

Data Centre Energy Utilisation and Accounting

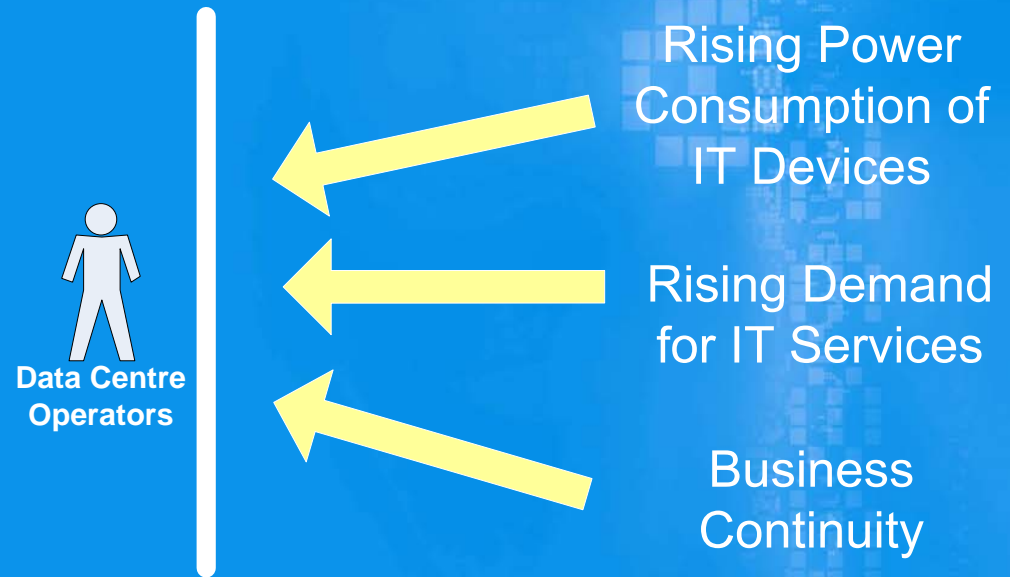
Liam Newcombe
BCS Data Centre Specialist Group Secretary

The Energy Problem
Asking the Wrong Questions
Per Service Energy Use
Metering
The DCSG Model

The Energy Problem

Demands on Data Centre Operators

Demands



Constraints

Constraints

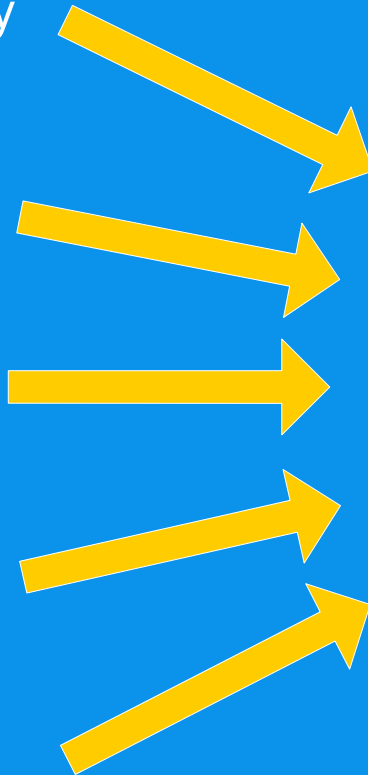
Power Availability

Power Cost

Carbon Cost
(Offset, Cap
& Trade)

Brand Value
(CSR)

Regulation



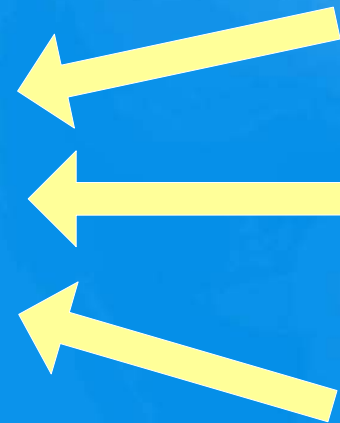
Data Centre
Operators

Demands

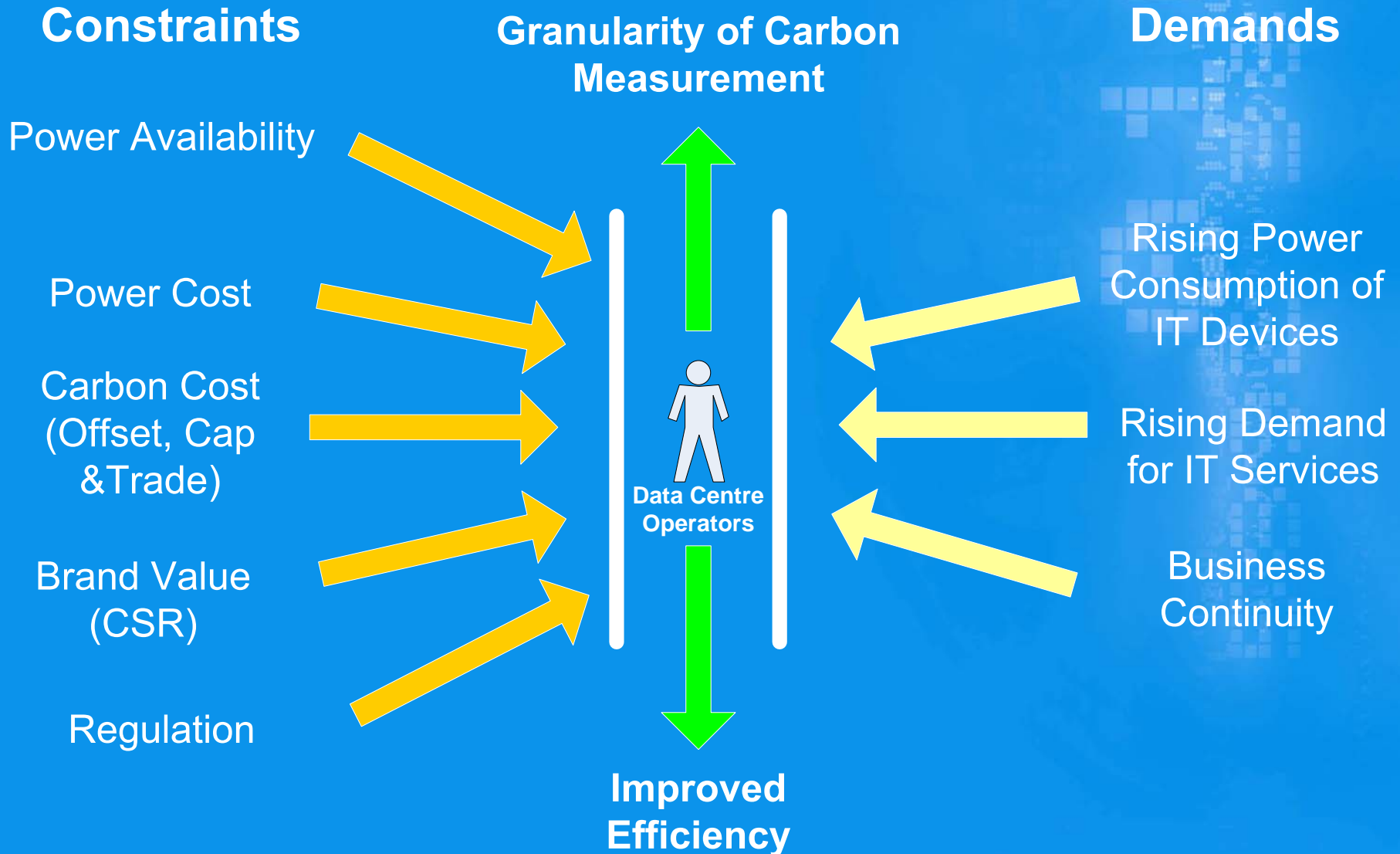
Rising Power
Consumption of
IT Devices

Rising Demand
for IT Services

Business
Continuity



New Requirements



Asking the Wrong Questions

“For each Watt my Data Centre consumes what output do I get?”

VS.

“For each Service I deliver how much energy do I use?”

Targeting Supply

Targeting Demand

Delivered IT Services

Traditional Carbon Accounting

Reporting Metrics

Whole Building

Whole Platform

Apply Targets

Create Incentive to Change

Useful Work

Data Center Productivity

DCiE / PUE

Per Service Accounting

Analysis Metrics

Detailed Breakdown

Why is my IT Inefficient?

How do I Change?

Should I use Product X?

How much £/CO2 will I Save?

Energy

Per Service Energy Use

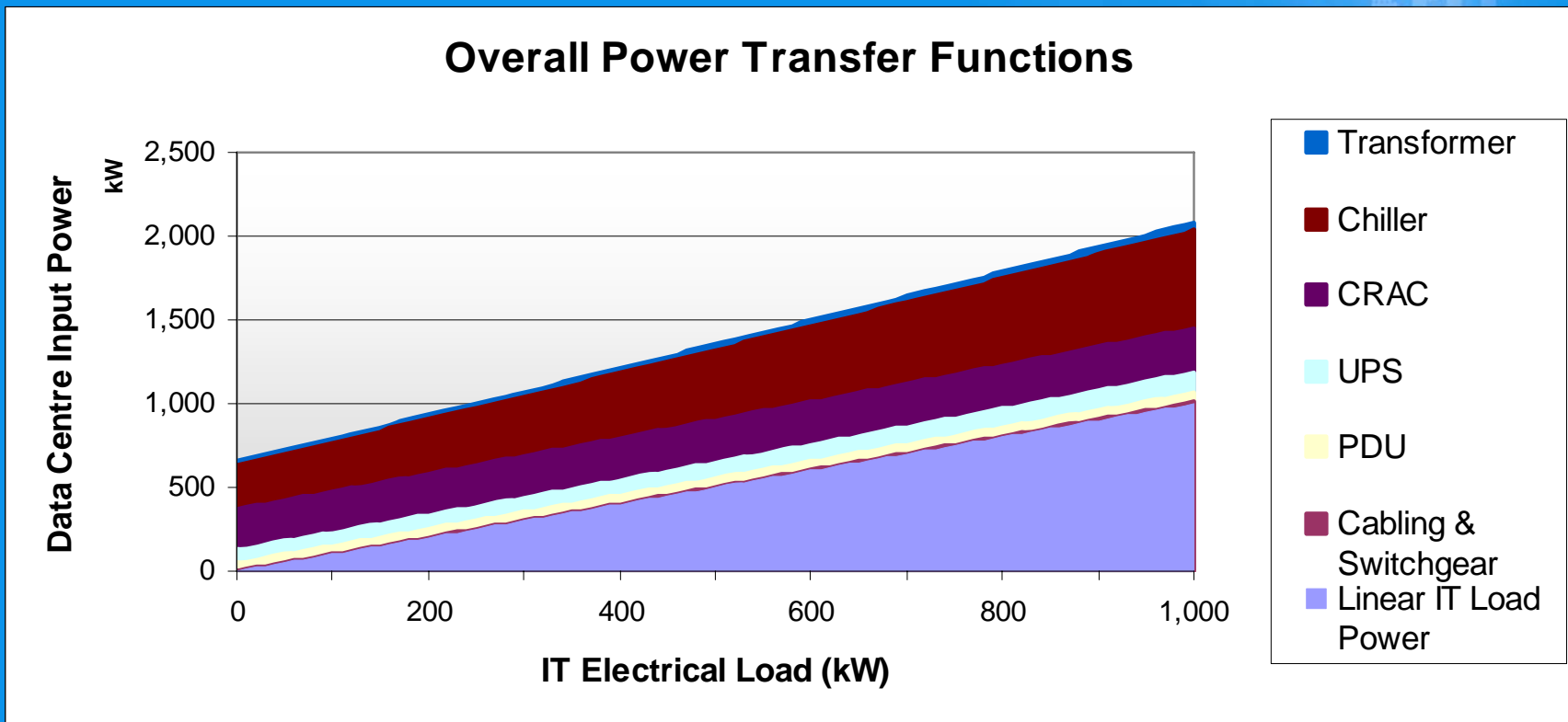
Data Centres

Servers

Server in a Data Centre

External Temperature

Data Centre Power - Where does it go?



Per Service Energy Use

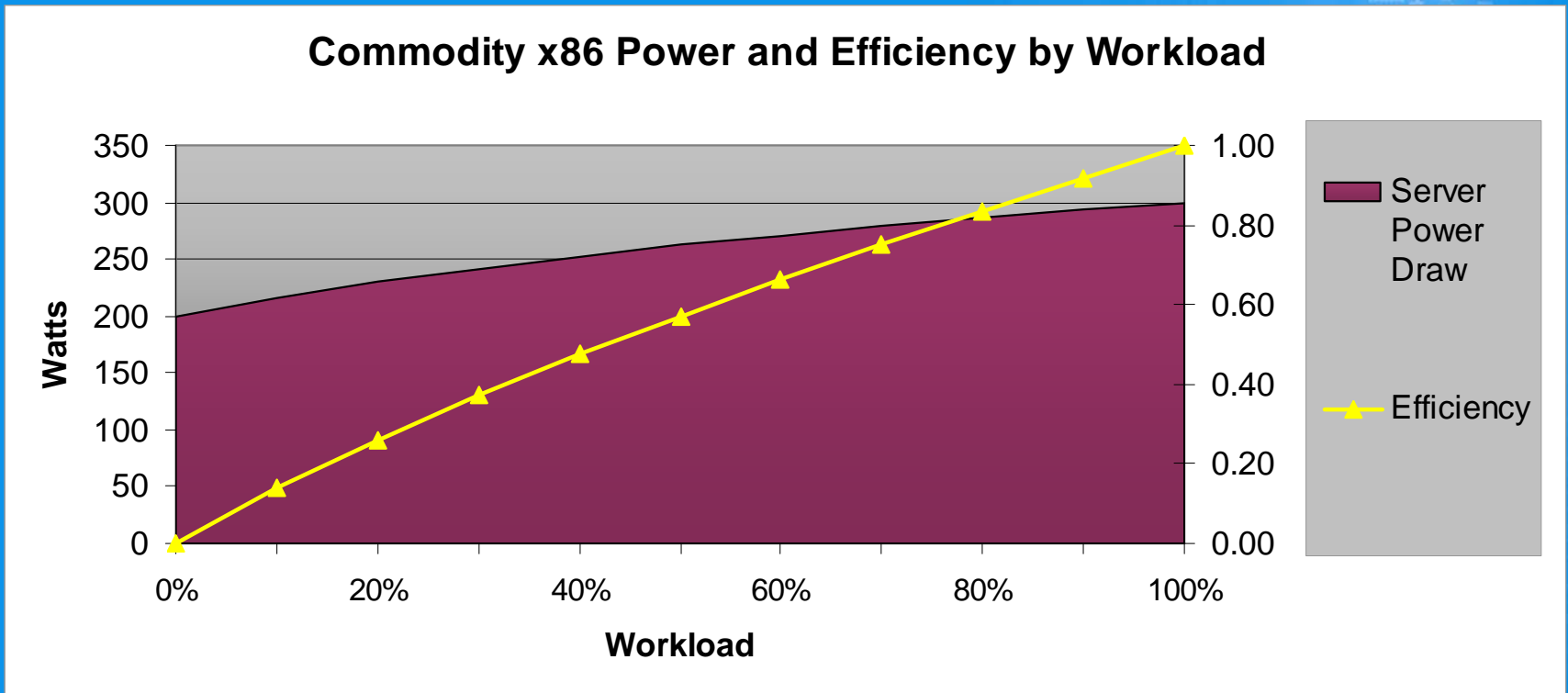
Data Centres

Servers

Server in a Data Centre

External Temperature

Server Power and Efficiency vs. Workload



Per Service Energy Use

Data Centres

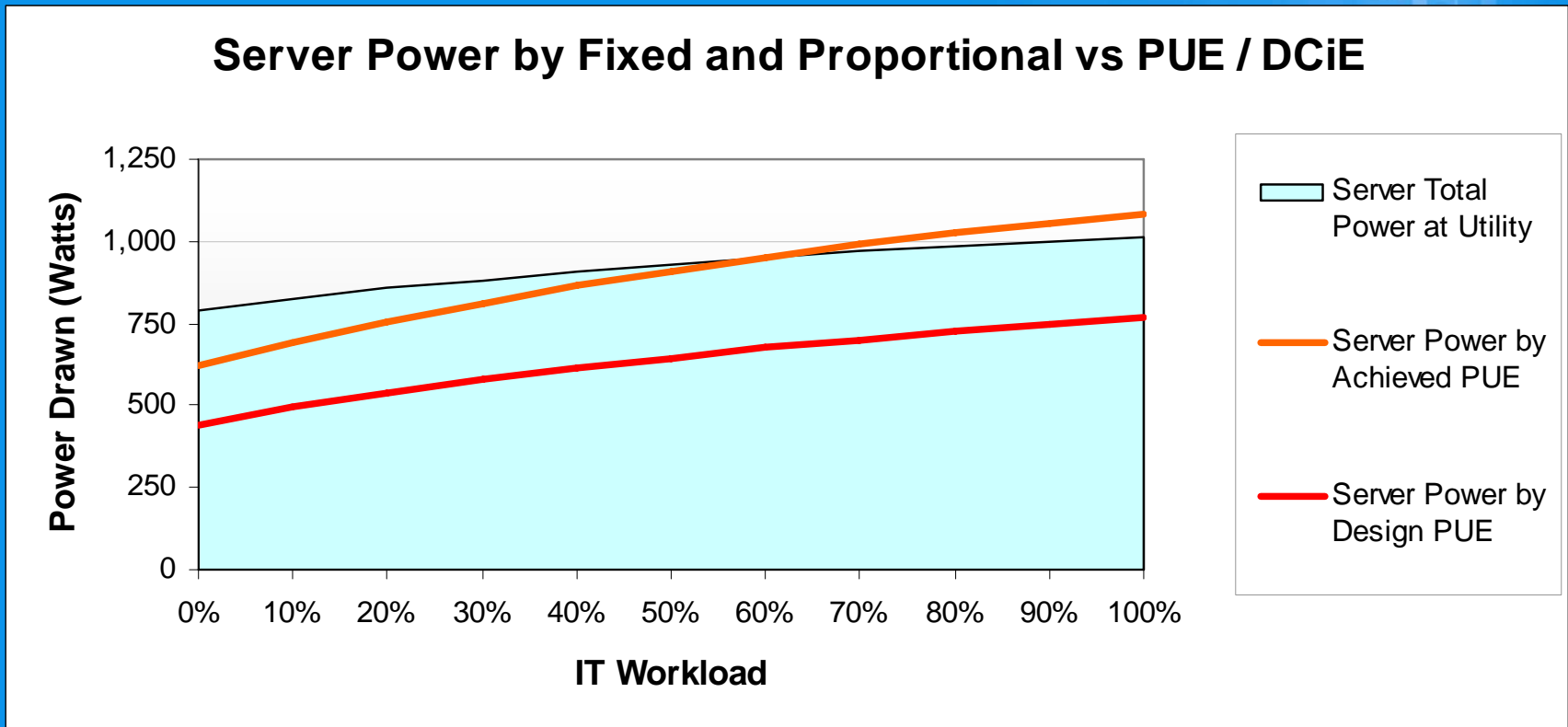
Servers

Server in a Data Centre

External Temperature

Put the Server in a Data Centre

What does DCiE / PUE tell us?



Per Service Energy Use

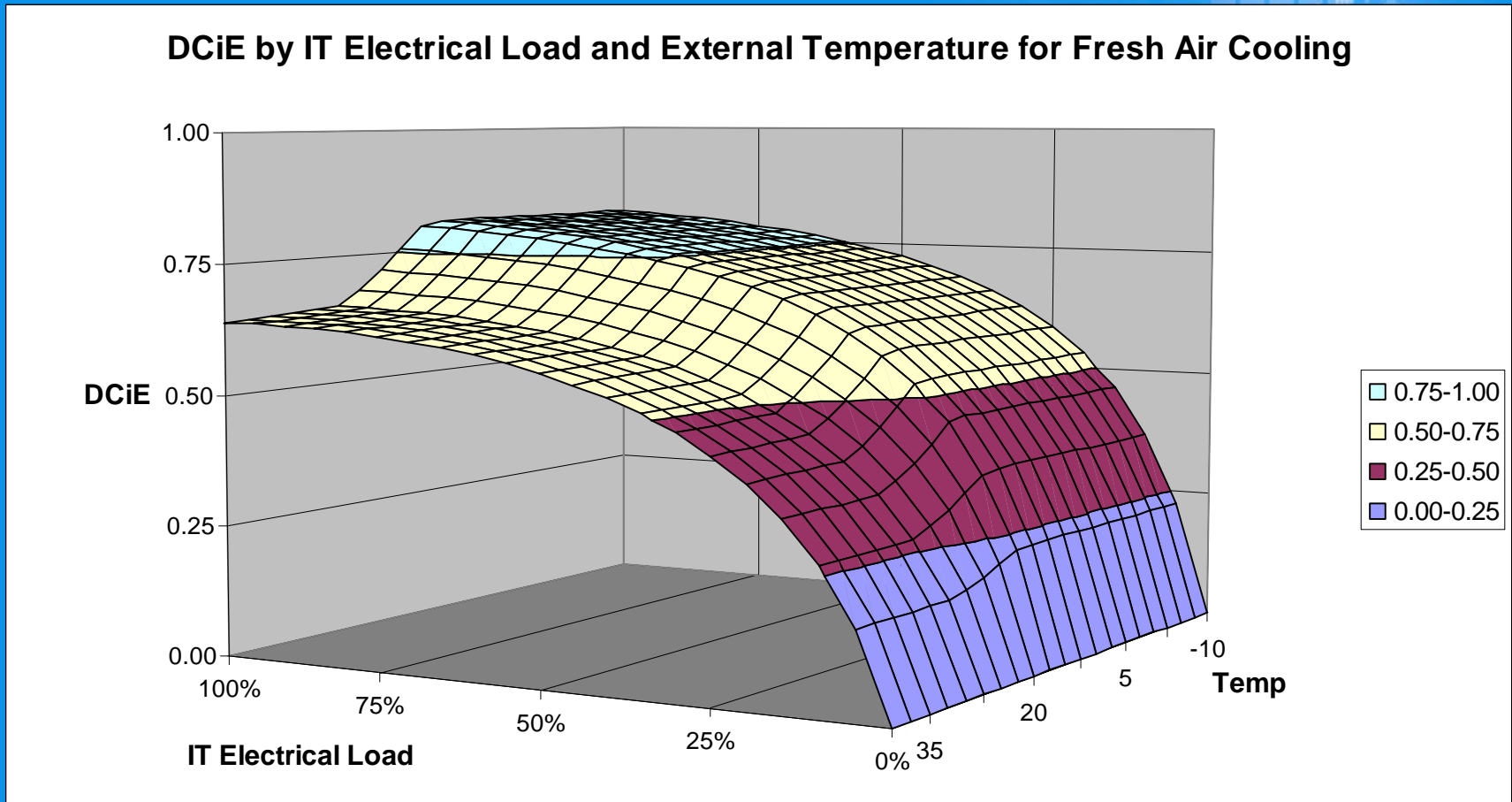
Data Centres

Servers

Server in a Data Centre

External Temperature

Efficiency by Electrical Load and Temperature



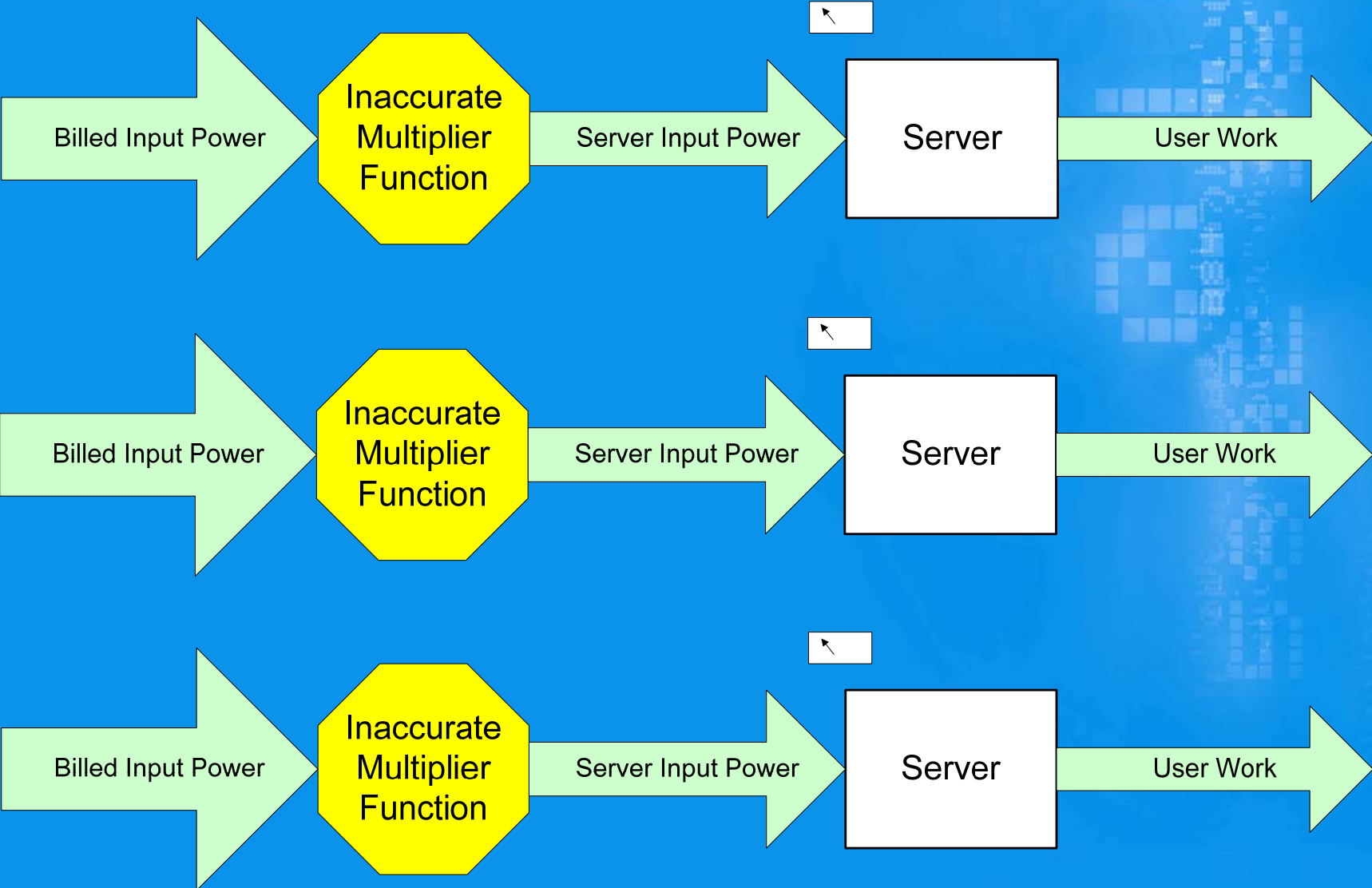
Metering

Install Detailed Power Metering?

What about Blade Servers and
Virtualisation?

What about Grid / Cloud Infrastructures?

Install Detailed Power Metering?



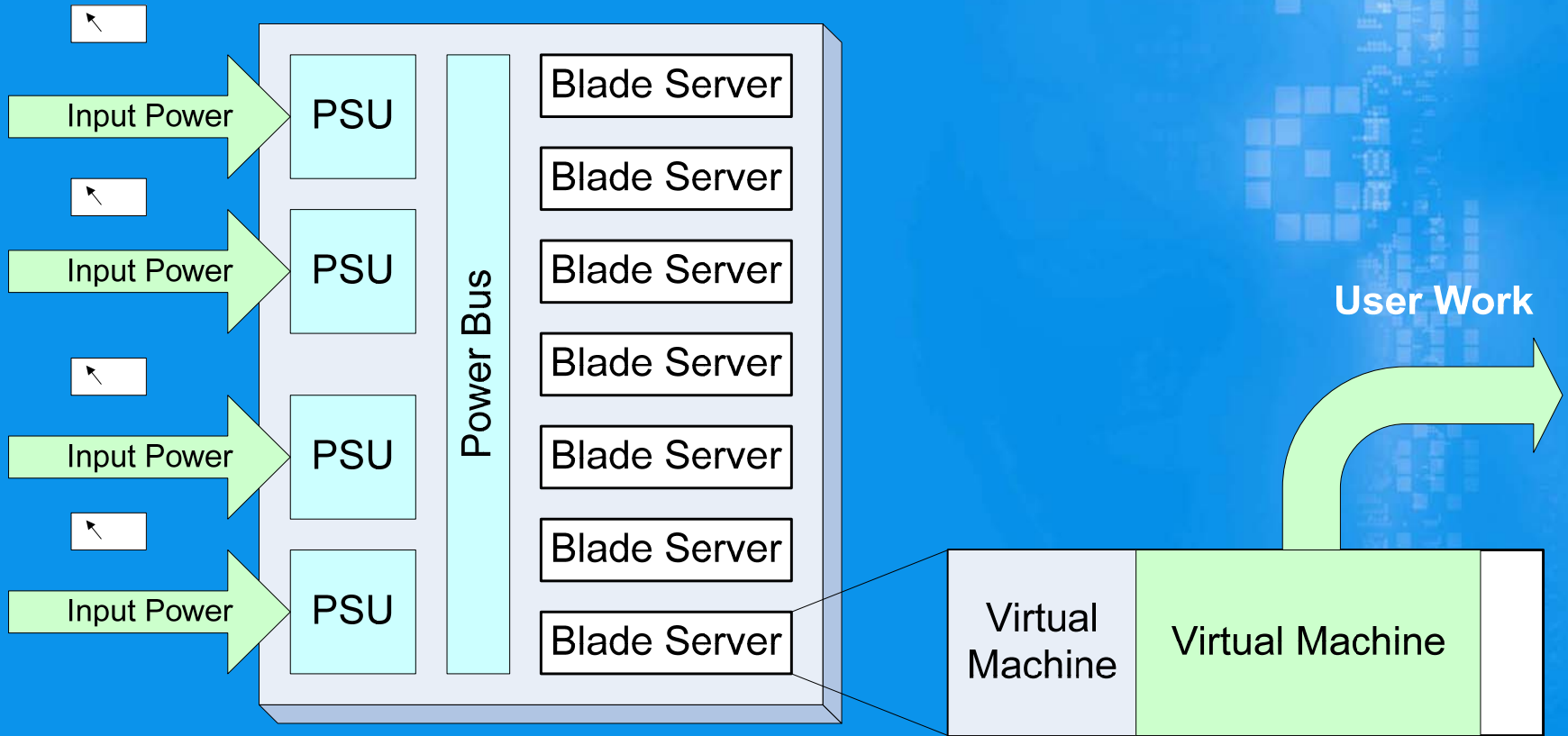
Metering

Install Detailed Power Metering?

**What about Blade Servers and
Virtualisation?**

What about Grid / Cloud Infrastructures?

Metering Fails for Blades or Virtualisation



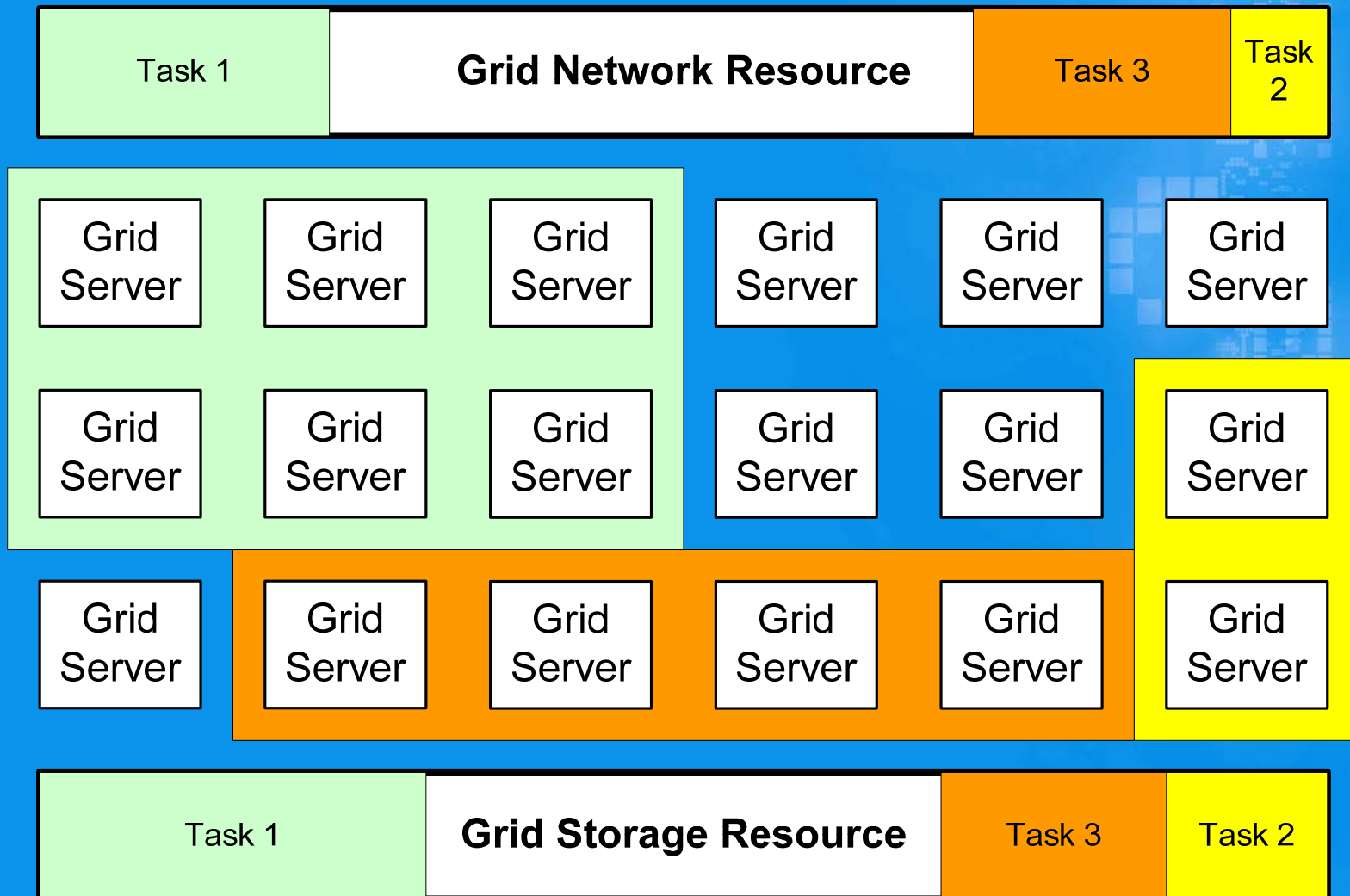
Metering

Install Detailed Power Metering?

What about Blade Servers and
Virtualisation?

What about Grid / Cloud Infrastructures?

Metering Even Less Effective for Grid

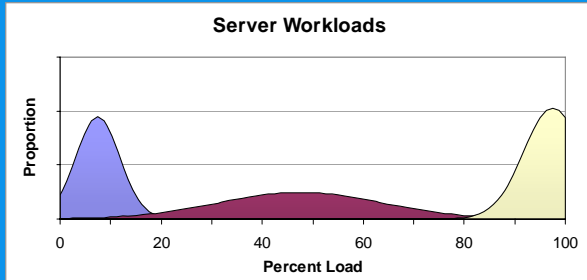


Metering

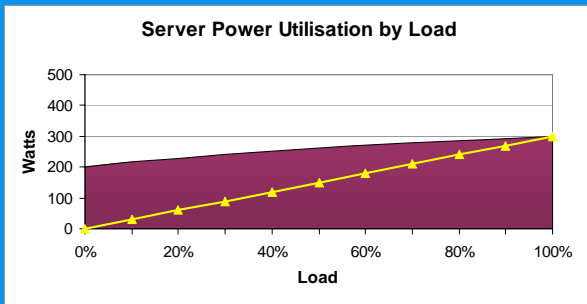
Cannot solve our problem

DCSG Data Centre Model

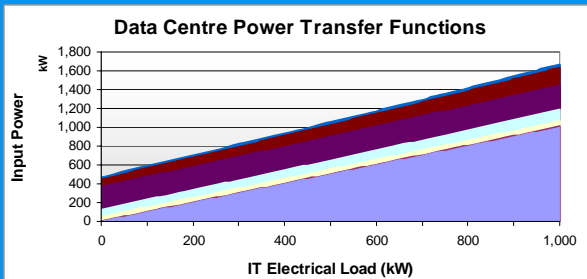
DCSG Data Centre Model



IT Workload



IT Device Load to Power Function



Data Centre Power Transfer Function

DCSG Data Centre Model

Example Scenario

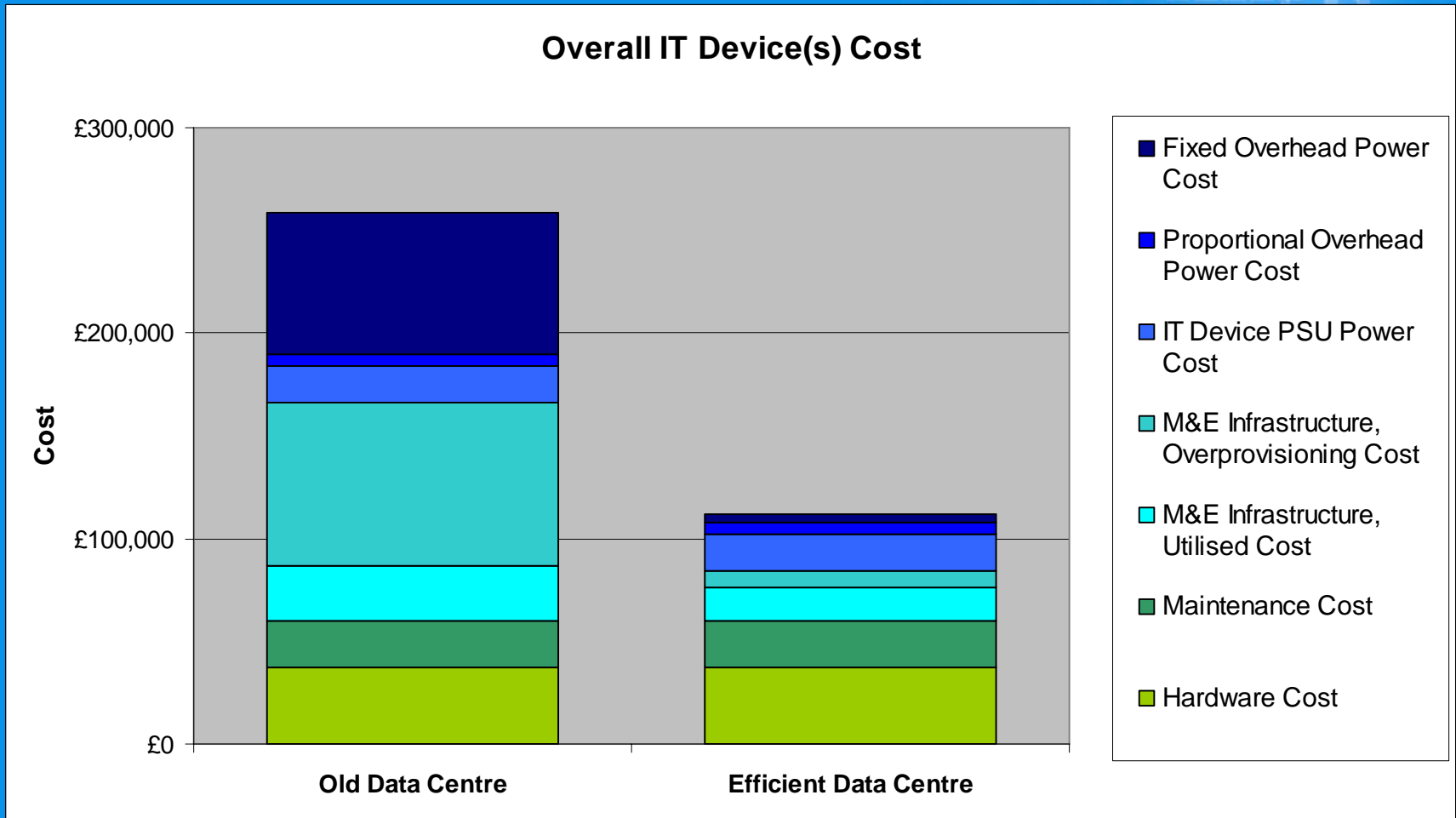
Old Tier 4 Data Centre

vs.

New, Modular Data Centre

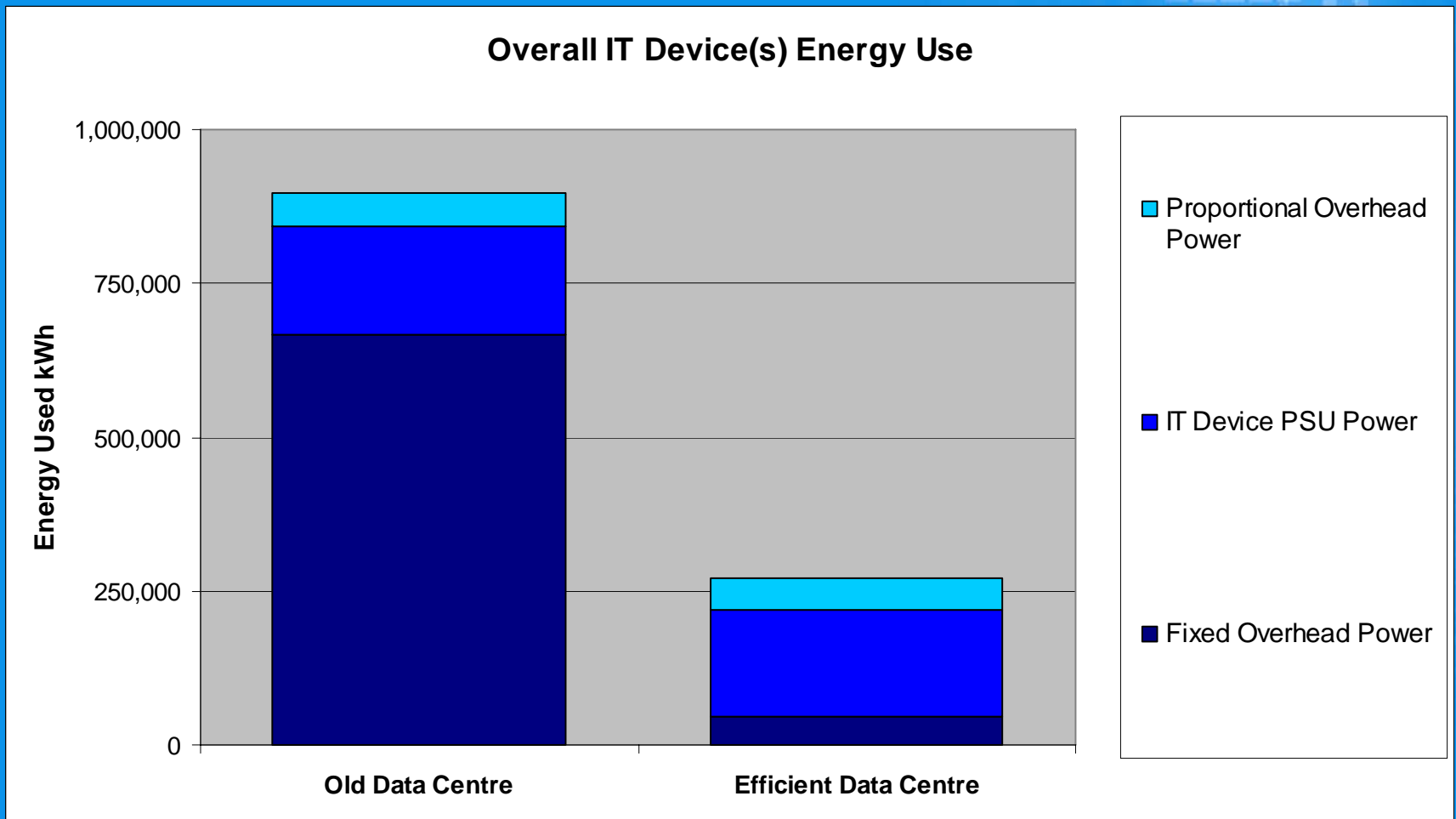
DCSG Data Centre Model

Old vs. New, Modular Efficient Data Centre



DCSG Data Centre Model

Old vs. New, Modular Efficient Data Centre



DCSG Data Centre Model

Example Scenario

Same Computing Workload

100 One App Per Server Servers

vs.

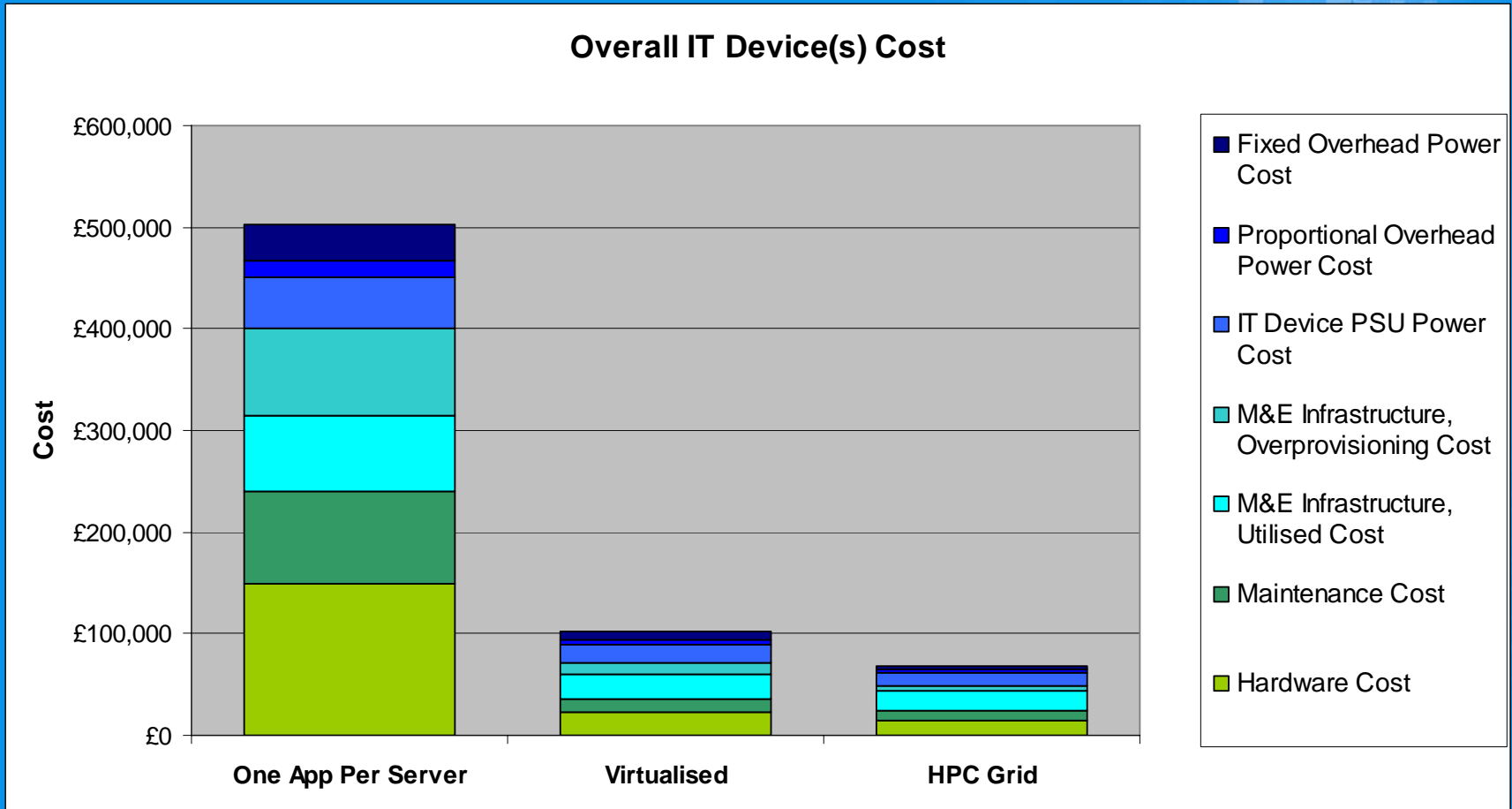
15 Virtualised Servers

vs.

10 HPC Grid Servers

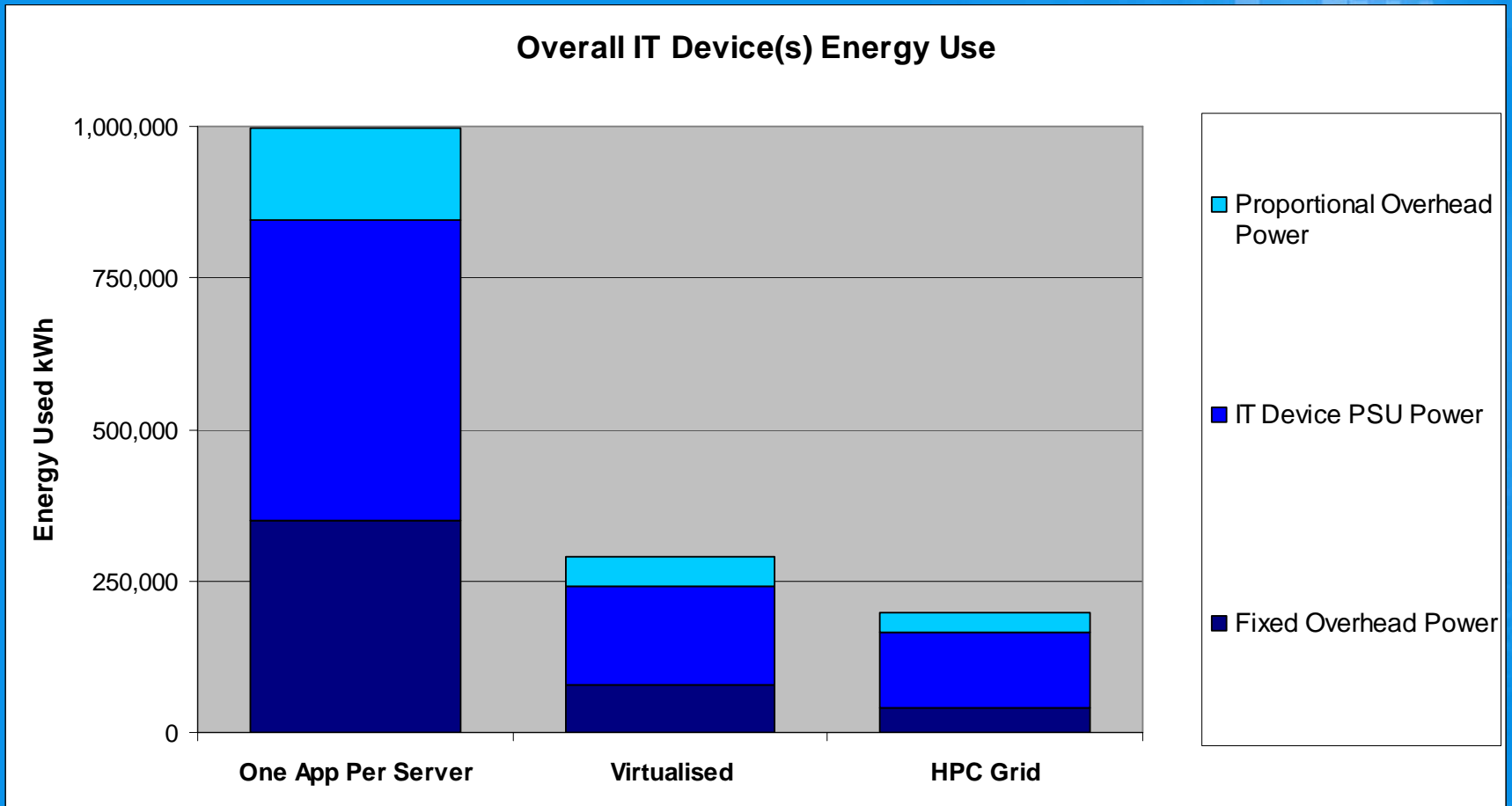
DCSG Data Centre Model

One App Per Server vs. Virtualised vs. HPC Grid



DCSG Data Centre Model

One App Per Server vs. Virtualised vs. HPC Grid



Thank you
Find out more
Data Centre Specialist Group
<http://dcsg.bcs.org>