

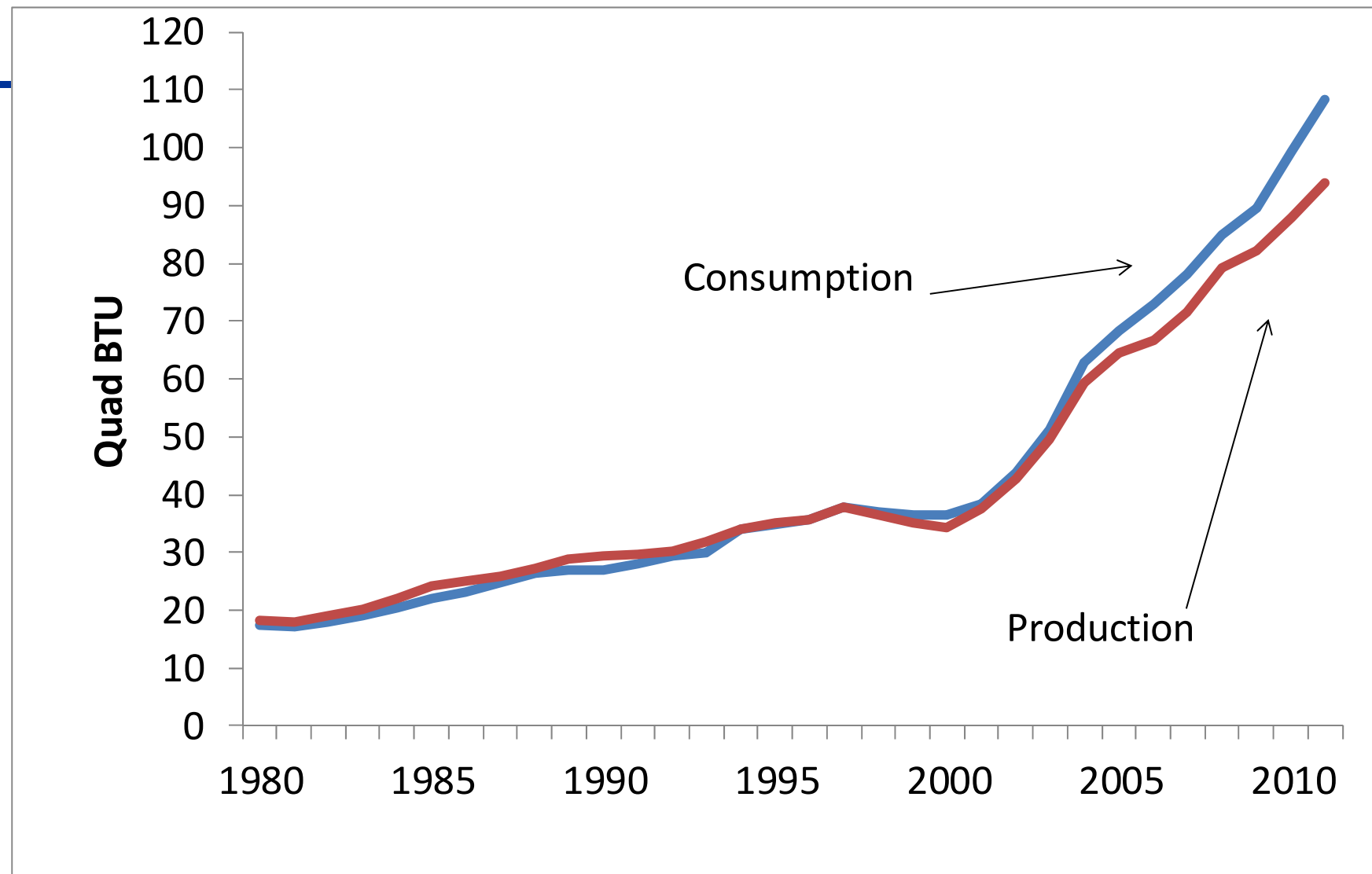
ENERGY
STUDIES
INSTITUTE

"China's domestic and international energy strategies: recent trends and outlook"

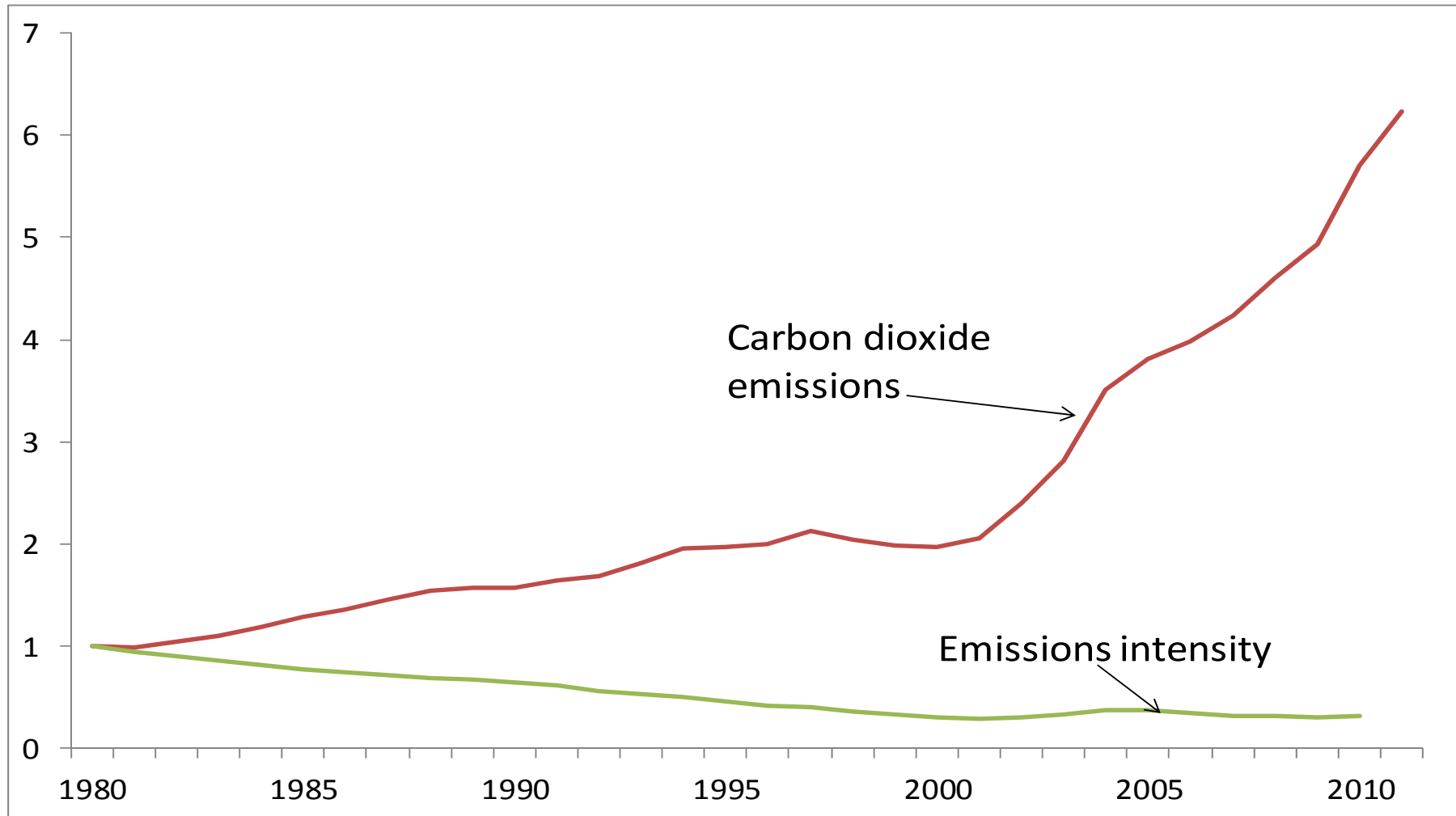
Philip Andrews-Speed

1. INSIDE CHINA

Energy production and consumption, 1980-2011



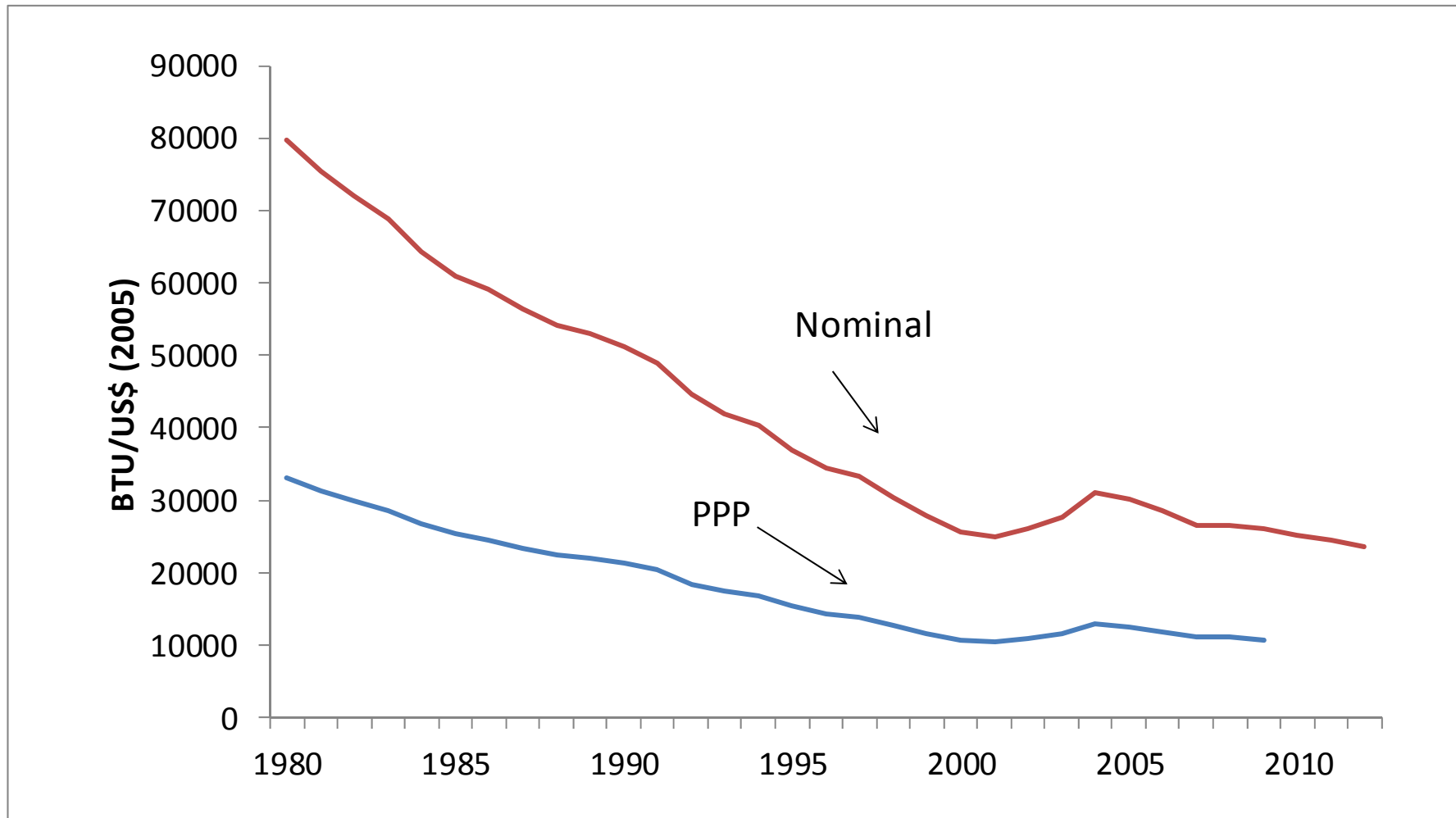
Normalised emissions 1980-2011



Structure of primary energy consumption

	1980	1985	1990	1995	1999	2000	2005	2011
Coal	72.2 %	75.8 %	76.2 %	74.6 %	66.1 %	61.4%	69.5%	70.5%
Oil	20.7 %	17.1 %	16.6 %	17.5 %	23.2 %	28.6%	21.0%	17.5%
Natural gas	3.1 %	2.2 %	2.1 %	1.8 %	2.2 %	2.7%	2.7%	4.5%
Hydro-electricity	4.0 %	4.9 %	5.1 %	6.1 %	6.6 %	6.8%	5.8%	6.0%
Nuclear & renewable								1.5%

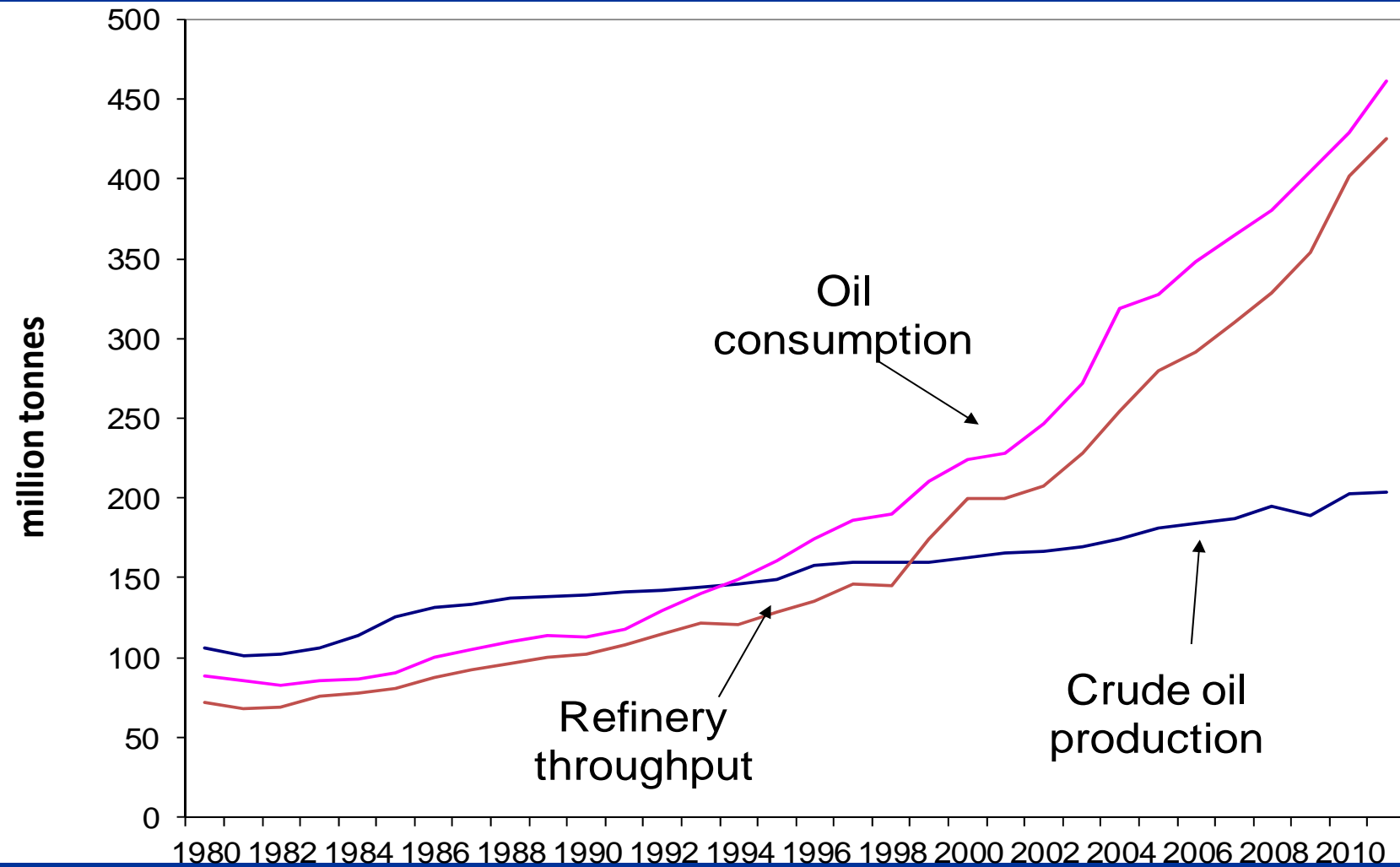
Energy intensity, 1980-2012



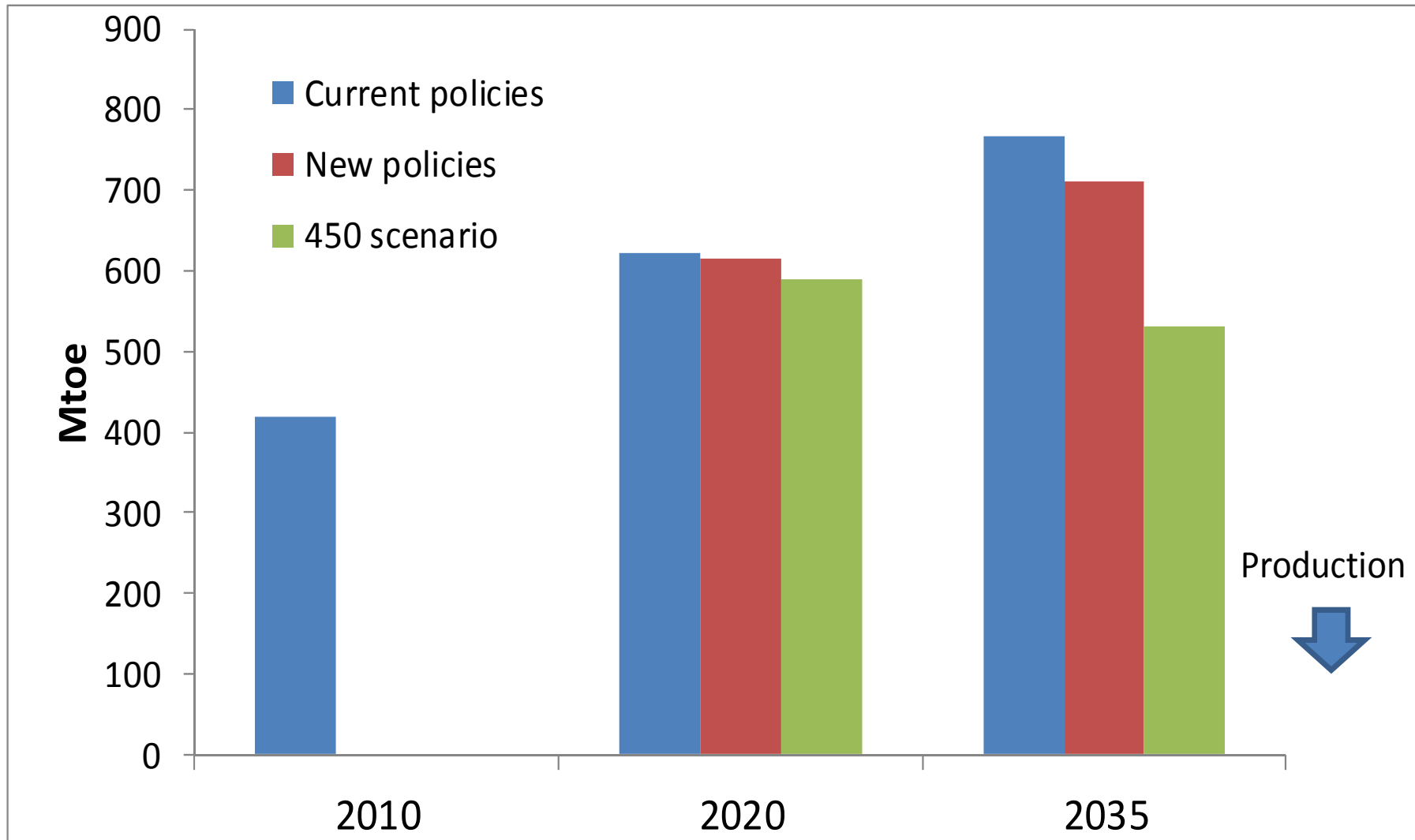
Energy efficiency strategy since 2004

- Amendment of the *Energy Conservation Law*
- *Medium & Long-term Plan for Energy Conservation*
- Ten key energy-efficiency projects
- **Top-1000 Enterprises Energy Conservation Programme**
- Energy-intensity reporting system
- Energy-efficiency labelling; policy on small motor vehicle engines
- *Programme on Energy-Saving Technology Policies*
- Government procurement & energy management
- **Closure of old, inefficient plant**
- Discriminatory energy pricing

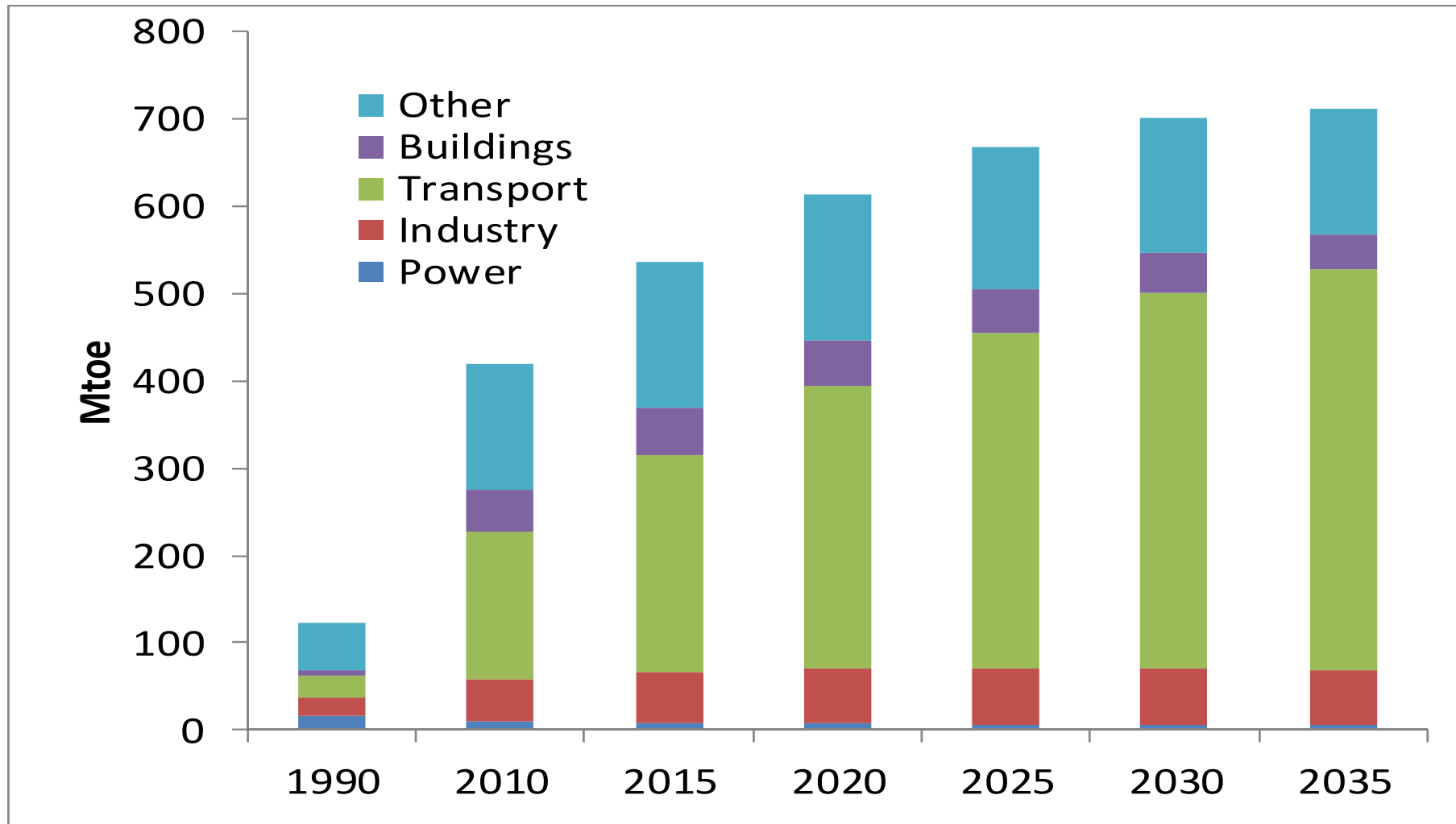
China: oil supply and demand 1980-2011



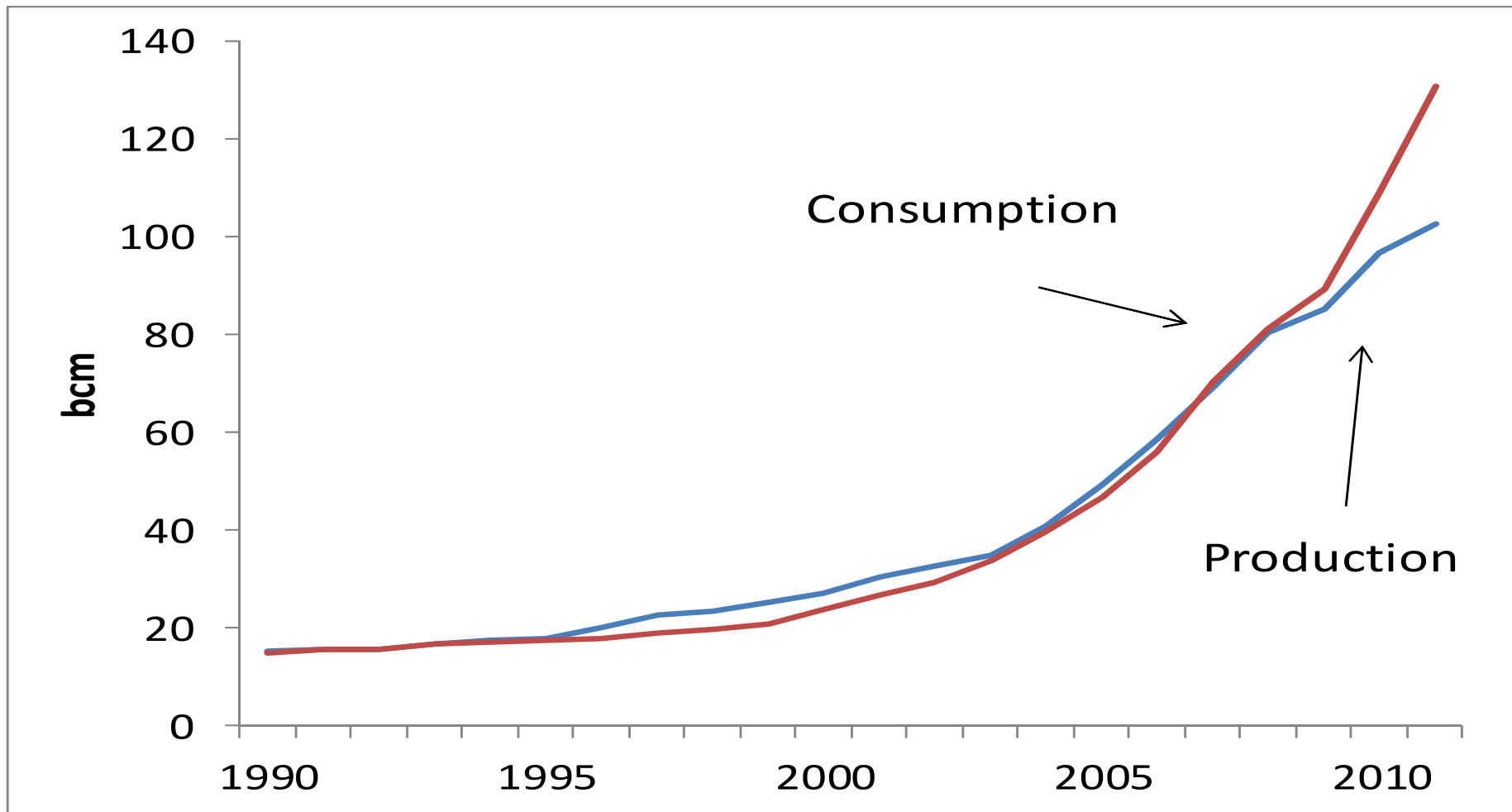
China's future oil demand



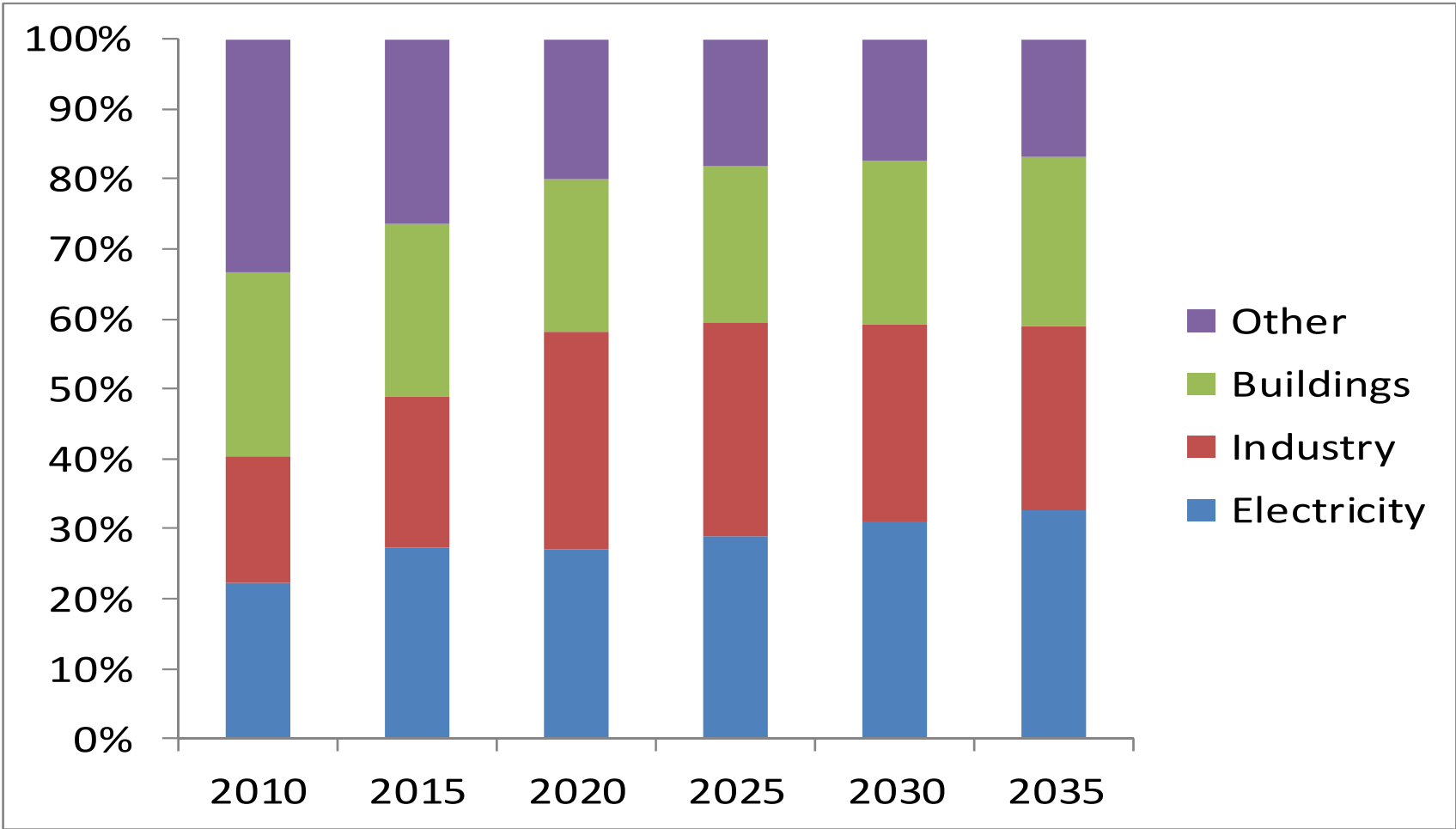
China's end use for oil (new polices)



Gas supply and demand, 1990-2011



Projected end-use for gas (new policies)



Elements of China's oil & gas strategies

Domestic

- Maximise production
- Maximise refining
- Build pipelines
- Ports/terminals/shipping
- Build storage
- Coal to liquids, biofuels
- Fuel consumption standards
- Gas/electric vehicles
- Urban mass transport

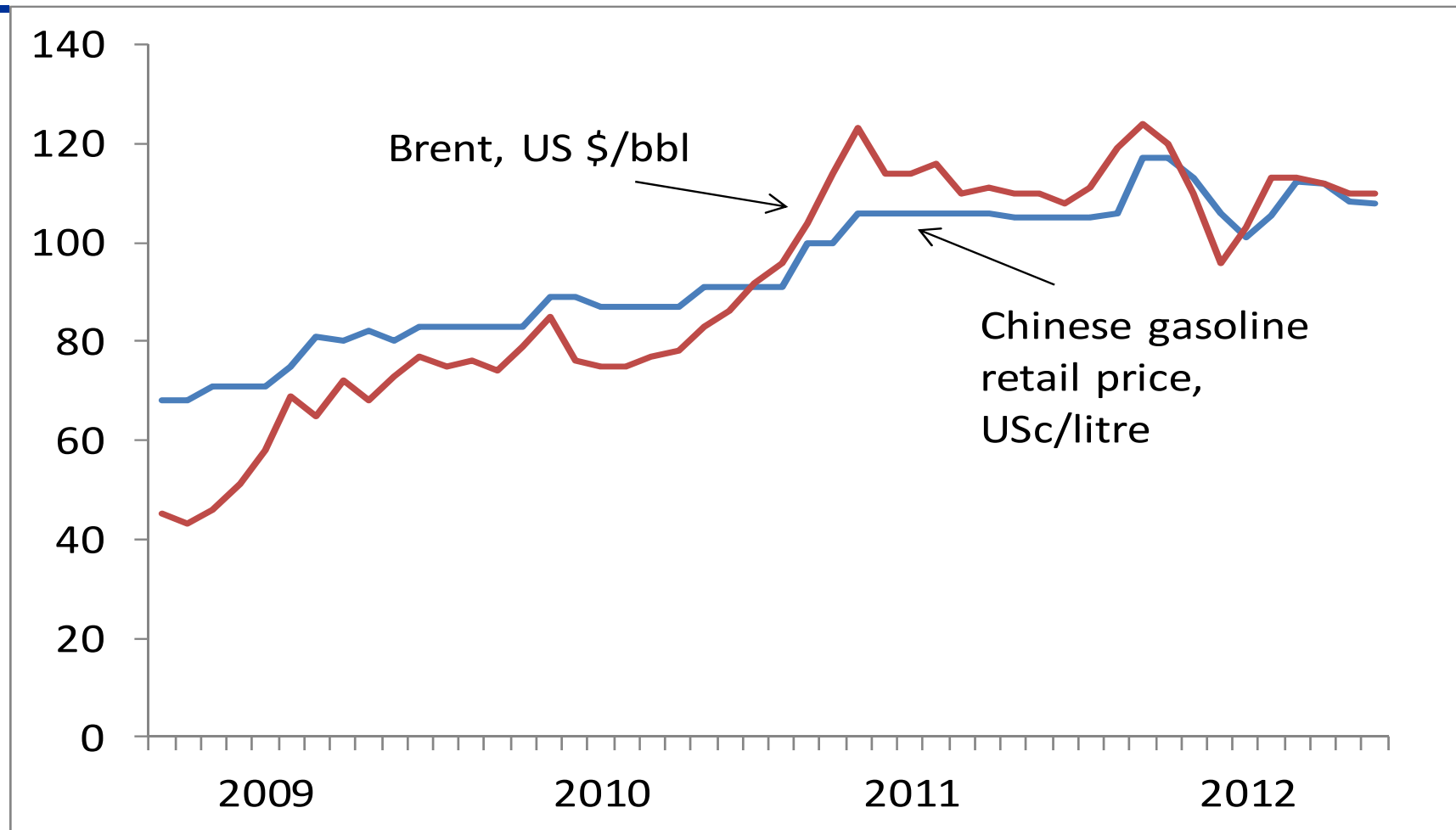
BUT

- Encouraging private road transport, air travel
- Fuel pricing/tax

Overseas

- Diversify imports
 - Maximise crude imports of product imports
 - Long-term contracts/relationships
 - Overland import (pipe/rail)
- Overseas investment
 - Exploration & production
 - Refining
- Oilfield services & construction
- Inward investment from foreign NOCs
- 'Loans for oil', debt relief
- Diplomacy, aid

China's retail oil price



China's gas policy

- Before mid-1990s:
 - Gas priced very low, for fertilizer
 - Local gas use for energy in Sichuan and NE China
- Mid 1990s to 2010:
 - Support for domestic gas production
 - Including tight gas and coal-bed methane
 - Additional energy supplies, environment
 - Fluctuating support for gas imports
- 2010 onwards:
 - Surge of interest in shale gas

Today's gas prices

- Pricing – set by government
 - Well-head prices:
 - For industrial use Y 1.2-1.6/cu metre (US\$ 5.1-6.9/m BTU)
 - For residential use: Y 0.8-1.2/cu metre (US\$ 3.4-5.1/m BTU)
 - City gate price: well head price + transport tariff
 - Transport tariff: Y 0.116-0.9/cu m (US\$ 0.5-4.0/m BTU)
 - Experiment to link to oil prices
 - End user tariffs: depends on mix of gas sources and distribution mark up
- Pipelines:
 - Notably West-East pipeline
- China has little low cost gas (2-3 time coal price/m BTU)

Pipelines: planned and actual

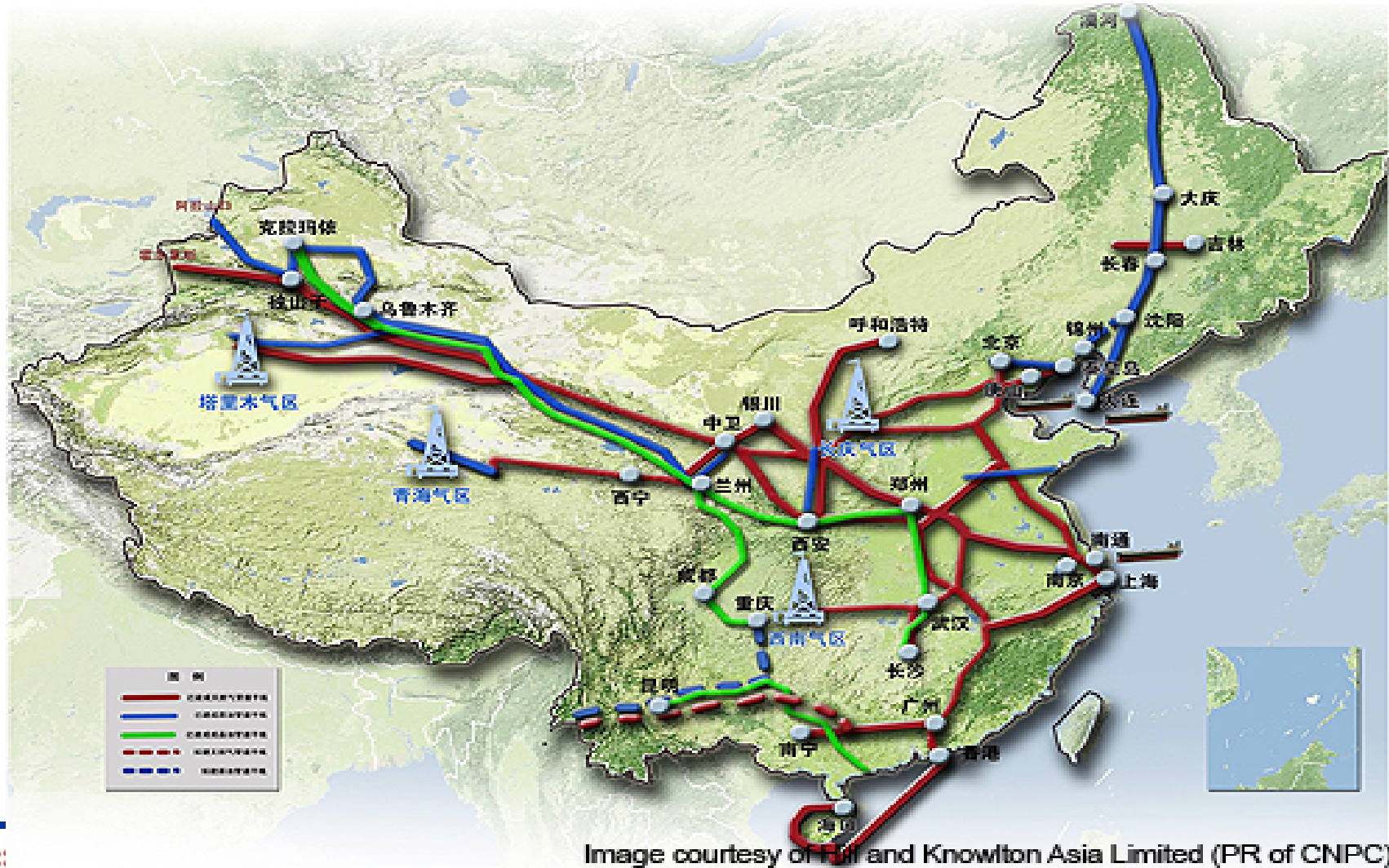


Image courtesy of Hill and Knowlton Asia Limited (PR of CNPC)

Shale gas

- Probably substantial resource
 - Two bidding rounds
 - Price subsidy
 - Many complications will constrain production rise:
 - Geological information & conditions
 - Technological adaptation
 - Legal
 - Sector politics
 - Actors
 - High costs - Pricing
 - Water, environment, social
-

China's energy challenges (past)

- 'Keeping the lights on'
 - Maintaining growth of energy supply to support economic growth and social expectations
- At the same time:
 - Providing access to energy at 'acceptable' prices
 - Constraining environmental damage:
 - Local, regional, global
- Through:
 - Commercialised, state-owned energy companies
 - Massive investment in new energy production & transmission infrastructure
 - Government control of energy prices
 - Sustained efforts on energy efficiency since 2004

China's energy challenges (current)

- Constraining rate of growth of energy demand
 - Structure of economy
 - Energy efficiency and energy conservation
- Reducing role of coal & increasing role of natural gas (+ nuclear + renewables)
 - More expensive
- Transport policy
 - Energy demand
 - Fuel mix
- How to achieve goals???

2. INTERNATIONAL STRATEGIES

Elements of China's oil & gas strategies

Domestic

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- Maximise refining
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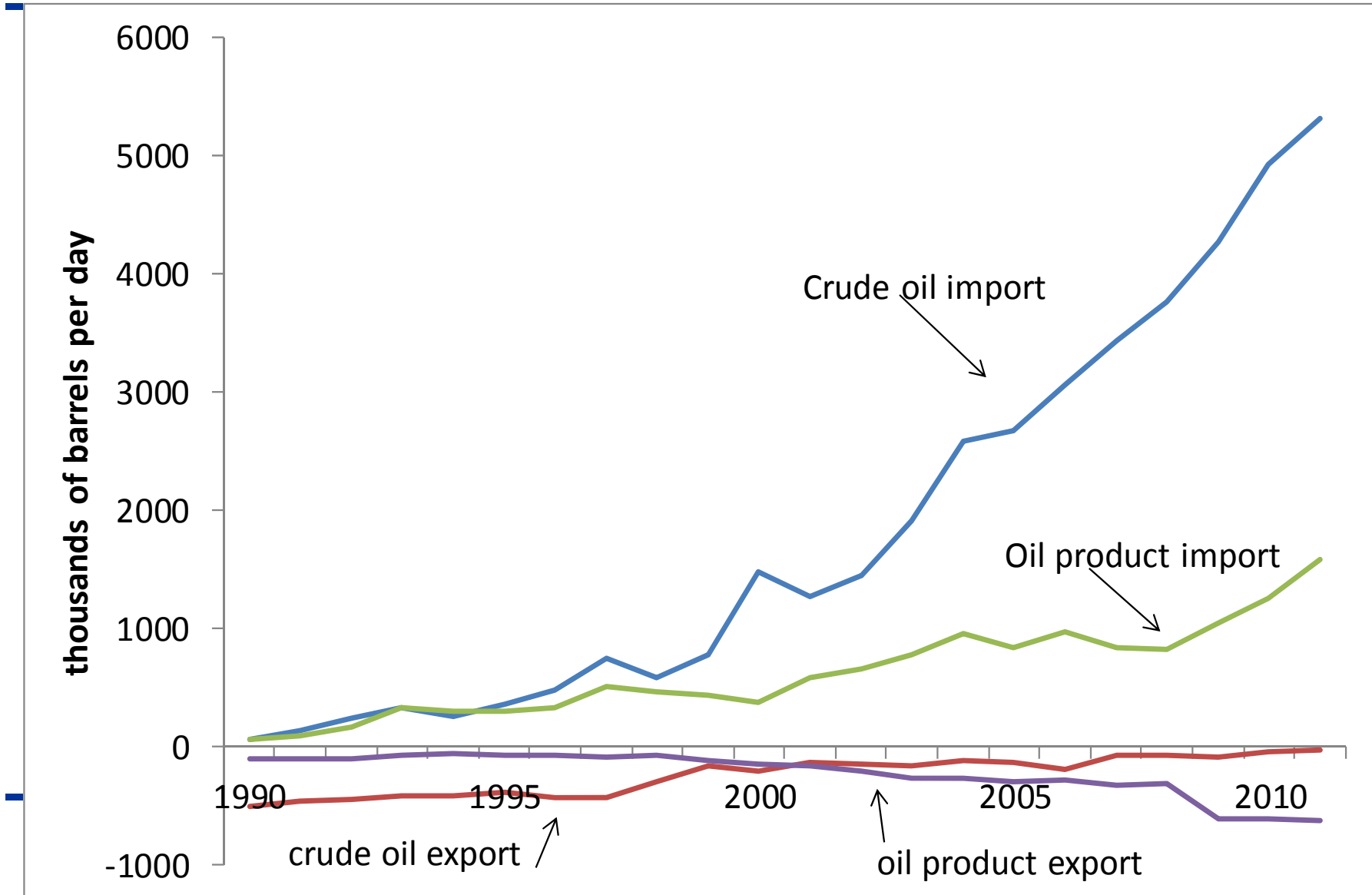
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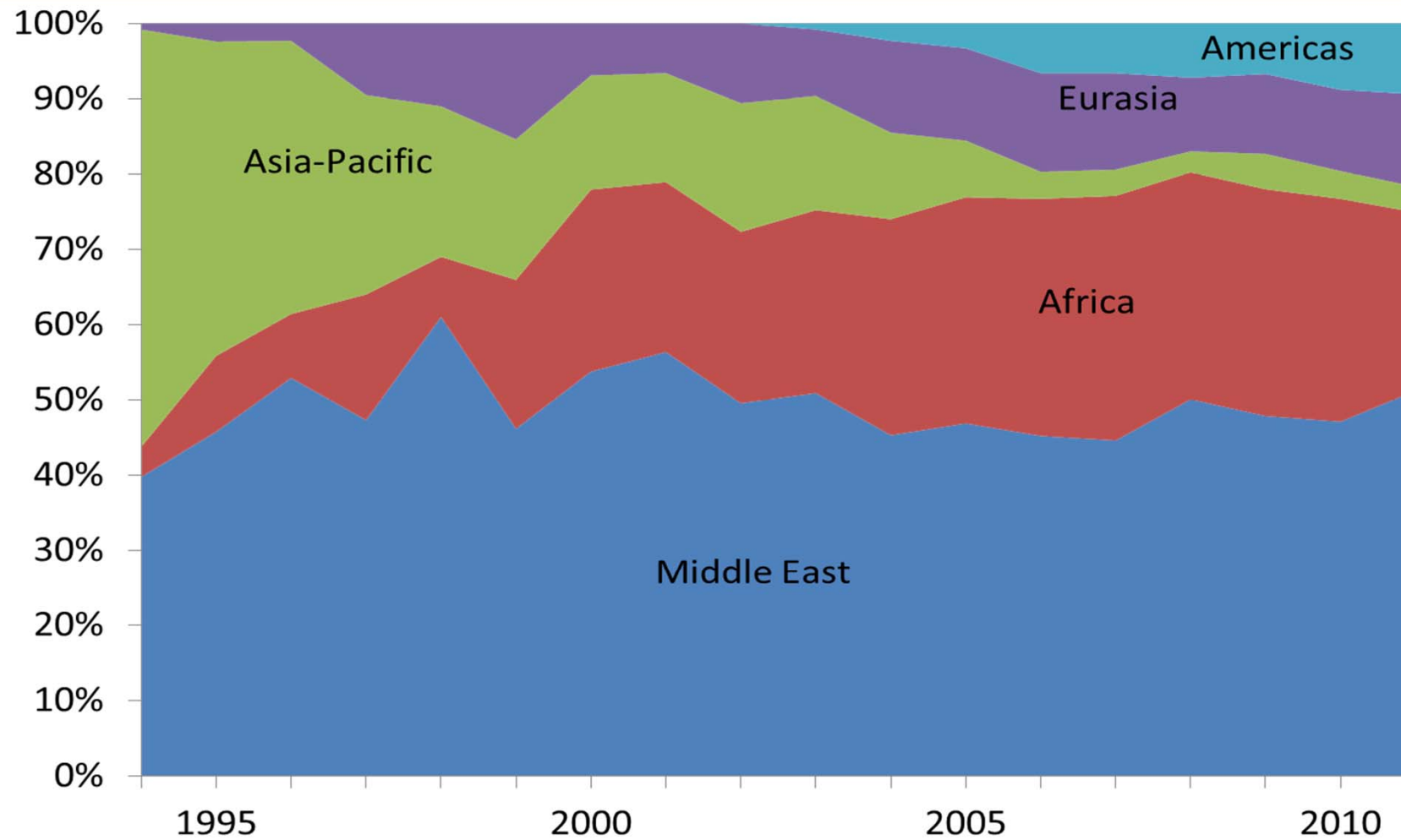
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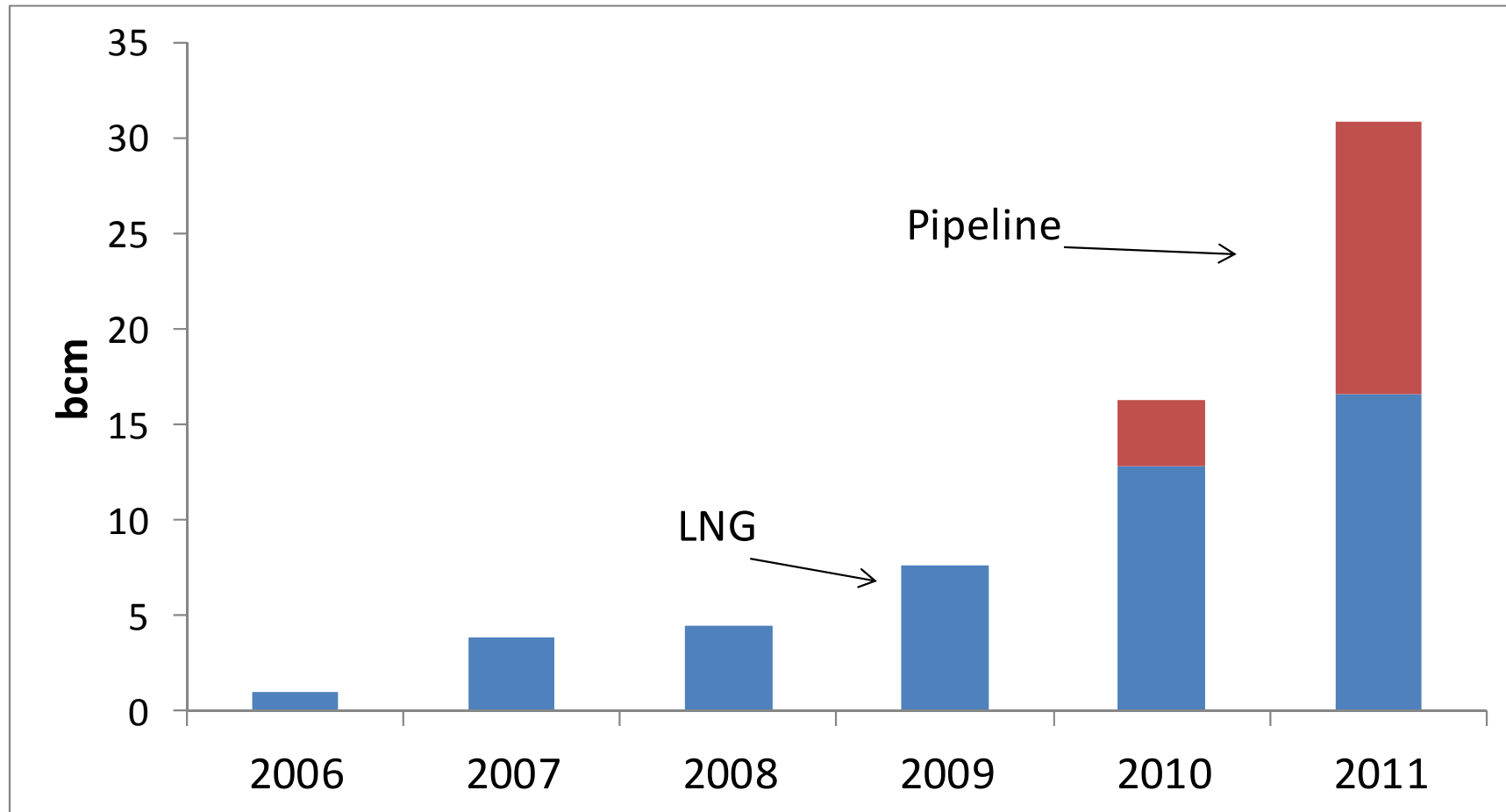
Oil trade 1990-2011



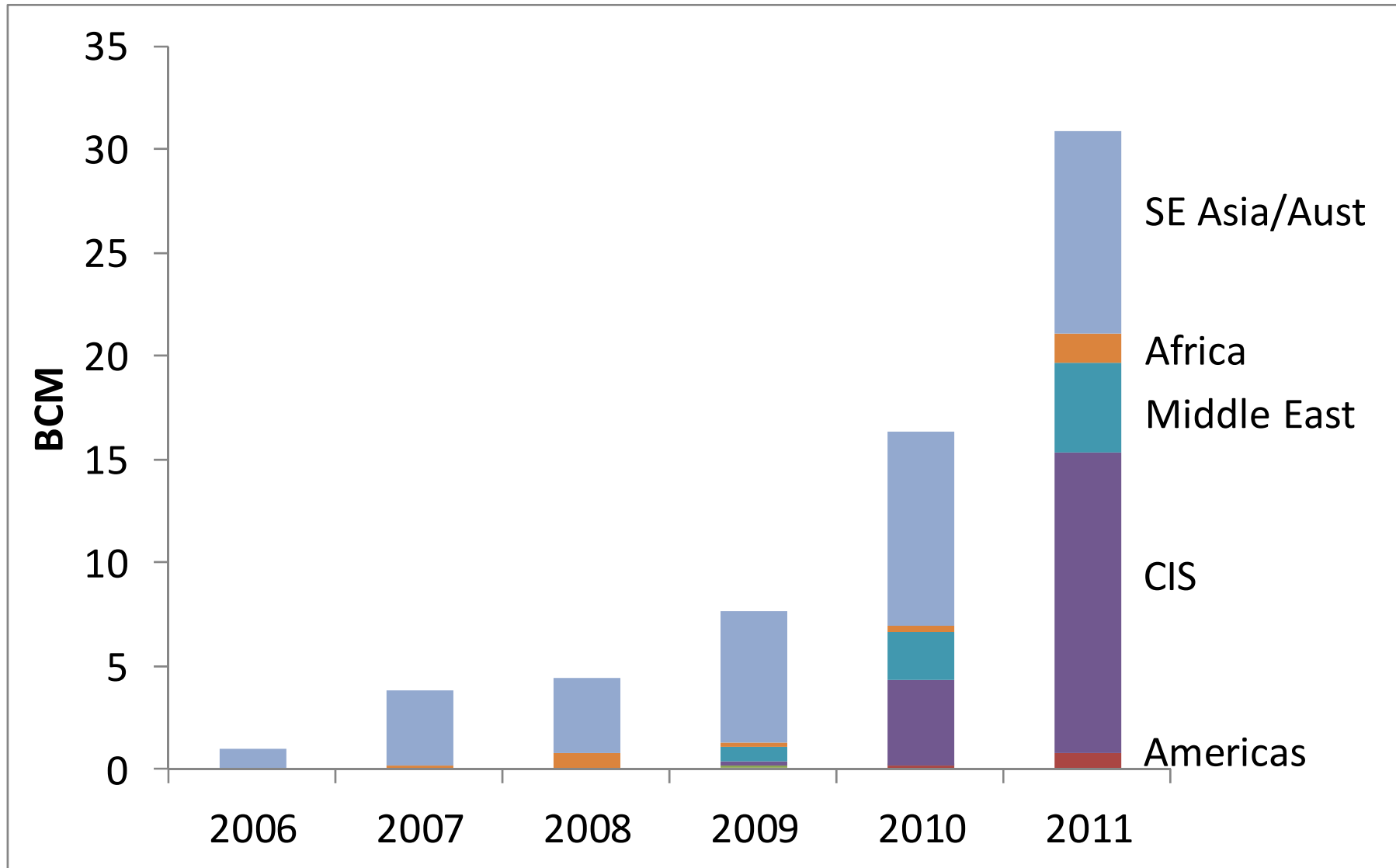
Sources of China's crude oil imports, 1995-2011



China's gas imports, 2006-2011



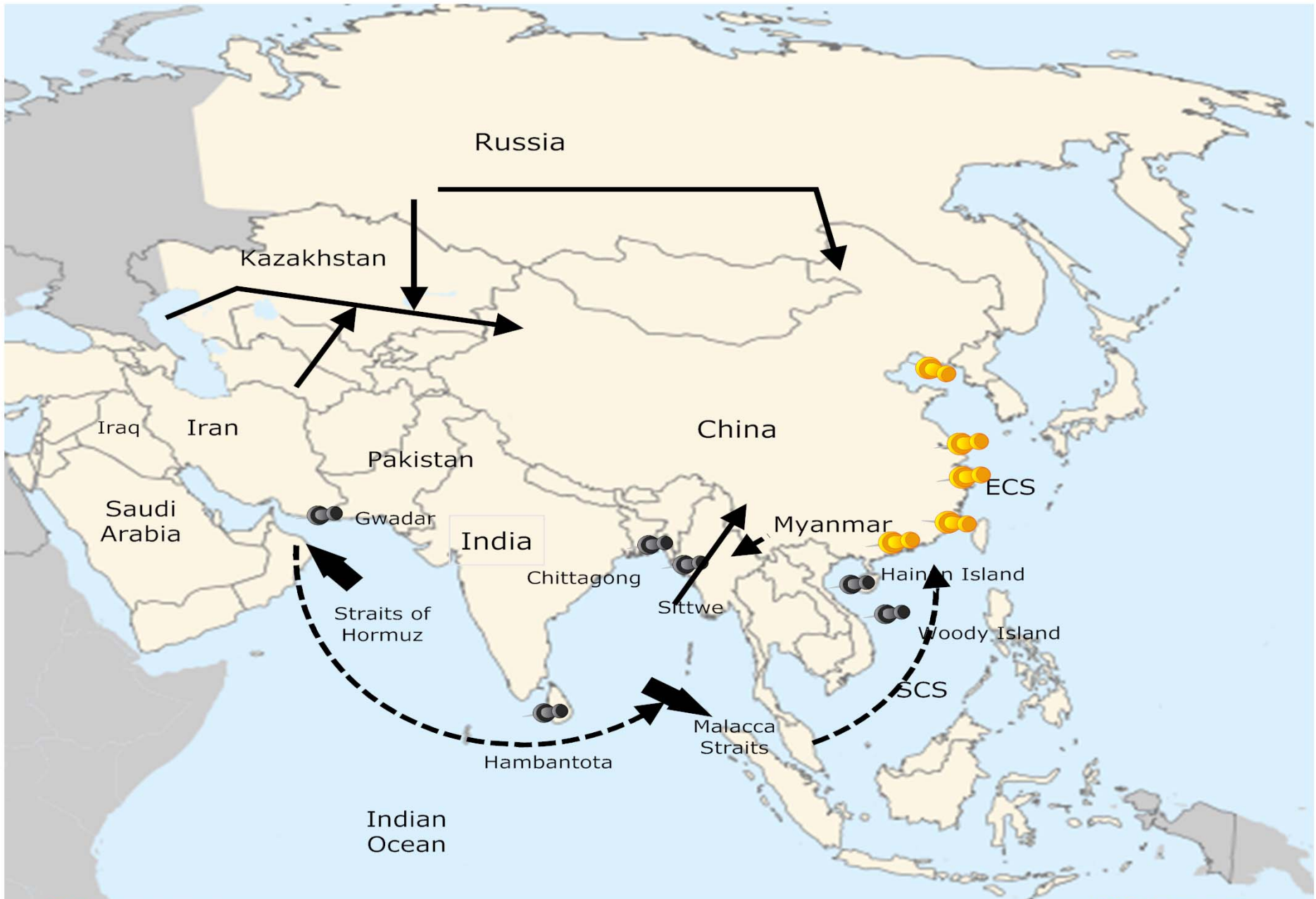
Sources of gas imports 2006-2011



Projections of future gas imports

bcm/year	2011	2020	2030
LNG imports	16.6	38-52	34-70
Pipeline imports	14.2	36-140	66-180

Source: FACTS Global Energy, 2011, A New Era for Natural Gas in China



Overseas investments: 1993-2012

- 1992-1997:
 - Small assets, low risk
 - Peru, Canada, Thailand, PNG
- 1997-2002:
 - larger onshore projects
 - Kazakhstan, Sudan, Iran, Venezuela, Nigeria
- 2002-2007:
 - Wider scope
 - ‘new’ types: deep water, tar sands, gas, LNG, import pipelines
 - Active M & A
- 2008-9
 - Iraq, Iran, Turkmenistan
 - Collaboration with Japan, Taiwan
 - “Loans for oil”: Ru, Kz, Br, Vz
- 2009-12:
 - Latin America:
 - CNOOC : \$ 3 bn, for Bidas (failed)
 - Sinochem (\$ 3 bn) & Sinopec in Brazil
 - PetroChina: Venezuela
 - North America:
 - PetroChina: multiple \$bn deals In Canada
 - Sinopec \$ 4.6 bn, tar sands Canada
 - CNOOC: Trinidad, US Gulf of Mexico, US shale gas and oil, Nexen
 - UK: PetroChina-Ineos, CNOOC-Nexen, Sinopec-Talisman
 - Australia: gas fields, coal-bed methane

2011 overseas oil production :
CNPC 42 mmt, Sinopec 18 mmt, CNOOC 4 mmt
Total 64 million tonnes, cf total domestic production of 204 mmt

Destinations of upstream investments by Chinese NOCs

C.I.S. + Europe	Middle East & North Africa	Sub-Saharan Africa	S, SE & NE Asia, Australia	Americas
2.	4.	3.	5.	1.
Azerbaijan Kazakhstan Kyrgyzstan Russia Turkmenistan Uzbekistan United Kingdom	Algeria Chad Egypt Iraq, Iran Libya, Mali Mauritania Morocco Niger Oman, Qatar Saudi Arabia Somalia Syria, Tunisia U.A.E. Yemen	Angola Cameroon Congo Brazzaville Cote d'Ivoire Equatorial Guinea Egypt Ethiopia Gabon, Kenya Madagascar Mozambique Nigeria Sao Taome Sudan Tanzania	Australia East Timor Indonesia Mongolia Myanmar Pakistan Papua New Guinea Philippines Thailand	Argentina Bolivia Brazil Canada Colombia Costa Rica Cuba Ecuador Peru Trinidad & Tobago U.S.A. Venezuela

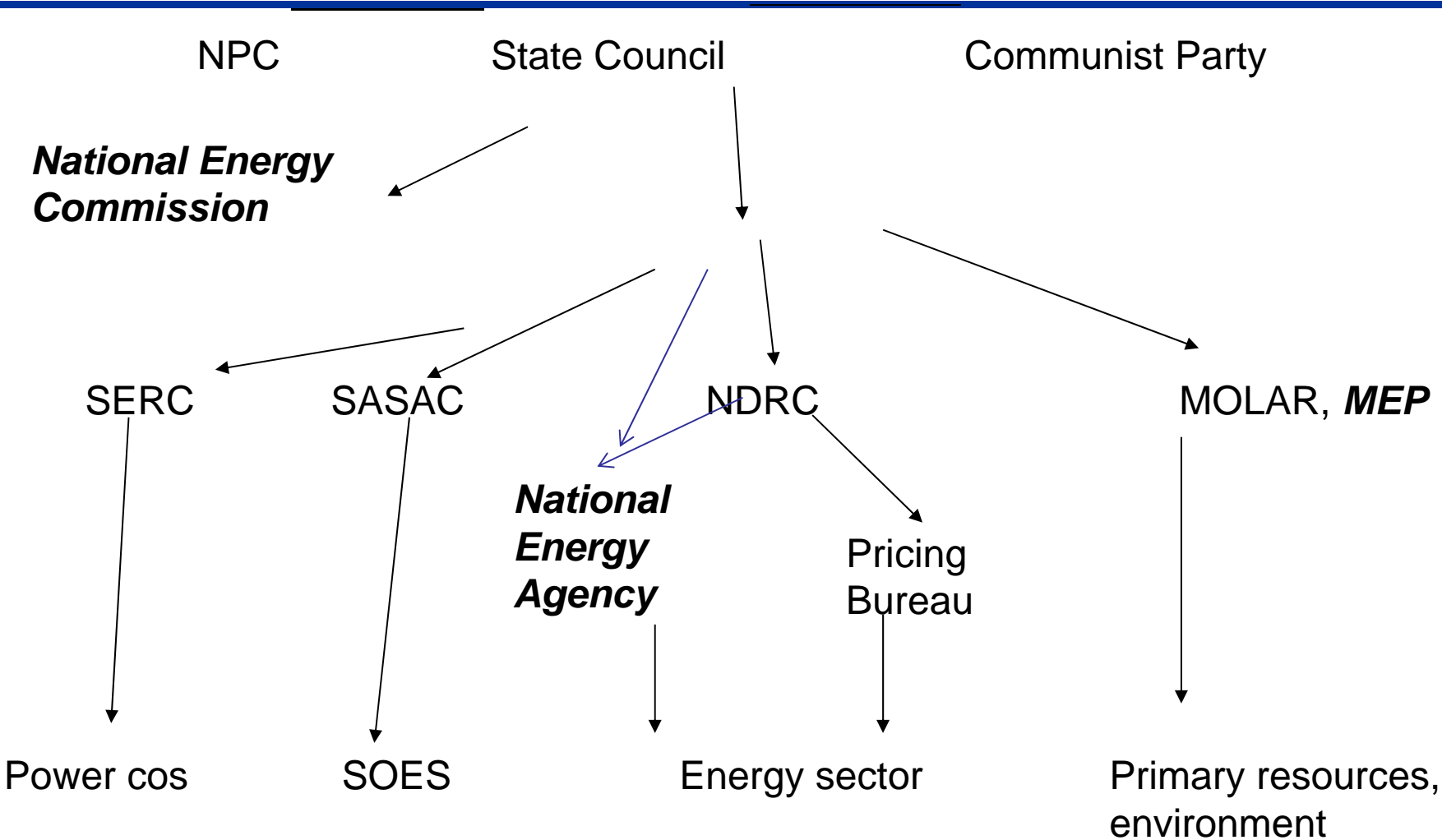
Chinese NOC's overseas investment: Objectives of the parties

China's government	Host government
Energy Policy: "security of supply" Industrial policy: pillar industries Social policy: employment Financial policy: forex and tax Foreign policy	Energy policy: investment (?embargoed) Industrial policy: diversify investors Oil exports: market guarantees Economic policy: investment/aid Resource policy: regaining control Foreign policy: anti-West/USA
China's NOC	Host NOC
Reserves growth Profits Vertical integration Survival & international ambitions Avoid tight governance & price controls Technology & skills	Funds: investment, loans Cheap(er) oil field services Access to opportunities in China

For how long will objectives converge?

3. SECTOR REFORM

Management of energy sector 2012



Abbreviations

- NPC: National Peoples Congress
- MOLAR: Ministry of Land & Natural Resources
- NDRC: National Development & Reform Commission
- MEP: Ministry of Environmental Protection
- SASAC: State Asset Supervision and Administration Commission
- SERC: State Electricity Regulatory Commission

Petroleum industry after 1998

- Reforms:
 - Split productive assets from holding company:
 - CNPC: PetroChina Ltd
 - Sinopec: Sinopec Ltd
 - CNOOC: CNOOC Ltd
 - IPO for 10-20% of shares
 - No rules for competition upstream or downstream
 - New system for oil prices
- Issues:
 - Massive investment programmes, improved performance, but
 - Powerful position of NOCs; Pricing

Electrical power industry

- Reforms in 1997/8:
 - State Power Corporation (SPCC) created, Ministry abolished
- Reforms in 2002/3:
 - SPCC broken up into:
 - 2 T&D companies
 - 5 G companies
 - State Electricity Regulatory Commission (SERC)
- Issues:
 - Massive investment programmes, improved performance, but
 - Powerful position of companies; Pricing

Outlook for energy sector reform

?