

Improving Energy Efficiency in the Industrial Sector

**Presentation at the United Nations Learning Center
May 3, 2006**

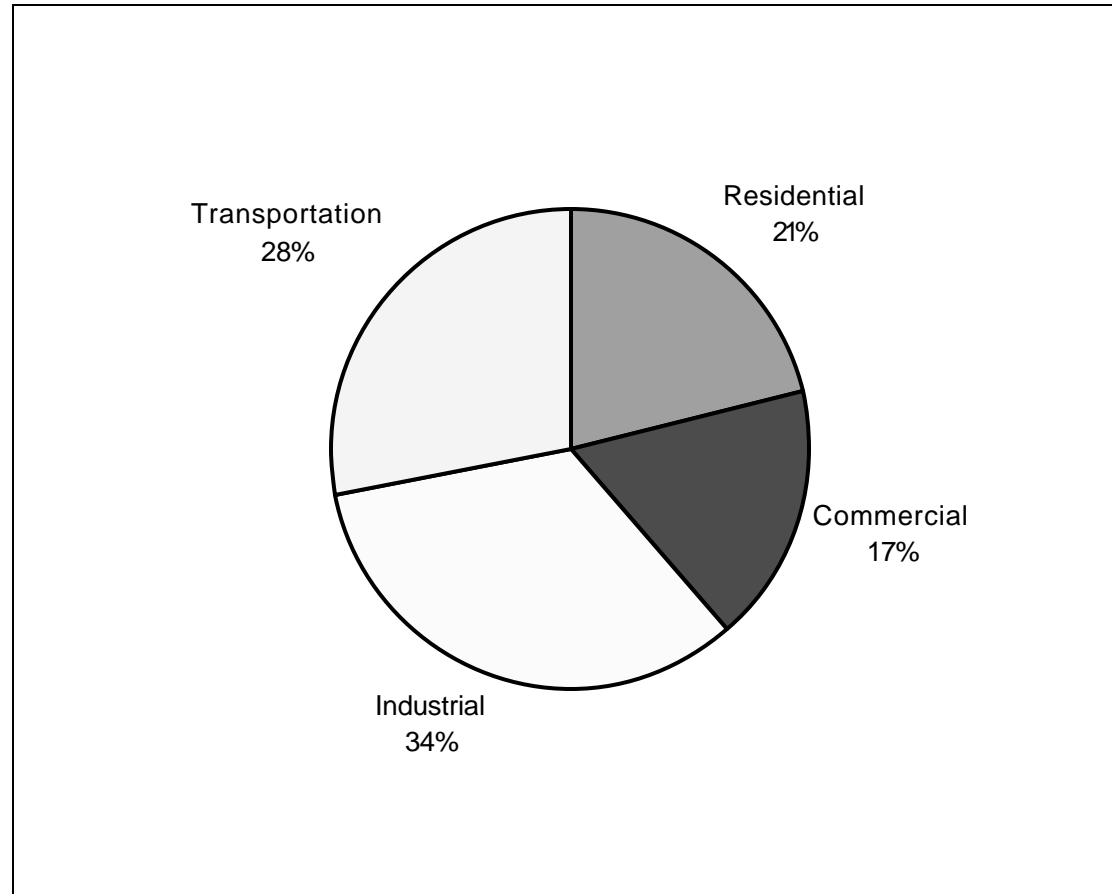
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Outline

- Industrial energy use
- Opportunities for savings
- The mandatory/voluntary continuum
- Policies
 - Broad comprehensive legislation
 - Information dissemination
 - Skilled personnel
 - Efficiency standards
 - Energy taxes and tax incentives
 - Voluntary agreements
 - Utility programs and incentives
 - Role of cogeneration/CHP
- Conclusion

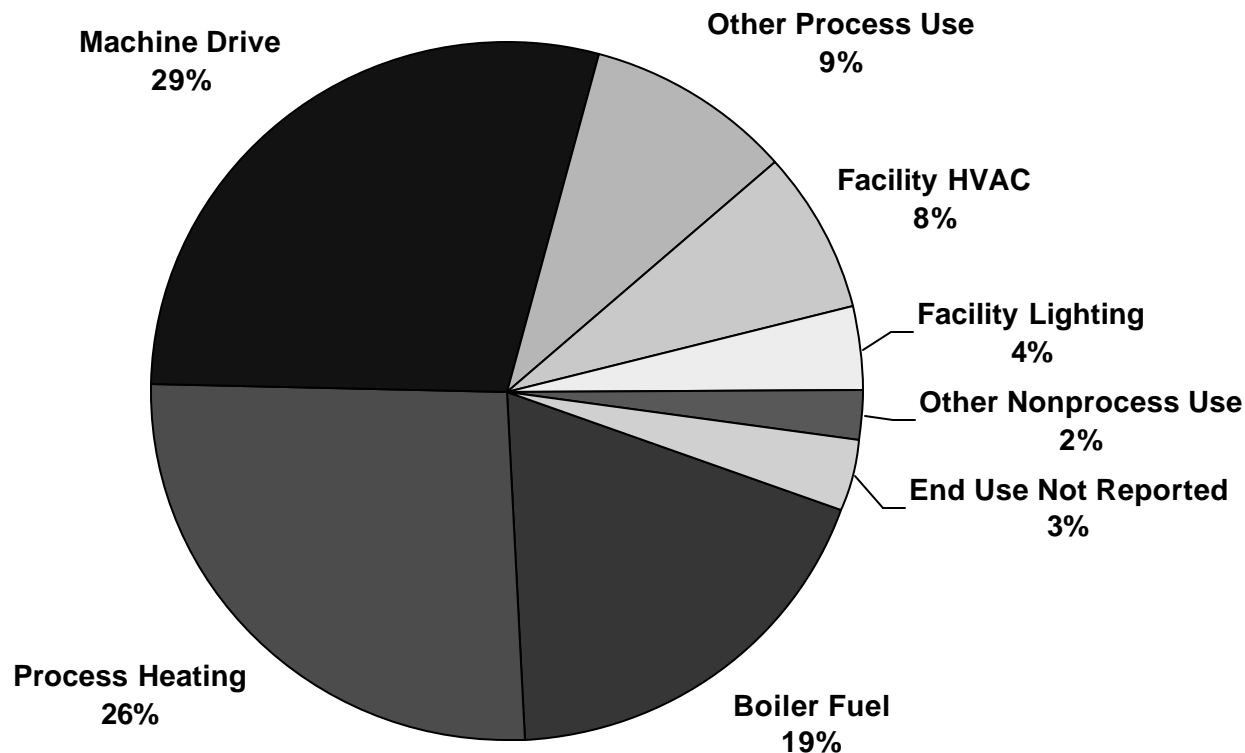
Industry as a Proportion of U.S. Energy Use



Source: EIA, AEO 2006

U.S. Industrial Energy Use by End-Use

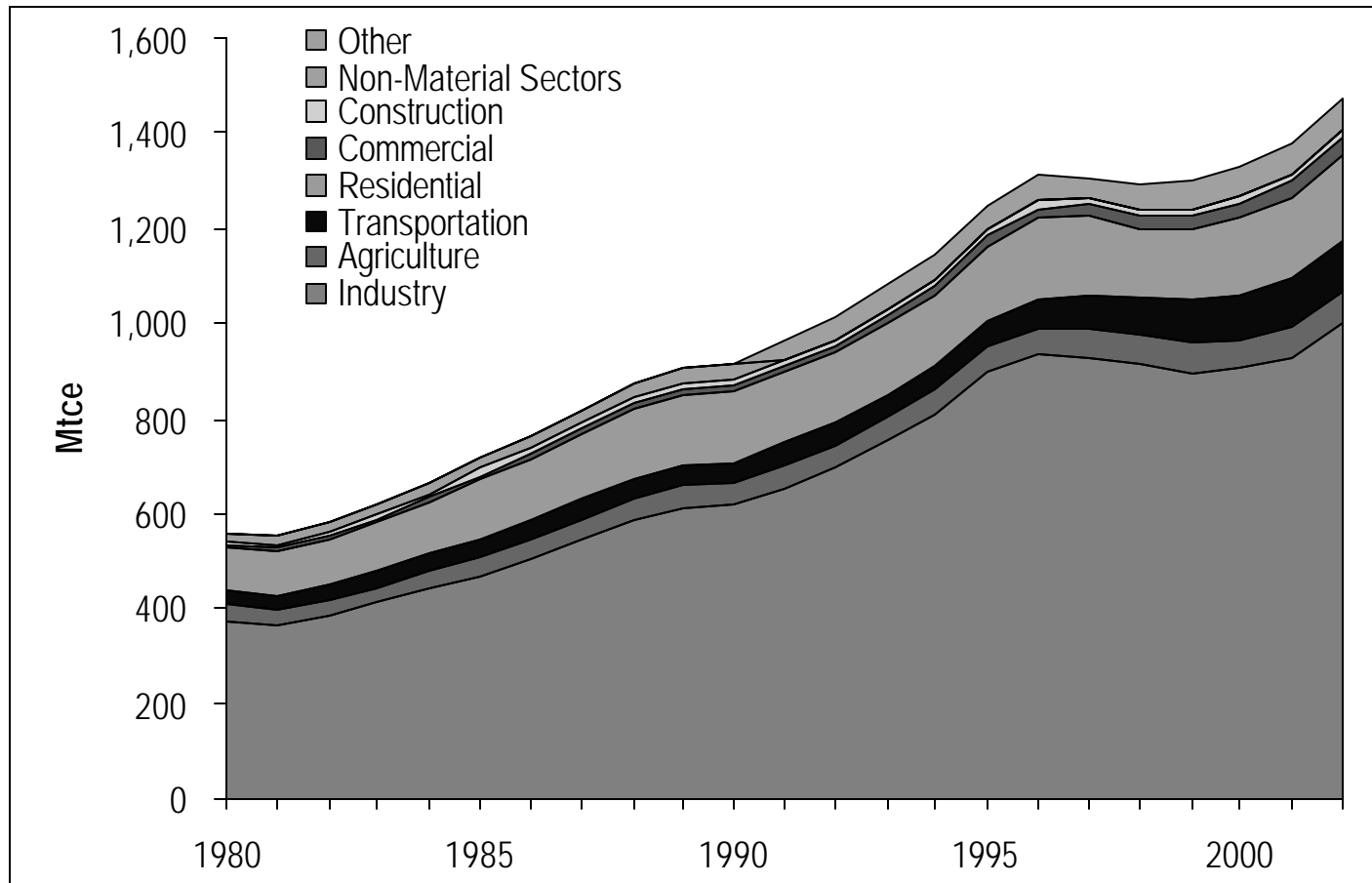
2002 Total Primary Manufacturing = 17.6 Quads



Source: ACEEE analysis of EIA, MECS 2002.

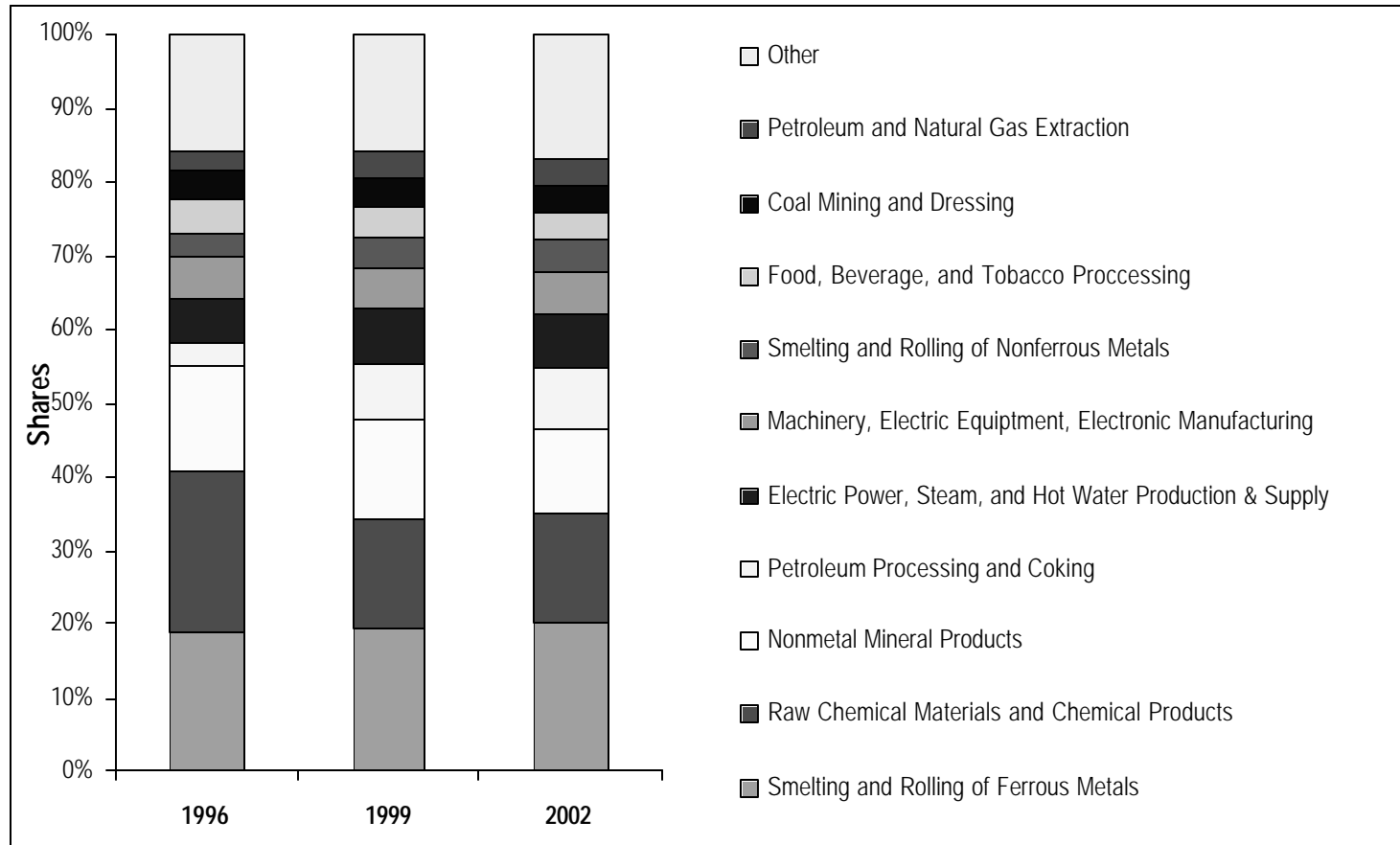
Note: feedstock use not included

Energy Use in China by Sector



Source: LBL, China Energy Databook 2004

Energy Use in China by Industry



Source: LBL, China Energy Databook 2004

Summary of Studies of Savings Potential in the U.S.

Region	Year	Fuel	# Yrs	Residential			Commercial			Industrial		
				Tech	Econ	Ach	Tech	Econ	Ach	Tech	Econ	Ach
California	2003	Elec	10	21%	15%	10%	17%	13%	10%	18%	12%	11%
Mass.	2001	Elec	5	NA	31%	NA	NA	21%	NA	Included in comm.		
New York	2003	Elec	20	40%	32%	NA	46%	40%	NA	21%	18%	NA
Oregon	2003	Elec	10	28%	NA	NA	32%	NA	NA	35%	NA	NA
Puget	2003	Elec	20	35%	19%	12%	39%	16%	12%	NA	NA	10%
Southwest	2002	Elec	17	NA	NA	26%	NA	NA	37%	NA	NA	33%
U.S.	2000	Elec	20	NA	NA	27%	NA	NA	22%	NA	NA	17%
Vermont	2003	Elec	10	NA	NA	30%	NA	NA	32%	Included in comm.		
Median				32%	25%	26%	36%	19%	22%	21%	15%	14%
California	2003	Gas	10	NA	NA	NA	NA	21%	10%	NA	NA	NA
Oregon	2003	Gas	10	69%	54%	NA	16%	8%	NA	NA	NA	NA
Puget	2003	Gas	20	48%	19%	10%	20%	16%	8%	NA	NA	9%
U.S.	2000	Gas	20	NA	NA	8%	NA	NA	8%	NA	NA	8%
Utah	2004	Gas	10	46%	27%	NA	29%	11%	NA	NA	NA	NA
Median				48%	27%	9%	20%	14%	8%	NA	NA	9%



Source: Nadel et al. 2004.

Mandatory/Voluntary Continuum

Mandatory ←————→ **Voluntary**

Regulation/Standards/Taxation

Agreements/Targets

Reporting/Benchmarking

Audits/Assessments

Information Dissemination
and Demonstration

Policies to Achieve Savings

- Broad comprehensive legislation
- Information dissemination
- Skilled personnel
- Efficiency standards – motors, pumps, fans, boilers (covered before)
- Energy taxes and tax incentives
- Voluntary agreements
- Utility programs and incentives (covered before)
- Role of cogeneration/CHP

Broad Comprehensive Legislation

- Several countries (mostly in Asia) have based comprehensive industrial efficiency legislation.
- Thailand
 - Energy Conservation Promotion Act of 1992
 - Demand management programs
 - Specific financial measures
 - Efficiency standards for machinery
 - Support structures
 - Thailand also has an energy conservation fund to help pay for these and other policies (funded with an oil import fee)

Information Dissemination

- Brochures, hotlines, videos, labeling, etc.
- Example: UK Best Practices program
 - Information on specific technologies and practices
 - Case studies (with evaluation info)
 - Hot line
 - Now part of UK Carbon Trust:
<http://www.thecarbontrust.co.uk/energy>

Skilled Personnel

- A few countries mandate that companies over a certain size have a dedicated energy manager on staff
 - Korea, Japan, Thailand, Finland, Portugal, Denmark, Italy
- Can also provide skilled consultants in
 - U.S. Industrial Assessment Centers provide audits to small/medium sized firms
 - Motor systems programs in Canada, China

Energy Taxes and Incentives

- Tax incentives discussed previously
- Also option of imposing energy taxes
 - Could apply to all customers
 - Can be waived if take certain energy efficiency or carbon-saving actions (this is being done by several European countries)

Voluntary Agreements

- Agreements by industry segments or companies to achieve specific multiyear energy savings or carbon reduction targets
- Successfully used in several European countries (e.g. Denmark, Netherlands, Switzerland and UK); also South Korea
- Provides industry more flexibility than mandatory programs
- Usually backed up with threat of mandatory programs if targets not met

Role of Cogeneration/CHP

- Cogeneration (combined heat and power) plants produce both electricity and steam for industrial process needs
- Efficiencies often 60-80%
 - Much better than 30-45% at power plants
- To encourage CHP, need:
 - Reasonable interconnection requirements
 - Reasonable rates for backup power and power purchases
 - Emissions requirements that reward improved efficiency

Conclusions

- Can generally reduce energy use in industry by ~15% cost-effectively; more in long-term
- Variety of policies can be employed
- Again, multiple strategies needed; one policy won't do it all