Agenda

- Situational Awareness

- Opportunities

- Lessons Learned

- Questions

$80B

What is the annual Federal IT Budget?

Does NOT Include Energy Costs

$58B

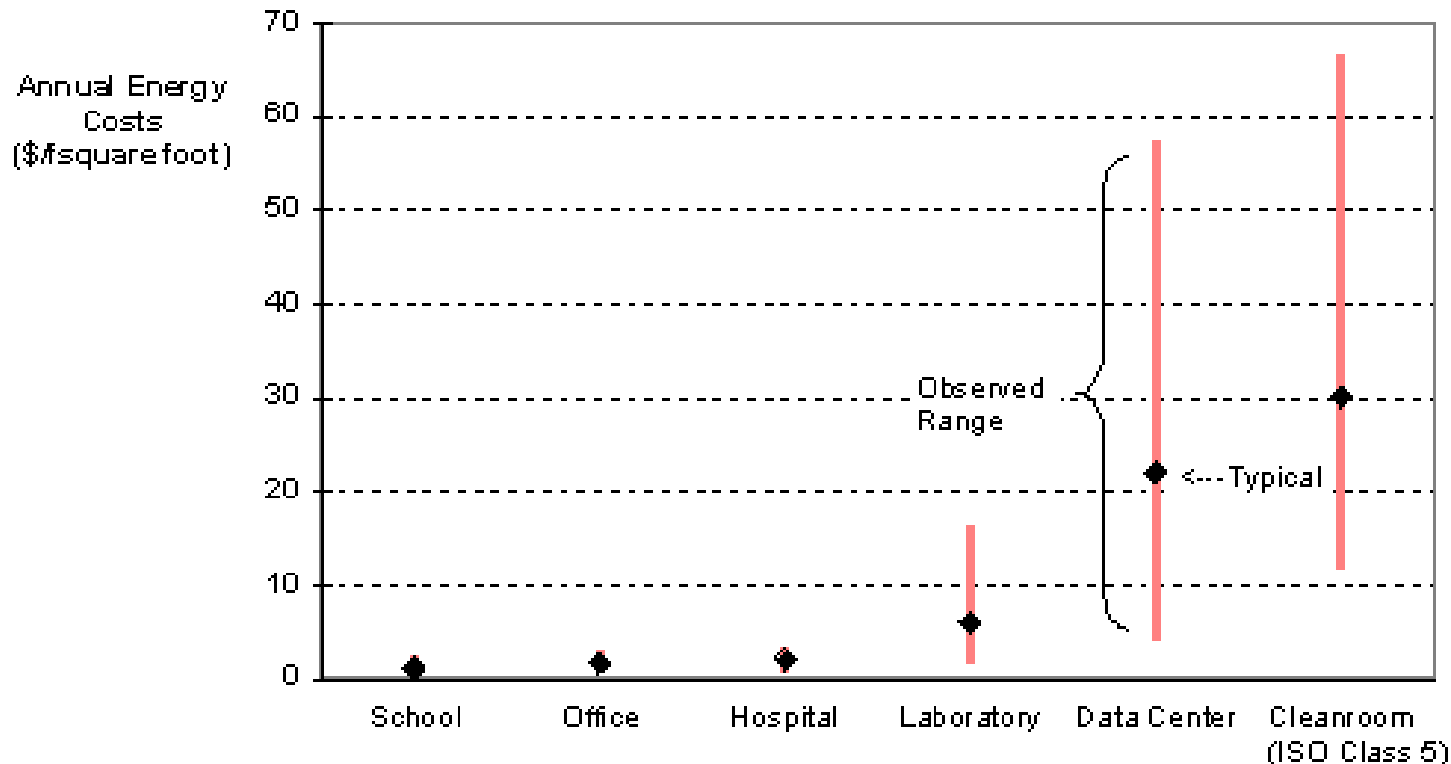What is the amount of money that the Federal government spends annually on O&M of legacy IT systems?

High-tech buildings are energy hogs
Data Centers: 100x more energy than standard office space

Comparative Energy Costs
High-Tech Facilities *vs.* Standard Buildings

Data centers are 2 Lines-of-Business with Different Incentives

IT Infrastructure	Facilities Infrastructure
IT Systems Performance & Availability	Utility Service Provider – Only
Operational Control of Floor Space	Pay the Electric Bill
Energy Efficiency NOT an Incentive (if you don't pay the power bill!)	**No Operational Control (therefore, no way to lower the costs)**

- ## DC Efficiency Requires Unified Management!

Data Center Variability

- Energy / GHG Efficiency vs IT Systems Efficiency

Energy / GHG	IT Systems
• Power sources	• Virtualization
• Power loses	• Systems consolidation
• Cooling	• CPU Utilization
• Air Flow Mgmt	• Lifecycle replacement

- Facilities vs IT Systems Management

- High-Performance Computing vs Business Automation

Market Drivers

- EO13514 – 2009

- FDCCI - 2010

- EO13693 – 2015

- FITARA - 2015

- FDCCI Update - 2015

What are the Requirements?

E.O. 13693

- PUE < 1.5

- 100% of data centers metered

FDCCI

- Close 40% of federal data centers

- Virtualization >75%

- Facility Utilization >80%
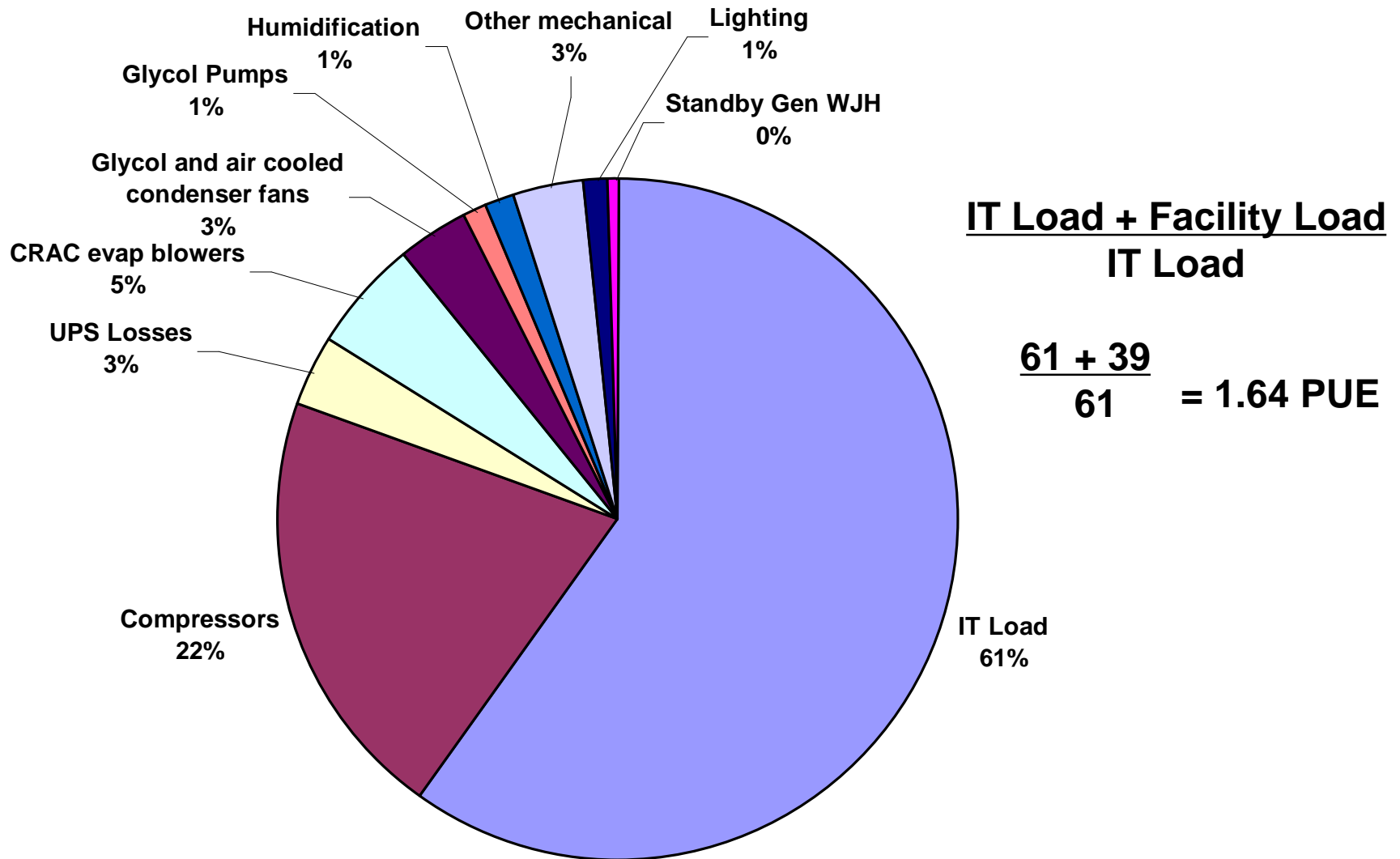
- Storage Utilization >70%

Performance Requirements

Requirements	Target Goal	Current Performance
Close Data Centers	>40% (2015)	19%
PUE (Existing)	<1.5 (2018)	1.9
PUE (New)	<1.4	n/a
Advanced Metering	100% (2018)	<10%
Facility Utilization	>80%	45%
Storage Utilization	>70%	58%
Virtualization	>75%	44%

Power Utilization Effectiveness (PUE)

IT Load + Facility Load
IT Load

$$\frac{61 + 39}{61} = 1.64 \text{ PUE}$$

PUE – The "Holistic Approach"

Actual Energy Usage **vs** *Energy Needed*

IT Infrastructure

ENERGY WASTE

Facilities Infrastructure

PUE = 2.0

$ CO_2

PUE=1.4   What does that mean?

IT
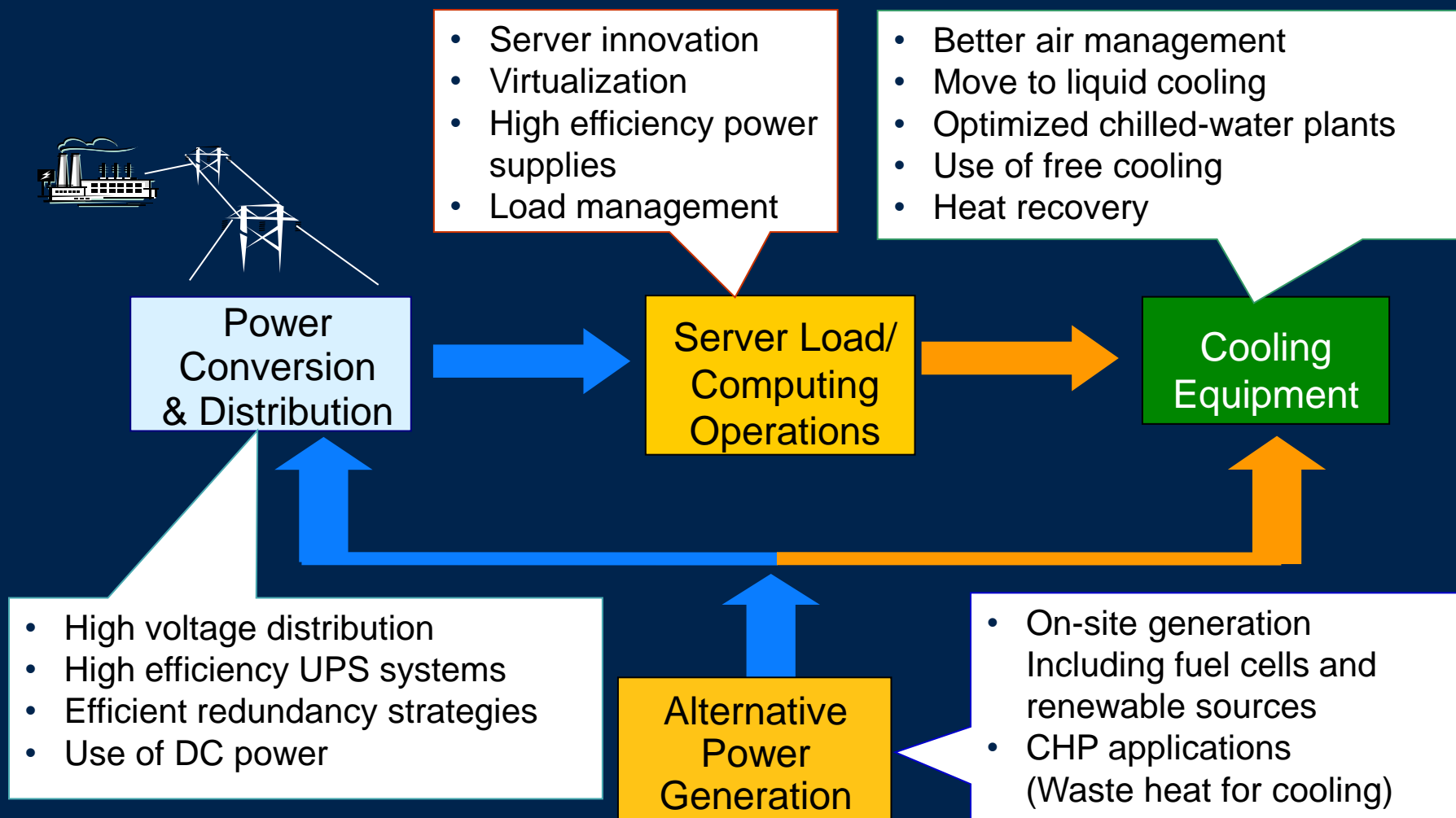Infrastructure
70% of Total Energy

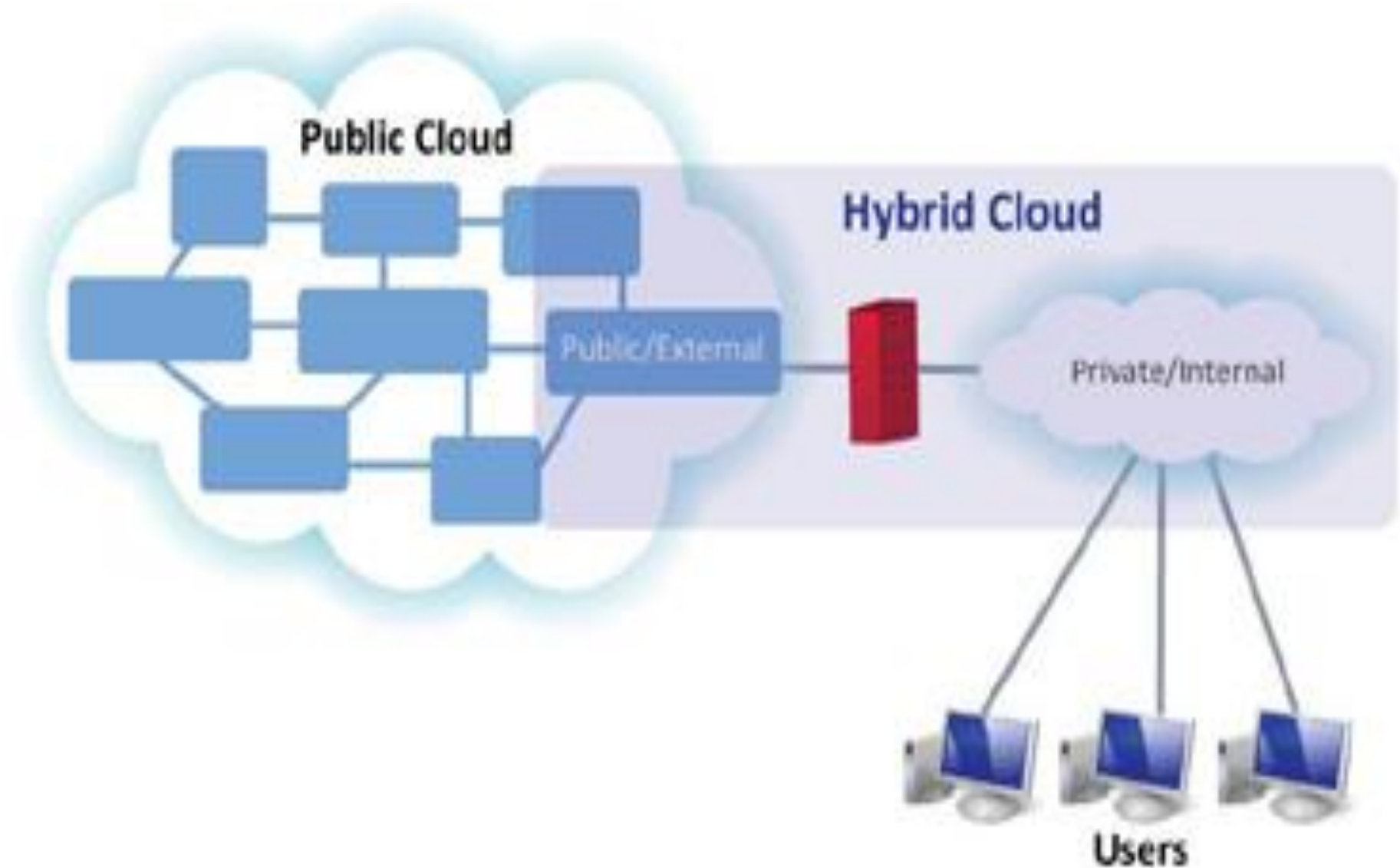Facilities
Infrastructure
30% of Total Energy
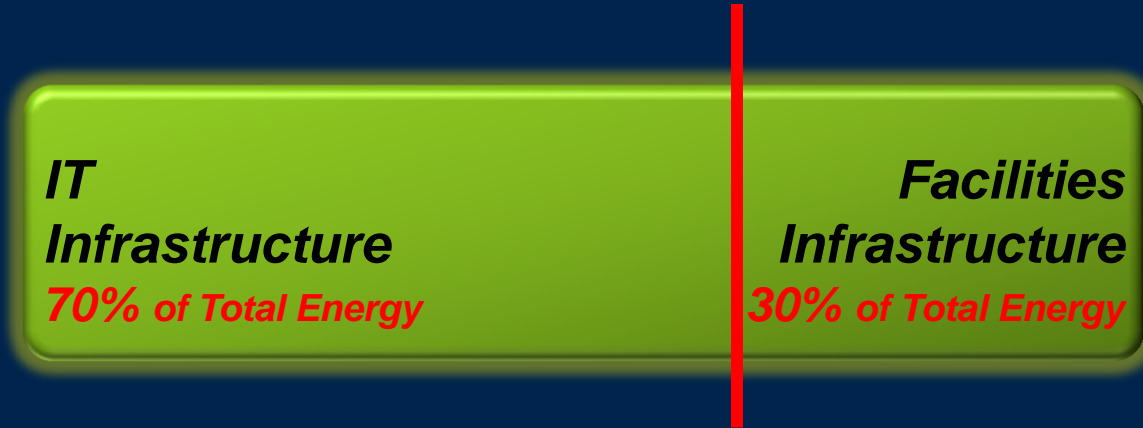
PUE = 1.4

$$PUE = \frac{\text{Facility Energy} + \text{IT Energy}}{\text{IT Energy}} = \frac{30\% + 70\%}{70\%} = 1.4$$

Energy Efficiency Opportunities

Power Conversion & Distribution

Server Load/ Computing Operations

- Server innovation
- Virtualization
- High efficiency power supplies
- Load management

Cooling Equipment

- Better air management
- Move to liquid cooling
- Optimized chilled-water plants
- Use of free cooling
- Heat recovery

- High voltage distribution
- High efficiency UPS systems
- Efficient redundancy strategies
- Use of DC power

Alternative Power Generation

- On-site generation Including fuel cells and renewable sources
- CHP applications (Waste heat for cooling)

Opportunities – Cloud Services

The Emergence of Hybrid Cloud and Hybrid IT

2003 → **Virtualization** 65% penetrated

2008 → **Private Cloud** 44% deployed

2011 → **Hybrid Cloud** 70% pursuing

2006 → **Public Cloud** $9 billion IaaS alone

Hybrid IT 58% pursuing
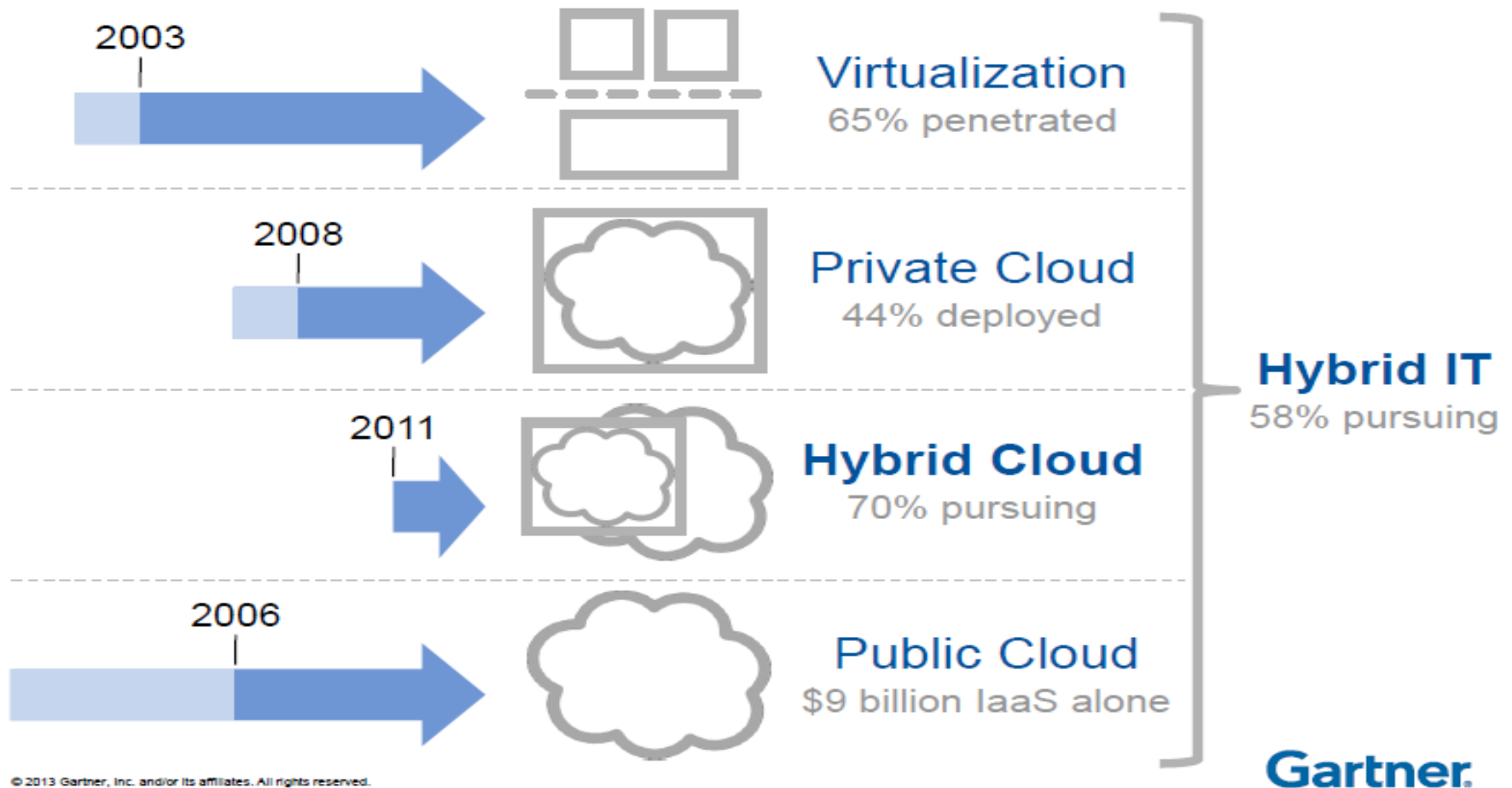
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Opportunities – Other

- Virtual Desktop / Thin Client

- Managed Print Services

- VOIP

- Video Teleconferencing

Lessons Learned – Notice of Opportunity (NOO)

- IT & Facility Partnership
- DC-Pro (Energy Efficiency Assessment)
- Check for existing Energy Efficiency Projects
- Broad Scope (Multiple Phases)
- Focused Interest (Initial Phase)

Lessons Learned – Preliminary Assessment (PA)

- **Leverage Metering**

- **Leverage Modeling Tools**

- **IT Cost Accounting**

- **IT Inventory**

- **IT Technical Architecture**

- **IT Strategic Plan**

Lessons Learned – Investment Grade Audit (IGA)

- Costs vs Savings

- IT Lifecycle (6-8 years)

- Identify Roles & Responsibilities btwn ESCO & IT Service Provider

- Deconflict w/ existing IT projects

H.R. 1268 – Energy Efficient Government Technology Act

(2) BEST PRACTICES.—The Chief Information Officers Council established under section 3603 of title 44, United States Code, shall recommend best practices for the attainment of the performance goals, which shall include Federal agency consideration of the use of—

(A) energy savings performance contracting; and

(B) utility energy services contracting.

Questions

Jake Wooley
IT Program Manager - Sustainability