

Importance of **Green** Data Centre



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Few aspects to share.....

1. Key National Issues to be considered
2. Power Consumption in Data Centres
3. Green Data Centre
4. Avenues for going Green
5. IGBC initiatives in India

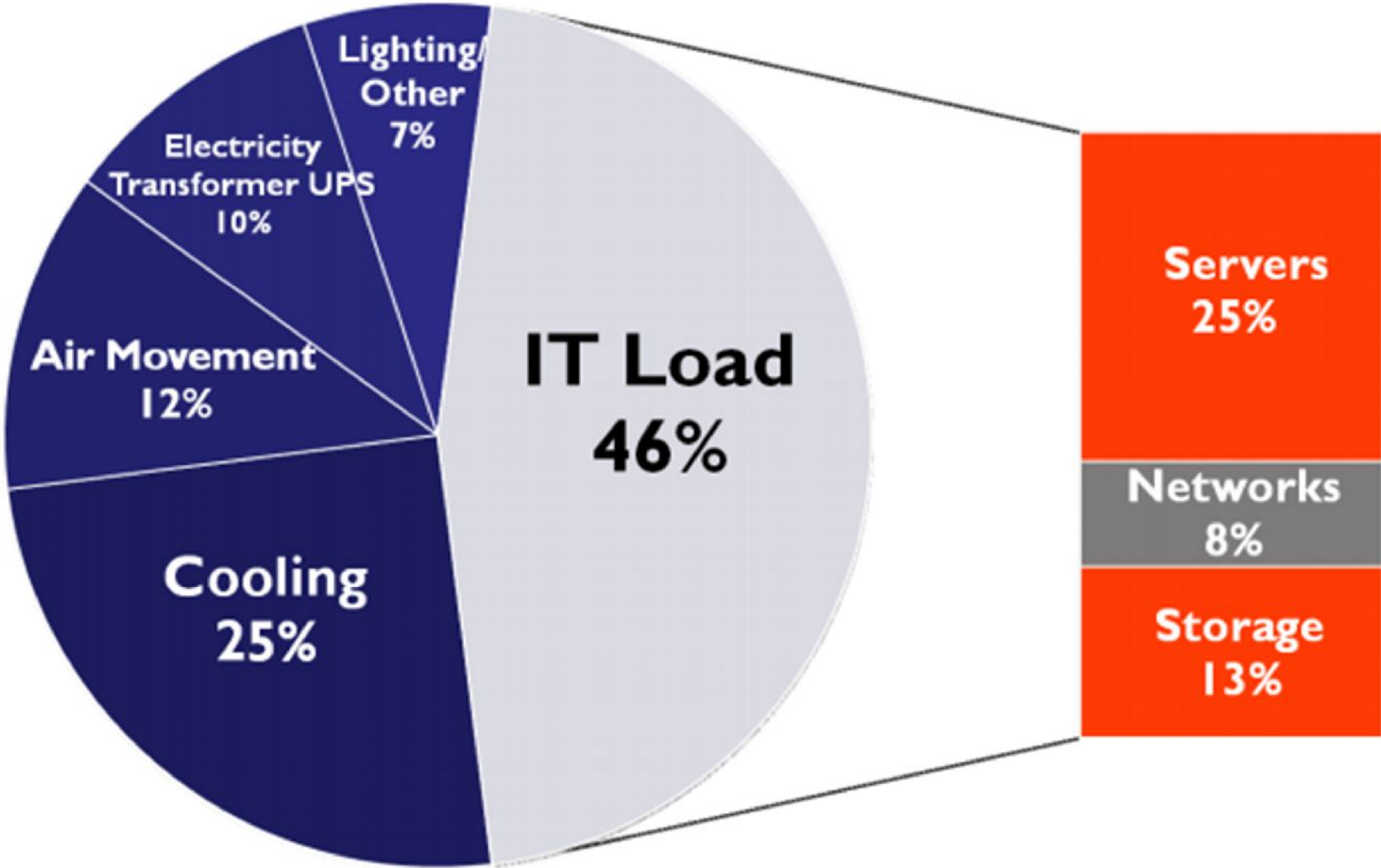


Key National Issues to be considered

- **Reduction in overall energy demand & peak loads.**
- **Facilities for developing Data Centre Infrastructure.**
- **Availability of Power & transmission links.**
- **Availability of water for cooling.**
- **Heavy dependence on fossil fuel.**
- **Lower percentage of Renewable energy to the grid.**
- **Inability to consider using of recycled material.**
- **E-waste handling & E-waste management.**

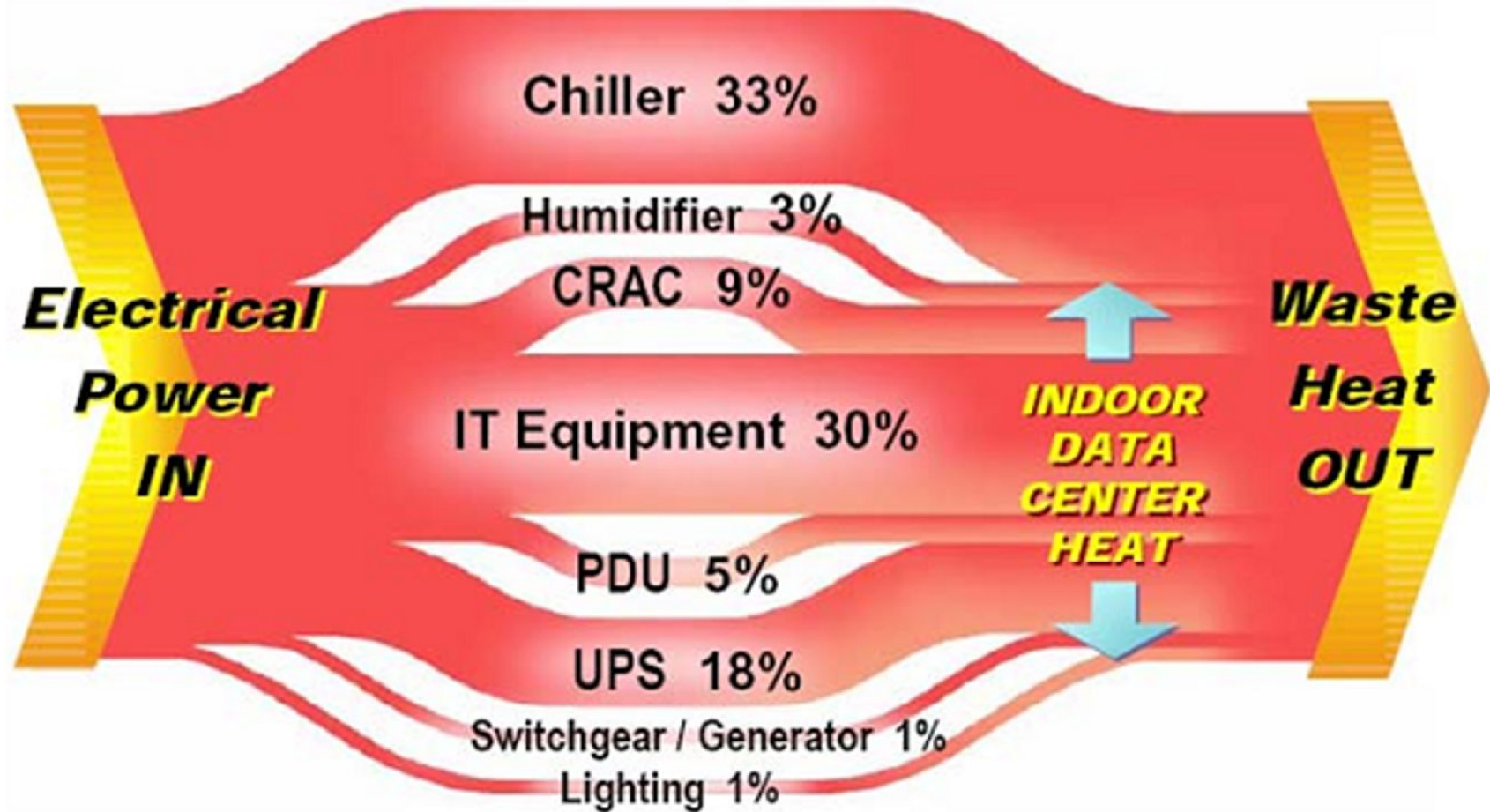


Power used in Data Centres (approx.)





Energy flow in a Data Centre



Example of a Data Centre with 30% efficiency. Here, the PUE is:-

Total facility power ÷ IT Power

*This comes to a **PUE of 3.3** which is an example of least efficient Data Centre.*

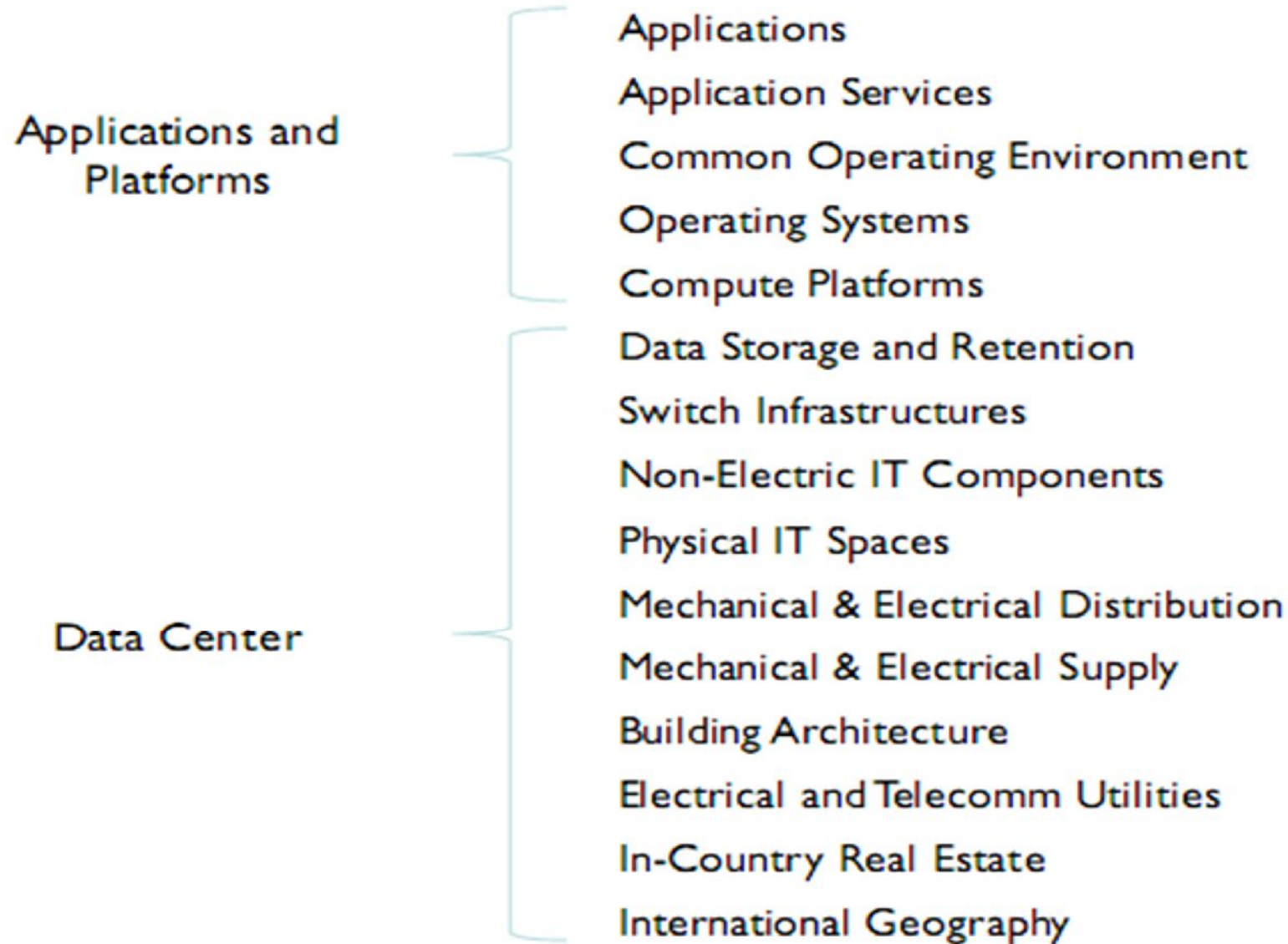


Defining Green Data Centre

A Green Data Centre is a repository for Storage, Network, Compute, Management & Dissemination of Data in which the mechanical, lighting, electrical and computer systems are designed and operated for maximum energy efficiency and minimum environmental impact.



Typical 'OSI' stack in a Data Centre





Avenues for Going Green....

- **Increasing Disk utilisation:-** Consolidation of disk capacity in newer, efficient high capacity drives can reduce space utilisation up to 50%. Spin down of inactive disks is another option.
- **Dynamic provisioning of Infrastructure:-** Increase system utilisation so that the system is optimally loaded (up to 70% load).
- **Load Balancing:-** Load spots should be identified & controlled.
- **Compression & De-duplication technologies:-** Depending upon changed data & business, a 15-16x capacity reduction is possible.
- **Thermal Management:-** Identification of Hot spots and suitable corrective actions help to optimise energy consumption.
- **Tiered Rack Management:-** Segregating high energy guzzler racks from medium & lower energy racks can help in Thermal Mgmt.



Avenues for Going Green....

- **Processor selection:-** Low power processors can provide up to 8-10% lower energy utilisation.
- **Virtualisation:-** gives the benefit of optimally using the Hardware and reduce the physical form factor, energy without adversely impacting system performance. Energy saving can be up to 15-16%.
- **High efficiency Power Supplies:-** Hidden benefit to save power wastages (up to 11-12%) which are usually side-tracked during procurement stage.
- **Variable capacity cooling:-** Using variable speed fan drives can help to save energy up to 6-7%.
- **Synchronisation of Cooling units:-** Monitoring & Control of daily operations through Synchronised operation of cooling units can help save energy up to 2%.

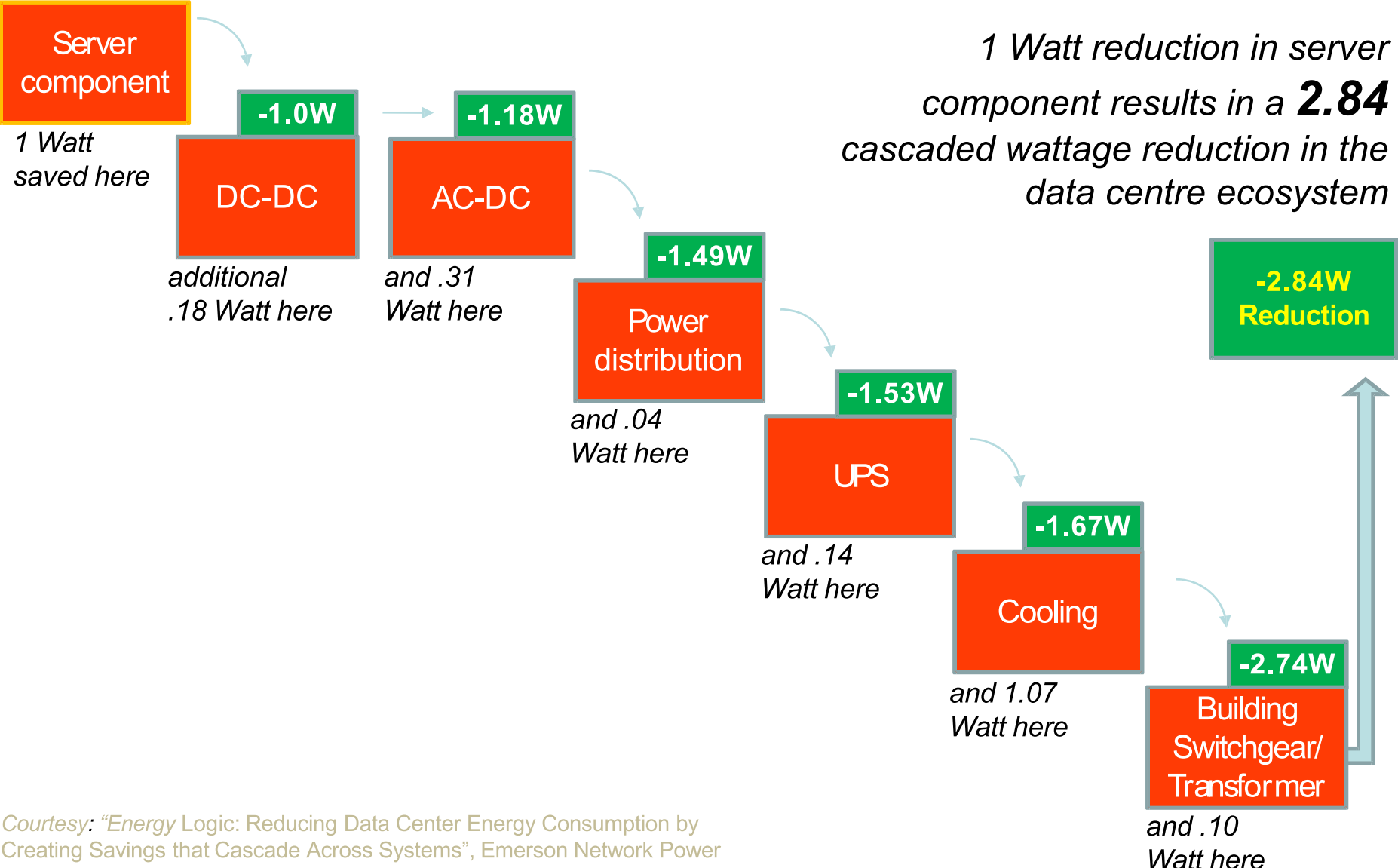


Avenues for Going Green....

- **Newer efficient cooling:-** In-rack cooling, liquid cooling, etc.
- **Isle management:-** The present need is to have both, Cold Isle containment & Hot Isle containment to segregate air flow so that target cooling is achieved.
- **Online health monitoring:-** Data Centre Health monitoring using suitable DCIM tool is a must to spot inefficiencies for immediate control.
- **Waste recycling:-** Complete & Controlled disposal of obsolete/ decommissioned systems through a Recycling agency so that dumping is eliminated.
- **Periodic Data Centre assessments:-** Regular assessment of Data Centres help identify those inefficiencies and problems which a DCIM tool may not be able to.



Cascade effect in improving efficiency



Courtesy: "Energy Logic: Reducing Data Center Energy Consumption by Creating Savings that Cascade Across Systems", Emerson Network Power



IGBC initiatives in India

- **In India, Indian Green Building Council** has developed the pilot version of IGBC Green Data Centre Rating System Abridged reference Guide.
- Development of IGBC Green Data Centre Rating System is an important step to facilitate the adoption of green building practices in India.
- IGBC rating system is intended to enable construction and operation of data centres with enhanced resource efficiency, thereby leading to National benefits and address the National priorities.
- Source:- <https://www.igbc.in/>



Green Data Centres... Why they matter

Green Data Centers

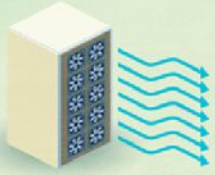
The more we use the Web, the bigger the job for data centers.

That requires energy. A lot of energy.

Why They Matter

How do Green Data Centers save energy?

Boost airflow management



↓40% energy

Consolidate servers



↓10-40% energy

Improve processing technology



↑6 fold computer efficiency

Exploring innovative cooling technologies



↓up to 95% energy

Raise temperatures



↓60% cooling costs

What benefits do we get?



Replacing an older server with a design that uses today's latest technology and at least 30% less energy saves:



enough electricity to avoid up to 1 ton of carbon emissions



emissions from more than 100 gallons of gasoline



up to \$480 over its useful life (4 years)

- Sources:
- ▶ Department of Energy Best Practices Guide for Energy-Efficient Data Center Design
 - ▶ Green Revolution Cooling
 - ▶ U.S. EPA Greenhouse Gas Equivalencies Calculator
 - ▶ "Purchasing More Energy-Efficient Servers, UPSs and PDUs," Energy Star
 - ▶ Uptime Institute



Courtesy:- Intel Corporation



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