Chinese Coal Imports Under a Water-constrained World

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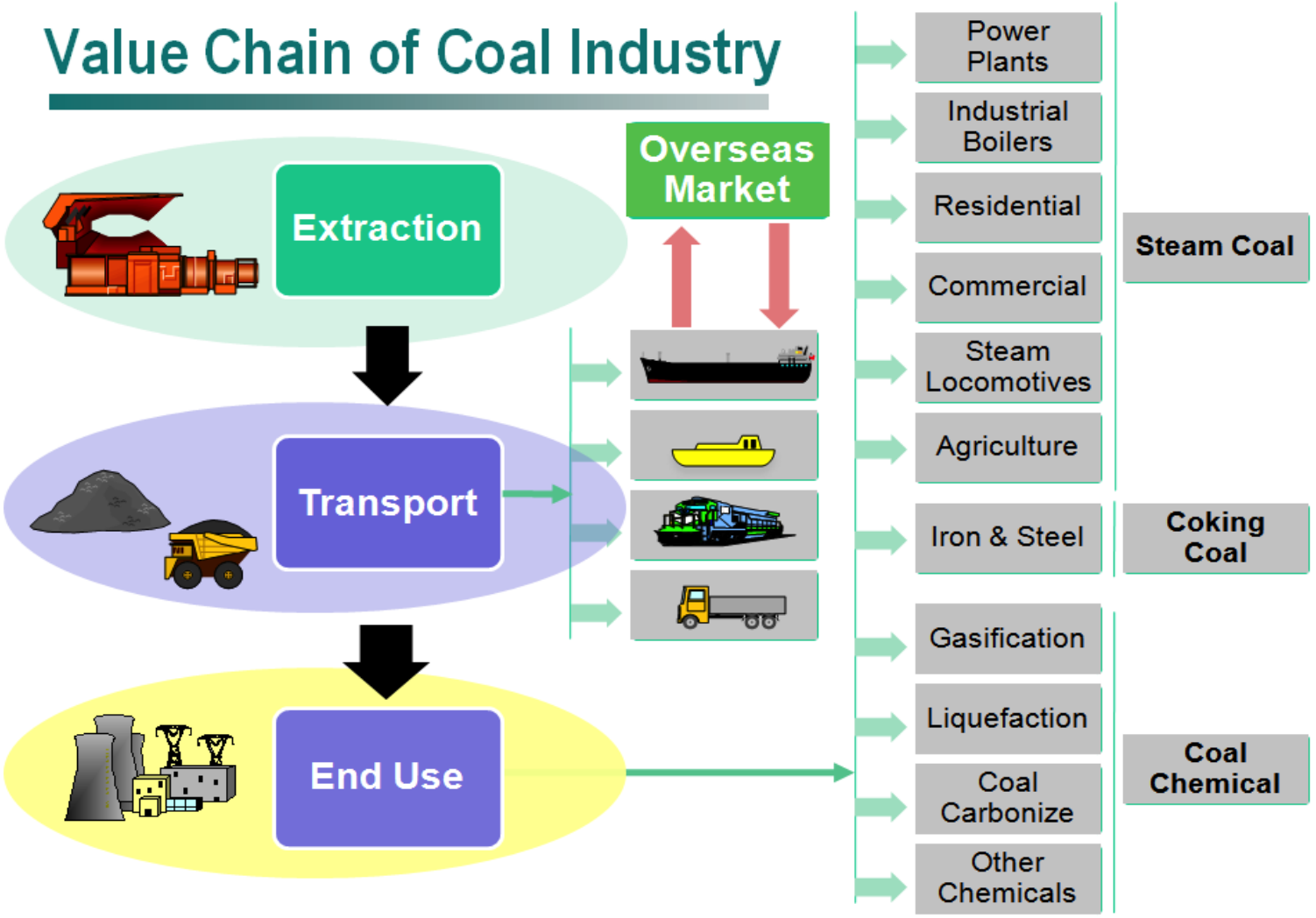
Presentation Outline

- Chinese Coal Value Chain
- China's Rising Coal Imports
- Water Implications

Value Chain of Coal Industry



Coal Resources in China

Source: Tu (2011).

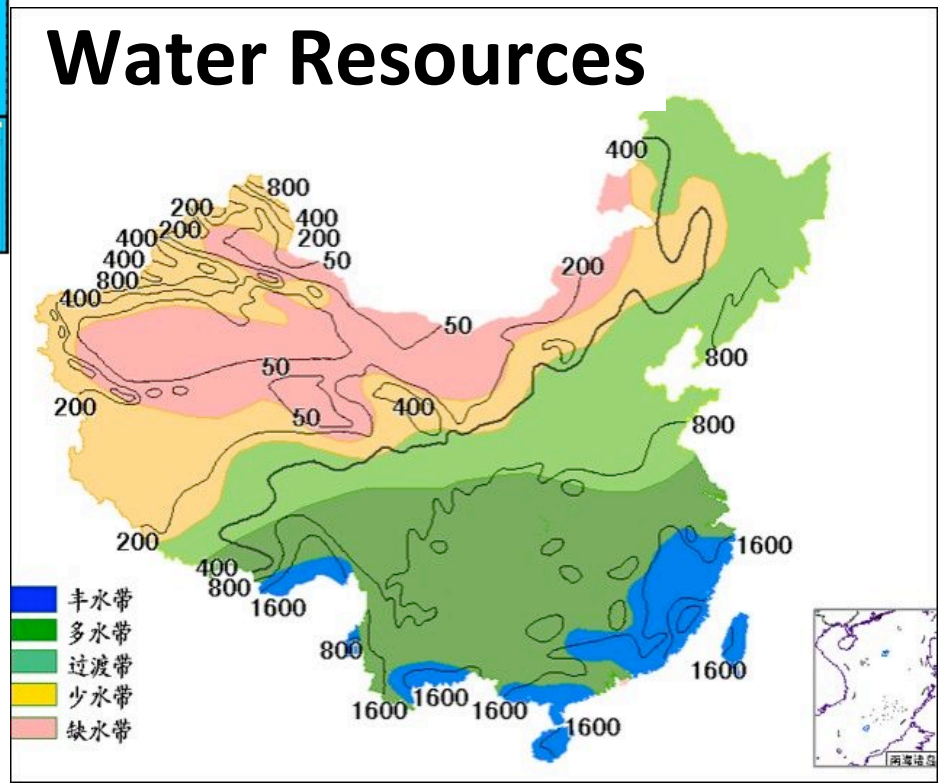
- Coal resource vs. consumption distribution determines pattern of coal transport in China.
- Coal mining vs. water.

Proven Coal Reserves:

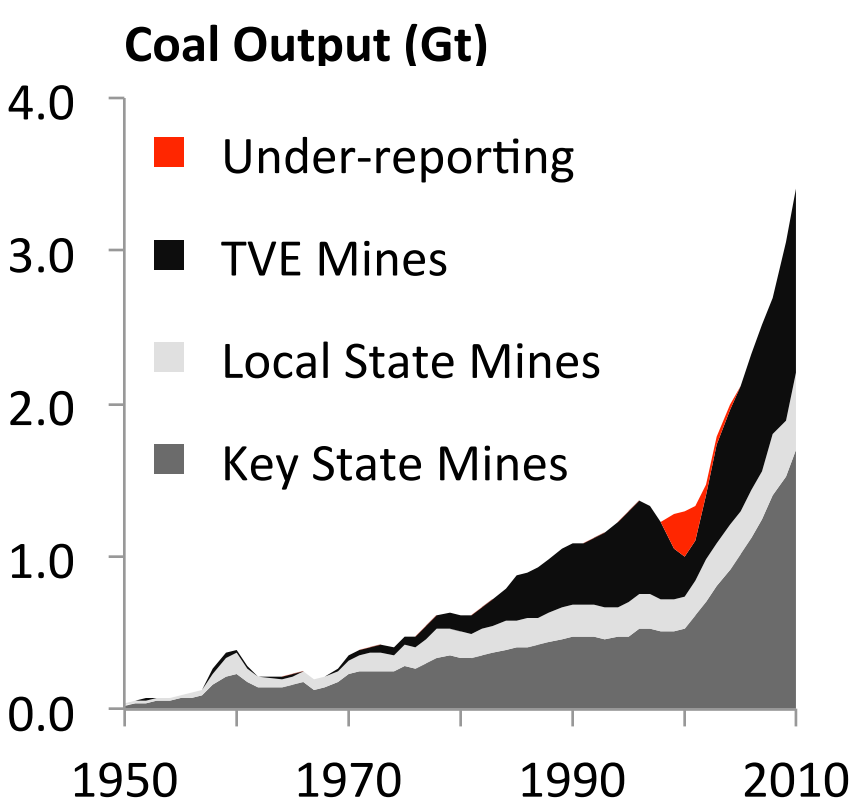
	Gt	%
U.S.	237	25.9
China	170	18.5
Russia	157	17.1
World	916	100.0

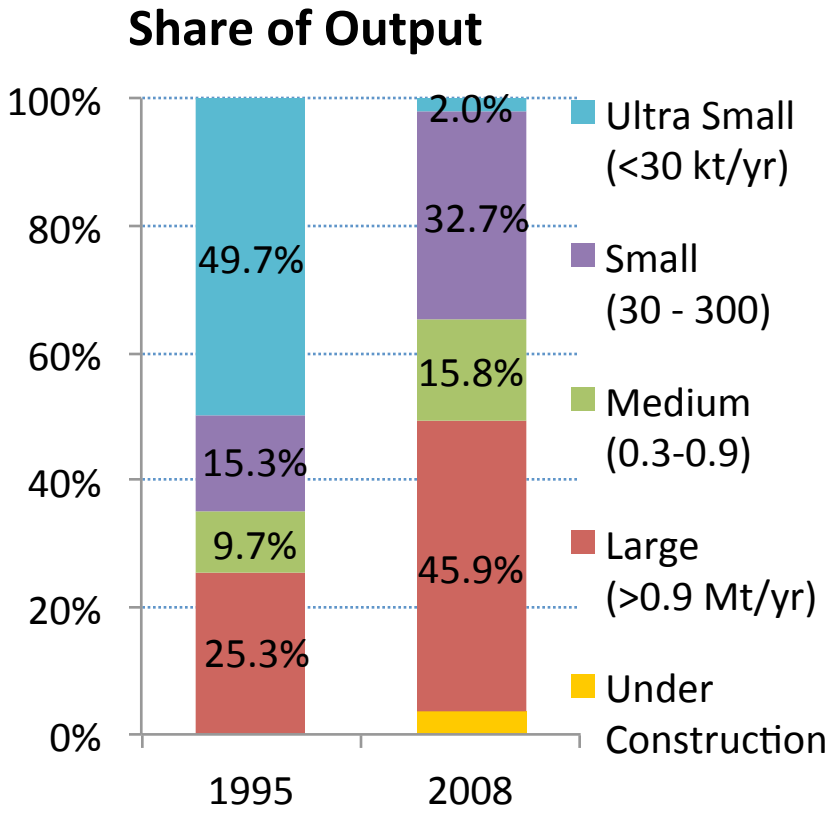
Source: MLR, CNCA and BP (2011).

Water Resources



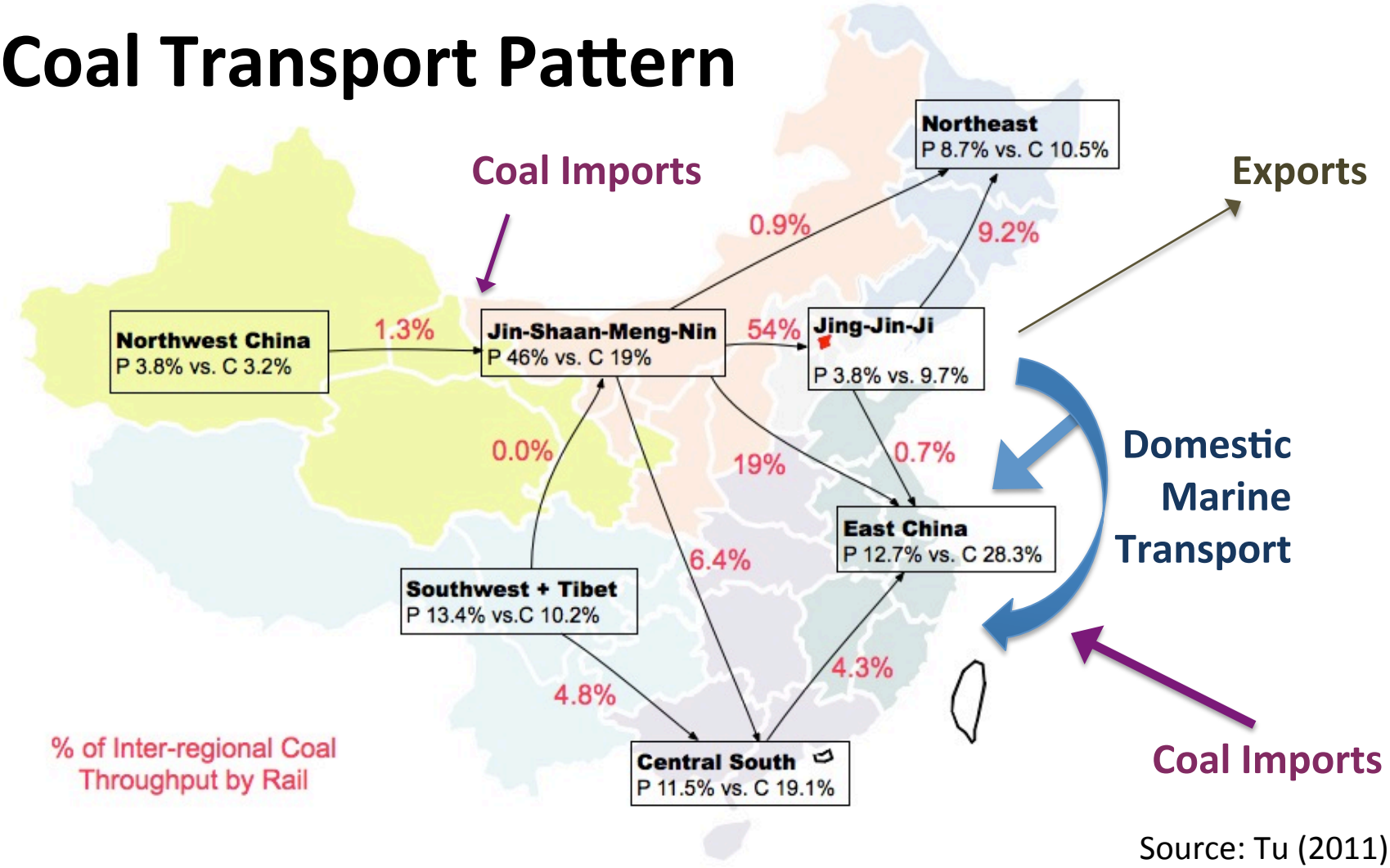
Coal Production in China





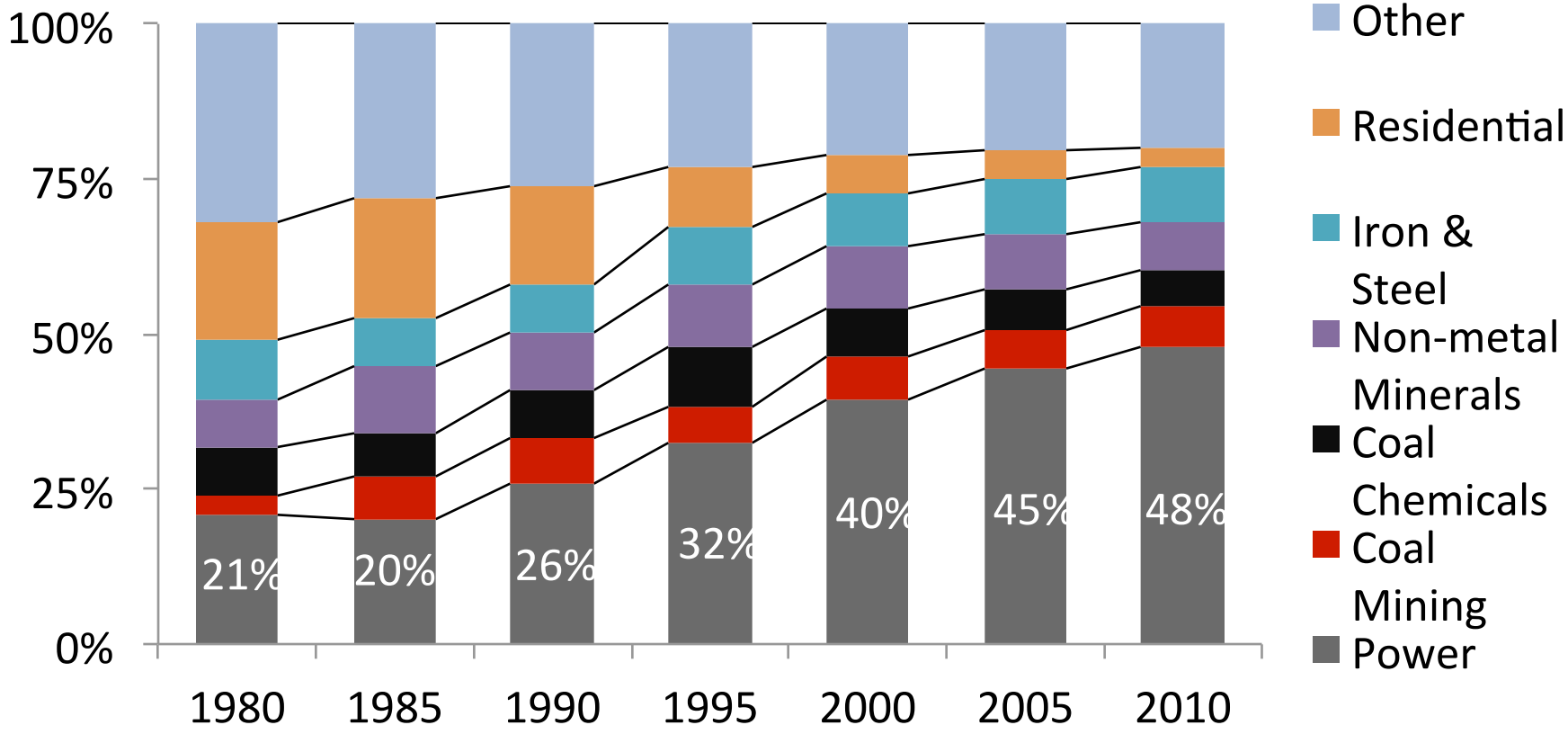
Source: Tu (2011). Industrial Organization of the Chinese Coal Industry. & CNCA.

Coal Transport Pattern



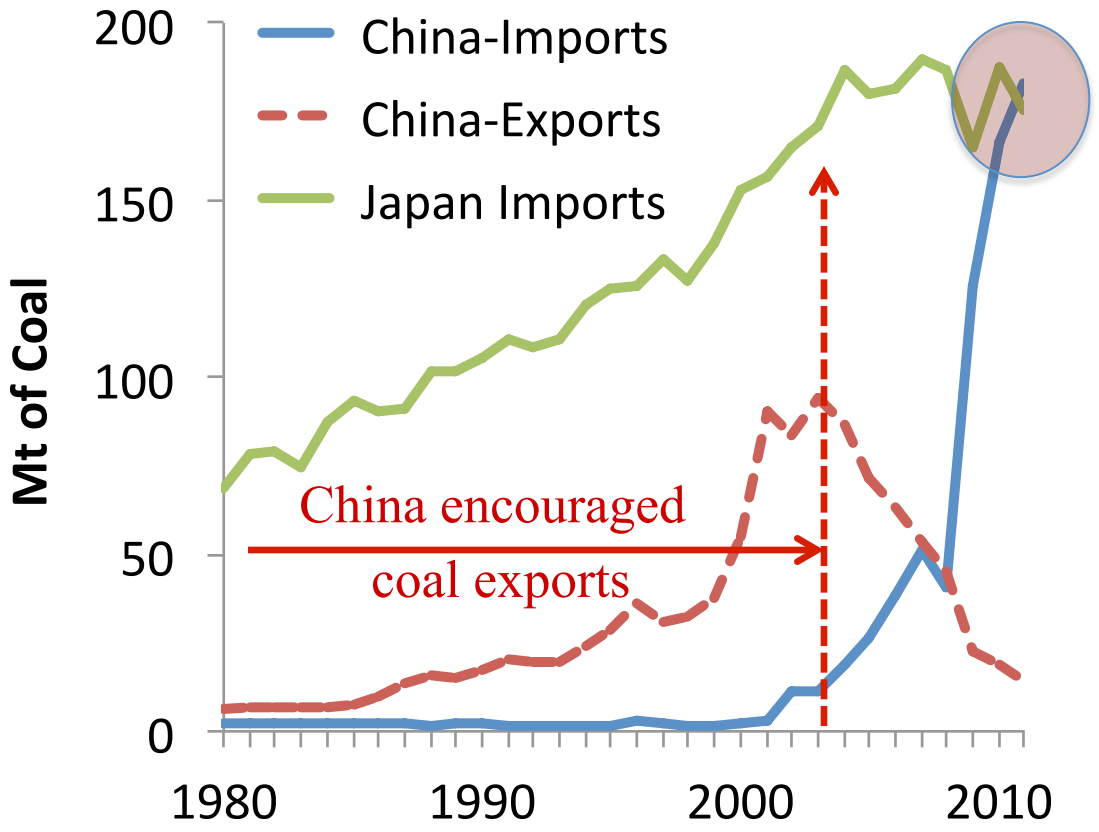
Source: Tu (2011).

Coal Consumption by Sector in China



Source: NBS and CNCA.

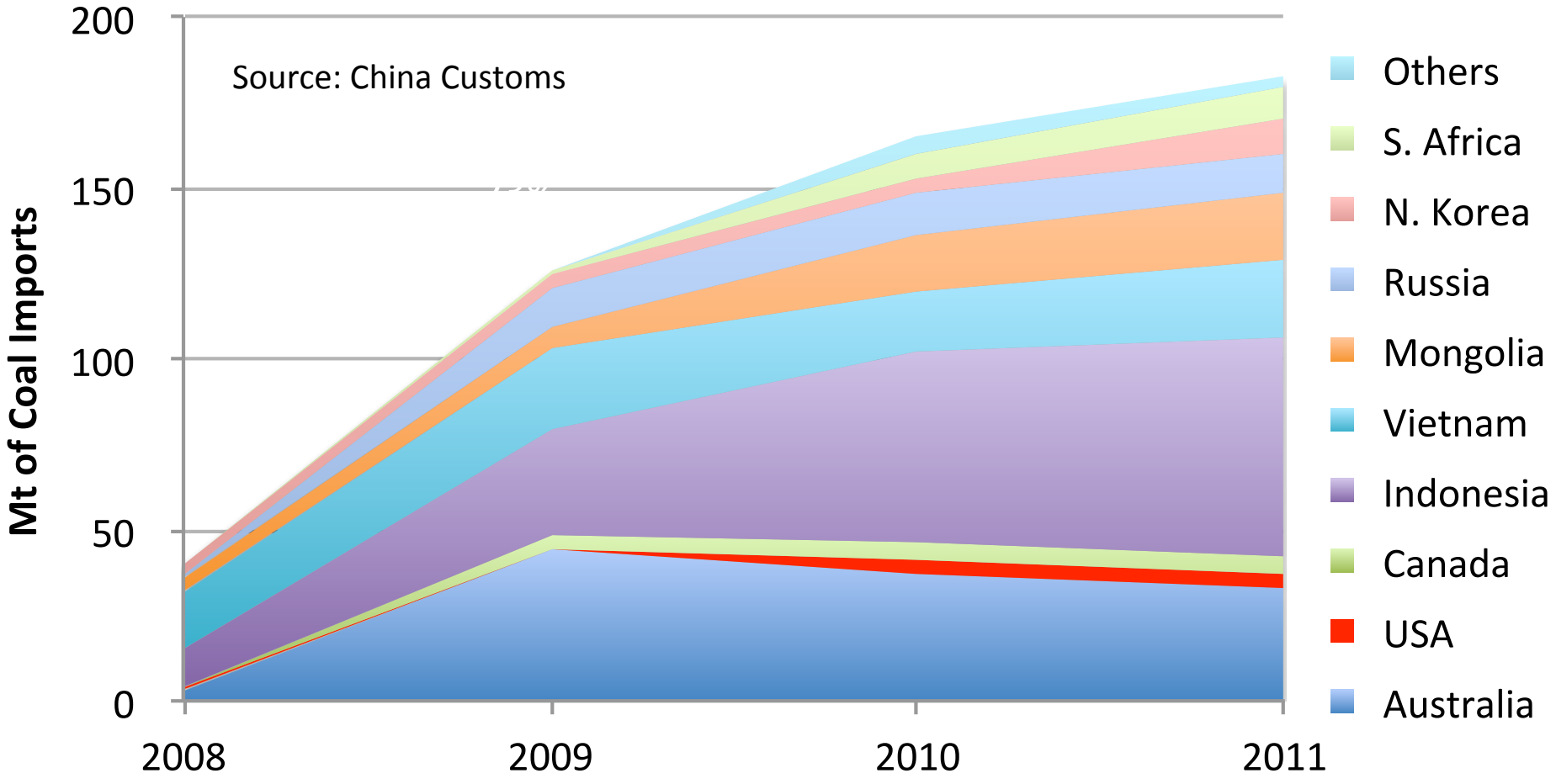
Chinese Coal Imports/Exports



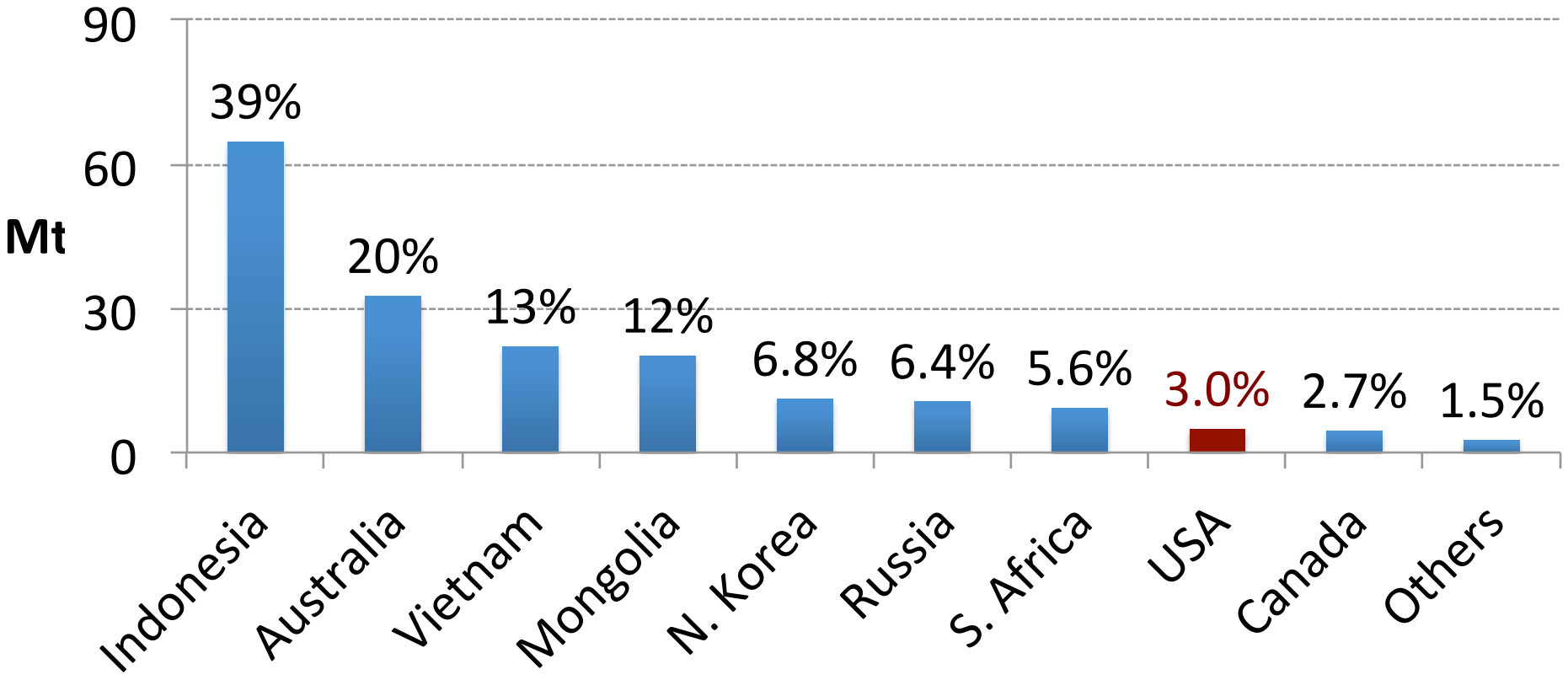
- Global coal trade is about one third of China's domestic coal consumption level.
- Chinese coal exports peaked in 2003
- China became a net coal importer in 2009.
- China passed Japan as the world's largest coal importer in 2011.

Source: NBS, China Customs, US EIA & Reuters.

Chinese Coal Imports by Country

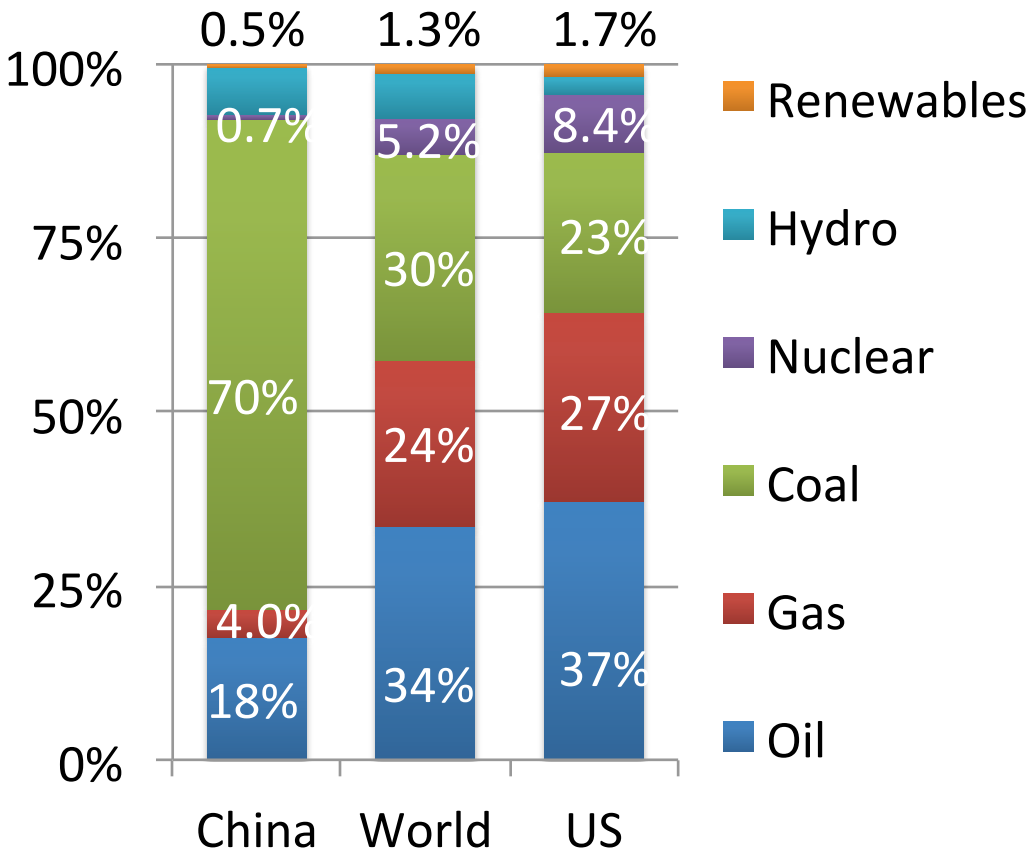


Chinese Coal Imports by Country in 2011



Source: China Customs.

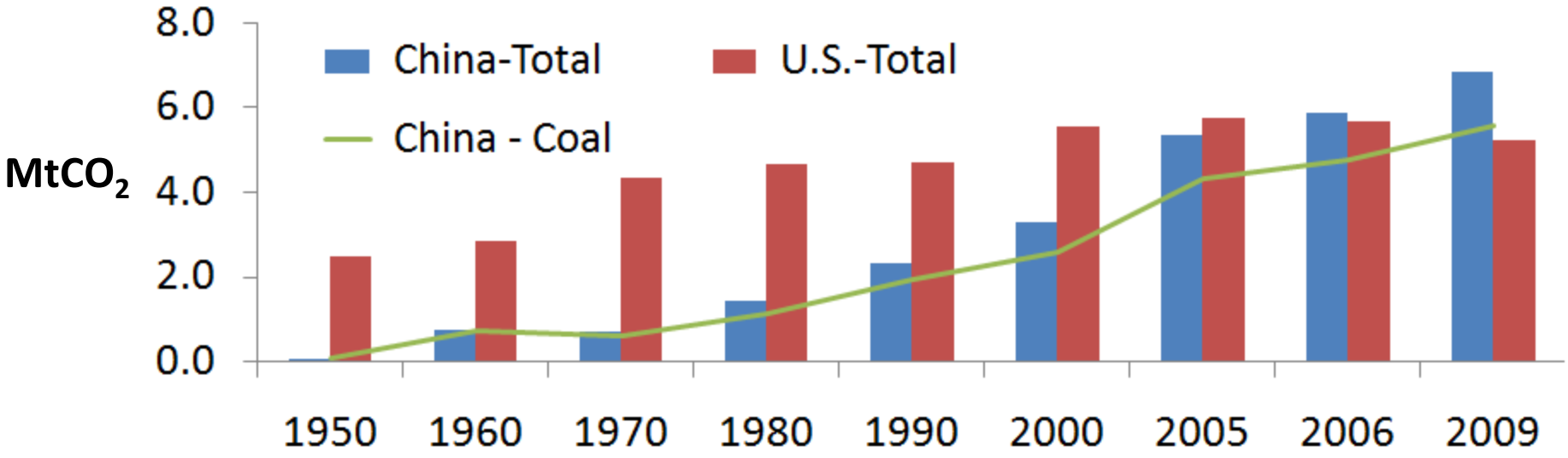
Understanding China's Rising Coal Imports



Source: BP World Statistical Review 2011.

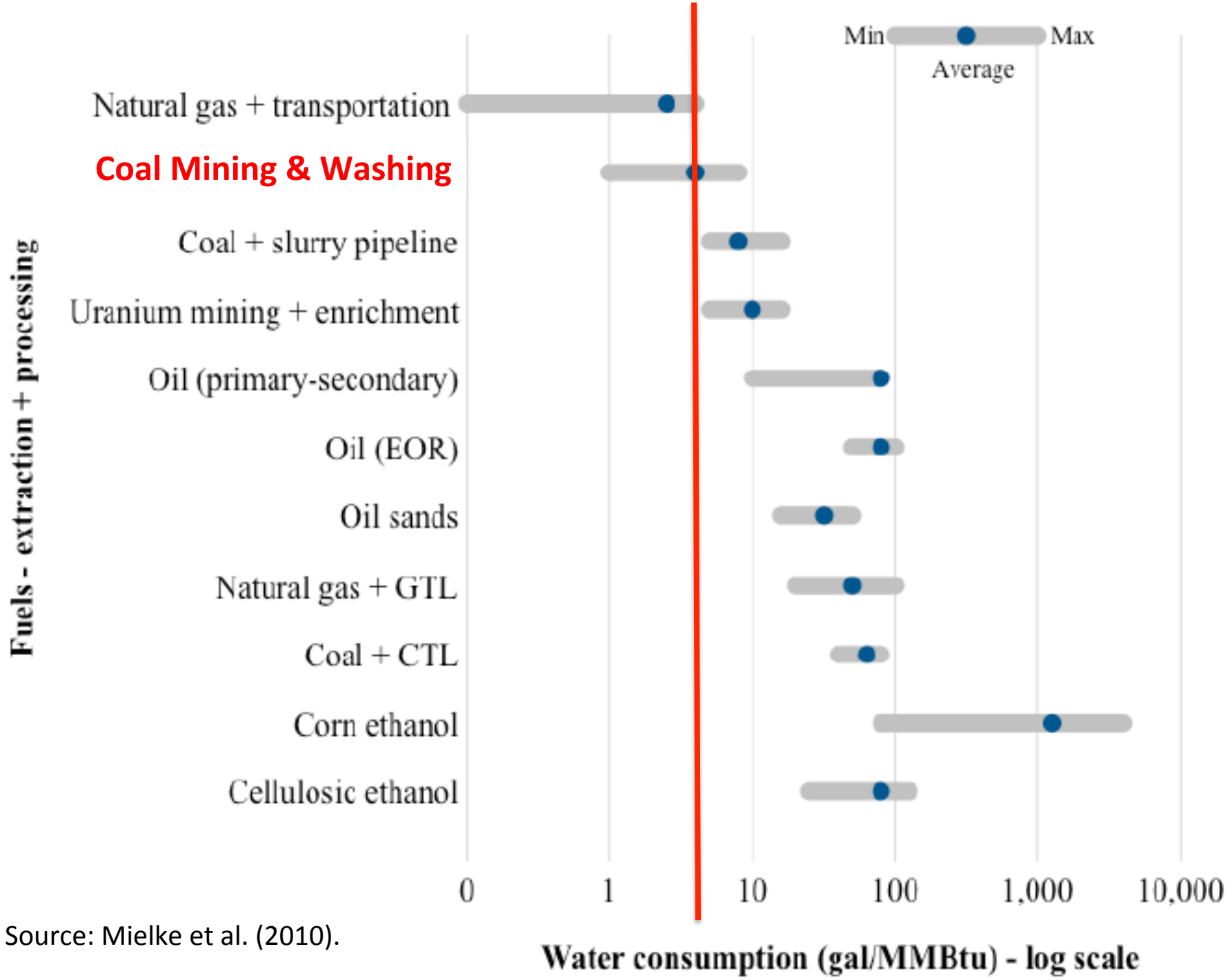
- Transport bottleneck.
- Environmental impacts such as air quality, water and GHG emissions.
- Safety concerns.
- Market and pricing factors.
- Coking coal resource constraints.
- Social stability.

Targeting Chinese Coal is Key to Climate Solutions

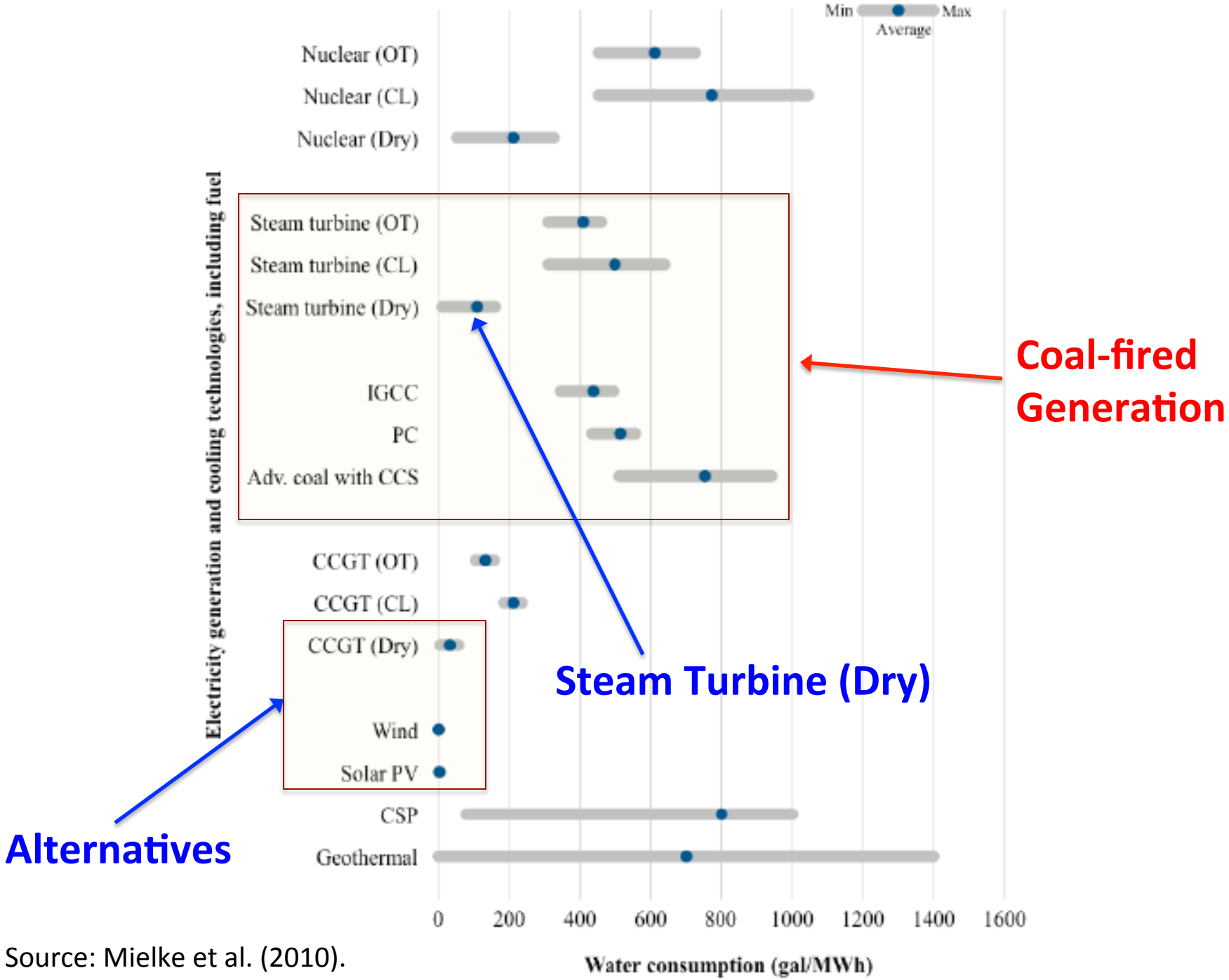


Source: NBS, IEA, US EPA, ERI and own estimation.

- In 2006, China passed US as the leading carbon emitter.
- In 2009, emissions from Chinese coal comprised 20 % of global carbon emissions, an amount greater than total US emissions.



Source: Mielke et al. (2010).



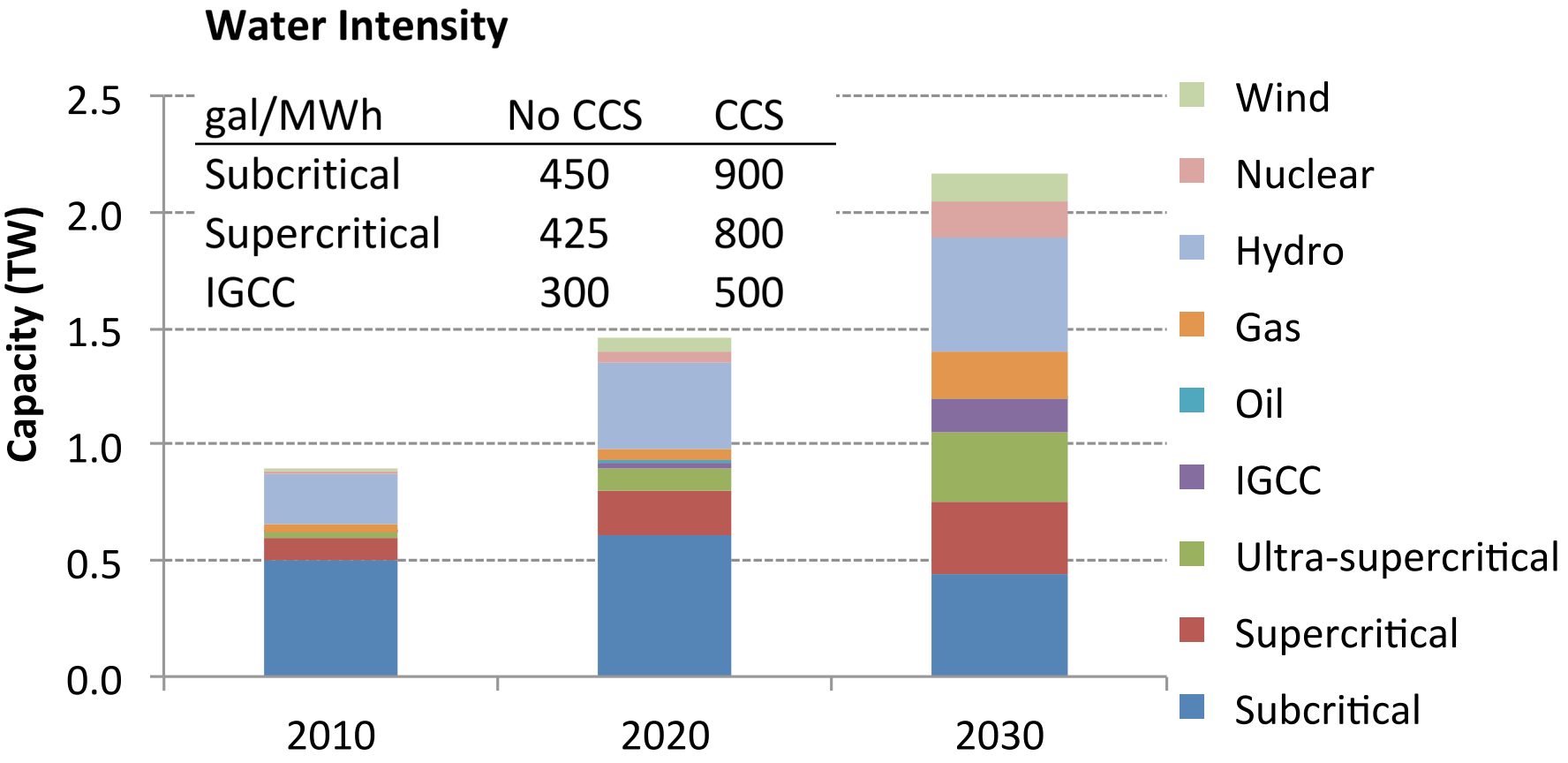
Source: Mielke et al. (2010).

Water Use by Coal in China (2008)

	Water Use (km^3)	Percentage
Coal Mining	6.5	7%
Coal Preparation	3.5	4%
Coal-fired Power	78.6	87%
Coal Chemicals	1.9	2%
Total	**90.6**	**100%**

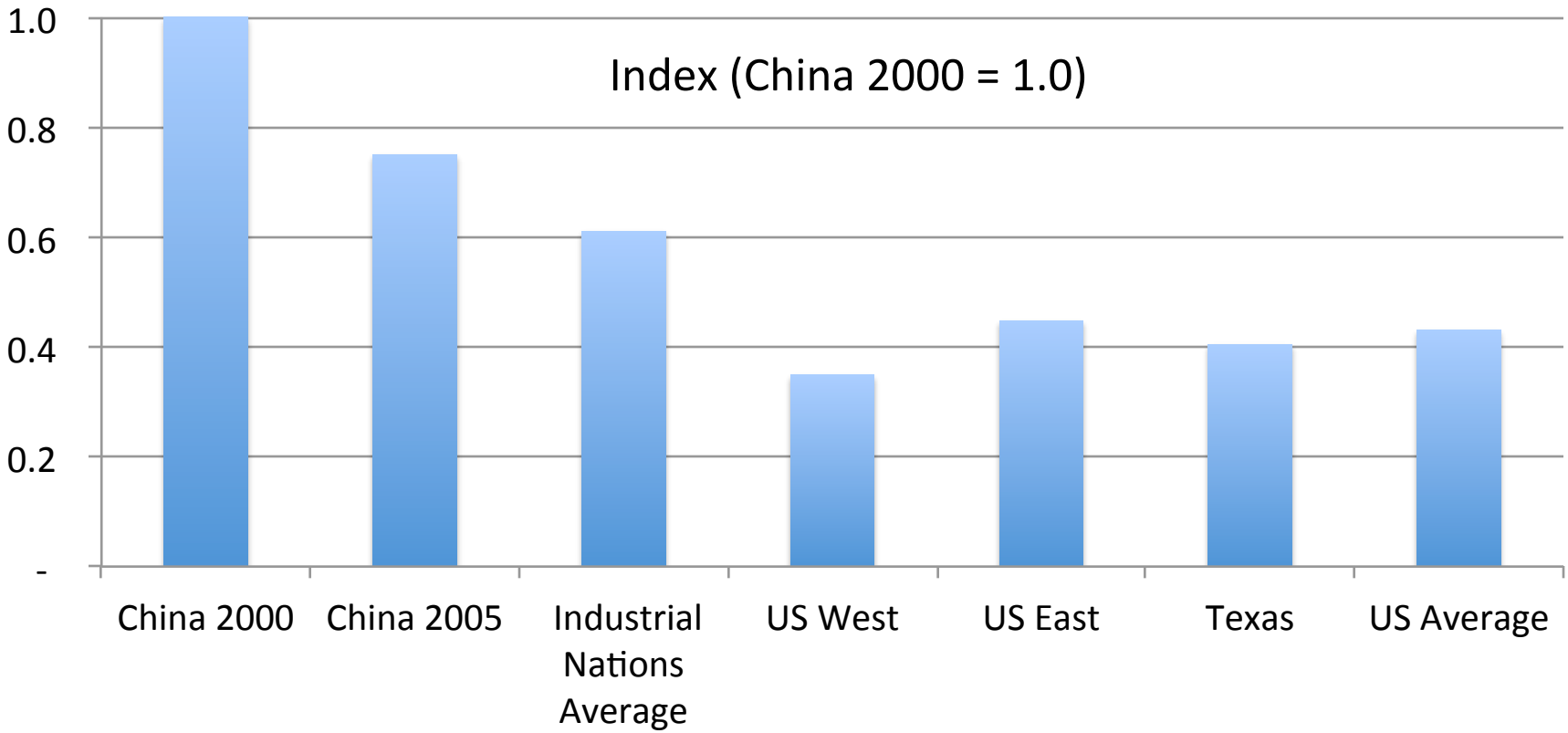
Source: Pan, Liu & et al. (2010).

Installed Power Capacity in China by 2030



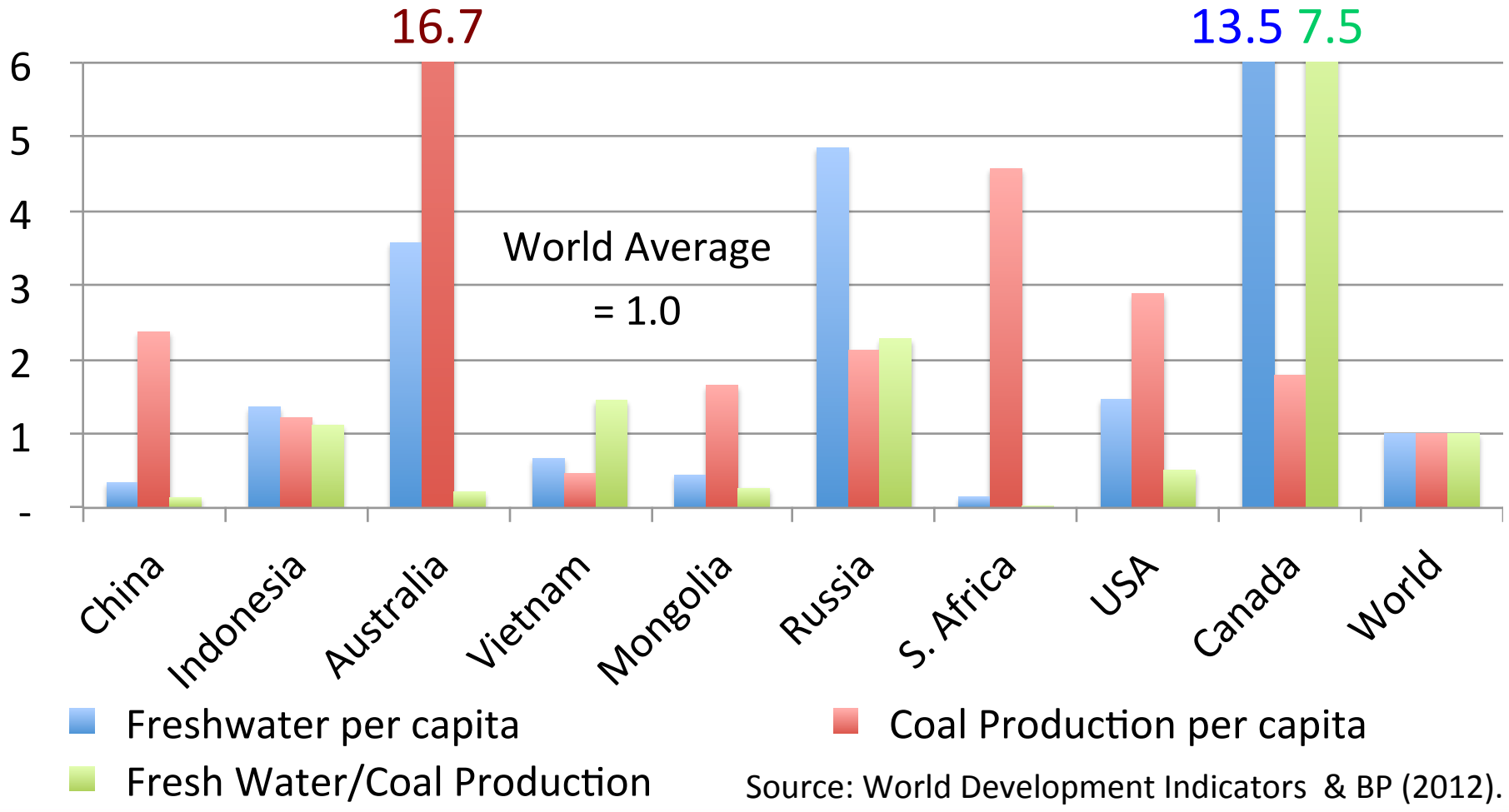
Source: Tu (2011).

Water Intensity of Thermal Power



Source: Jiang & Han (2008).

Water Implications of China's Coal Imports



Source: World Development Indicators & BP (2012).

Summary:

- Water is expected to become an increasingly pressing issue throughout the Chinese coal value chain.
- Improvements on air quality and carbon emissions may not be compatible with water conservation.
- Energy security improvement may not be compatible with water conservation.
- How to balance energy security, air quality, carbon emissions and water consumption is key for the optimization of the Chinese coal value chain including the country's rising coal imports.

Thank You !