

China's Energy Management System Program for Industry

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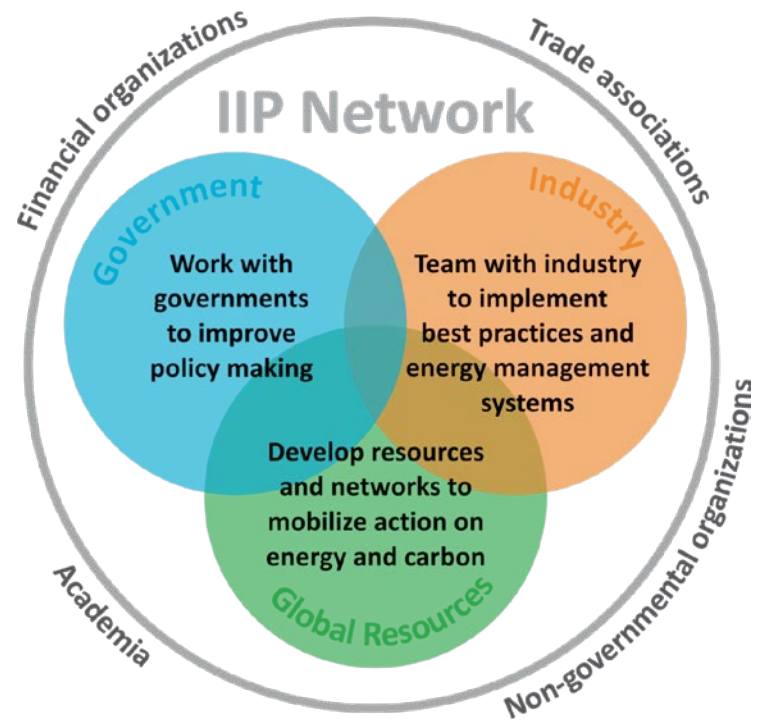
Outline

- Introduction to IIP and global industrial energy use trends
- Profile of China's industrial energy use
- Overview of China's industrial energy efficiency programs
- Overview of China's Energy Management Systems program
- IIP's efforts to support effective implementation of EnMS in China

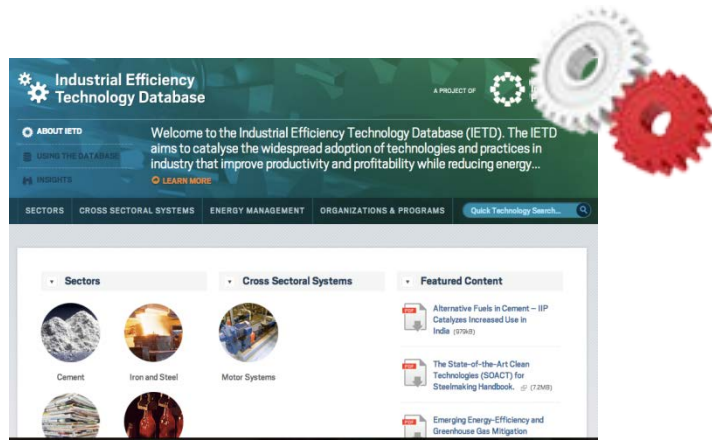
About the Institute for Industrial Productivity

The Institute for Industrial Productivity provides industry and governments with the best energy efficiency practices to reduce energy costs and prepare for a low carbon future.

- Bridging the gap between government policy and industry implementation.
- Developing original research, analysis and databases.
- Sharing best practices, including policy experience, and providing access to a network of international experts.



IIP's Best Practice Databases

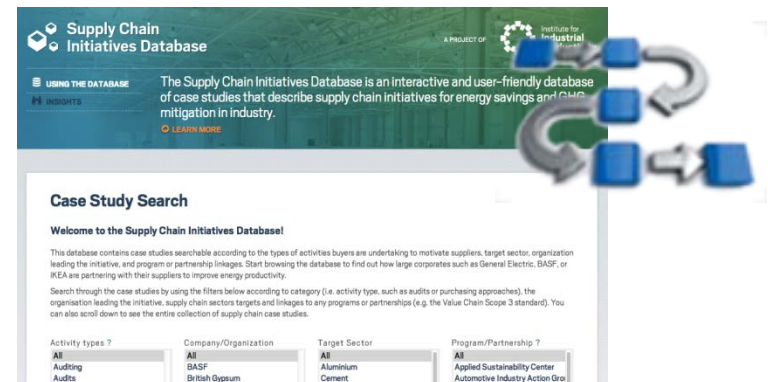


Industrial Efficiency Technology Database

www.ieta.iipnetwork.org

Industrial Efficiency Policy Database

www.iepd.iipnetwork.org



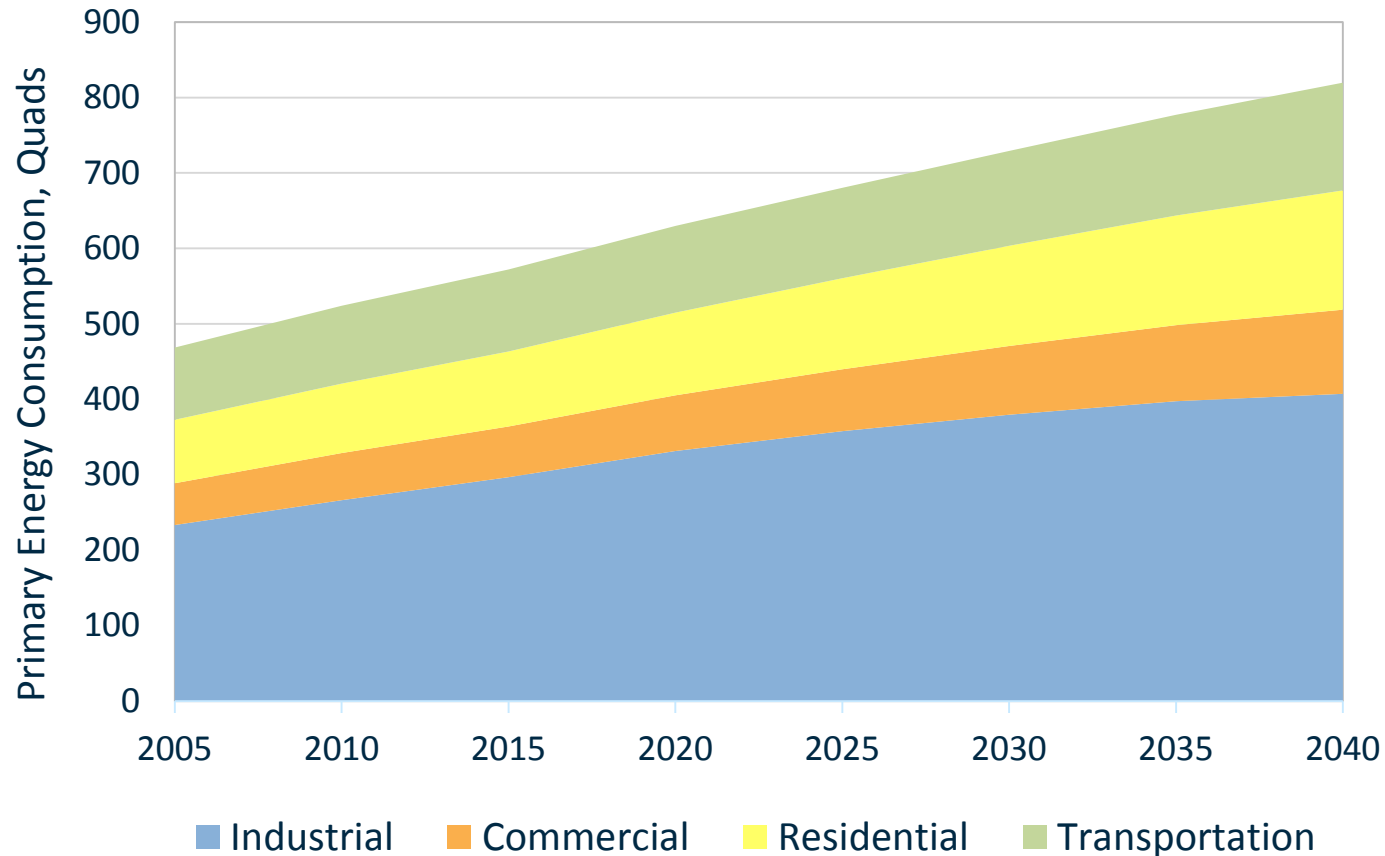
Industrial Efficiency Finance Database

www.iipnetwork.org/databases/finance

Supply Chain Initiatives Database

www.iipnetwork.org/databases/supply-chain

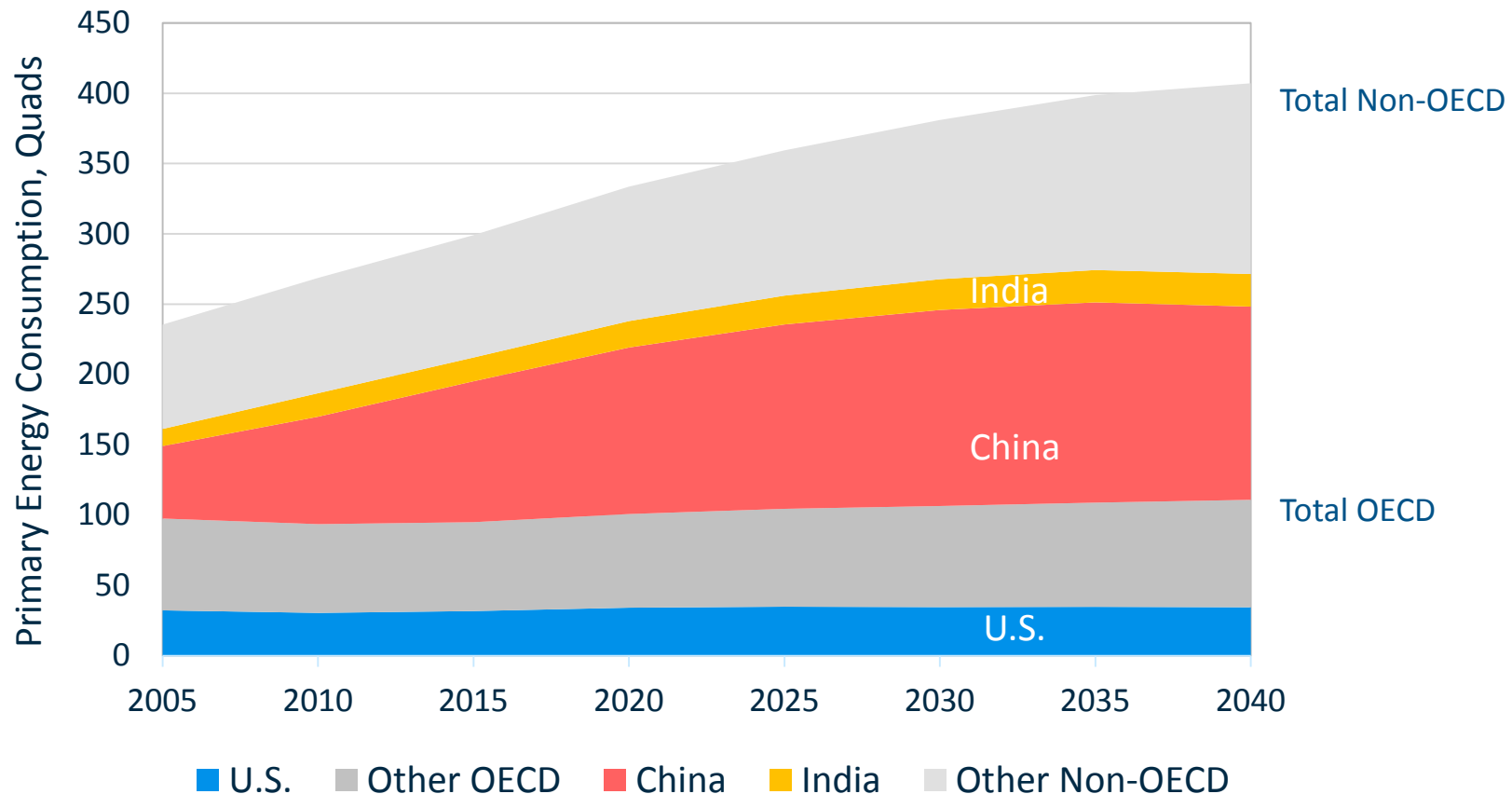
Industry Accounts for 50% of Total Global Energy Use (Primary Energy Basis*)



Source: DOE EIA International Energy Outlook 2013

* Includes fuel for electricity generation and T&D losses

The U.S., China, and India Represent about 50% of Total Industrial Energy Use

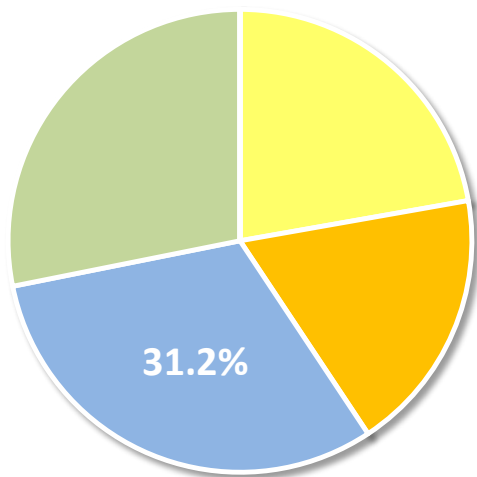


Source: DOE EIA International Energy Outlook 2013

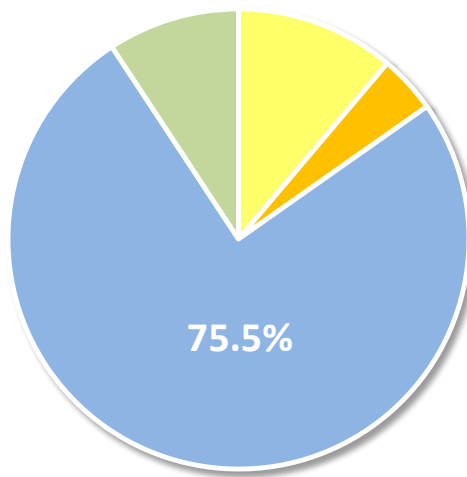
Industry is the Largest Energy Consuming Sector in the U.S., China and India

Primary energy use - 2010

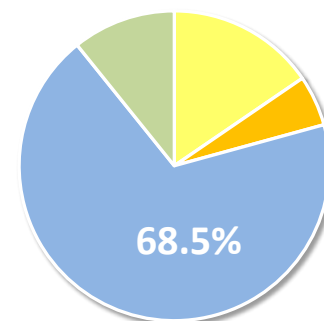
Industrial Commercial Residential Transportation



U.S.
97.9 Quads total



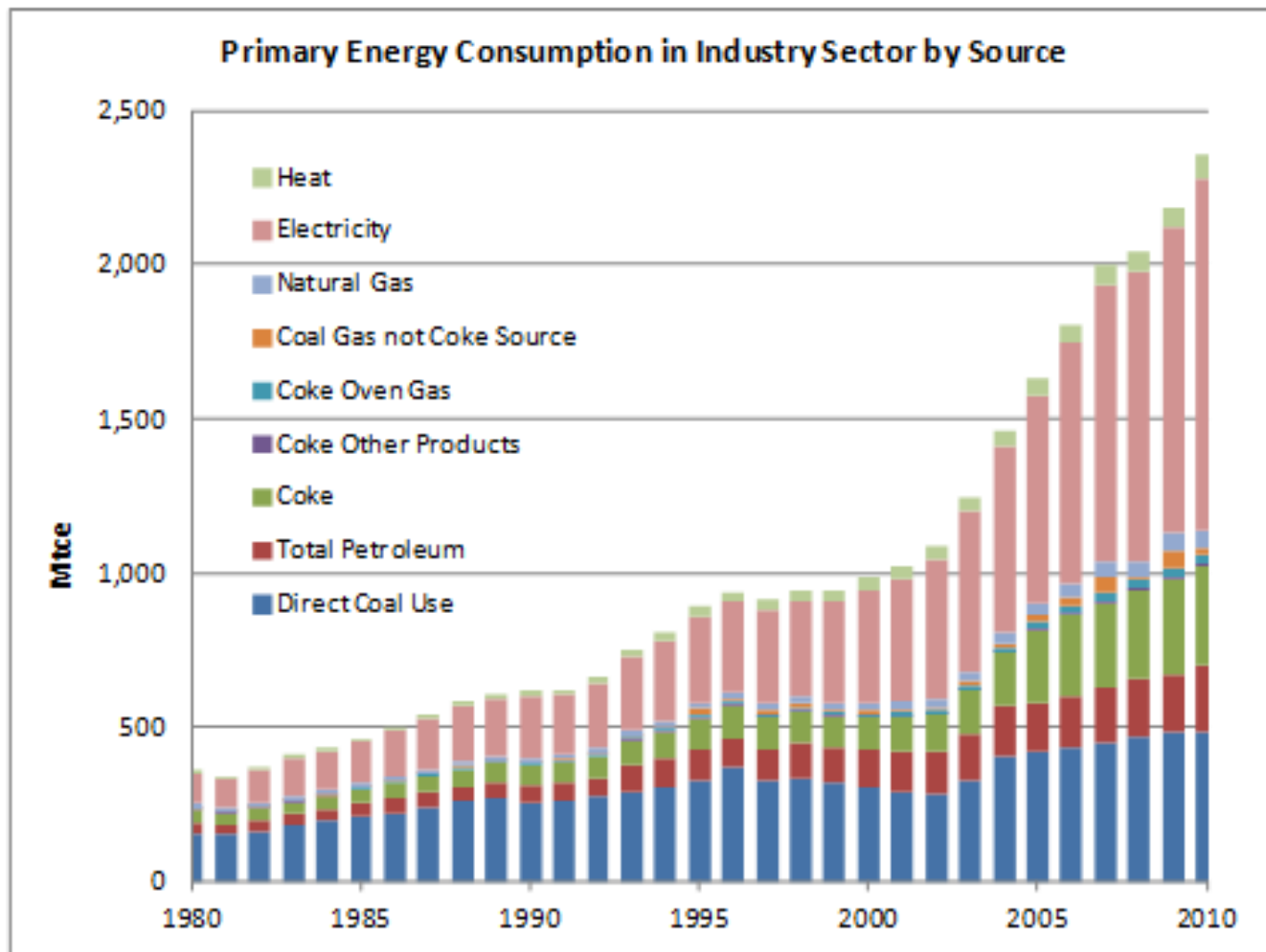
China
101.2 Quads total



India
27.4 Quads total

Source: DOE EIA International Energy Outlook 2013

Industrial Energy Growth in China: 1980 - 2010



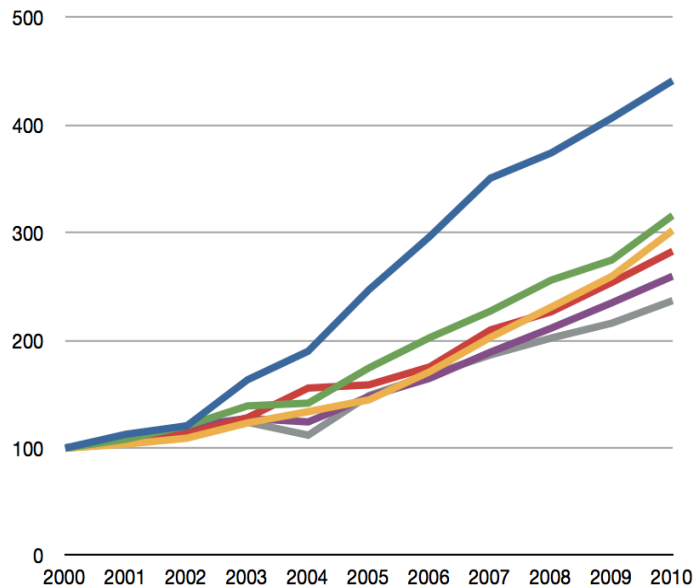
Source: NBS, 1980 – 2011b



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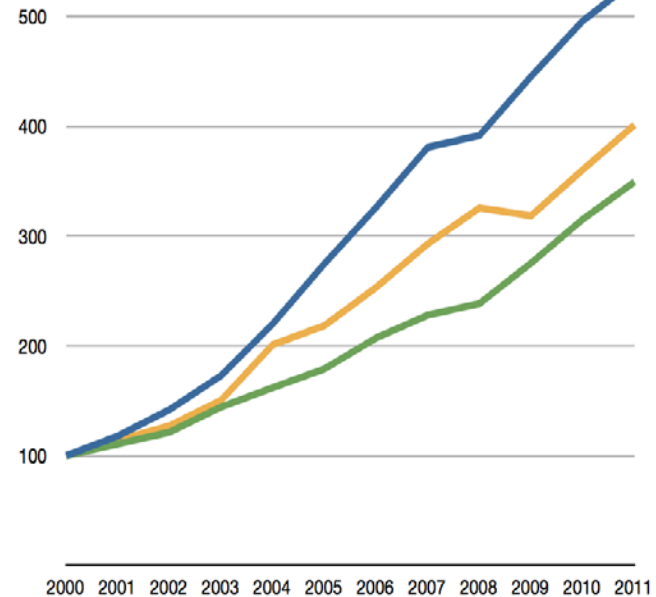
China's Industrial Growth has been Fueled by Exports, Infrastructure and Internal Demand

Manufacturing Value Added Growth Index



- Metals
- Non-metallic minerals
- Food and tobacco
- Machinery
- Chemicals
- Textile and leather

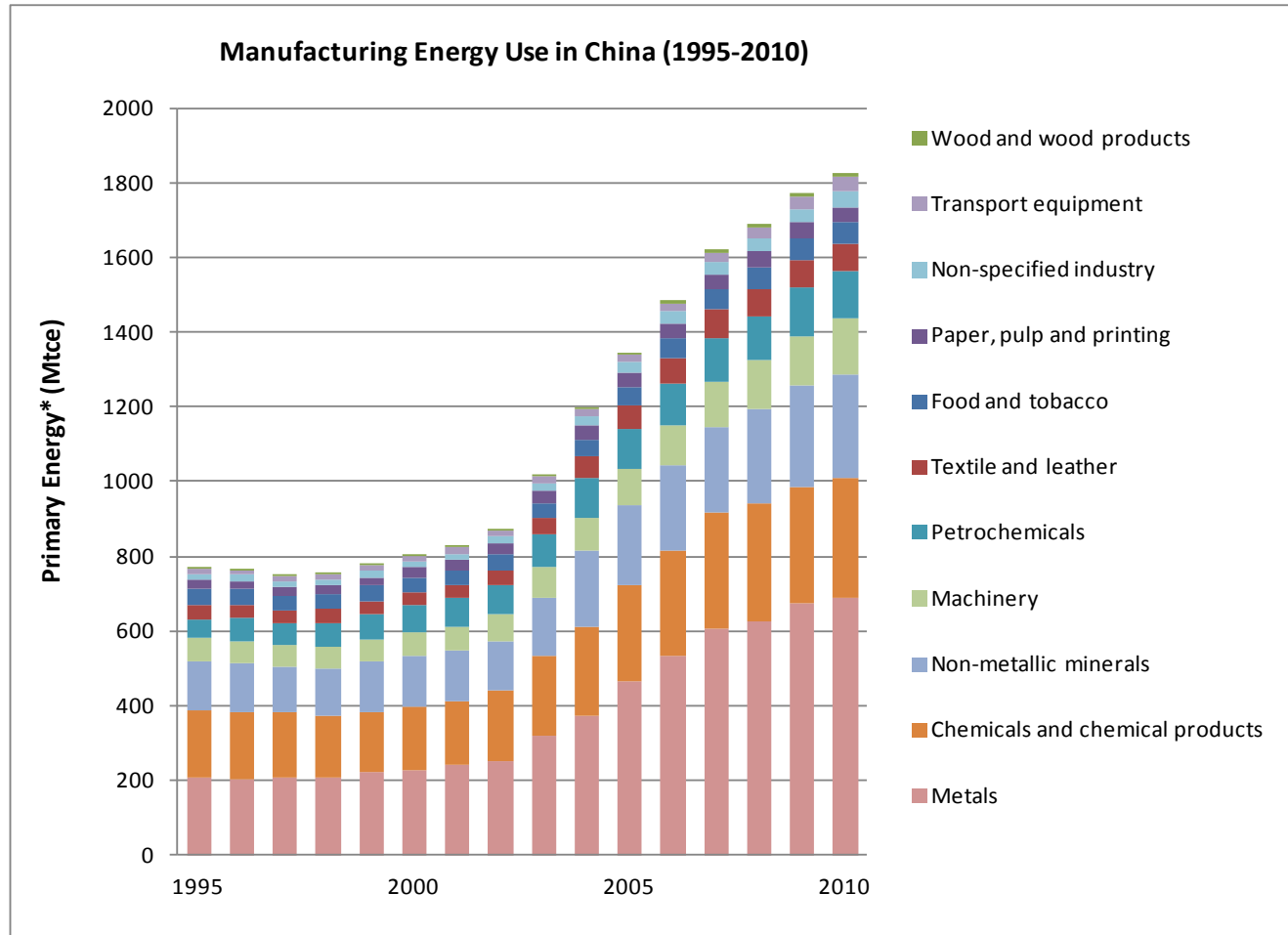
Commodity Production Growth Index



- Crude steel
- Cement
- Plate glass

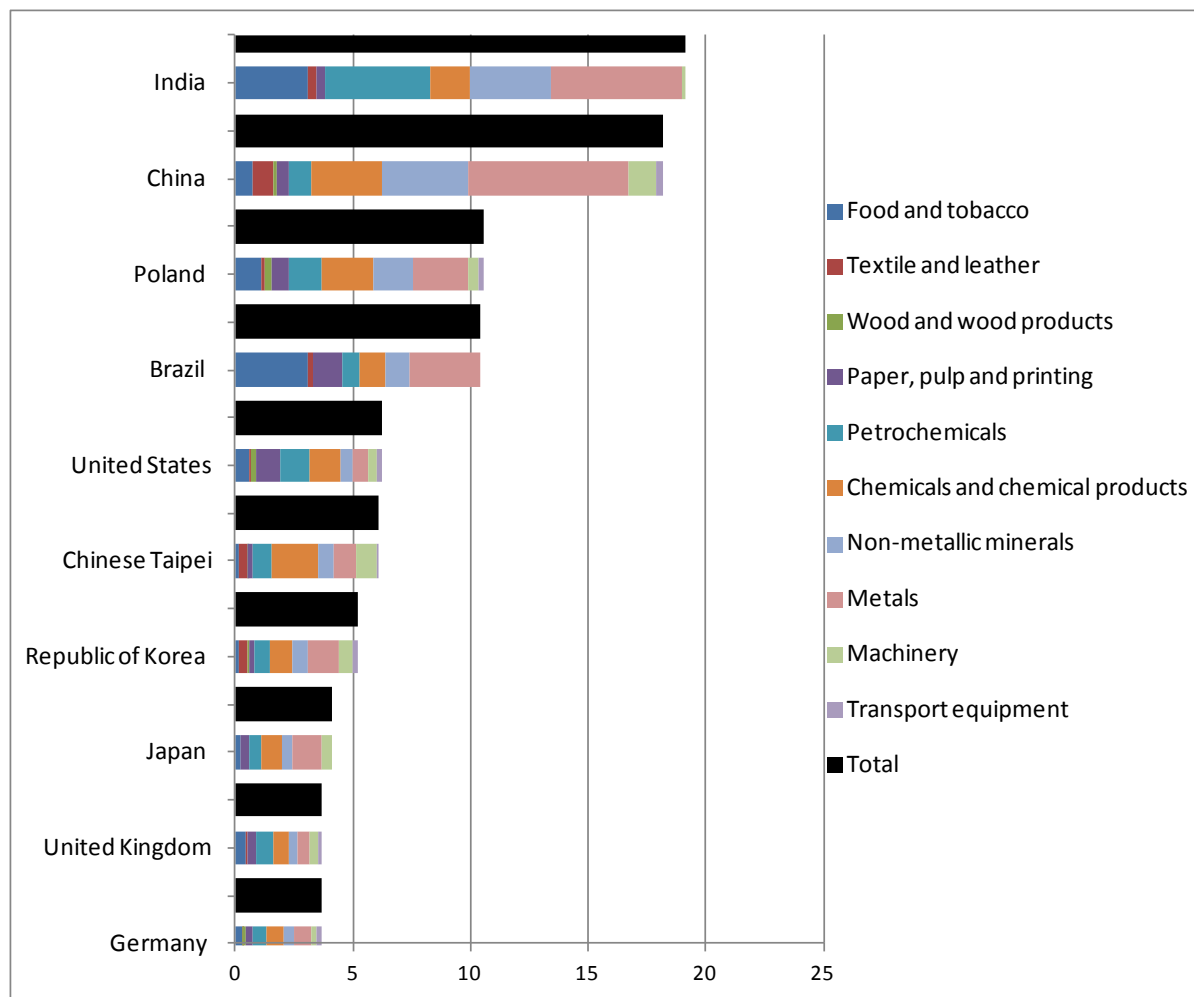
Source: NBS

Manufacturing Energy Use in China: 1995 – 2010



Source: NBS, 2011b

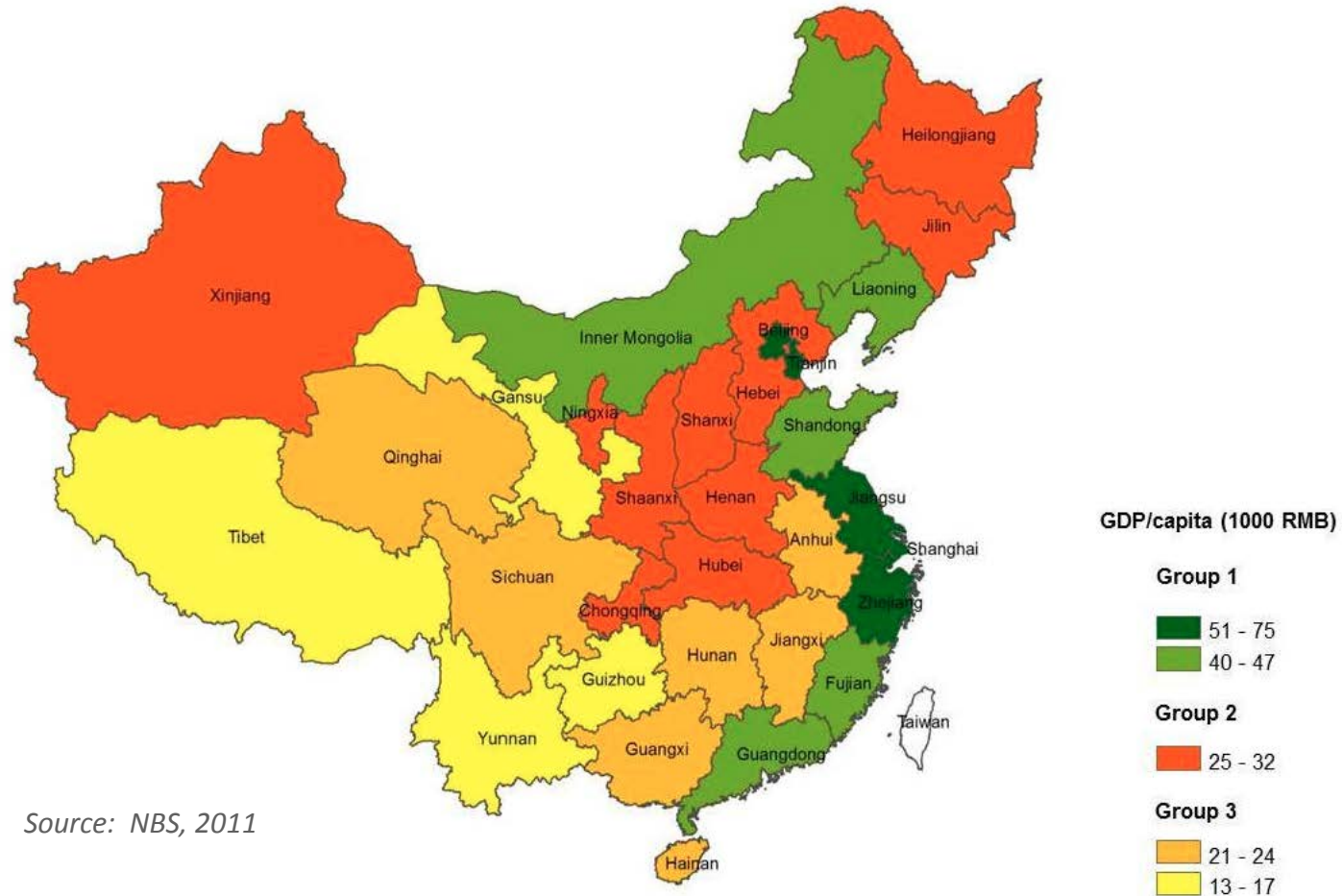
Energy Intensity Comparison – Manufacturing Value Added (2007)



Source: IEA, 2012; UNIDO, 2012

China Has Great Disparities in the Level of Development

Gross Domestic Product per Capita by Province, 2010



Source: NBS, 2011



China's Energy Efficiency Programs

- Comprehensive system of policies and programs based on a mix of government regulation and market-based approaches
 - Energy Conservation Law - 1999
- Current aggressive energy efficiency promotion system developed under 11th Five Year Plan (2006 – 2010)
 - Revised Energy Conservation Law - 2007
- Continued under 12 Five Year Plan (2011 – 2015) with focus on capacity building and implementation
- Three Institutional Groups
 - National, provincial and local governments
 - Industrial enterprises
 - Third party service and support organizations

Key Industrial Energy Efficiency Programs - 1

Programs	11 th Five Year Plan	12 th Five Year Plan
Overall Targets	<ul style="list-style-type: none"> National – 20% energy/GDP reduction over 2005 by 2010 Provincial – Range from 12-22% 	<ul style="list-style-type: none"> National – 16% energy/GDP reduction from 2010 by 2015; 17% CO₂/GDP reduction Provincial – Range from 10-18%
1 - Government-Enterprise Agreement Platform		
Enterprise Targets and Agreements	<ul style="list-style-type: none"> National – Top 1,000 Program (>108,000 tce/year) Provincial – additional agreements 	<ul style="list-style-type: none"> National – Top 10,000 Program (15,000 enterprises >10,000 tce/year) Provincial – additional agreements with enterprises >5,000 tce/year
Phasing Out Obsolete Capacity	Closure program initiated in 2007	Broader scope and new targets
Enterprise Energy Managers	Requirements established	Large-scale implementation under Top 10,000 and provincial programs
Enterprise Reporting	Mandatory for Top 1,000	Mandatory for Top 10,000 and provincial
Energy Efficiency Assessments for New Fixed Assets	National program launched	Implementation at nat'l/provincial levels
Minimum Energy Consumption Standards	National unit standards set for production of 27 industrial products	New standards under national “100 Standards Program”

Key Industrial Energy Efficiency Programs - 2

Programs	11 th Five Year Plan	12 th Five Year Plan
2 – Enabling and Support Systems		
Enterprise Energy Audits	Required under Top 1,000 program; Quality varied	Required under Top 10,000 and provincial programs; Efforts to improve 3 rd party capacity
Energy Management Systems (EnMS)	Pilot program in Shandong Province; Nation standard 2009	Program to foster implementation for Top 10,000 and provincial; Provincial and local support programs
Financial Awards for Energy Efficiency Investments	RMB 22.4 billion provided by central government; ESCO investment award program launched	Broader scope and new targets
Energy Efficiency Rating and Labeling for Manufacturers	Suzhou Energy Efficiency Star	National pilot program
Other	National guidance on benchmarking; National technology catalogs	Improved benchmarking for key enterprise planning; Improved catalogs

Key Industrial Energy Efficiency Programs - 3

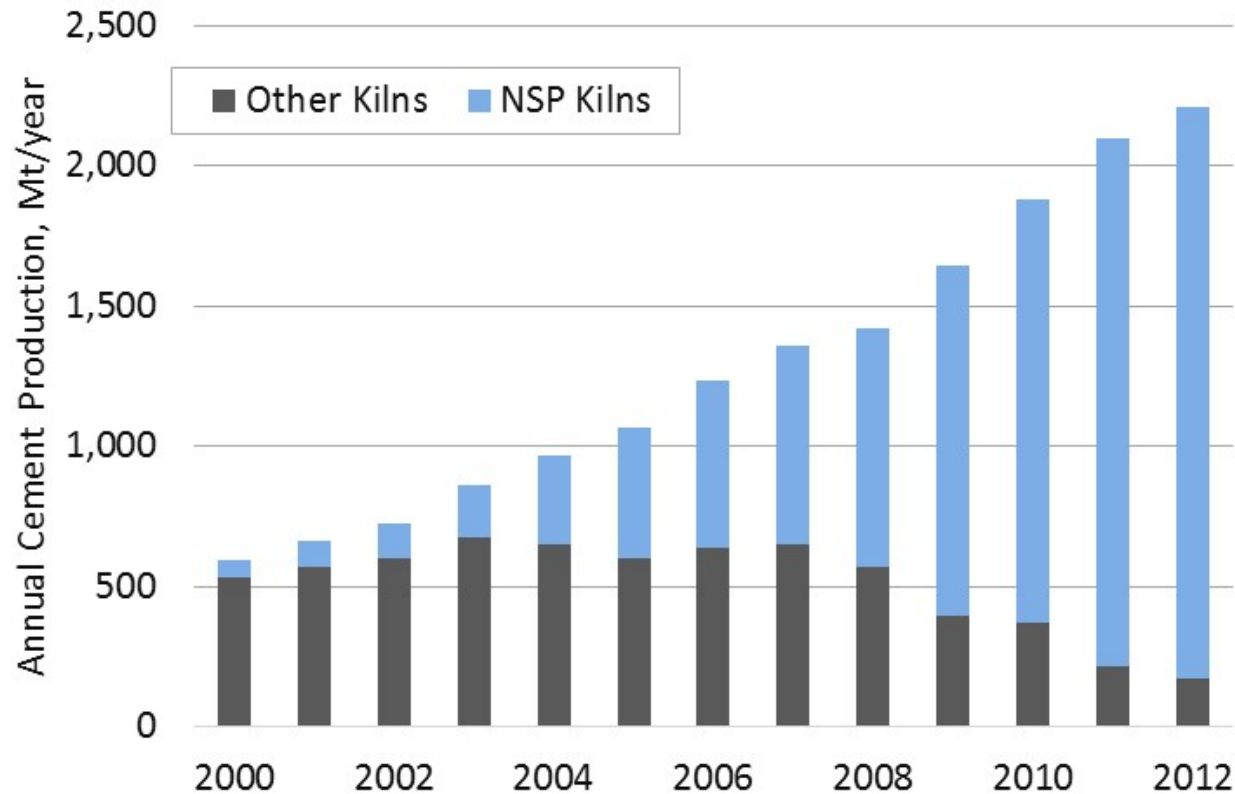
Programs	11 th Five Year Plan	12 th Five Year Plan
3 – Market-Based Programs		
Energy Pricing and Tax Policies	Penalty electricity pricing; New taxes tested	Further pricing reforms; review of tax policies
Expanded Performance Contracting	ESCO industry entered a fast growth stage; Investment reached \$4.25 billion in 2010	Continued growth expected; Energy performance contracting becoming mainstream
Energy Use/Carbon Cap and Trade	Beijing, Tianjin and Shanghai set up exchanges for voluntary carbon trading	Introduction of energy/carbon caps; Launching of pilot trading schemes
Expanded Commercial Financing	Energy efficiency pilot programs established	Expansion and further development
4 – Integrated Programs		
Low Carbon Development Zones		Pilot programs in 5 provinces and 8 cities
Circular Economy/Industrial Remanufacturing		Piloting of provincial by-product synergy program

Results of the 11th Five Year Plan

- 19.1% reduction in energy use per unit GDP – NDRC
 - 82% from industrial sector
- Top 1,000 Enterprises – Goal of 100 Mtce savings (150 realized)
 - Energy savings agreements signed by high-level representatives was effective
 - Heavy investment in new technology and energy savings projects
 - 95% established energy management office
 - Energy audits conducted, but capabilities and quality varied
- Phasing out obsolete capacity – Goal of 91 Mtce savings
 - 19 energy intensive subsectors
 - Cement – 250 Mt
 - Iron making – 100 Mt
 - Steel – 55 Mt
 - Difficult to implement due to loss of tax revenue and jobs at local level

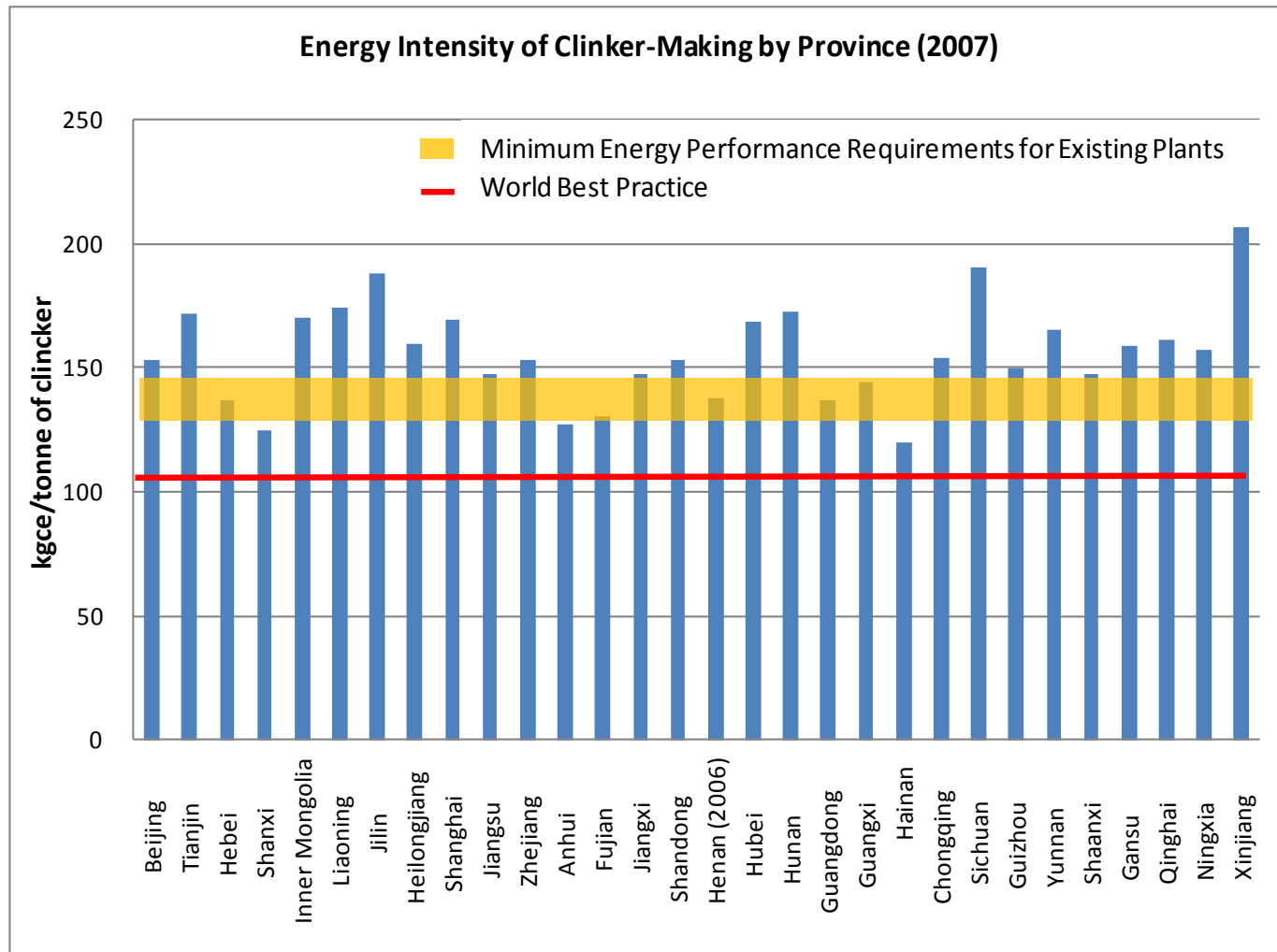
An Example of the Impact of China's Energy Efficiency Program on Technological Improvement in the Cement Industry

Technology Evolution in China's Cement Industry



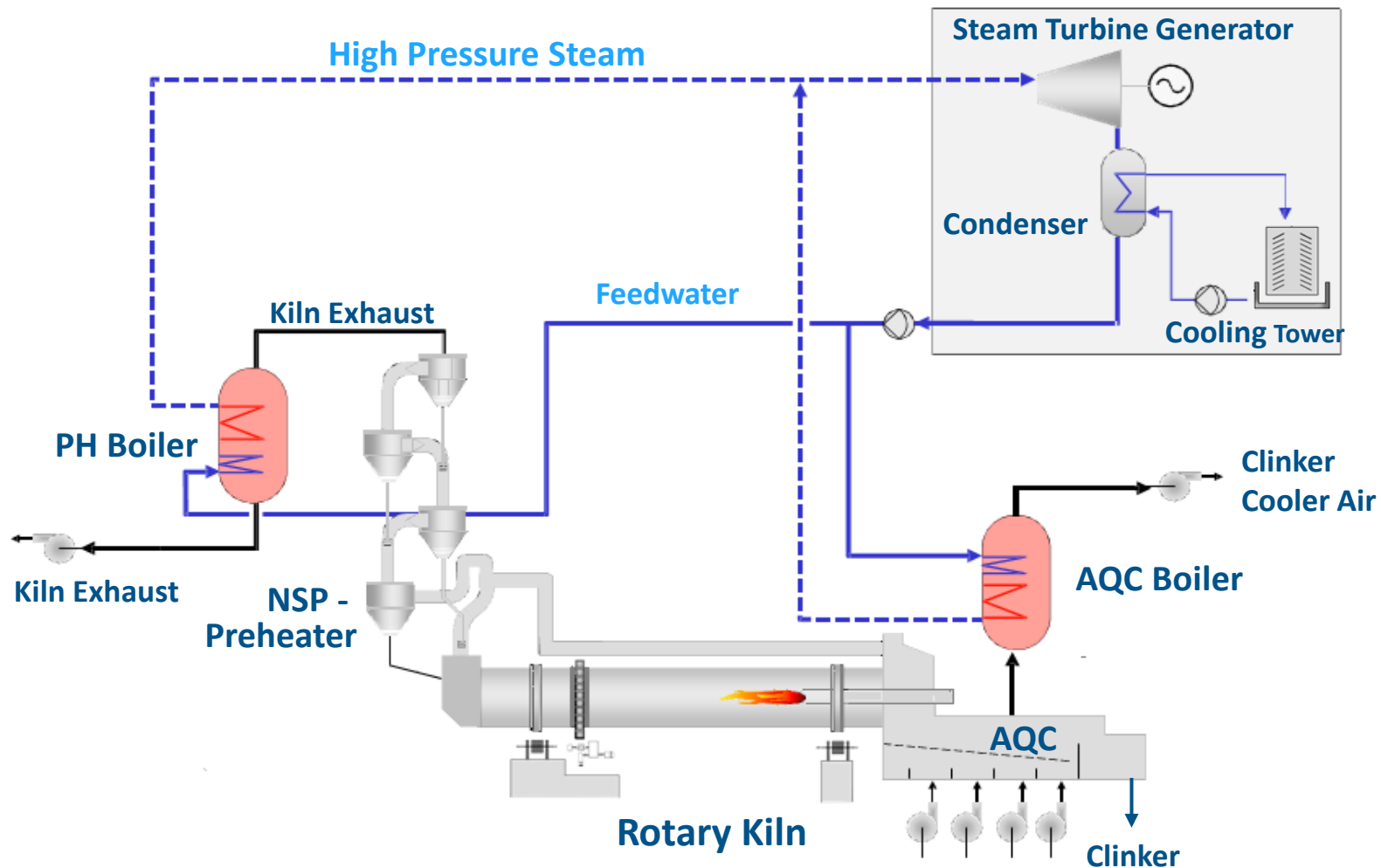
Source: Chinese Cement Association 2013

There is a Wide Range in Energy Performance



Source: China Cement Association, AQSIQ

Waste Heat Recovery was identified as an Efficiency Technology that could be widely applied

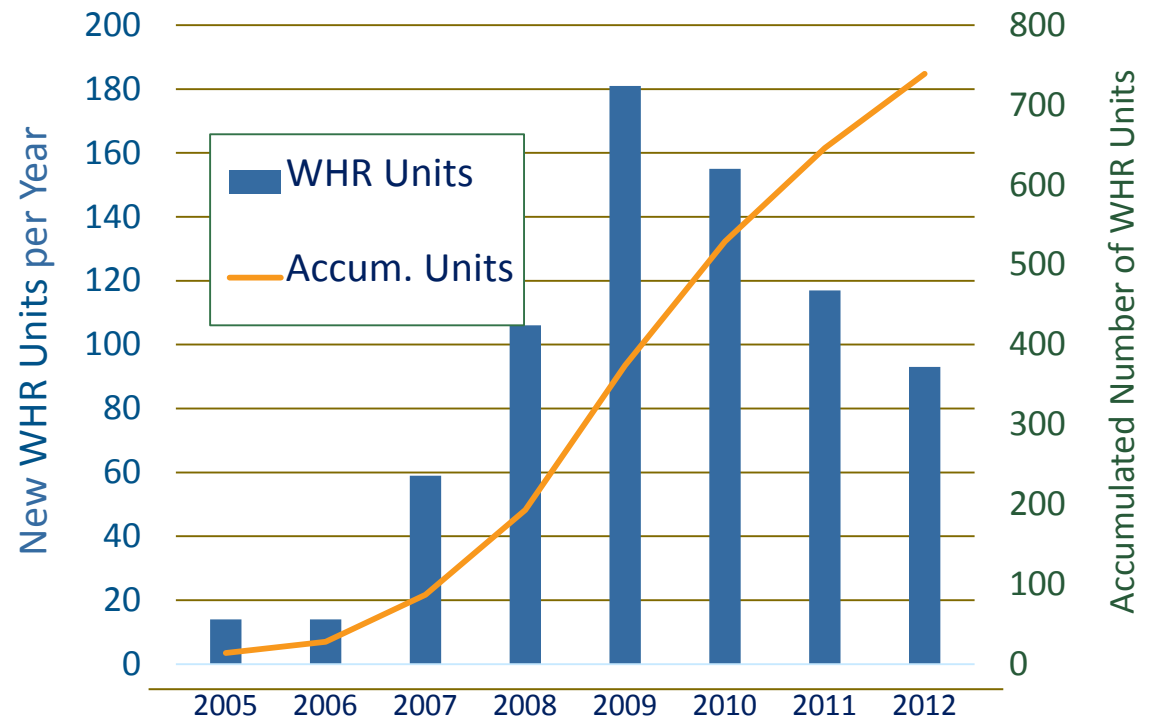


Waste Heat Recovery in Cement



Waste Heat Recovery in China's Cement Industry

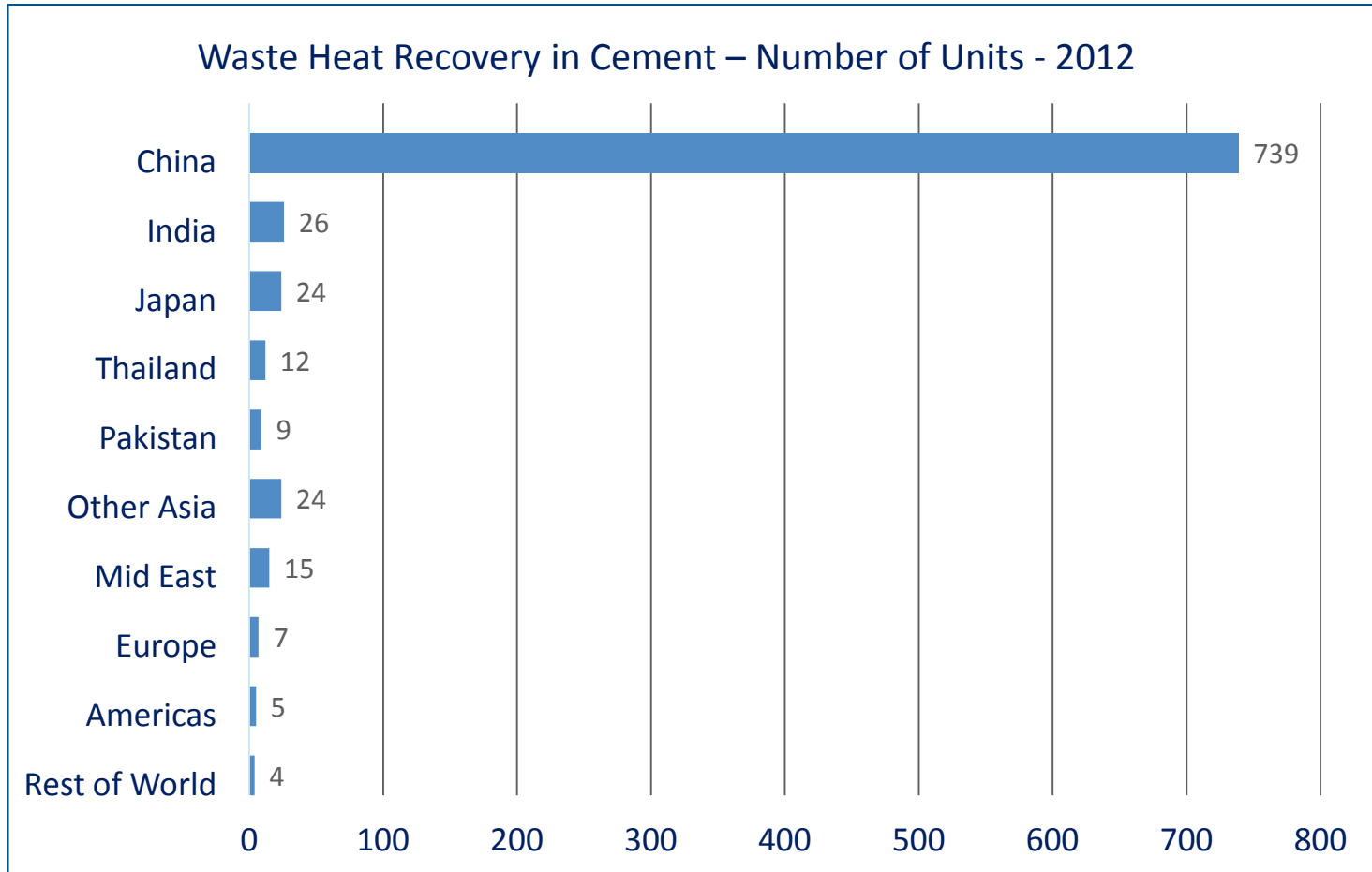
- 2007 – Energy Conservation Law “encourages” rotating kiln technology and waste heat to power
- 2010 – Ministry of Industry and Information Technology requires all new production lines to be equipped with WHR
- 2011 – 12th Five Year Plan (2011 – 2015) sets a target for WHR to be on 65 percent of clinker capacity
- Domestic market nearing saturation.



Source: “Latest Waste Heat Utilization Trends”, OneStone Research, CemPower 2013

Waste Heat Recovery in Cement – Market Status

(Chinese Suppliers now dominate market for WHR in Cement)



Source: "Latest Waste Heat Utilization Trends", OneStone Research, CemPower 2013

Energy Management Systems is an Important Next Step in China's Efficiency Program

- EnMS piloted in 11th FYP in a small group of enterprises and Shandong Province
 - Shandong interested in EnMS for more effective implementation of efficiency regulations and investments, and to promote continuous improvement
- Shandong issued its own EnMS standard, implementation guidelines and training programs, piloted EnMS in key enterprises, and developed a plan for broader roll out
- Central Government issued a broad national EnMS standard in 2009 – GB/T 23331
- EnMS a key part of Top 10,000 program in 12th FYP

Energy Management Systems Implementation

- 2012
 - GB/T 23331 revised to more closely follow ISO 50001 in 2012
- 2013
 - EnMS Implementation guidance for Iron and Steel
 - EnMS Implementation guidance for Cement
 - EnMS Implementation guidance Plate Glass
- 2014
 - EnMS Implementation guidance for Thermal Power
 - EnMS Implementation guidance for Coke
 - EnMS Implementation guidance Plate Coal Industry
 - M&V guidance on energy performance
- 2015
 - EnMS Implementation guidance for Paper
 - EnMS Implementation guidance for Petrochemicals

Energy Management System Implementation Issues

- Getting management “buy-in”
 - More than a “check off” on a requirements list
- Strengthening support capacity
 - Quality energy audits and assessments
 - Certification organizations
 - Training and education
- Providing implementation support to enterprises
 - Training
 - Tools
 - Guidance

IIP's China Program

Key Activities:

- Develop best practices, case studies, database and tools in support of EnMS implementation in Top-10,000 Enterprises Program
- Assist provincial/local pilot programs to advance Energy Management Systems in key enterprises
- Develop case studies for energy systems optimization in Iron and Steel and chemicals industries



IIP's Support of EnMS in China

- Leverage international and domestic best practices
 - Network of international and Chinese experts
- Support of Dezhou pilot program (Shandong Province)
 - Joint workshops on EnMS with Dezhou Conservation Center
 - Conducted Energy Reviews with three of 52 key enterprises
 - Two paper mills and a large international auto parts supplier
 - Chinese experts for technical audit, international experts for EnMS support
 - Providing technical assistance to enterprises during implementation (what next?)
- Developing Energy Review Guidance for Chinese enterprises

IIP's Support of EnMS in China

- Additional pilot program support in Jiangsu and Sichuan provinces
 - In conjunction with World Bank program
- Promotion of EnMS through supply chain project with CDP (*Action Exchange*)
 - Energy scans to suppliers in Shanghai area

Objectives

- Build capacity at the provincial and city/county level
- Help roll out EnMS programs to other regions
- Provide limited technical support for early adopters
- Develop key tools and guidance documents
- Assist in training third party service providers
- *Help establish effective EnMS implementation in China*

Thank You!

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