

# Optical Disc & Long term Archiving for a sustainable society



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Dec, 2008

# AGENDA



**1. Data explosion & Energy**

**2. MIC and ITU activities**

**3. Hybrid Storage is the way**

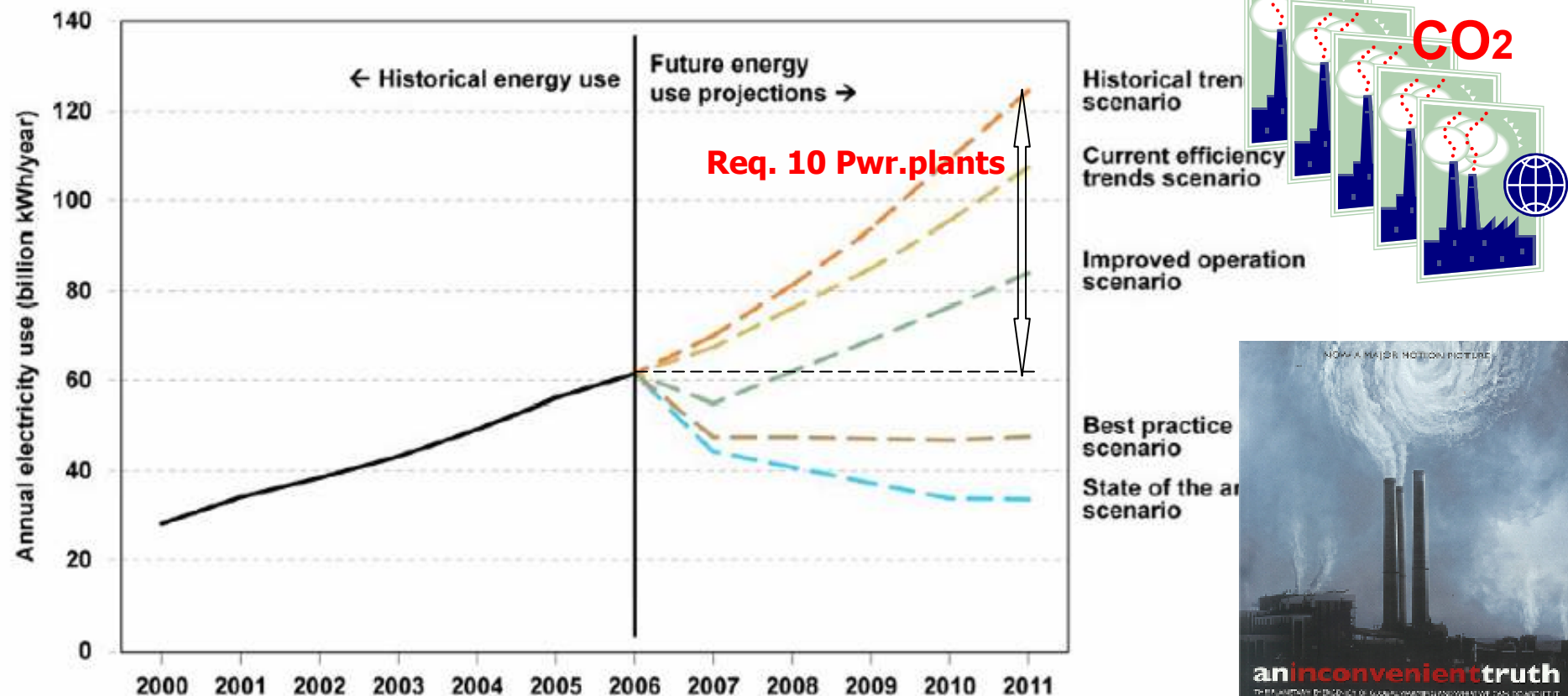
**4. Why Optical based Archive**

# EPA reported to the US Congress

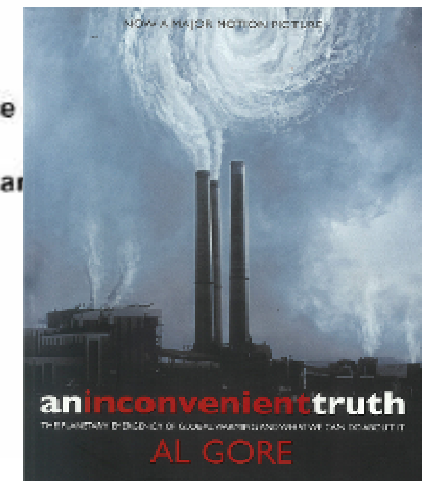
- The Power consumption in US data center alone:
- 61BKWh / 2006, 100BKWh / 2011 (double in 5 years)
- Require 10 Power plants for just data centers by 2011

Figure ES-1. Comparison of Projected Electricity Use, All Scenarios, 2007 to 2011

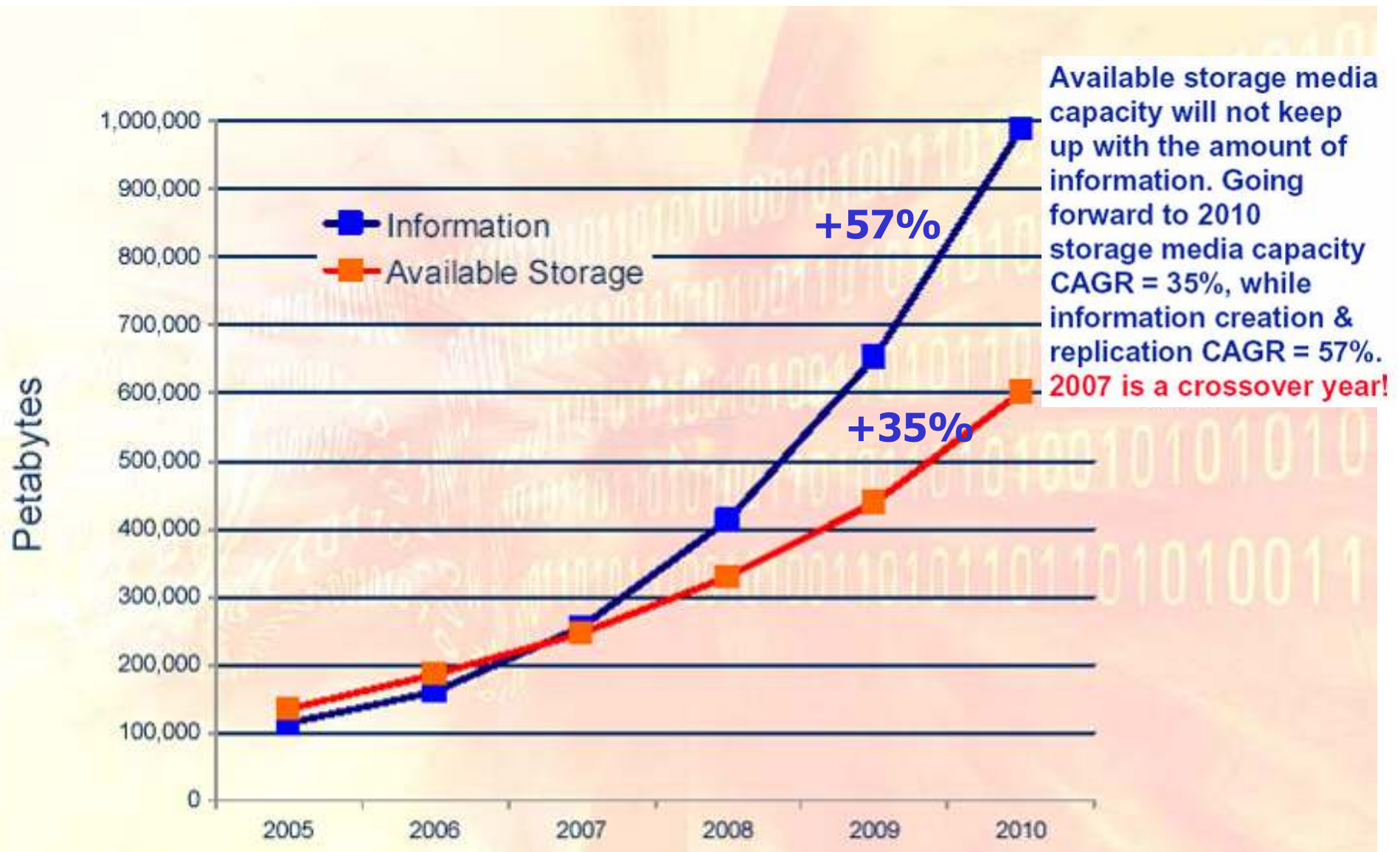
EPA report/2007.8.2



Source: U.S. Environmental Protection Agency STAR Program



# Information Explosion

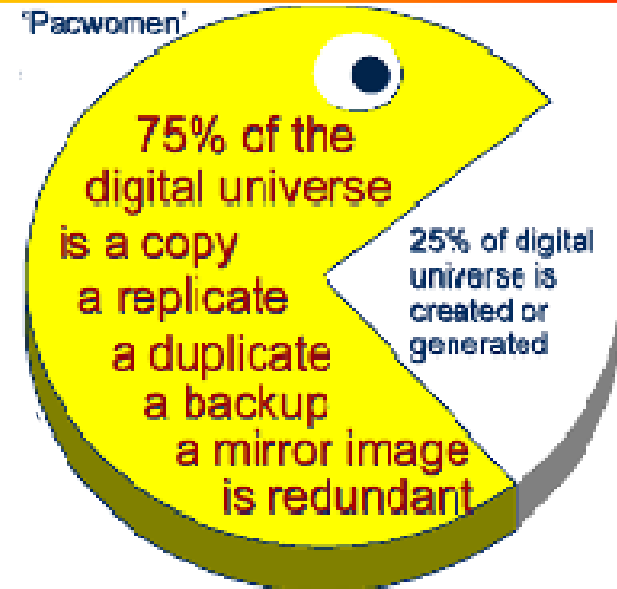
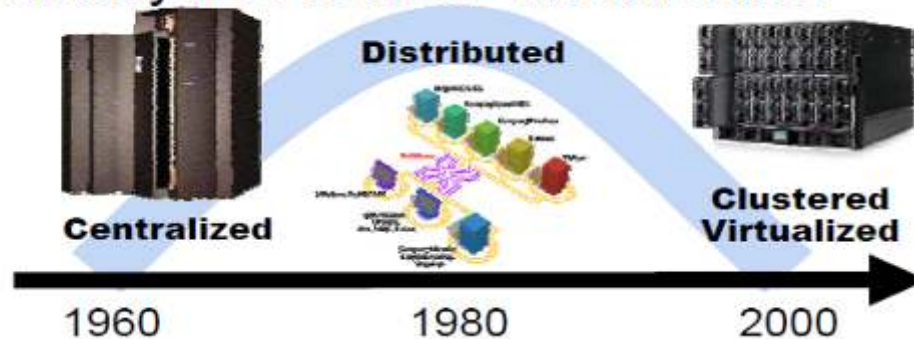


Source: IDC

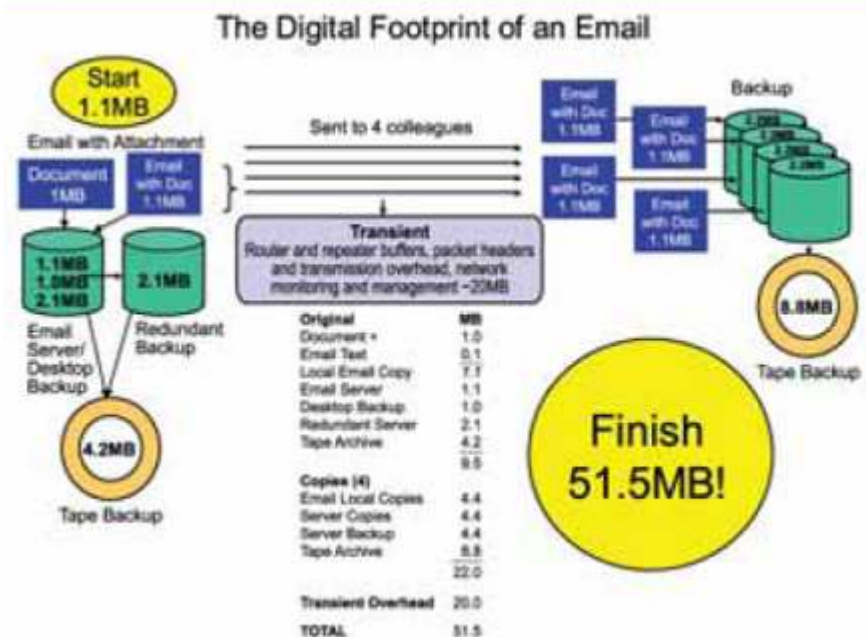


# The reasons for data explosion

- Pre 1990s — data was predominantly “structured” (i.e., within databases)
- Today and in the future — data is/will be essentially free form or “unstructured”



Source: IDC

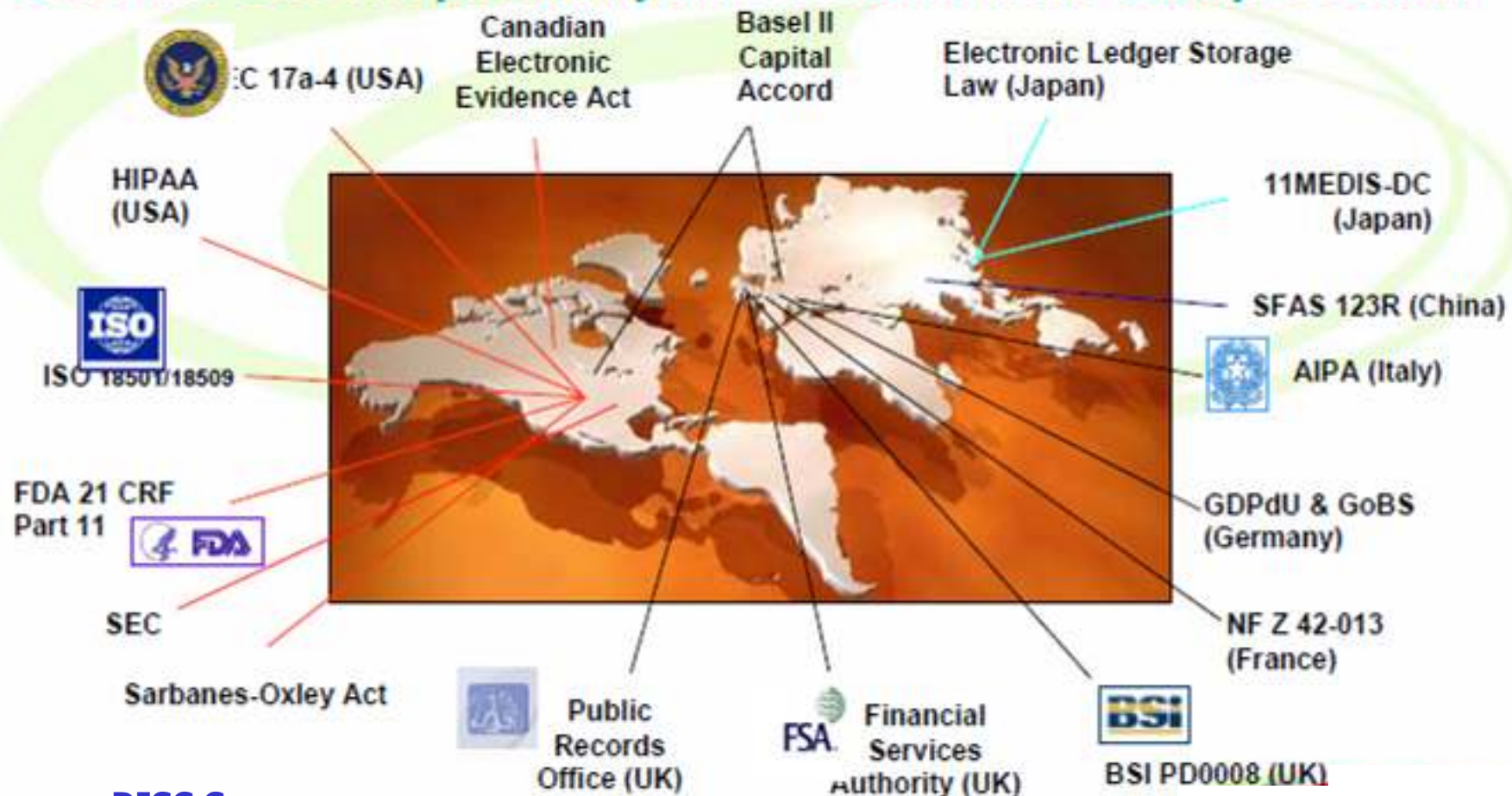


# Growing Archiving Importance by Regulation

Problem - Regulation Deluge

**Because Terrorism, Corp.-scandal, SOx**

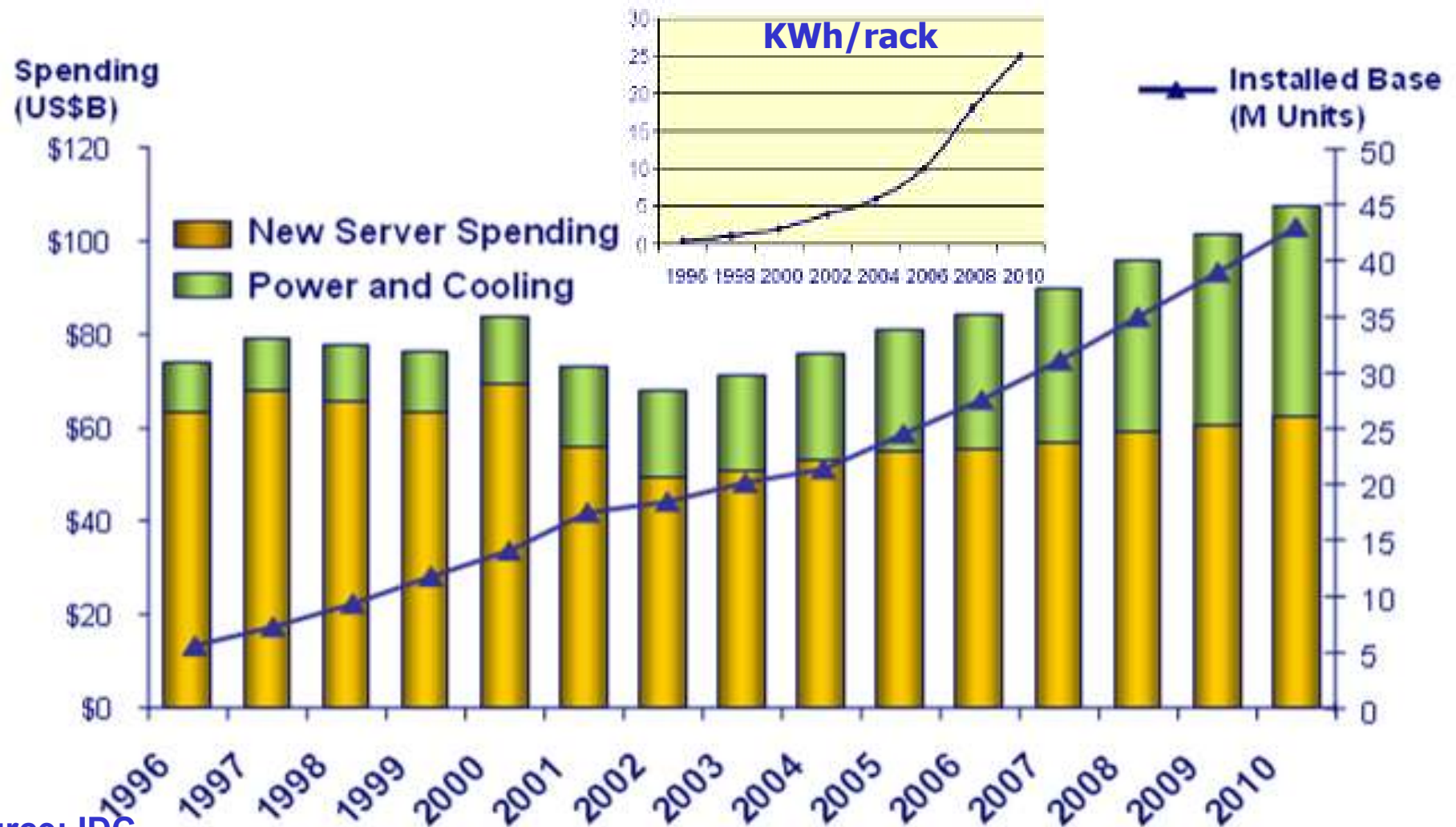
**CEOs and CIOs are personally liable for continuous data protection!**



Source: DISC Corp.

# WW Server market: Impact of Power

- Power & Cooling cost in 1996 is only 15% of total
- Power & Cooling cost in 2010 will be 40%

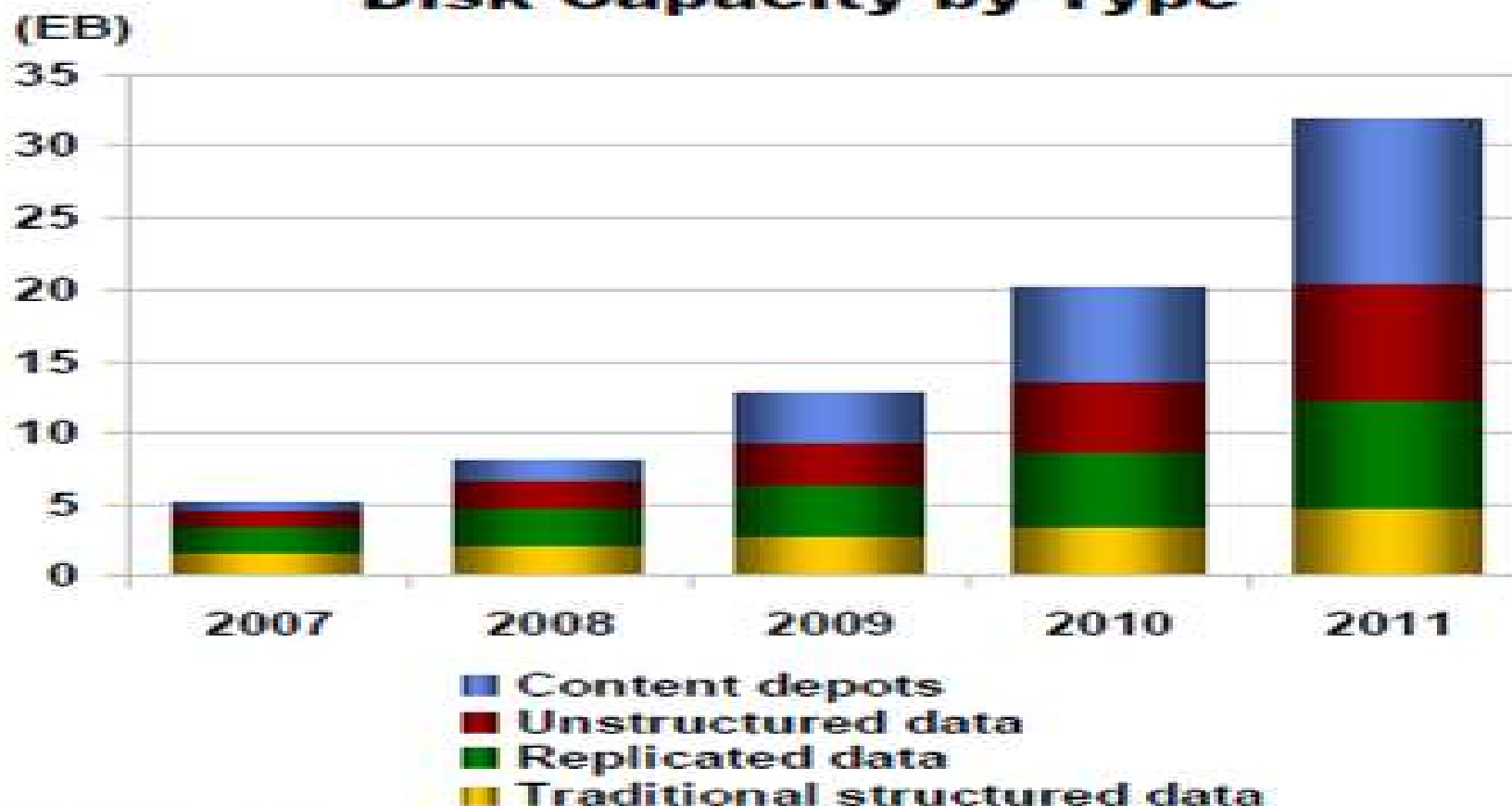


Source: IDC

# Information explosion & In-active data

- Disc Capacity rapidly growing
- Majority of data are FIX data (In-active data)

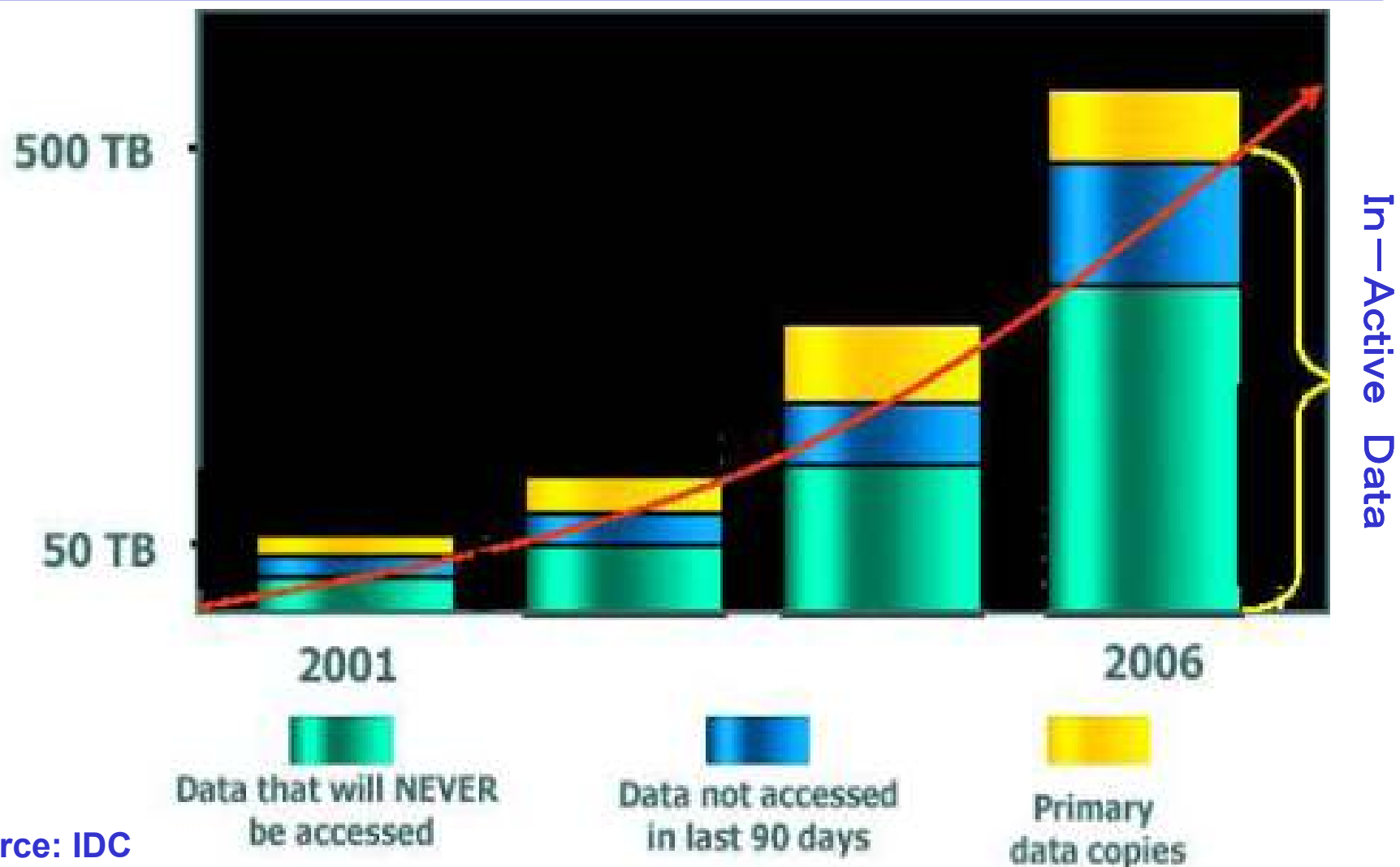
**Consumption of Enterprise  
Disk Capacity by Type**





# In-active data =sleeping data

**80% of the entire data are in-active (sleeping) data among the exploding data storage capacity**



# AGENDA



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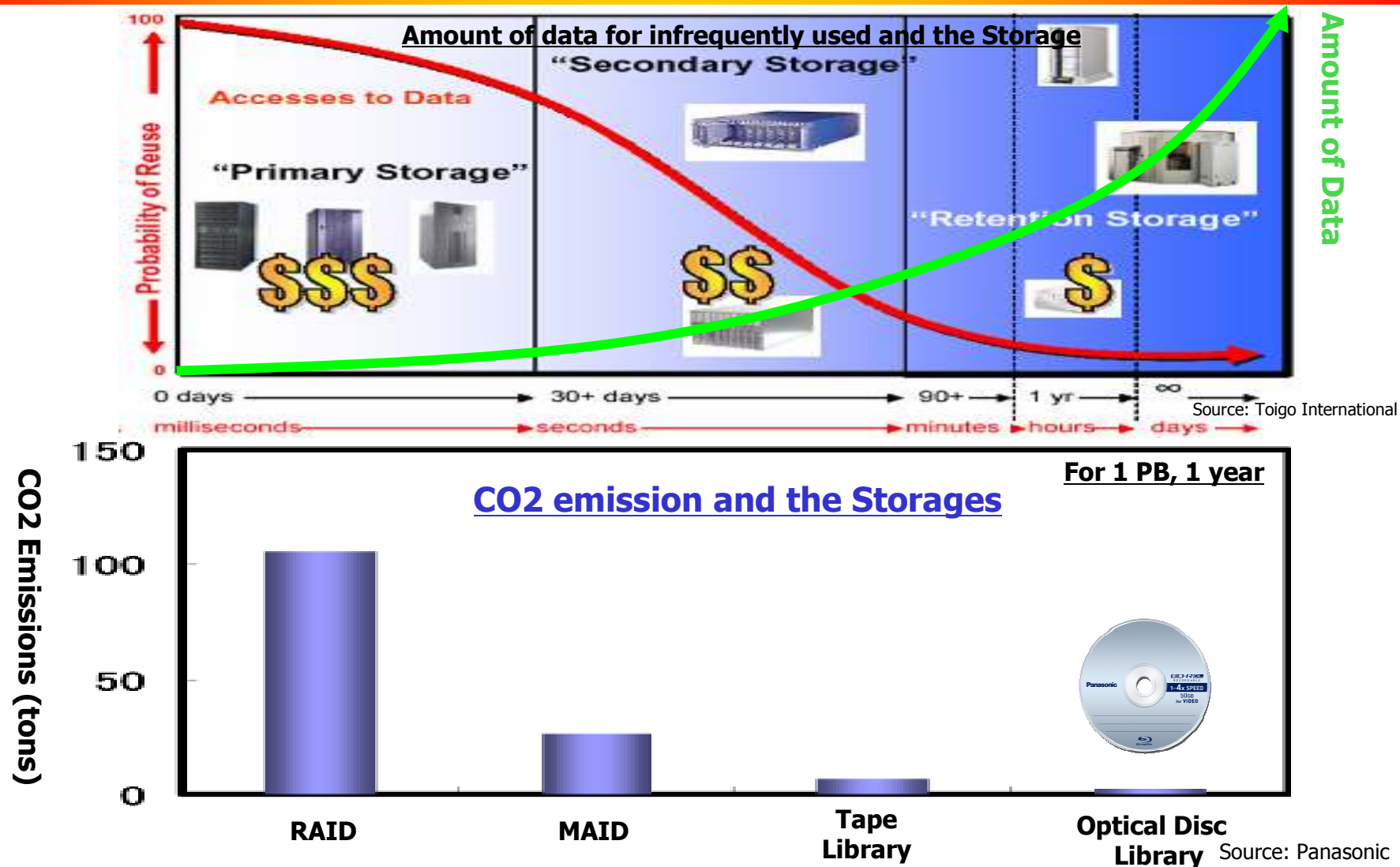
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**3. Hybrid Storage is the way**

**4. Why Optical based Archive**

# Japanese Gov. MIC report

2008. 4. 10

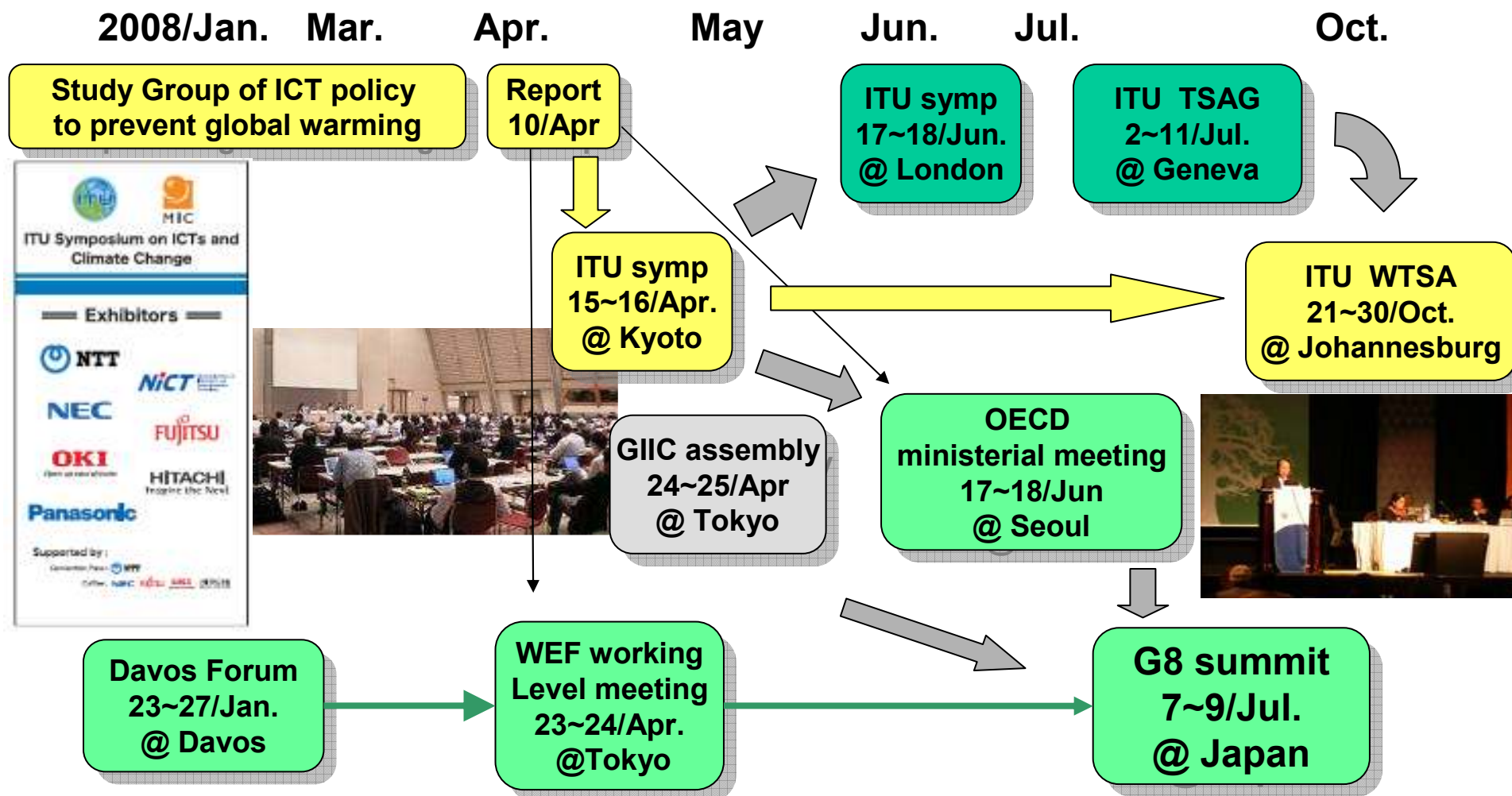


**Promote low power (low CO<sub>2</sub>) Storage devices, such as Optical Disc for inactive archive data**

Source: Translated from Japanese Gov. MIC report 2008. 4. 10



# ITU Activity for global warming problem





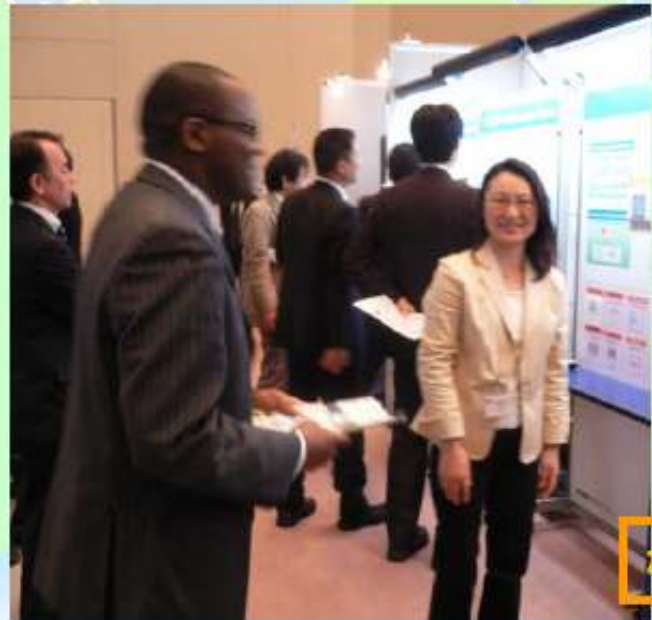
# ITU Symposium in Kyoto 2008/4/15-16



二之湯政務官



ITUジョンソン局長



ボツワナ大学 Totev教授と岡田課長



大工大学大学院 平松教授

# ITU/WTSA08 Symposium in Johannesburg

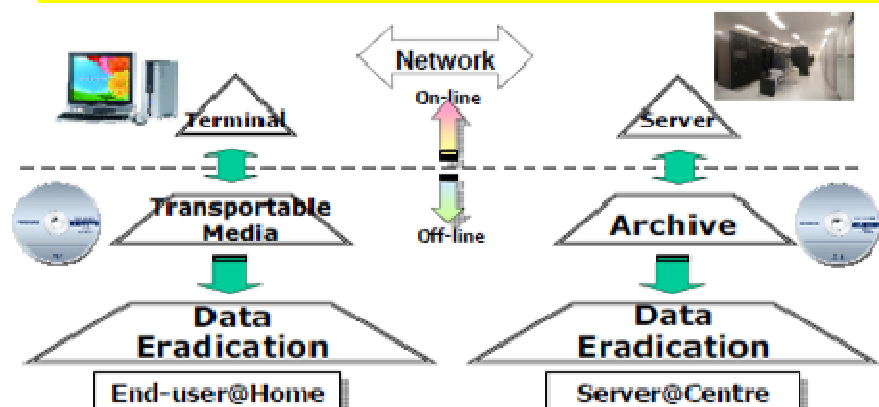
PanaNews 2008-10-21 日

「ITU-T(国際通信連合)/WTSA-08 国際標準化  
シンポジウム」で櫛木シニアフェローが講演  
【発信:スタンダードコラボレーションセンター】

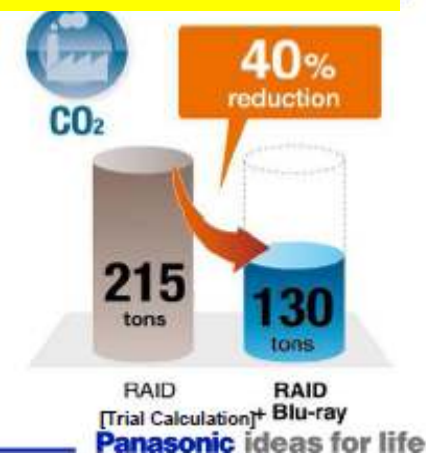
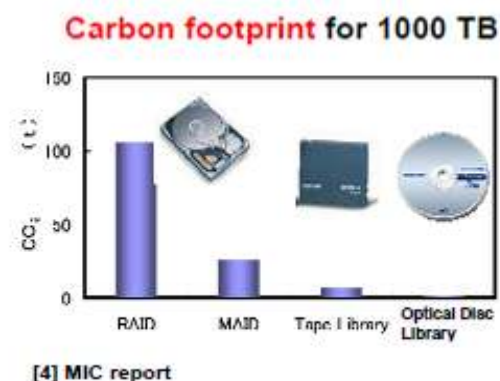
2008/10/20



## Multi-tier Storage save energy and reduce CO2



Panasonic ideas for life



# AGENDA



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# Hybrid is the way for sustainable society

- Resource pressure & Global warming issues makes the trend toward "Hybrid"

## Hybrid VEHICLE

**Engine  
+ Motor**



## Hybrid Storage

**RAID +  
Optical**



+



*Tape Archive*



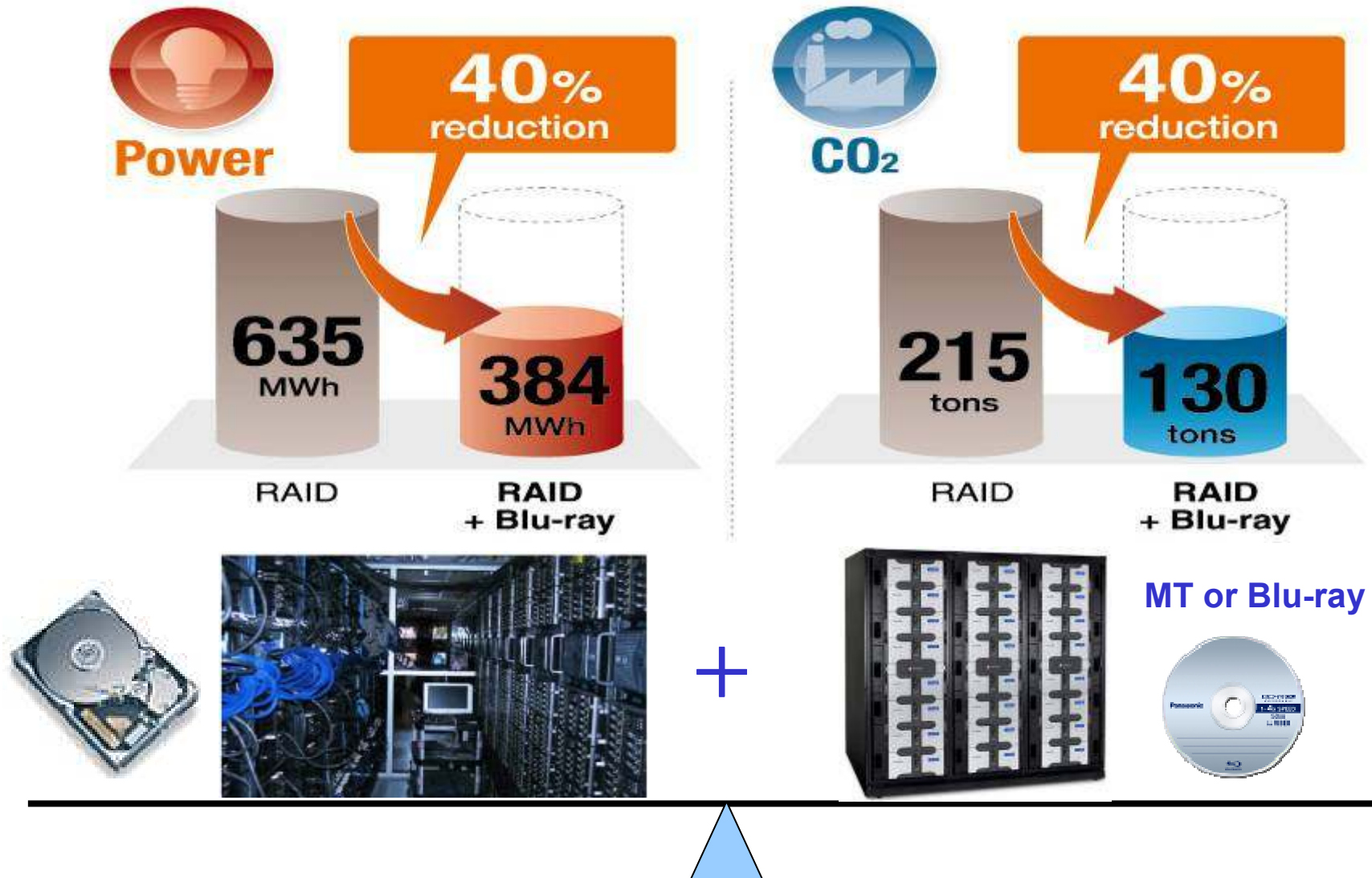
*Optical Archive*



# Hybrid Storage save energy & reduce CO2

## ■ Case study ;

Case for 400TB archived by BD for 1 year out of Total Capacity 1,000TB

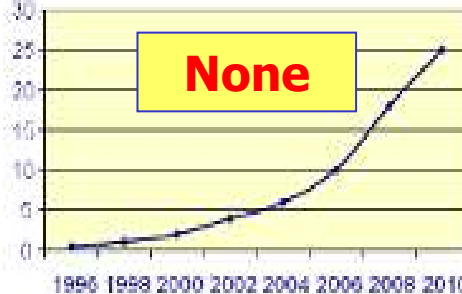




# No Metric nor Criteria in IT industry

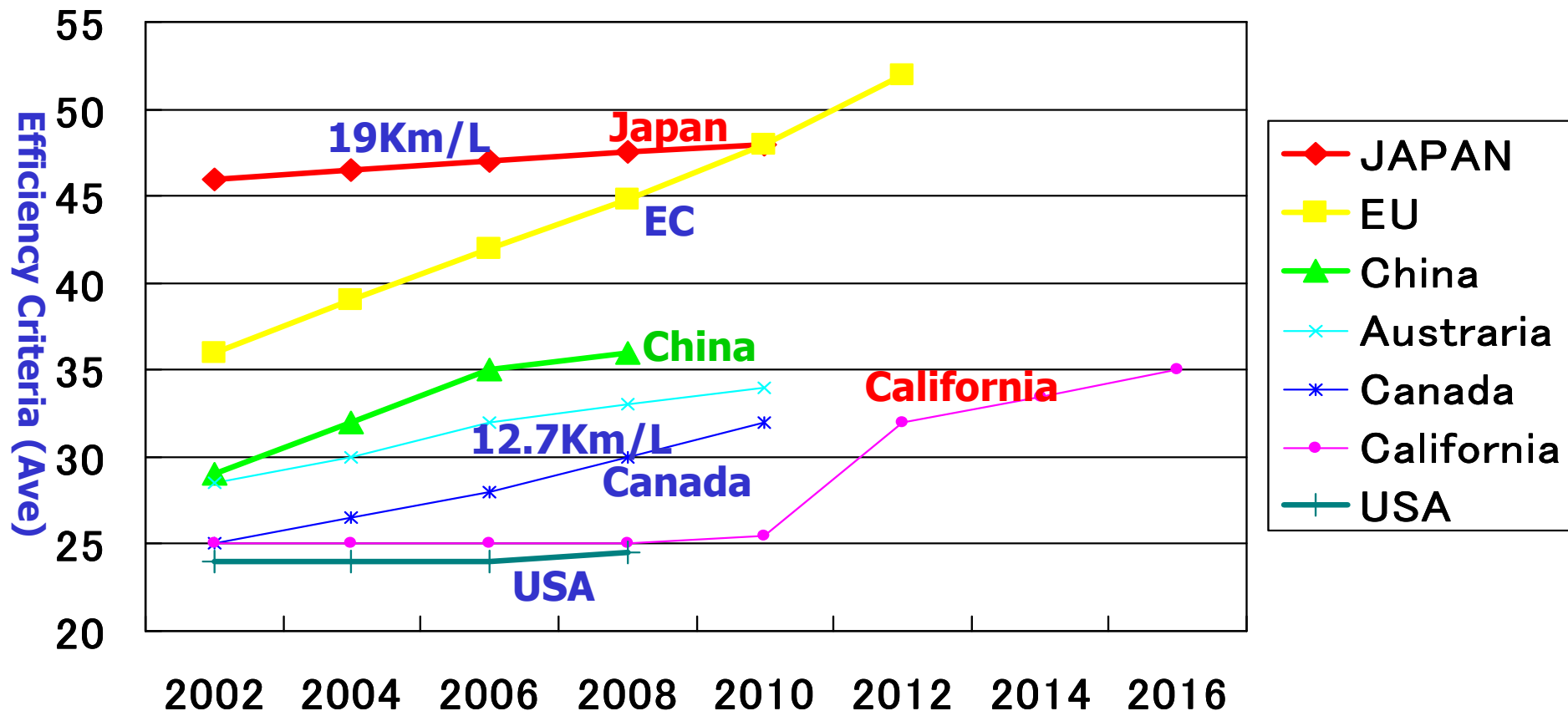
- Automotive industry has the Criteria [Km/Litter]
- Digital data has CFP, but NO Criteria in IT industry
- Metric & Criteria is the first step for the argument

CFP: Carbon foot-print

| Industry                                                                                                                                                                | Metric                                                                                                                          | Criteria                                                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|
|                                                                                       | <div>Km/L</div>                                                                                                                 | <u>Fuel efficiency</u><br><div>19 Km/L</div> <p>Case for Japan</p> |
|   | <p>Kilowatts per rack</p> <div>None</div>  | <u>Power efficiency</u><br><div>None</div> <p>(PB·yr/KW)</p>       |

# Metric & Criteria in Automotive Industry

- Metric & Criteria is the essential
- Criteria (High hurdle) helped to reduce CO2 and Competitiveness



Source: An Inconvenient Truth / Al Gore

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# Why Optical based Archive (1)

## ① Longevity ② Data mining ③ T.C.O.



1,000 years



500 years



50 years

- ① Long archive life
- ② No power archive
- ③ No air condition req.
- ④ CO2 less
- ⑤ None-contact read



10-15 years  
(Re-fresh)



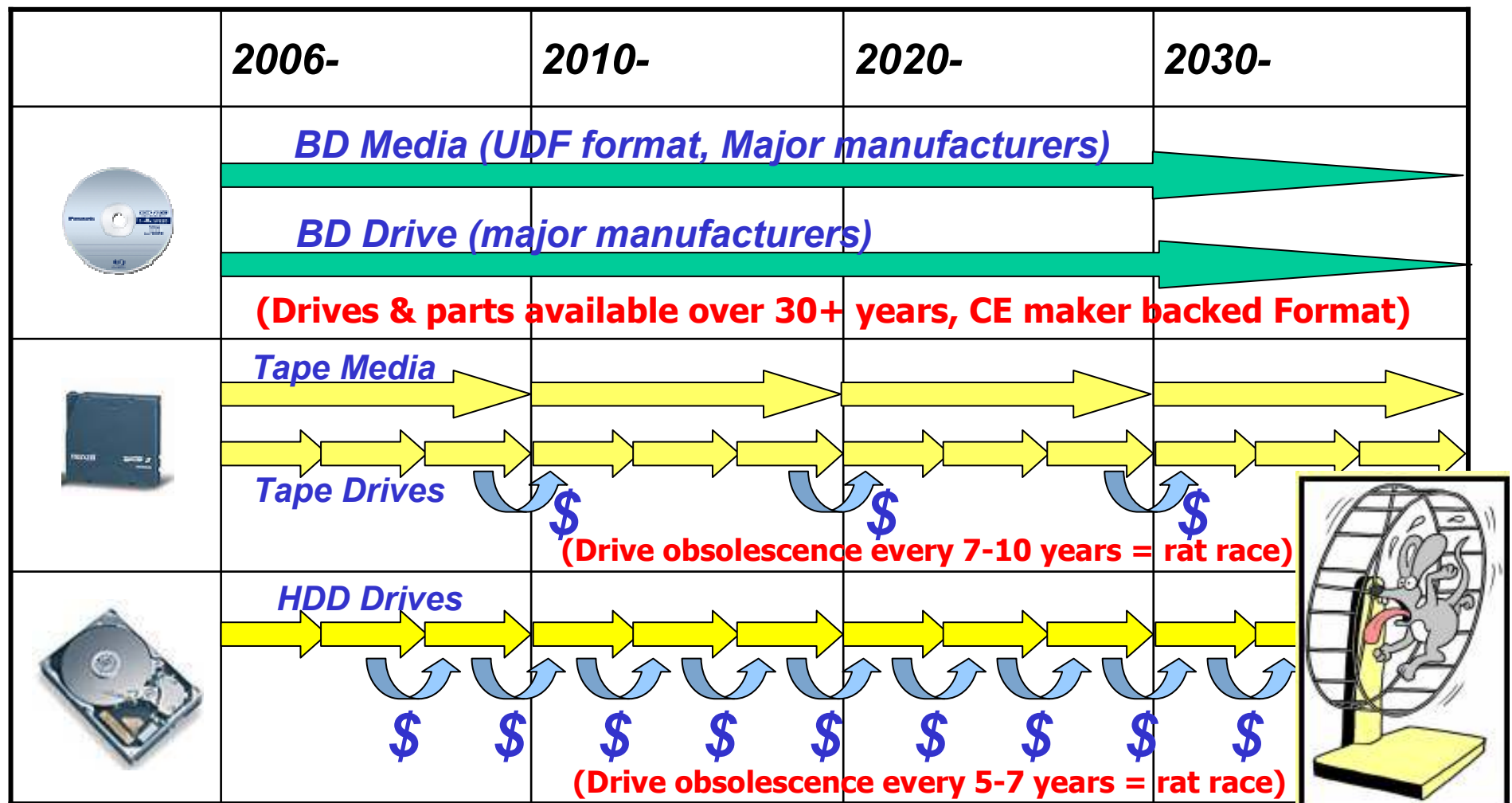
3-5 years  
(Re-place)

- ① Short life (mechanic)
- ② Powered Archive
- ③ Air conditioning req.
- ④ with CO2
- ⑤ Contact write & read



# Why Optical based Archive (2)

- Optical Media & Format are solid & stable (Physical and Logical)
- In case of RAID based Archive, you have to keep "RAT RACE"
- Because drive will fail by 3-5 yrs, and obsolete in every 5-7 Yrs



# Replacing HDDs creates mountains of junk

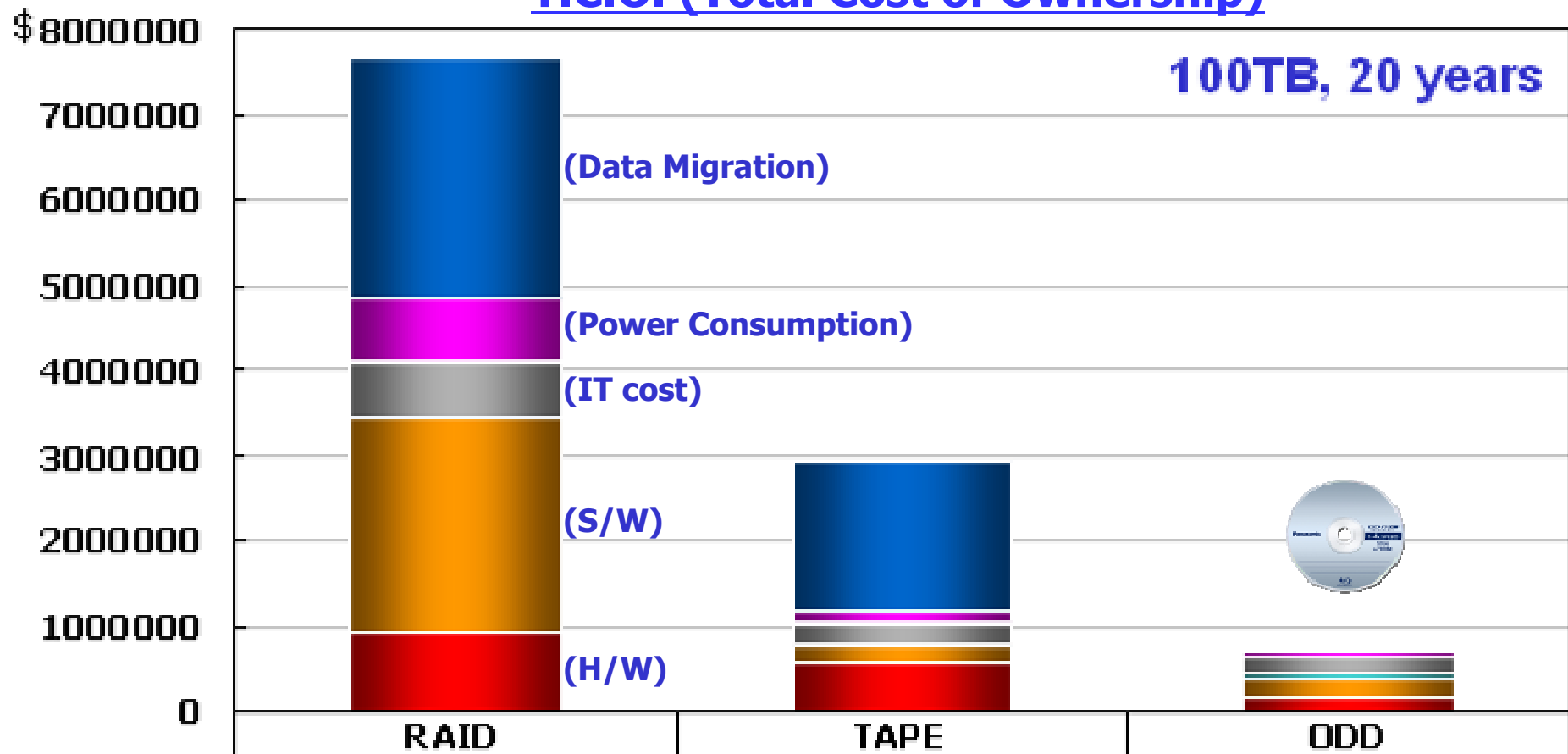


Rolling hardware and replacing failed HDDs, obsolete SANs and NAS units, creates mountains of junk.

# Why Optical based Archive (3a)

- Real cost for Archiving is Operational Cost, not for H/W alone
- You need \$3M for 5 migration cycles in 20 years (H/W & S/W)
- You need closed to \$1M for electricity in 20 Years for 100 TB

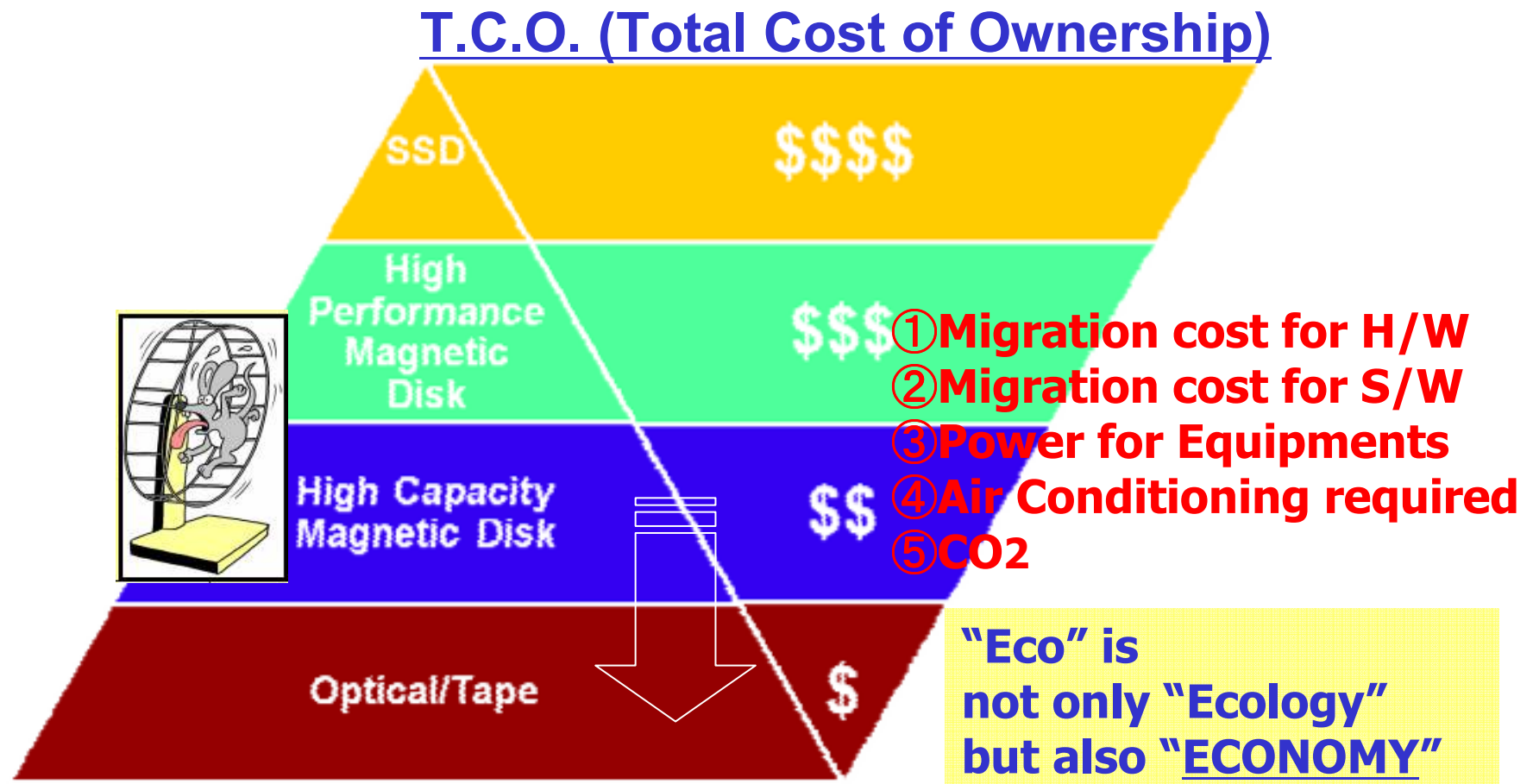
## T.C.O. (Total Cost of Ownership)





# Why Optical based Archive (3b)

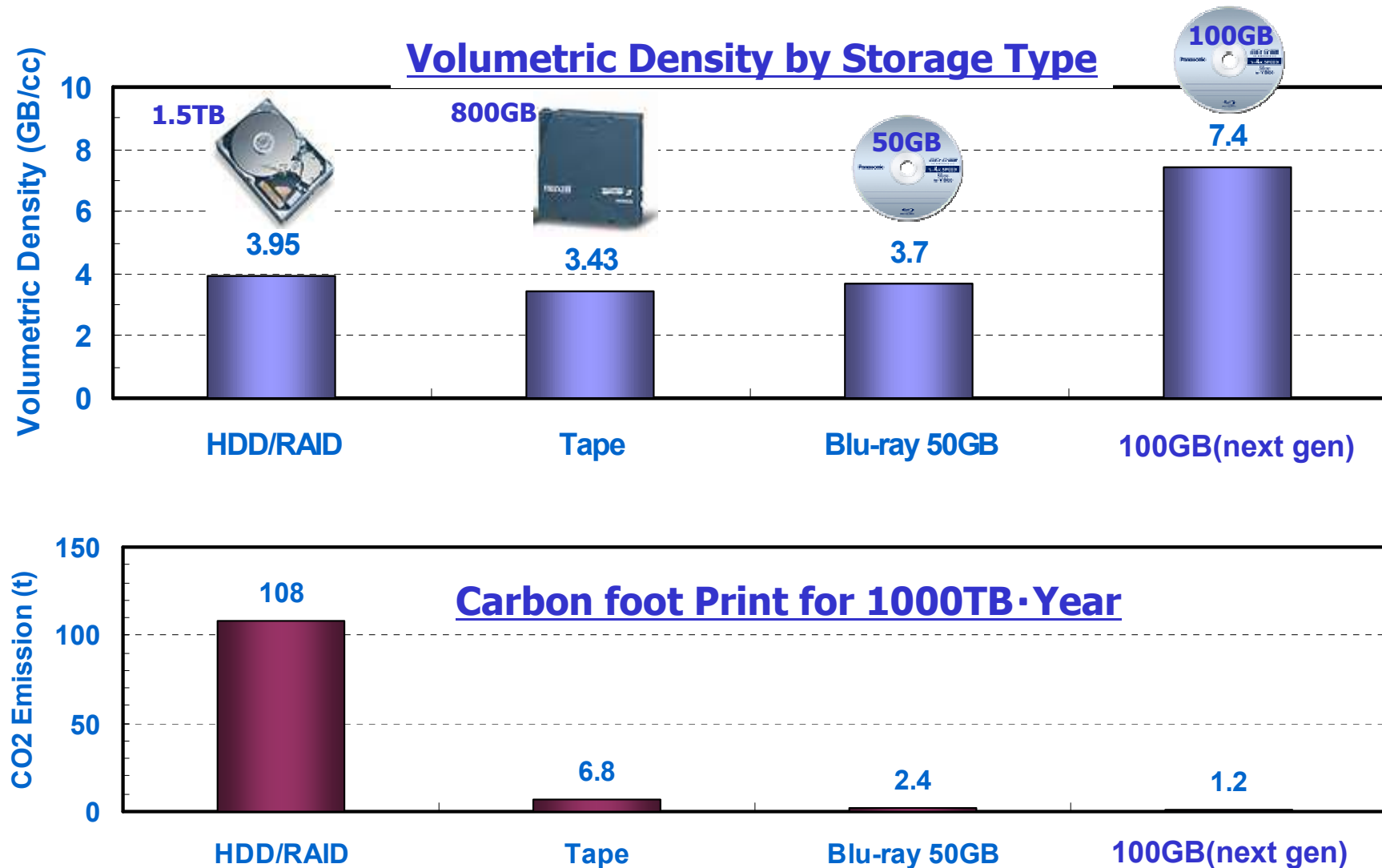
- Real cost for Archiving is Operation Cost not for H/W
- Archive for 1,000TB requires 1000 person (Resource)
- Storage Operation cost in Wall St./NY : \$300K/TB/Yr



Source: IDC

# Why Optical based Archive (4)

## ■ Optical advantage for Volumetric density & CO2 emission

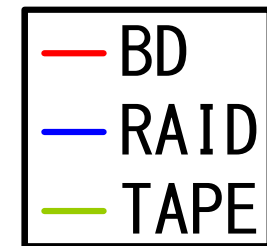
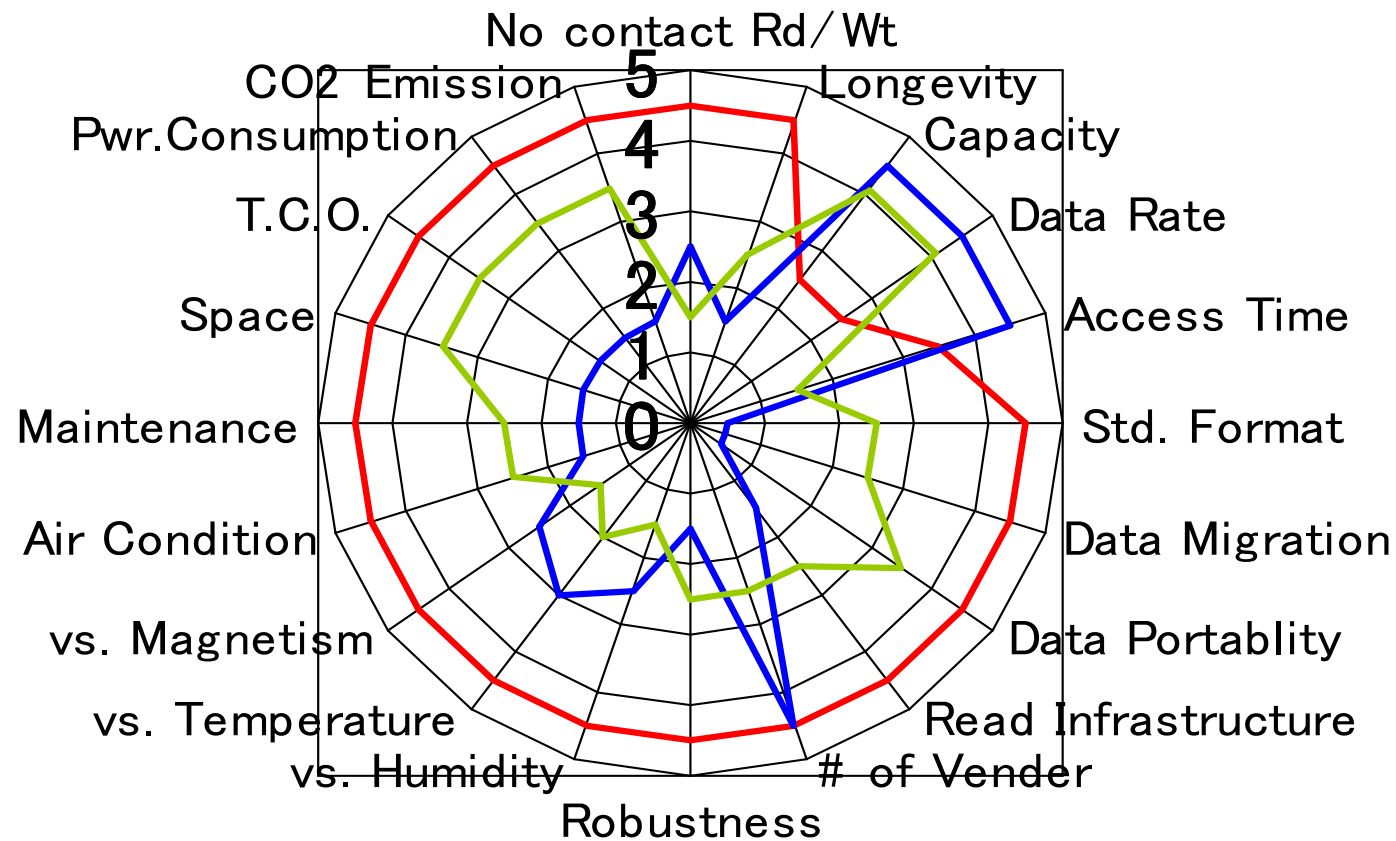


Source: Panasonic



# Why Optical based Archive (5)

■ BD has superior characteristics as an archive media



# Why Optical based Archive (6)

|                                                                                                                                    |                                                                                                                                           |
|------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
|  <b><u>Soft Archive</u></b><br><b>(migration)</b> |  <b><u>Hard Archive</u></b><br><b>(Migration less)</b> |
| <b>Mechanical media</b><br><b>(MTBF)</b>                                                                                           | <b>Disc solid media</b><br><b>(No MTBF)</b>                                                                                               |
| <b>Short-Life</b><br><b>(migration, drive obsolescence)</b>                                                                        | <b>Long-Life</b><br><b>(migration less)</b>                                                                                               |
| <b>Powered (24hr/365d)</b><br><b>(Powered/CO2 Archive)</b>                                                                         | <b>Power-less</b><br><b>(No Power Archive)</b>                                                                                            |
| <b>Air conditioning req.</b><br><b>(with CO2)</b>                                                                                  | <b>No Air conditioning</b><br><b>(with out CO2)</b>                                                                                       |
| <b>High T.C.O.</b>                                                                                                                 | <b>Low T.C.O.</b>                                                                                                                         |

# Why Optical based Archive (7)

- Hurricane [Katrina] in Aug.2005, Data in VA hospital in Louisiana
- All medical records from hospital were destroyed or severely damaged
- 98% of the data in Optical disc recovered, data in HDD & Tape are dead after a month later in the high temperature & humidity mud & dirty water

## Hospital's Data Survives Hurricane Katrina



The Southeast Louisiana Veterans Health Care System (formerly the VA Medical Center, New Orleans) and its outpatient clinics located throughout southeast Louisiana are committed to providing high-quality, compassionate, and safe health care to the more than 220,000 veterans who live in the 23-parish region they serve. The 354-bed acute care facility was affected by flooding following Hurricane Katrina in August 2005.

"The media had been exposed to extremely high temperatures and humidity from brackish standing water, they were covered in debris and dust for more than a month," said Allen. "We were able to recover all of the patient images off of the Plasmon libraries. We had just started to migrate to UDO™ (Ultra Density Optical) for an archive solution when the hurricane hit. We are now primarily using the Plasmon UDO Archive Appliance for its long-term recoverability."



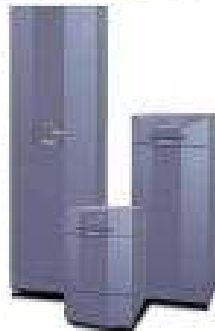
# Case of BD Archive Installation

## National Institute for Fusion Science (NIFS) in Japan

Blu-ray Discs are used to archive experimental data for fusion science.  
The volume of experimental data is increasing 50% every year.

### Points for Adopting BD

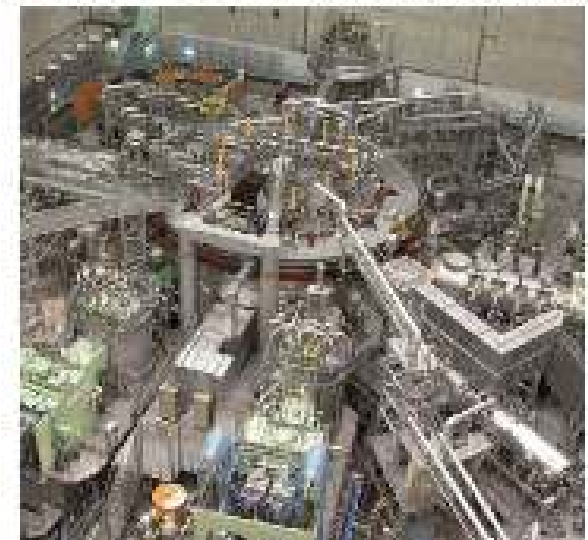
- Long term data preservation
- Future capacity expandability
- Low Power, Low CO<sub>2</sub>
- Total cost of ownership (TCO)



### LHD Control Floor



### Exp. Device Large Helical Device (LHD)



BD is the media with no power required for archiving  
you can save Energy and reduce CO2 emission  
and your operation cost drastically.

These are the differences with RAID/HDD  
which require electricity 24Hr•365 days



**contribute**





*Thank you  
very much !*