

NUCLEAR ENERGY AGENCY

NUCLEAR DEVELOPMENT COMMITTEE – NDC

55th meeting

Radioactive Waste in Perspective

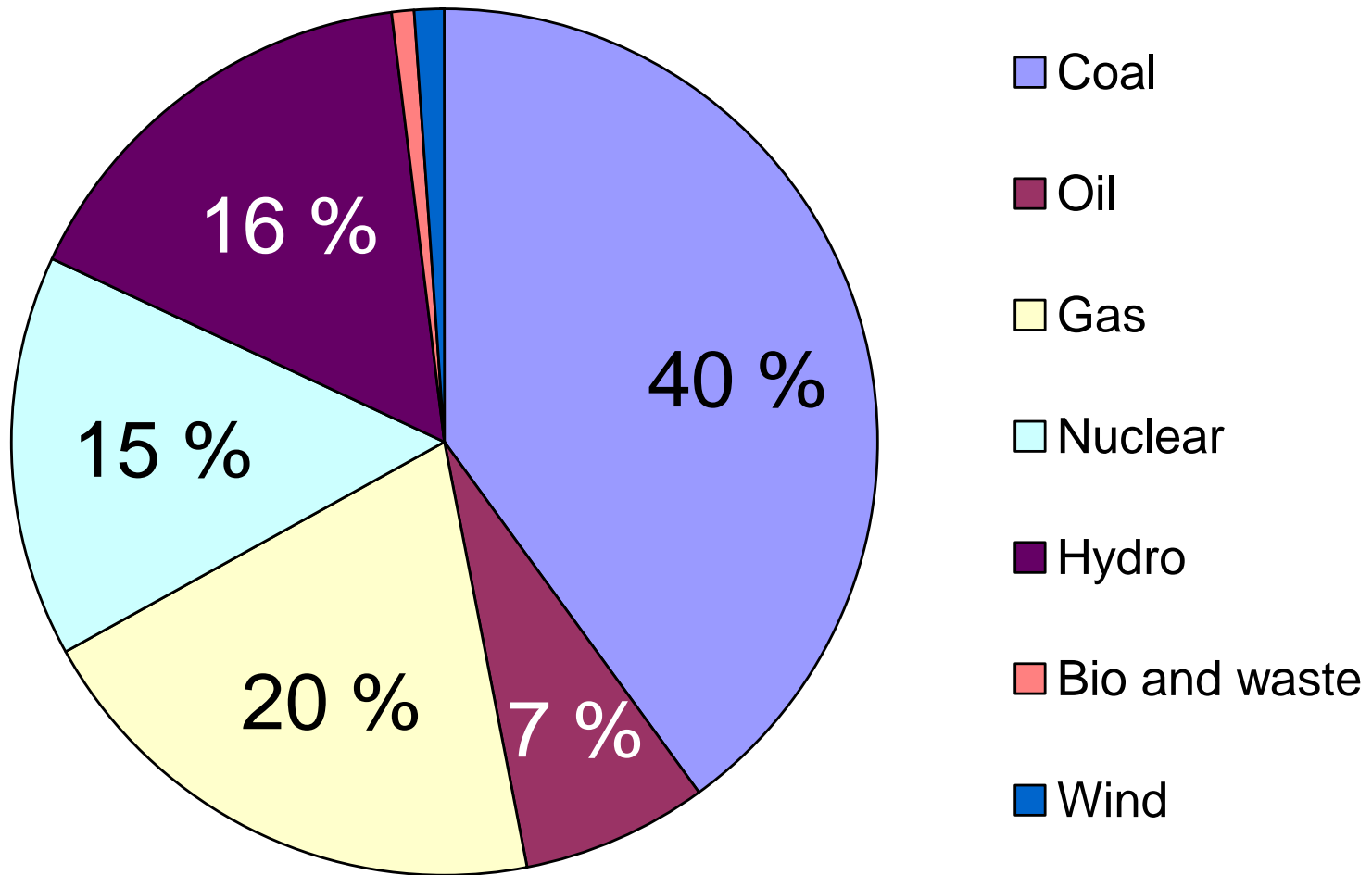
Case study:

***Residues from thermochemical
energy production***

Rolf Sjöblom

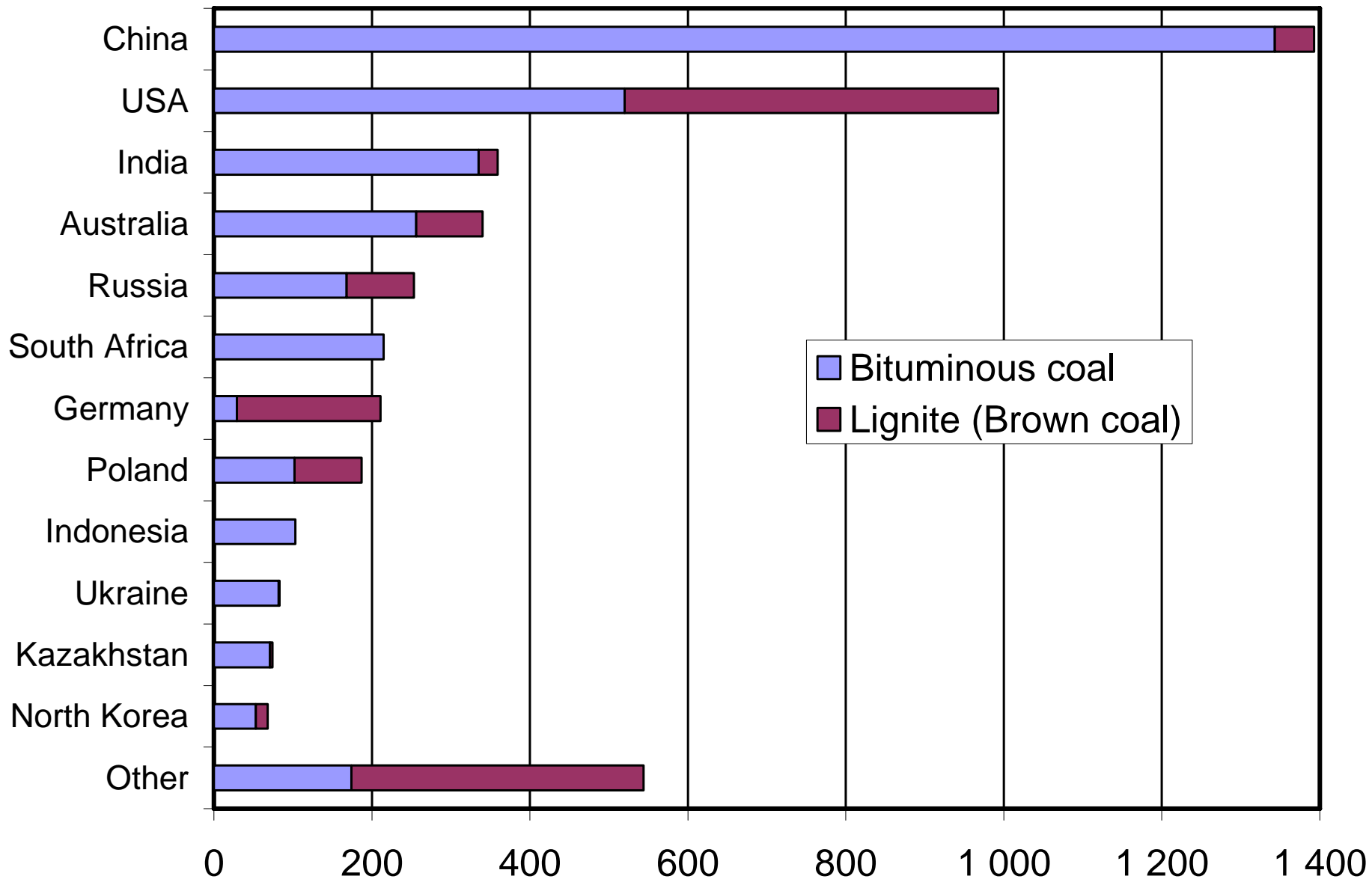


Electricity generation from different sources, 2005



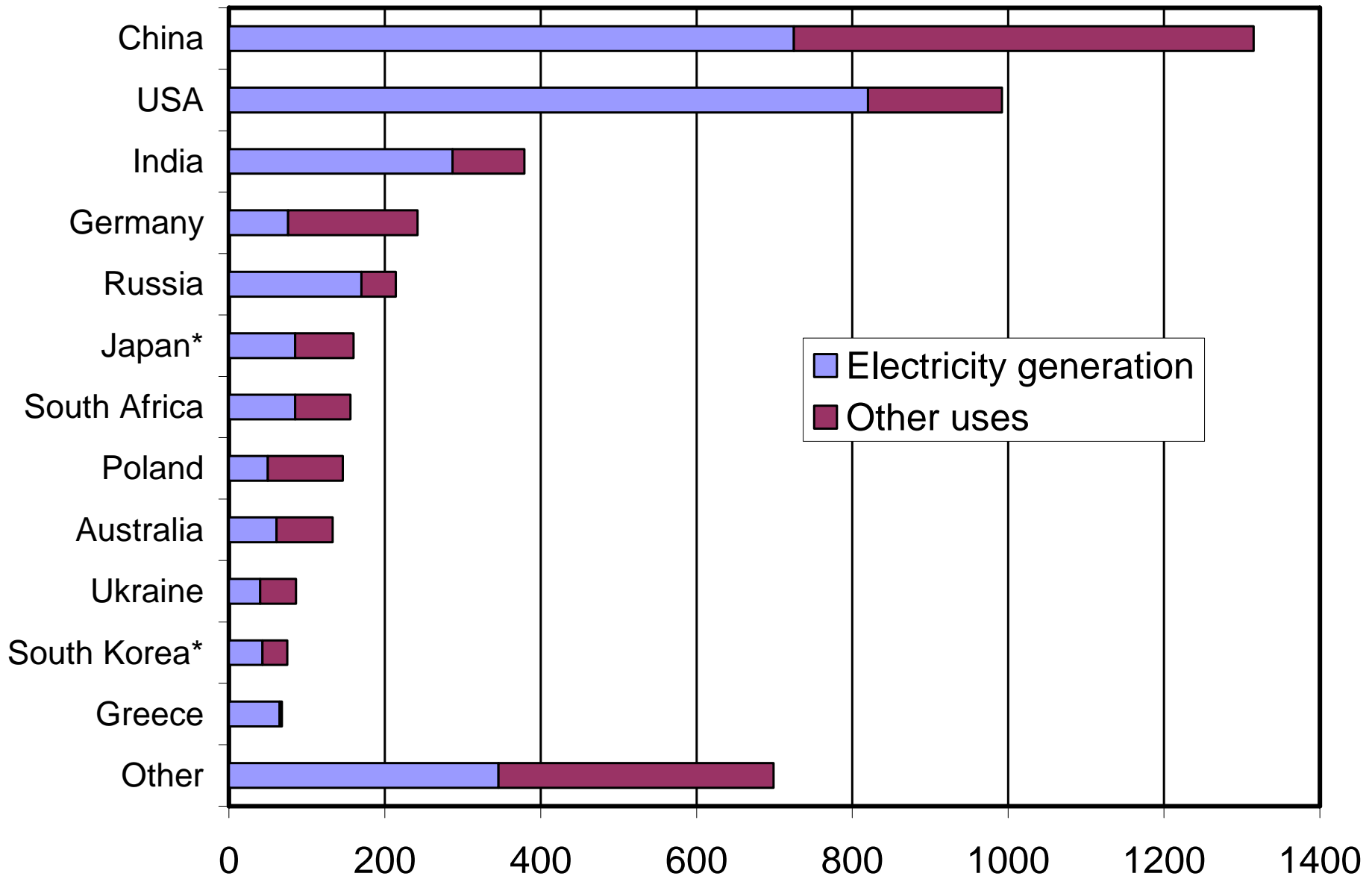
World production of coal in Mtonnes per year

Total volume 4 823 Mtonnes per year

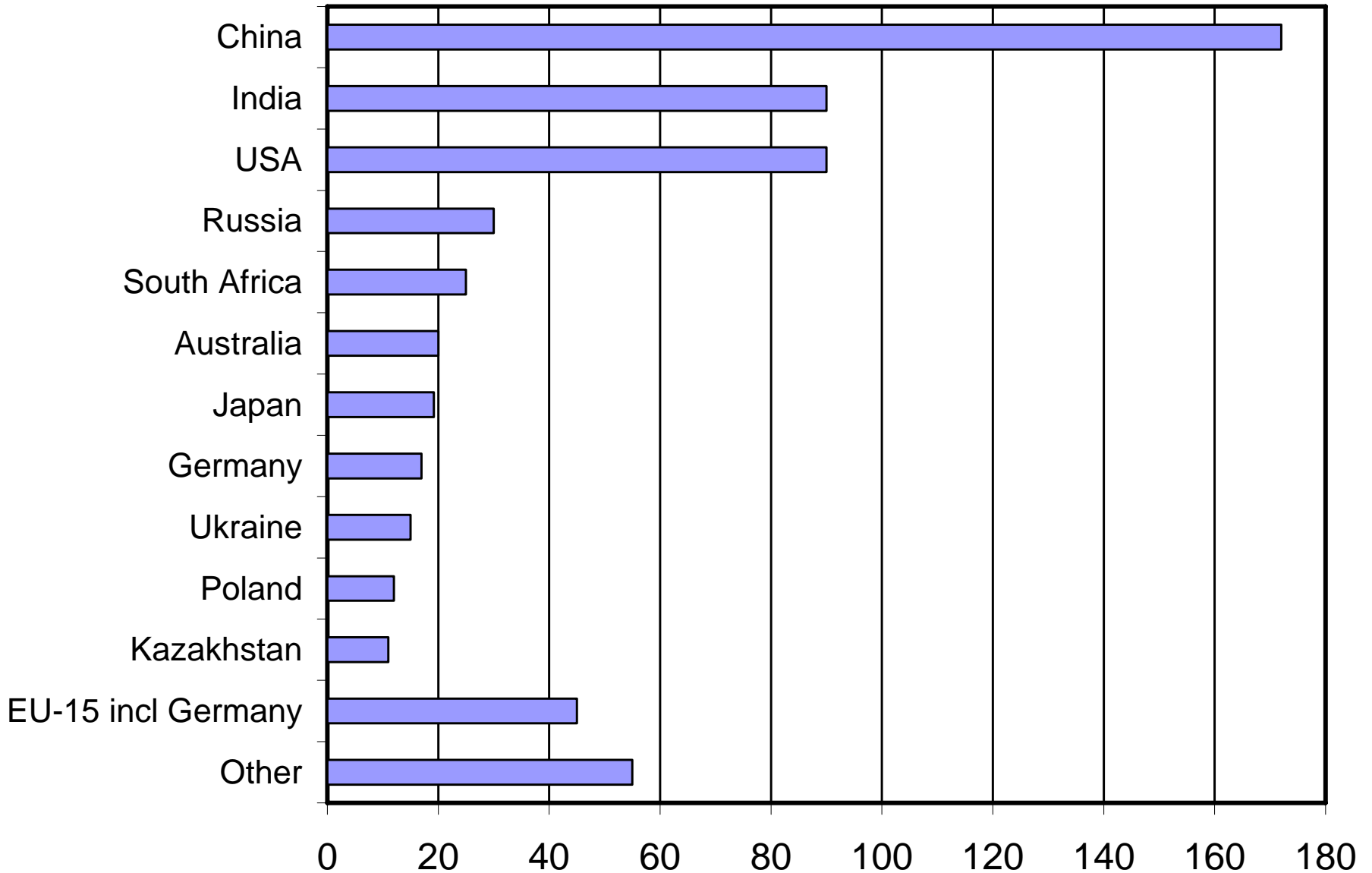


Worldwide coal consumption in Mtonnes per year

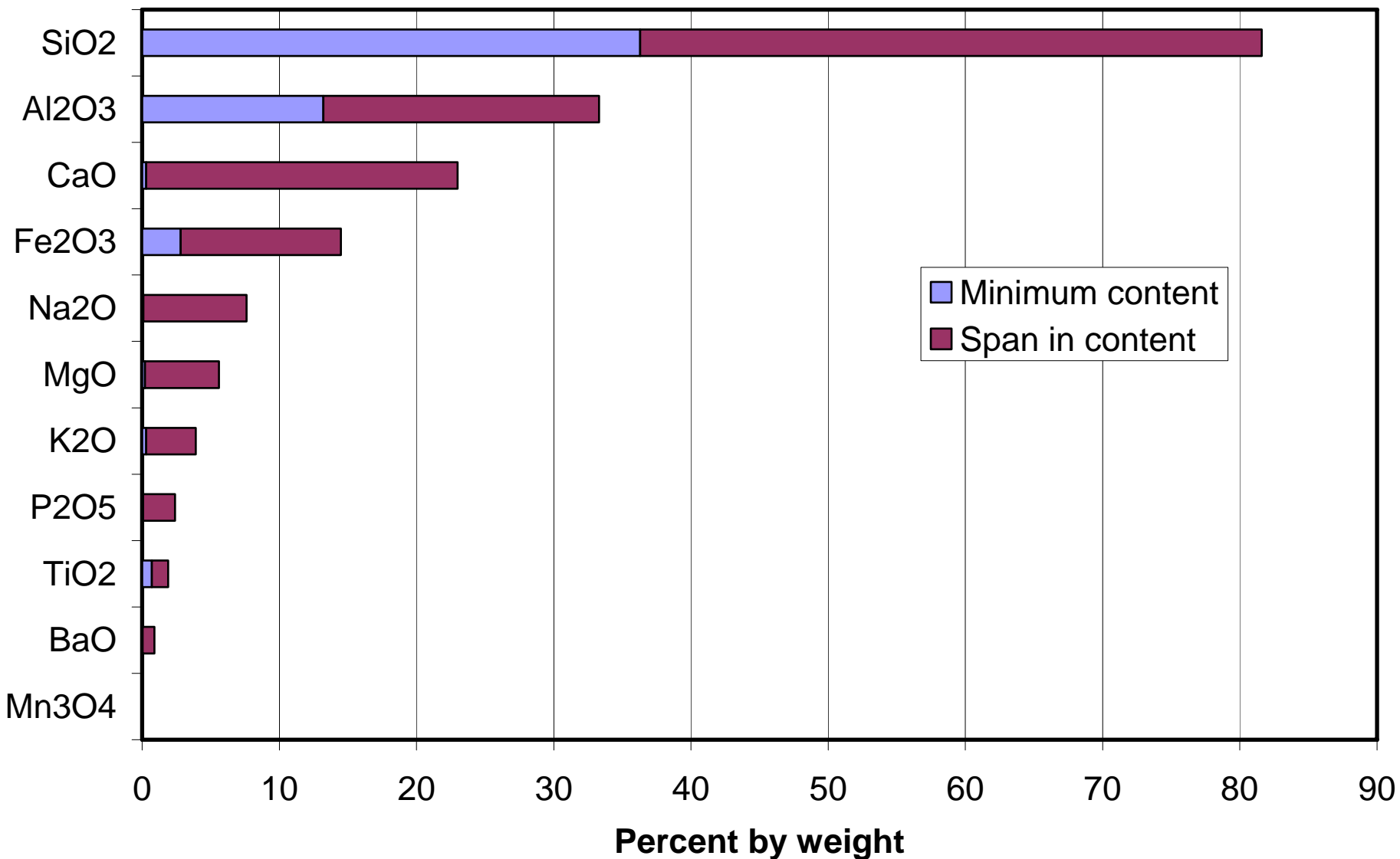
total volume 4 665 Mtonnes per year, *=non-producer



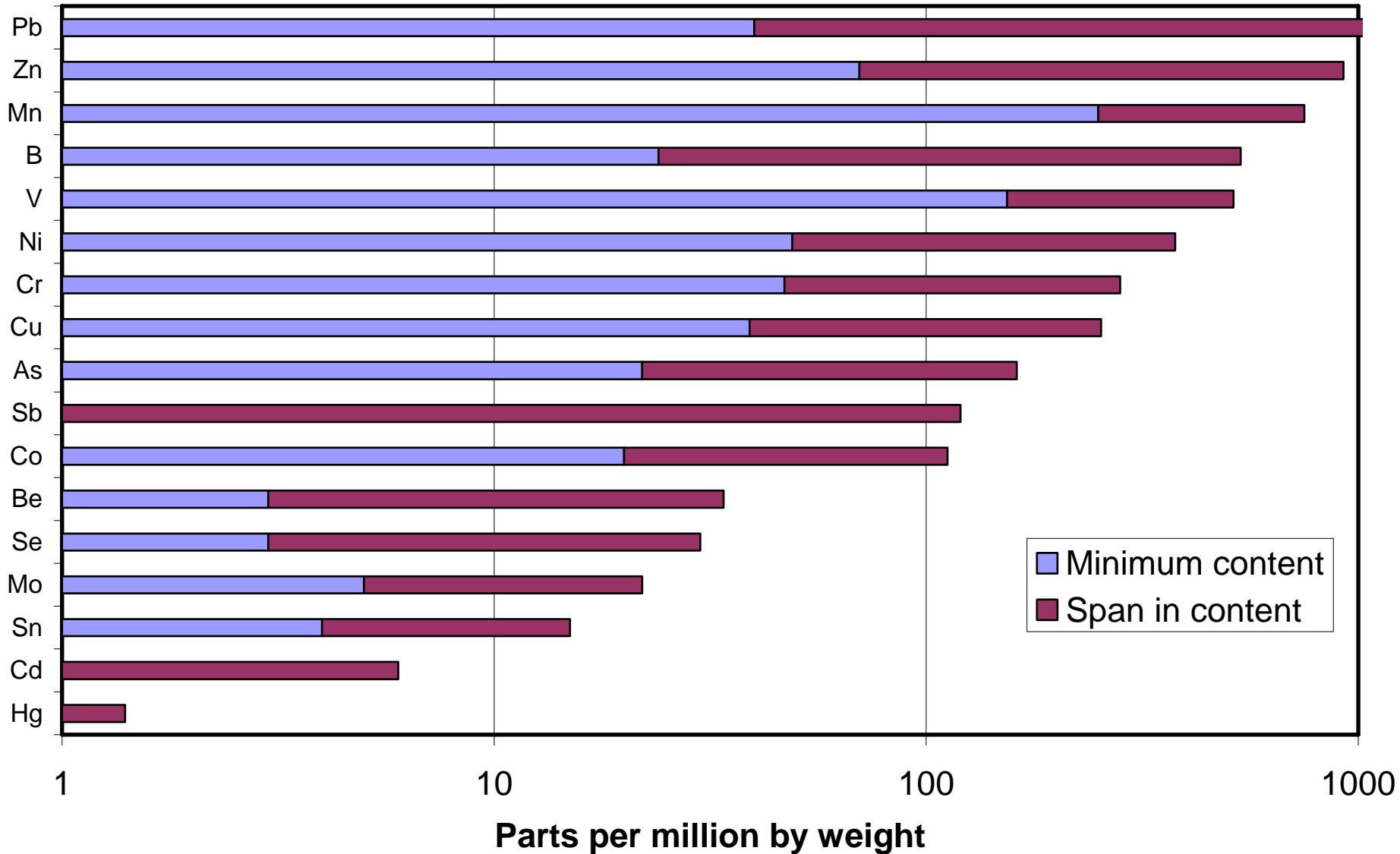
World coal ash generation in Mtonnes per year total volume 584 Mtonnes per year



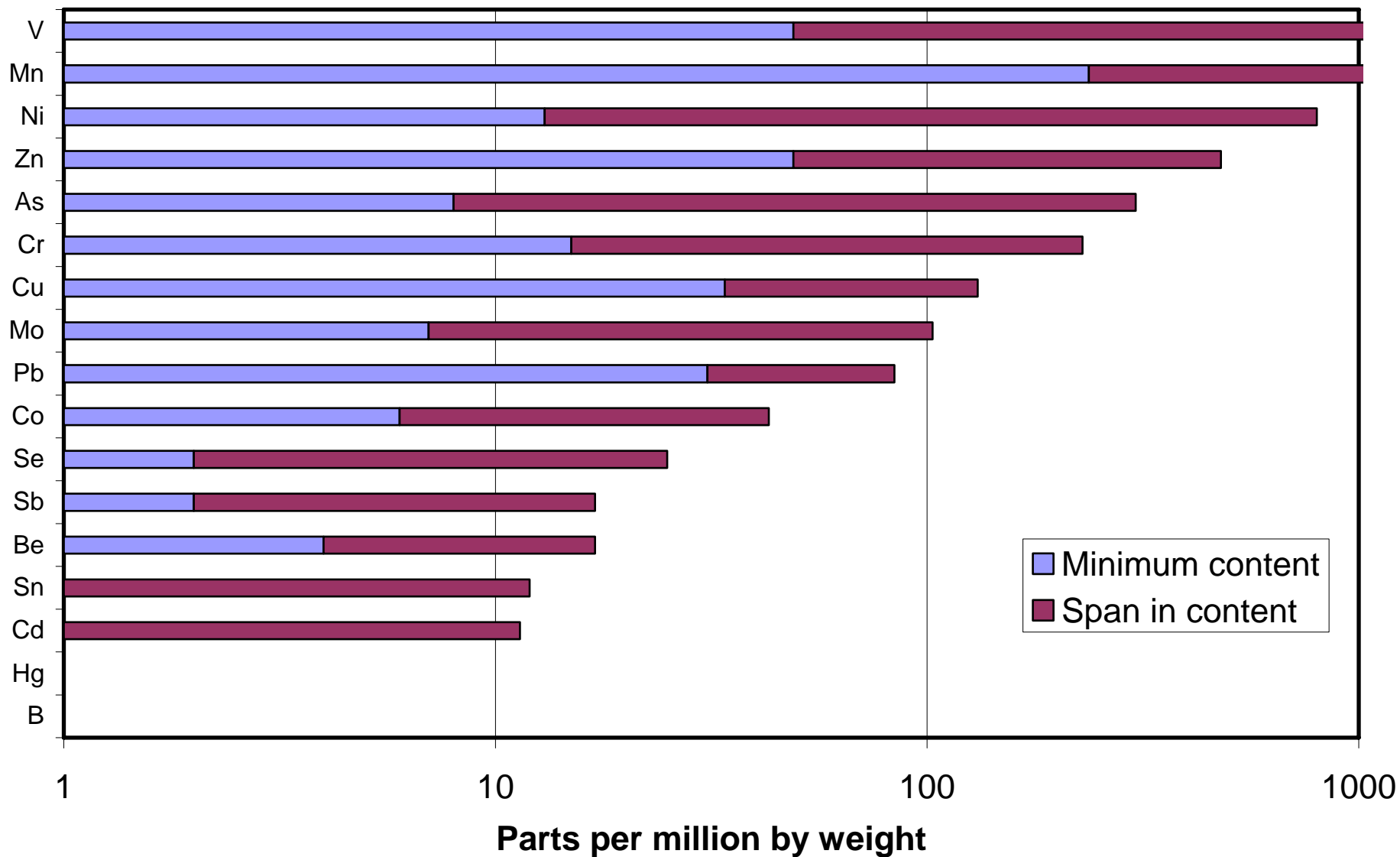
Major elements in coal ash, 11 samples from different countries



Minor elements in coal ash from Europe, many samples



Minor elements in coal ash from Canada & US, many samples



Content of radionuclides, Bq/kg

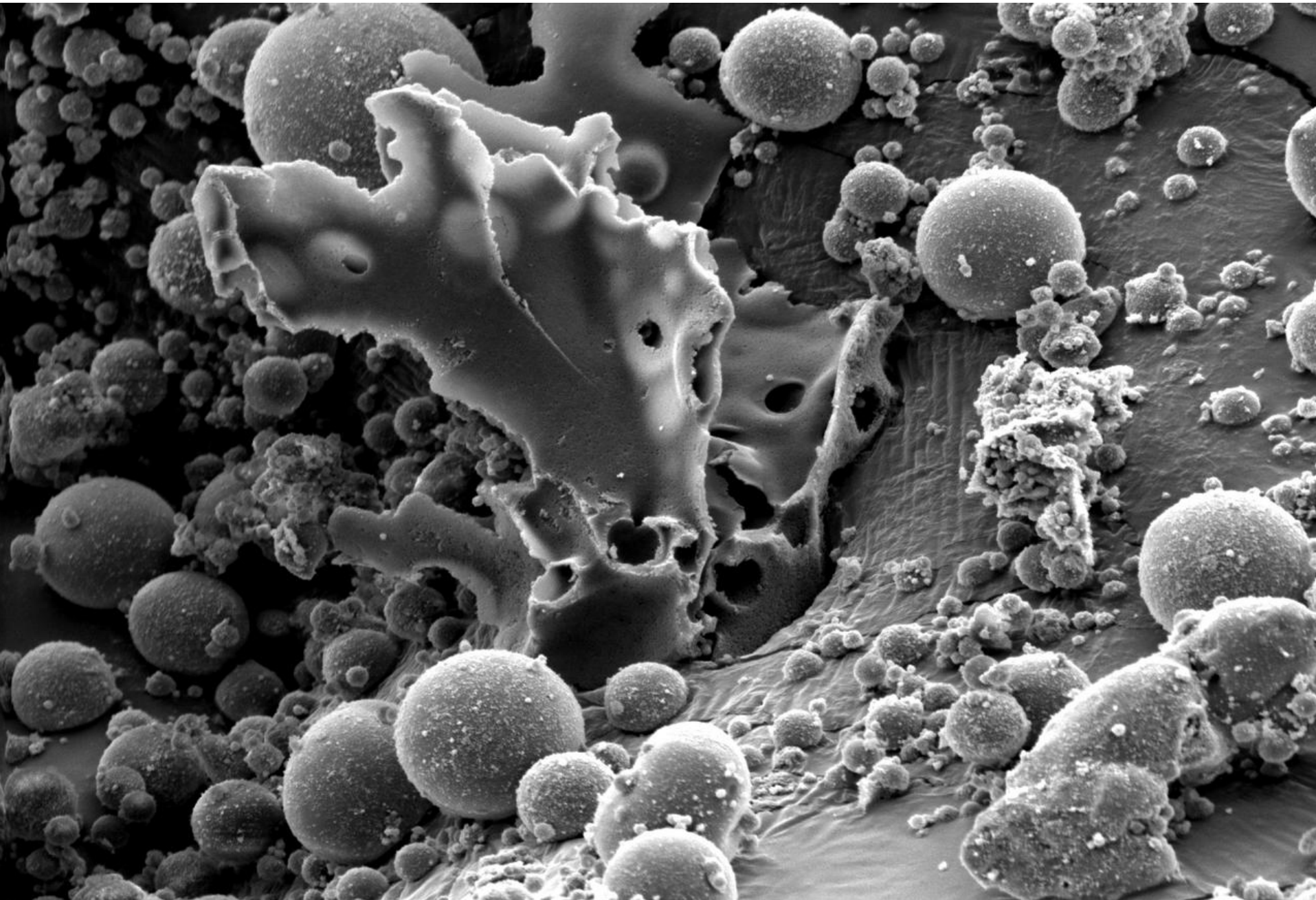
Comparison concrete / coal fly ash	Ra-226	Th-232	K-40
Concrete, typical	40	30	400
Coal fly ash, typical	180	100	650
Concrete, maximum	240	190	1600
Coal fly ash, maximum	1100	300	1500

Maximum dose for inhabitant in "coal ash house" a few mSv/y

Ash properties

Powder burners (dominating method)	Fluidized bed combustion
High furnace temperature	Moderate furnace temperature
Quenched molten glass – High reactivity	Limestone bed sand - High alkalinity
Pozzolanic properties	Liming & cementing properties

Fly ash particles are mostly spherical and < 45 micron



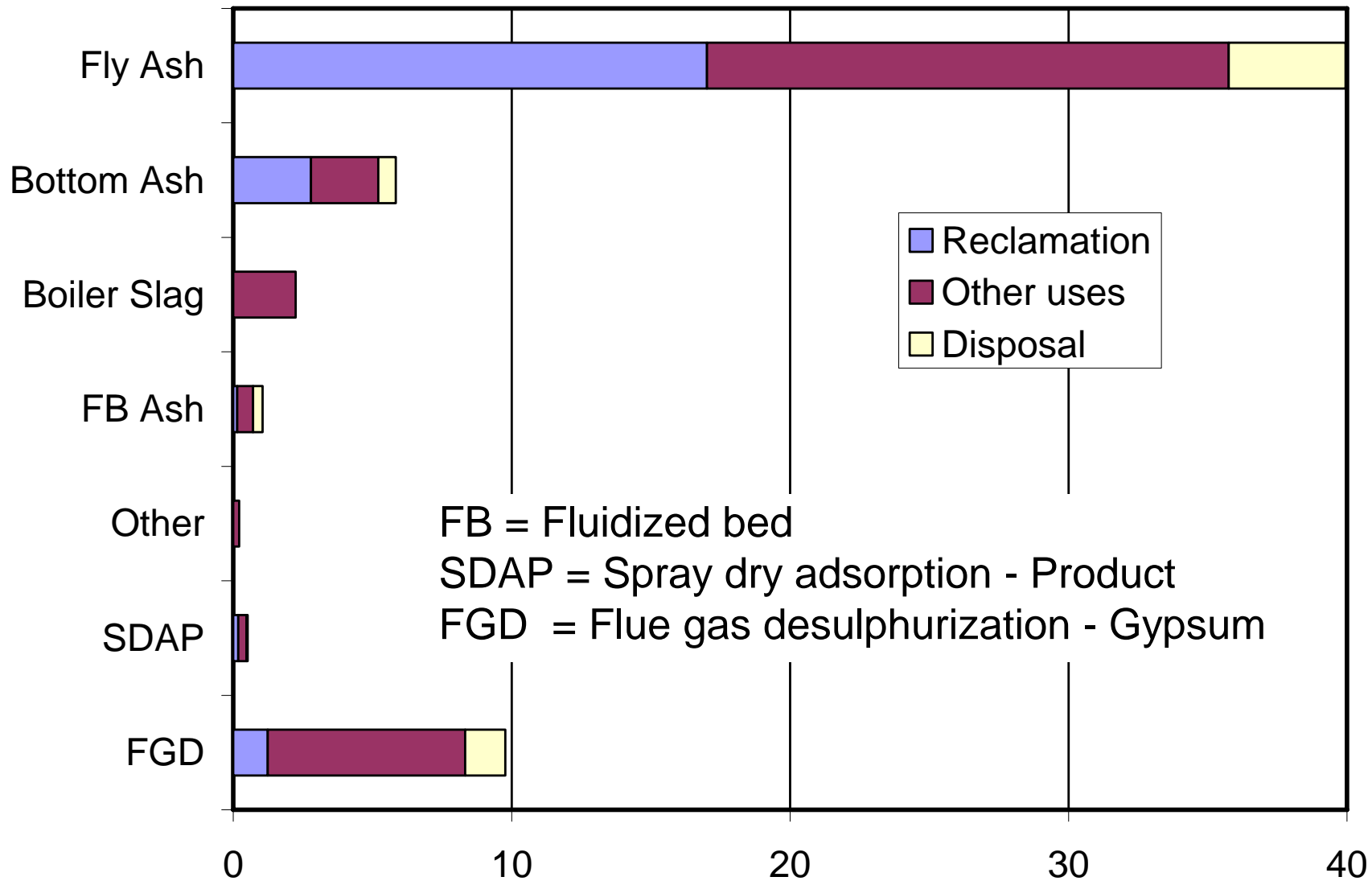
Ash utilization

- Replaces cement and lime in concrete and mortar – often with superior results
 - Liming reactions
 - Pozzolanic reactions
- Fertilization in agriculture
- Geotechnical applications
- Waste stabilization
- Asphalt filler
- Reclamation

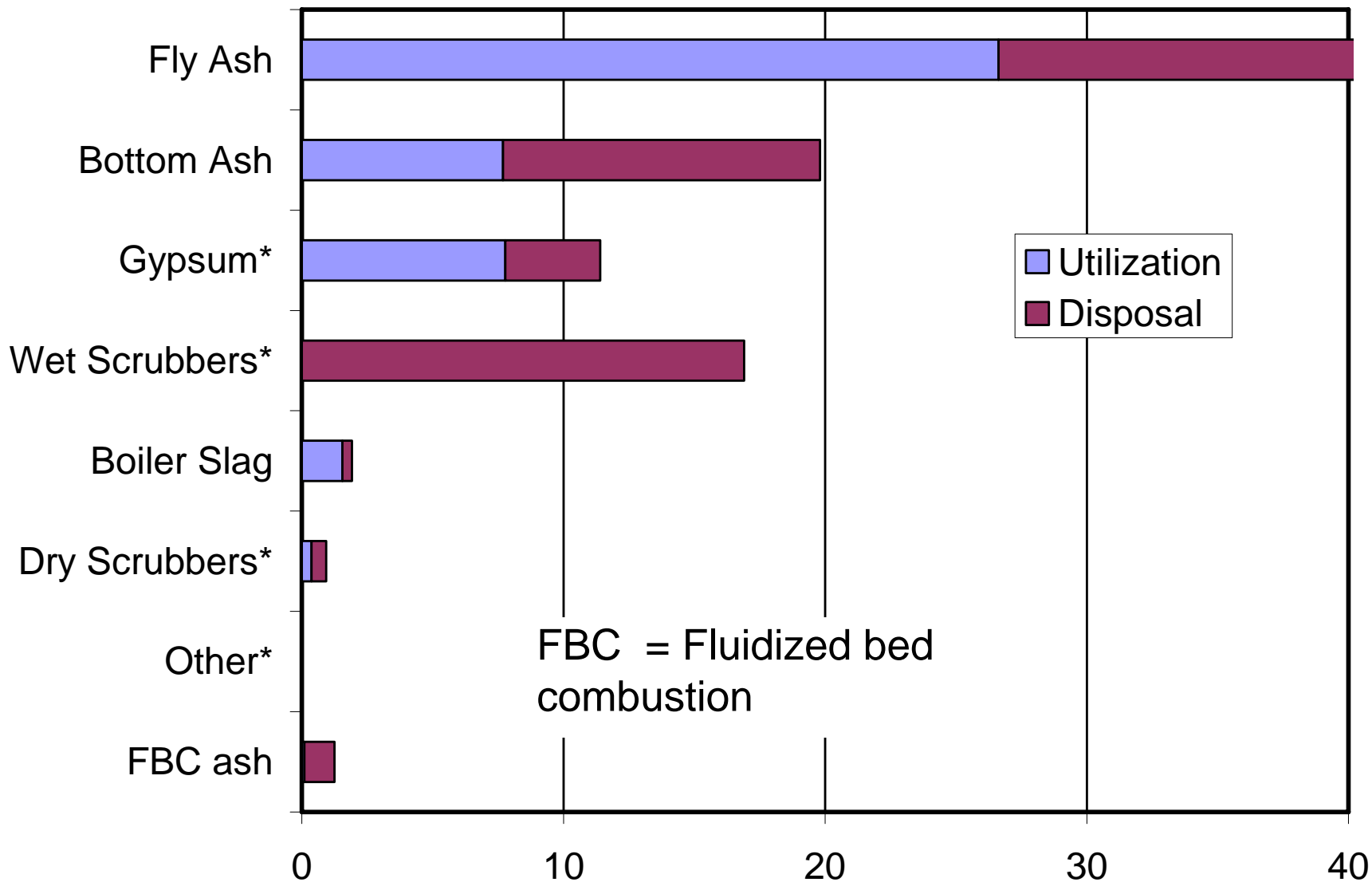


Pont du Gard – an almost 2000 years old construction in stone & Roman cement. Aqueduct and bridge in south of France

Utilization of various coal combustion residues in Europe (EU 15), Mtonnes per year



Utilization of various coal combustion residues in the United States, Mtonnes per year



Health and environment aspects

- Levels of species that can have a detrimental effect on human health and the environment are generally low in coal ash (in relation to e.g. the EU criteria for hazardous waste)
- Coal ash is generated in large volumes and reaches a diversity of destinations while the volumes radioactive waste are much lower and reach fewer destinations
- The major impact of coal combustion is from outside the area of coal ash, namely ...

CCS – Carbon Capturing and Storage

CO₂-FREE ELECTRICITY AND HYDROGEN FROM FOSSIL FUELS

