



American Council for an Energy-Efficient Economy

# Energy Efficiency in Policy and Markets

**R. Neal Elliott, Ph.D., P.E.**

Associate Director for Research

ACEEE

March 5, 2008

# The American Council for an Energy-Efficient Economy (ACEEE)

30 year old, non-profit 501(c)(3) dedicated to advancing energy efficiency through research and dissemination.

35+ staff in Washington DC, + field offices in DE, MI, WA and WI.

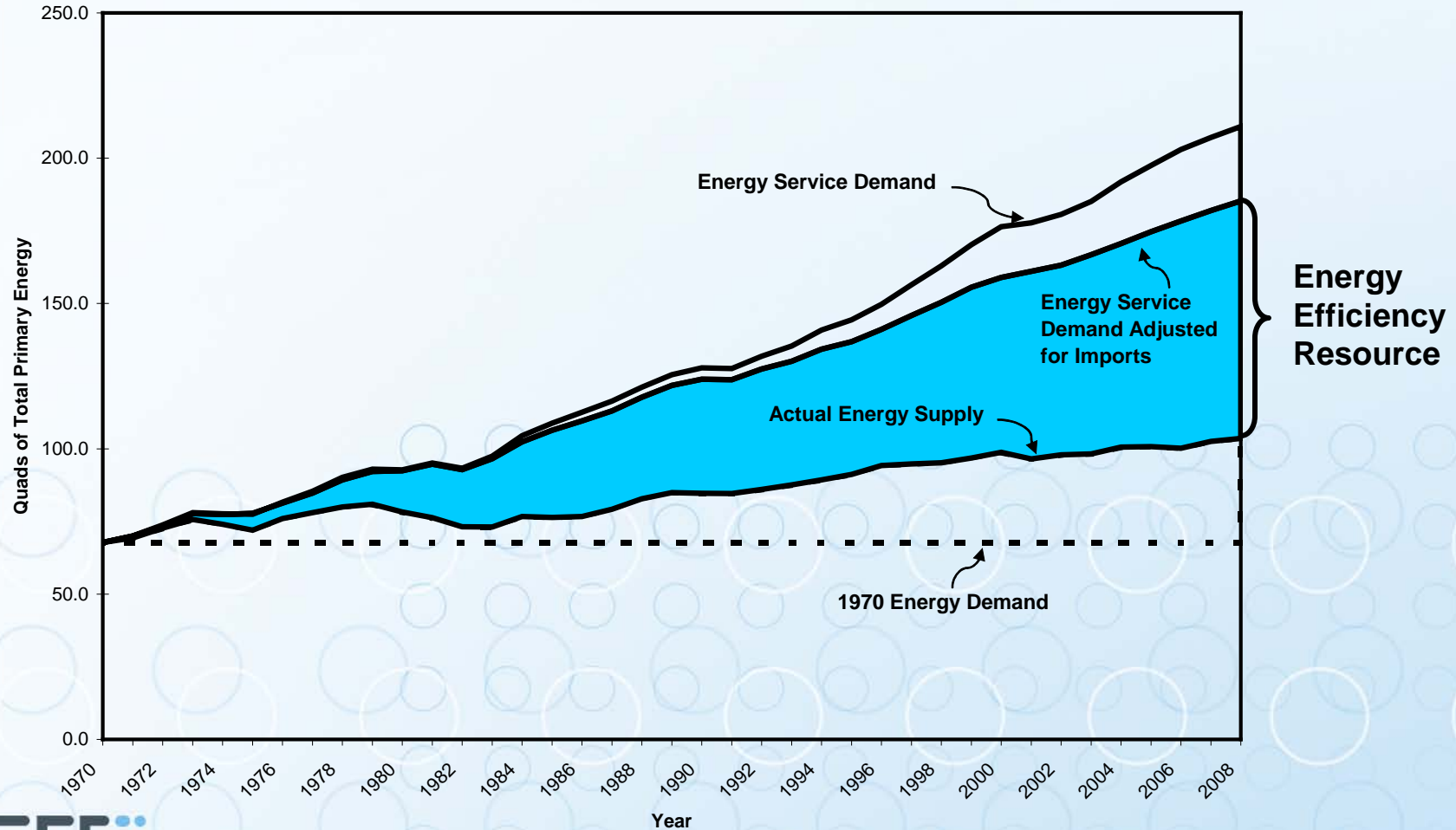
Focus on End-Use Efficiency in Industry, Buildings, Utilities, and Transportation; Economic Analysis & Human Behavior; and State & National Policy

Funding:

- Foundations (34%)
- Federal & State Grants (7%)
- Specific Contract work (21%)
- Conferences and Publications (34%)
- Contributions and Other (4%)

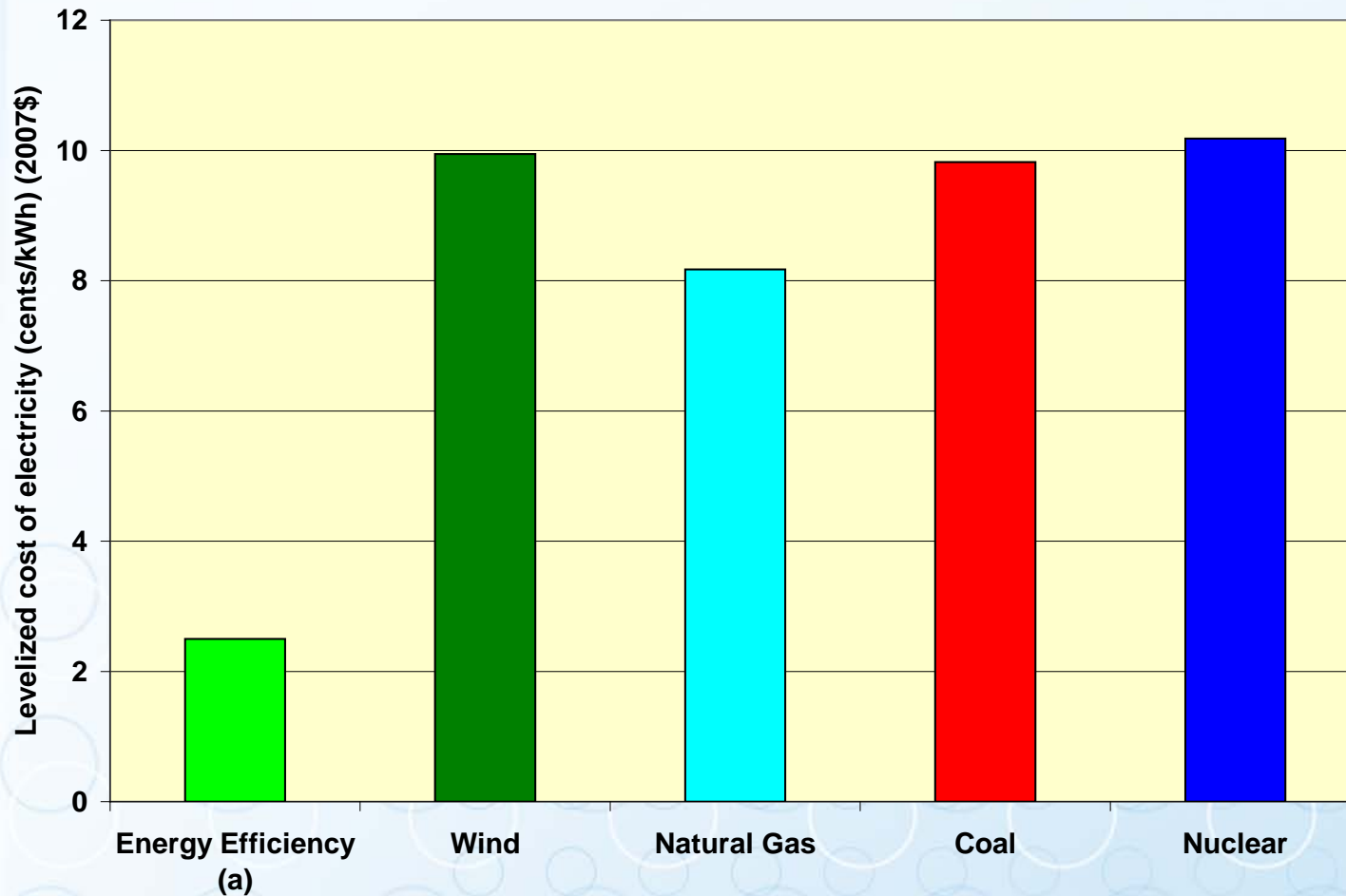
# Energy Efficiency's Past Role in Meeting US Energy Needs:

## U.S. Energy Use in Relation to GDP 1970-2008



# Why Energy Efficiency?

## Average Cost of New Electric Resources





# Energy Market Outlook— Cloudy with Volatile Prices

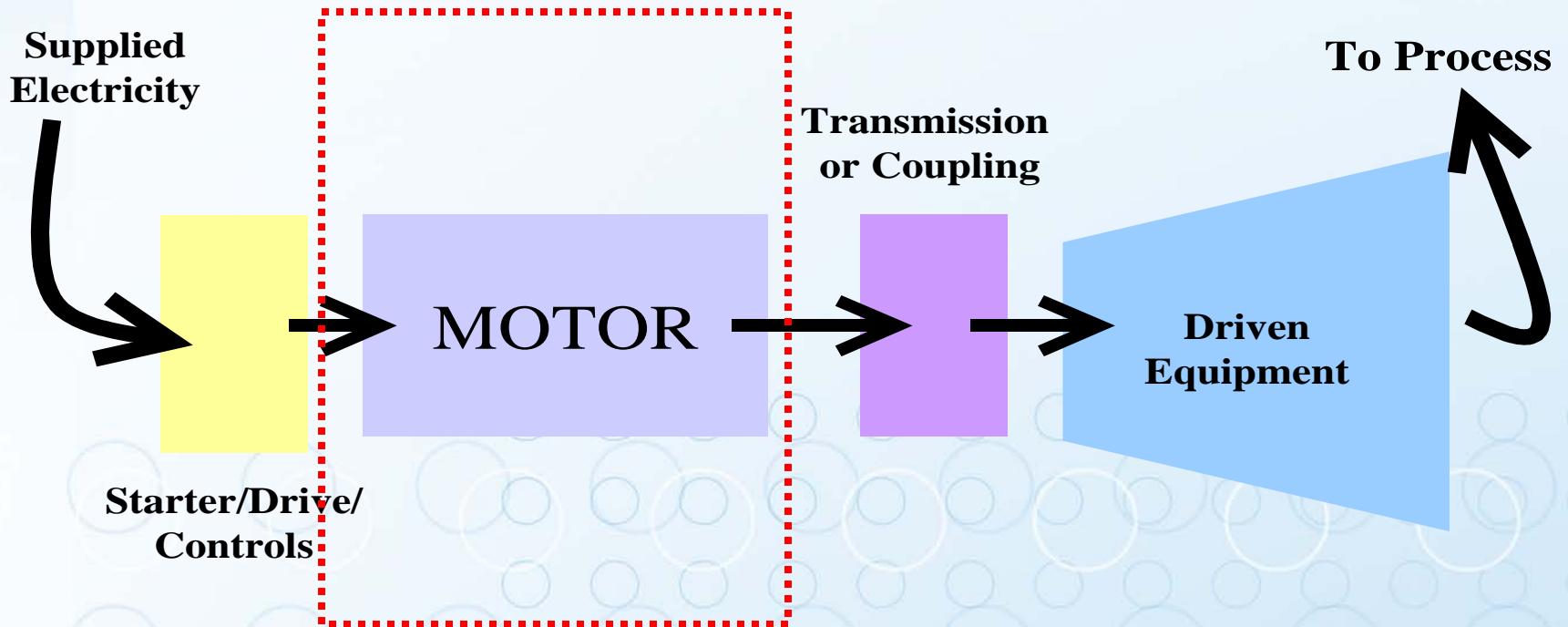
- Tight resource supply markets still exist
- Current low prices result from recession
- Shale gas available but how much at what price?
- Uncertainty in cost for Nuclear
- Renewables limited by manufacturing capacity and project formation capacity
- Energy markets will be driven by global forces – China and India



# Motor Systems & Energy Efficiency

- Electricity consumption by motor systems:
  - Half of U.S. total
  - 68+% in manufacturing
- Motors key to many EE opportunities—HVAC, industrial process, alt-energy
- Motor efficiency standards & regulations an EE success story

# Motor Systems



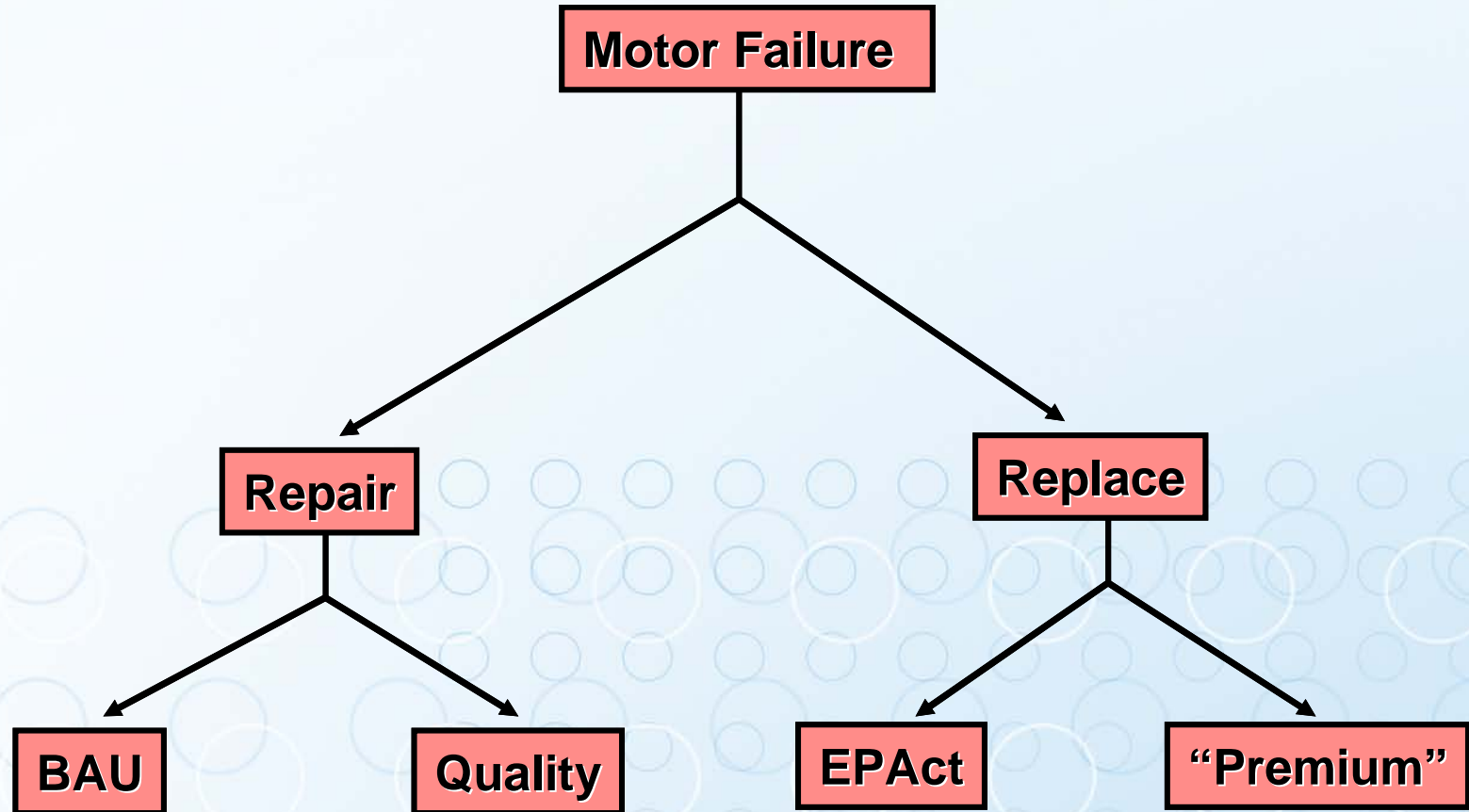
# History of Motor Efficiency Standards & Regulations

- 1987—NEMA introduces the *Energy Efficient* label for integral poly-phase—CSA follows suite
- 1988-1990—IEL and CEA undertake motor testing activities
- 1992—Congress enacts 1-200hp motor standards as part of *EPAct* based on NEMA MG-1
- 1994—Canada harmonizes standards with US
- 1996—CEE advances a more efficient level and DOE begins small motor rule proceeding
- 1998—DOE issues *EPAct Motor Rule*

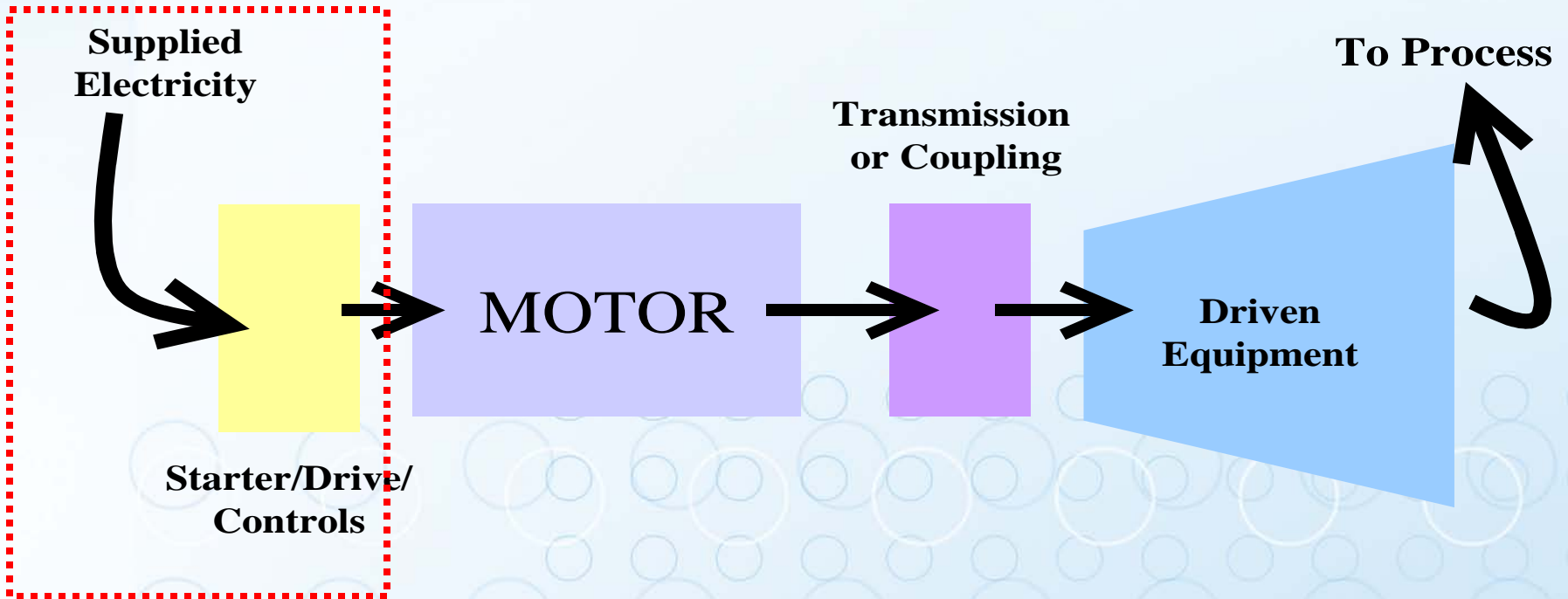
# History Continues

- 2000—NEMA establishes *NEMA Premium* label for 1-500hp—working w/ CEE launches *MDM*
- 2007—Congress enacts expanded motor standards as part of EISA—embraces *NEMA Premium* to 1-200hp and *EE* to 201-500hp
- 2010—DOE issues small motor rule
- Where can we go from here??—all *Premium*?
- *Advanced Motors?*

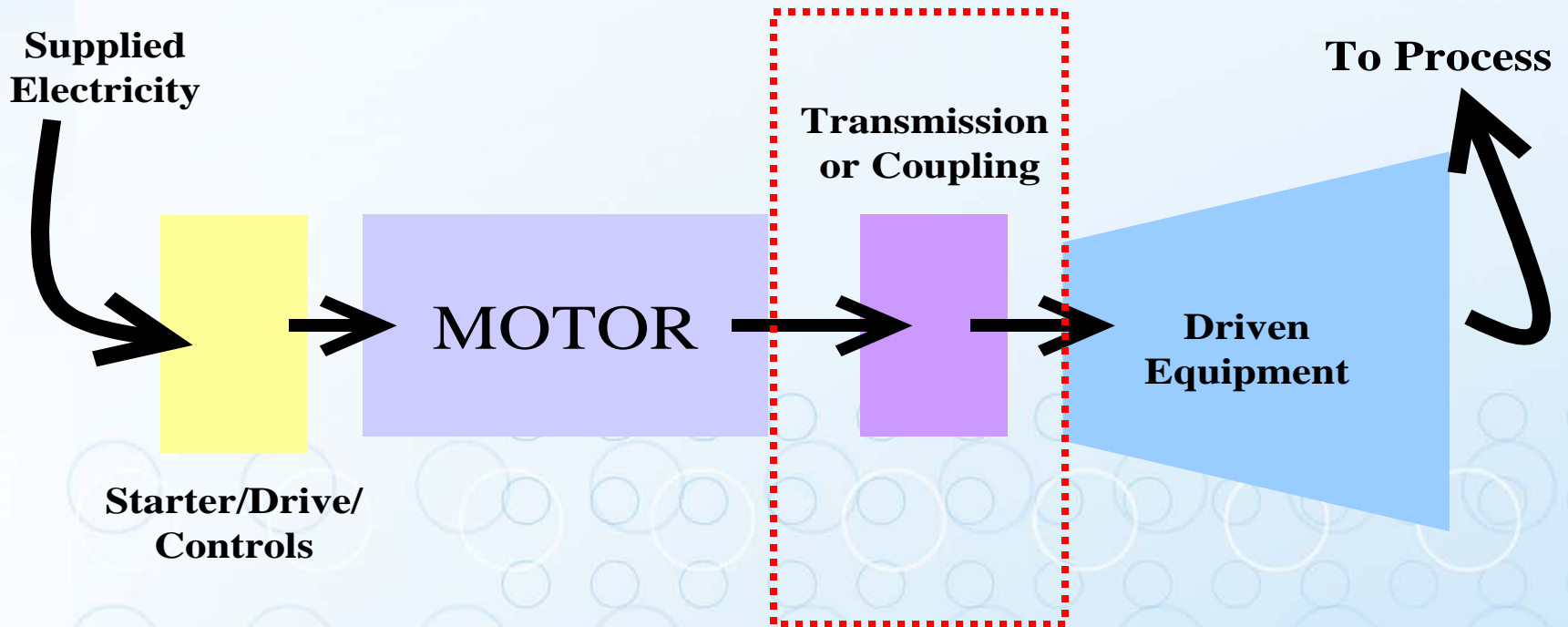
# Motor Decisions Matter – about making the *Right* decision



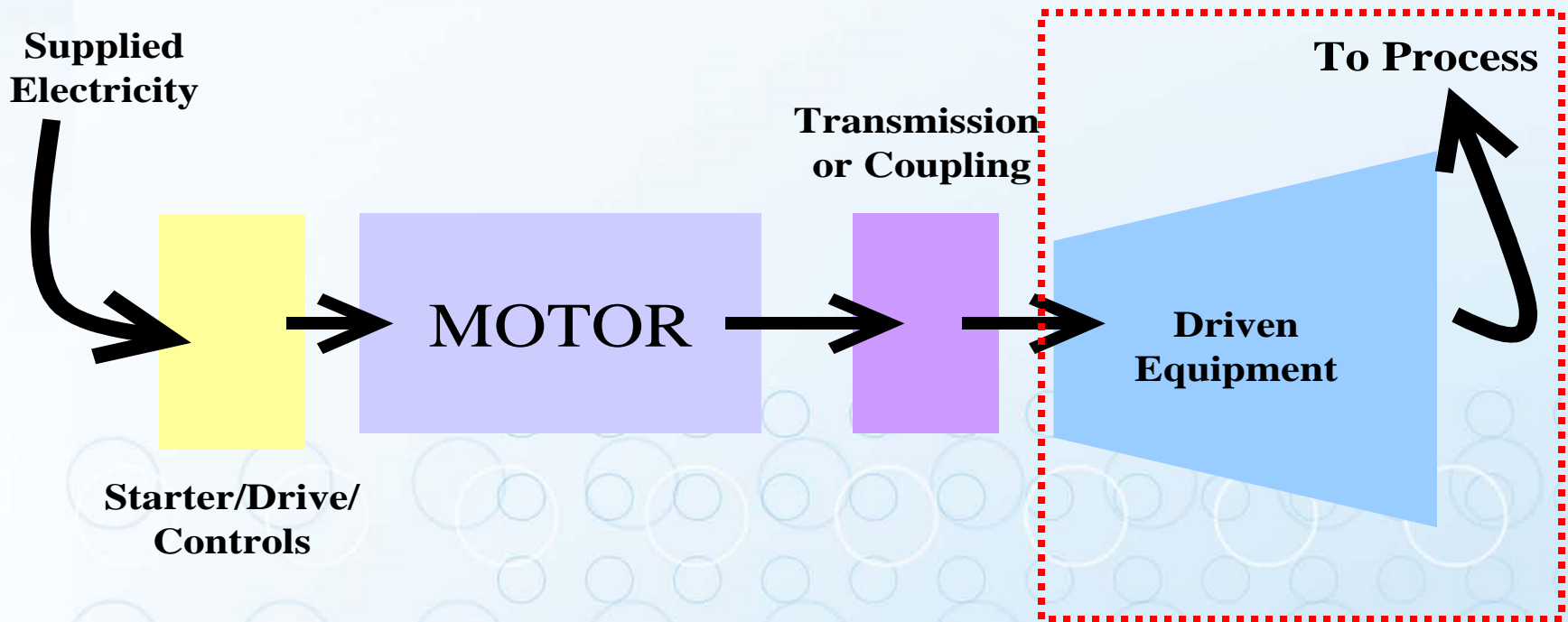
# Motor Systems Opportunities— Electric Supply & Conditioning



# Motor Systems Opportunities— Power Transmission



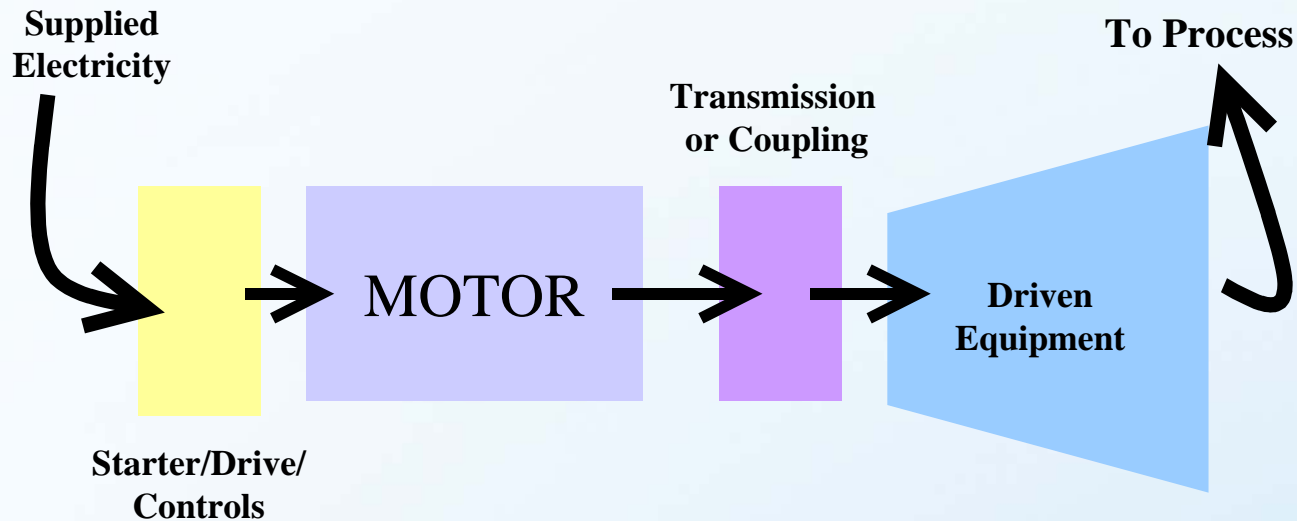
# Motor Systems Opportunities— Process Optimization & Right-Sizing



# System Opportunities

- Know your actual loads
  - remember the affinity law for pumps, fans & compressors: power  $\sim$  speed<sup>3</sup>
  - Small changes in speed result in large changes in energy use
  - Match speed to actual requirements
- Right size motor – match motor to actual load. Motor less efficient at part load

# Efficiency – look beyond the Motor



- 2-5% savings in motors
- 5% in electric supply
- 3-7% in transmission
- 20-50% in system optimization

# Future Directions in Motor System Efficiency—Focus on the System

- Focus on “smart” systems
- Increased focus on “right-sizing”
- Development of “smart” motors that combined advanced technology with “intelligent” controls
- Motor system and process management practices—ISO 50001

# Roles for Government in Energy Efficiency

- Education & Awareness
  - Workforce
  - Awareness
- Innovation—support for RD&D
- Standards & Regulations—establish the rules of the market
- Promoting investment & innovation

# Recent Federal Legislation

- **Energy Policy Act, 2005**
- **Energy Independence and Security Act, 2007**
- **Emergency Economic Stabilization Act, 2008**
  - (“Bailout”)
- **American Recovery and Reinvestment Act, 2009**
  - (“Stimulus”)



# Energy & Climate Legislation

Still a work in process—with lots of cooks in the kitchen:

- House Climate bill passed (H.R. 2454) last June, but stalled in Senate
- Energy legislation (S. 1462)- passed committee but now stalled
- Waiting Kerry, Lieberman and Graham to introduce “3<sup>rd</sup> Way”



# Where do we go from here?

- Still waiting to figure out how to put all the pieces together in the Senate
- Resolving industrial impacts a critical path element—Brown & Bayh leading group of 12 manufacturing Senators
- Then conference with the House...
- If Climate Stalls, will Energy Bill Reemerge?

# Jobs Bill Prospects

- Likely a series of smaller bills—first already signed into law
- One will target manufacturing—SME Focus:
  - Provide \$4B for DOE Manufacturing EE proposals not funded by \$156M from ARRA
  - \$50M for MEP program at Commerce
- In play and could move in next few months

# The Energy Efficiency Value Proposition

Energy efficiency in business can :

- Reduce operating costs
- Be an investment for a future of higher energy prices
- Reduces exposure to volatile energy prices and climate regulations
- Can increase productivity through better process control

# Role for Equipment Manufacturers

- Innovate:
  - new technologies will create the future
  - the future will require new business models
- Lead: EE can represent an opportunity for growth
- Advocate: Many in government and the public think we are a post industrial economy

# Summary & Conclusions

- We face an uncertain energy future due to resource constraints and climate concerns
- Efficiency will be a key element of the response
- Motor systems are the largest consumer of electricity—our most expensive energy source
- The future of motor efficiency lies in the system & bringing intelligence to controls

# Contact Information

**R. Neal Elliott, Ph.D., P.E.**

Associate Director for Research

ACEEE

529 14<sup>th</sup> Street, NW, Suite 600

Washington, D.C. 20045

202-507-4009

[rneliott@aceee.org](mailto:rneliott@aceee.org)

For more information visit: [www.aceee.org](http://www.aceee.org)