Fossil reserves & Markets

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My background

Career:

2003–2004: Energy & transport consultant, VC manager, Ricardo-AEA, UK

2004–2005: Manager, Environment, CEN – European Committee for Standardization, Brussels

2005–2012: Adviser (Renewable Energy, Decarbonisation, EVs), EURELECTRIC, Union of the Electricity Industry, Brussels

2012– Various roles, now Manager (Energy), Aalto Networking Platform, Aalto University

Education:
2001 BSc, University of Edinburgh
2002 MSc, Imperial College London
2021 DSc (Tech.), Aalto

Promotion of early EVs 2009, EC HQ, Brussels

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Fossil reserves & markets

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Module 2: Oil markets

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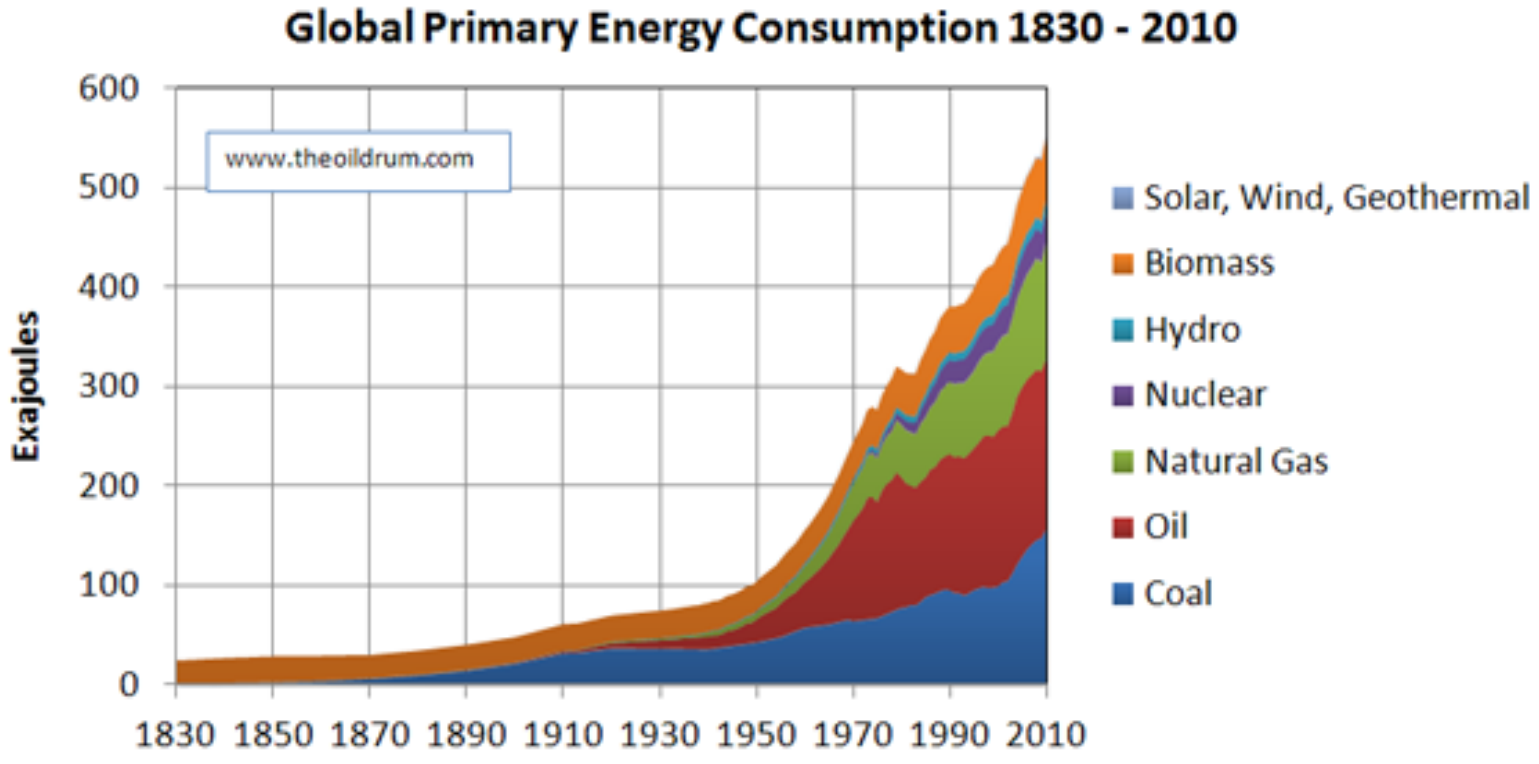
History of Energy Consumption



Fossil fuel reserves & resources: definitions

Reserves: ”we can use these”

Resources: ”we know they are there / they probably are there / they maybe are there”

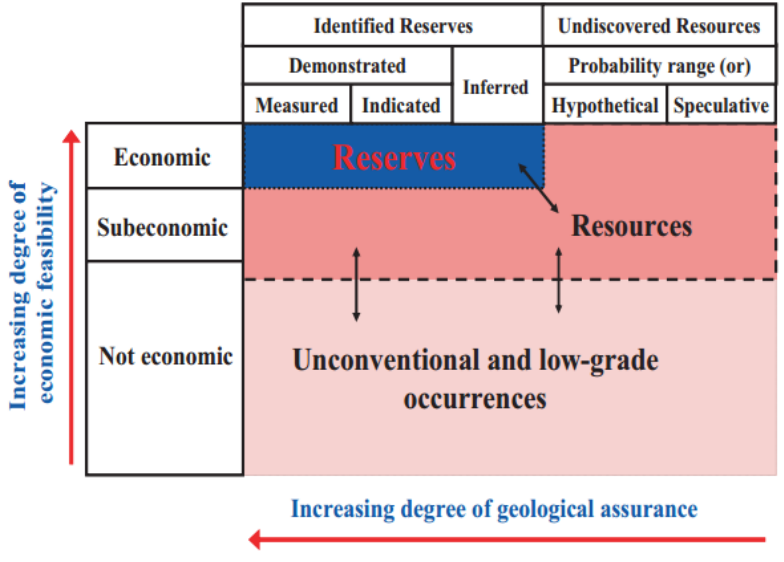
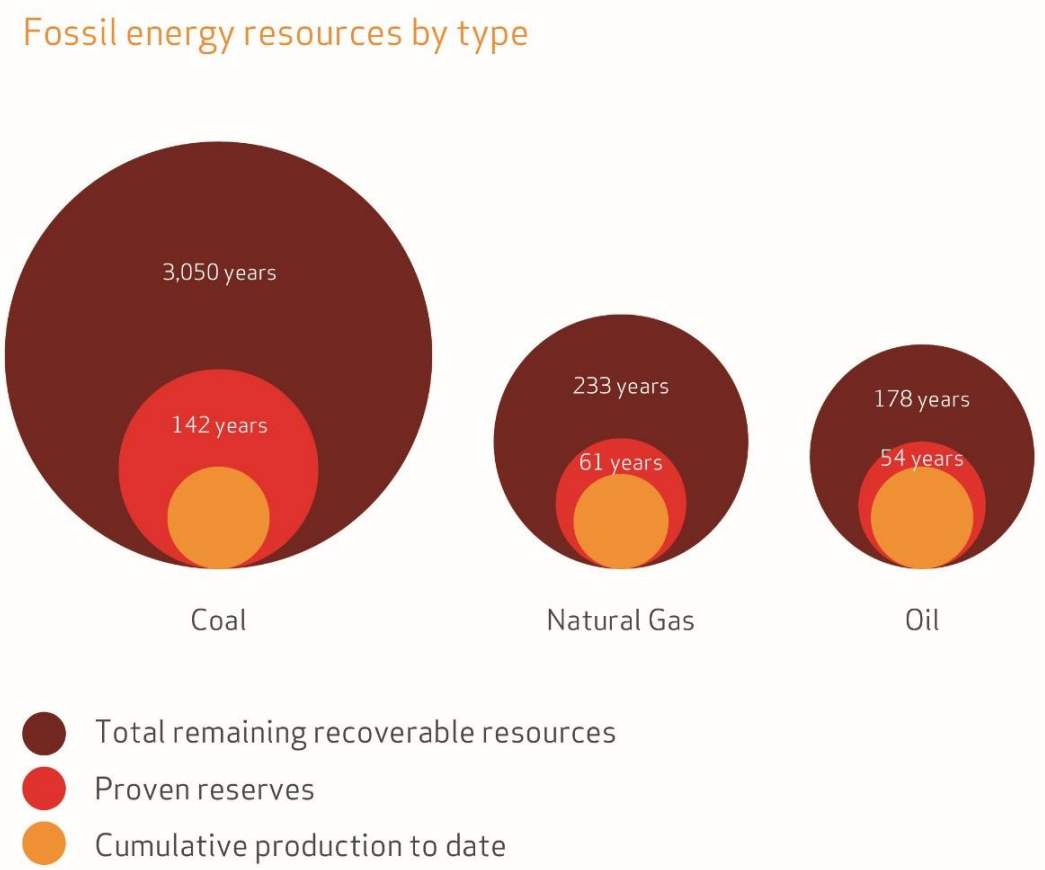


Figure 7.1 | Principles of resource classification. Source: McKelvey, 1967.

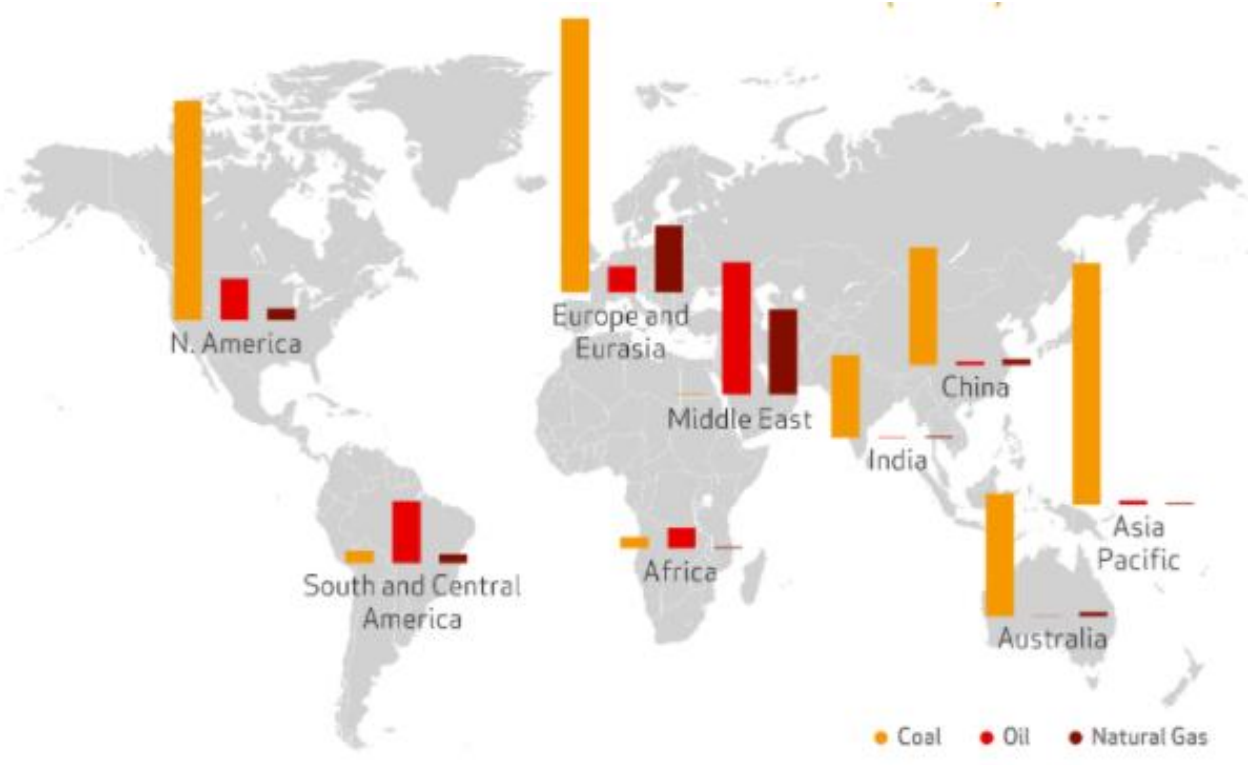
How long would reserves & resources last?

Remaining recoverable resources and proven reserves, years left at current rate of use



Source: IEA World Energy Outlook 2013

Location of global fossil fuel reserves



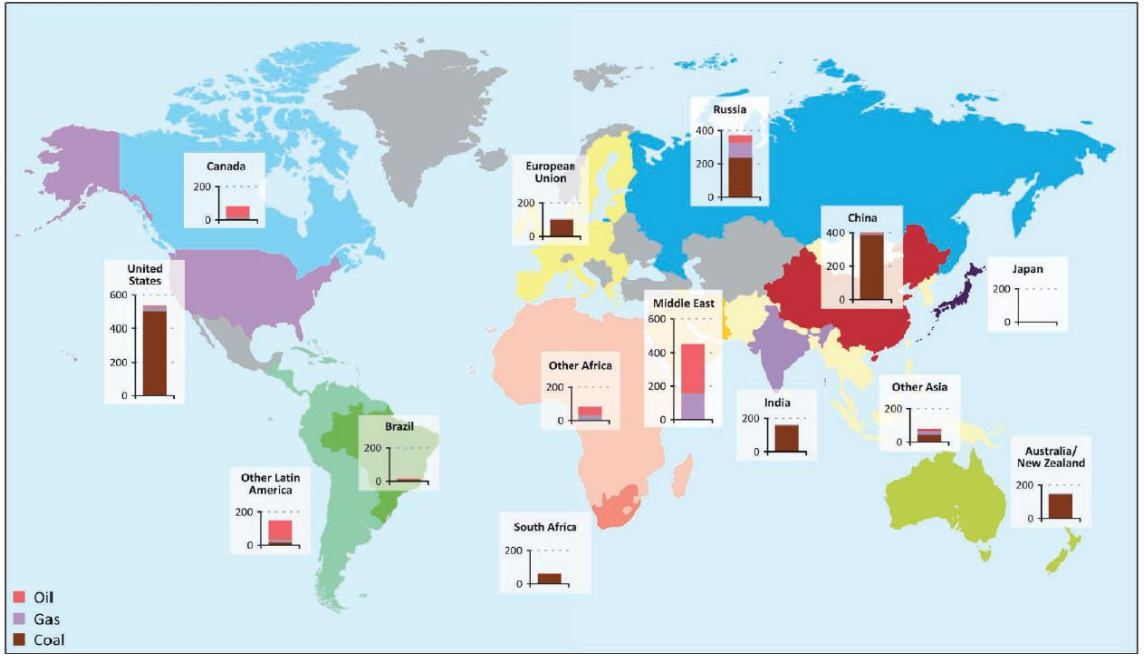
Source: BP Statistical Review of World Energy 2018 (WCA Analysis)

What would happen if we burnt all the reserves?

To limit climate change to 2 C, between 2012-2050 we can emit 880 $GtCO_2$

Total in this figure: 2860 $GtCO_2$

Figure 8.11 ▷ Potential CO_2 emissions from proven fossil-fuel reserves at the end of 2011 by region (Gt CO_2)



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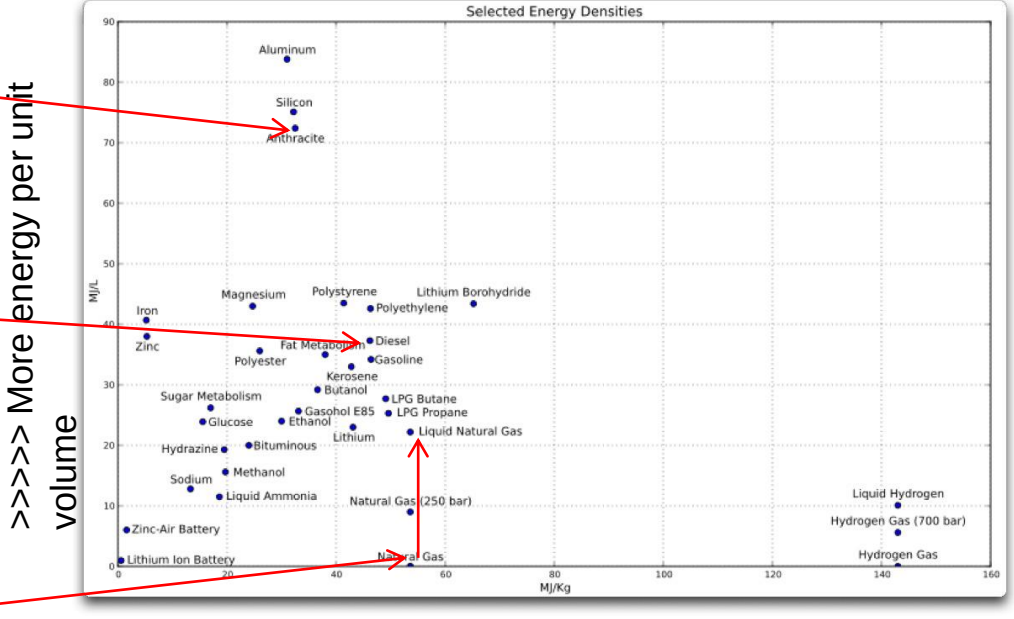
IEA, 2012.

Energy density & transport/trading

- **Coal – Very energy dense** per volume (but less energy per unit mass than oil), transport by train and ship
- **Oil - Energy dense** enough to go by ship or train unrefined, pipelines are used but most are rather short, but there are exceptions like e.g. trans-Alaska
- **Gas - not very energy dense** per volume. Needs to be pressurised, then pipeline is best (but geopolitical barriers!), ship transport only in liquefied form (LNG)



>>>>> More energy per unit volume

>>>>> Lighter mass per unit energy

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Source:
https://wattsupwiththat.files.wordpress.com/2013/07/energy-densities.jpg

Fundamental differences between oil, gas and coal markets

Oil

OPEC and the balance between supply and demand are the key drivers in oil markets

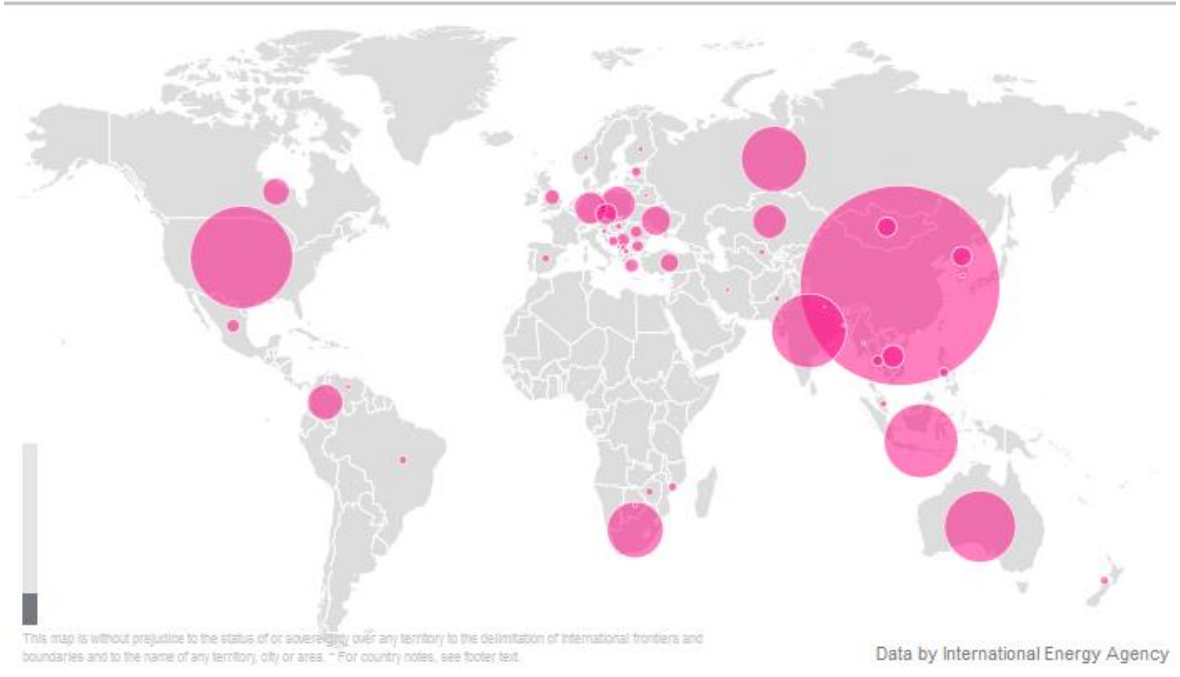
Coal

Coal has abundant reserves and it is easily traded

Gas

Gas is mostly traded in pipelines and storage near consumption is often difficult

Coal production

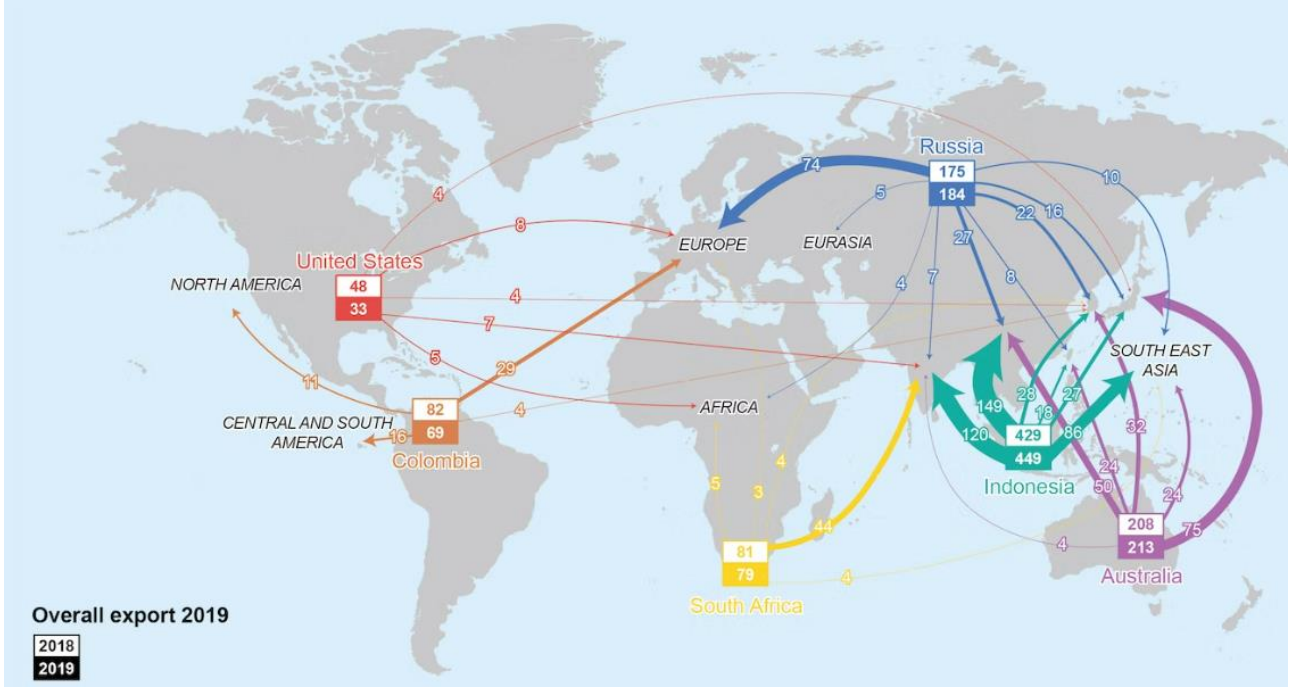


IEA Energy Atlas (data for 2012); data on Mtoe producer basis

China is by far the largest producer although it only has third largest reserves

Coal trading

Main trade flows in thermal coal market, 2018 & 2019 (Mt):



Note: Internationally traded coal only, not that mined and used with same country

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Source: IEA