

Green to the Core II:

The Key Role of the Data Center in Green IT

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This Matters



IT is not Green . . . Today

“Information and communication technology (ICT), the fifth largest consumer of power in the world, currently contributes 3-4% of the world’s CO₂ emissions—and is doubling every three to four years.”

International Science Grid

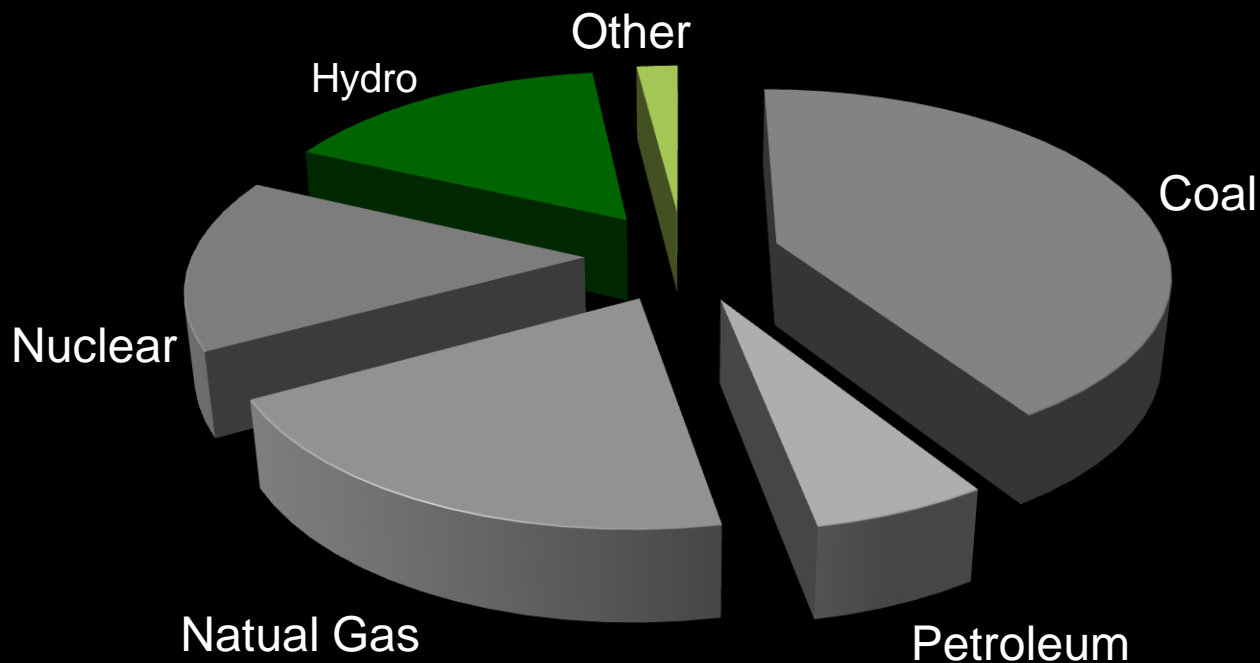
Datacenters Can Drastically Improve Green IT

- Four Challenges
 1. Dirty Power (High Carbon)
 2. Datacenter (DC) Efficiency
 3. IT Efficiency
 4. Resistance to Green IT

Challenge 1 - Dirty Power



Challenge 1 – Dirty Power: World Power Sources

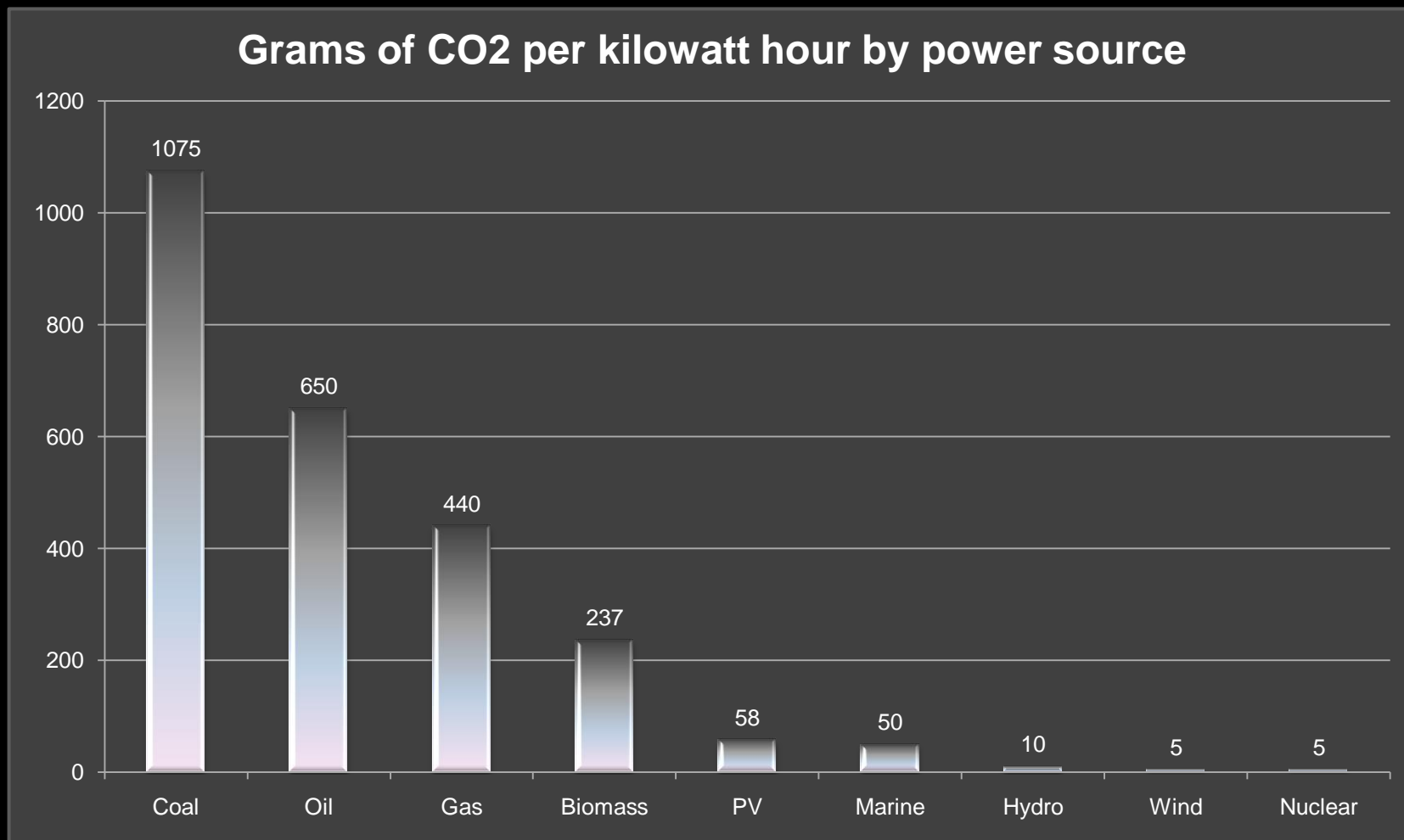


Total World Electricity Generation by Fuel (2006)

Source: IEA 2008

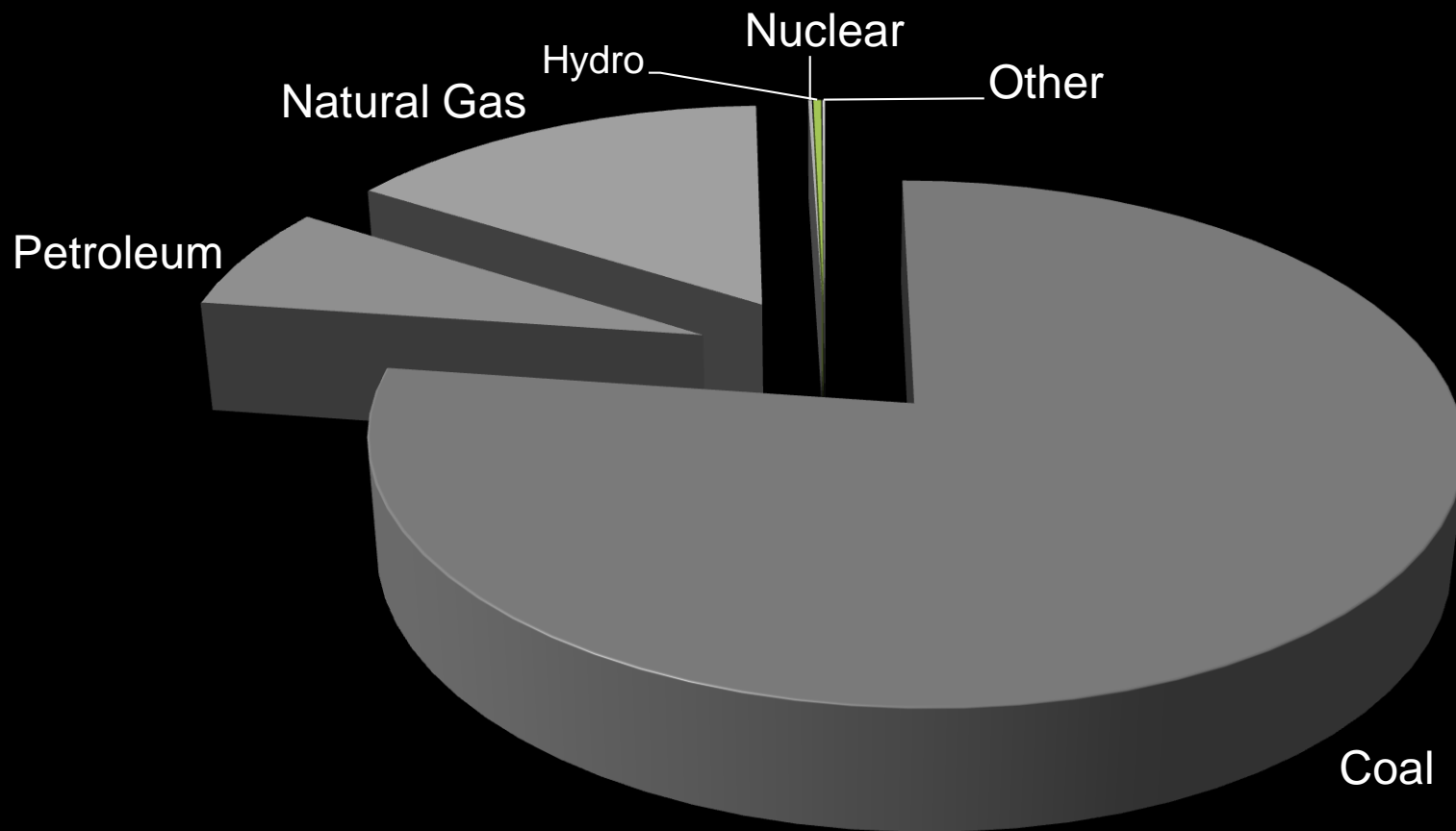
*Other includes solar, wind, combustible renewables, geothermal & waste

Challenge 1 - Dirty Power: Power Source CO₂

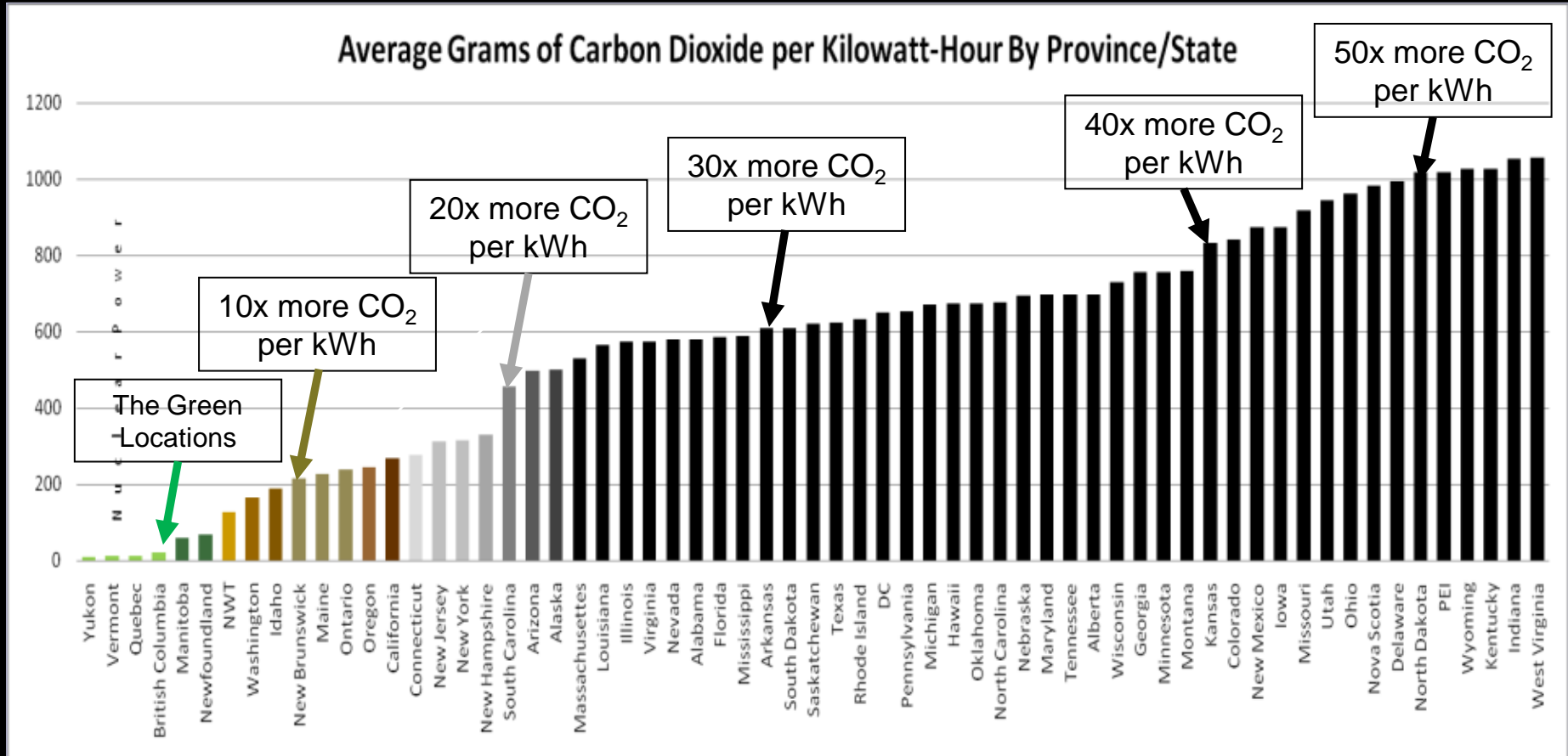


Parliamentary Office of Science and Technology - UK &* European Data – 2004-2006

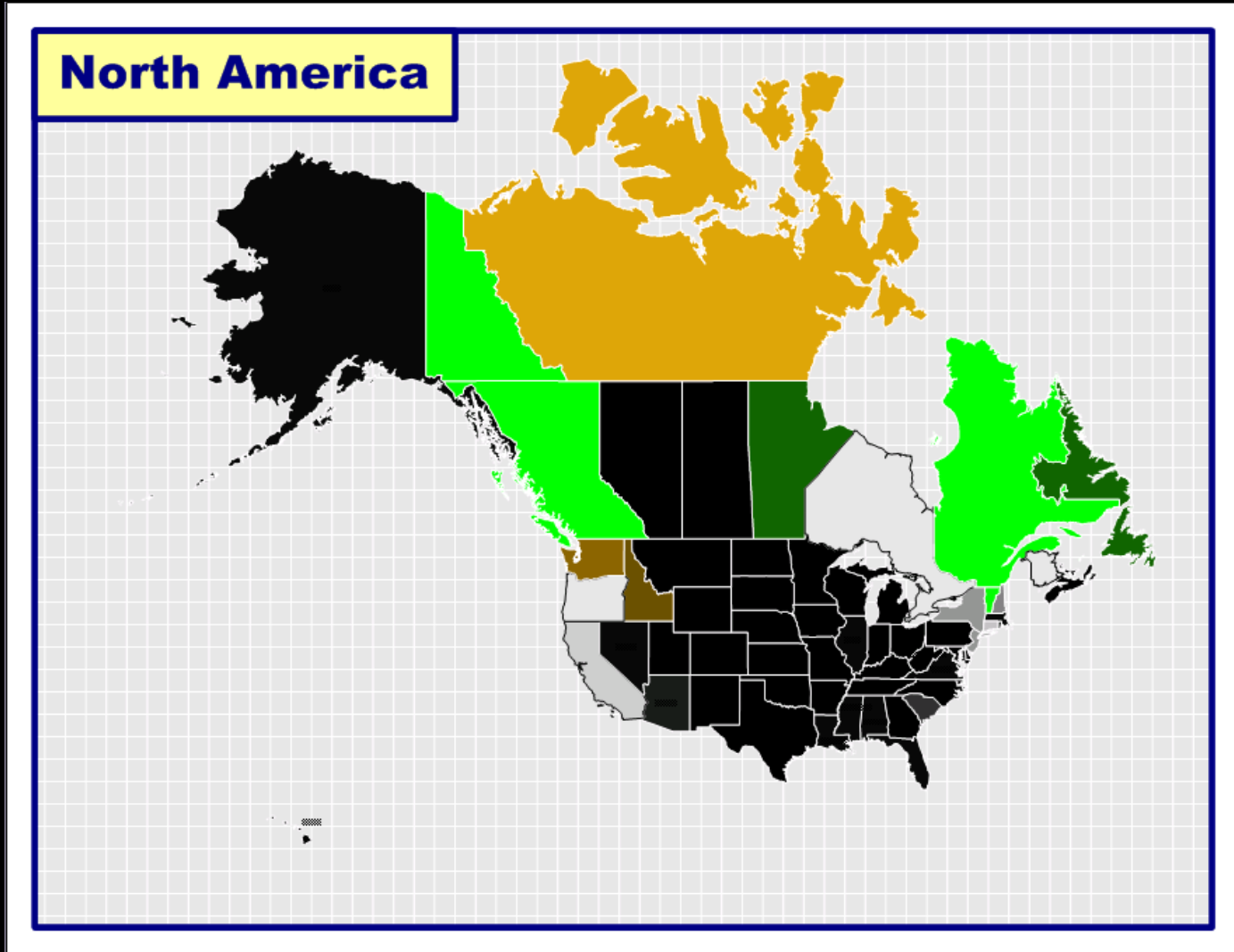
Challenge 1 - Dirty Power: CO₂ Impact by Power Source



Challenge 1 - Dirty Power: Understand CO₂ by Location



Challenge1 - Dirty Power: Find Green Power Locations



Challenge 1 – Dirty Power Solutions

- Locate datacenters near green power sources
- Hydropower is the best source at this time
- Combine solar and wind with hydropower for best result
- Green Result - CO₂ reduced by:

10 to 50X

Challenge 2 – Datacenter Efficiency



Challenge 2 – DC Efficiency: Modular Design

Old Open Inefficient Design



New Modular Efficient Design



Efficiency Improvement – 1.3x

Challenge 2 - DC Efficiency: Cold Aisle Containment

Old Open Aisle Design



New Enclosed Cold Aisle Design



Efficiency Improvement – 2x

Challenge 2 - DC Efficiency: *Cooling*

Old "Always ON" Chiller Design



Free Cooling Chiller Design



Efficiency Improvement – 2x

Challenge 2 – Data Center Efficiency

- Modular Design
- Cold Aisle Containment
- New “Free Cooling” Design
- Green Result – Efficiency Improvement:

2 to 2.5X

Challenge 3 - IT Efficiency

“The first rule of any technology used in a business is that automation applied to an efficient operation will magnify the efficiency. The second is that automation applied to an inefficient operation will magnify the inefficiency.”

Bill Gates

Challenge 3 - IT Efficiency: Server Hardware

2005 Server Design

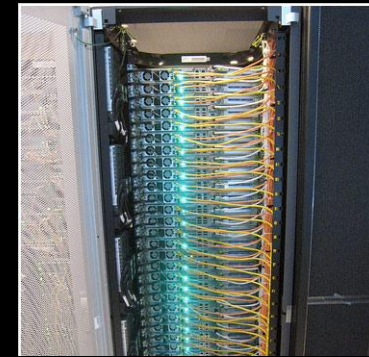
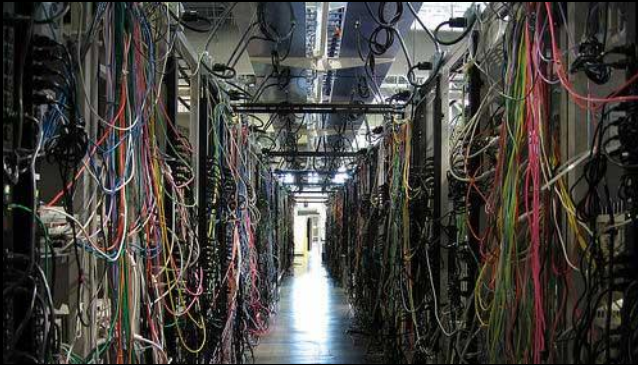
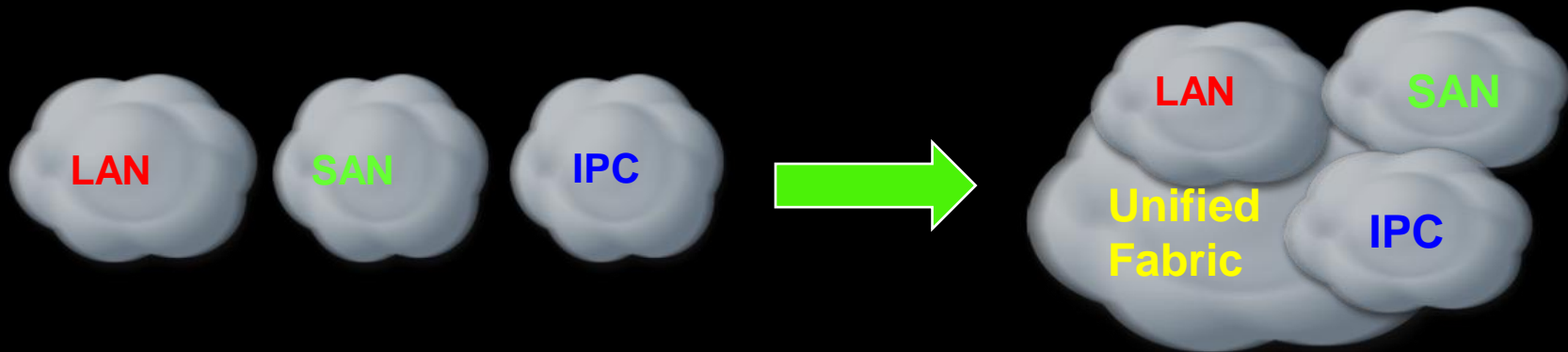


Modern Server Design



Efficiency Improvement – 1.3x

Challenge 3 - IT Efficiency: Network Design



Efficiency Improvement – 1.2x

Challenge 3 - IT Efficiency: Virtualization

Traditional Computing Environment



Virtualized/Cloud Environment



Efficiency Improvement – 1.5x

Challenge 2 – Data Center Efficiency

- Server Efficiency
- Network Efficiency
- Virtualization
- Green Result – Efficiency Improvement:

2X

Green IT Datacenter Results

Reduced Power Source CO₂ to 1/10th

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graph TD; A[Reduced Power Source CO2 to 1/10th] --> B[Reduced Datacenter Power Usage by 1/2]; B --> C[Reduced IT Power Usage by 1/2]; C --> D[Green Result - Carbon Footprint reduced to 1/40th];
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Reduced Datacenter Power Usage by 1/2

Reduced IT Power Usage by 1/2

Green Result – Carbon Footprint reduced to 1/40th



1/40th

Challenge 3 – Resistance to Change



Top 5 Reasons for Resisting Green IT Datacenters

Rank	Objection	Answer
5	Too Expensive	Green IT Datacenters use substantially less power and are less expensive to operate.
4	Protecting IT jobs.	Most IT jobs are required to run Line of Business applications.
3	Government chooses poor location for political reasons and jobs.	Educate governments on the impact created by making the wrong choice. Datacenters are not large employers but going Green is politically correct.
2	Green IT isn't important to the decision maker.	Apply a cost to Carbon to make it important.
1	Want to be close to servers.	Full KVM (keyboard, video, mouse) remote access with 24/7 on site assistance.

The Carbon Market is Coming

Environment minister unveils key part of Canadian carbon market

Last Updated: Wednesday, June 10, 2009 | 4:44 PM
 CBC News



Minister of the Environment Jim Prentice speaks with the media after giving a speech about establishing a carbon market to the Economic Club of Canada in Ottawa on Wednesday. (Sean Kilpatrick/Canadian Press)

House Passes Landmark Climate-change and Energy Bill

Friday June 26, 2009

The [U.S. House of Representatives](#) today passed the [Energy and Security Act of 2009 \(H.R. 2454\)](#), intended to reduce [greenhouse gas](#) emissions and increase the nation's energy security. The bill passed with 211 Democrats and 211 Republicans joined in voting for the bill. 218 Republicans voted in opposition.

The [House bill](#) proposes to reduce U.S. greenhouse gas emissions to 83 percent by 2050. To accomplish this, the bill creates a cap-and-trade system, which places an upper limit – the “cap” – on total greenhouse gas emissions. The cap reduces steadily until reaching the 83 percent target. Companies such as electric utilities, oil refiners and other major emitters will receive allowances. Companies that were unable to meet their requirements will have to buy those carbon allowances. Theoretically, the creation of a carbon trade market would create jobs and stimulate the development of greenhouse gas-reducing technologies at little or no cost.

Obama implores Senate to pass climate bill

SOURCE: [The Goshen News](#) Washington : DC : USA | 25 days ago

VIEWS: 11 0 0

IMAGES



See All Images

Hours after the House passed landmark legislation meant to curb greenhouse gas emissions and create an energy-efficient economy, President [Barack Obama](#) on Saturday urged senators to show courage and follow suit. The sharply debated bill's fate is unclear in the Senate, and Obama used his weekly radio and Internet address to ratchet up pressure on the 100-seat chamber. "My call to every senator, as well as to every American, is this," he said. "We cannot be afraid of the future."

Summary - The Green IT Data Center Solution

- Source Green Renewable Power Locations
- Cooler Climates are Best
- Build Large Efficient Data Centers on Rural Industrial Land
- Light/Build World Class Networks
- Move to Virtual and Cloud IT Models
- Setup Green Applications:
 - Virtual Desktop/Thin Client
 - VOIP/Video Conferencing for all
 - Other “no travel” collaboration tools

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