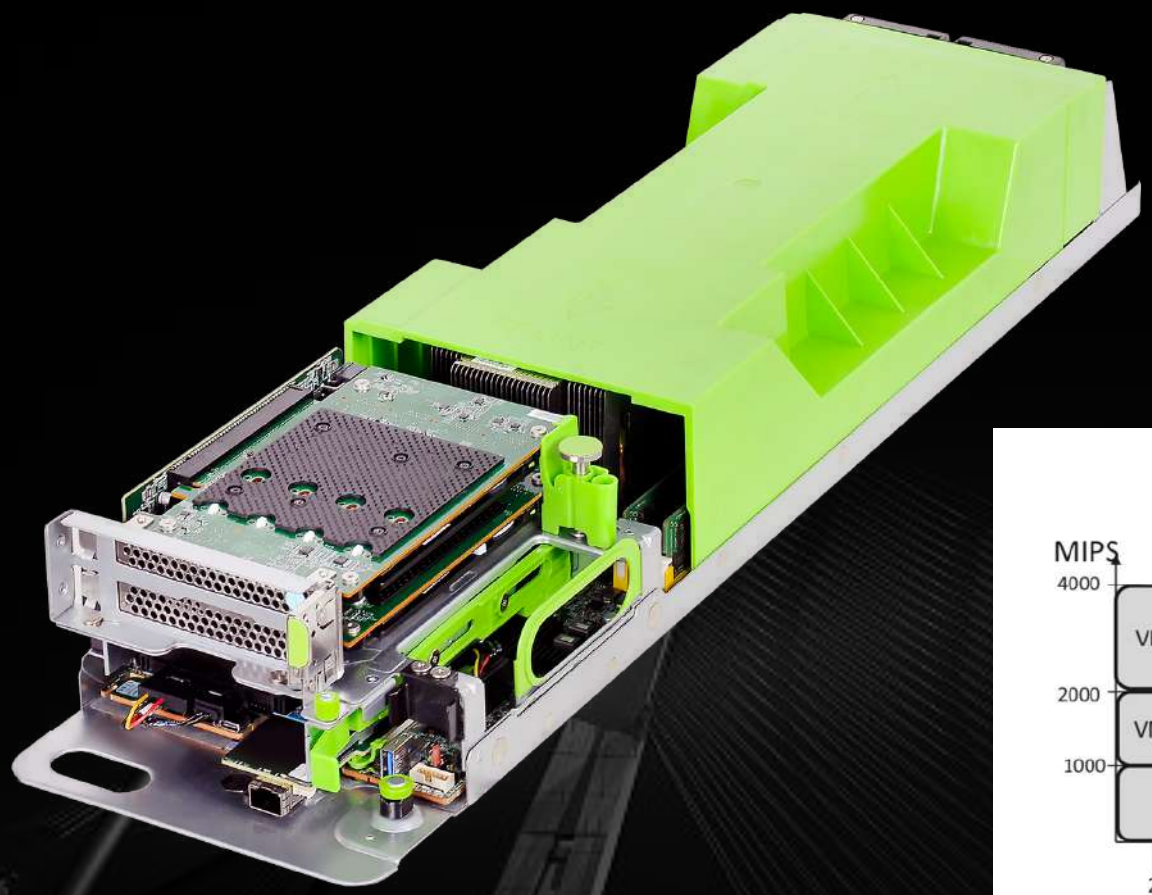
HUAWEI

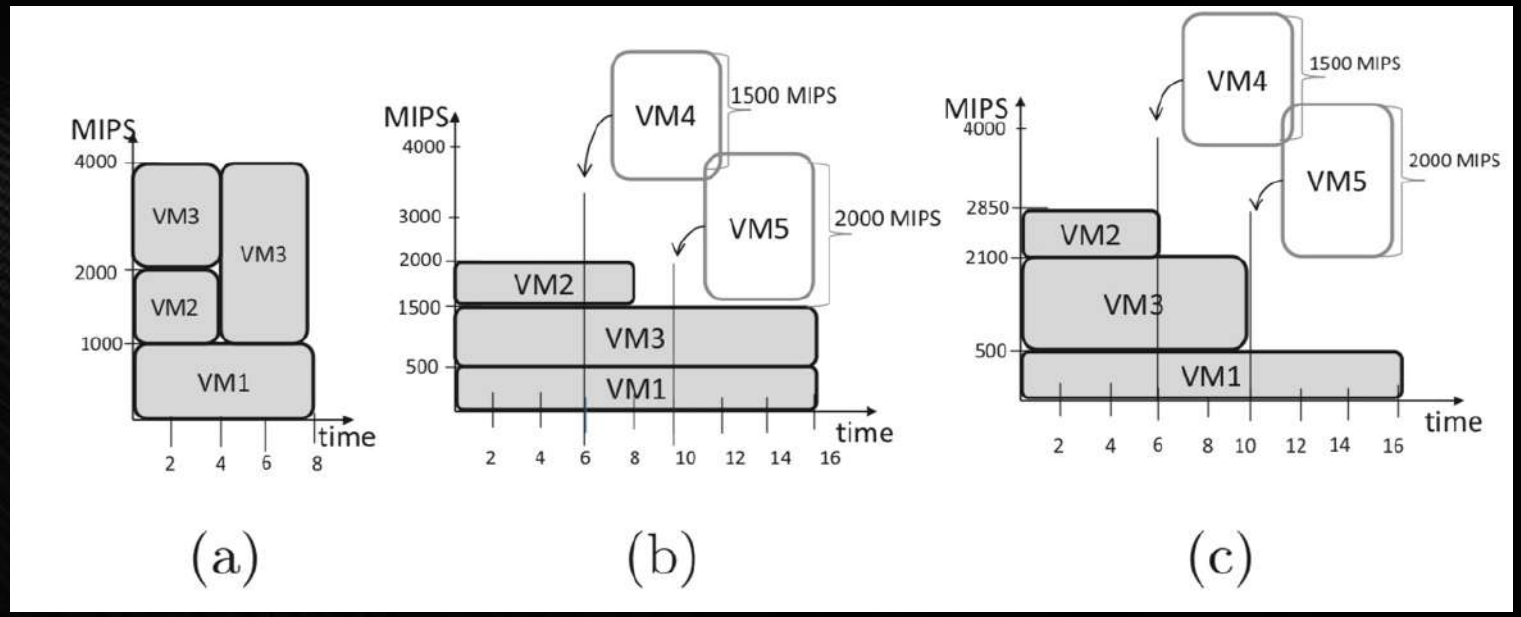
AI project for Humpback salmon in Norway

Fish Counts	
No Fish:	604
Small Fish:	1775
Pink Salmon:	3376
Atlantic Salmon:	12135
Arctic Char:	266
Otter:	240



AI project for Humpback salmon in Norway





HUAWEI

Cooling & Heat Recovery for an Optimal xUE

AI-based smart cooling

Manual adjustment

AI

AI-based energy saving

Close-coupled cooling improves energy efficiency

In-room cooling

In-row cooling in aisle containment

Board-level/Immersion liquid cooling

AI

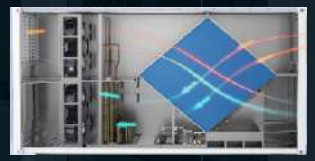
PUE: 2.0 → 1.5 → 1.3 → 1.0x

WUE: 2.0 → 1.2 → 0.7 → 0

GUE: 63% → 71% → 76% → 85%

Free cooling reduces energy consumption

Chilled water system



Indirect evaporative cooling

Waste heat recovery

HUAWEI

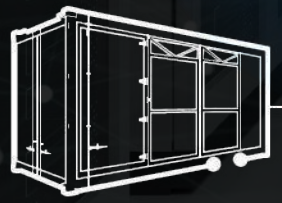
Energy Management – Why now?

Technology / Innovation

Indirect Renewable Energy

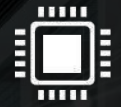
Direct Renewable Energy

FFR



BESS

MV UPS



Chip cooling

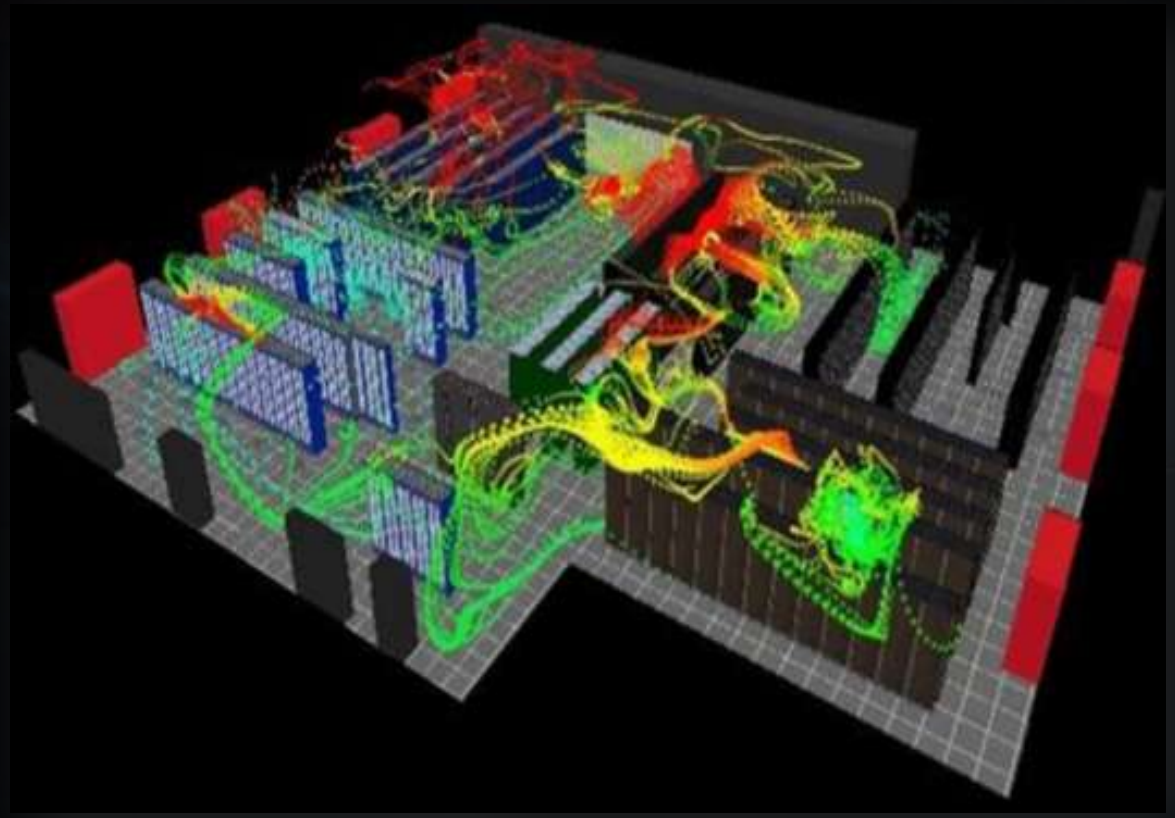
Cold plate liquid cooling

Immersion cooling

Heat recovery

Energy usage optimization: From component to system

Utilization



AI

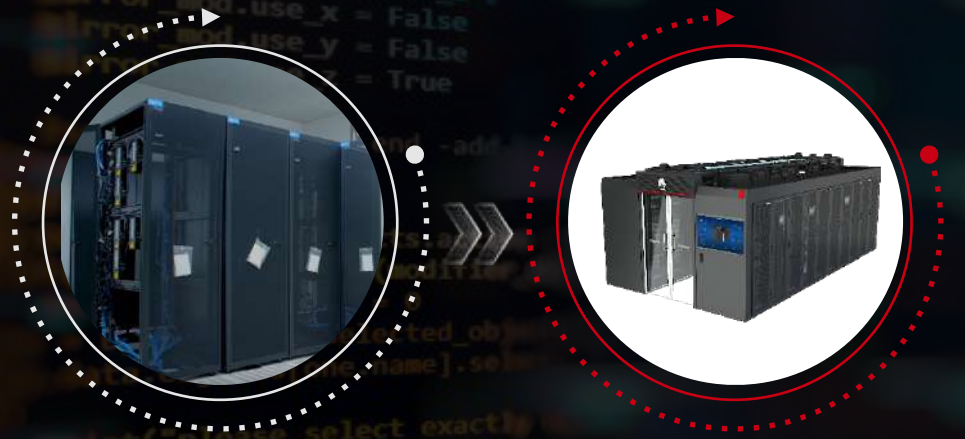
HUAWEI

Simplified – Simplified Architecture: Innovative Buildings and Equipment Rooms

Prefabricated buildings

Breaking a whole into parts: parallel works thanks to product design of engineering

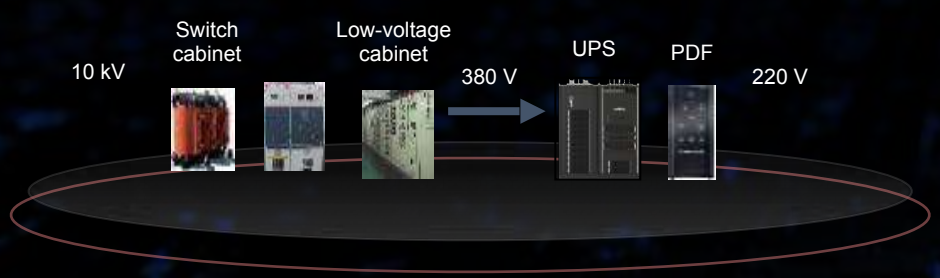
Modular equipment room

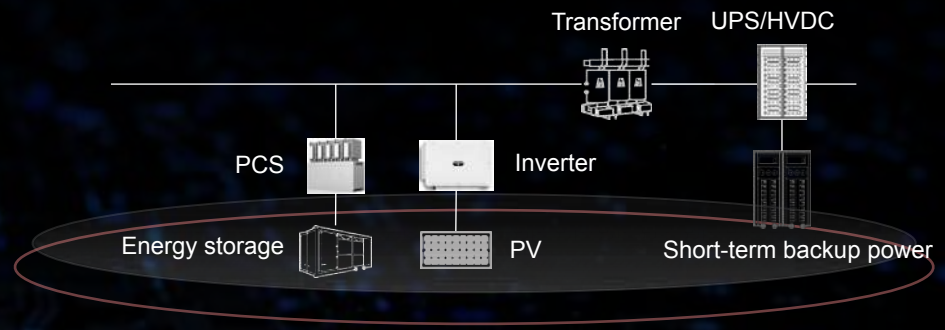


Integrating parts as a whole: all in one instead of combination

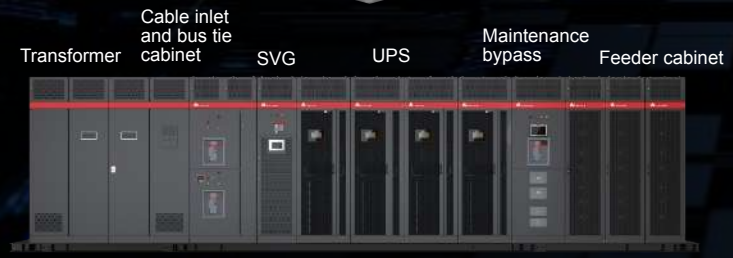
HUAWEI

Simplified – Simplified Power Supply: Redefined Components and Links



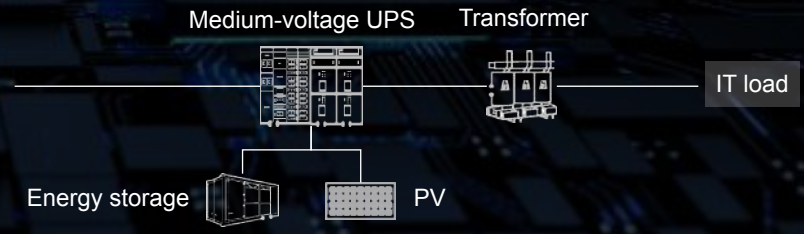


Component integration



Physical connections → Converged power supply

Link simplification



Complex → Simplified links

HUAWEI

Simplified – Simplified Cooling: Interaction Between Cooling and Heat

Cooling side

Maximized use of free cooling sources and one heat exchange

Simplified cooling link

Air-liquid convergence

Heat side

Air + liquid cooled deployment

HUAWEI

Autonomous Driving – O&M Automation

Manual inspection ↓ AI-based remote inspection

Smart sensing @IoT/voice recognition/image recognition

Digital and standardized O&M

Digital foundation for visualization/Expert experience sharing on cloud

L0: Manual O&M	L1: Assisted O&M	L2: Partial Autonomous DC	L3: Conditional Autonomous DC	L4: Highly Autonomous DC	L5: Fully Autonomous DC
					

HUAWEI

Autonomous Driving – Automatic Energy Efficiency Optimization: Enables Smart Cooling

Huawei uses cloud and AI technologies

HUAWEI

Autonomous Driving – Operation Autonomy: Maximizes Resource Value

Resource optimization @AI

Intelligent matching between SPCN demand and supply

Energy scheduling @AI

On-demand scheduling of green power, energy storage, and backup power

HUAWEI

Reliable – Proactive Security: Early Warning and Quick Fault Closure

AI predictive maintenance

Fault prediction

Remedy → Prevention

Automatic fault response

1 min discovery, 3 min analysis, 5 min service recovery

Manual response → Automatic response

HUAWEI

Sustainable – All Efficient: PUE → xUE, One Dimension → Multi-Dimensional System

Evaluation indicator: PUE → xUE

CUE

PUE

WUE

GUE

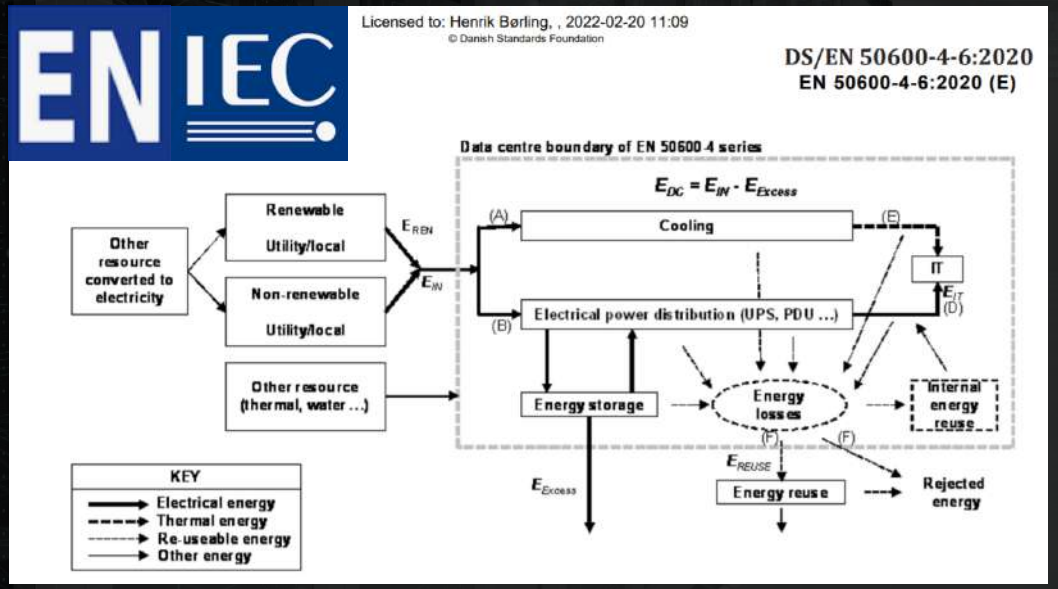
xUE: $_{\alpha}$CUE | $_{\beta}$PUE | $_{\gamma}$WUE | $_{\delta}$GUE | …

CUE : Carbon Usage Effectiveness
PUE: Power Usage Effectiveness
WUE: Water Usage Effectiveness
GUE: Grid Usage Effectiveness
α / β / γ / δ are used to balance the importance of each indicator. The values vary with regions/industries.

HUAWEI

Sustainable – All Recyclable: Standards as KPI's and Benchmarking

Focus for sustainability has increased as there now for The European standard for datacenters EN50600 has an amendment EN50600-4 with several definitions of KPI's for datacenter installations, with the indicators at ISO/IEC 30134



ISO/IEC 30134

Power Usage Effectiveness (PUE)

Renewable Energy Factor (REF)

IT Equipment Energy Efficiency for servers (ITEEsv)

IT Equipment Utilization for servers (ITEUsv)

Energy Reuse Factor (ERF)

Cooling Efficiency Ratio (CER)

Carbon Usage Effectiveness (CUE)

Water Usage Effectiveness (WUE)

HUAWEI

Sustainable – All Recyclable: Maximizing Resource Recovery Throughout the Life Cycle

Waste heat recovery

Leverage waste heat for cooling/heating/power generation.

4R's
Reduce
Reuse
Recover
Recycle

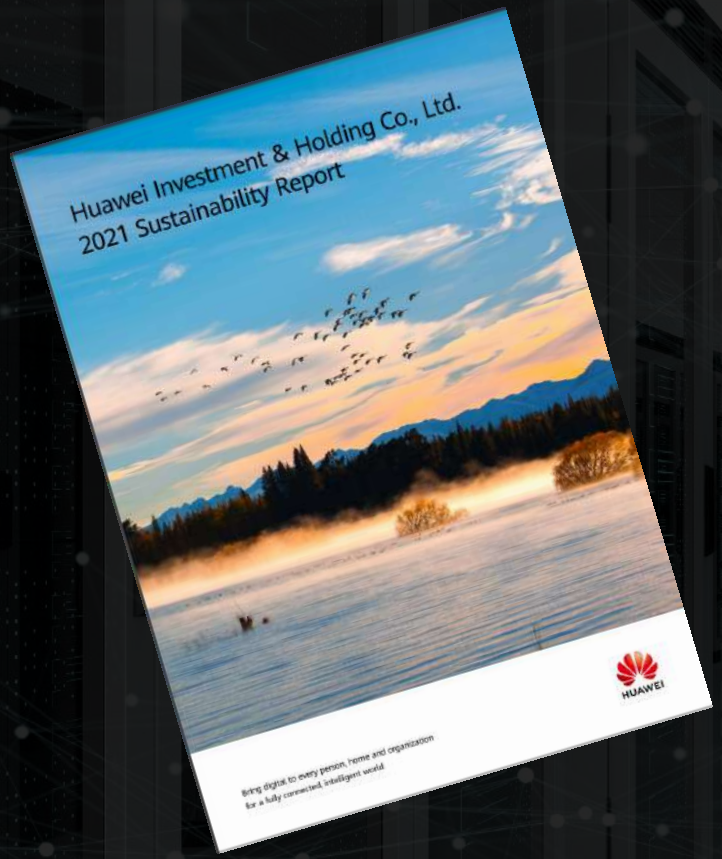
Material recovery

Recycle materials at component, room, and campus levels.

Technological innovation improves recyclability and leads to a low-carbon circular economy

HUAWEI

Overall - Sustainability



Jon Laban – OCP, Decarbonisation of Data Centres including Scope 3 GHG Emissions DCA UK


We Do Not Inherit The Earth From Our Ancestors,
We Borrow It From Our Children.