



INSTITUTE FOR  
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Sharing best practices for low carbon enterprises

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# Energy Efficiency & Industrial Productivity *- Gaining through Saving*

## IEA Workshop: *Evaluating the Multiple Benefits of EE*

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# Decision-makers Matter!

**Need to make a compelling business case to the board**  
**Productivity gains “sell”**

**Chief Technology Officer**

“Do we know what energy efficiency practices and technologies are available?”

**Driver: knowledge**

**Financial Director**

“Do we have the money to invest and are we willing to spend it on EE?”

**Driver: Financials**

**CEO**

“Are we committed to prioritize EE above other investments?”

**Driver: Commitment**

**Marketing Director**

“Do the public and market demand us taking EE measures?”

**Driver: Public and market demand**



**Regulatory Affairs Officer**

“Does this government policy require us to take EE measures?”

**Driver: Policy obligation**



# 'Productivity' or 'Non-Energy Benefits' (NEBs)

## **NEB definition:**

- Additional enhancements to the production process thanks to energy efficiency projects (Worrell et al, 2003). In addition to reducing energy, these projects increase the productivity of the firm.
- **EE + NEBs = increased productivity**

## **NEBs include:**

- lower maintenance costs,
- increased production yield,
- safer working conditions and a better working environment,
- reducing waste and emissions
- reduced downtime

NEBs also called co-benefits or multiple benefits





# A Different Business Case

## Co-benefits industry example

- Lime Master (Thailand)
- Option: Bag filters to reduce dust emissions
- Environmental benefits per year
  - Net electricity increase: 109 MW
  - Fuel oil savings: 66,430 liters
  - Air emission reductions: 176 tons CO<sub>2</sub>, lime dust
- Recovered lime powder: 730 tons/yr
- Financial savings: US\$ 56,000/yr, 1 year payback
- Social benefits
  - Reduced staff exposure to dust
  - Reduced community dust exposure
  - Improved relationship community / government

Government  
trigger for  
option

Company  
benefits  
from option





# Quantifying NEBs: Case Studies (1)

## 2 key messages

- Co-benefits often exceed the value of energy savings
- Including co-benefits reduces payback times for new investments

### Pye and McKane (1999)

- DOE's Motor Challenge Program (41 projects)
- **Reduced capital expenditures and labor costs >> energy savings**

### Hall and Roth (2003)

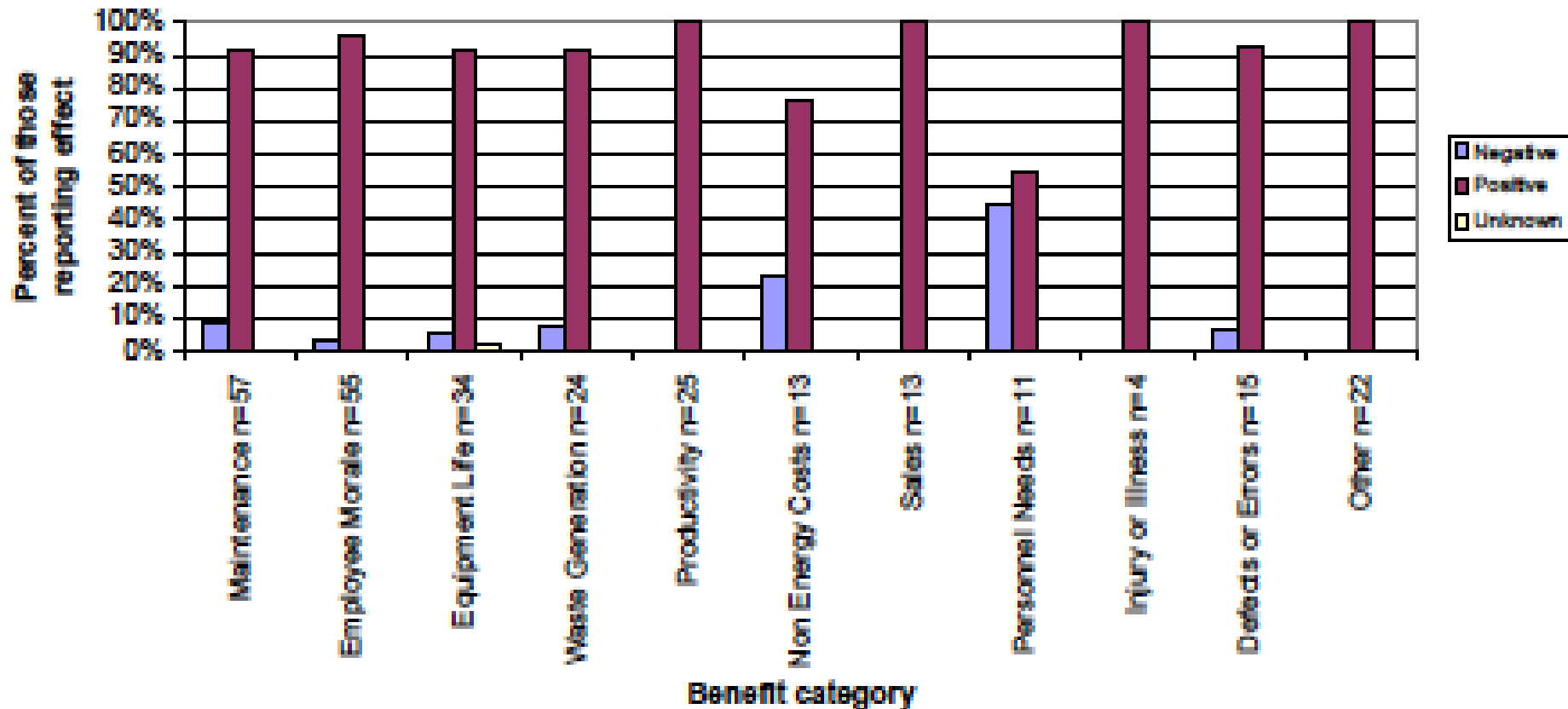
- Wisconsin's Focus On Energy Business Program (74 projects)
- **Value of NEBs are equal to about 2.5 times the projected energy savings for the installed measures**
- NEBs equal to about \$17,239 per measure installed per year





# Hall et Roth: NEB

Overview of Impact of NEBs Reported





## Quantifying NEBs: Case Studies (2)

### Key message:

- Quantifying NEBs opens the door to more ambitious EE policies

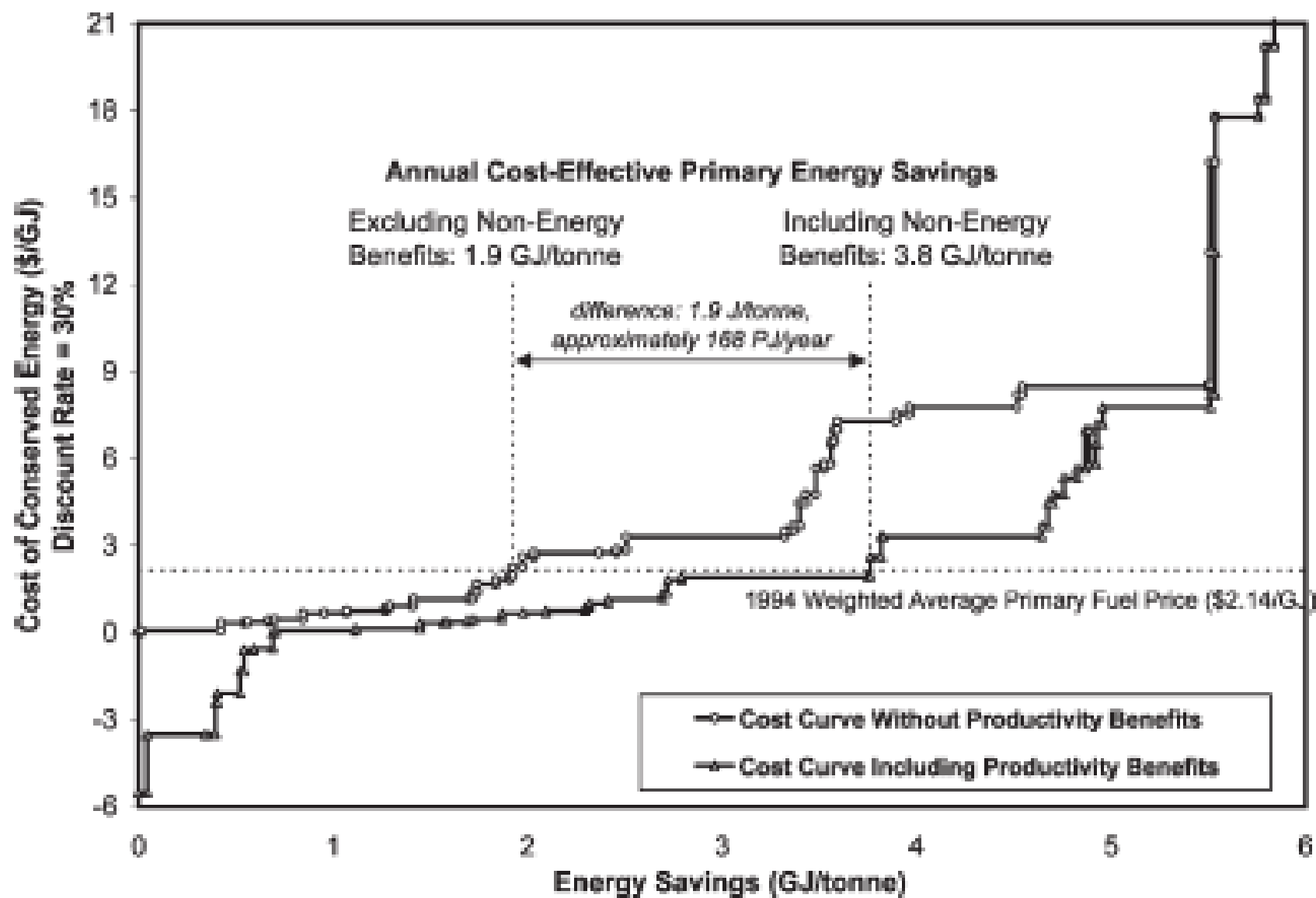
Worrell et al (2001 and 2003)

- 77 projects in 6 OECD countries
- **Improvement of payback time from 4.2 years to 1.9 years after monetizing co-benefits**
- Inclusion of quantified co-benefits in an energy-conservation supply curve for the US iron and steel industry **doubled the potential for cost-effective savings**





# Worrell et al: NEB in Cost Curves







# Methodology & Challenges

## Methodology & Findings

- Literature proposes methodologies to quantify NEBs (in \$)
- **No consensus method for quantifying NEB**
- Interviews & surveys are the 1<sup>st</sup> step in all evaluations of NEBs
- Quantification of the NEBs of industrial technologies is often done on a case-by-case basis.

## Challenges

- Not all co-benefits are easily quantifiable in financial terms (e.g., increased safety or employee satisfaction)
- Need to assess net co-benefits, as negative impacts that may be associated with some technologies
- Attn!!! some projects with NEB drive higher GHG emissions...





# Issues & Suggested Priorities

## NEBs = a game-changer

- @ Project level: attractiveness of EE projects; decision making
- @ Program level: ↑ cost effective EE potentials & implementation

## NEB assessments and Energy Management Programs

- *PLAN*:
  - Design methodology and tools to evaluate NEBs (AUS)
  - Organize pilots & case studies that measure NEB of several EE technologies (US)
  - Integrate EnMS and other business tools (IR, JP)
- *IMPLEMENT*: Communicate & promote NEBs
- *M&E*: Include indicators for NEB quantification at the start (i.e. in the action plan) & evaluation method

**Question: Rebound effect?**





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# Thank you!

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