



**ERCIM**

European Research Consortium  
for Informatics and Mathematics

# **Green Computing – A Late Start**

**Mazin Yousif**  
**Advisory Committee Chair**

May 2009



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European Research Consortium  
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## **ERCIM's Advisory Committee**

G rard Berry

Michael Brodie

Chris Horn

Frank Kelly

Erik Sandewall

Kurt Mehlhorn

Alexander Schrijver

Ulrich Trottenberg



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## ERCIM's Advisory Committee

- Advise ERCIM Exec and BoD
- Evaluate WG performance
- Provide opinion on Cor Baayen Award
- Critique publications, Newsletters...
- Miscellaneous BoD Inquiries

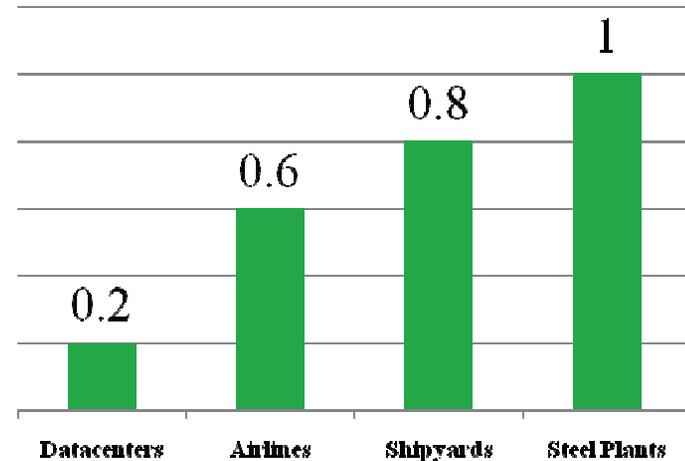
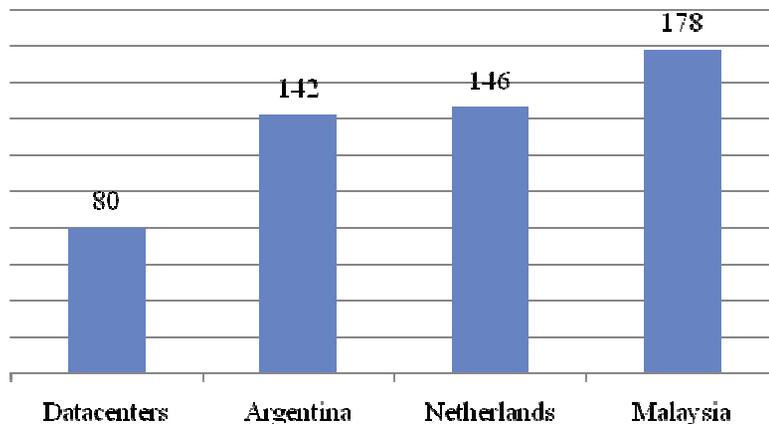


## Green Computing - Motivation

Energy Consumption: WW doubled b/w 2000-06;

- US: will likely double again b/w 2006-11 (~110BKWh/year);
- EU: ~104BKWh in 2020

➔ Carbon Emission: >quadruple in 2020 (~340MMT)



Source: AMD; Financial Times; Gartner; Stanford University; Uptime Institute; McKinsey Analysis



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## Green Computing Pillars

- Advanced Cooling Technologies
- Best Practices
- Hold IT Accountable for Cost
- Productivity =  $f(\text{Consumption})$
- Reduce internal/external heat

- Innovations in new Materials; lower voltages; etc
- Increased Integration: SoC
- Virtualization
- Autonomic Power Computing

- Energy caps
- Resources consolidation
- Incentives to promote energy conservation (e.g., Certificates)

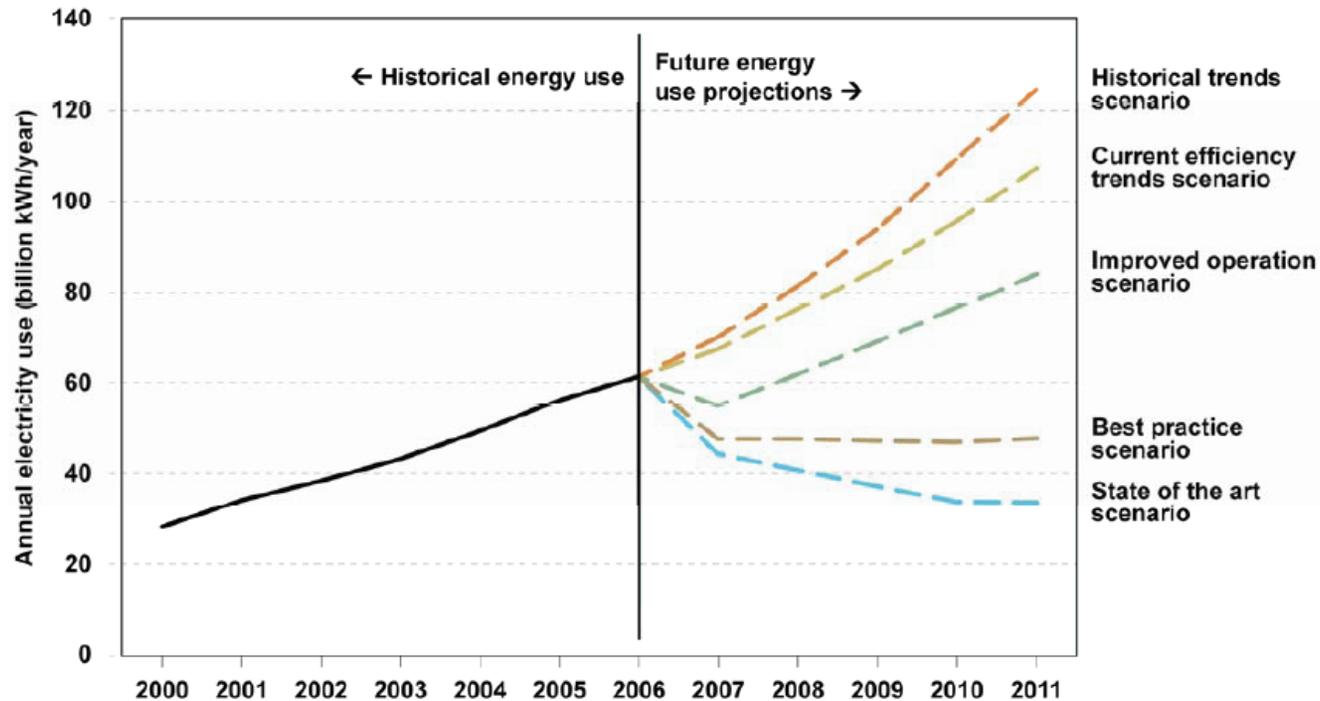
- Energy-Efficient Equipment
- Minimize resources executing workload with SLA
- Benchmarks + quantifiable metrics (standards)
- Holistic thermal/energy models



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## Green Computing – There is Hope



**You do not have to take BOLD actions; any little efficiency improvements help**

Source: EPA Report to Congress on Servers & Datacenters Energy Efficiency, July 2007

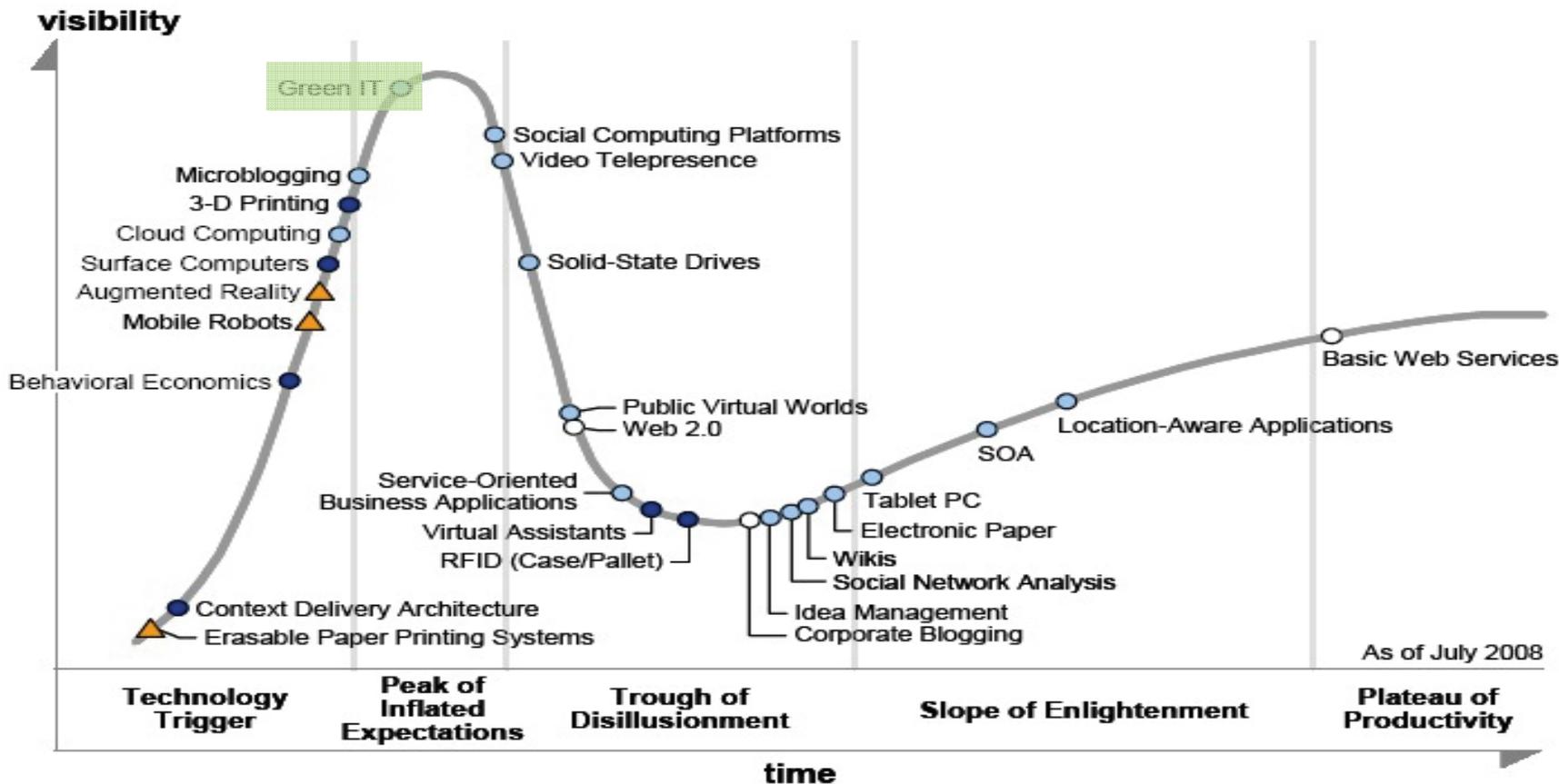


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# Green Computing – It Will Happen

Figure 1. Hype Cycle for Emerging Technologies, 2008



**Years to mainstream adoption:**

○ less than 2 years    ● 2 to 5 years    ● 5 to 10 years    ▲ more than 10 years    ⊗ obsolete before plateau

Source: Gartner (July 2008)

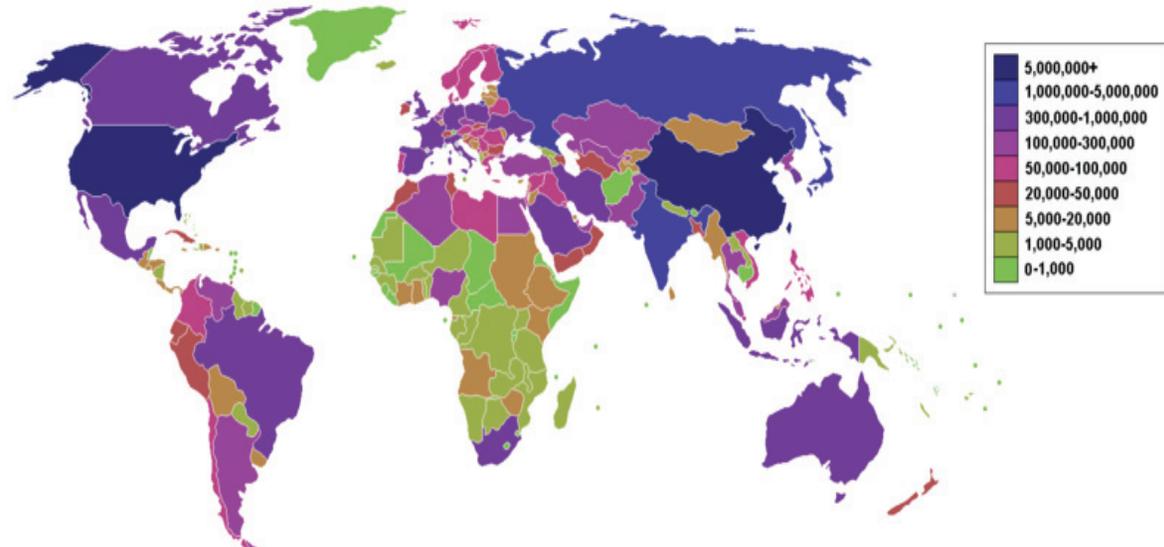


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## ERCIM & Green Computing

- Take leadership steps to promote green computing
- Encourage establishing green computing WG
- Draft green computing research vision
- Encourage green computing initiatives
- Work with European Standard Bodies
- Work with EU to expand on the Code of Conduct...





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# Thank You

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