

Institutionalising Energy Efficiency in China

Second Australian Summer Study on Energy Efficiency
Sydney, 27 February to 1 March 2013

David Crossley

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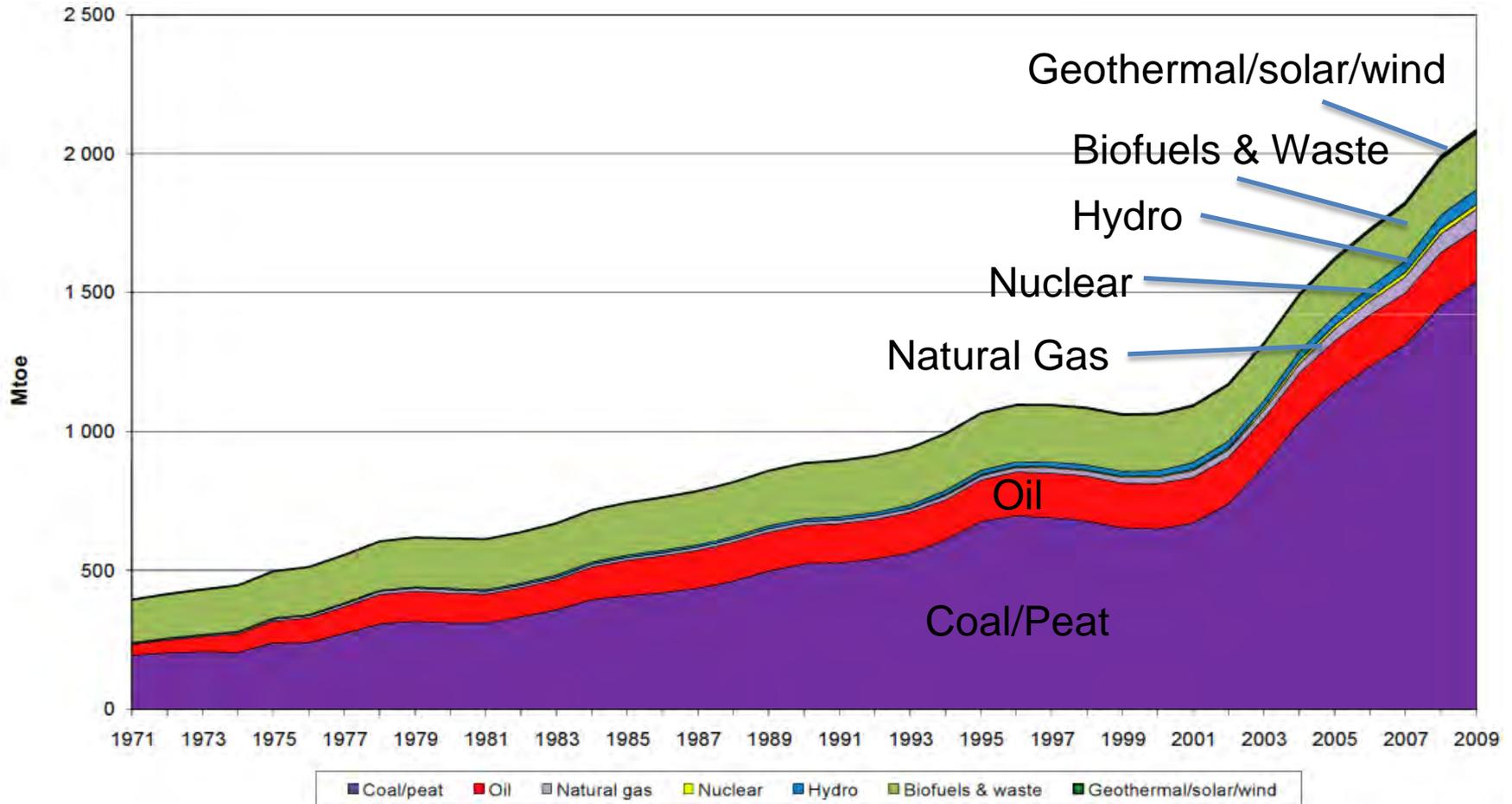
Presentation Topics

- Overview of energy production and energy use in China
- Development of energy conservation policies and programs in China
- Energy efficiency and carbon targets in China
- Institutionalisation of energy efficiency in China

Overview of Energy Production and Energy Use in China

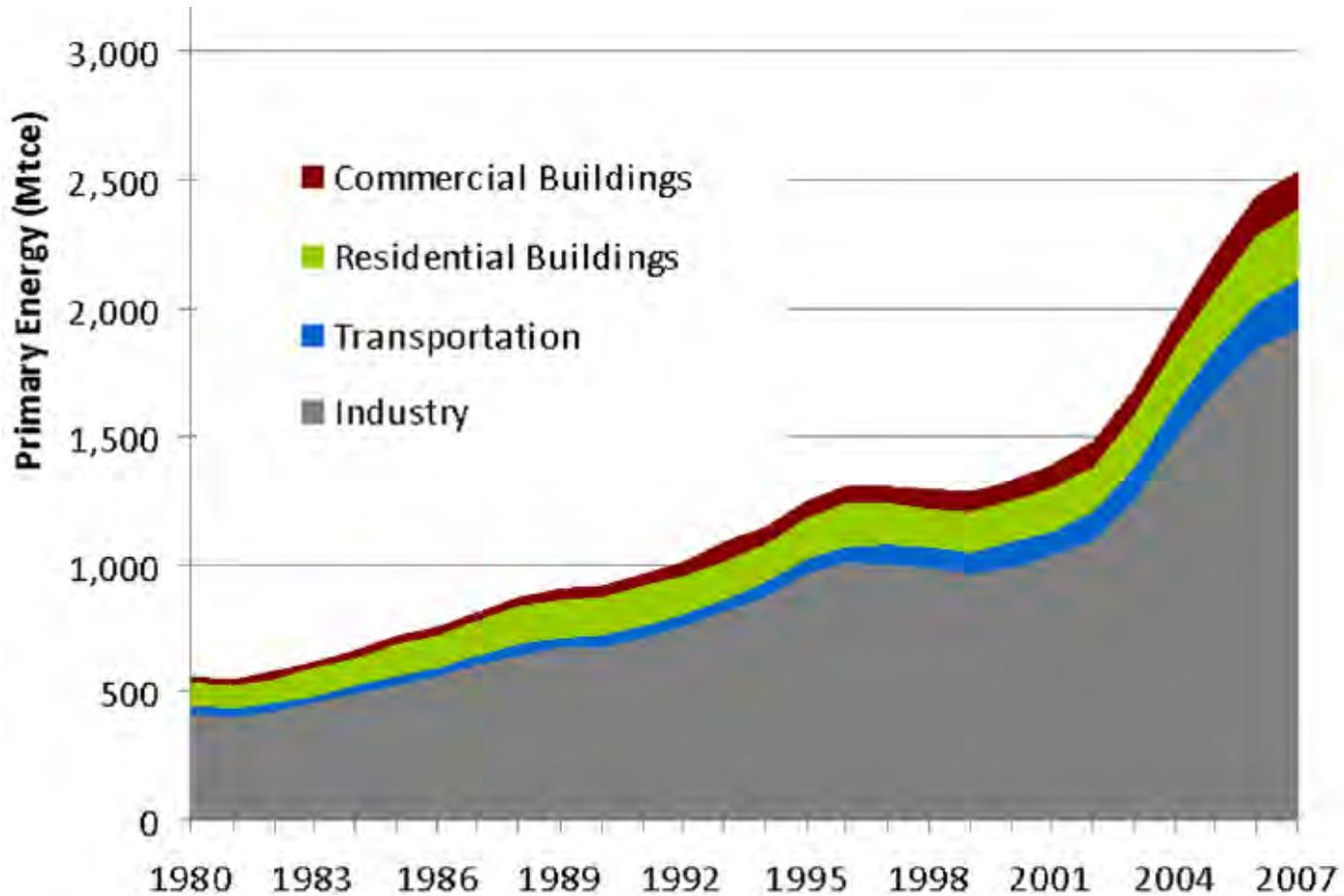
Energy Production in China 1971 to 2009

(Mtoe)



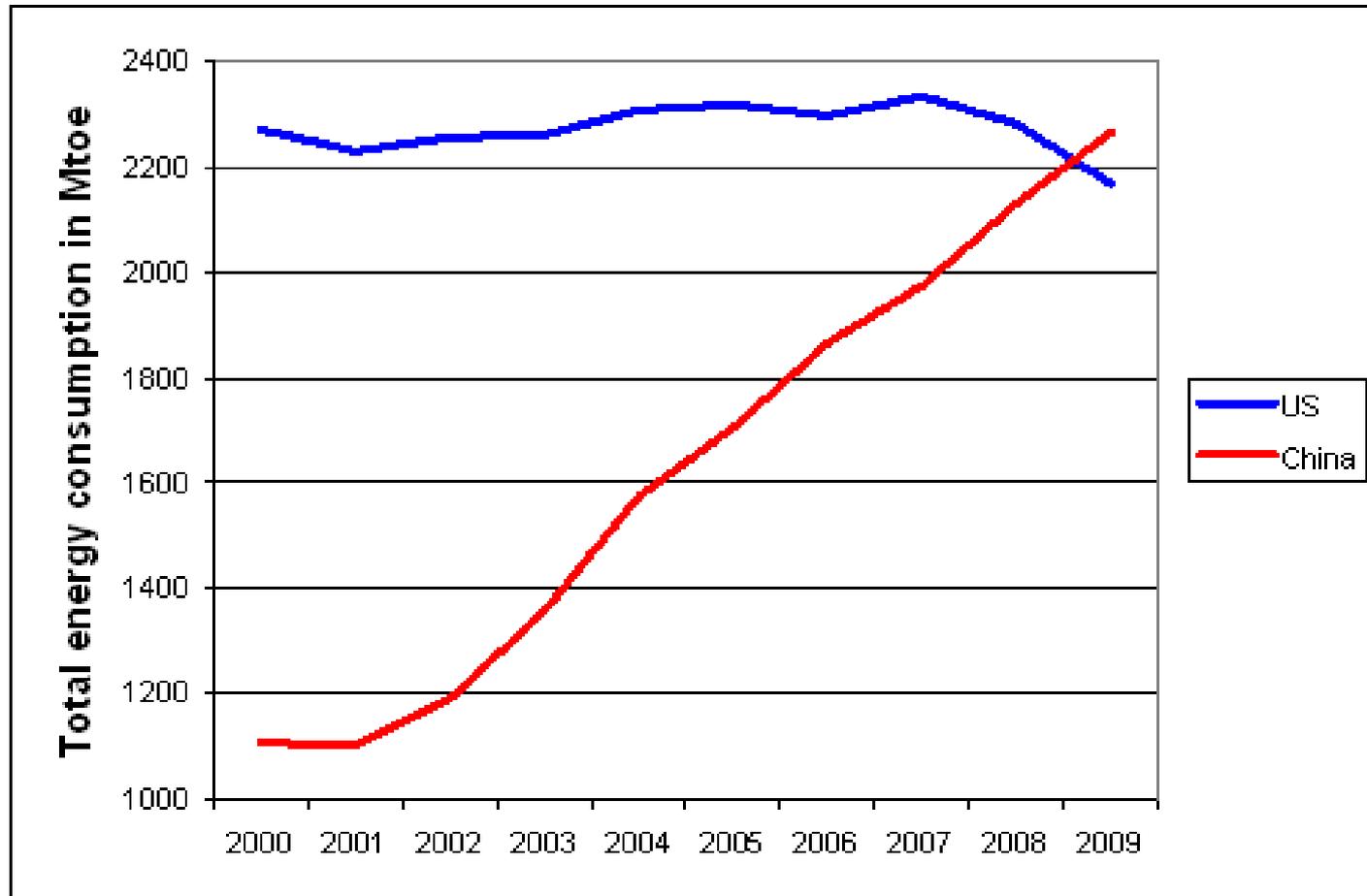
Source: International Energy Agency

Energy Use in China 1980 to 2007 (Mtce)



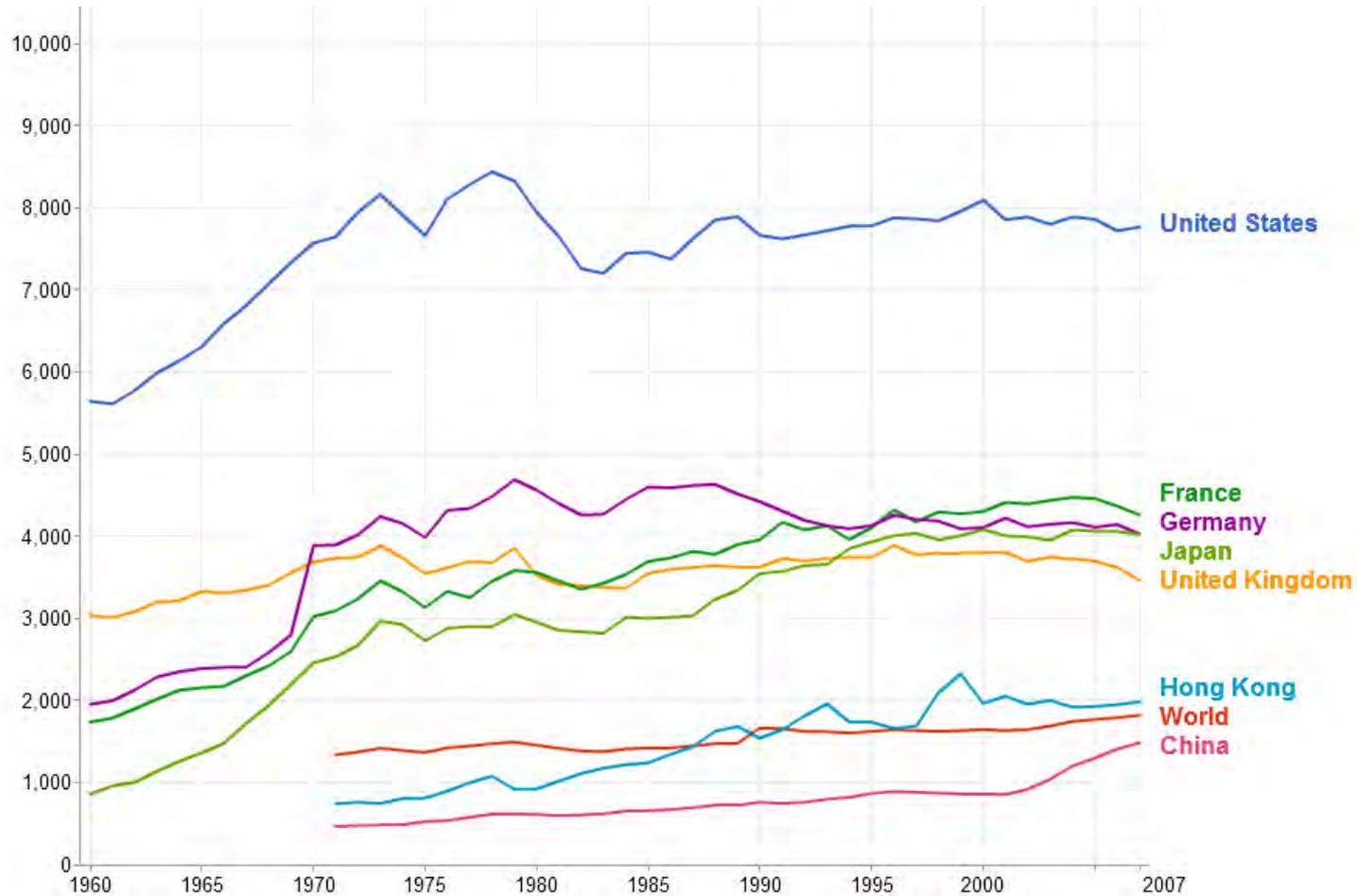
Source: Lawrence Berkeley National Laboratory

Energy Use in China and US 2000 to 2009 (Mtoe)



Source: International Energy Agency

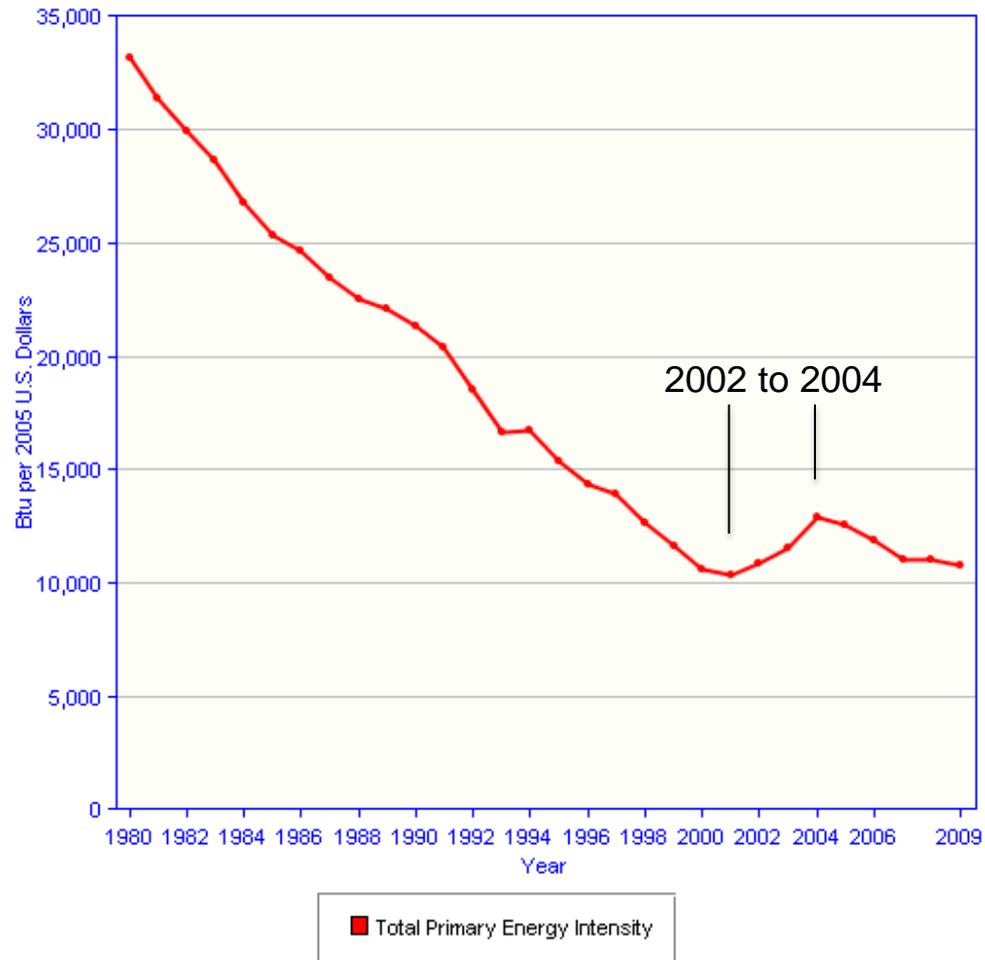
Primary Energy Use Per Capita 1960 to 2007 (kgoe/capita)



Data Source: World Bank World Development Indicators

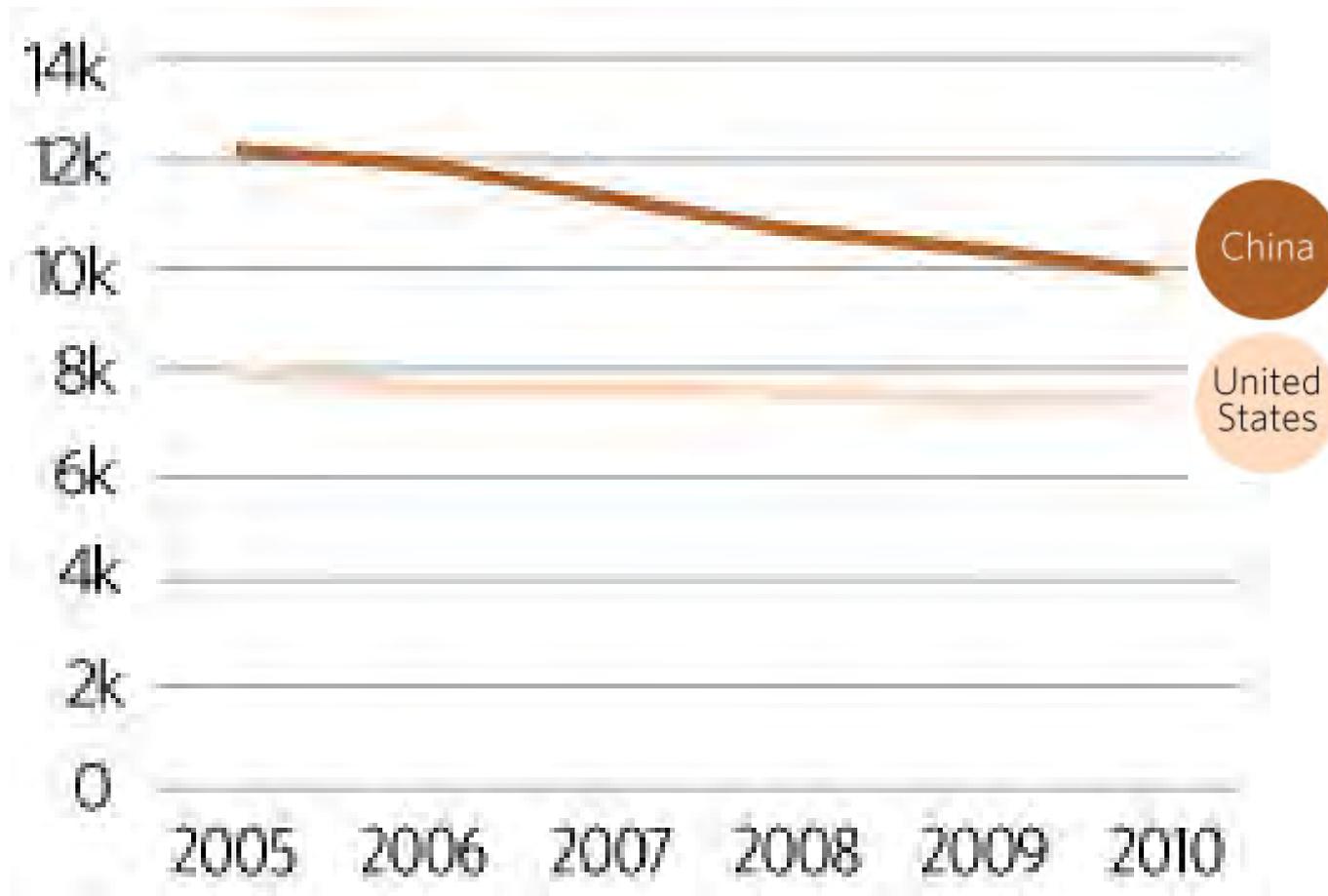
Energy Intensity in China 1980 to 2009

(Btu/GDP in 2005 US\$)



Source: US Energy Information Administration

Energy Intensity China & US 2005 to 2010 (Btu/\$GDP)



Source: Climate Policy Institute / Tsinghua University

Development of Energy Conservation Policies and Programs in China

Government Involvement in Energy Efficiency

- Chinese government involvement in energy efficiency commenced in the 1980s with the establishment of energy conservation agencies with managerial functions at various levels of government
- Energy engineers and energy administrative bodies were also introduced into large- and medium-sized state-owned enterprises, and special personnel were assigned to manage energy conservation
- Over 200 Energy Conservation Centres were set up by local governments and sectoral agencies; their mission was to assist enterprises design energy-efficiency projects, use energy efficient equipment appropriately, and provide training and information
- The Centres were originally supported with government funds, but later became dependent on revenues from sales of their services
- In 1998, prior to a major government reorganisation, there were 180 Centres employing 3,200 people; during the reorganisation some Centres were closed or merged

1997 Energy Conservation Law (1)

- In 1982, parallel with the establishment of the Energy Conservation Centres, work began on drafting an Energy Conservation Law
- In 1984, the central government's main planning body proposed a general outline of the Law and, in 1986, the State Council promulgated interim regulations for managing energy conservation
- In 1990, the planning body released an outline draft of the Law for discussion; this was amended 11 times, and a further draft submitted for review and approval by various government agencies
- In 1993, a draft of the Law was submitted to the State Council (China's Cabinet); and a further amended draft was adopted by the State Council Executive
- In 1995, the draft Law was submitted to the National People's Congress (China's Parliament); it was eventually adopted in 1997, after several further amendments and deliberations
- The whole process, from initial drafting to passage, took 15 years

1997 Energy Conservation Law (2)

- Chinese law comprises policy principles rather than specific provisions
- The 1997 Energy Conservation Law provided a policy framework that enabled China's 33 provincial-level governments to promulgate detailed local bylaws and regulations on energy conservation
- In particular, the Law required all levels of government to arrange funds to implement energy conservation measures and to set limits, in terms of energy consumption per physical unit of product, for products which are energy-intensive to produce
- The Law provided the legal and policy basis for setting jurisdictional and sectoral targets for end-use energy consumption and energy intensity
- The Law also required local governments to establish a system for discontinuing backward, over energy-intensive energy-consuming products and equipment; this led to major programs to close down old, small-scale and inefficient energy-intensive industrial capacity, including small old emissions-intensive power stations

1997 Energy Conservation Law (3)

- The 1997 Law identified key energy-using entities as those with an annual energy consumption equivalent to more than 10,000 tce; these entities were required to appoint an energy manager and to submit periodical reports to government on energy consumption, energy use efficiency and the energy conservation measures they implemented
- The Law also authorised the development of national energy conservation standards that are technically advanced, economically rational, and subject to continuous improvement
- The Law also authorised various levels of government to “supervise and manage” energy conservation work in their jurisdictions
- This led to the establishment of Energy Conservation Supervision Centres – in effect “energy efficiency police” – by many provincial-level governments, with powers to inspect facilities, to levy fines on offenders, and even to close down offenders

2004 Energy Conservation Plan

- In 2004, in response to the increase in energy intensity, the national planning body issued the Medium and Long-Term Energy Conservation Plan; the overriding goal of the Plan was to reduce national energy intensity by 20% between 2005 and 2010
- The Plan specifically defined “Ten Key Energy-Saving Projects”, including: coal-fired industrial boiler retrofits, residual heat and pressure utilization, petroleum saving and substitution, motor system energy saving, and energy system optimization
- The Plan set energy intensity targets for the years 2010 and 2020 for individual energy-intensive industries, including cement, steel, petrochemicals, oil refining, and electricity generation
- The Plan also specified raising energy efficiency standards for major energy-using appliances to international levels by 2010
- In 2007, many of the same targets, objectives and policies appeared in both the 11th Five-Year Plan and the China National Climate Change Program

2007 Energy Conservation Law (1)

- In 2007, the National People's Congress passed an amended Energy Conservation Law to strengthen the provisions of the 1997 Law, which by that time was largely ignored
- The 2007 Law significantly increases the importance of energy efficiency by specifying: “The state implements an energy strategy of promoting conservation and development concurrently ***while giving top priority to conservation***”
- The 2007 Law includes a provision that the state “will implement a system of accountability for energy conservation targets and a system for energy evaluation whereby the fulfilment of energy conservation targets is taken as one part of the evaluation of local people's governments and their responsible persons”
- The Law therefore makes achievement of energy efficiency targets a component of the performance evaluation of local governments and their officials

2007 Energy Conservation Law (2)

- The 2007 Law requires reports to government by key energy-using entities to be made annually; in addition to the requirements under the 1997 Law, these reports must also contain information about whether the entity's energy conservation targets were achieved
- The 2007 Law authorises the imposition of penalties on key energy-using entities that fail to achieve targets or implement energy conservation measures; this covers more than 15,000 enterprises
- The Law also authorises the implementation of a system of differential electricity pricing whereby enterprises in some energy-intensive industries can be charged higher prices if their operations fail to meet energy intensity targets
- Differential electricity pricing is applied to energy-intensive enterprises in eight industries; enterprises are divided into three categories according to resource consumption and technology level; inefficient enterprises pay surcharges on the standard price

1000 Enterprise Program

- In 2006, the central government established the 1000 Enterprise Program, a new system for agreements between government and individual enterprises on specific enterprise energy savings targets, and monitoring and supervision of compliance with these targets
- The government requires the top 1,008 energy-using enterprises to participate in the program; together they account for about one-third of China's total energy use
- Agreements on energy conservation measures and energy savings targets are established in energy savings responsibility contracts
- Central government agencies set the objectives, targets, scope, and implementation guidelines in the contracts; provincial-level governments are in charge of most of the details of implementation; progress in each individual enterprise is evaluated annually
- Provinces and prefectures have signed energy savings responsibility contracts with thousands of additional key energy-using enterprises

Energy Efficiency in Buildings

- In 1986, China adopted its first mandatory national energy efficiency building codes; these were for new residential buildings in the cold region and in the severe-cold region
- Codes were adopted for the hot-summer-cold-winter region in 2001, the hot-summer-warm-winter region in 2003, and for new public and commercial buildings in 2005
- These codes are being progressively updated
- In recent years, China has put significant emphasis on code compliance and enforcement and there has been a sharp increase in compliance by new residential buildings
- New programs have been established for energy conservation retrofitting of existing buildings
- Progress has also been made on the reforms necessary to achieve significant energy savings in buildings served by district heating schemes in northern China

Support for an Energy Services Industry

- The ESCO industry in China was launched as part of a deliberate plan by the Chinese government with support from the World Bank
- In 1995/96 the World Bank and the government agreed to mobilize technical and financial assistance to introduce and develop energy performance contracting (EPC) in China
- Funding was provided to three new pilot Chinese ESCOs that were started with assistance from three provincial-level governments; this provided the three pilot ESCOs with a dedicated large line of credit to assist with making the EPC business model actually work
- Subsequently, private sector ESCOs were started and the industry grew rapidly so that in 2011 there were about 3,900 ESCOs in China
- In 2010, the State Council issued a policy document instructing local governments and ministries to support development of the industry
- The government also extended its existing financial incentives for energy conservation to cover qualified EPC projects

Grid Company Energy Efficiency Obligation

- From January 2011, the central government placed an energy efficiency obligation on State Grid and China Southern Grid, the two large government-owned combined electricity transmission, distribution and retail companies
- The obligation requires the grid companies to achieve energy savings of at least 0.3% in sales volumes and 0.3% in maximum load compared with the previous year
- The obligation also lays a foundation for the expansion of demand response programmes by requiring the installation of load monitoring equipment on 70% of the peak load, and load control equipment on 10% of the peak load, in any locality
- The energy and demand targets set by the obligation can be met with end-use energy savings from all economic sectors and from any facility; in addition, reduction of losses in transmission and distribution networks can also be used to meet part of the targets

Energy Efficiency and Carbon Targets in China

Recent Energy Efficiency and Carbon Targets

- **11th Five-Year Plan (2006-2010)**
 - Energy intensity target – 20% reduction
Actual reduction achieved was 19.1%
- **12th Five-Year Plan (2011 to 2015)**
 - Energy intensity target: 16% reduction
 - Carbon intensity target: 17% reduction
 - These are “mandatory/binding targets”
- **Total Annual Primary Energy Consumption Target**
 - Capped at 4.0 Gtce by 2015
 - This is a “non-binding” target
- **Medium-term Carbon Target**
 - Carbon intensity target: 40 to 45% reduction by 2020

Setting of Energy Efficiency Targets (1)

- Setting of energy efficiency targets started in earnest in the 2004 Energy Conservation Plan and has expanded since then
- China's leadership continues to insist that achieving energy efficiency targets is essential
- National level targets are set by the central government, and are then subdivided and assigned with clear accountabilities for delivery to provincial-level governments and to administrators of key national programs
- Provincial-level targets are set by the State Council, based on submissions from provincial-level governments that include factors such as: the development level, industrial structure, energy intensity, total energy consumption, per capita energy consumption, and the level of energy self-supply in the province

Setting of Energy Efficiency Targets (2)

- Energy efficiency targets for lower levels of government at the prefectural and county levels are allocated and supervised by provincial-level governments
- Targets for individual enterprises under energy savings responsibility contracts are set by the central government for large energy users and by lower levels of government for smaller users
- Performance against these targets is evaluated and enforced by officials from Energy Conservation Supervision Centres – the “energy efficiency police”
- Individual government officials may be subject to penalties and/or sanctions if energy efficiency targets in their areas of responsibility are not met

Top 10 Energy Intensity Reduction Results

Province/ Municipality	Energy Intensity (tce/10,000 RMB)		Target Reduction for 11 th Five-Year Plan	Actual Reduction Achieved	Target Reduction for 12 th Five -Year Plan
	2005	2010			
Beijing	0.792	0.582	20%	26.5%	17%
Hubei	1.510	1.183	20%	21.7%	16%
Tianjin	1.046	0.826	20%	21.0%	18%
Chongqing	1.425	1.127	20%	21.0%	16%
Heilongjiang	1.460	1.156	20%	20.8%	16%
Shanxi	2.890	2.235	22%	22.7%	16%
Inner Mongolia	2.475	1.915	22%	22.6%	15%
Fujian	0.937	0.783	16%	16.5%	16%
Guangdong	0.794	0.664	16%	16.4%	18%
Yunnan	1.740	1.438	17%	17.4%	15%

Source: China National Development and Reform Commission

Institutionalisation of Energy Efficiency in China

Institutional Benefits

As identified by Bob Taylor, formerly of the World Bank

- China's comprehensive energy conservation policies and programs, particularly since 2006, have achieved a high level of attention among all groups at all levels on how to achieve energy efficiency
- These activities have yielded a wealth of new ideas, development of a host of new major programs, promulgation of many new and relatively advanced regulations, and a large organizational effort with massive investments of human resources and money
- The institutional gains include:
 - the new legal and regulatory foundations put in place,
 - design and implementation experience in a large number of new major programs,
 - capacity building at all levels, and generation of innovative new approaches

New Policies and Programs

- New systems have been established to allocate and supervise mandatory energy conservation targets for key energy-using industries, and to provide technical and financial support to help these industries achieve their targets
- Large new programs have been implemented to eliminate particularly wasteful industrial plant and to assess the energy efficiency characteristics of proposed new large projects
- Enforcement of national energy efficiency codes and standards has been strengthened
- New public energy efficiency funds have been set up and energy pricing policy adjustments have been implemented
- A new energy services industry has been developed from scratch
- A new energy efficiency obligation has been placed on the two large grid companies that supply electricity to the majority of China

The Challenge for Market-Based Mechanisms

- The overall result has been to institutionalise energy efficiency in China, so that efficiency is now almost automatically considered when new industrial or building projects are being developed or major refurbishments are being planned
- This result has been achieved almost entirely through administrative and regulatory mechanisms which were appropriate when China's economy was entirely based on government command and control
- With the continuing move to a more market-based economy, market-based mechanisms to achieve energy savings are now being developed
- It remains to be seen whether these new mechanisms will be as effective as the existing policies and programs in maintaining the ongoing reduction in the level of energy intensity in China

About RAP

The Regulatory Assistance Project (RAP) is a global, non-profit team of experts that focuses on the long-term economic and environmental sustainability of the power and natural gas sectors. RAP has deep expertise in regulatory and market policies that:

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Global
US
China
EU

The Regulatory Assistance Project

Home Office (US)
50 State Street, Suite 3
Montpelier, Vermont 05602

phone: 802-223-8199
fax: 802-223-8172

www.raponline.org