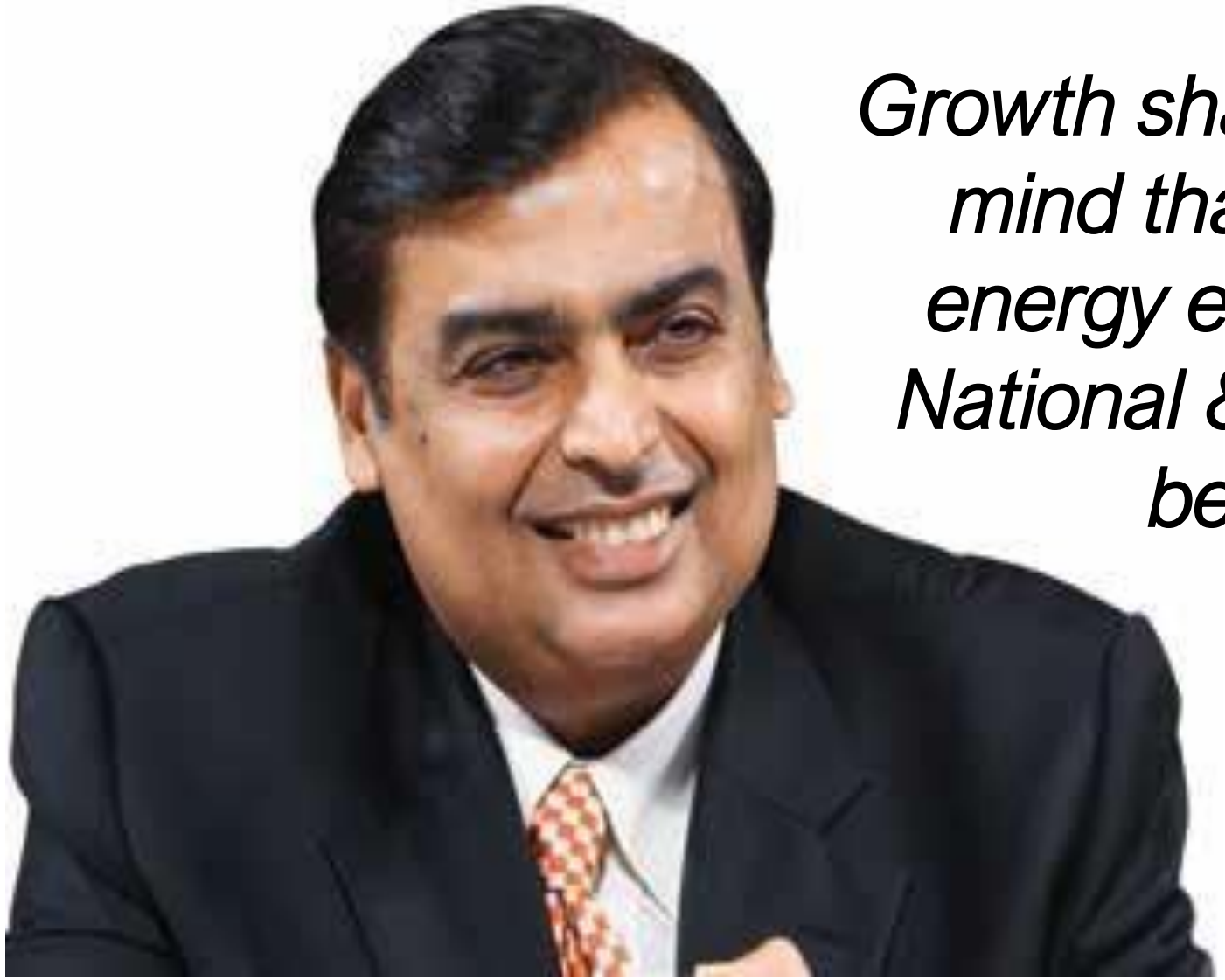
Enhanced Energy Efficiency in Indian Data Centers …

By M. L. Sinhal

From CMD's Desk ...



Growth shall be achieved keeping in mind that design must be most energy efficient and sustainable. National & Natural resources shall be used judiciously.

Agenda

1. What is Data Center ?
   - Configuration Components
   - Design Code
   - Main Power Components
2. Data Center Power Efficiency (PUE)
3. Server Air-Cooling Practices
4. Steps taken to reduce HVAC Power
5. Efforts to improve PUE & Reliability
6. The role of server designers for server heat removal
7. Green certification of RIL Data Centres

We are in 2020

Data center

What is Data Center

The storage space for a large group of networked computer servers typically used by organizations for processing, or distribution of large amounts of data is called Data Center.

Configuration Components

- Data Center Building
  - Data Center Hall
  - Meet Me Rooms
  - Configuration areas
  - Battery Rooms
  - UPS Rooms
  - BMS Rooms
  - Security Control room
- Allied Utilities area
  - Efficient Electrical Power System
  - DG House
  - Chiller Plant & cooling tower
  - STP/ETP Plant
  - Administration Building

Design Codes

A Telecommunications Infrastructure Standard for Data Centers - TIA-942

Discipline Standards

1. IEC (Electrical)
2. ASHRAE (HVAC)
3. NBC (Building)
4. NFPA (Fire)

Main 3 Power Components

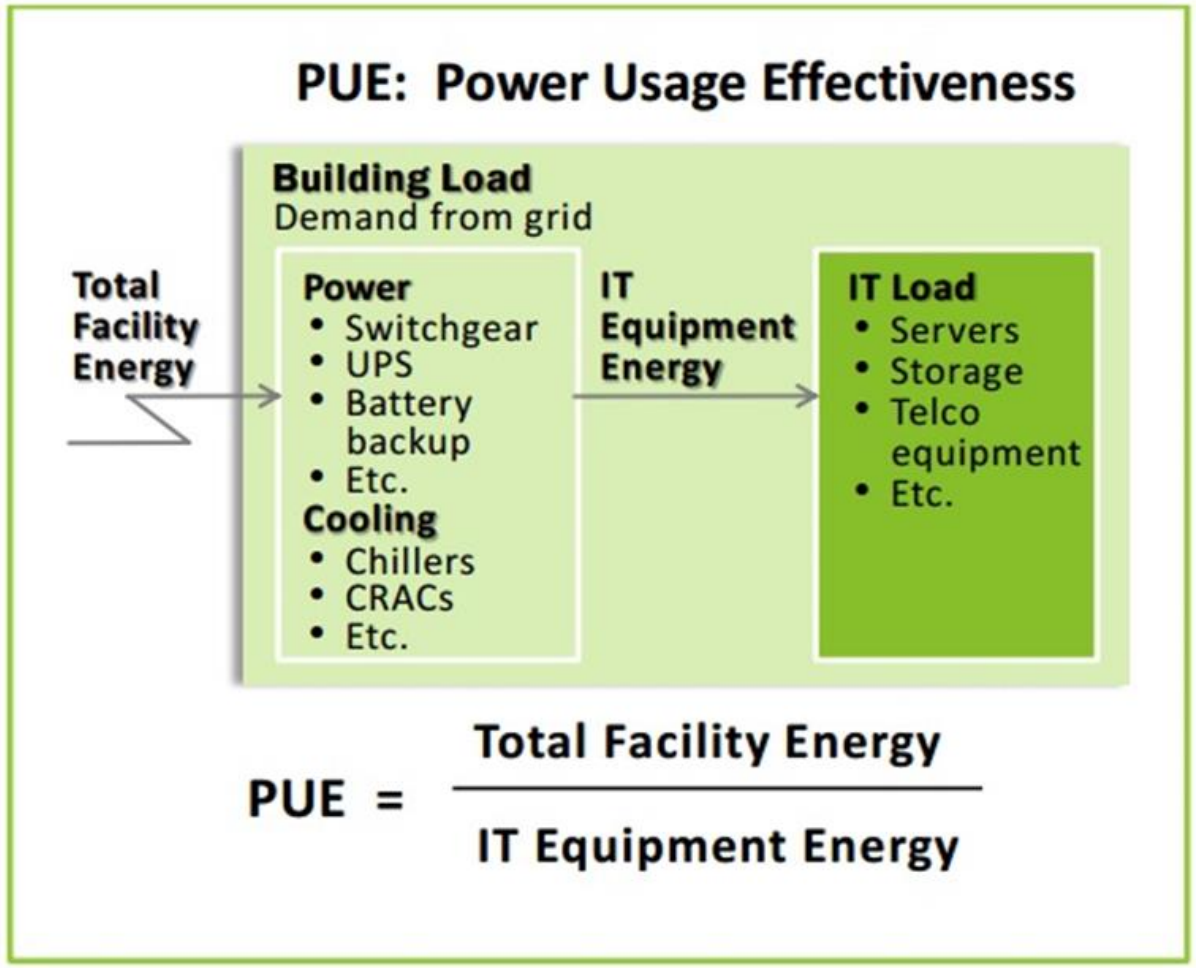
- Server Rack – IT Power
- HVAC
  - Chillers
  - Pumps
  - Cooling tower
  - Precision air conditioners
- Ancillary
  - Transformer
  - UPS
  - Lighting

Data Center Efficiency

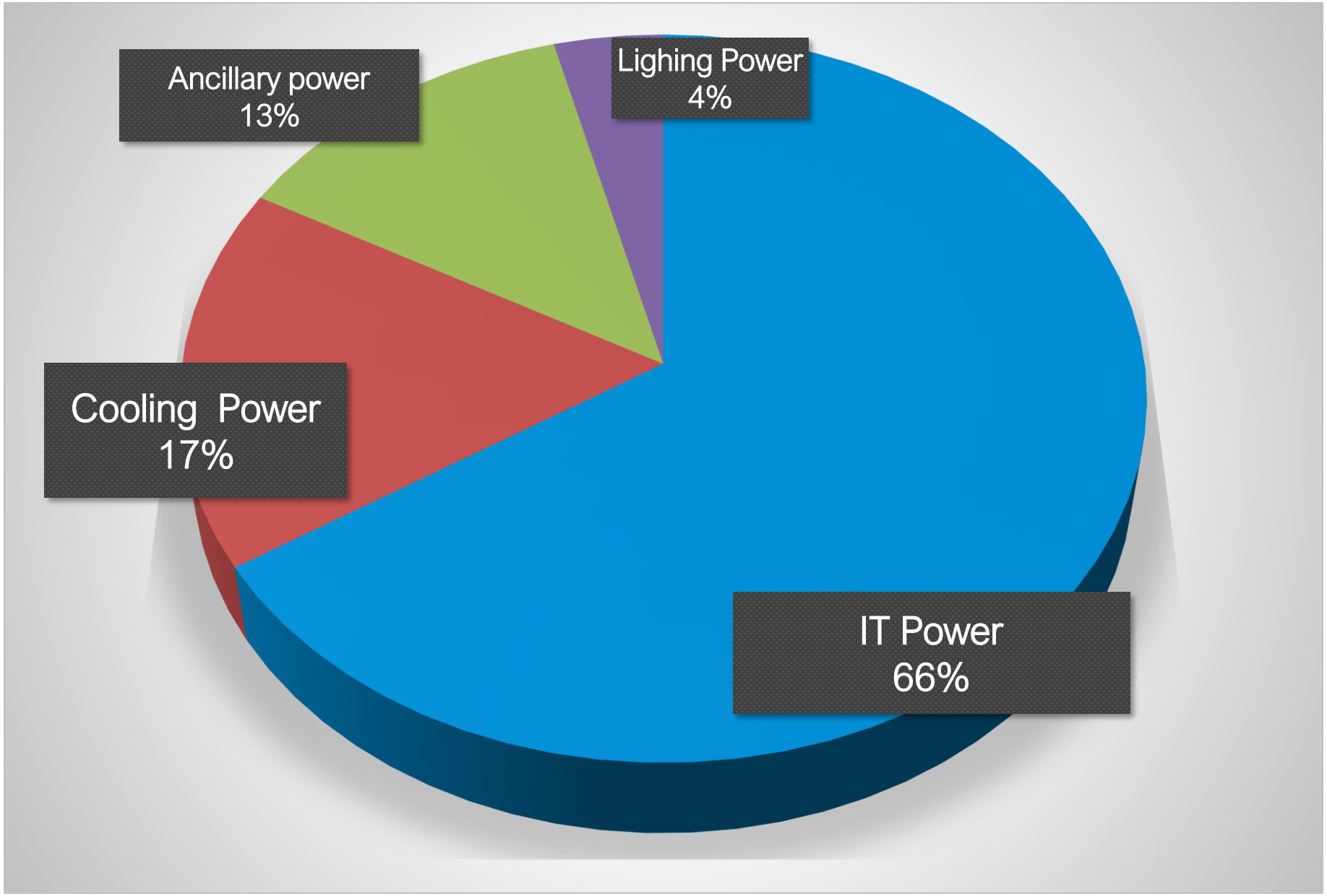
- PUE is most common term used for Data center efficiency
- PUE is the ratio of,

$$= \frac{\text{Total Facility power(KWh)}}{\text{IT Equipment Power(KWh)}}$$

- Lower the PUE, Better the Efficiency of Data center .
- PUE is also a function of geographical location of data centre



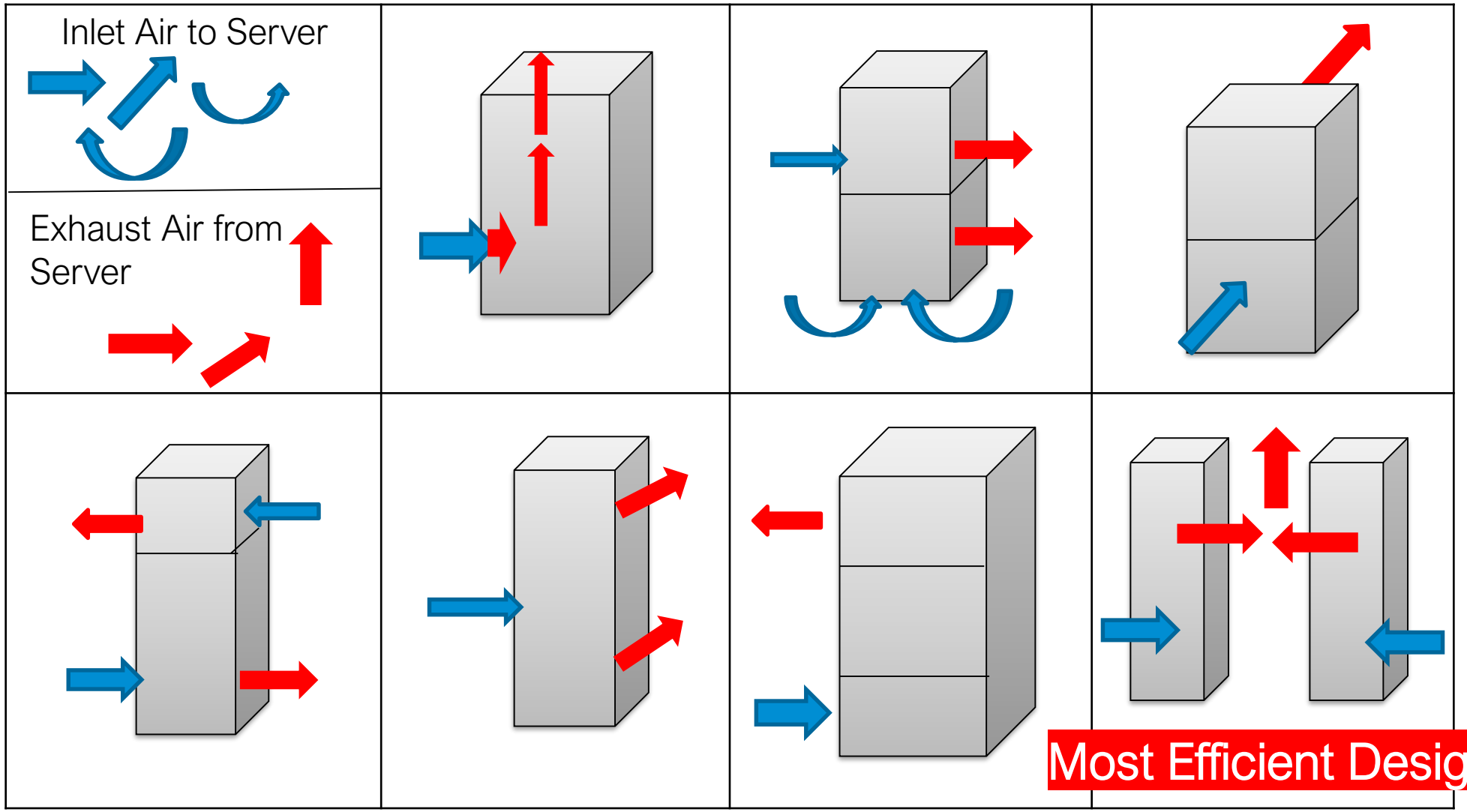
Typical PUE Break Up



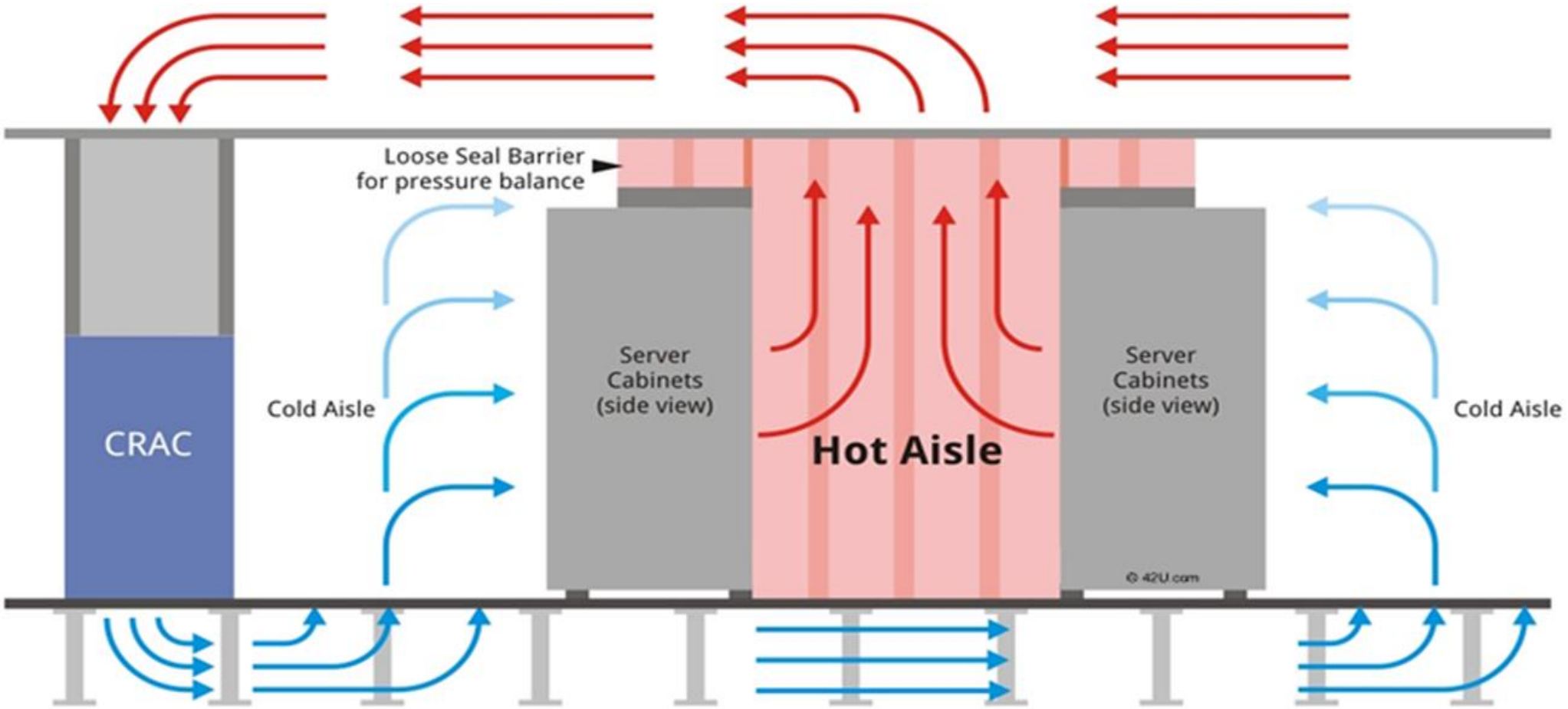
For this system PUE value is 1.5

Generally PUE varies from 1.15 to 1.7

Server Air-Cooling Practices

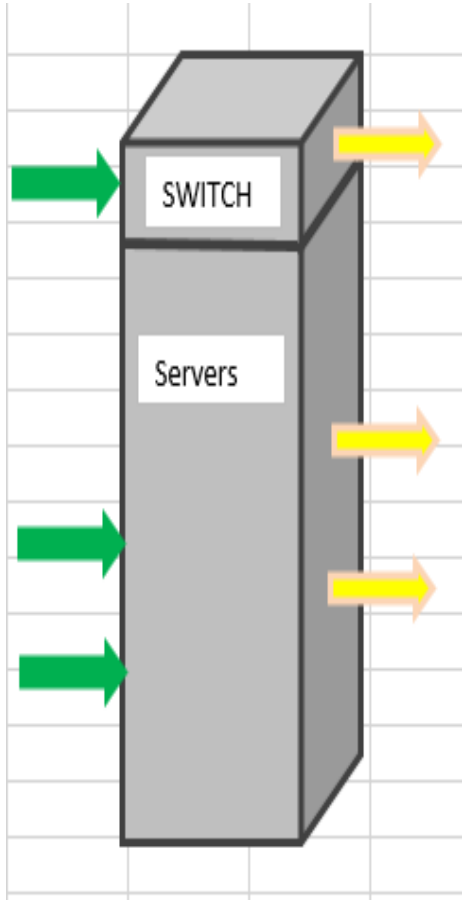


Most Efficient Heat Removal System

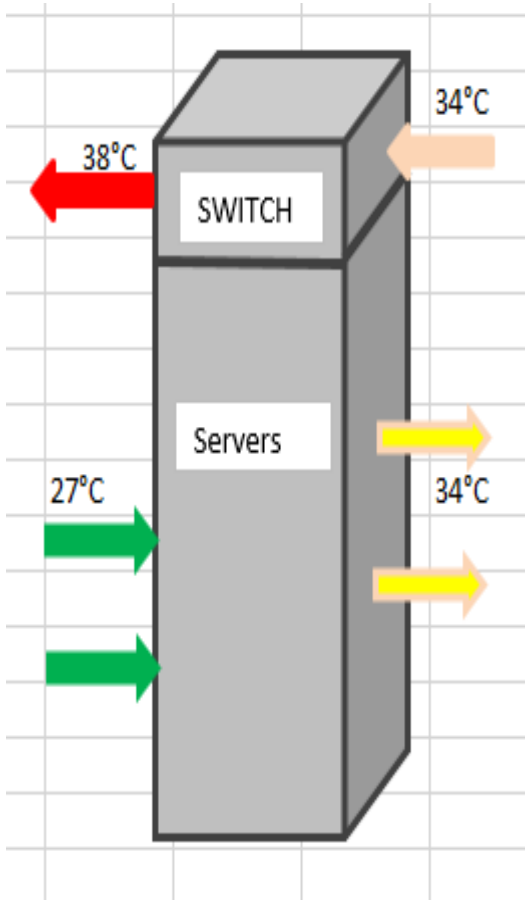


The cold aisle provides cold air directly to the front of all the racks and hence to the servers, while the hot aisle receives the warm air discharged by the servers after completing its cooling purpose.

Switch and Server Air-Cooling Practice



Good Practice



Wrong Practice

Steps taken to reduce HVAC Power

- Major step in reducing the PUE is reducing the Chiller power consumption.
- ASHRAE allowed the server inlet air temperature as **27 °C**.
- With this chiller operating temperatures are changed from
  7 °C /12 °C to **20 °C /27 °C**.
- This has reduced the chiller power consumption from
  0.66 ikw/TR to **0.32** ikw/TR.
- PUE Reduced from **1.45** to **1.35**

Efforts to improve PUE & Reliability

- A typical Data Center Hall has servers of different make
- Different manufacturers follow different heat removal system
- If multiple servers of different makes are kept in the same hall, cooling arrangement suffers.
- To improve PUE and reliability, we undertook measures like:
  - diverting cold air and hot air
  - providing back plate
  - providing bottom plate
  - correcting main switch location

Server Models & Air Directions

SERVER	AIR DIRECTION
SAMSUNG	Having air flow from bottom and discharge back
CEINA 6500	Front suction and front discharge
HP DL380	Cable manager obstruction exhaust air
TEJAS TJ1400/TJ-1600	Air from left /discharge right
NSN NOKIA	Server fan low static pressure
TOR SWITCHES	Some switch have back suction/front discharge
AL-NOKIA1830-PSS32	Front suction side discharge
AUDIO CODE	Jumper left air intake/ right air discharge
IBM	No filter in intake air
CIENA 5430	Front suction /back discharge ✓
HP 7000	
NSN NOKIA	

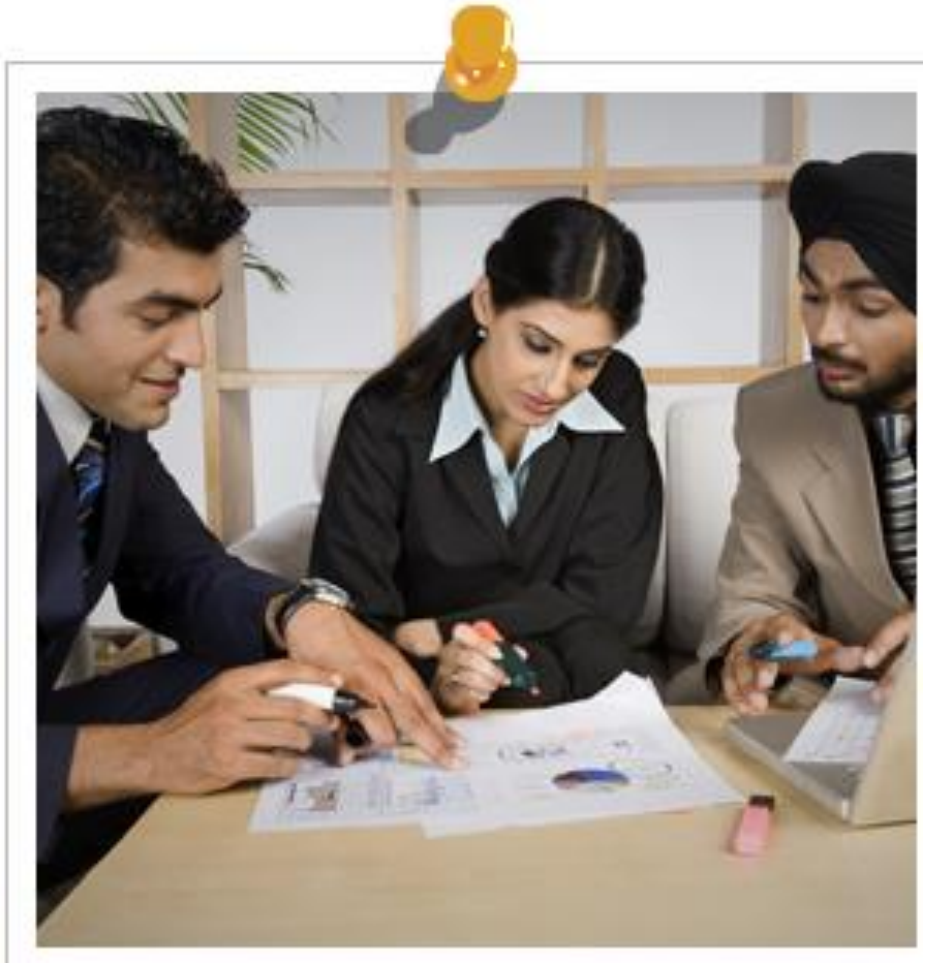
Reliance

Need of hour

I feel all the Server manufacturers should come together for standardization of server air flow.

Server air flow shall be front entry and back discharge.

CII-IGBC & Lawrence Berkeley National Laboratory, USA should help the association of server manufacturers to make Data Center industry more energy efficient.



Reliance

RIL Data Centre …

- PUE operating range of Reliance Data Centres is between 1.3 and 1.4.
- RIL has applied for Green certification of its Data Centers.
- We are in advanced stages and expect to receive it soon.

Thank You

By M. L. SINHAL