Mineral Deposits and their Global Strategic Supply

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resourcing the future

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Agenda

- Growing prosperity for more people
- Everything we need to grow is abundant in the Earth's crust
- Ineffective natural resource governance may limit supply
- Human ingenuity finds new ways to supply natural resources

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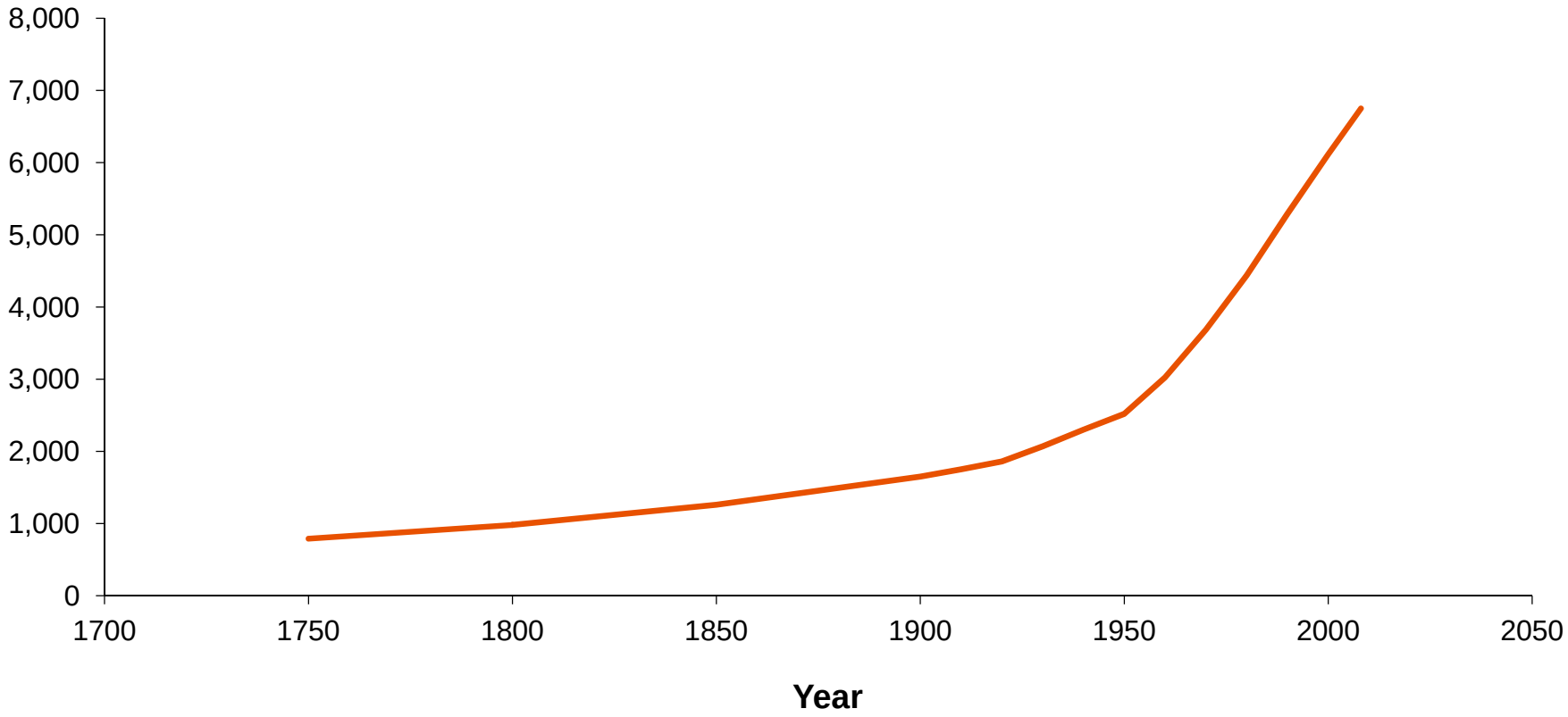
Population growth

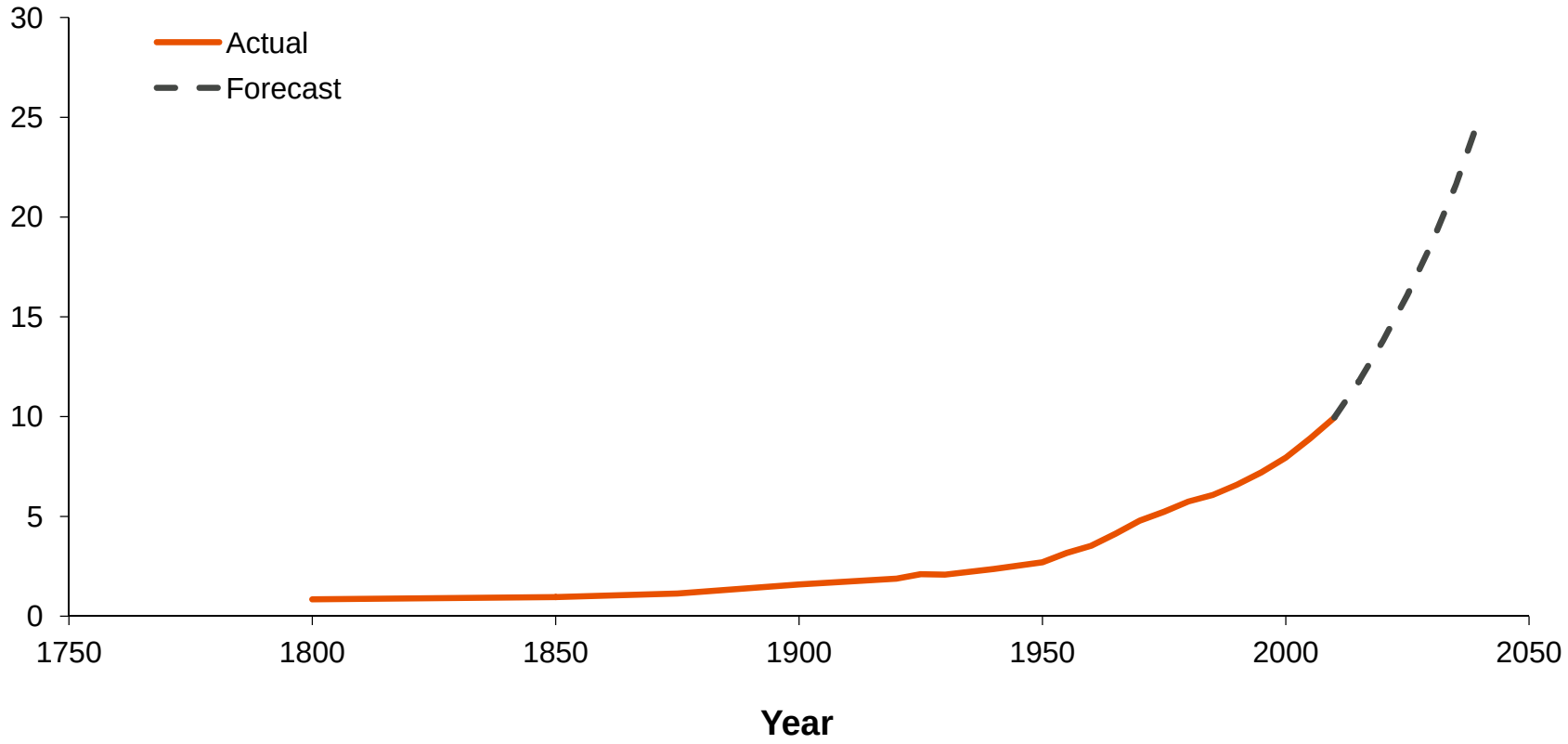
World population
(million)



Source: US Census Bureau, UN Statistics.

Rising living standards

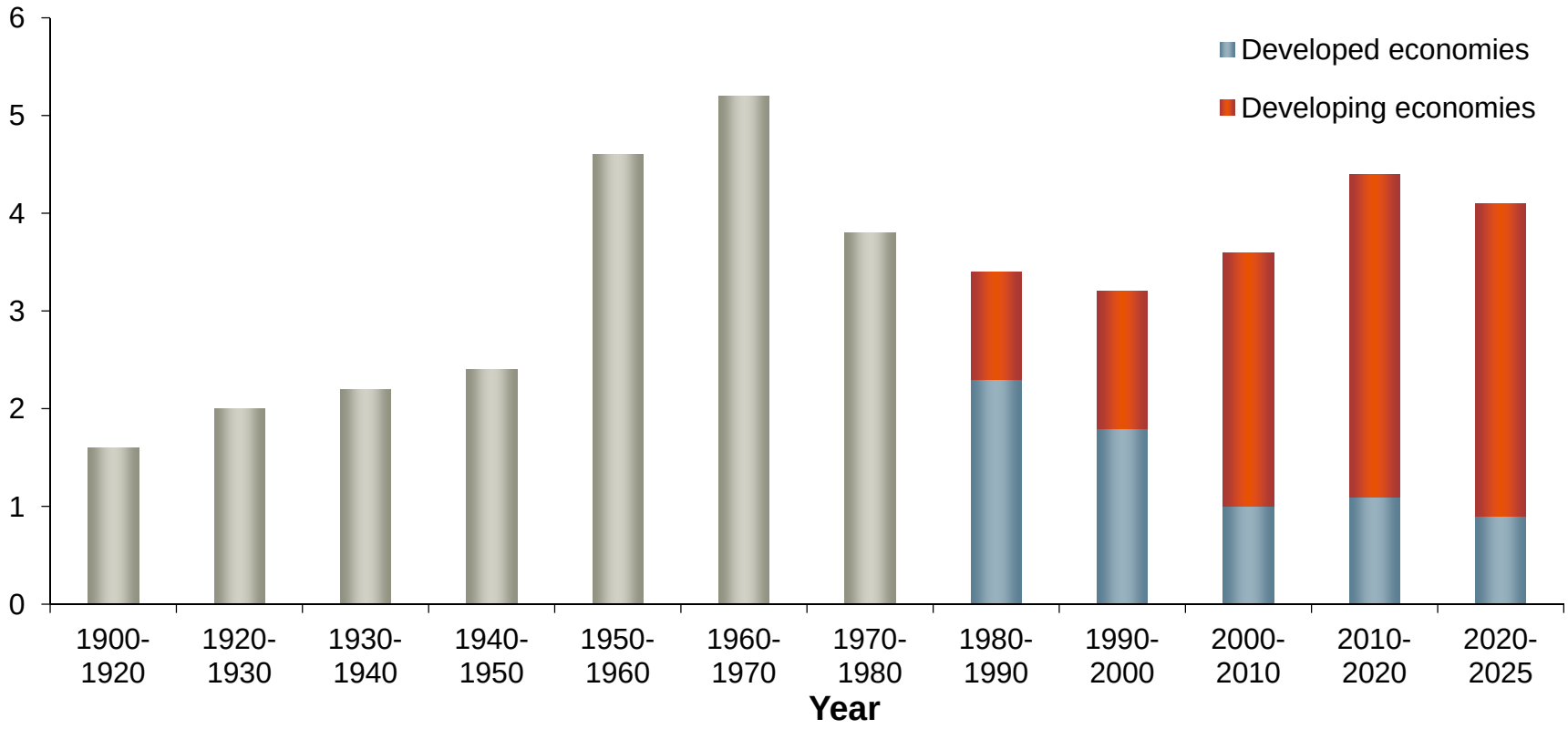
Global GDP per capita
(2005 real US$'000, PPP basis)



Sources:
GDP data for 1700-2000 from De Long, 1998, "Estimates of World GDP, One Million B.C. - Present" (Dept Economics, U.C. Berkeley).
GDP Data for 2000-2040 from Global Insight – WES.
Population data for 1800-1950 from Grubler, Arnulf. 2008. "Energy transitions." In: Encyclopaedia of Earth. Eds. Cutler J. Cleveland (Washington, D.C. National Council for Science and the Environment).
Population data for 1950-2100 from Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, World Population Prospects: The 2010 Revision.

Long term economic growth despite short term volatility

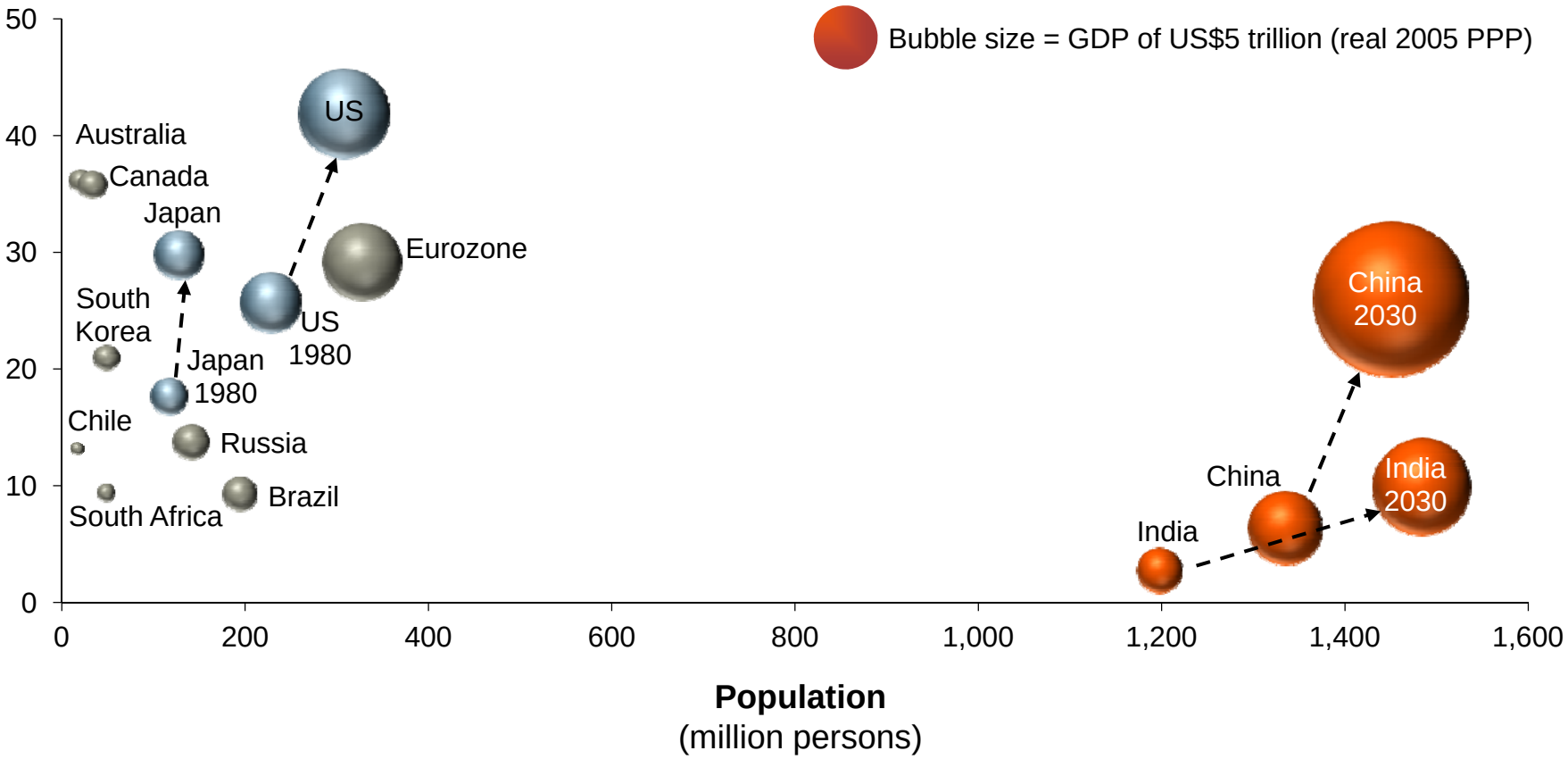
Global GDP growth rate
(% per annum)



Source: 1900 to1980 – J. Bradford De Long ("Estimates of World GDP", 1998); 1980 to 2010 – IMF World Economic Outlook Database; 2010 to 2025 Forecast – Global Insight.

Chinese GDP is set to grow substantially to 2030

Global GDP per capita[1]
(2005 real US$'000, PPP basis)



Source: Global Insight; BHP Billiton analysis.
1. All figures for 2009 unless mentioned otherwise.

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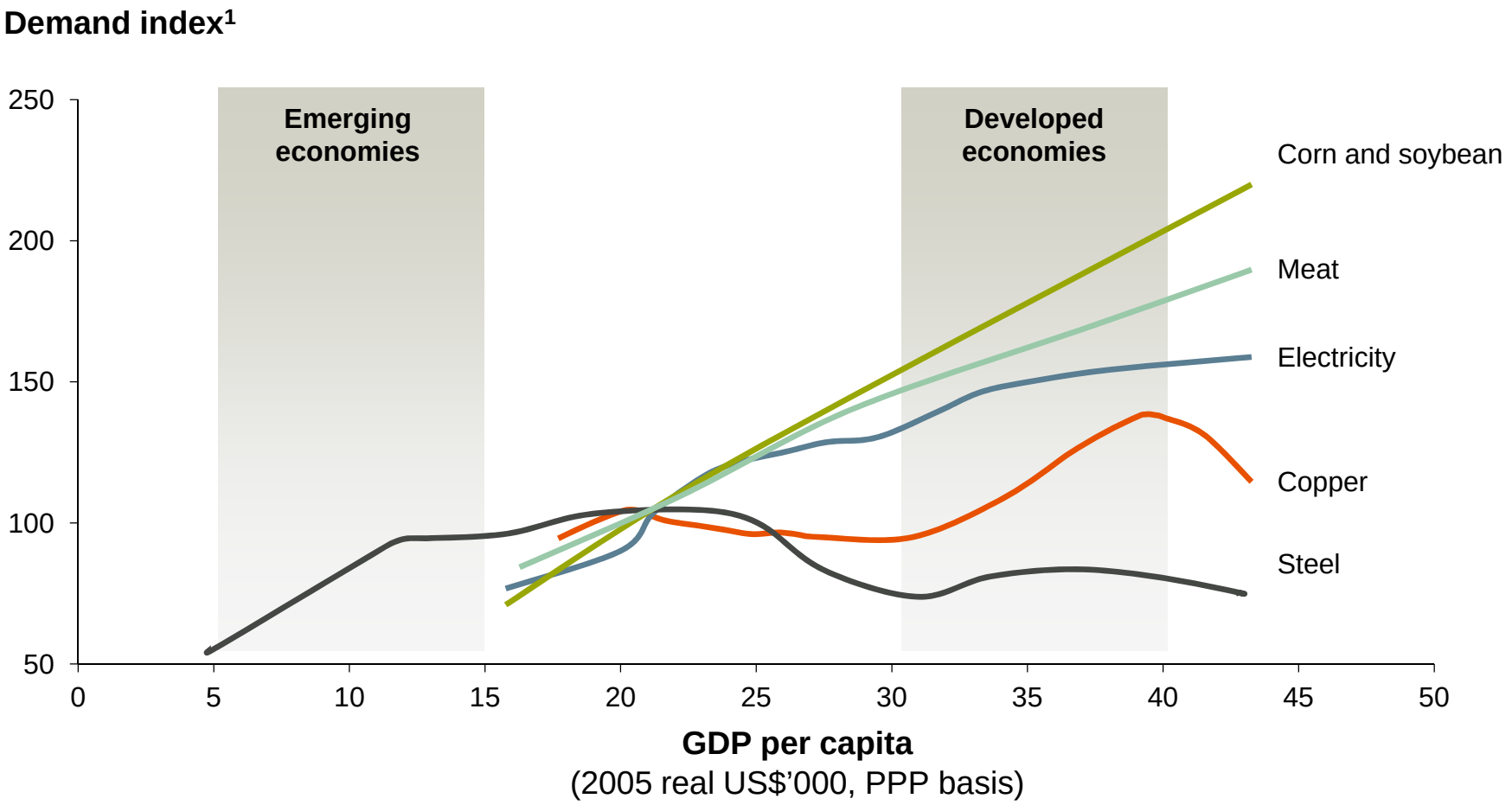
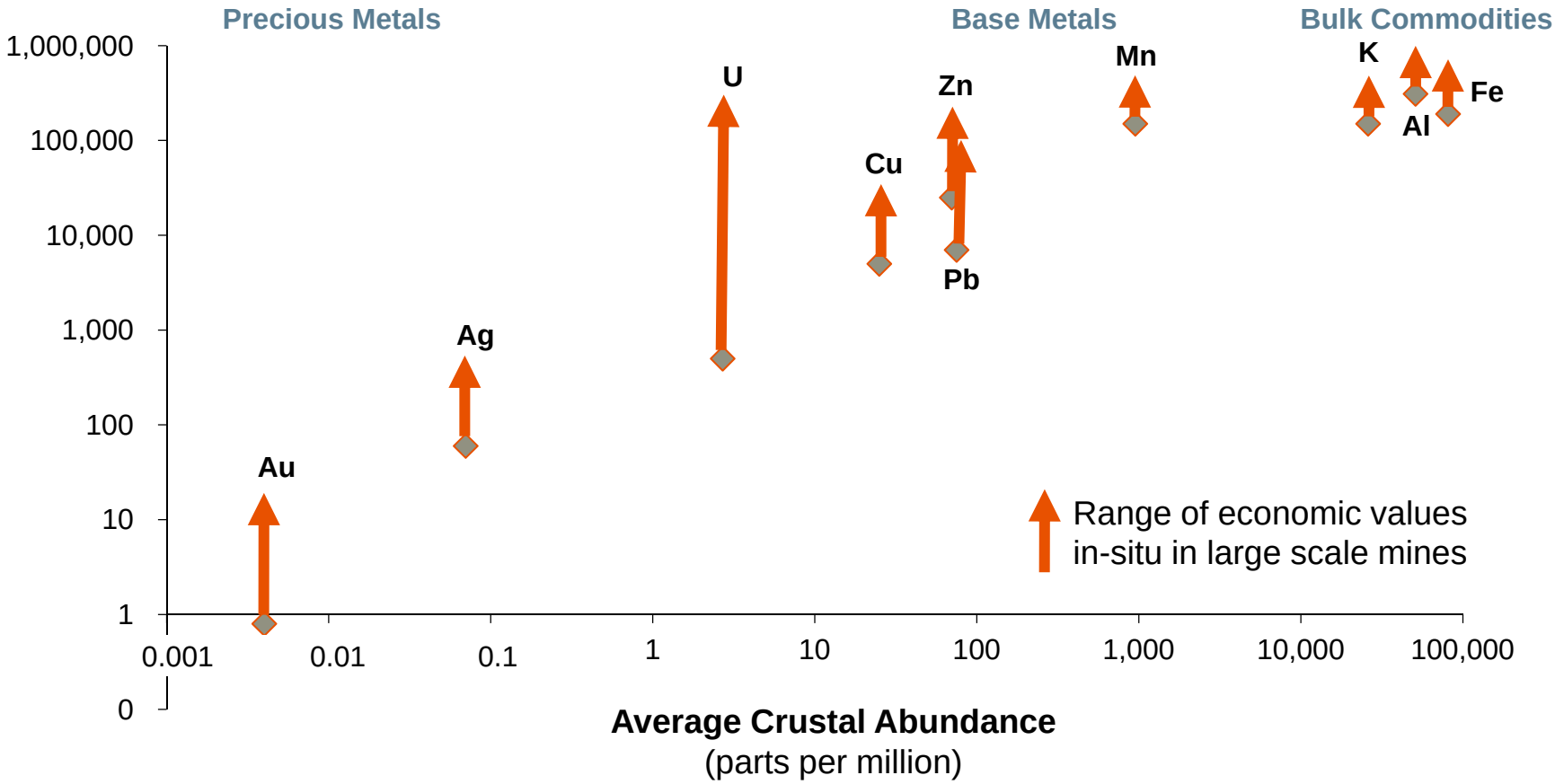
Commodity intensity evolve with economic development



Source: World Bank; Brook Hunt; CRU; IISI; Global Insight; CISA; worldsteel; JBS; IEA; BHP Billiton analysis.
1. The demand intensity index represents the volume consumption per capita consumption, 1968 as 100 for each of the commodities, based on the USA experience.

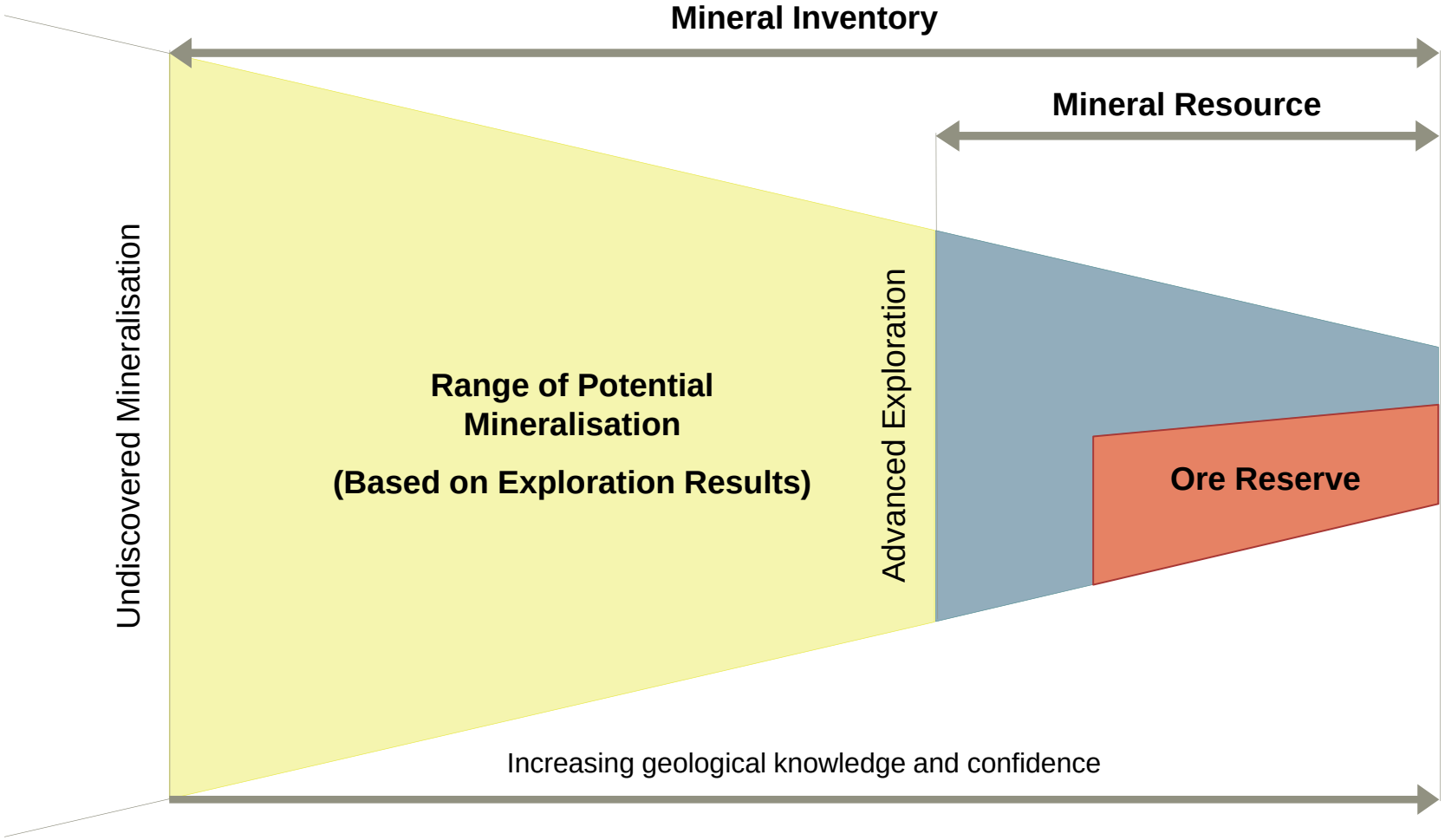
Crustal abundance of some key commodities

Economic value in-situ in large scale mines
(parts per million)



Source: Crustal abundance for precious & base metals Levinson A.A. (1974) Introduction to Exploration Geochemistry (Applied Publishing, Calgary), BHP Billiton analysis.

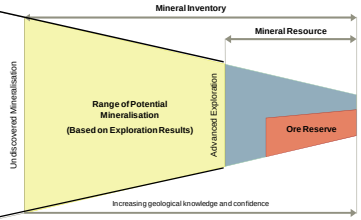
What we know about crustal resources



The range of Potential Mineralisation is estimated from geological information including boreholes, outcrops and geophysical information. The potential quantity is conceptual in nature, there has been insufficient exploration to define a Mineral Resource and it is uncertain if further exploration will result in the determination of a Mineral Resource.

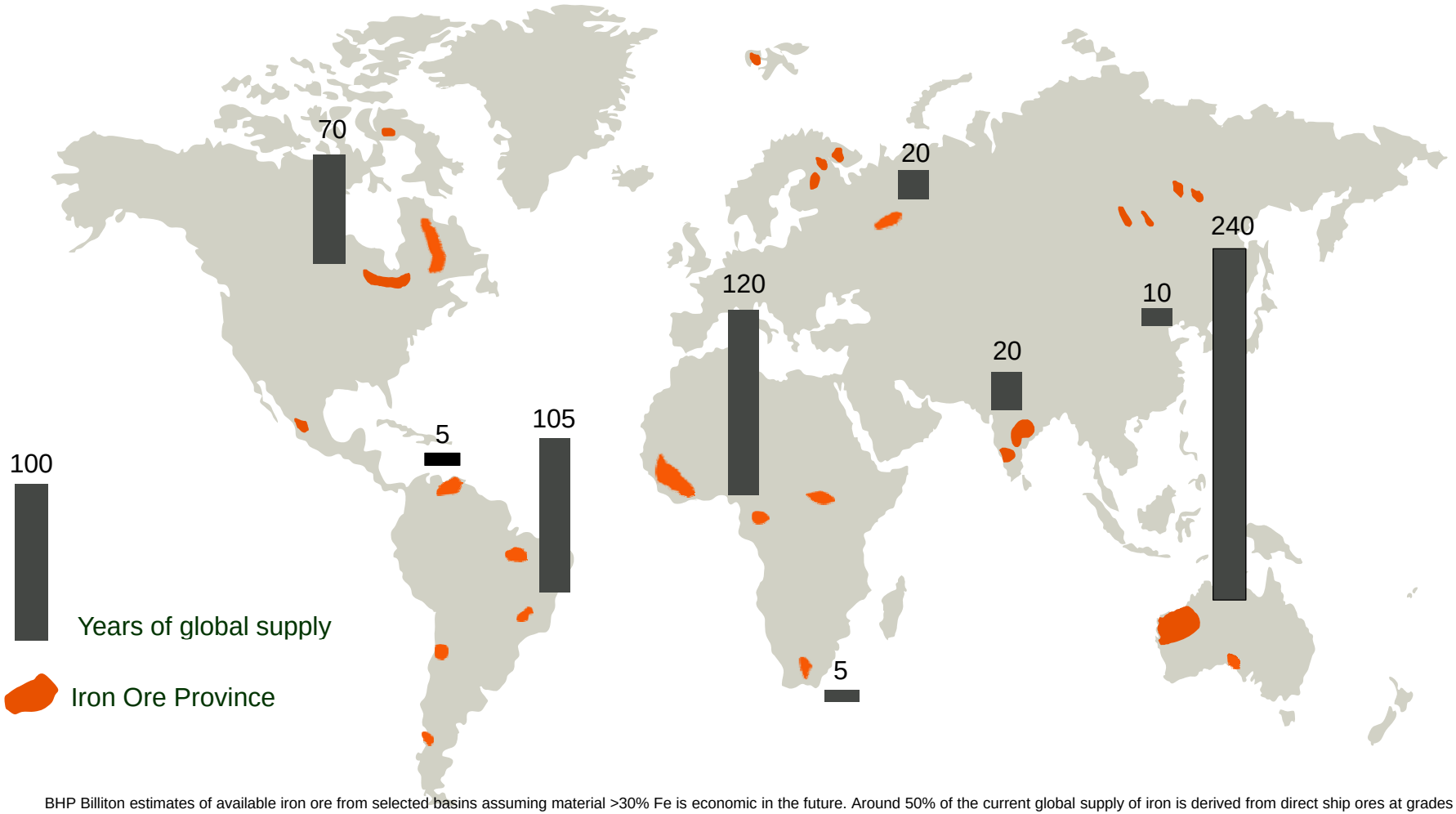
What we will discover about crustal resources

undiscovered mineralisation



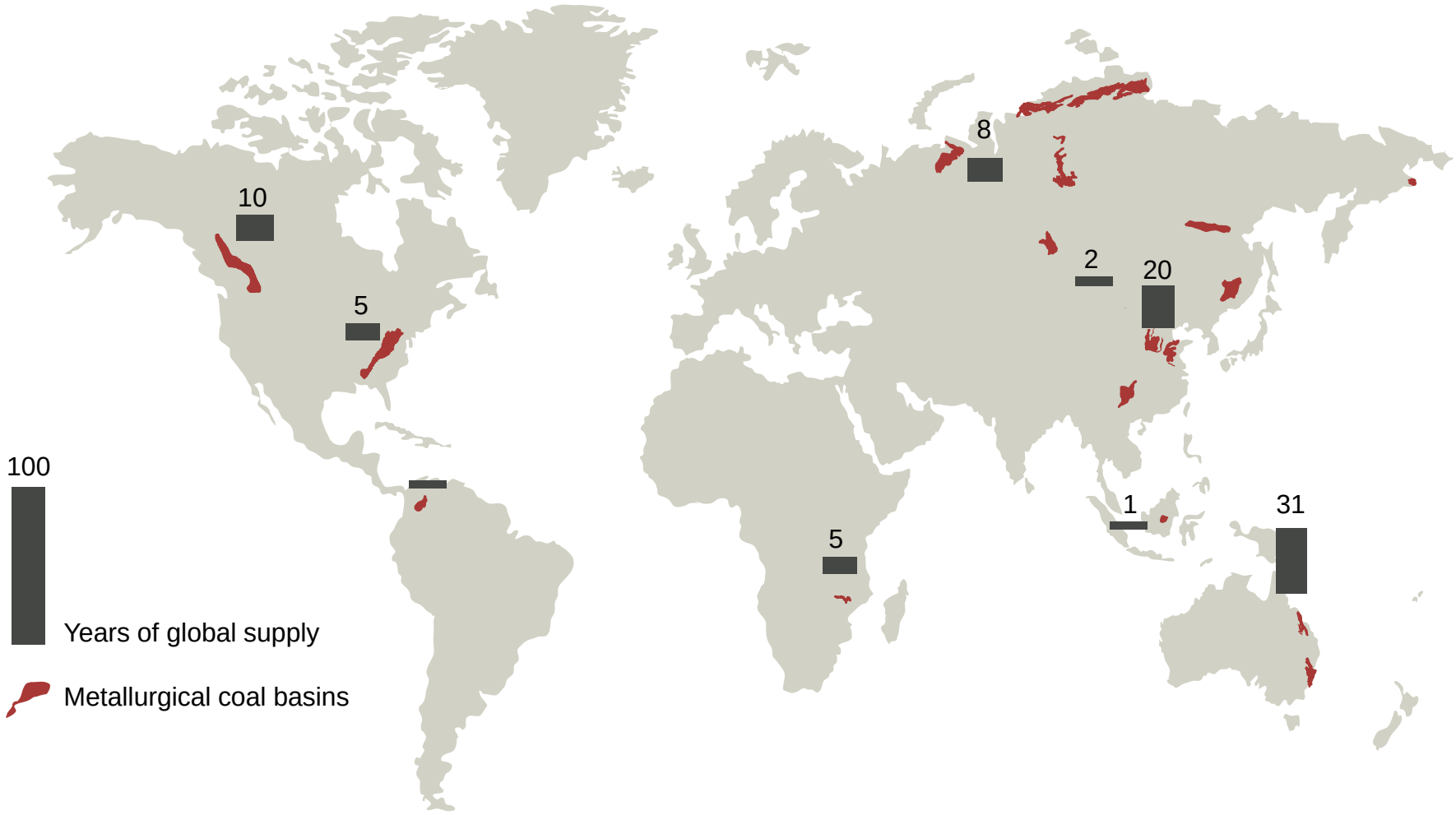
Increasing geological knowledge and confidence

Estimated available iron ore



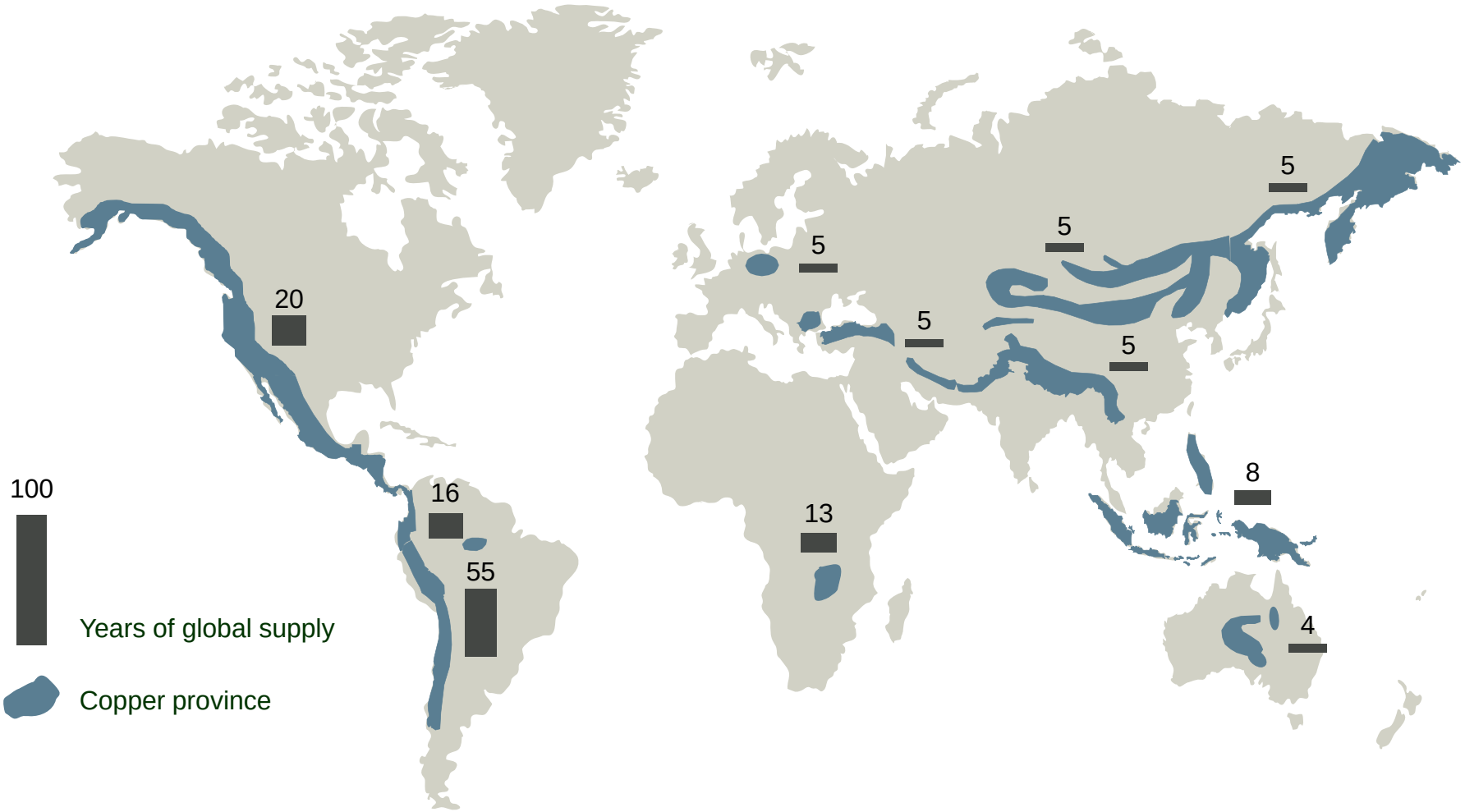
BHP Billiton estimates of available iron ore from selected basins assuming material >30% Fe is economic in the future. Around 50% of the current global supply of iron is derived from direct ship ores at grades of >60% Fe. In some locations, ores at grades as low as 30% (eg China, Canada and Russia) are currently mined for domestic markets. This estimate assumes that, over time, cut-off grades migrate towards 30% Fe and that 2-3% of the volume of the iron bearing sedimentary formations of the major basins is ultimately extractable. This implies a potential for ~500 years of supply based on current demand.

Estimated available metallurgical coal



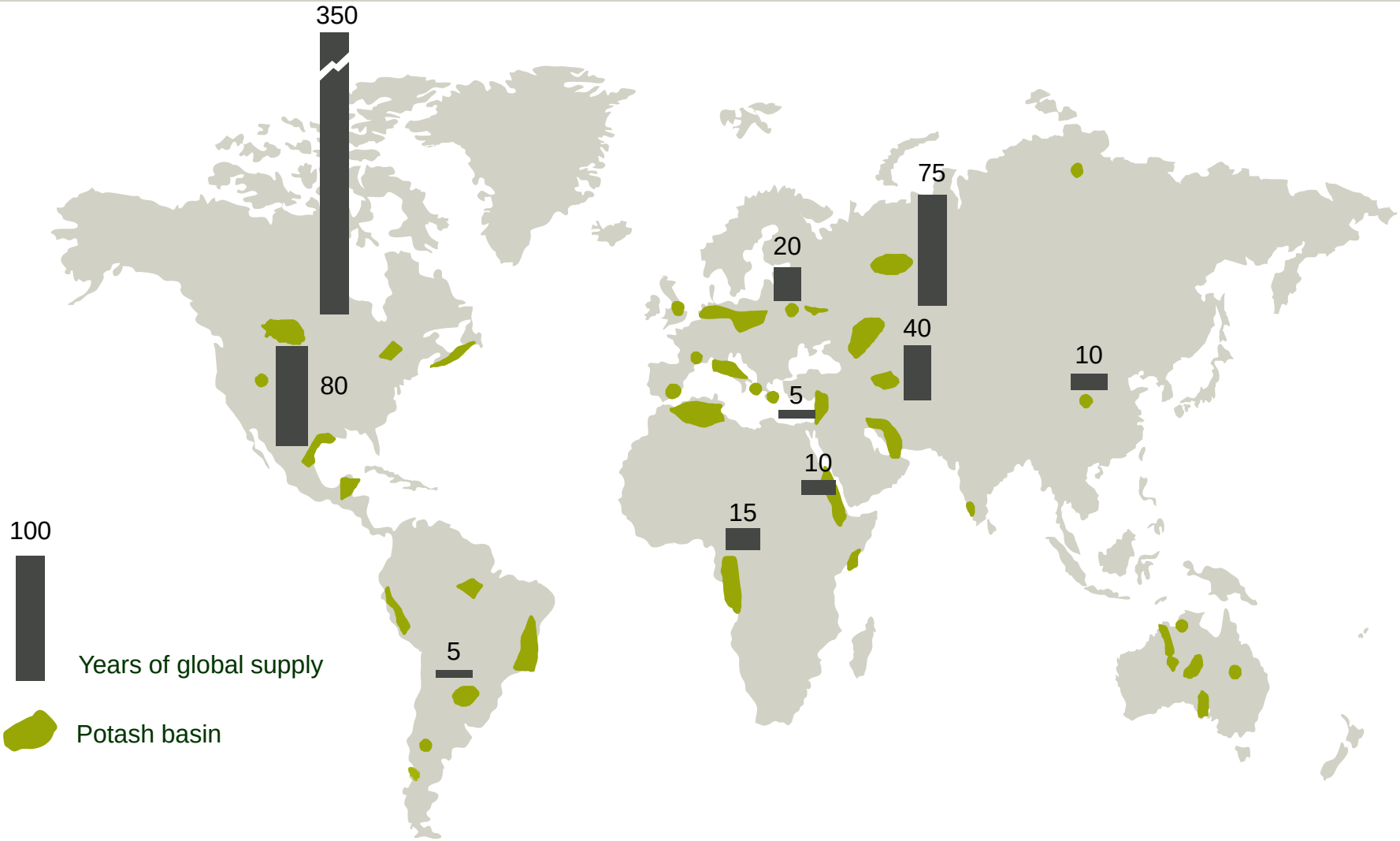
BHP Billiton estimates for available metallurgical coal including hard (HCC), semi-hard (SHCC), semi-soft (SSCC) coking and pulverised coal injection (PCI) qualities. Rates assumed for conversion of in-situ resource to product vary from basin to basin in the range of 10-70% depending on nature and disposition of known geology and washery yields. Total is estimated as ~80 years of supply at current rates of consumption.

Estimated available copper



BHP Billiton estimates of copper available from selected provinces. Extrapolations from estimated reserves and resources published by the USGS (2010) with the application of factors to convert in-situ metal to product depending on knowledge of deposit styles and likely geological disposition. Total is 175 years including 10 years of supply from deep ocean sources.

Estimated available potash



BHP Billiton estimated potash available from selected basins applying a depth constraint of 2500m. The assumed conversion of in-situ to product potash varies from 3-15% depending upon knowledge of seam characteristics and geological disposition. Production is assumed to be derived from conventional, and solution mining plus surface brine extraction methods. This implies a potential for ~900 years of supply based on current demand.

Estimated supply

Expressed as years of estimated global supply at current production rates

	Estimated mine life	Estimated orebody life	Estimated available supply
Iron Ore	*75*	*190*	500
Metallurgical Coal	20	160	80
Copper	*40*	*220*	175
Potash	*285*	*1670*	500

Sources: based on US Geological Survey (2010) for reserves and resources *(in italics)*. Other data is BHP Billiton estimates. Estimated mine-life and estimated orebody life are based on in-situ material whereas estimated future supply allows for conversion of in-situ mineralization to product.

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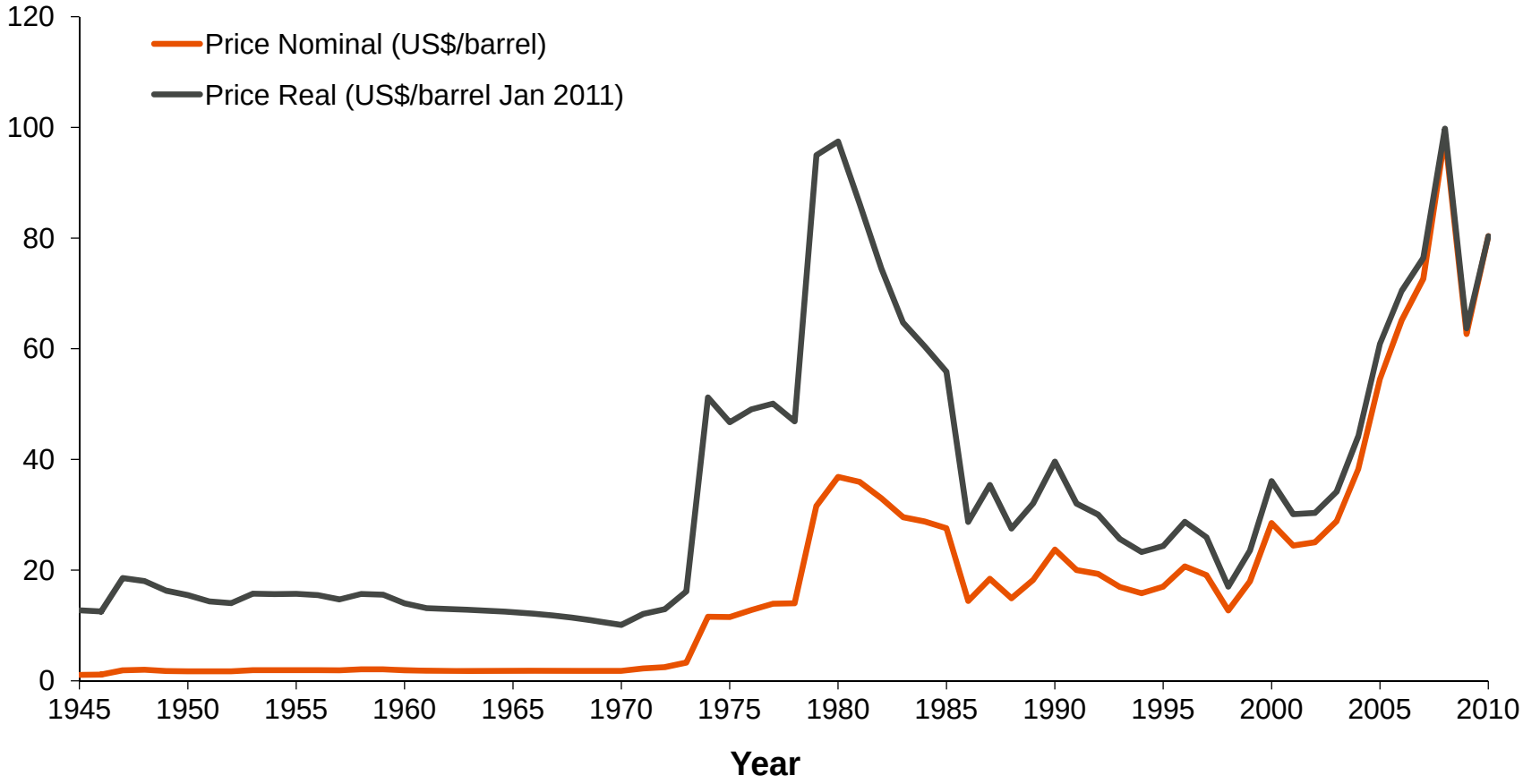
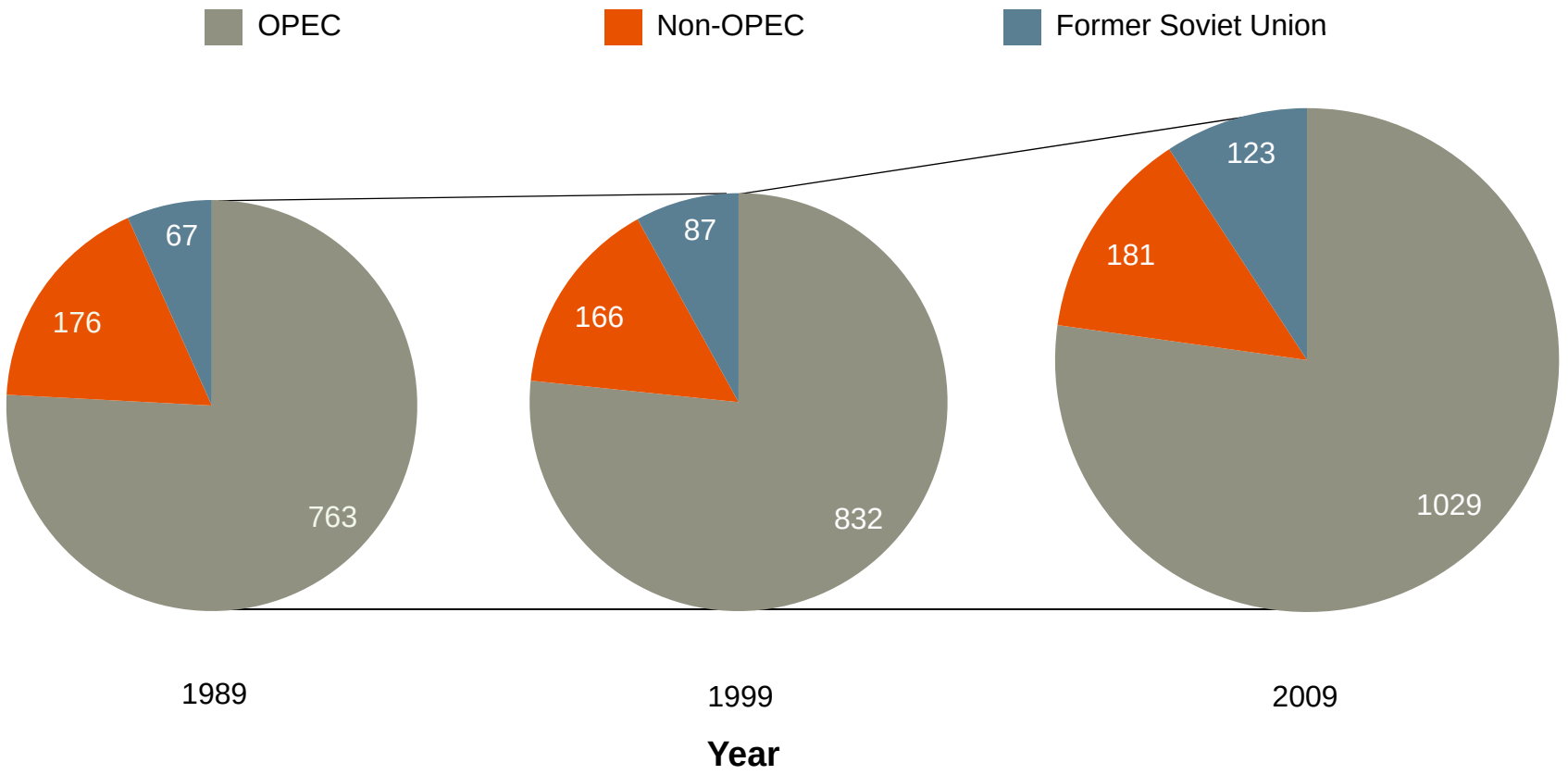
Resource governance affects prices

Spot Price of Oil
US$ per barrel



Source: 1945-1983 Arabian Light posted at Ras Tanura; 1984-2010 Brent dated.

Resource governance affects inventory



Source: BP Statistical Review of World Energy June 2010.

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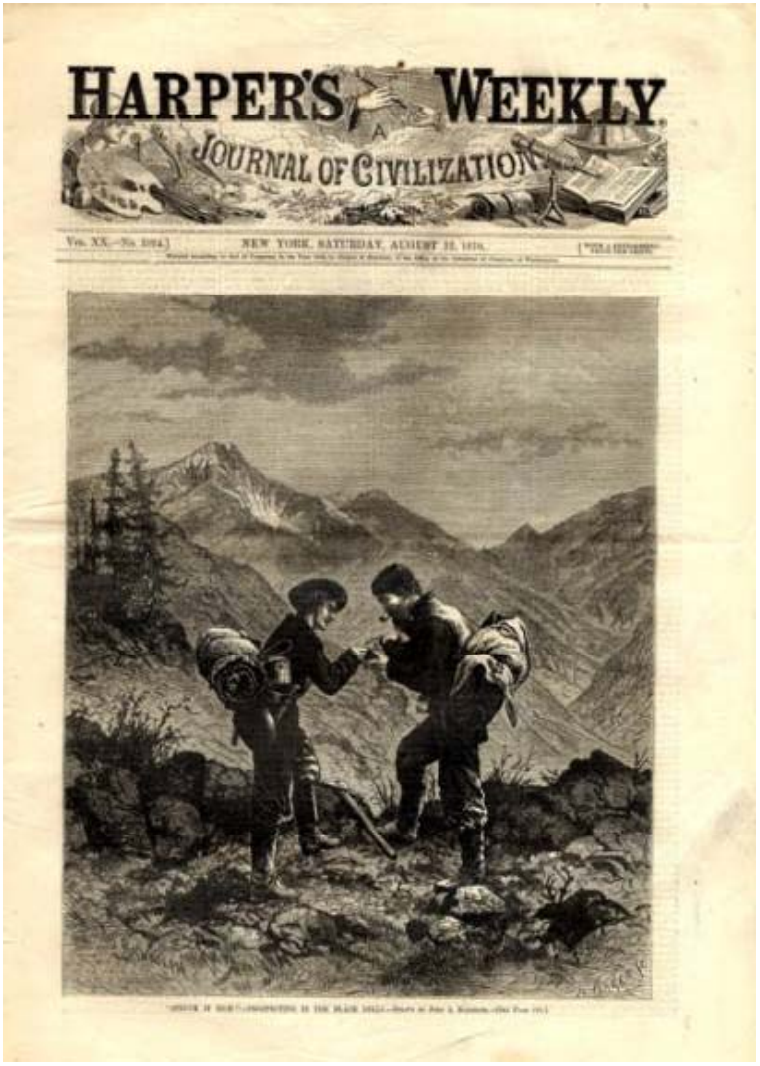
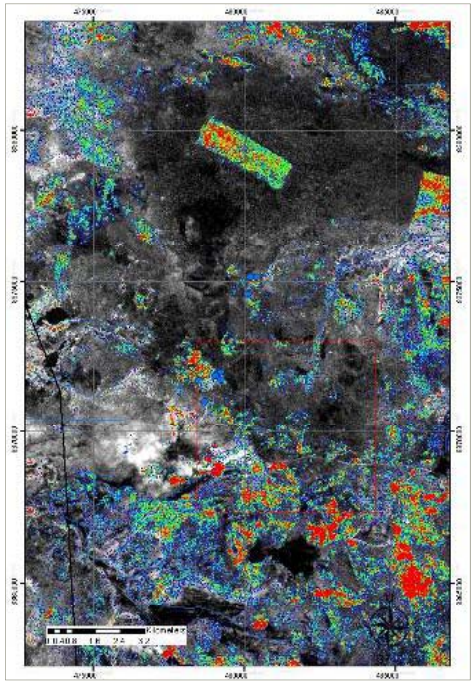
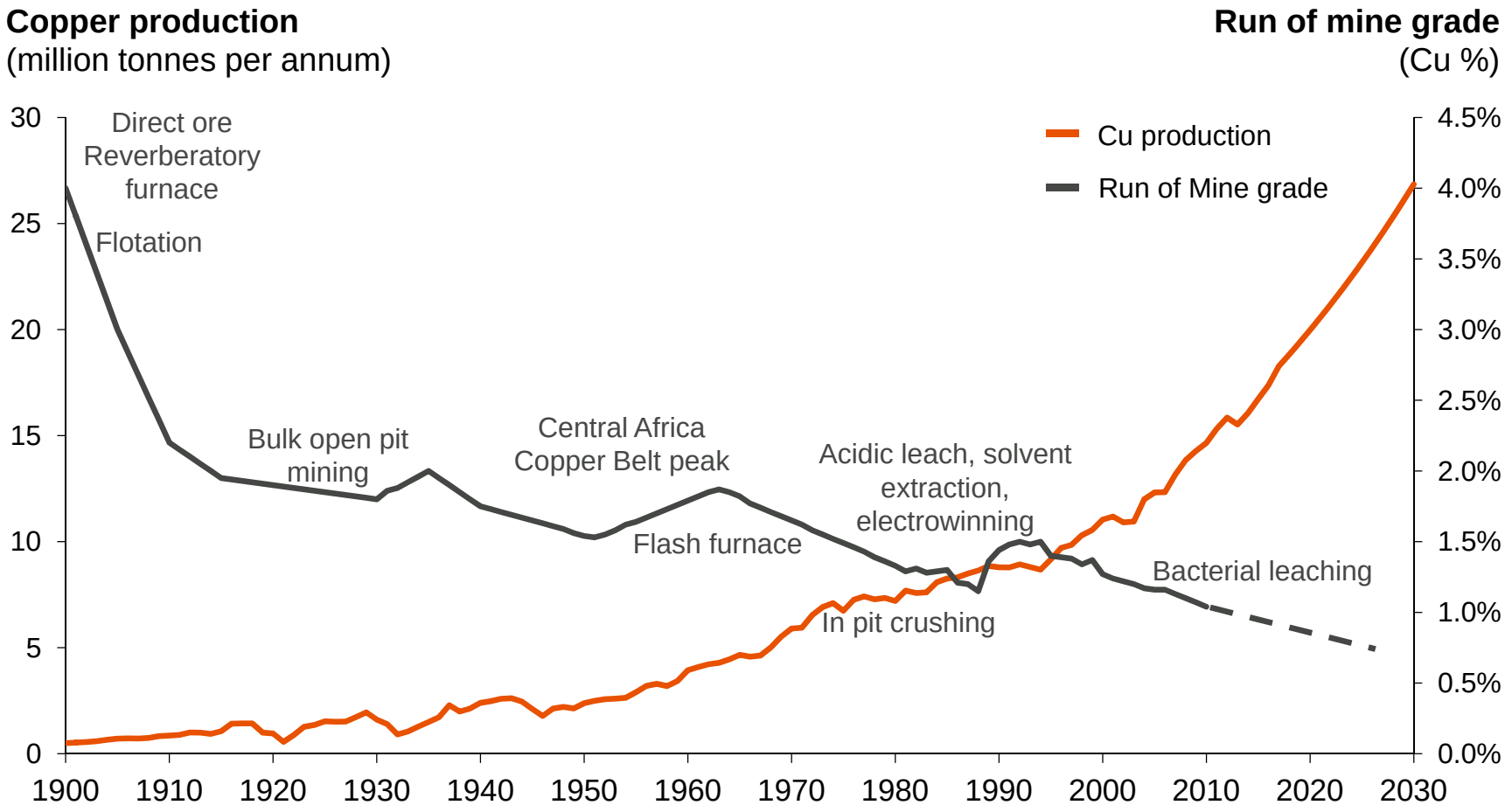
Discovery technology then,



.... and now



Technology – extraction



Source: US Geological Survey (1900-83), Brook Hunt (1984 onwards).

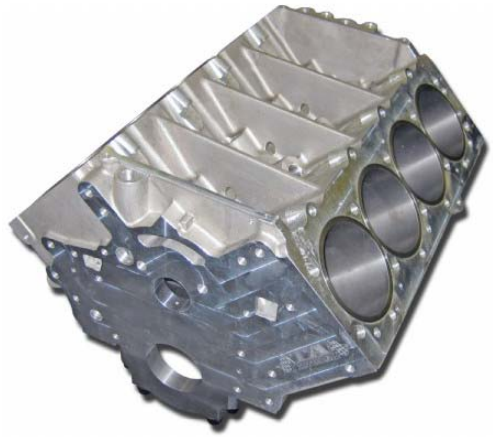
Technology - transportation

Technology - metals substitution

high voltage copper cable

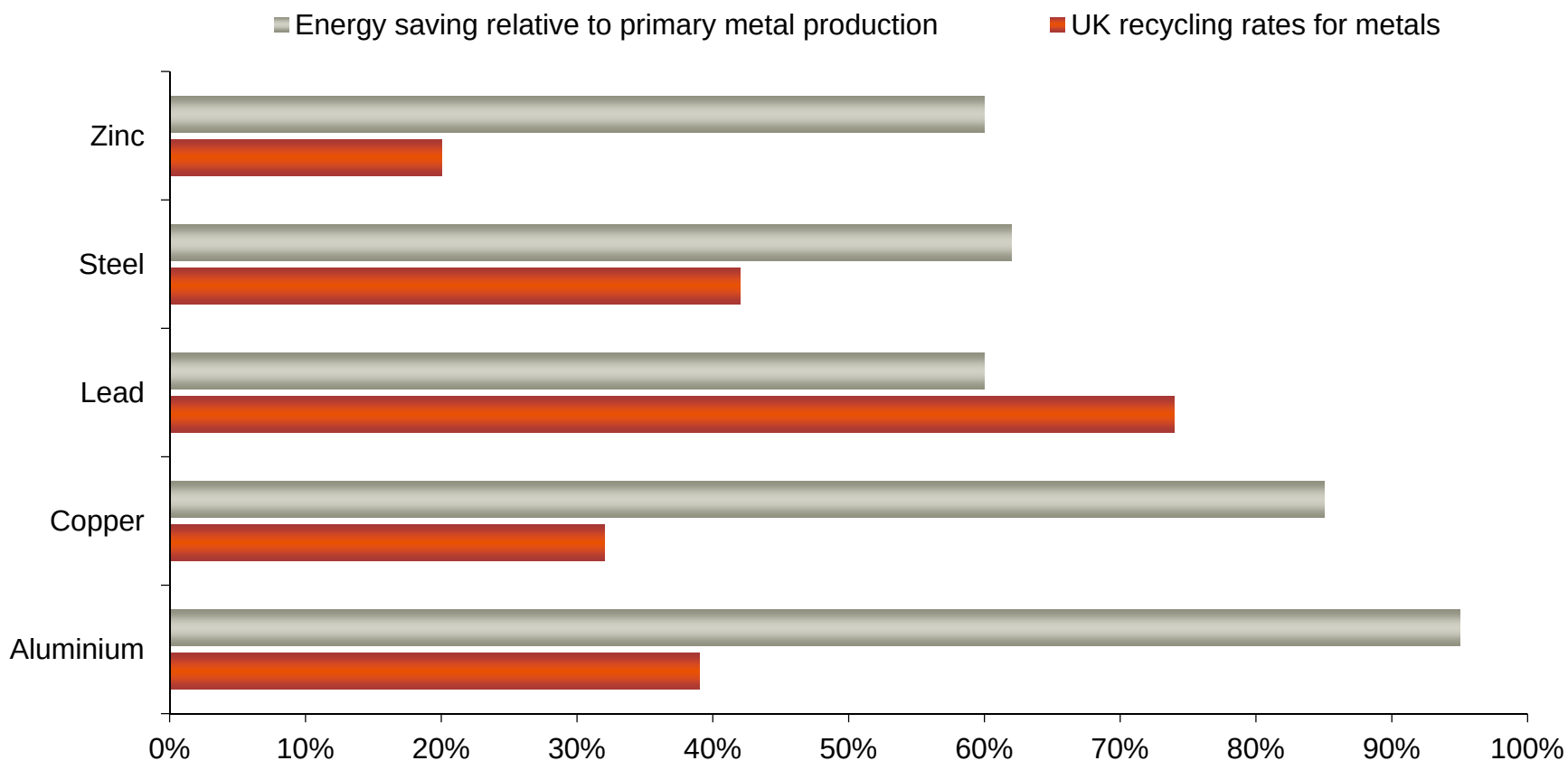
high voltage aluminium cable

steel engine block



aluminium engine block

Recycling a source of secondary supply



Source: British Metals Recycling Association.

Environmental outcomes

Direct impacts of mineral supply

Commencing mine rehabilitation after metallurgical coal mining

Indirect impacts of mineral demand

Low carbon emission electricity generation

Summary

- Growing prosperity for more people
- Everything we need to grow is abundant in the Earth's crust
- Ineffective natural resource governance may limit supply
- Human ingenuity finds new ways to supply natural resources
- Global companies have a role to play

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resourcing the future