# Smart Grids & Clean Power 2010
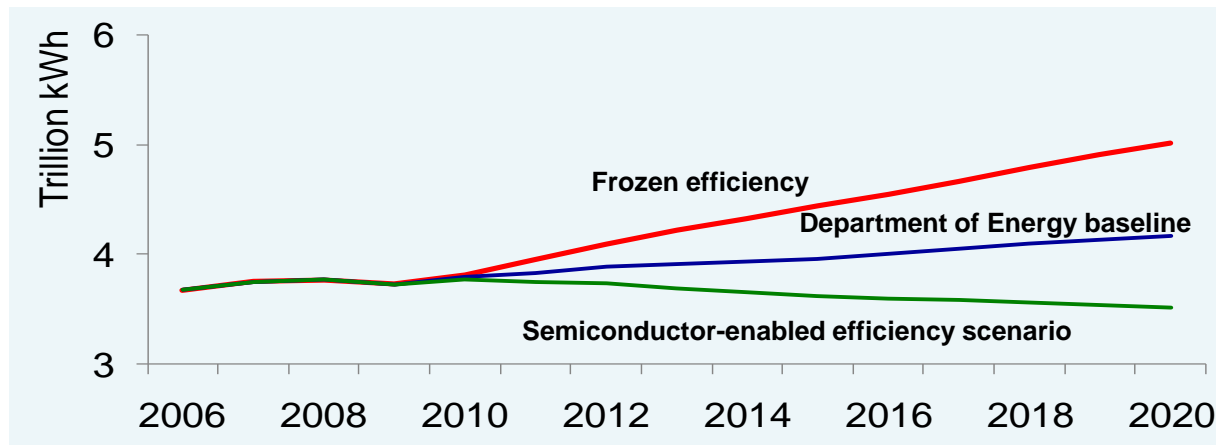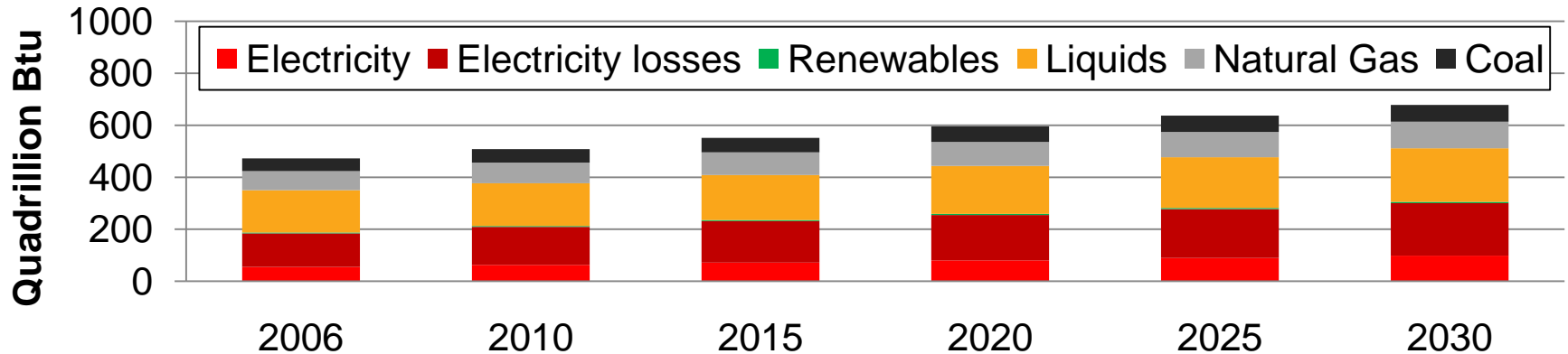# Green Technologies

Ian Drew, EVP, ARM
24 June 2010

# Chips Are Key to Greening Technology

- Global energy demand will continue to rise as economies develop and electronic devices proliferate



*Note: Accelerated investments in semiconductor-related technologies stimulated by smart policies.
Source: American Council for an Energy-Efficient Economy (ACEEE), "How Big Energy Efficiency? Contributions of Semiconductor Technologies" (2009).

# Devices Must Become More Efficient

- Servers, personal computers, power supplies, lights, appliances, cars,… all show a similar curve of inefficiency
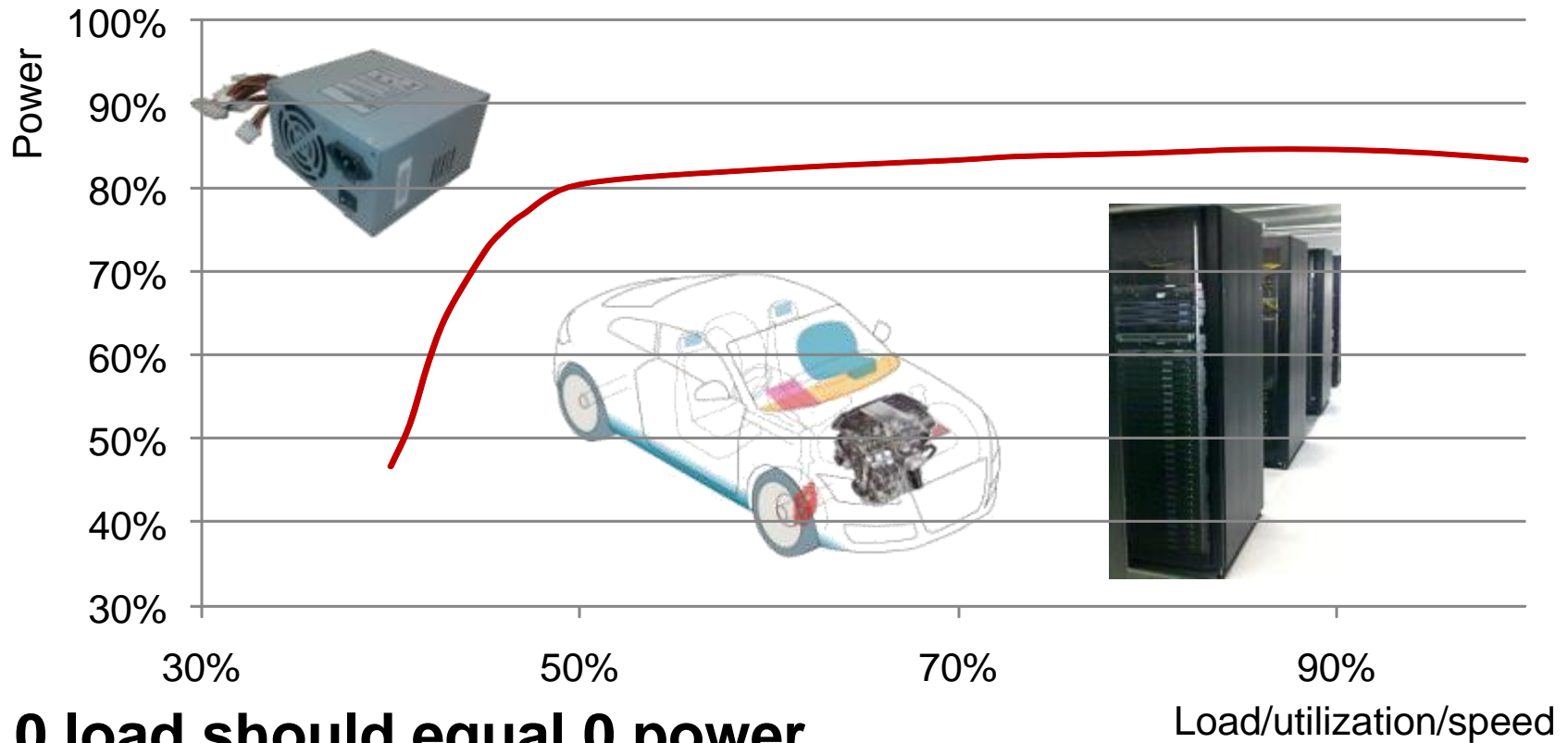


- **0 load should equal 0 power, green technology and smart devices can achieve this**

The Architecture for the Digital World®   **ARM**®

# Current Energy Value Chain

- Limited interaction between consumers and utility providers

- Consumers don't monitor or manage energy consumption

One-way energy & information flow
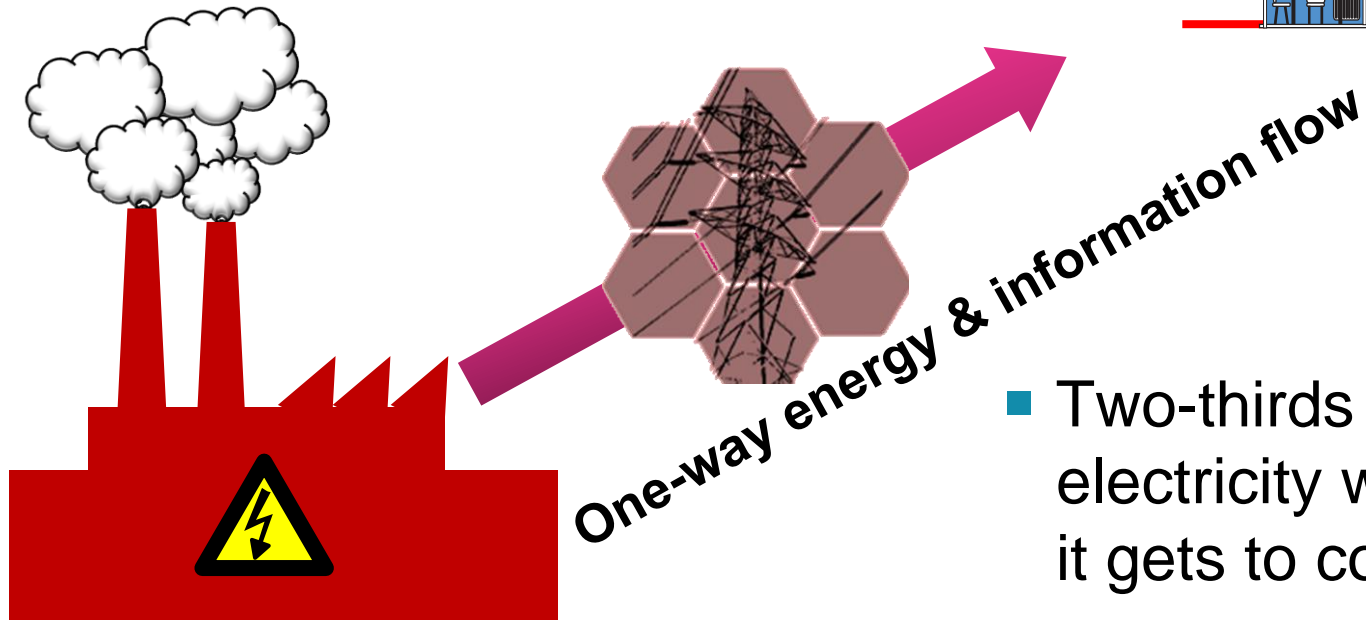
- Two-thirds of generated electricity wasted before it gets to consumer

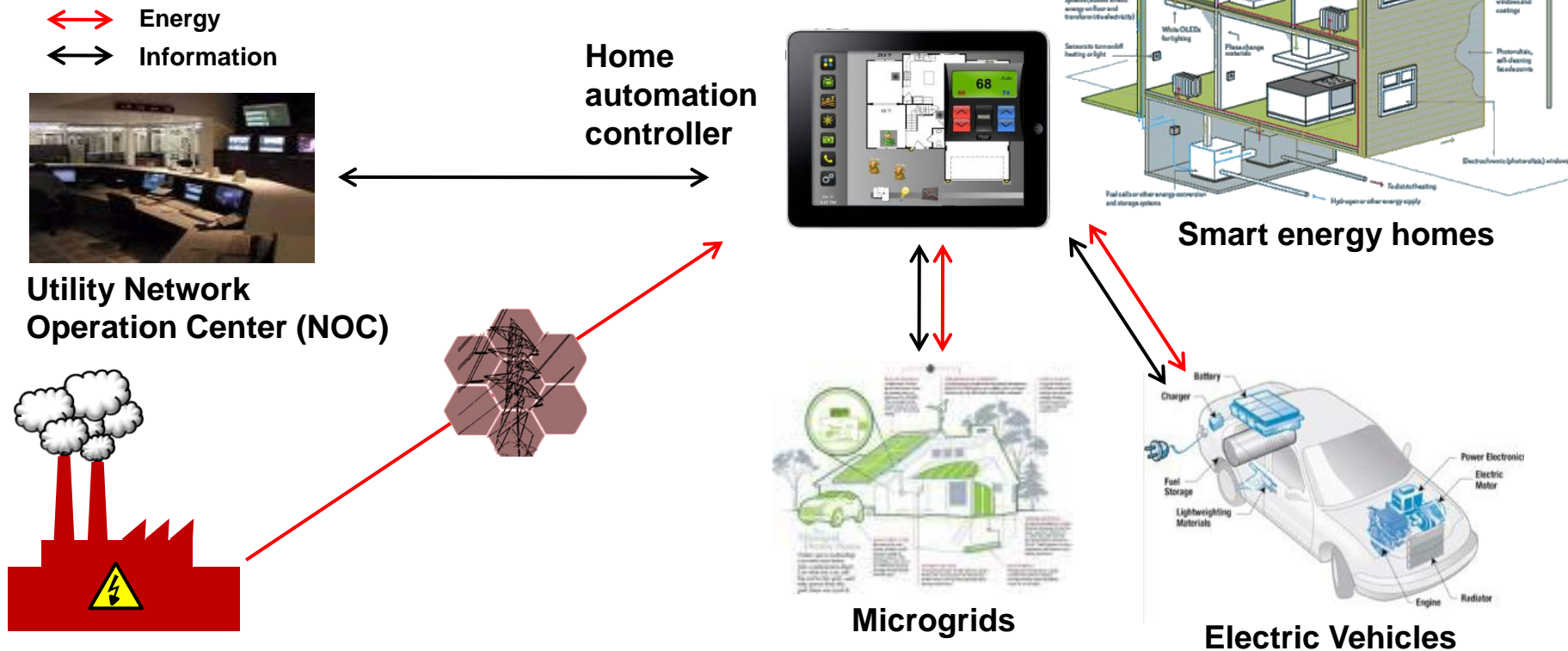The Architecture for the Digital World®

**ARM**®

# Emerging Energy Value Chain

- Smart grid builds participatory interaction between consumers and utility providers

- Consumers and smart appliances monitor, control and reduce energy consumption

Two-way information flow enabled by Smart meter & grid

**ARM**®
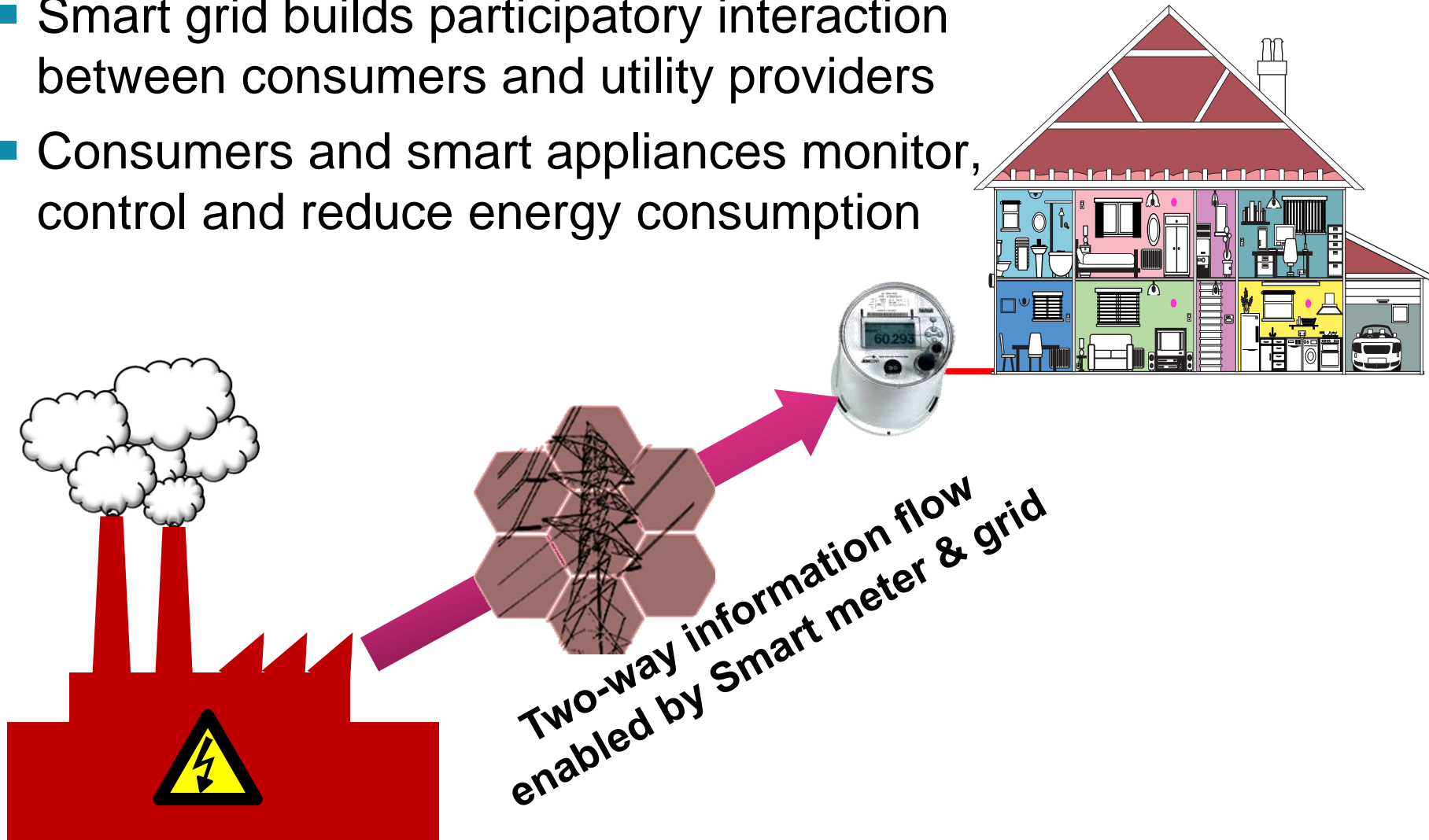
# Engaged Consumer

- Traditionally passive end of value chain becomes engaging position encouraging new services



Energy

Information

Home automation controller

Utility Network Operation Center (NOC)

Smart energy homes

Microgrids

Electric Vehicles

# When Appliances and Meters Can Talk

- Knowledge helps consumer cut wasted energy and bills

- Peak usage flattens as appliances make smart choices

  - More efficient base loads generate electricity at lower cost – benefiting both provider and consumer

  - Only 8% of 2.65 billion meters for gas, electricity and water worldwide are automated
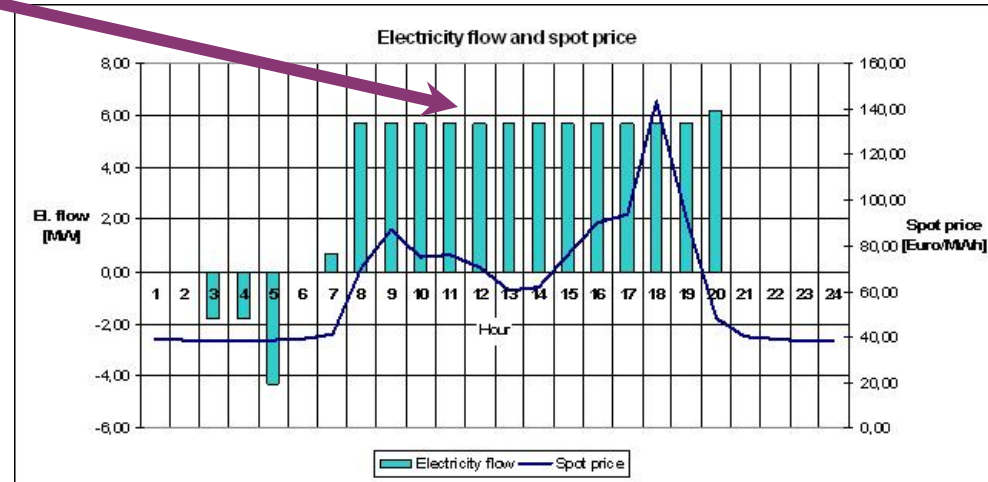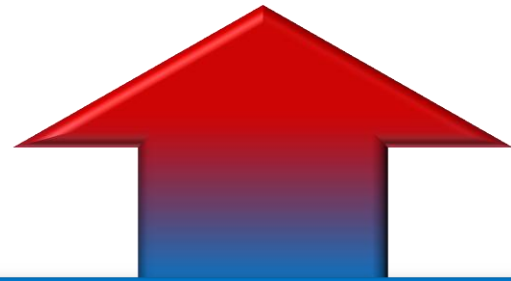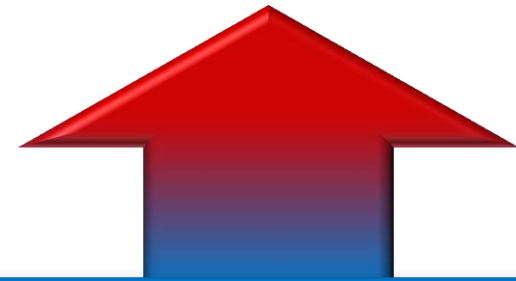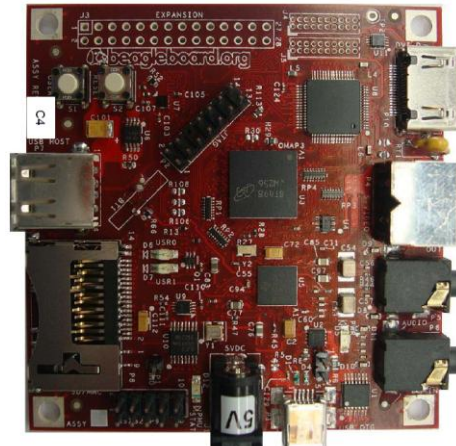


**COMMS**
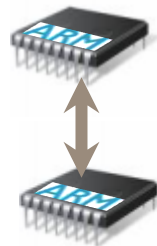
**COMMS**

# Server Power Challenges





$26B to power and cool worldwide servers in 2005 – projected to be $44.5B this year!*

*Source: IDC #203598 Worldwide Server Power and Cooling Expense 2006-2010 Forecast

The Architecture for the Digital World®

**ARM**®

# ARM Prototype Servers



**http://linux-arm.org running on prototype blade chassis**



BeagleBoard



- **based on Marvell MV78100 SoC**
  - V5 ARM running at 1GHz
  - 1.5GB RAM (DDR2-800)
  - 2.5inch SATA Laptop Drive
  - Debian Lenny OS
  - 12DC Power to board
  - Single 240v AC to 12V DC
  - 8 - 10W per blade

- **Based on TI OMAP3530 SoC**
  - V7 ARM Cortex-A8 running at 720MHz
    - NEON™ SIMD Coprocessor
  - 2Gb NAND x 16 (256MB)
  - 2Gb MDDR SDRAM x32 (256MB @ 166MHz)
  - 5VDC Power to board
  - Single 240v AC to 5V DC
  - <2W per board

The Architecture for the Digital World®

**ARM**®

"advanced electronic and ICT technologies – if given the right set of policy signals – could generate additional productivity gains well beyond the European Union's 20 percent reduction targets now set for the year 2020"

*Skip Laitner,*
*American Council for an Energy Efficient Economy (ACEEE)*

**ARM**®