# Emerging Green Conference
# Hidden Carbon Hot Spots Session

## *Introduction and Opportunities for Energy Management in the Electronics Industry*

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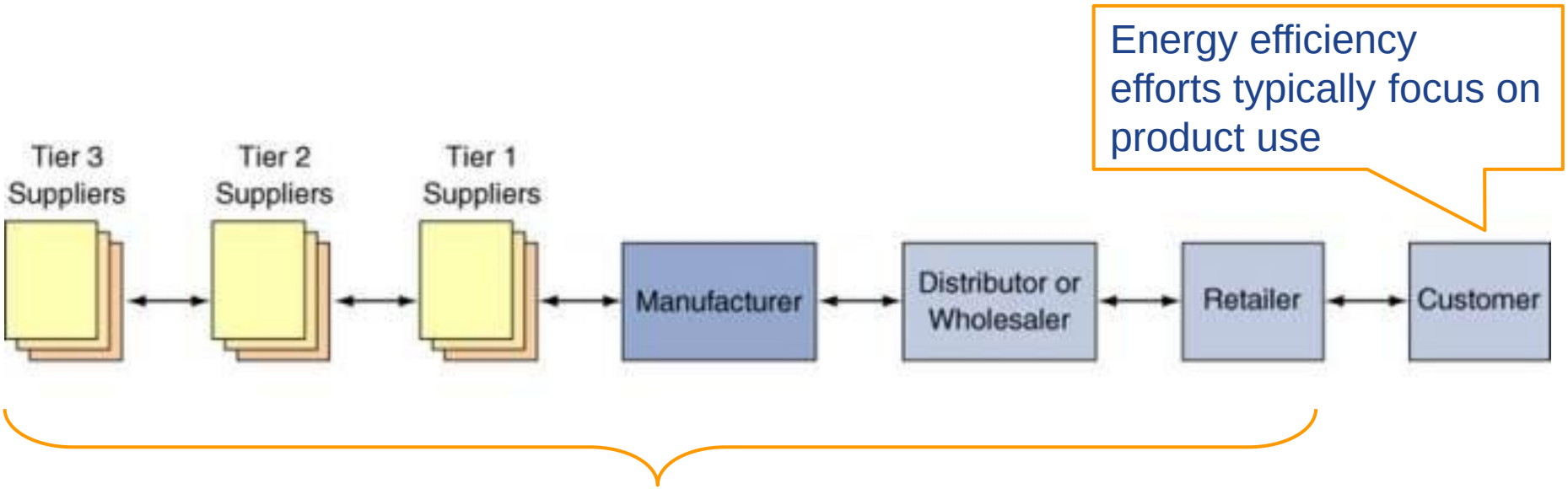
# Emerging Green Conference
# Hidden Carbon Hot Spots session

- Importance of examining the total supply chain
- Example life cycle analysis
- DOE project to assess the global electronic supply chain
- Energy efficiency and energy management to reduce carbon along supply chain
- Superior Energy Performance® program

# Importance of Examining the Total Supply Chain




- Energy consumption required for raw materials extraction, Tier 1-3 suppliers, OEM manufacturing processes, distribution, and transportation also contribute to a product's energy and carbon footprint.

- These areas represent critical opportunities for the electronics industry to reduce carbon emissions, improve energy efficiency, and respond to customer demands for greater sustainability.

# Example Life Cycle Analysis: Apple iPhone 6s

## Greenhouse Gas Emissions for the Apple iPhone 6s

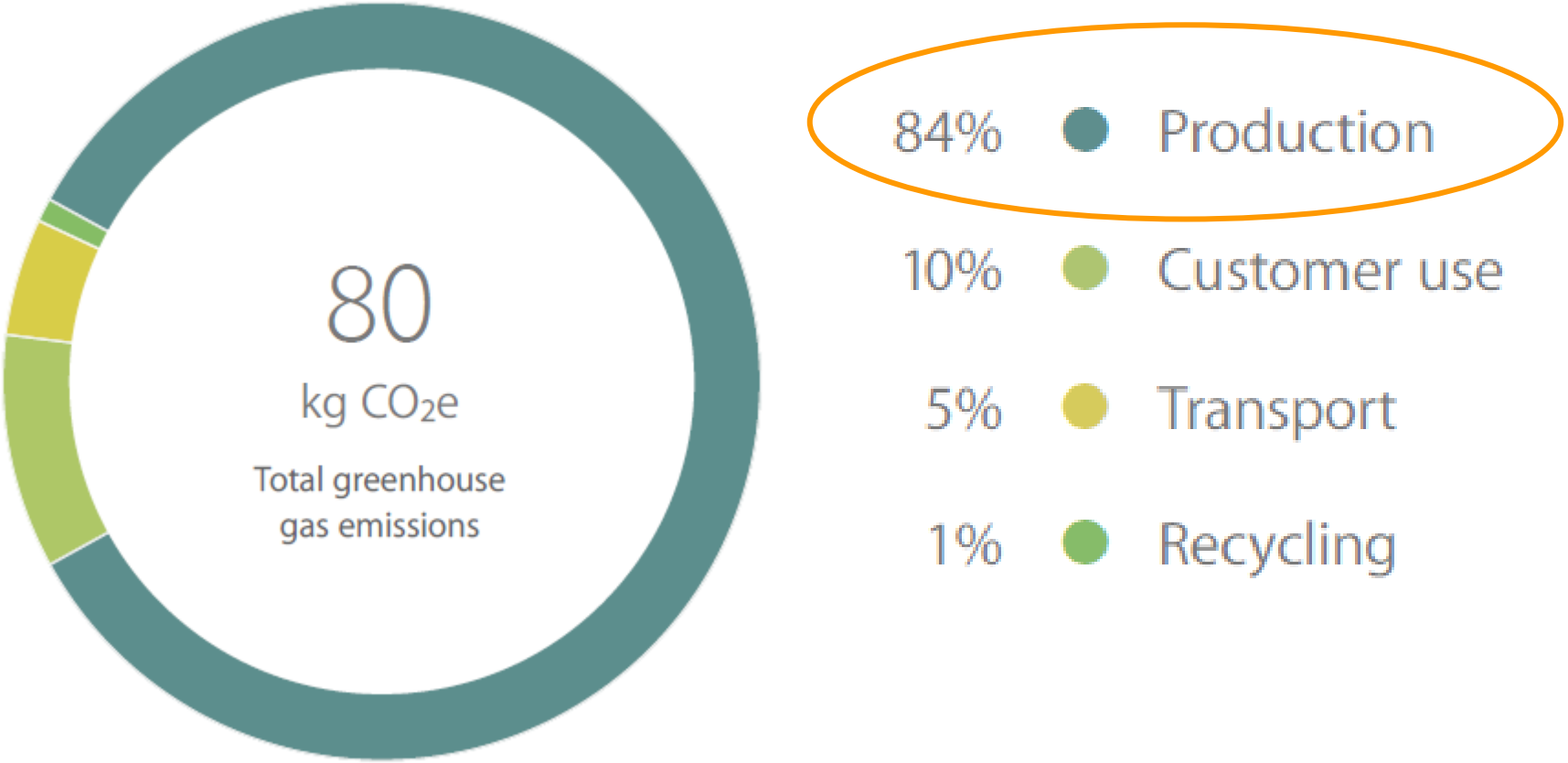





Image and data from Apple: http://images.apple.com/environment/pdf/products/iphone/iPhone6s_PER_sept2015.pdf

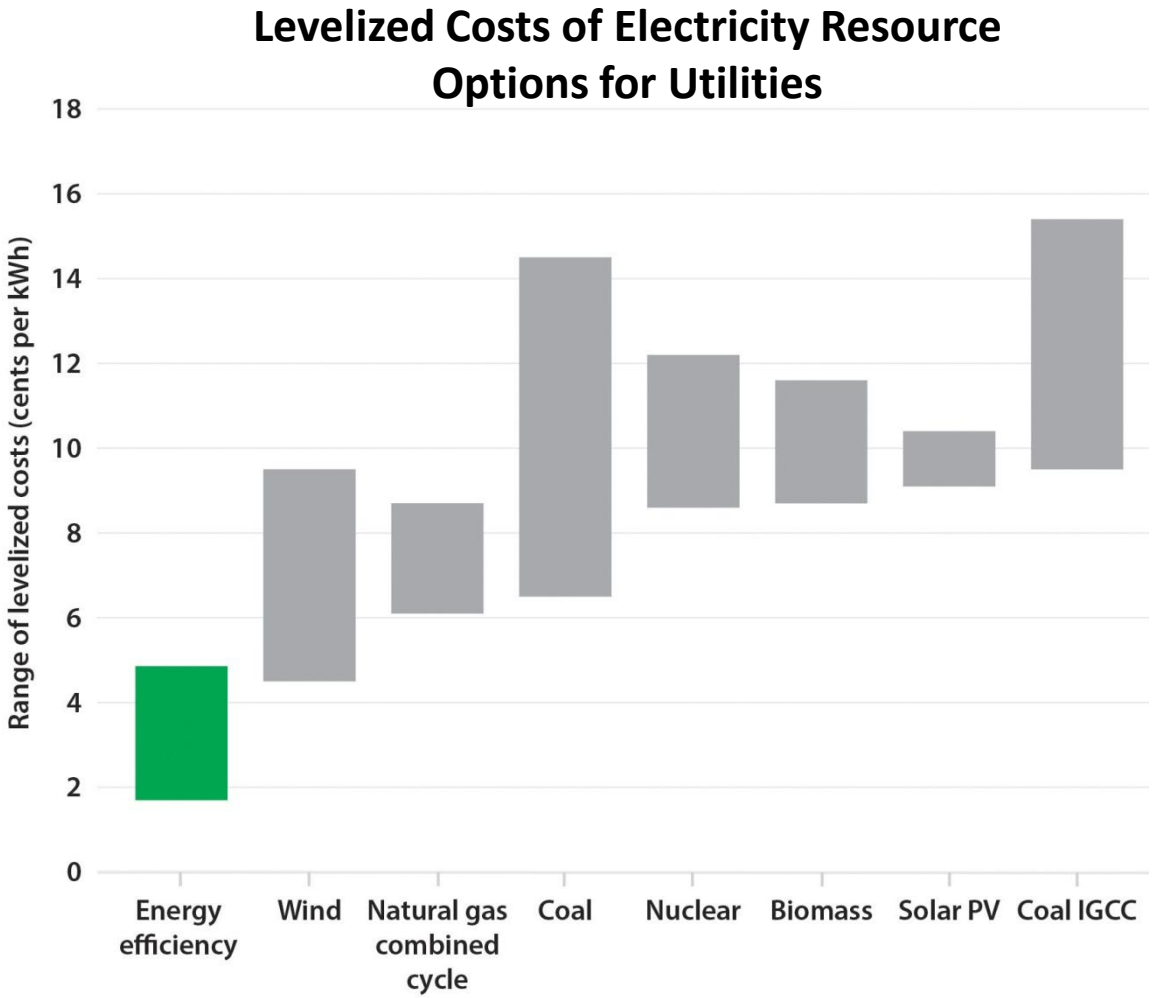
# Energy and Carbon Assessment of the Global Electronic Supply Chain

- **Sponsors**: U.S. Department of Energy, potentially other federal agencies, and NGOs
- **Purpose**: Understand the energy and carbon footprint implications for certain key electronics products (TBD)
  - Describe life cycle analysis of key products.
  - Identify carbon hotspots for key products and the potential growth of these hotspots.
    - Public and private stakeholders for improving carbon hotspots
    - Research and development opportunities
  - Explore implications of on-shoring manufacturing back to the United States: economic trade, energy and environmental implications
- **Status:** scope and approach of study still evolving.
- **Partners sought**

# Energy Efficiency: Cost-Effective Carbon Reduction

**Energy efficiency is more cost-effective than other clean energy alternatives.**

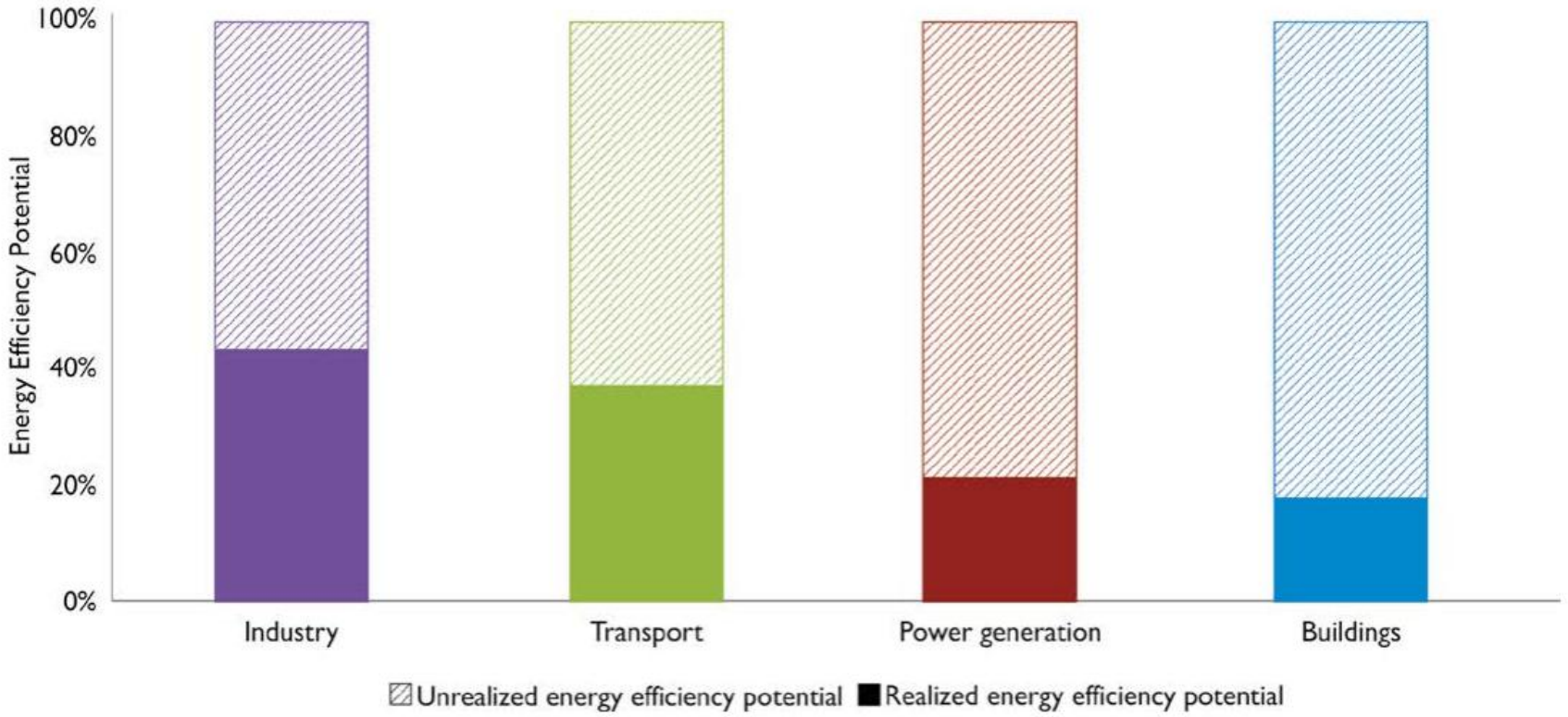
Energy efficiency is the least-cost resource option to reduce carbon emissions, compared to other clean energy alternatives




Source: American Council for an Energy-Efficient Economy, The Best Value for America's Energy Dollar: A National Review of the Cost of Utility Energy Efficiency Programs, 2014. /research-report/u1402

# Despite Significant Benefits of Energy Efficiency…Lots of Untapped Potential

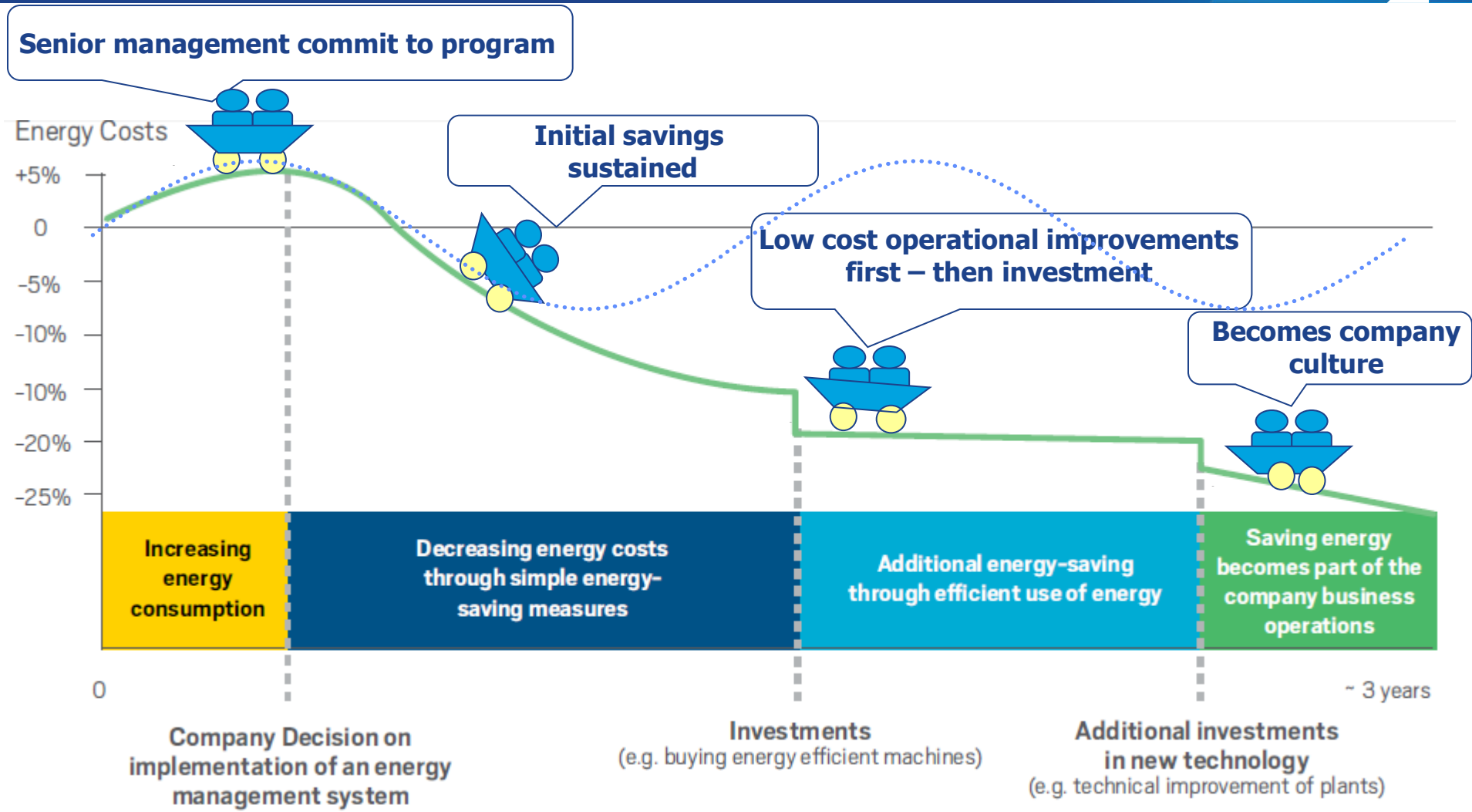
Source: World Energy Outlook, IEA 2012



# Ad hoc Approach to Energy Efficiency


Source: UNIDO 2010

# Structured Approach to Energy Management



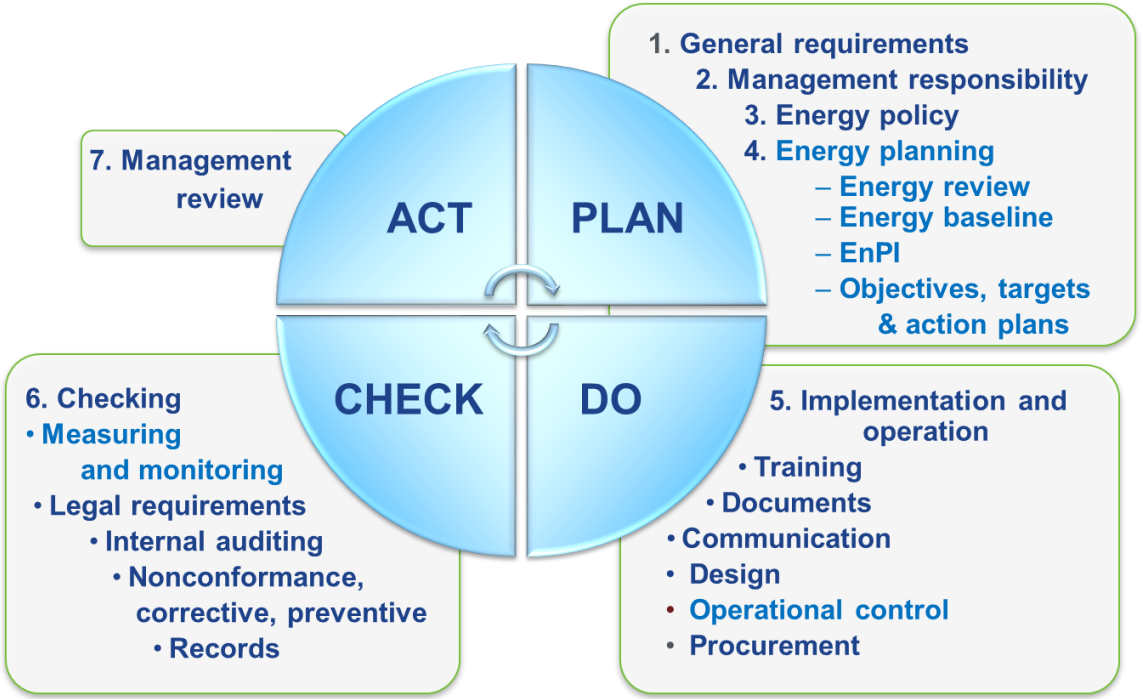

Source: Kahlenborn et al. (2012), based on Lackner & Holanek (2007)

# ISO 50001–Energy Management Systems (EnMS)

International standard that draws from **best practices around the world**. Developed with input from 56 countries, many countries now adopting it as a national standard.

ISO 50001 specifies requirements for establishing, implementing, maintaining and improving an EnMS.

***ISO 50001 is compatible with ISO 14001 with a more detailed energy focus.***




Light blue text represents new data-driven sections in ISO 50001 that are not in ISO 9001 & ISO 14001

# Superior Energy Performance® (SEP™)

SEP is a DOE certification program that verifies energy management excellence and sustained energy savings.

**SEP is ISO 50001 plus:**

- **Deeper, sustained savings at less cost** through robust tracking and measurement with advanced tools
- **Credible, third-party verification** by ANSI-ANAB accredited entity that market can reward supply chains, utilities, and carbon trading
- **National recognition** by U.S. DOE identifying sustainability leaders

iStock photo: 16418416

# SEP Requirements

SEP certification requires industrial facilities and commercial buildings to meet the ISO 50001 standard and improve energy performance.

## Superior Energy Performance

**ISO 50001 certification**

**Verified energy performance improvement**

| Silver | Gold | Platinum |
|---|---|---|
| **5%** energy performance improvement over 3 years | **10%** energy performance improvement over 3 years | **15%** energy performance improvement over 3 years |
| -or- | -or- | -or- |
| 15% energy performance improvement over 10 years + **30** Best Practice Scorecard points | 15% energy performance improvement over 10 years + **61** Best Practice Scorecard points | 15% energy performance improvement over 10 years + **81** Best Practice Scorecard points |

# SEP Certified Facilities
## and Verified Energy Performance Improvement

Improvement over 3 years unless stated otherwise

| | | |
|---|---|---|
| Schneider Electric | Saanichton, BC Canada | 30.6% |
| | Smyrna, TN | 23.1% |
| | Clovis, CA | 16.7% |
| | Seneca, SC | 15.6% |
| | Hopkins, SC | 10.2% |
| | Tijuana, Mexico | 10.2% |
| | Peru, IN | 24.9% over 10 years |
| | Cedar Rapids, IA | 8.8% |
| | Lexington, KY | 6.9% |
| | Lincoln, NE | 6.5% |
| | Rojo Gomez, Mexico | 5.9% |
| VOLVO | Mack Trucks, Macungie, PA | 41.9% over 10 years |
| | Dublin, VA | 28.4% over 10 years |
| | Hagerstown, MD | 20.9% |
| 3M | Brockville, Ontario Canada | 21.4% over 7 years |
| | Cordova, IL | 5.6% |
| NISSAN | Smyrna, TN | 17.7% |
| HARBEC | Ontario, NY | 16.5% |
| Cummins | Whitakers, NC | 12.6% |
| Coca-Cola | Dunedin, FL | 12.2% |
| GENERAL DYNAMICS | Scranton, PA | 11.9% |
| COOPERTIRES | Texarkana, AR | 10.1% |
| BRIDGESTONE Your Journey, Our Passion | Wilson, NC | 16.8% over 10 years |
| OLAM | Gilroy, CA | 9.8% |
| MedImmune A member of the AstraZeneca Group | Gaithersburg, MD | 8.5% |
| CURTISS WRIGHT | Cheswick, PA | 7.6% |
| LAND O'LAKES | Carlisle, PA | 5.7% |

Last updated: September 1, 2015



SEP Measurement & Verification Protocol provides robust methodology to track and verify energy performance improvement.

# Savings: Cost-effective, deeper, credible

## Deeper, more rapid savings at less cost

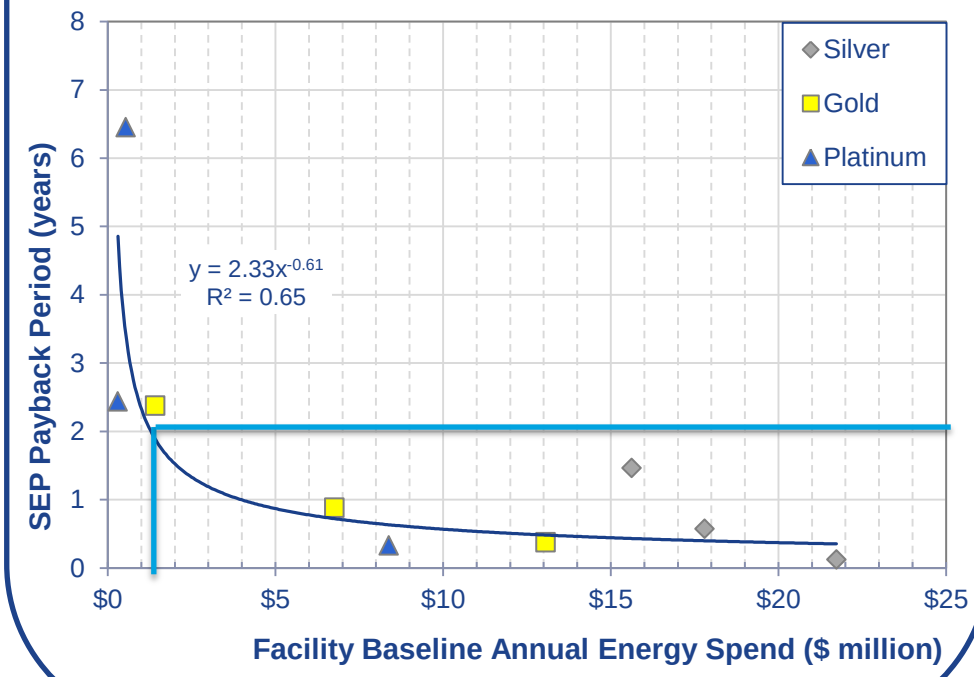
- 2015 study of 10 SEP-certified facilities
  - 12% reduction in energy costs within 15 months of starting to implement SEP, on average
  - Saved over **$430,000/year** on average from **low/no cost operational improvements**

## Credible, third-party verification

- Valuable data and analysis for **higher confidence in energy efficiency investments**

**Payback:**

Less than 2 year payback for facility with a baseline annual energy spend greater than $1M






**Replicate results** across company's facility and buildings nationally and internationally

# SEP and Standards for Electronics

DOE is working with multi-stakeholder standard development working groups to consider incorporation of SEP through OEM partnerships with one or more supplier.

**Product sustainability standards**

- NSF 426 – Data center servers
  - An optional criterion allows servers to earn 1-2 points if one or more suppliers earn SEP certification. *In working draft.*
- UL 110 – Mobile phones
- IEEE 1680.1 – Computers and displays

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