HP
Data Center Facility Consulting

Planning and Implementing Data Center Projects Worldwide

Rainer Kirsch
Data Center Facility Consulting EMEA

Agenda

- Worldwide Data Center projects – Things to consider
- How to ensure quality and success
- HP's approach
- Examples

Wynyard DC, England

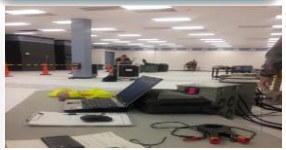
HP Technology Consulting – Data Center Facilities

Consulting & Strategy

Design

Implementation

Assurance



Energy Services

HP Critical Facilities covers the entire data center Lifecycle

Technology Leadership

- Large market share in the DC (Servers, Storage, Networking, Software)
- Design of more than **~5 Mio m²** DC whitespace (market leader)
- 40+ MW Class Data Center
- Research and development for data centers
  - HP Performance Optimized DC (POD)
  - Multi-Tier-Hybrid-Design
  - First “out of the box” data center (Flex-DC)

- More than 300 Data Center engineers and consultants worldwide
- Hundreds of successful transformation projects
- 8.300 certified ITIL-Experts, 10.200 Linux-Experts
- 28.900 certified Microsoft-Specialists
- WW leading in IT consolidation projects
- Strategic Alliances with SAP, Microsoft, VMWare

Worldwide Data Center projects –

Things to consider

Worldwide Data Center projects: Planning

- Different norms and regulations in basically every country

Worldwide Data Center projects: Legal

- License required for obtaining authority approvals
- Civil code of countries

Worldwide Data Center projects: Financial & Purchase

- Project budged and cost control
- Availability of equipment and material

Worldwide Data Center projects: Project Management

- Project management

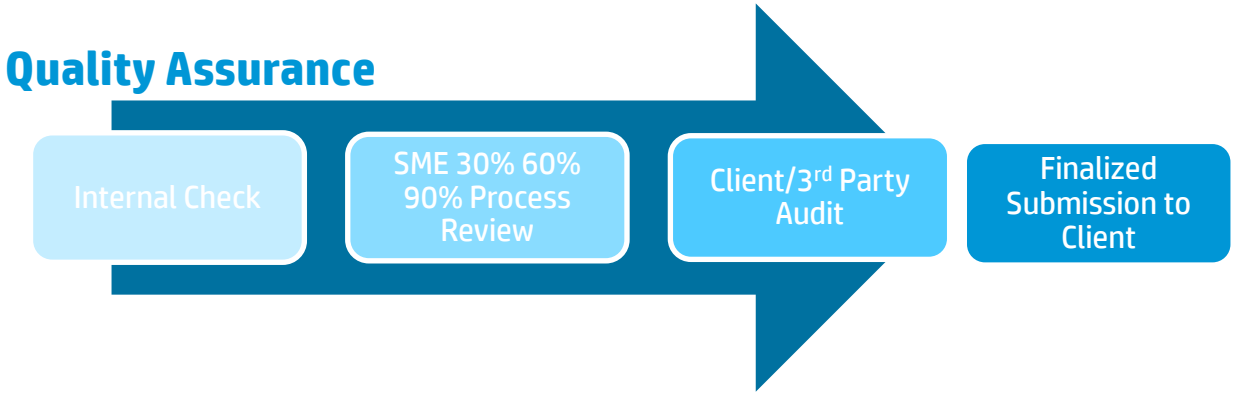
Worldwide Data Center projects: Local ‘flavor’

- Cultural background
- Data center market maturity

How to ensure quality and success?

How to ensure quality and success?

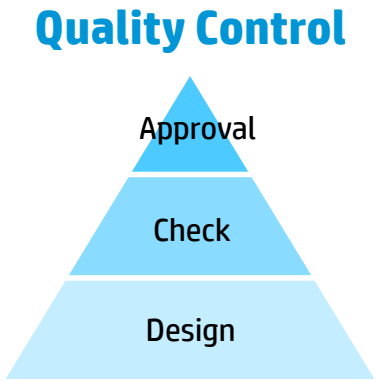
- DC design and project management from Germany only will not be successful
- Knowledge about local standards and norms is essential
- Daily local presence required for project management



Steps towards a successfully international project

1. Identify a partner company which is taking overall responsibility

2. Find trustful and reliable subcontractors in the designated country



3-level Discipline Internal Review

3. One Project Management Office as single instance of contact and decision making for German and foreign project teams

The HP approach:

Global Data Center Expertise – Local Delivery excellence

HP DC Facility Consulting – WW Capability

Zhang, Yong-Hai, China Lead

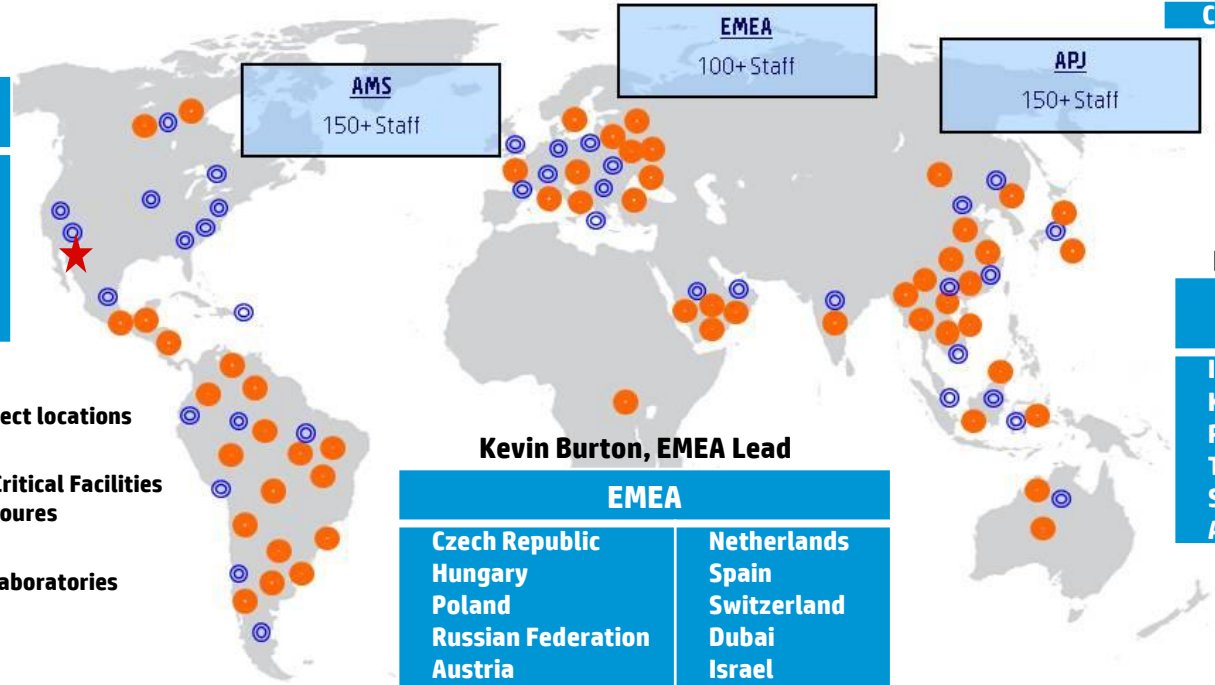
China

China

Dave Winn, AMS Lead

AMS

Argentina
Brazil
Canada
Colombia
Mexico
United States



Ross Davis, APJ Lead

APJ

India
Korea
Philippines
Thailand
Singapore
Australia

Kevin Burton, EMEA Lead

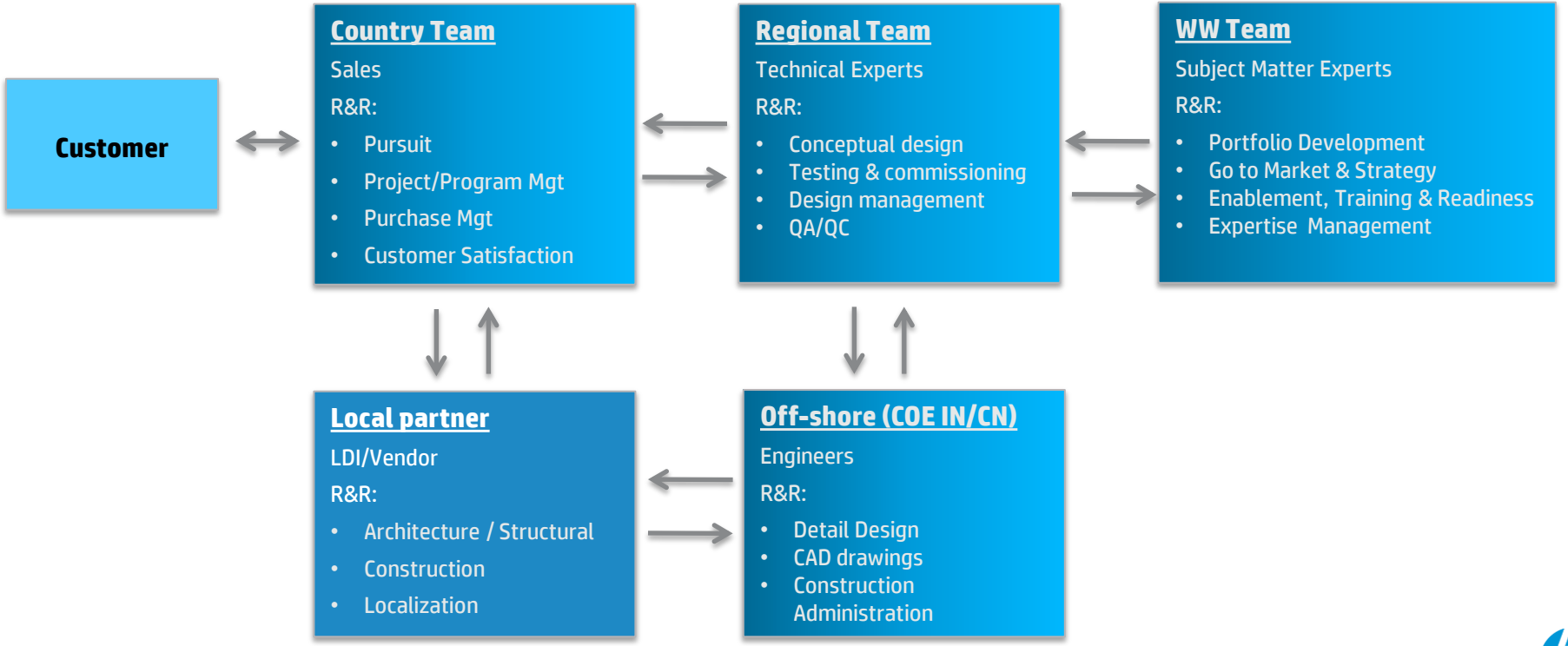
EMEA

Czech Republic	Netherlands
Hungary	Spain
Poland	Switzerland
Russian Federation	Dubai
Austria	Israel
France	Saudi Arabia
Germany	Turkey
Italy	UK

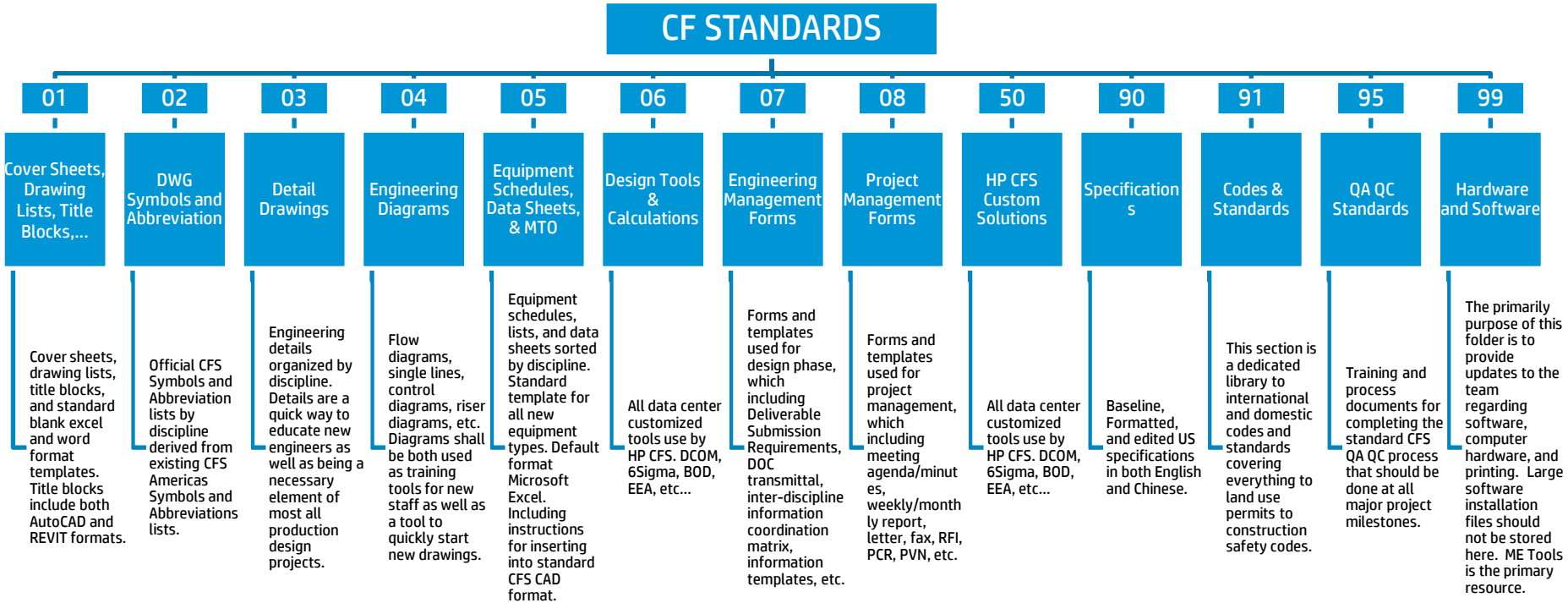
Brian Whelan, WW Lead

Global Data Center Facility Delivery Model

Global Data Center Expertise-Local Delivery excellence



Data Center Facility Standards management

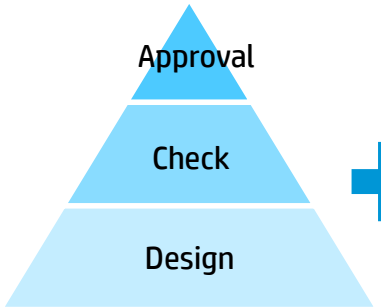


Quality Management

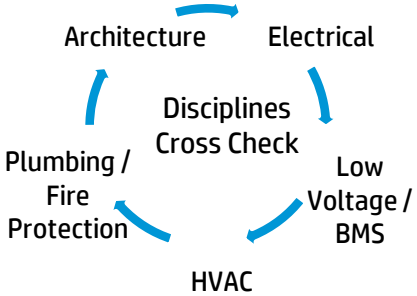
Quality Assurance

Internal Check → SME 30% 60% 90% Process Review → Client/3rd Party Audit → Finalized Submission to Client

Quality Control



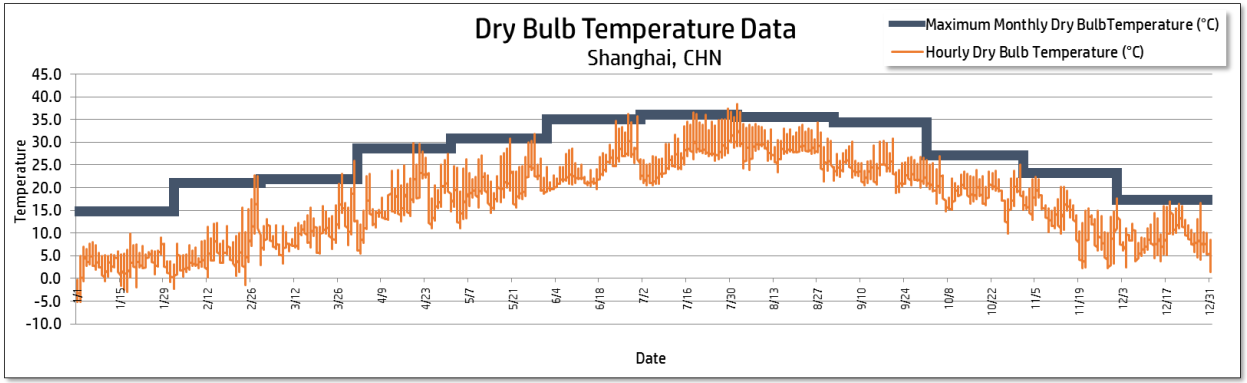
3-level Discipline Internal Review

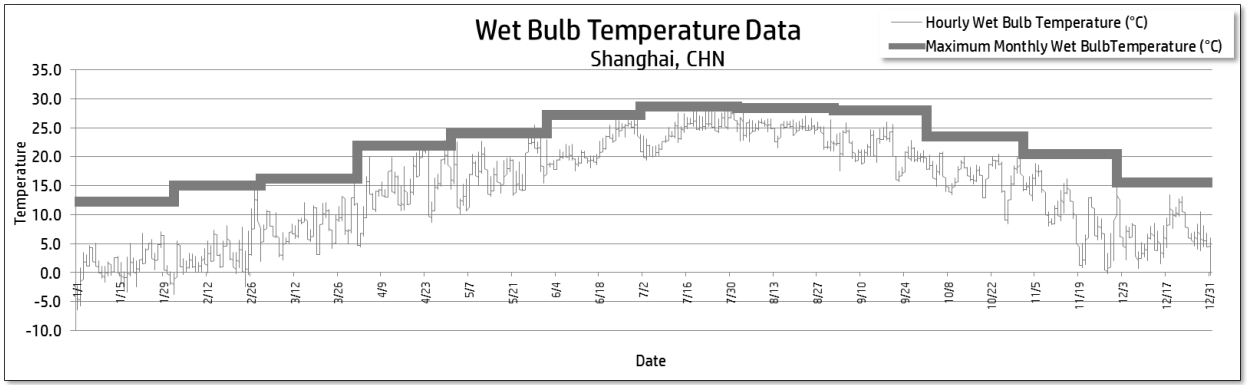


Review Tools — Color Coding

Example: Shanghai / China

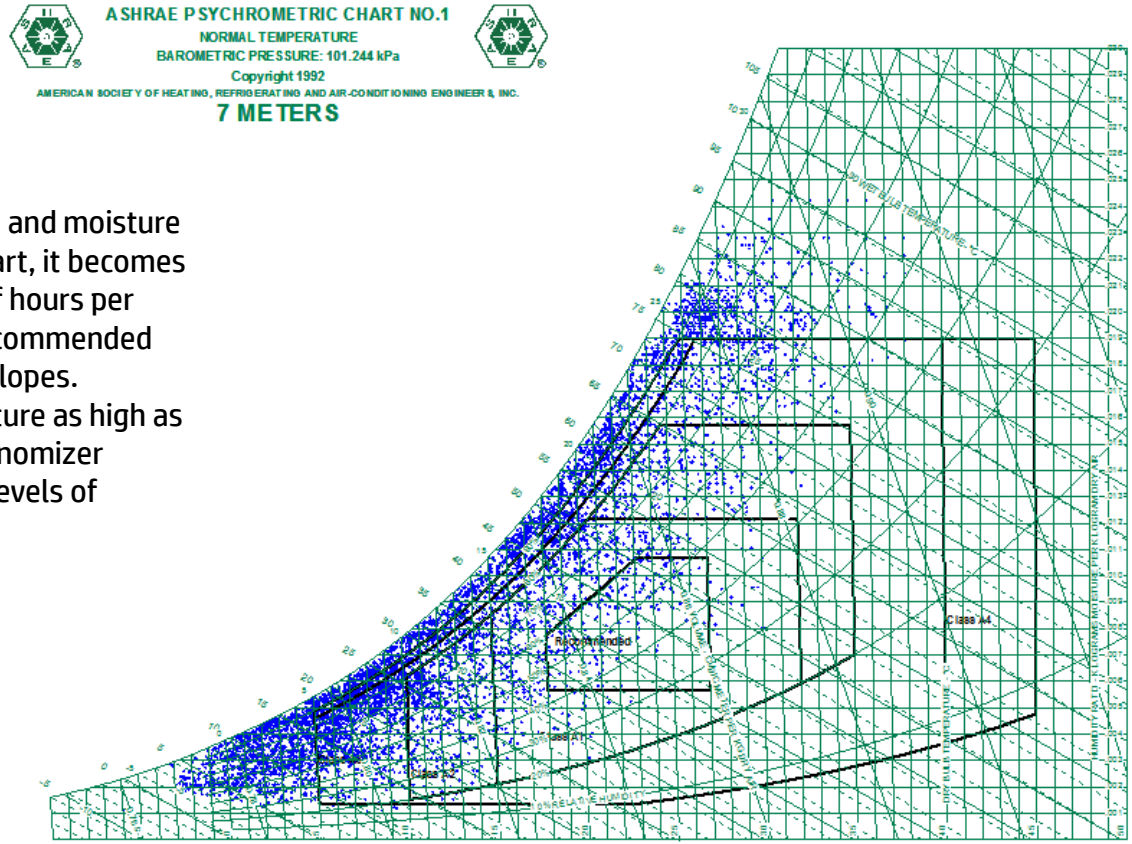
Climate Location – Shanghai, CHN





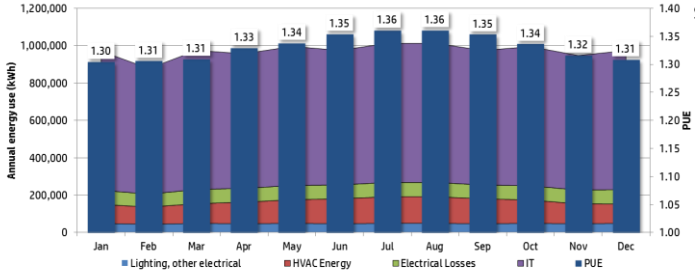
Hourly temperature is used primarily for energy use simulations and the maximum monthly temperature is used in sizing cooling equipment

Climate Location – Shanghai, CHN



Plotting the hourly temperature and moisture values on the psychrometric chart, it becomes apparent that a large number of hours per year fall outside the ASHRAE recommended temperature and moisture envelopes. Keeping the supply air temperature as high as possible and optimizing the economizer strategy will yield outstanding levels of energy efficiency.

Monthly Energy Use and PUE Estimation – Shanghai,CHN

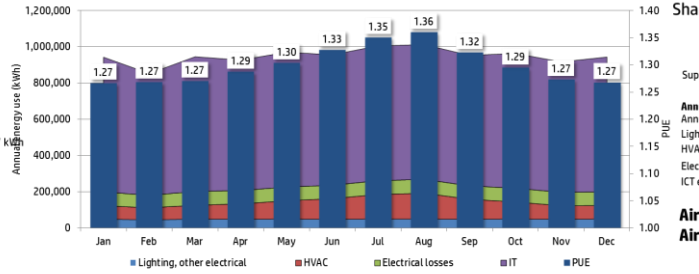


Shanghai

Supply Air Temp = 77.0°F/25.0°C

Annual PUE = 1.33
Annual energy = 11,662,163 kWh
Lighting, other electrical energy = 577,437 kWh
HVAC energy = 1,426,826 kWh
Electrical losses = 897,900 kWh
ICT energy = 8,760,000 kWh

Water-Cooled Chiller Water Econ

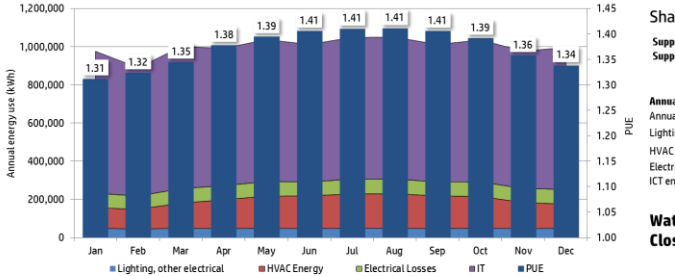


Shanghai

Supply Air Temp = 77.0°F/25.0°C

Annual PUE = 1.30
Annual energy = 11,384,820 kWh
Lighting, other electrical energy = 577,437 kWh
HVAC energy = 1,149,483 kWh
Electrical losses = 897,900 kWh
ICT energy = 8,760,000 kWh

Air-Cooled DX Indirect Air Econ

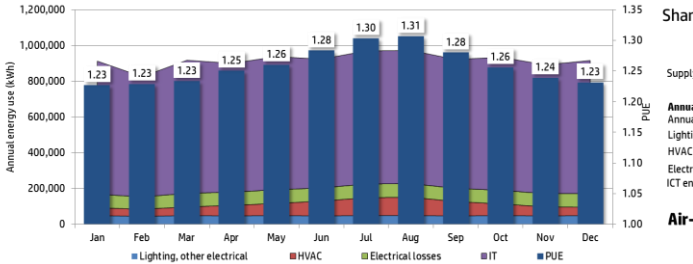


Shanghai

Supply Air Temp = 77.0°F/25.0°C
Supply Water Temp = 70.0°F/21.1°C

Annual PUE = 1.37
Annual energy = 12,030,447 kWh
Lighting, other electrical energy = 577,437 kWh
HVAC energy = 1,795,110 kWh
Electrical losses = 897,900 kWh
ICT energy = 8,760,000 kWh

Water-Cooled Chiller and Closed Circuit Coolers

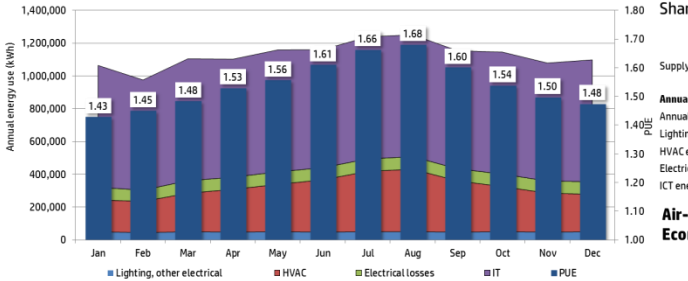


Shanghai

Supply Air Temp = 77.0°F/25.0°C

Annual PUE = 1.26
Annual energy = 11,021,721 kWh
Lighting, other electrical energy = 577,437 kWh
HVAC energy = 786,384 kWh
Electrical losses = 897,900 kWh
ICT energy = 8,760,000 kWh

Air-Cooled DX Indirect Evap

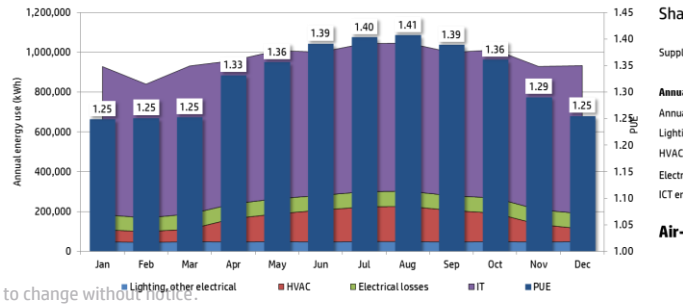


Shanghai

Supply Air Temp = 77.0°F/25.0°C

Annual PUE = 1.54
Annual energy = 13,529,311 kWh
Lighting, other electrical energy = 577,437 kWh
HVAC energy = 3,293,974 kWh
Electrical losses = 897,900 kWh
ICT energy = 8,760,000 kWh

Air-Cooled Chiller with Economizer Module



Shanghai

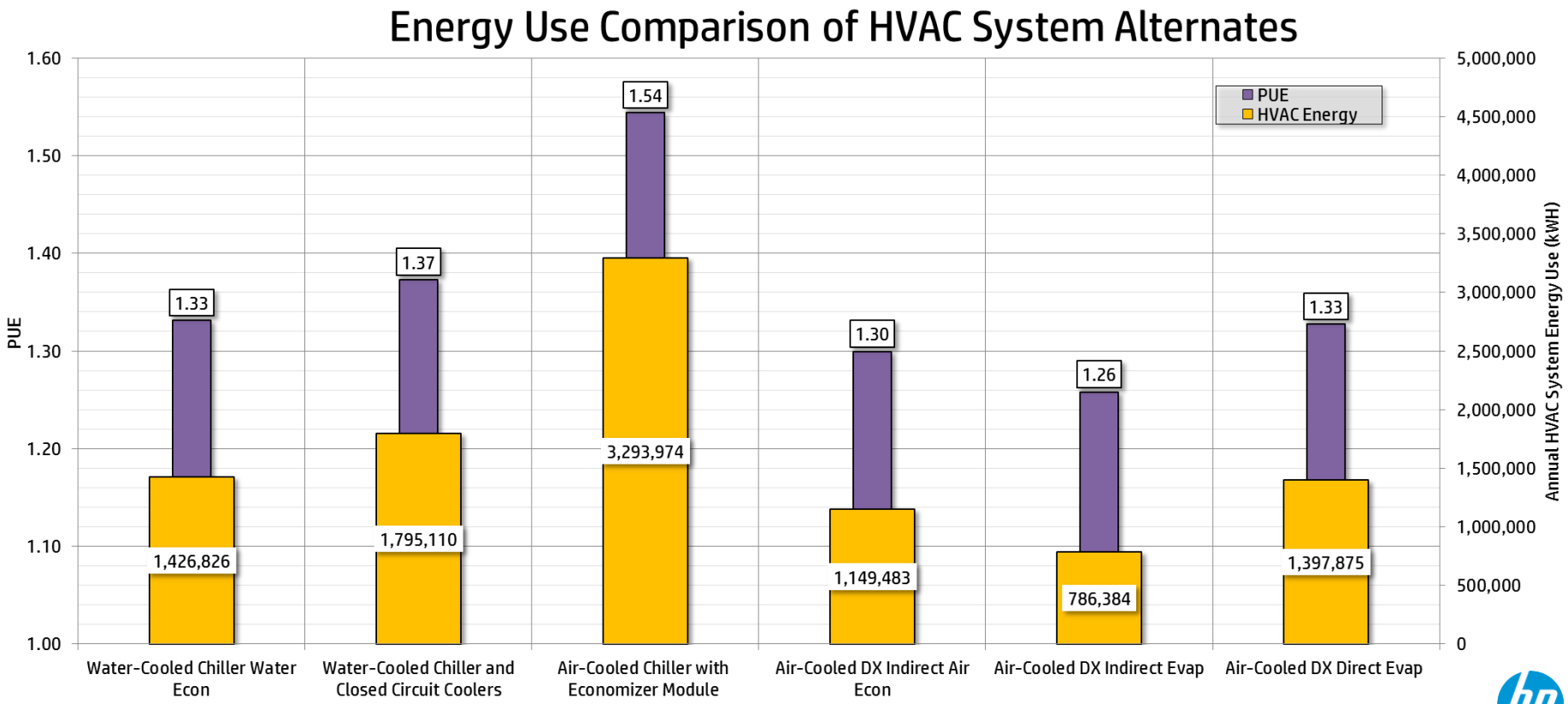
Supply Air Temp = 77.0°F/25.0°C

Annual PUE = 1.33
Annual energy = 11,633,212 kWh
Lighting, other electrical energy = 577,437 kWh
HVAC energy = 1,397,875 kWh
Electrical losses = 897,900 kWh
ICT energy = 8,760,000 kWh

Air-Cooled DX Direct Evap

Note: assumptions on lighting loads, miscellaneous power, occupancy schedules, etc. have been made in this analysis in order to represent a realistic energy usage of a data center. These assumptions are used through out the analysis.

Summary of Cooling System Alternates – Shanghai, CHN



Note: assumptions on lighting loads, miscellaneous power, occupancy schedules, etc. have been made in this analysis in order to represent a realistic energy usage of a data center. These assumptions are used through out the analysis.

Project management issues – Shanghai, CHN

- Different understanding of data center best practices
- Cultural background
- Communication differences
- Language difficulties
- Time shift

HP References

Worldwide Data Center Projects

Government Data Center The Hague Netherlands

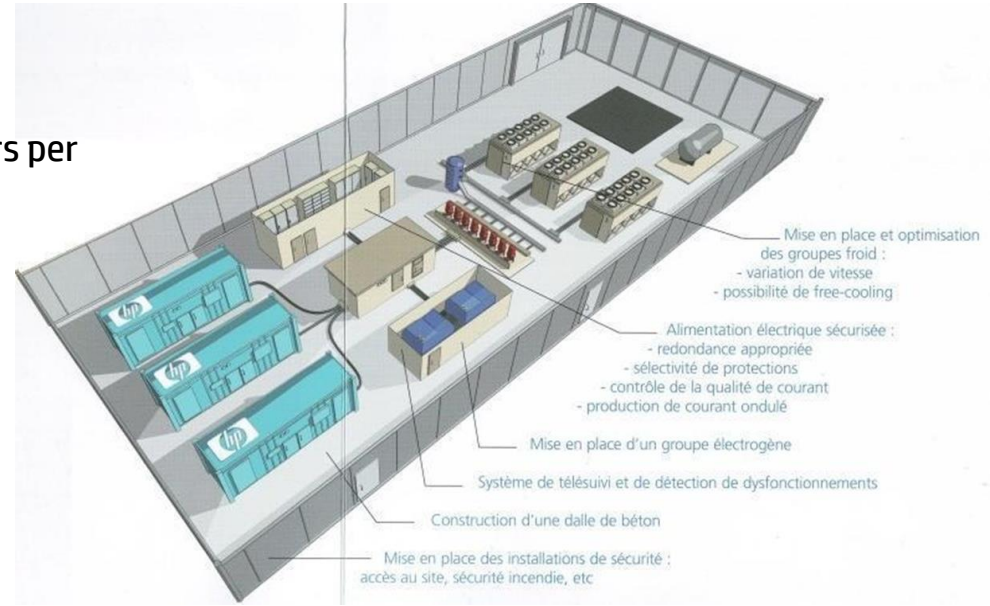
Available Sustainable Scalable Secure Flexible Economical

- Datacenter serving 5 ministries and other government departments
- Design, Build and Maintain a new data center (brownfield)
  - 2700 m²
  - 8 MW in 6 data halls
  - 5 stages
- Consortium set up with installation company, lead by HP
- HP selected out of >10 competitors
- Equal to or better than the competition for all criteria
- Energy efficiency: “Free Cooling”, adiabatic assistance, PUE <1.12
- Tier III availability, no SPOF’s
- Highest level of physical security

HP POD Installation Airbus Hamburg und Toulouse

Key Requirements

- Data Center consisting of 3 IT containers per site
- 460 kW / Container, N+1 resilience
- Power, cooling and IT containers
- Fast Track schedule (initial 21weeks/ upgrade 3days)
- Full design & build
- Harsh environment







France Telecom

Key figures:

- 2 campus of 2 buildings each
- Each building is 10 MW IT
  - 4 data halls of 1000 m² @2.5kw/m²
- Direct free cooling
  - Feasibility study
  - Design
  - Implementation
- HP as head of the consortium

Customer Objectives	HP Solution / Approach	Customer Benefits
Evolve to NGDC : *« An environment available 24x7, built with industry-standard modules, operated thru automated procedures, offering very high service levels, reducing operating expenses »* • Robustness, resilience and security • Optimization /reduction of TCO • Low carbon impact, Green DC • Very high quality of service • Agility to introduce changes • Key figures: 2 campus of 2 buildings each. Each building is 10 MW IT HQ, hosts 4 data halls of 1000 m² @2.5kw/m²	• Comprehensive consulting and project management approach, in consortium with a local architect and a building / structure company. • Full range of services: concept design, detailed design, detailed specification and constructors selection, construction management, commissioning • HP DCFC focused on key technical environments: Mechanical, Electrical, Plumbing, BMS, Security, Fire Protection… • HP as head of the consortium during the design phase	• Robust design, Tier III+ • Optimal energy balance and PUE +/- 1.2 • 30% energy saving versus standard design ➔ pays back first year datacenter CAPEX investment in 15 years • A first data center standard model for future constructions: 1 building to be cloned 4 times • Utilization of latest technologies (Direct Air Free Cooling) • Online capacity upgrades • Very high level of security • HQE French certification

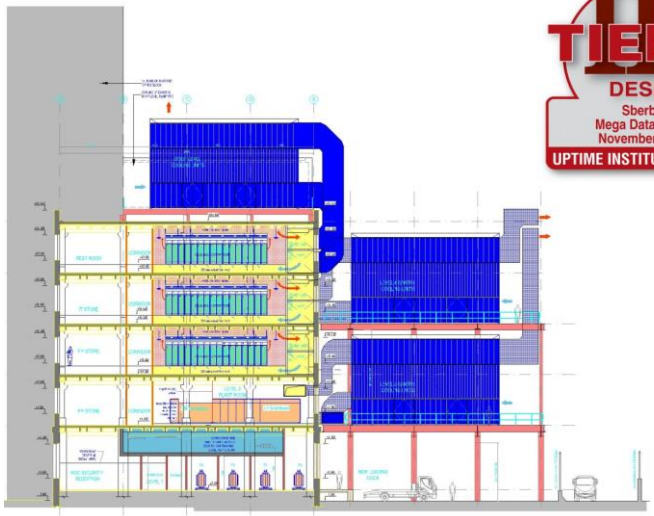
Sberbank Moscow/Russia

Most eco-friendly and innovative DC in Russia

PUE 1.3

- 5000m2 @ 2kW/m2
- Tier 3 certification
- Electrical topology Tier 4 compliant
- Unique cooling solution, patent pending
- Design of power supply, air conditioning, fire protection, M&E systems
- Project Management

Opening by Russian prime minister Nov 2011



TIER III DESIGN™ Sberbank Mega Data Center I November 2, 2011 UPTIME INSTITUTE CERTIFIED

DatacenterDynamics EMEA Awards 2012
Winner in category
„Innovation in the mega data center“:

Sberbank Mega DC 1

Tadawul Headquarter Building

Riyadh, Kingdom of Saudi Arabia

Project Outline

- Located in Saudi Arabia's financial center in Riyadh, stock exchange
- Building Chosen in an international competition, the exterior is equipped with louvers to allow for both panoramic views and shielding against the heat of the sun
- Design mobilizes numerous state-of-the-art technologies to assure sustainability in the desert environment

Data Center

- Building Design by Nikken Sekkei
- Data Center Design By HP Data Center Facility Consulting
  - Certified Uptime Institute Tier IV
  - 1400m² High Density Capable White Space
  - Data-center, 4th floor, Generator plant on 3rd floor, UPS room, 5th floor & MV Room on 6th floor.

Kazaktelecom Pavlodar/Kazakhstan

Design, build, finance & maintain project

First Tier III certified data center in Central Asia

- 1000m² / 380 Racks
- Tier 3 certification
- DC Design
- Quality Assurance (construction support and advise)
- Test & Commissioning
- IT Cloud solution, Network design
- Financing
  - **DC IAAS** - infrastructure as a service
  - IT infrastructure as a service
- DC infrastructure maintenance services

Why HP?

Data Center Facility Consulting – Value to our customers

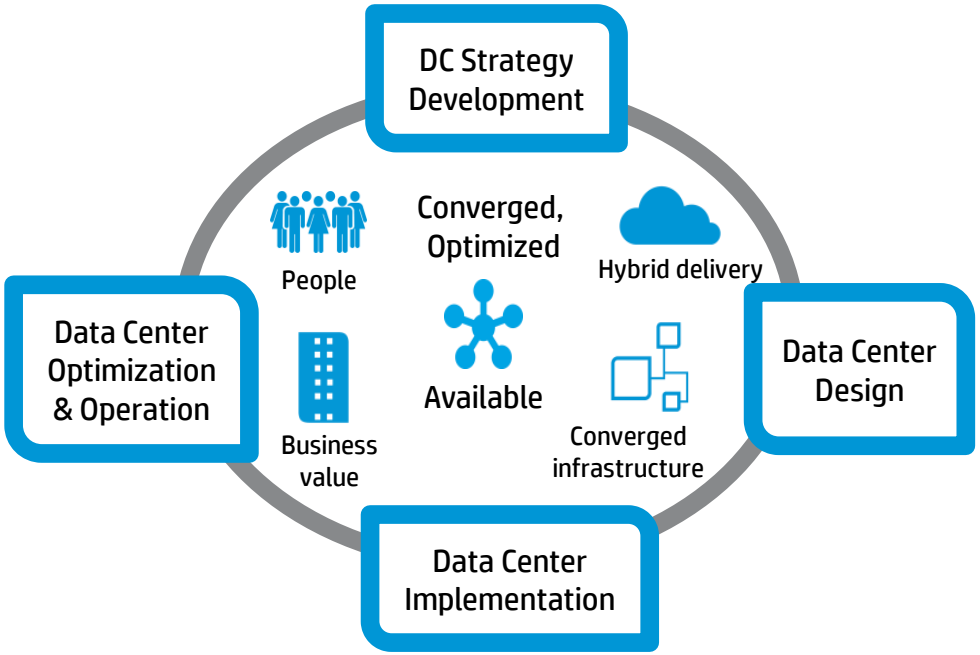
Why HP?

Data Center Design expertise and experience
- Designed 5+ million m² of data centers
- Designed 40 of the major Tier 4 Greenfield DC's
- Designed six 40 MW + data centers
- Local Uptime Institute accredited engineers
- Industry leader in the design of energy-efficient, "green" Data Centers with LEED APs and BREEAM Assessors
- More than 300 DC engineers and consultants worldwide

Full Data Center Lifecycle coverage
- From strategic consulting to DC operation
- Trusted advisor for all project stages

Integrated IT and Facilities Solutions out of one hand
- HP is the only company which can provide this
- Incorporation of Network and IT design into DC projects
- Anticipation of IT trends

HP's geographical reach and brand
- Experience from projects world wide
- International project delivery, local presence



Thank you!