WORKING GROUP 4: INCENTIVES AND VOLUNTARY PROGRAMS

This working group will discuss study tasks and information needs related to policies and programs in support of the following H.R. 5646 study objectives:

- Summarizing current government incentives offered for energy efficient products and services and consideration of similar incentives to encourage the adoption of energy efficient data centers and servers

- Offering recommendations regarding potential incentives and voluntary programs that could be used to advance the adoption of energy efficient data centers and computing

Agenda

10:30-10:35	Present relevant study objectives and agenda for meeting (5 minutes) • Read related H.R. 5646 language • Ground rules (no selling, stay at high level, let everyone participate) • We assume that all data received are public and citable
10:35-10:40	Introductions (Name and affiliation) (5 minutes)
10:40-11:30	Identify and discuss major barriers to efficiency improvements (50 minutes)
11:30-12:00	Identify existing and proposed polices and programs (30 minutes)
12:00-12:15	Break/ pick up lunch
12:15-12:35	Link barriers to existing and proposed policies (20 minutes)
12:35-1:20	Discuss each policy (45 minutes) • Identify issues/concerns/opportunities • Level of support within the group
1:20-1:35	Discuss ideas and process to develop final policy recommendations (15 minutes)
1:35-1:45	Summarize key working group outcomes (10 minutes)

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Each participant requested to provide contact information, topics of interest, desired role, and time frame for input (i.e. data) using the follow up form provided in the workshop packet. Interested persons can also contact us later to express opinions, counter-arguments, or suggestions.

Barriers to improved data center energy performance - DRAFT

- Energy is cheap, but performance is critical
  - Energy costs are small share of total costs
  - Demand for computing applications increasing, processing power cost decreasing
  - Industry players seek bragging rights for performance that can swamp efficiency gains
- Energy is invisible
  - Facilities capital and operating costs not included in TCO
  - Power and heat loads not considered in projections of remaining capacity and projected exhaustion point
  - IT managers don't see energy costs
  - Energy efficiency not a purchasing metric
  - Lack of user-friendly tools for energy consumption measurement and benchmarking
- Not making optimal use of current technologies
  - Server power save features not enabled
  - Focus on processors as main heat culprit, but other components (memory, disks, power supplies) are also important
  - Running servers at part load
  - Bad sensor calibration
  - Humidity sensor drift, especially
  - Bad airflow, dueling humidifiers, etc
  - Over-specifying humidity requirements
  - Lack of clarity on what to over-size – ex: cooling towers + ducts but not other things
  - Commissioning, retro-commissioning, re-commissioning
- Practices from other sectors do no apply to data centers
  - "Rules of thumb" ingrained into decision making patters of CIO, IT, facilities
  - A DC is not an office
  - Many EE designs like cooling towers, etc. are inappropriate for data centers
  - Heat load varies (both in space and time) much more than in other building types
  - Real estate budgeters don't understand why data centers cost so much per sq ft
  - Building codes do not explicitly address datacenters
  - DC not same as telecom
- Risks and costs
  - Application performance is paramount; little interest in changes that jeopardize performance
  - Overly conservative safety margins for datacenter requirements (e.g., reliability, latency, server capacity, humidity, air contaminants, etc.)
  - Savings unknown and efficiency will take years to fully implement
  - Major investments needed
  - Efficiency projects require downtime
  - Mistakes in hot aisle/cold aisle layout and other designs may take years to remedy
  - Lag time – IT equipment may change a lot in the 3 years it takes to build your DC
  - Rapid changes – future requirements hard to predict
  - HVAC components live long, IT equipment doesn't
  - Delays in new datacenter construction (to incorporate efficiency) can be (or seem) more costly than inefficiency

- Organizational incentives
  - IT managers “rule” the datacenter
  - Bad innovation can be career-ending
  - Manager performance not based on energy costs, so DC will see little reward for innovation
  - Incentive: data center service providers often price by number of servers utilized, so no incentive to reduce servers running at part load
  - No incentive to remove unused or legacy servers
- Lack of standards for energy benchmarking
  - Confusion about the difference between energy and power
  - Many ways to measure E perform – sq ft, activity, Mhz
  - How, when, and where to make what measurements
  - DC operators don’t want to release operations info (power or data #’s)
  - Many DC operations not separately metered
  - Standard setting is contentious and takes a long time
  - Confusion about whether to correlate with weather conditions
  - Appropriate metric depends on application
  - Different types of DCs – multi-tenant hosting, corporate in-house, government/institutional, educational
  - Key for benchmarking – compare with others who have similar scale, reliability and availability requirements
- Externalities
  - Better data centers might help utilities or the power grid, but who captures this?
- Lack of industry coordination
  - e.g., Facilities staff reconfigure racks optimized for efficiency by vendor
  - Software companies advise against running software on VMs since they haven’t tested it – warranty issues?
  - Linkages can be complex (e.g., tape drive energy use may be minor part of DC energy use, but humidity requirements can indirectly drive lots of energy use
- Manufacturers don’t offer energy efficient products because consumers don’t demand them (and vice versa)

Incentives and voluntary program categories - DRAFT

- Financial incentives (e.g., utility rebates, Federal tax deductions/credits)
- Technology procurement (i.e., incentives for incorporating new efficiency technologies into commercially available products)
- Information (e.g., technical guidance, awareness campaigns, publication of benchmark data)
- Education and training (e.g., datacenter operator certification, outreach to industry orgs + trade pubs)
- Industry standards (e.g., energy performance metrics, test procedures)
- Endorsement Labeling (e.g., ENERGY STAR)
- Government procurement (e.g., EPAct 2005 purchasing requirements)
- Government operation (e.g., mandatory benchmarking of Federal datacenters, pilot program implementation in Federal facilities)
- RD&D (e.g., new technology assessment, use DOE super computers as energy efficiency pilot, leverage Labs21 experience, assessment of aggregate savings potentials)
- Energy (or Carbon) Pricing (and utility metering)
- Public/private partnerships – X-prize-style incentives

Policies not included

- Equipment standards
- Building codes?

Barrier	Targeted Change Agent	Targeted Equipment	Policy Options (note existing vs. proposed)	Issues & Challenges	Level of Agreement (All, some, few, none)