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National Science Foundation

Funded, in part, by a grant from the National Science Foundation.
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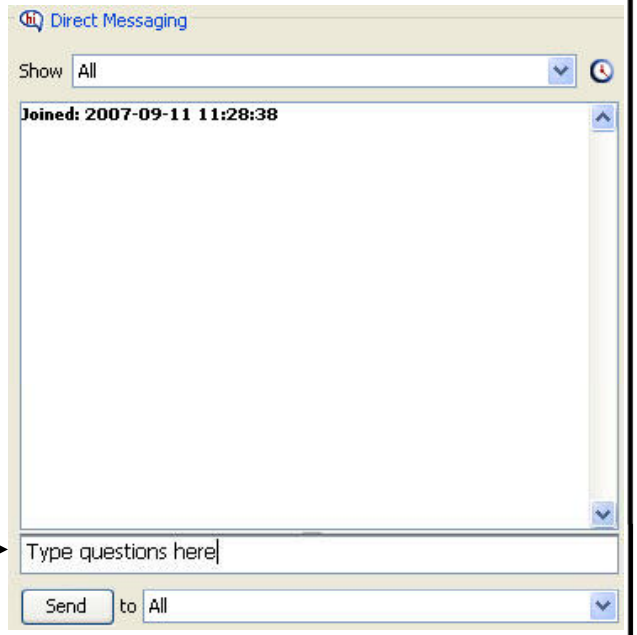
- If you have questions during the presentation, please submit them in the Chat Window.
- At the end of the session we will answer as many questions as we can. Please type your questions in the Chat Window.

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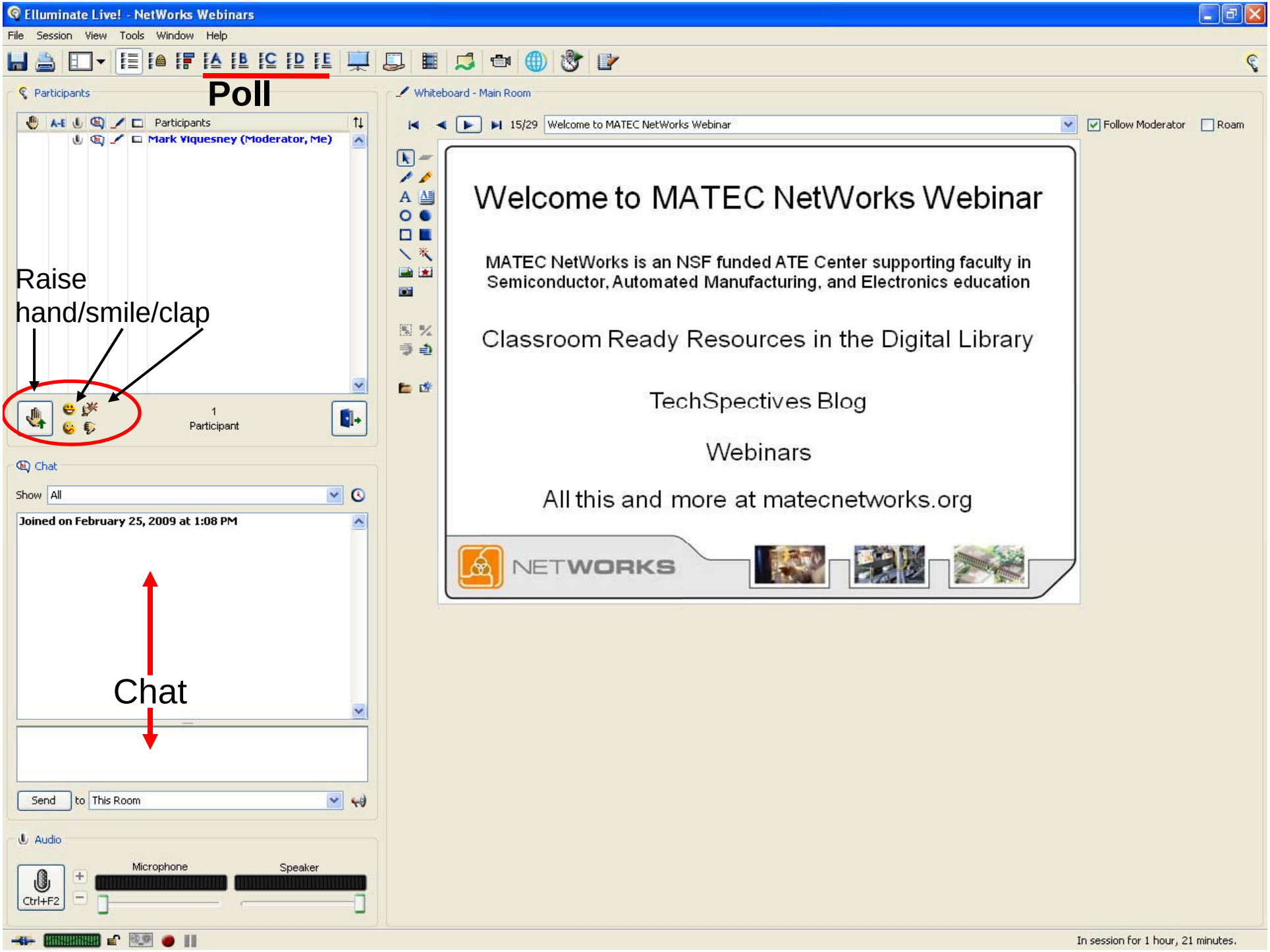
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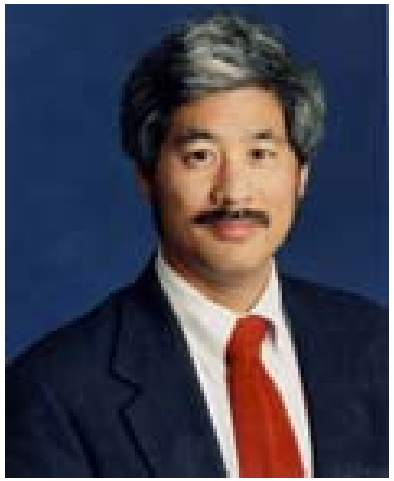
In session for 1 hour, 21 minutes.

# NetWorks Webinar Presenters

John Carrese
Director of the San Francisco Bay Region Center of Excellence hosted at City College of San Francisco.



Daryl Hatano
Vice President Public Policy
SIA

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# Workforce Trends and Needs In the Energy Efficiency Sector

**MATEC Web Seminar**

**September 11, 2009**

**Presenter: John Carrese**

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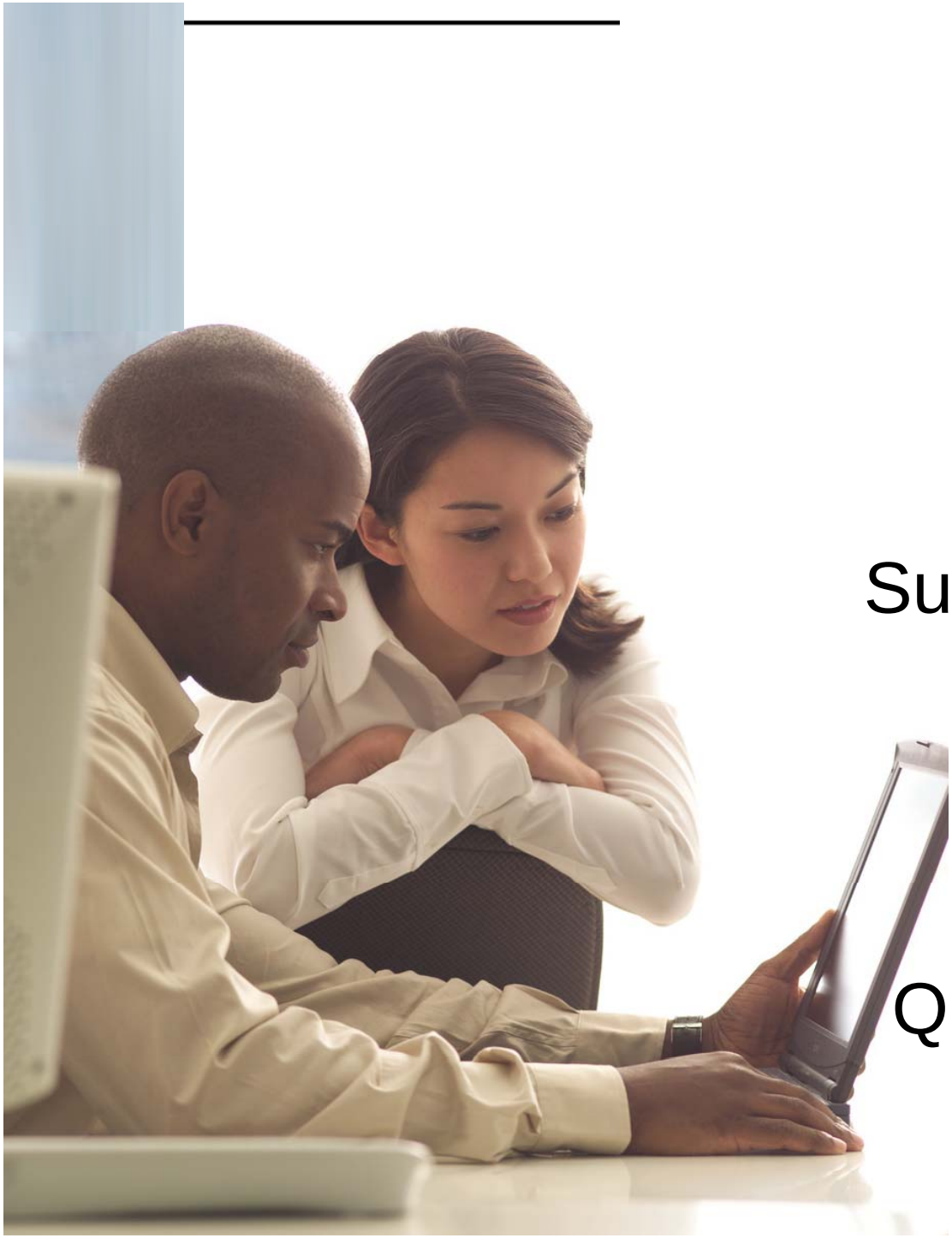

# Today's Presentation

About the Center of Excellence

Summary of Research

Key Findings

College Response

Statewide Project

Questions & Answers

# San Francisco Bay Center of Excellence

The Center of Excellence, in partnership with business and industry, delivers regional workforce research customized for community college decision making and resource development.

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# Research Objectives

- Identify and survey the firms in the Bay Area that hire energy efficiency workers in technical occupations
- Identify the projected job growth for these occupations & the workforce needs and challenges of employers.
- Identify college programs related to energy efficiency occupations.

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# Energy Efficiency Sector Bay Region

Three industries are most likely to be connected to energy efficiency occupations:

- Public or Private Utilities or Agencies
- Building Design and Construction
- Building/Facility Operations & Maintenance

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# Study Methodology

- Extensive literature review
- Built database of firms in energy efficiency sector
- Surveyed regional employers in the identified industries, with PG&E and industry support
- Extrapolated survey data to population of firms
- Industry validation





# Research and Industry Partners

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## Industry Partners

ASHRAE
Advancing HVAC&R to serve humanity and promote a sustainable world

BCA Southwest Chapter

California Building Performance Contractors Association
Cbpca

PG&E Pacific Gas and Electric Company®

BOMA Silicon Valley 25 1983 - 2008

BOMA san francisco www.bomasf.org

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# Occupations Studied

| | |
|---|---|
| Public or Private Utilities or Agencies | **Compliance Analyst or Energy Regulation Specialist**<br>**Resource Conservation or Energy Efficiency Manager**<br>**Energy Auditor or Home Energy Rater** |
| Building Design and Construction | **Construction or Design Project Manager**<br>**Building Performance or Retrofitting Specialist**<br>**HVAC Technician, Installer or Mechanic** |
| Building or Facility Operations and Maintenance | **Building Controls Systems Technician**<br>**Building Operator or Engineer** |

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# Occupational Employment & Growth

Combined, the estimated growth of the eight occupations:

- **Over the next 12 months** could result in **as many as 3,470 new jobs** for the Bay Area economy.
  - 950 building performance or retrofitting specialists
  - 590 energy auditors or home energy raters

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# Occupational Employment & Growth

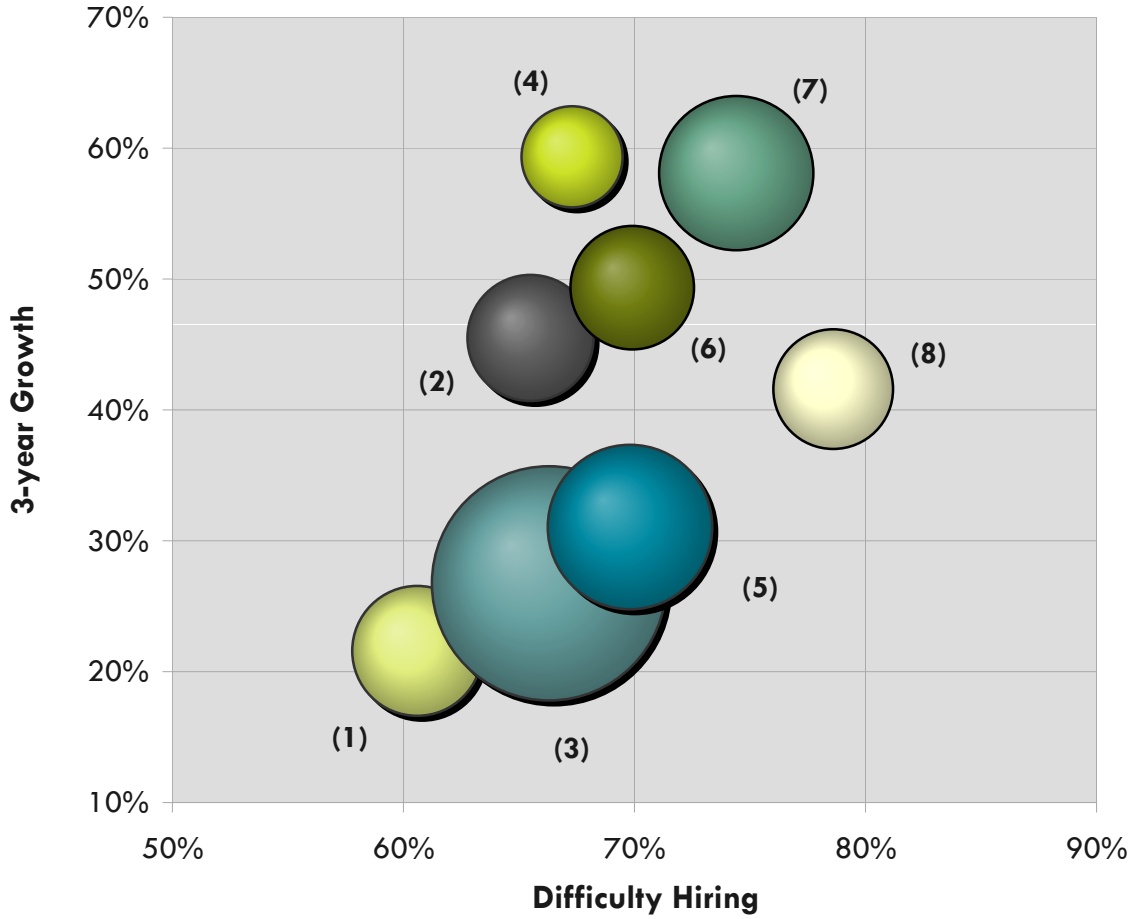
Combined, the estimated growth of the eight occupations:

- **Over the next 3 years** could result in **as many as 13,000 new jobs** for the Bay Area economy.
  - 2,850 construction/design project managers
  - 2,690 building performance or retrofitting specialists





# Workforce Challenges




- (1) Building operators or building engineers
- (2) Resource conservation or energy efficiency managers
- (3) Project managers for construction or design work
- (4) Compliance analysts or energy regulation specialists
- (5) HVAC mechanics, technicians or installers
- (6) Energy auditors or home energy raters
- (7) Building performance or retrofitting specialists
- (8) Building controls systems technicians

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# Occupational Wages

Wages for the 8 study occupations ranged from –

- HVAC Technicians/Installers

  | *Entry level* | *Experienced* |
  |---|---|
  | $41,600 | $72,800 |

- Construction/Design Project Manager

  | *Entry level* | *Experienced* |
  |---|---|
  | $60,000 | $90,000 |





# Education Preferences

- More than 45% of employers surveyed prefer applicants with a related Bachelor's degree.
  - Resource Conservation/Energy Efficiency Manager
  - Compliance Analysts/Energy Regulation Specialist
  - Construction/Design Project Manager





# Education Preferences

- One out of three employers prefer applicants with a specific Associate degree or program certificate.
  - Energy Auditor/Home Energy Rater
  - HVAC Technician/Installer
  - Building Controls Systems Technician





# Employers' Most Important Knowledge and Skill Areas

1. Ability to communicate with customers, in writing and in person.
2. Understanding of local and state energy efficiency requirements and incentives for new and existing buildings.
3. General understanding of the mechanics and engineering of energy systems, including HVAC, lighting, and renewable energy systems.





# Education and Training

Employers are interested in the community colleges providing education and training programs:

- student internship programs
  - 76% interest (27% great interest)
- on-site customized training for current employees
  - 61% interest (22% great interest)
- certificate program in energy auditing & retrofitting
  - 61% interest (25% great interest)





# College Programs Survey

- College Program Selection Criteria
- Colleges with Related Programs

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# Opportunity to Develop Programs

- Currently no programs for:
  - Energy Auditor/Home Energy Rater
  - Compliance Analyst/Energy Regulation Specialist
  - Resource Conservation/Energy Efficiency Manager
- Currently only one program for:
  - Building Performance Retrofitting Specialist





# Responding to Industry

- Build a Pipeline of Skilled Workers
- Create and Expand Industry Partnerships
- Provide on-going professional development for faculty

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# Additional Research

- Center of Excellence is collecting regional data across California to replicate this study
- Additional regional reports available soon
- Follow-on study with Lawrence Berkeley National Labs





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## What's New

**Energy Efficiency Occupations**
Bay Area employers are projected to add as many as 13,000 new jobs over the next three years in eight energy efficiency occupations. **More** +

**Home Health Care Aides**
The demand for Home Health Aides and Personal and Home Care Aides in the South Central Region is expected to increase by 22% adding over 1,700 new and replacement jobs through 2012. **More** +

**California's Green Economy**
In 2008, the Centers of Excellence launched a statewide effort to study the workforce needs of green industries and occupations. Visit our **Green Economy** page to learn more about the future of California's green workforce and the role of labor

## Energy Efficiency Study

***Providing Data Driven Information***

In 2008, the Centers of Excellence launched a research project to study the workforce needs of energy efficiency businesses throughout California.

**Press Release**
*March 19, 2009*
Green Jobs and Blue Skies — Energy efficiency occupations study provides hope for California's Bay Area.

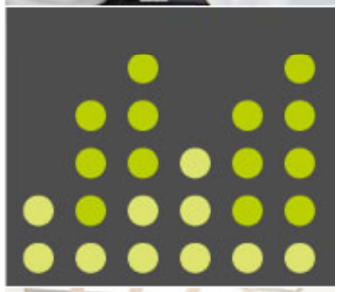
### Reports and Research

***New!*** Energy Efficiency Occupations: Bay Region (pdf)
In 2009, the San Francisco Bay and Greater Silicon Valley Centers of Excellence studied eight energy efficiency occupations that are most relevant to community colleges.

This environmental scan's findings are based on survey responses from more than 700 firms that hire energy efficiency workers in the 12-county Bay Area. Employers are projected to add as many as 13,000 new jobs over the next three years in this cluster of occupations.

Key Findings: Bay Region Energy Efficiency (pdf)
This document provides a brief overview of the Bay Region's Energy Efficiency study and employer survey.

***Coming soon!*** The Centers of Excellence are continuing to research energy efficiency occupations in California. In the next



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# Thank You!

John Carrese
Director
San Francisco Bay Center of Excellence
City College of San Francisco
jcarrese@ccsf.edu
(415) 550-4418





# Doing More with Less: Green Energy Opportunities in the Semiconductor Industry and the Policies to Promote Them

Daryl Hatano
Vice President,
Public Policy
SIA

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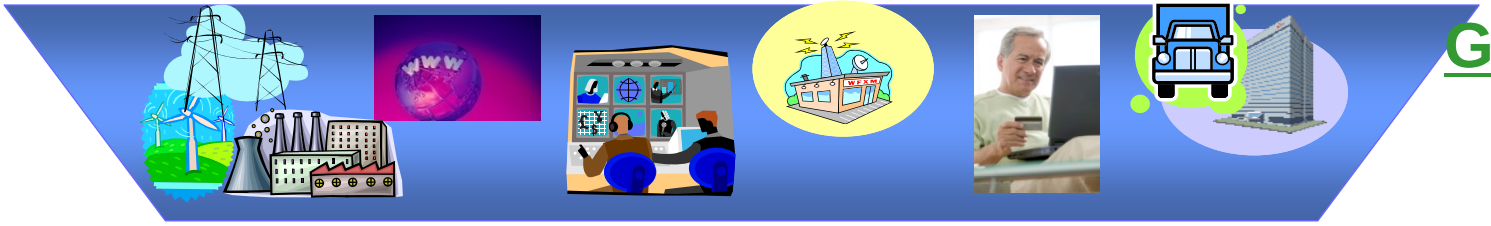
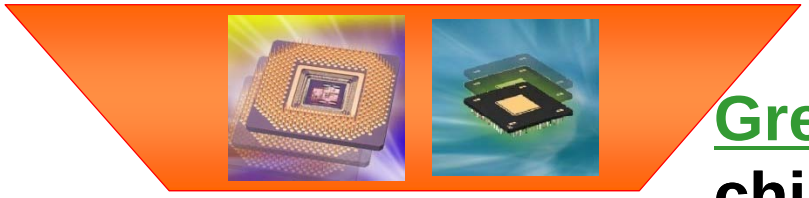
# How can the semiconductor industry contribute?



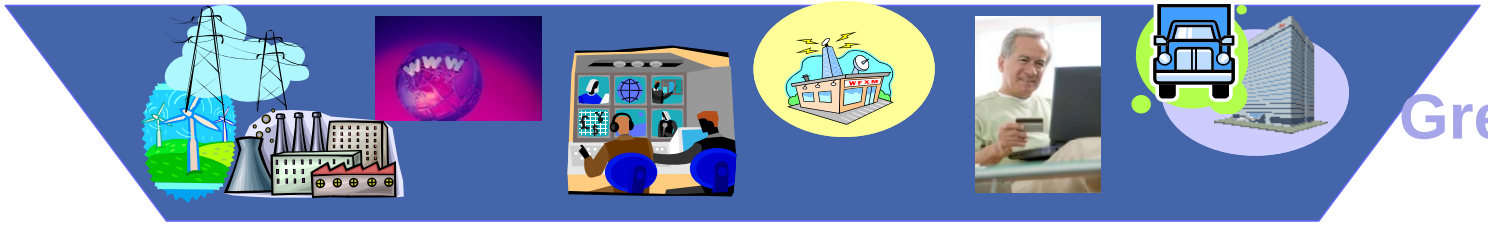
**Green Society – change behaviors**

**Green End Products – smart products use less energy**



**Green Products – make chips that use less energy**

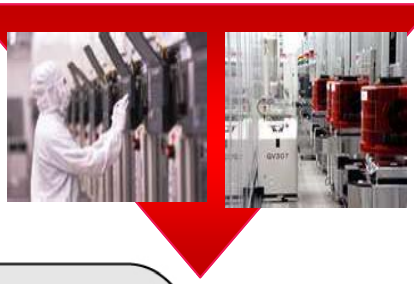
**Green Fab – less energy to make chips**



Green Society

Green
End Products

Green
Products



# Green Fab

# Making semiconductors efficiently

- Semiconductors represent 0.3 of one percent of U.S. electricity demand

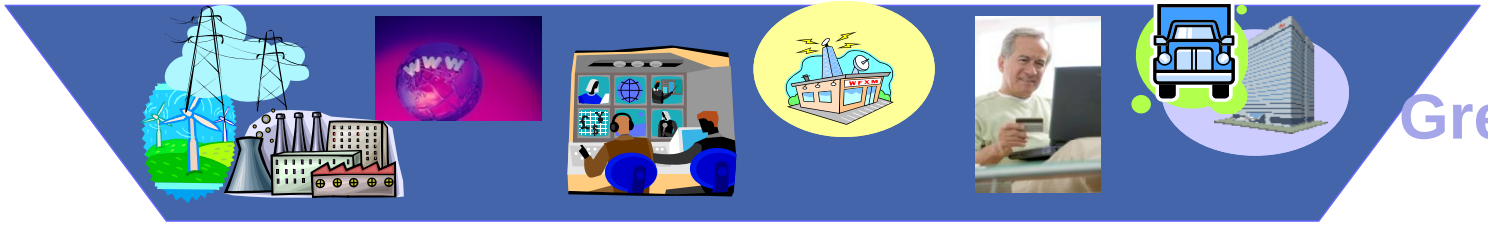
| | |
|---|---|
| **Semiconductor manufacturing** | **11.8 Billion KWHr** |
| **Total Manufacturing** | **891 Billion KWHr** |
| **Total U.S. consumption** | **3,836 Billion KWHr** |

- The World Semiconductor Council agreed to reduce normalized electricity by 30% by 2010 from the baseline of 2001. The 2007 data shows a normalized reduction of electricity of 37.2%.

- SIA has requested that the Green Building Council set LEED standards for Fabs.

*Source: Annual survey of Manufacturers for 2006, DOE Energy Information Administration*





Green Society

Green
End Products

# Green
# Products

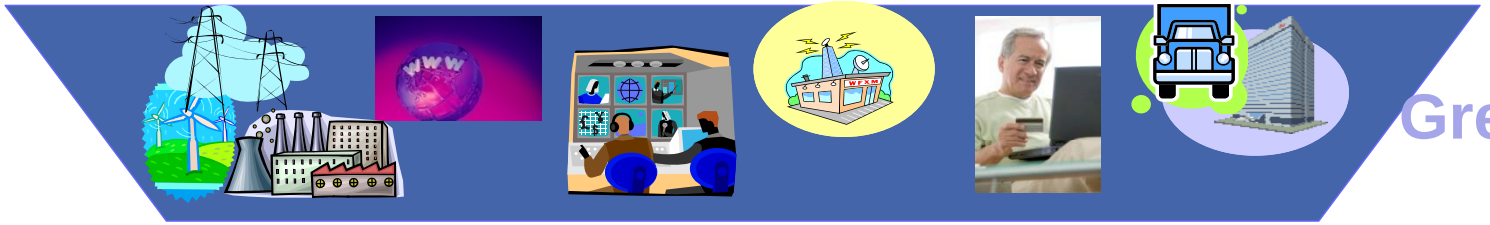
Green Fab

# Semiconductors Have A Good Story To Tell

| | 1978 | 2008 | Energy efficiency improvement |
|---|---|---|---|
| Auto | 14.3 miles per gallon | 20.0 miles per gallon | 40 percent |
| Passenger Airlines | 22.8 revenue passenger miles per gallon | 50.4 revenue passenger miles/gallon | 121 percent |
| Lighting | Incandescent light bulb 13 lumens per watt | Compact fluorescent bulb – 57 lumens/watt | 339 percent |
| Computer Systems | 1,400 instructions per second/watt | 40,000,000 instructions per second/watt | 2,857,000 percent |

Source: Technology CEO Council, "A Smarter Shade of Green", February 6, 2008.






Green Society

# Green End Products

Green Products

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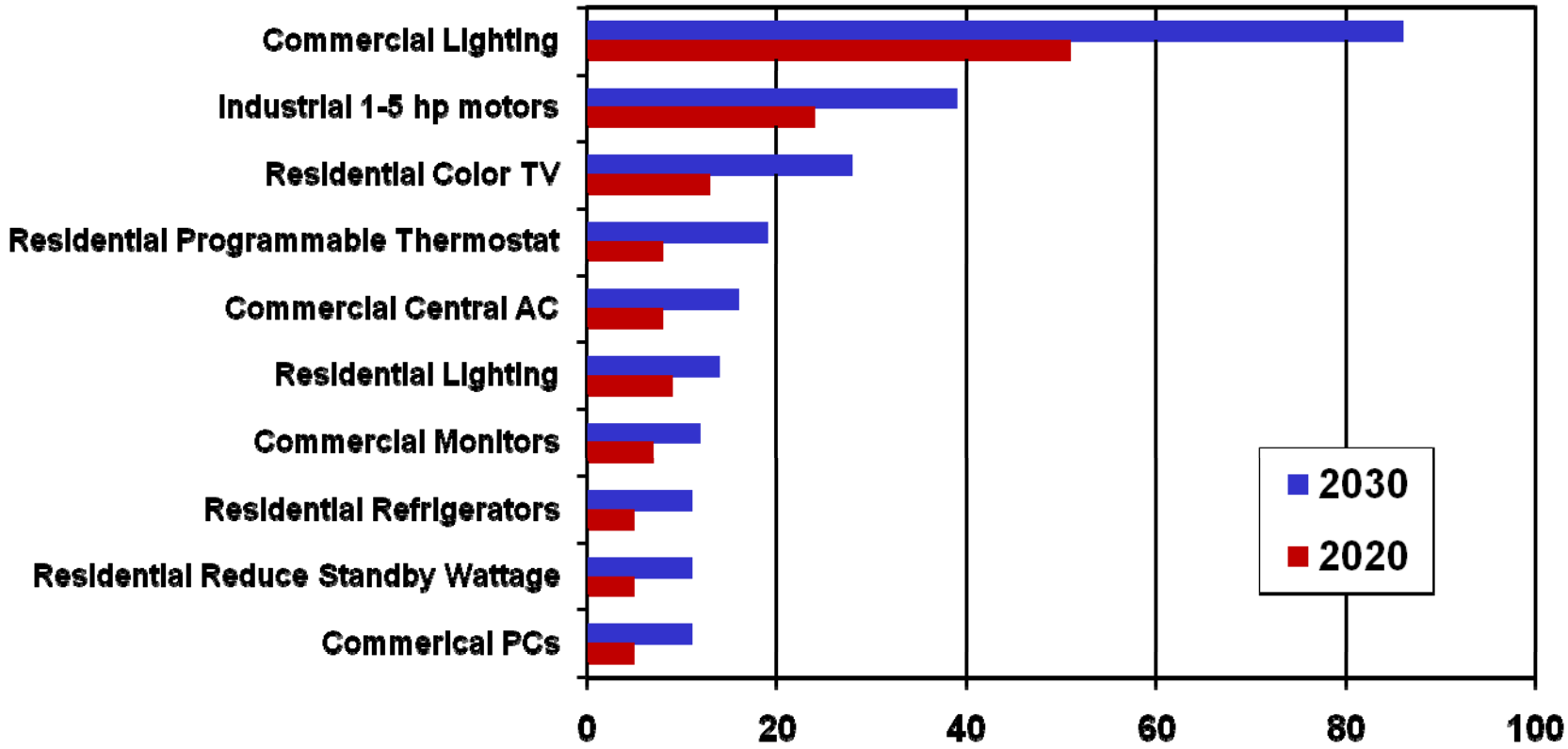
# EPRI Study (2009) Identified Highest Potential Energy Efficiency Opportunities




Source: EPRI "Assessment of Achievable Potential from Energy Efficiency and Demand Response Programs in the U.S. (2010-2030)" 2009.

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# Doing More with Less – Desk Light Example

- Halogen bulb
- 744 lux
- No electronics, just a 60 Hz transformer (weight 1.2 kg, 2.4 lbs)

17.8 Lux/Watt

- LED module
- 795 lux
- 8 W power supply in lamp base

72.9 Lux/Watt

*The LED lamp produces more light than the halogen bulb for ¼ of power !!*

Source: ON Semiconductor

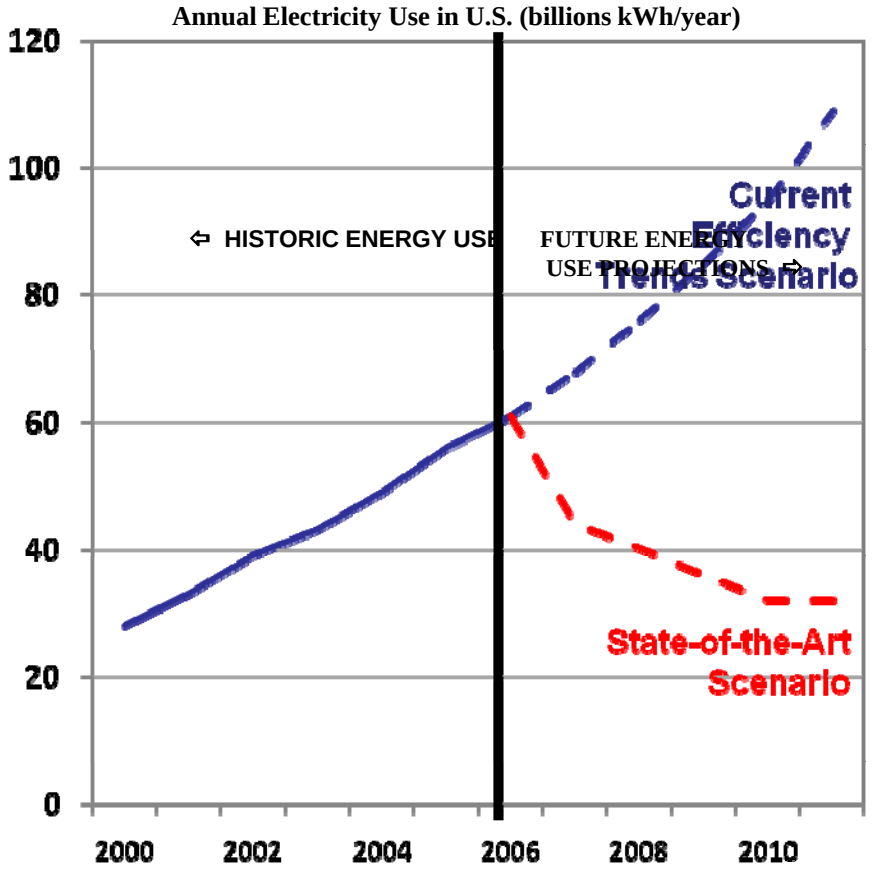


# Doing More with Less – Server/Data Center Example

- In 2006 servers and data centers in the U.S. consumed 61 B Kilowatt hours, double the amount consumed in 2000.
  - This represents 1.5 percent of total U.S. electricity consumption.

- Under current efficiency trends, U.S. energy consumption by servers and data centers could nearly double again in five years.

<u>Aggressive actions on Servers and Data Centers can have dramatic results</u>




US Environmental Protection Agency, "Report to Congress on Server and Data Center Energy Efficiency Public Law 109-431", August 2, 2007

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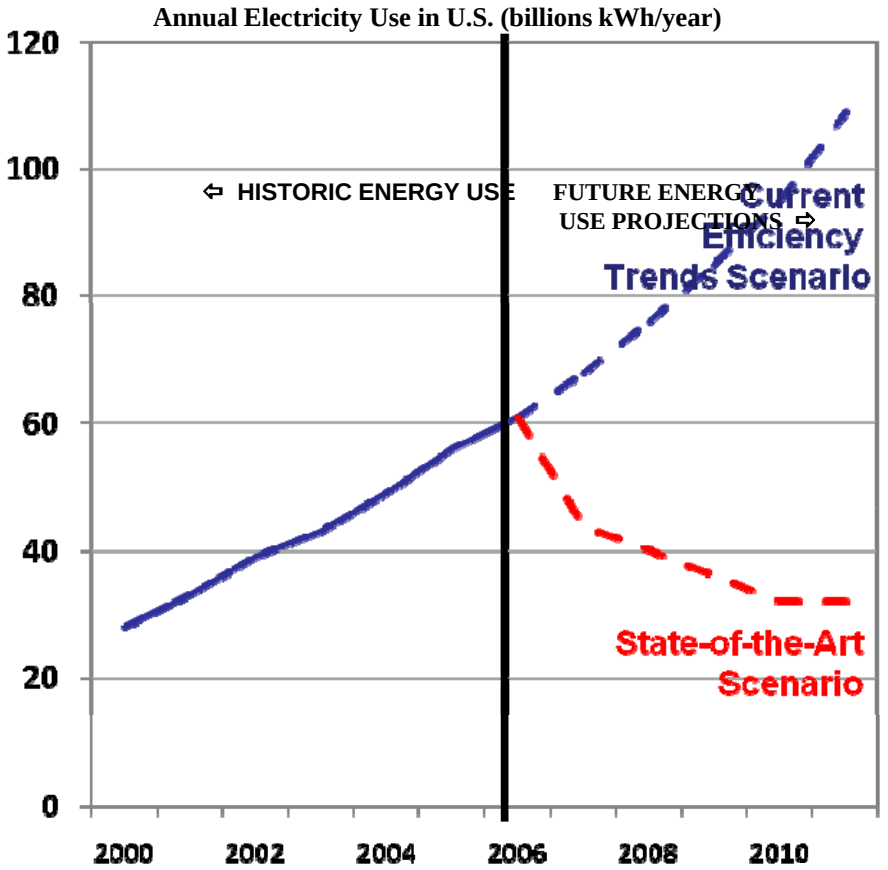
# Doing More with Less – Server/Data Center Example

- Energy consumption can be reduced by adopting state of the art technologies such as:
  - Aggressively adopt “energy efficient” servers.
  - Up to 80% improvement in efficiency of chillers, fans, pumps, and use of direct liquid cooling.
  - Enable power management at data center level of applications, servers, and equipment for networking and storage.




US Environmental Protection Agency, “Report to Congress on Server and Data Center Energy Efficiency Public Law 109-431”, August 2, 2007

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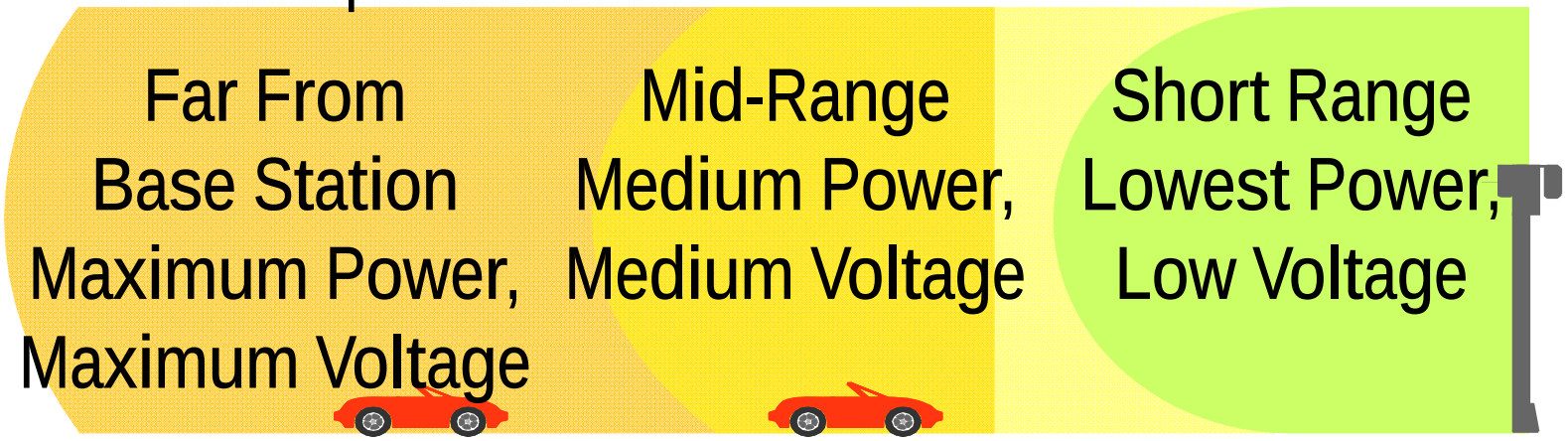
## Doing More with Less - Power Management Example

- Chip-Level Power Management
  - Idle, Standby, Halt Modes
  - Adaptive Voltage Scaling
- System Level Power Management
  - Peripheral shutdown
  - Reduced Power Modes

Example: Mobile receivers

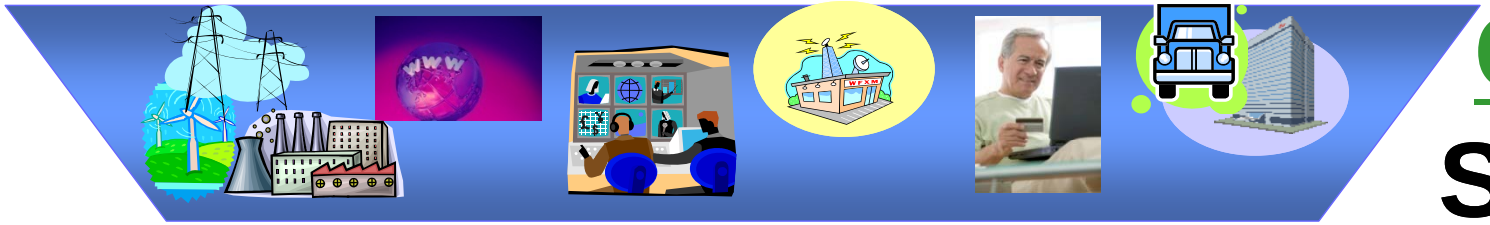


# Enabling Alternatives

- Semiconductors are an enabling technology for solar photovoltaic panels and wind turbines.
- Photovoltaic cells are a semiconductor technology.
- Semiconductors convert the DC power generated by solar and wind to the AC power used in most grids.
- Semiconductors can improve the efficiency of renewable energy. For example, solar panels are only as efficient as their weakest link, so clouds, dirt, tree shadows, and even bird droppings can greatly degrade panels' efficiency. Semiconductors can over-come this problem by allowing each part of a solar panel array to contribute power independently.







# Green Society

Green
End Products

Green
Products

Green Fab

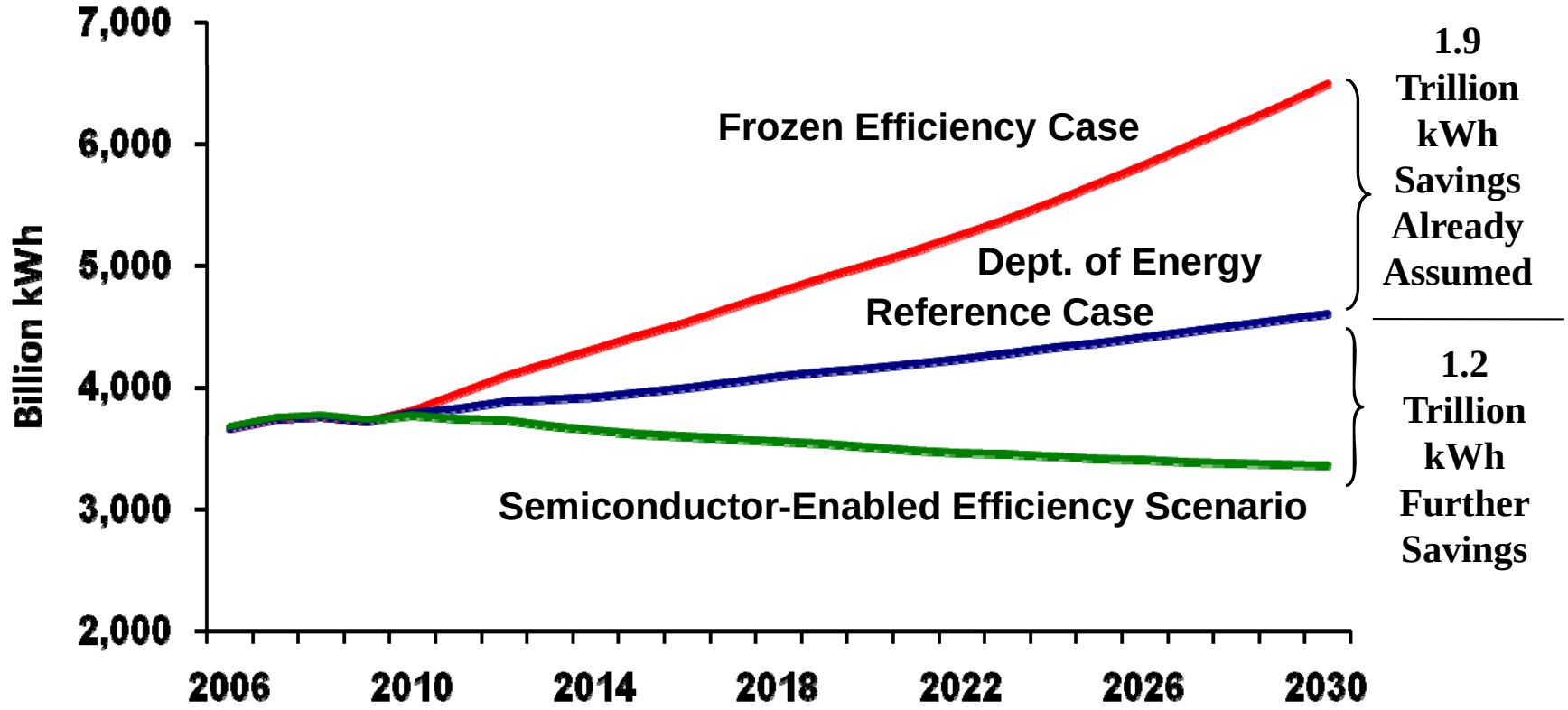
# Semiconductors enable energy savings through telecommuting

- An average U.S. telecommuter lives 22 miles from work. One person telecommuting just one day:
  - Saves 1.4 gallons of gasoline, the equivalent of up to 12 hours of an average household's electricity use, and
  - reduces CO2 emissions by 17 to 23 kilograms per day
- The 3.9 million telecommuters in the U.S. reduced gasoline consumption by about 840 million gallons
- This reduces curbing CO2 emissions by nearly 14 million tons, an amount equal to removing 2 million vehicles from the road every year.

*Source: Consumer Electronics Association (CEA) "The Energy and Greenhouse Gas Emissions Impact of Telecommuting and e-Commerce;" September, 2007.*



# Semiconductor Efficiencies can Save 1.2 Trillion KWH --




Source: American Council for an Energy Efficient Economy study

*Accelerated investments in semiconductor-related technologies stimulated by smart policies





# ACEEE Study – What does 1.2 Trillion KWhr savings in 2030 mean?

- **22% less electricity consumed than the reference case, and 11% less than today, even though the economy will be about 70 percent larger**

- **733 Million Metric Tons less CO2 emitted in 2030**

  - Even more when semiconductor enabled renewable energy (solar, wind) are included.





# ACEEE Study – What does 1.2 Trillion KWhr savings in 2030 mean?

- **296 plants (600 Megawatt) that are not built by 2030**
- **$126 B electric bill savings to consumers and businesses in 2030, and $1.3 Trillion in savings cumulative from 2010-2030**





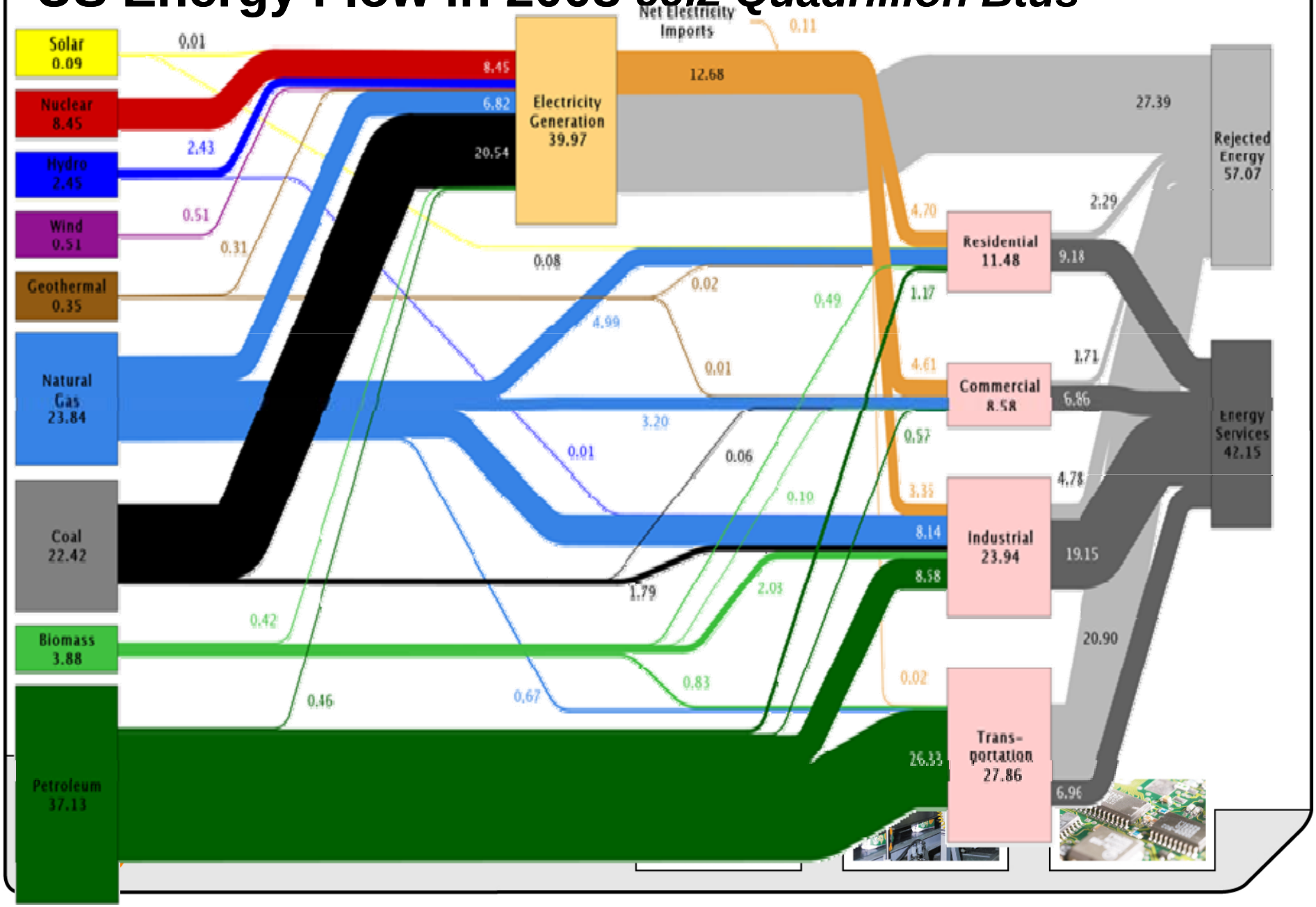
# Policy Opportunities

- Standards
  - Voluntary (energy star) or Mandatory performance standards
  - Technical standards (smart grid)
- Utilities
  - Decouple profits from consumption
  - Set requirements for efficiency and renewables.
- Financial Incentives
  - Tax, grants,
- Awareness
  - Best in class appliances
- Federal Procurement
- Research Programs
- Smart Grid
  - Electric vehicle integration



*Source: Lawrence Livermore National Laboratory; https://publicaffairs.llnl.gov/news/energy/energy.html*

# US Energy Flow in 2008 *99.2 Quadrillion Btus*



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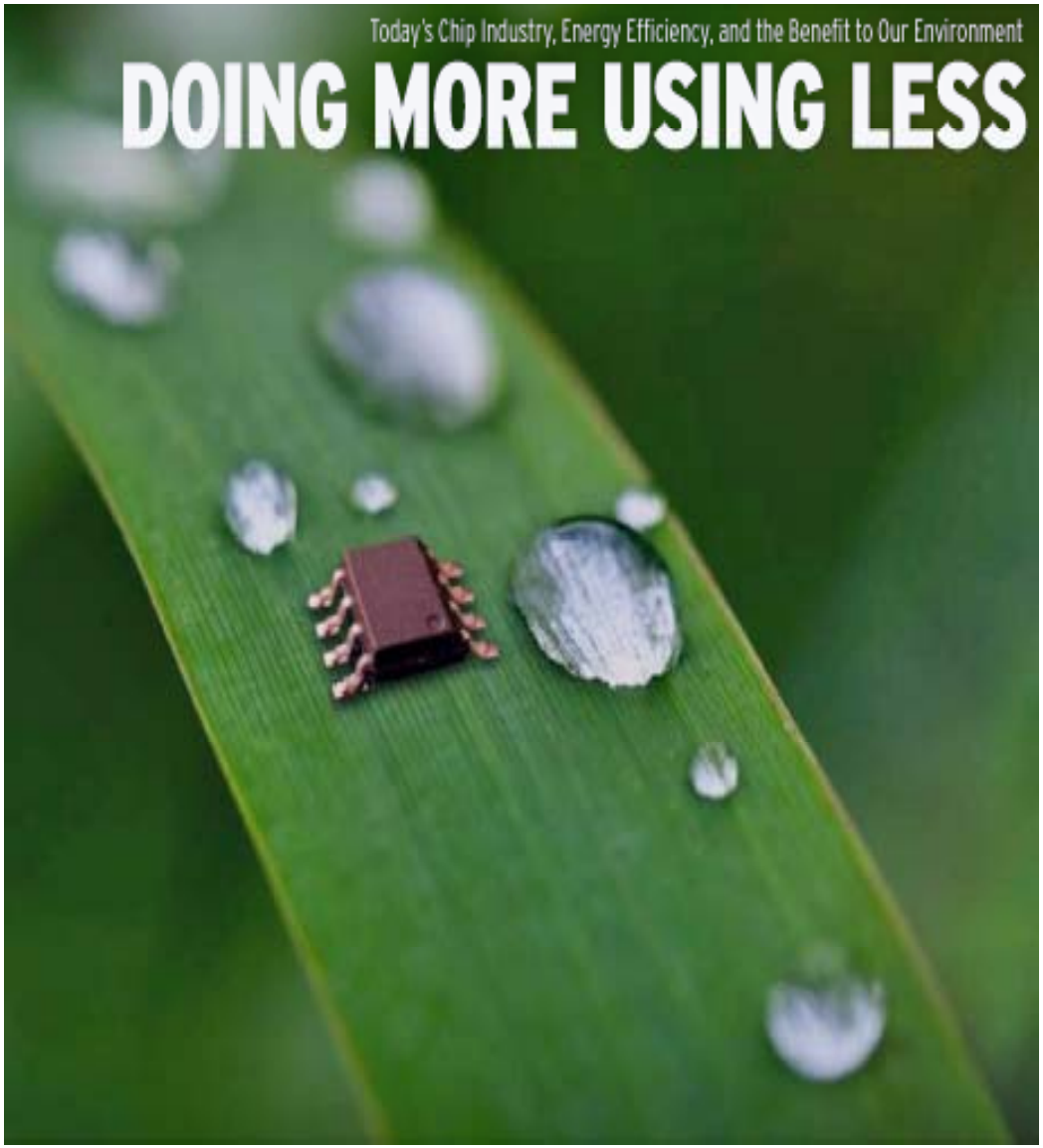
Questions?



**Waxman-Markey legislation creates market opportunities – utility level:**

- Sets requirements for utilities to meet a specified percentage of needs from efficiency and renewables.
- Requires utilities to plan for electric vehicles infrastructure.
- Establishes assessment of appliances for smart grid, provides for smart grid capability labels on appliances, and includes smart grid to the Energy Star program and rebates.



## Waxman-Markey legislation creates market opportunities – lighting and appliances:

- Establishes new lighting efficiency standards
- Requires an assessment of motor systems leading to a program to increase awareness of motor energy savings opportunities.
- Allows energy conservation standards to include “one or more” performance standards. Had this provision been in effect, last month’s vending machine standard could have required both a maximum daily energy use *and* a semiconductor smart control requirement.
- Establishes best in class appliance program
- Requires that each Federal agency create an implementation strategy to purchase energy efficient information and communication technologies and practices.





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**October 9:** **Sustaining Technical Programs**

**November 13:** **Nanotechnology in the Classroom**

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