

modern energy: the role metals & miners are going to play

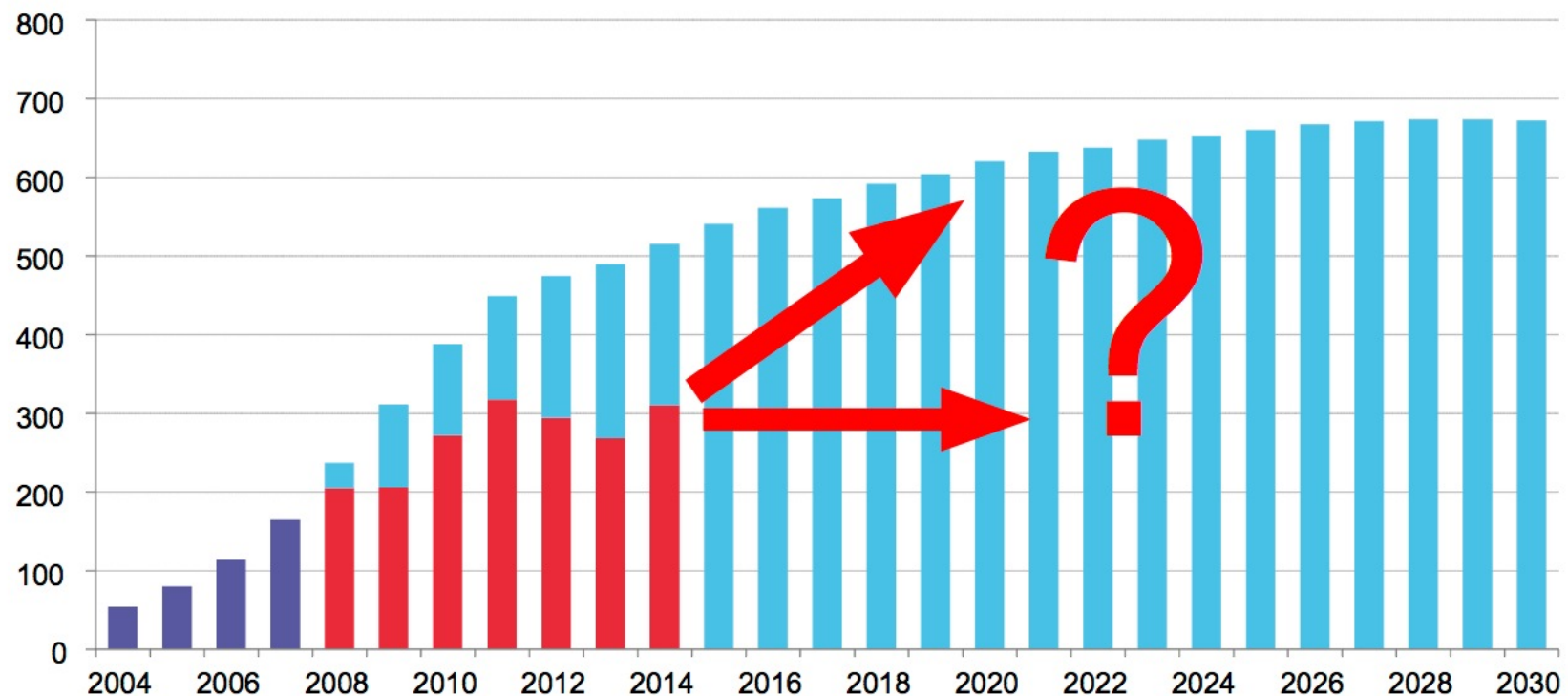


amir adnani & gianni kovacevic

CO2 promises - how is it possible?

CLEAN ENERGY CAPITAL REQUIREMENT TO 2030 (\$BN)

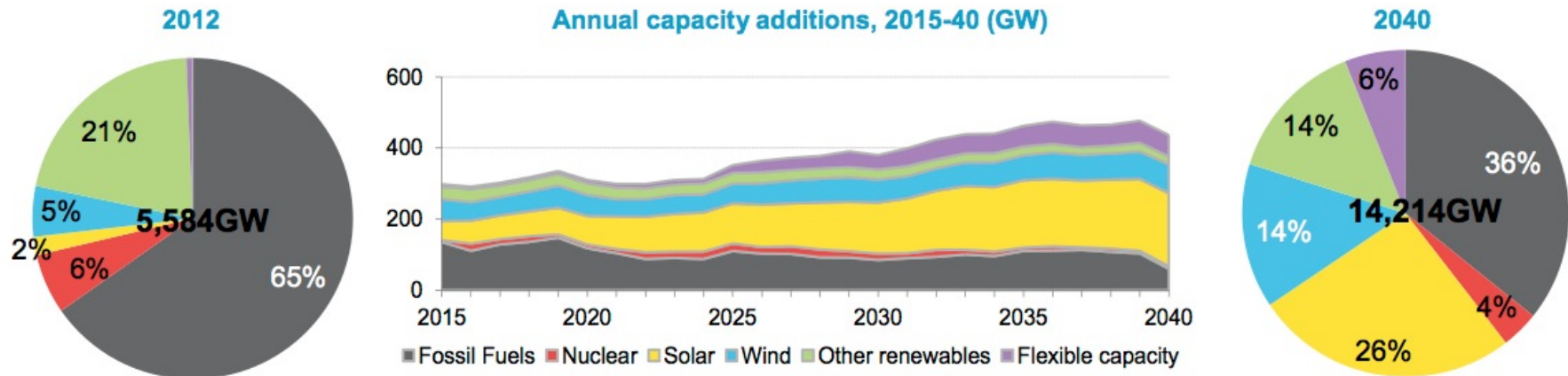
Bloomberg
NEW ENERGY FINANCE



Source: New Energy Finance Global Futures 2008, Bloomberg New Energy Finance

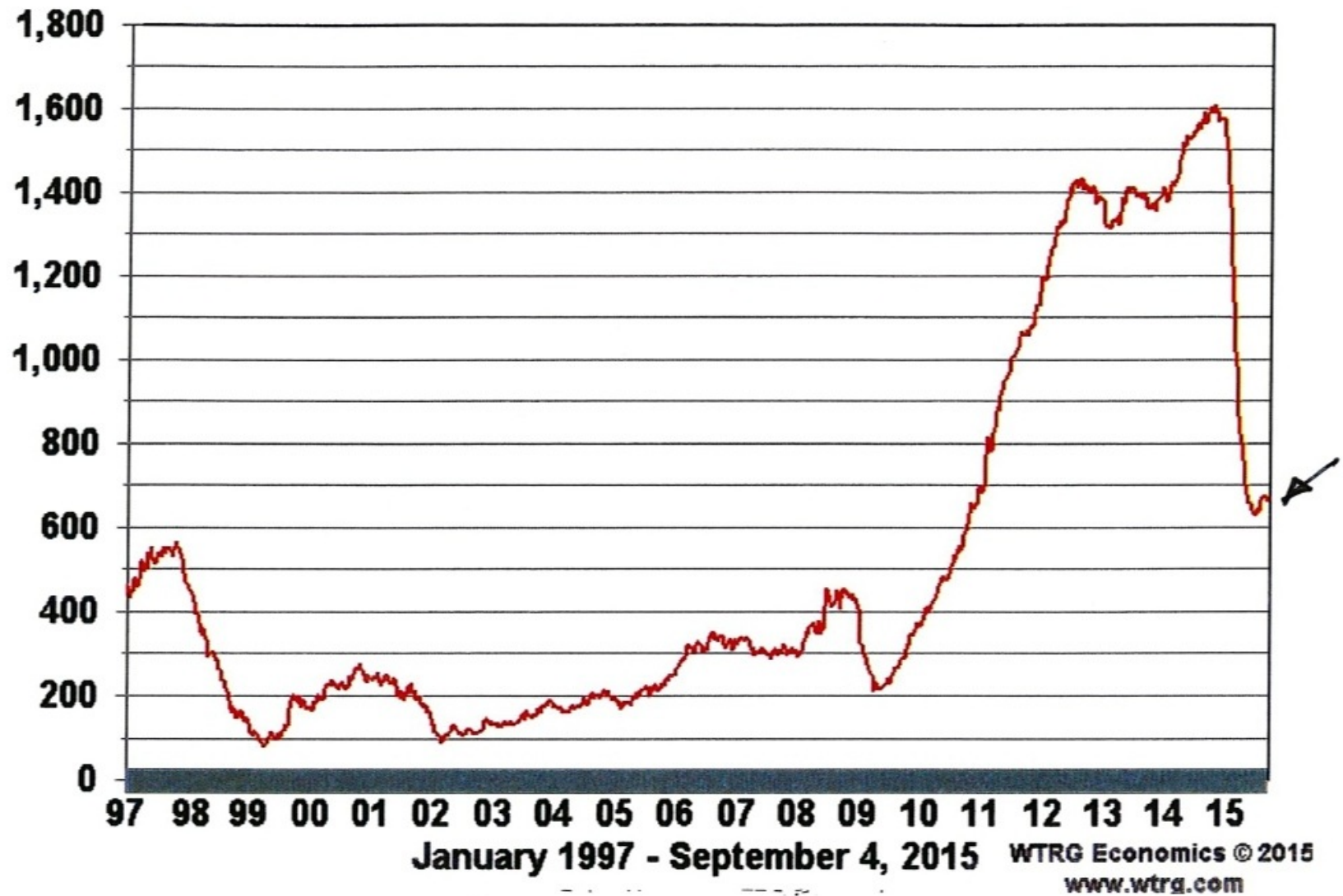
from 6,000GW to 14,000GW in 25 years?

Figure 1: Global installed capacity in 2014 and 2040 and projected capacity additions, by technology (GW)

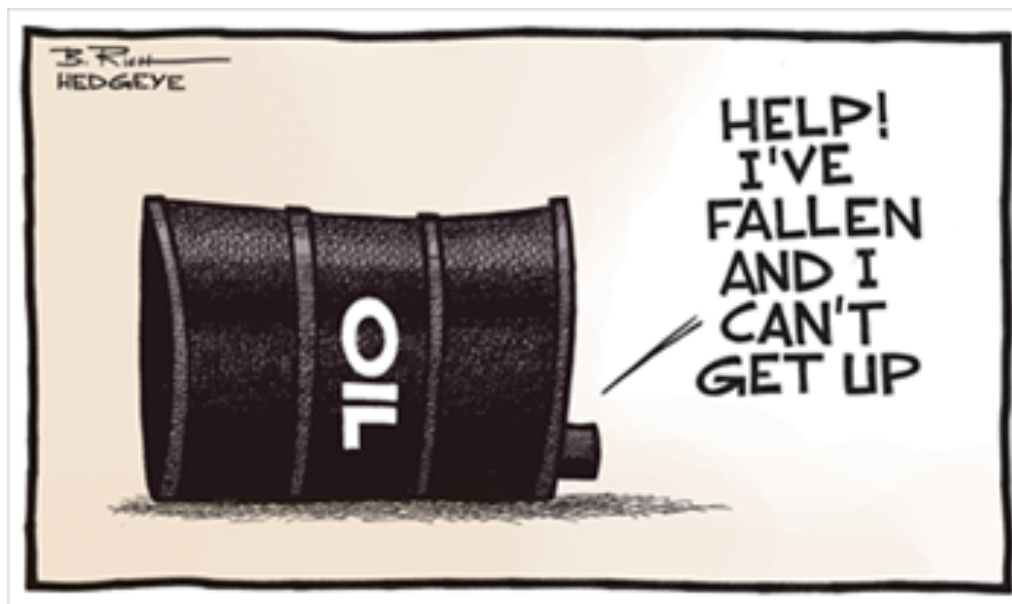


Source: Bloomberg New Energy Finance

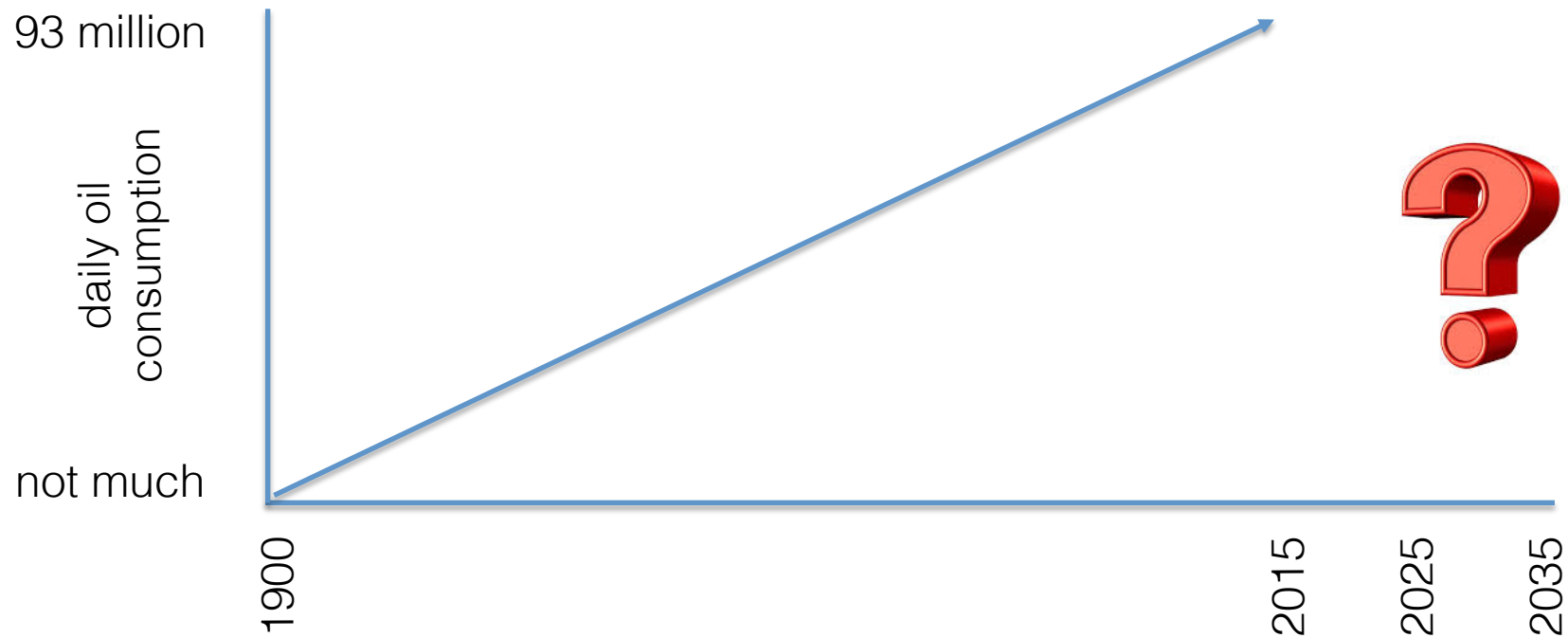
Oil - Rotary Rig Count United States



what is the role of oil in long-term energy?



in 2015 daily demand for oil is ~93 million barrels



electricity is the future of energy?

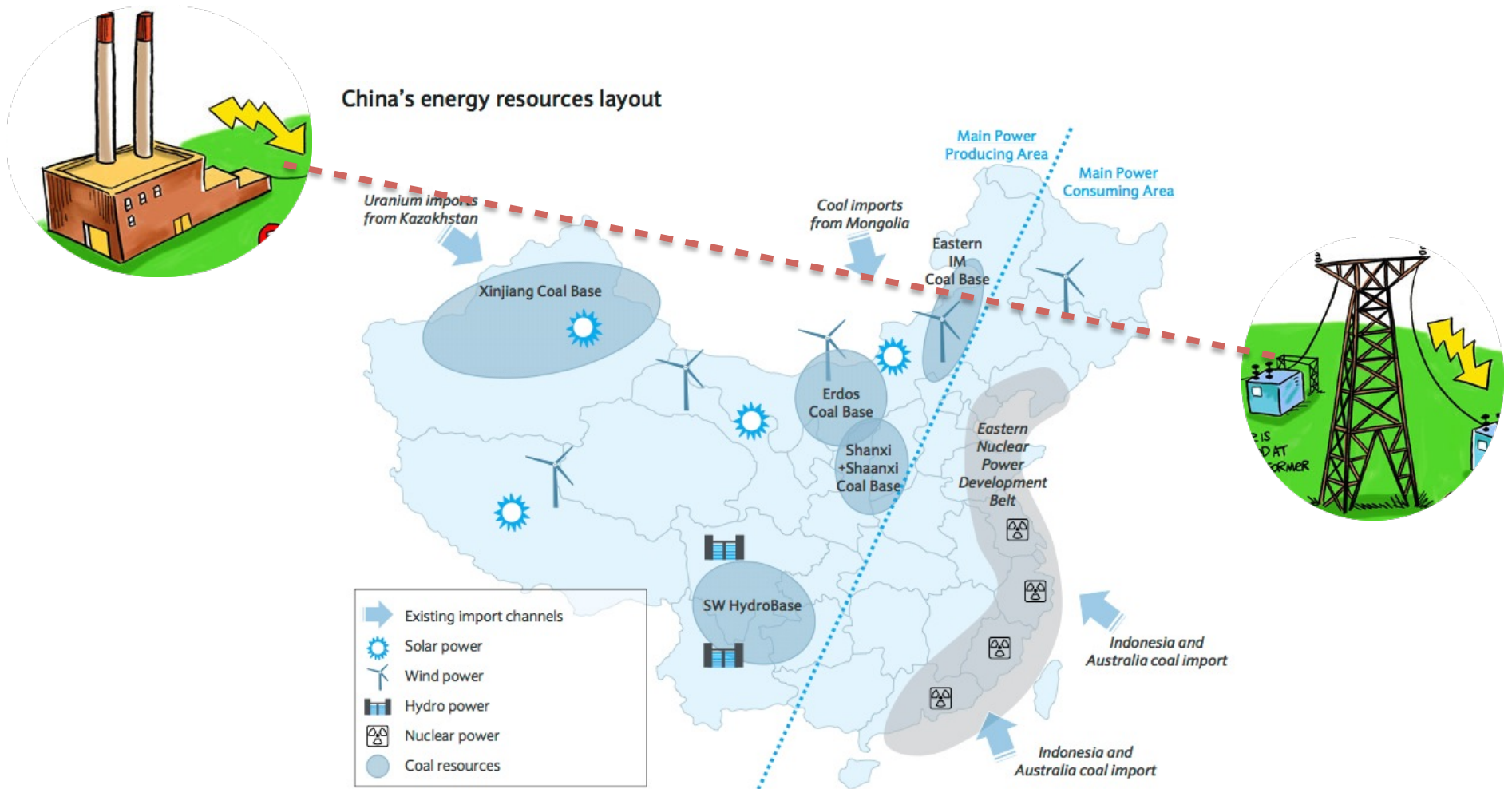


China's energy resources layout



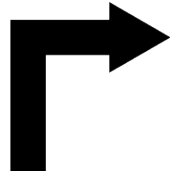
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electricity is the future of energy?

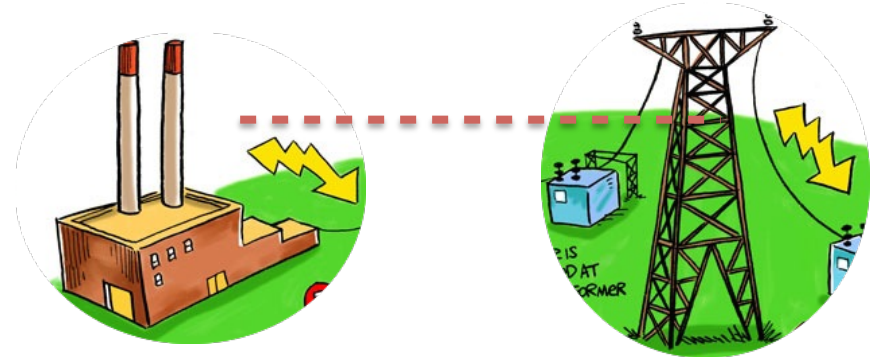


Source: China's National Development and Reform Commission, Barclays Research

electricity is the future of energy generation and transfer



= 5X more
copper /MWh

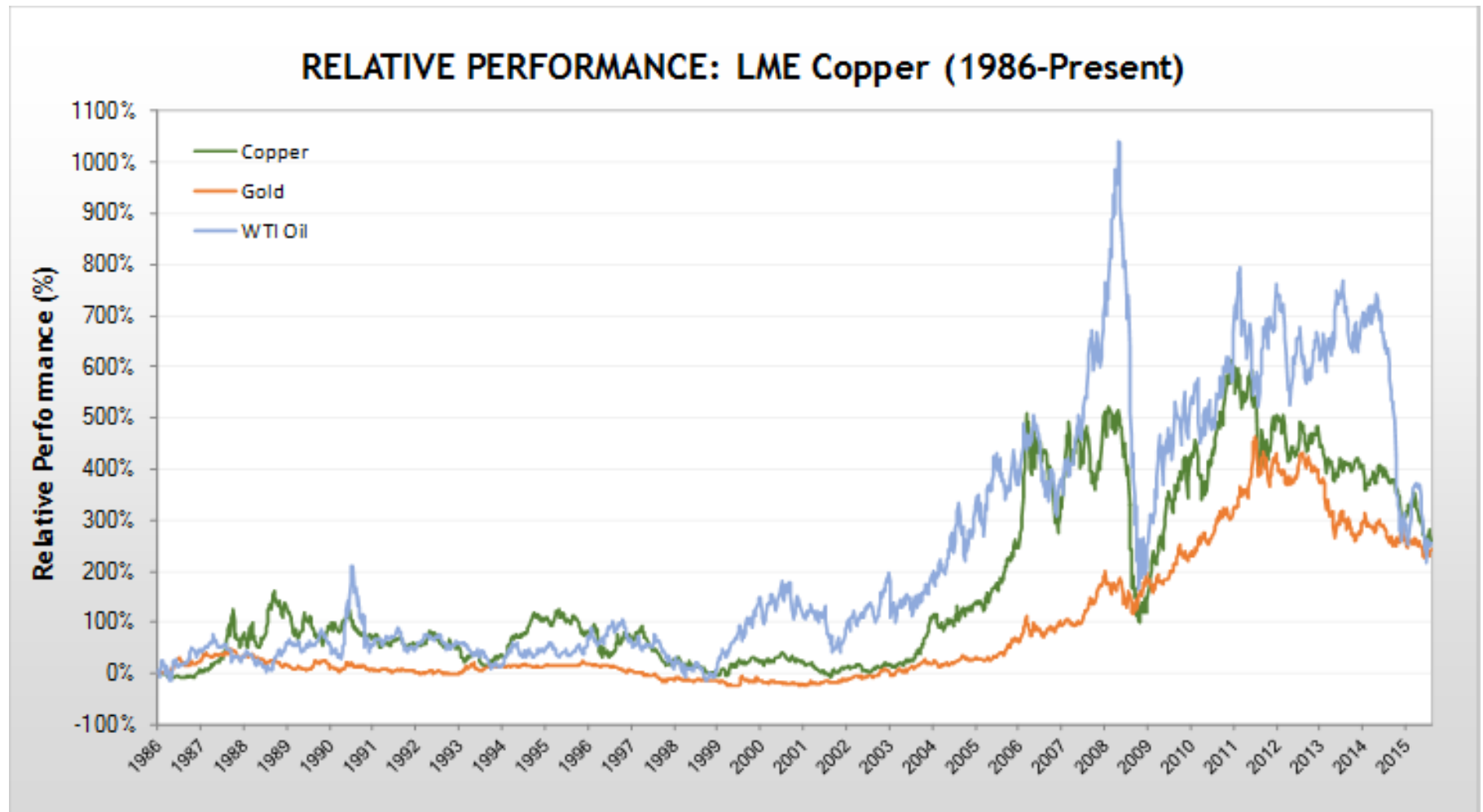


Changes in China's electricity generation capacity mix

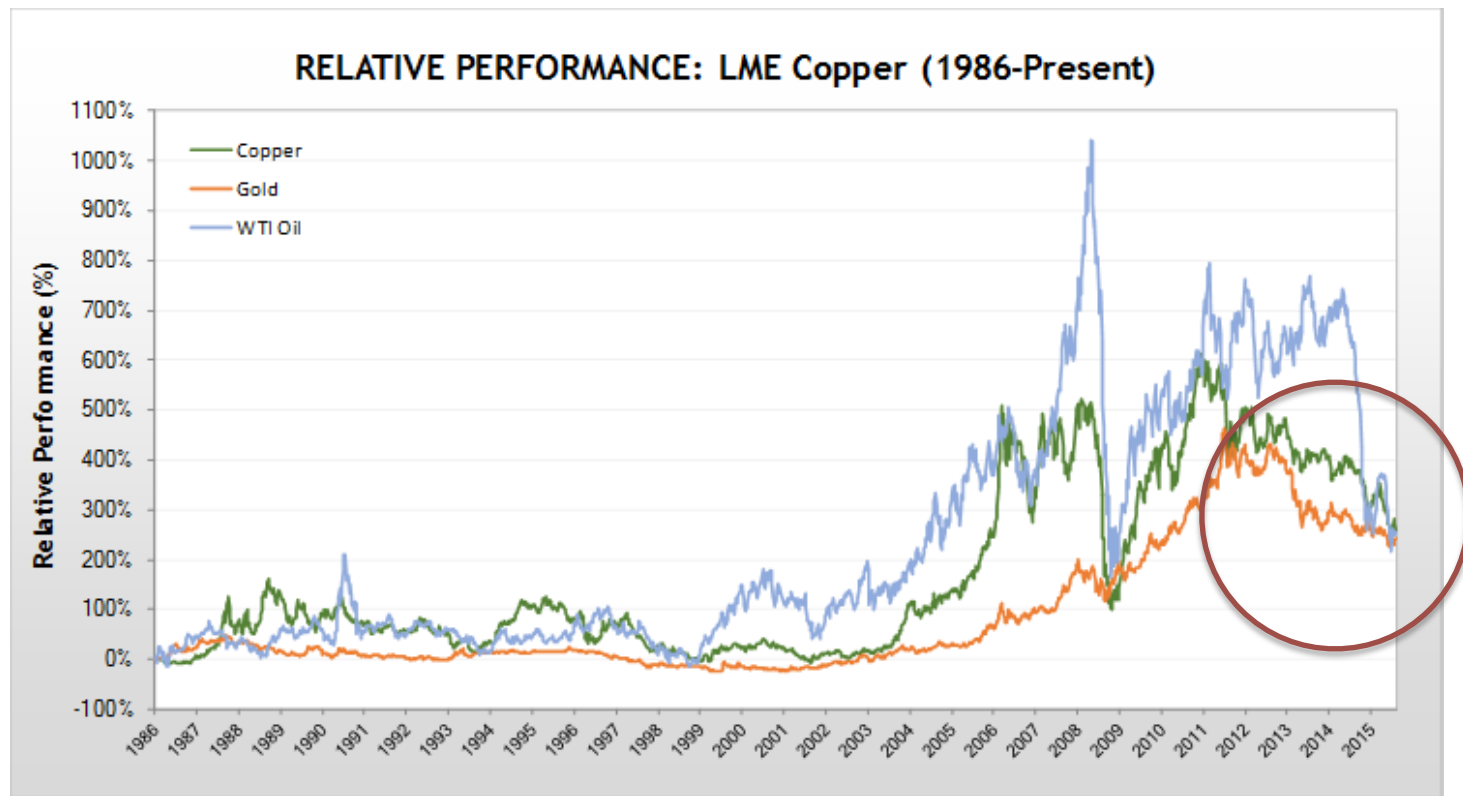
	Power generation capacity (GW)			
	2014	2020	Capacity Change	Increase
Nuclear	20	58	38	194%
Wind	96	200	104	109%
Solar	27	100	73	277%
Hydro	302	350	48	16%
Coal	825	953	127	15%
Natural gas	56	100	44	80%
Other	35	54	19	53%
Total	1360	1815	455	33%

Note: Nuclear, wind, solar and hydro are taken from the government's action plan. Coal, natural gas and others were derived from an industry body report. Source: China Electricity Council, NDRC

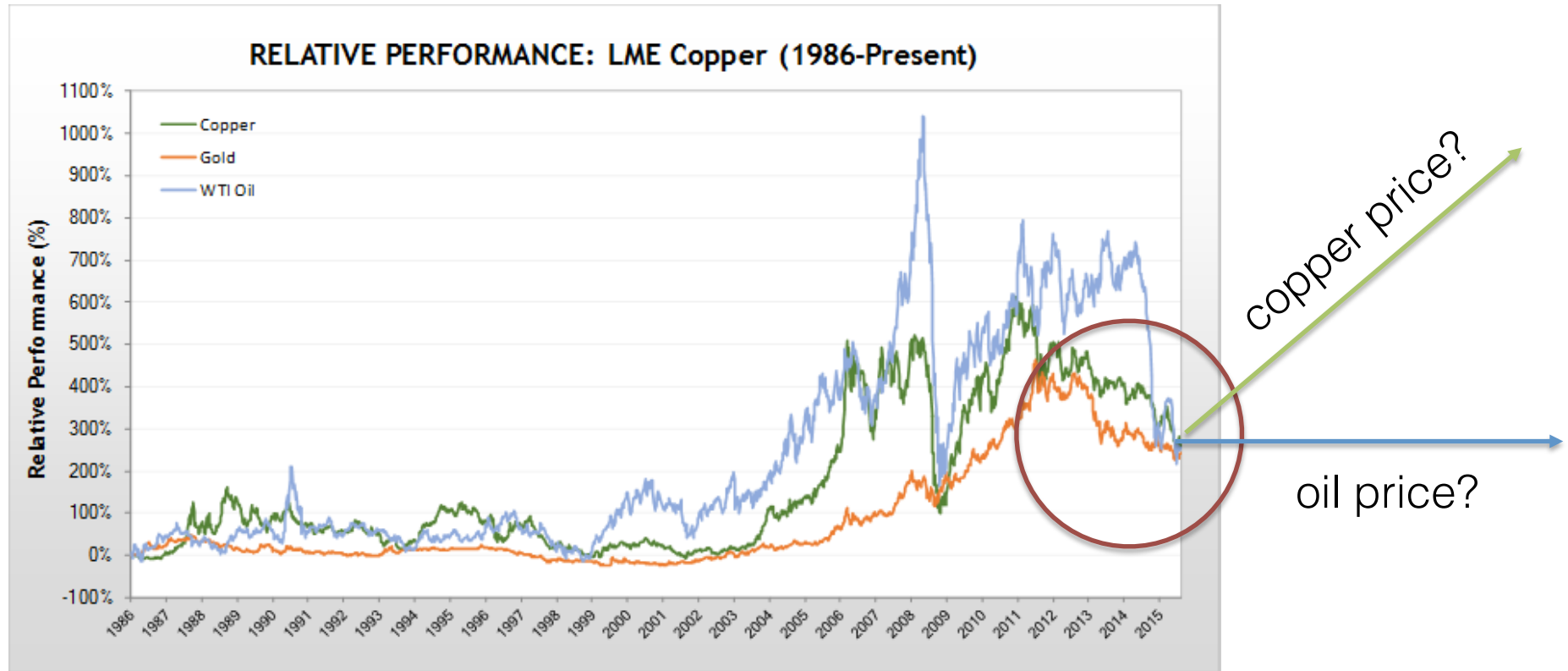
copper prices... highly correlated to oil (in the past)



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copper prices... highly correlated to oil (in the past)



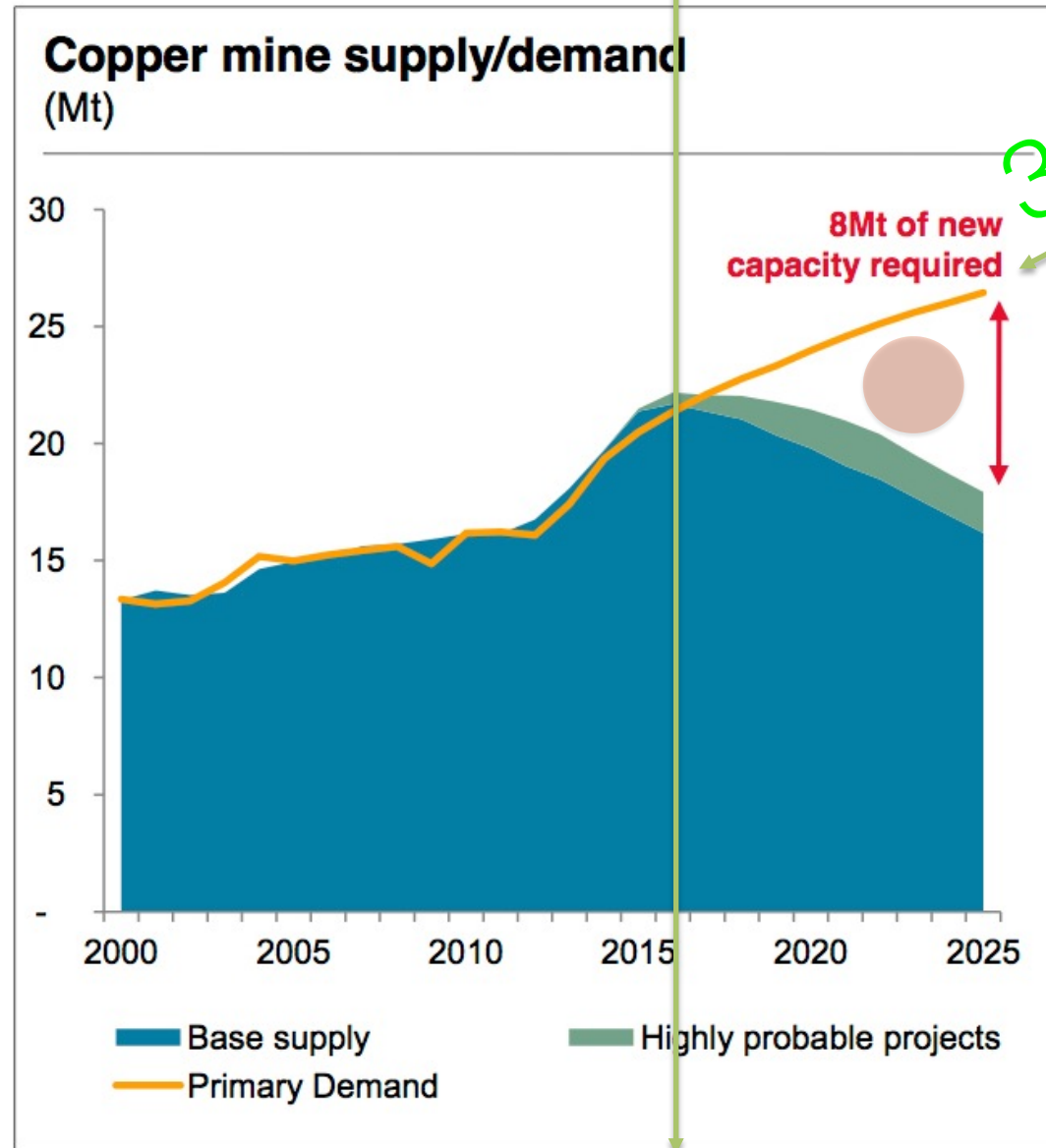


In the past year, a new divestment campaign has caught on, faster than any other such campaign in history, according to [a recent Oxford university study](#). Investors representing more than **\$2.5 trillion** in assets under management, including the Rockefeller Brothers Fund, Norway's giant oil fund and the Church of England (whose archbishop is a former oil executive) have all joined the chorus saying sayonara to their dirtiest fossil fuel investments.

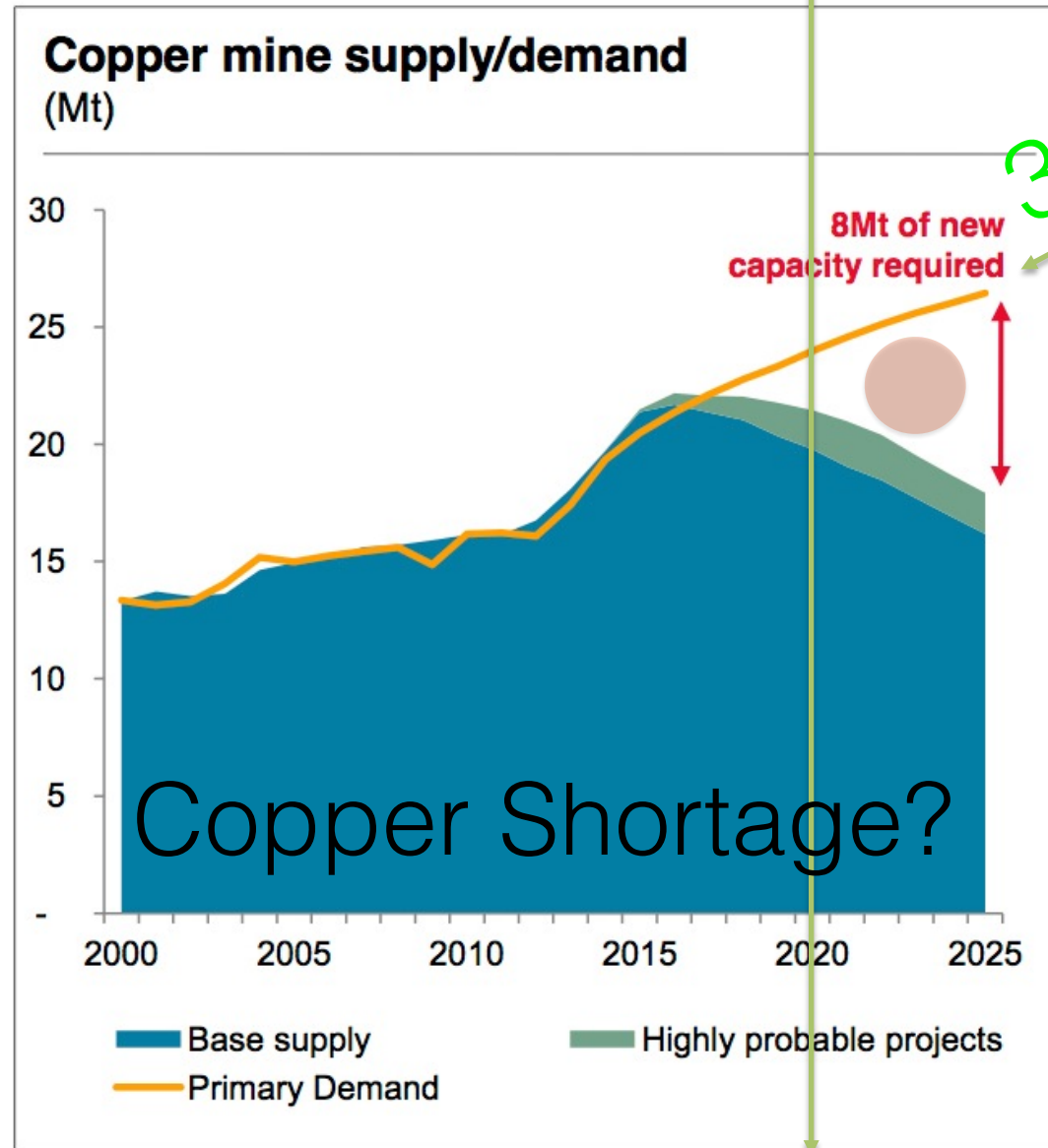
source: FT

BARCELONA (Thomson Reuters Foundation) - Hollywood actor Leonardo DiCaprio on Tuesday joined more than 400 institutions and 2,000 individuals who have promised to divest from fossil fuels, as new research showed they hold total assets of **\$2.6 trillion**.

who's going to finance the **real** supply shortfall?



who's going to finance the **real** supply shortfall?



Copper Shortage?

3% to 5%?

sage advice for any business

Warren Buffett's Castle and Moat Metaphor

"Look for the durability of the franchise. The most important thing to me is figuring out how big a moat there is around the business. What I love, of course, is a big castle and a big moat with piranhas and crocodiles." - Warren Buffett (US News & World Report, June 20, 1994)

Castle = A highly attractive business built upon a winning strategy and strategic brand

Moat = Barriers to competitor imitation and entry





These 6 barrels of uranium produce the energy equivalence of 220,000 barrels of oil.

\$740 Billion
Global Nuclear Energy Market
Over Next 10 Years

Chinese Nuclear Energy Growth

- Current Chinese installed nuclear capacity: 23 Gwe (26 reactors)
- Official government forecasts: 97 Gwe by 2025
- Context – current US: 99 Gwe (99 reactors)

Chinese Import Data

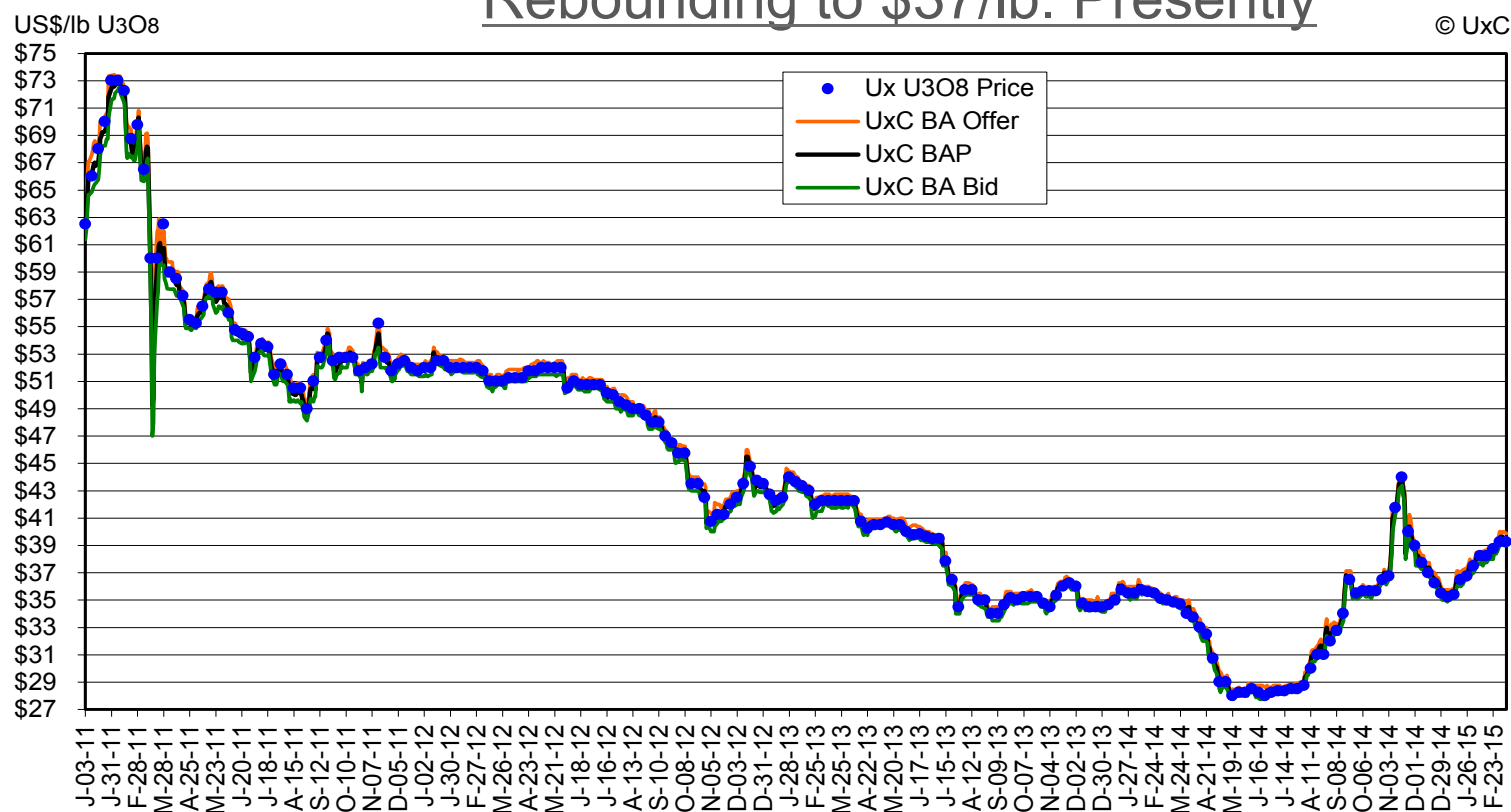
- 55M lbs. U₃O₈ in 2014 (up 12% from 2013)
- Context - U.S. reactors currently consume 50 million pounds U₃O₈ per year



2011-2014 Uranium Bear Market

Uranium is 2015's top performing commodity

Spot Price Drops from \$73 to \$28
Rebounding to \$37/lb. Presently



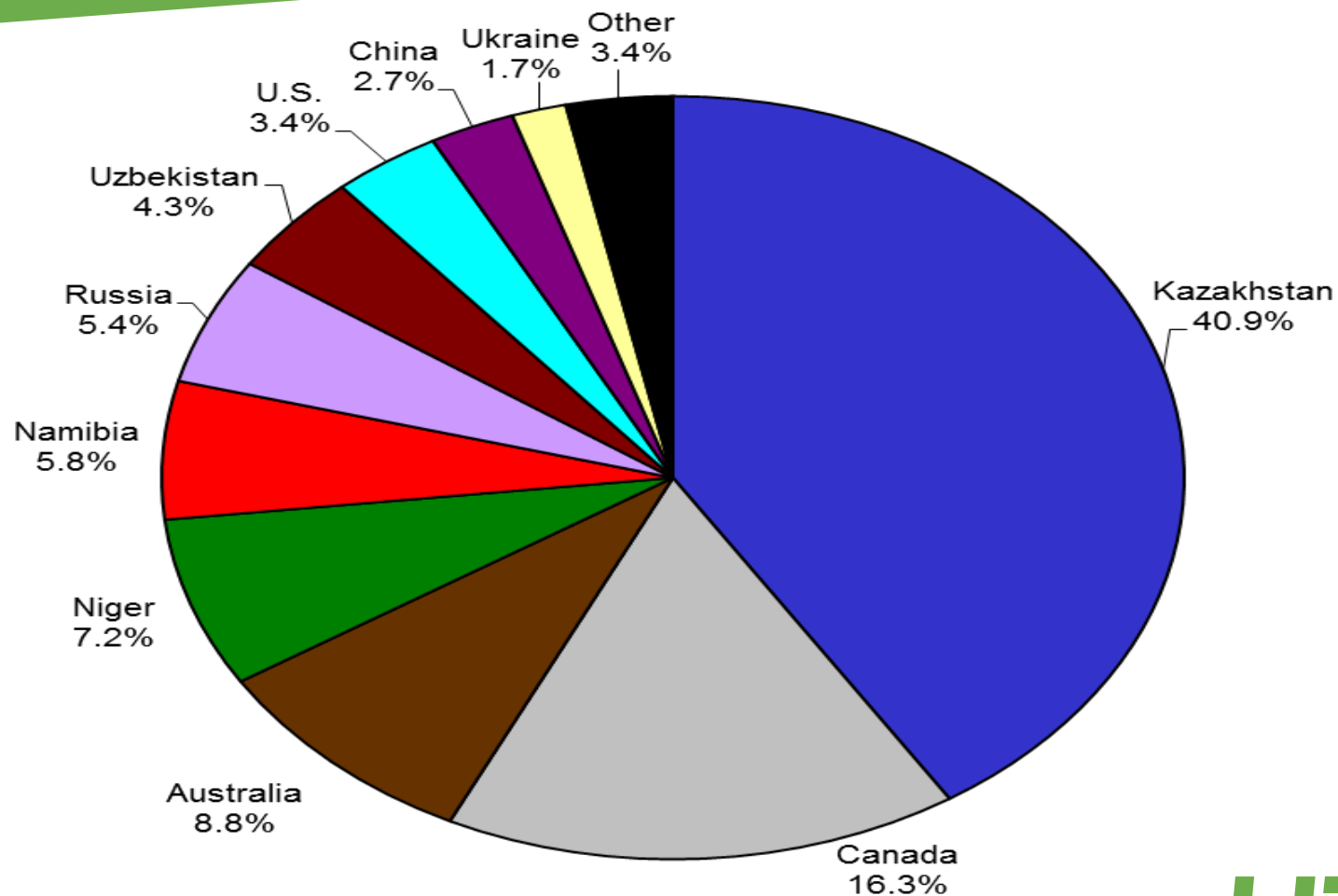
Courtesy Ux Consulting

Secondary Supplies

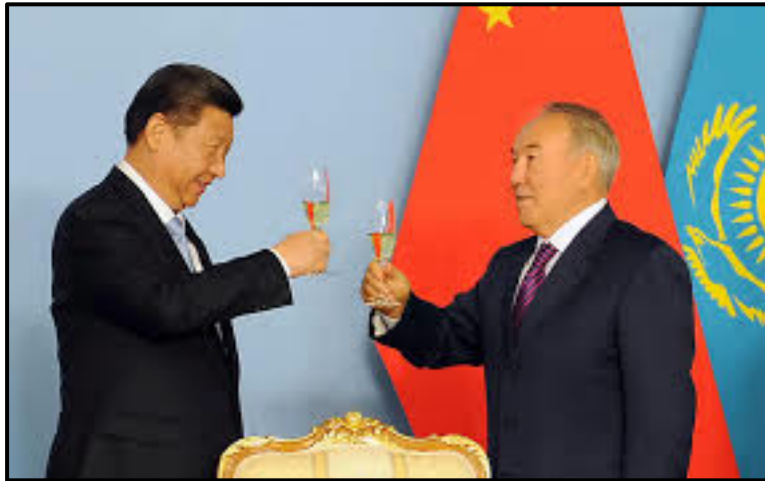
- US-Russian HEU Agreement ended 2013, had supplied 24 million lbs U3O8 annually – no extension



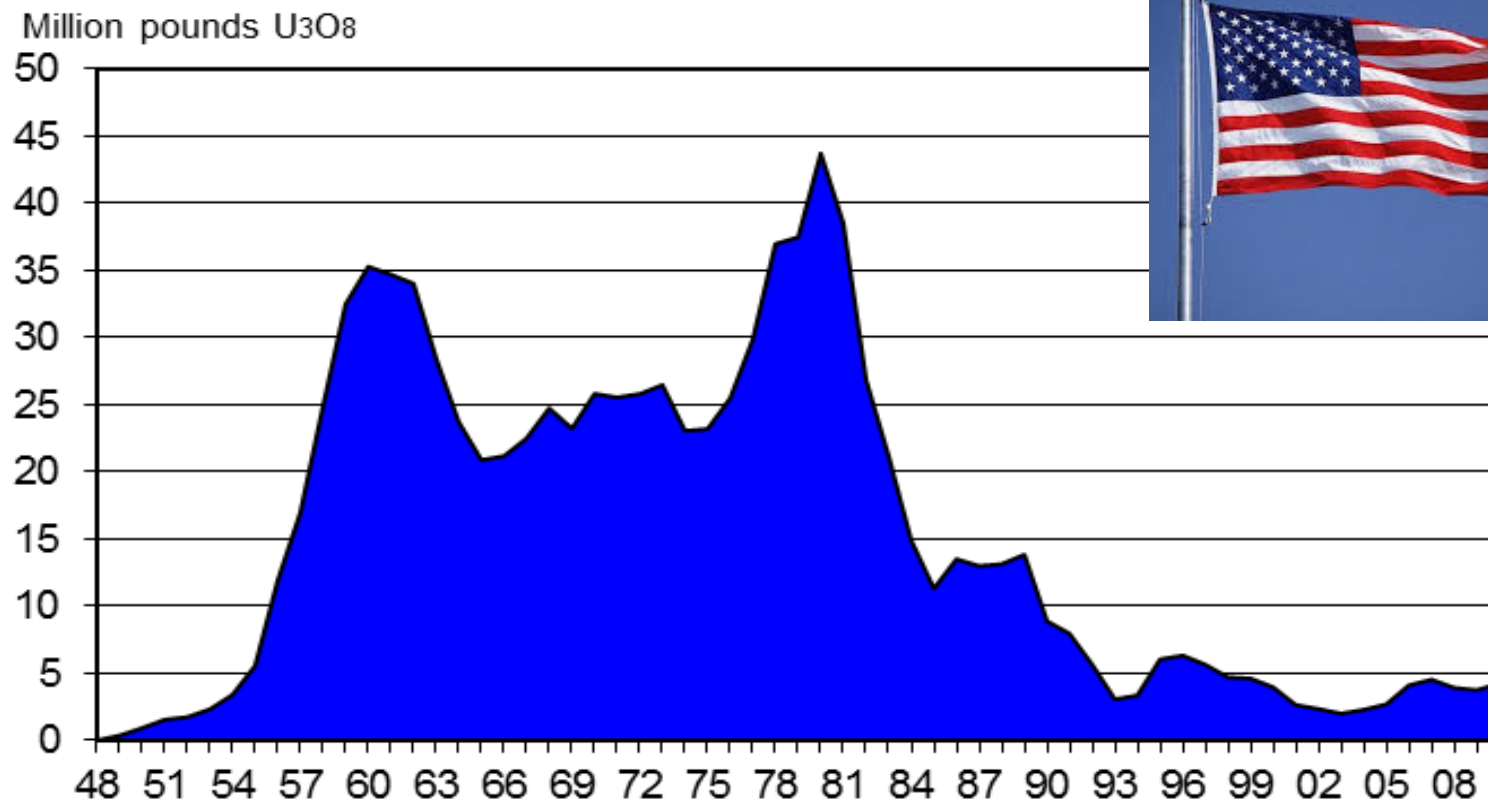
Most Global Production has elevated Geopolitical Risks



Geopolitical Considerations



Historical Uranium Production in the U.S.



Courtesy Ux Consulting