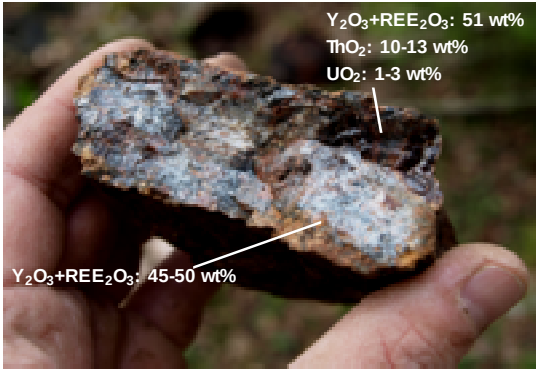


SGU  
Sveriges geologiska undersökning  
Geological Survey of Sweden

SveMins höstmöte  
161124

## Kritiska metaller och mineral



Y<sub>2</sub>O<sub>3</sub>+REE<sub>2</sub>O<sub>3</sub>: 51 wt%  
ThO<sub>2</sub>: 10-13 wt%  
UO<sub>2</sub>: 1-3 wt%

Y<sub>2</sub>O<sub>3</sub>+REE<sub>2</sub>O<sub>3</sub>: 45-50 wt%

Erik Jonsson  
SGU & Uppsala universitet

UPPSALA  
UNIVERSITET

SGU  
Sveriges geologiska undersökning  
Geological Survey of Sweden

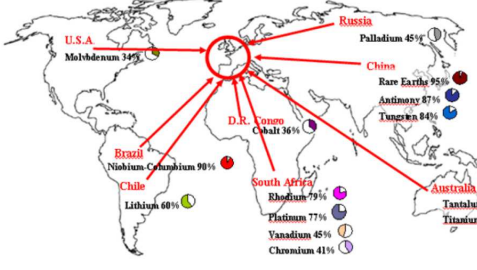
E. Jonsson: Kritiska metaller och mineral...

## Då blev de kända som kritiska för fler:

**"The mineral and metal supply crunch": 2010 och framåt...**  
(EU IP/10/752 Brussels, 17 June 2010)

"The expert group considers that 14 raw mineral materials are critical for the European Union: **antimony, beryllium, cobalt, fluorspar, gallium, germanium, graphite, indium, magnesium, niobium, PGMs (Platinum Group Metals), rare earth elements (REE), tantalum and tungsten.** Forecasts indicate that demand might more than **triple** for a series of critical raw materials by 2030 compared with the 2006 level."

**EU helt importberoende**



U.S.A. Molybdenum 34%

Brazil Niobium-Columbium 98%

Chile Lithium 60%

D.R. Congo Cobalt 36%

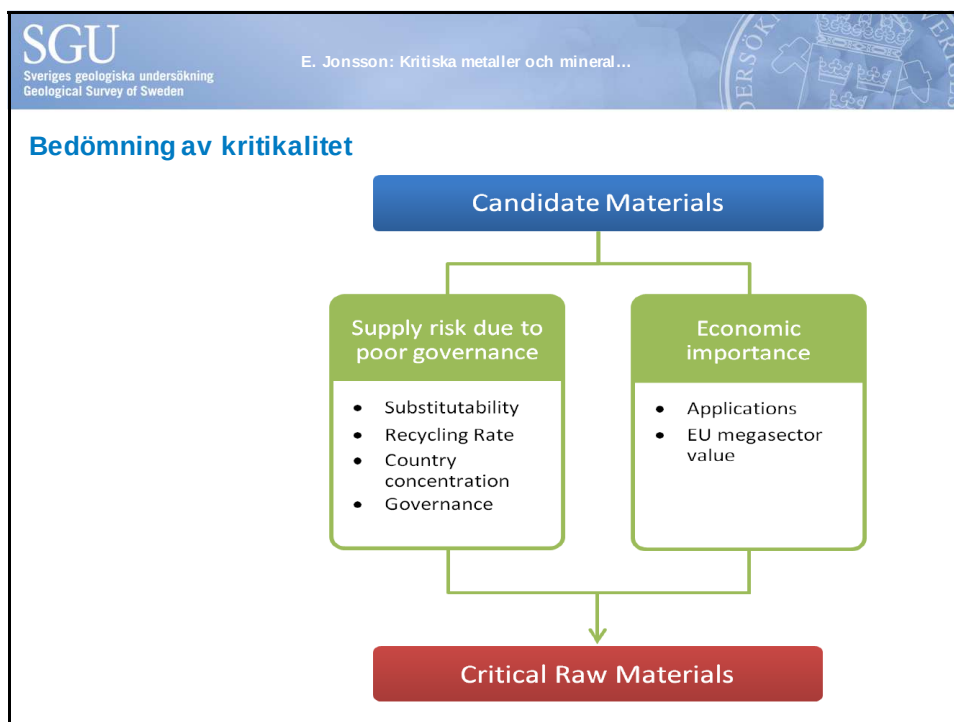
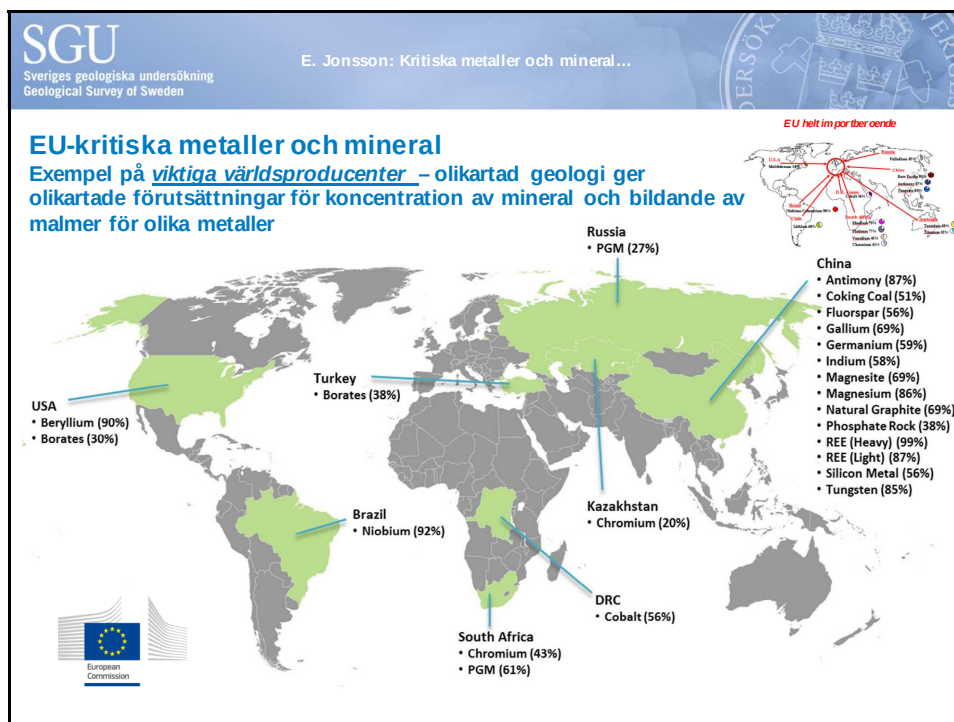
South Africa Platinum 77%  
Vanadium 45%  
Chromium 41%

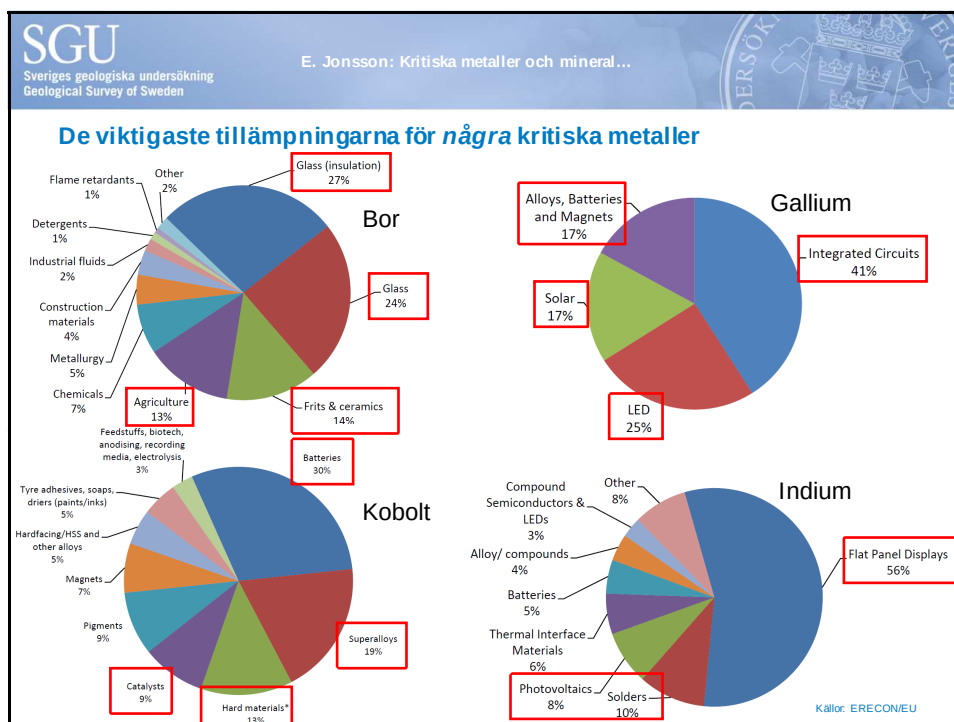
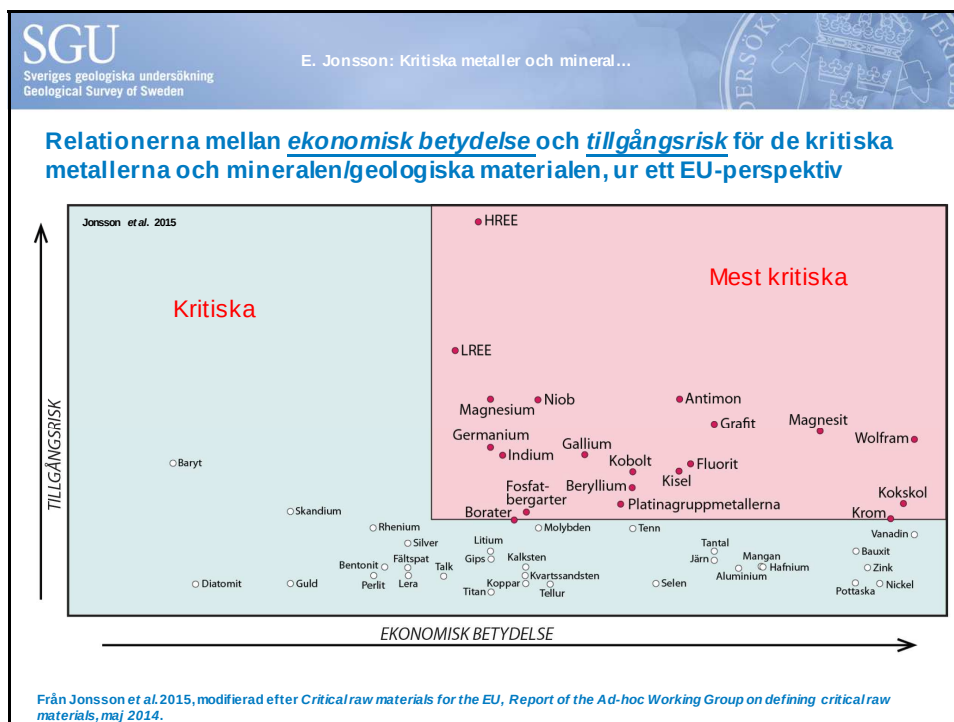
Russia Palladium 45%

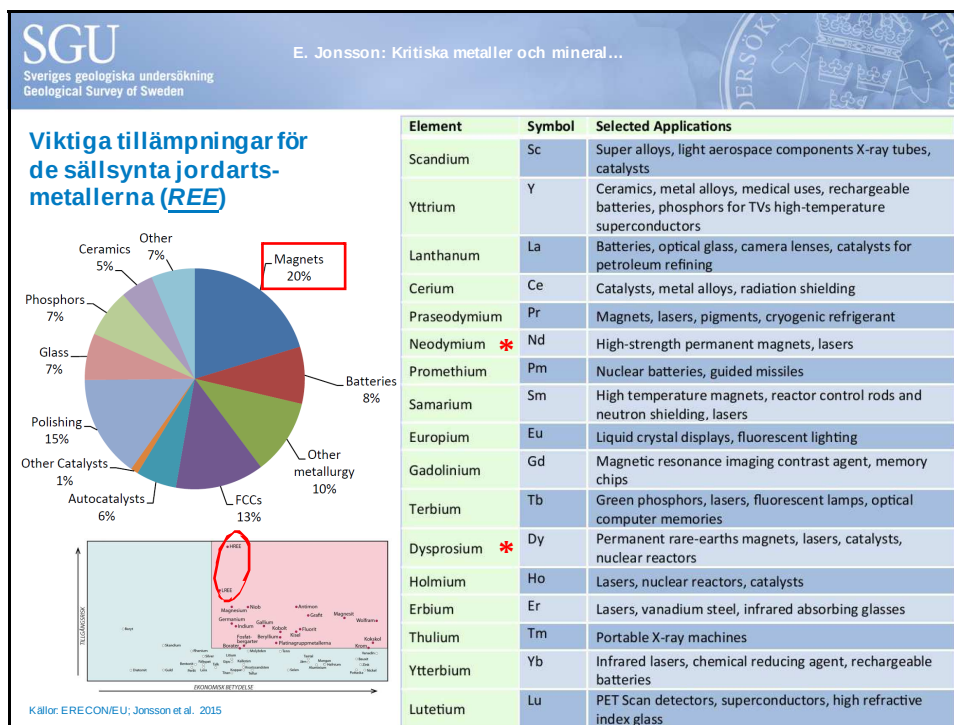
China Rare Earths 95%  
Antimony 87%  
Tungsten 84%

Australia Tantalum 60%  
Titanium 42%

Data source: World Mining Data (2008) \*\*=USGS (2008)  
The figures and pie graphs indicate the proportion of world production







**SGU**  
Sveriges geologiska undersökning  
Geological Survey of Sweden

E. Jonsson: Kritiska metaller och mineral...

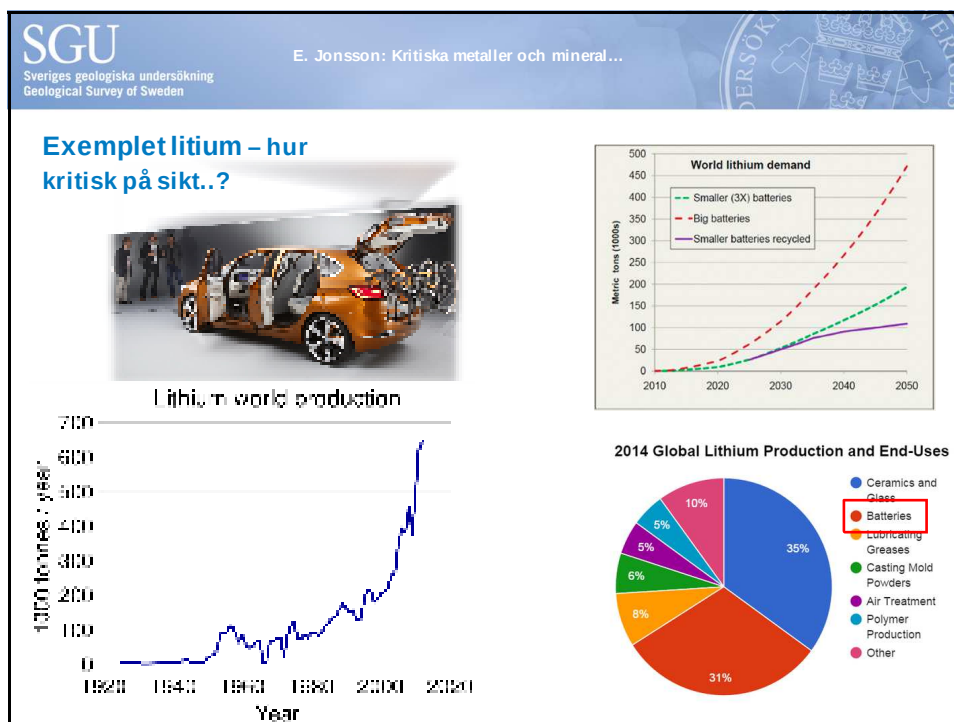
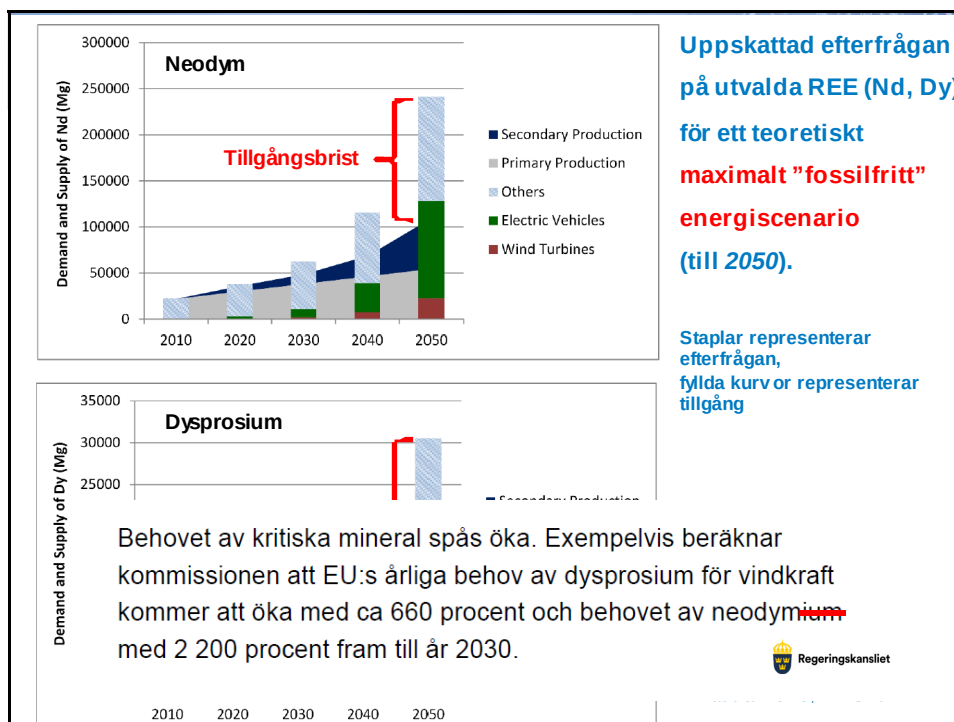
## Magnet Applications

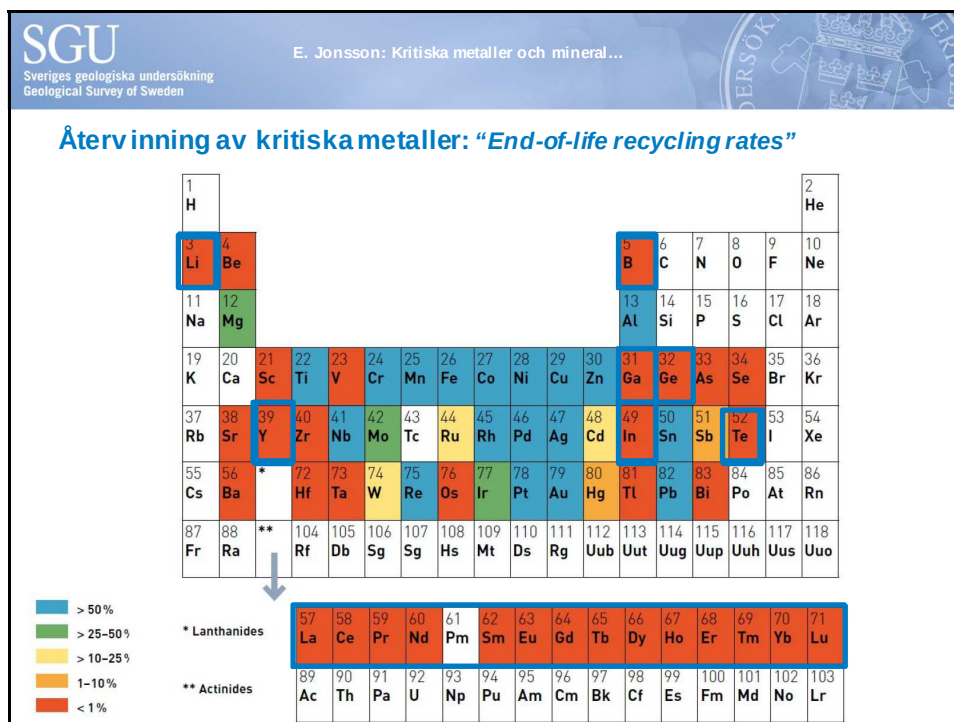
Source: Vestas AS

- Wind Turbine
  - The gearbox problem
  - Direct drive solution
    - ~500kg/MW

**CMI** | Accelerating Energy Innovation  
Critical Materials Institute

Mishra & Anderson, ERES 2014





SGU  
Sveriges geologiska undersökning  
Geological Survey of Sweden

E. Jonsson: Kritiska metaller och mineral...

### Kritiska metaller:

Miljö- och sociala aspekter på brytning

Kontrollerad brytning i länder med stark miljölagstiftning eller import från länder utan eller med svag lagstiftning/efterlevnad?

Konfliktmineral? (t.ex. DR Kongo)



