Hydrometallurgy Course

Part of the NFR-Boliden-Glencore-Yara Hydromet Project

Sustainable Mining and (Re-)Use of Metals

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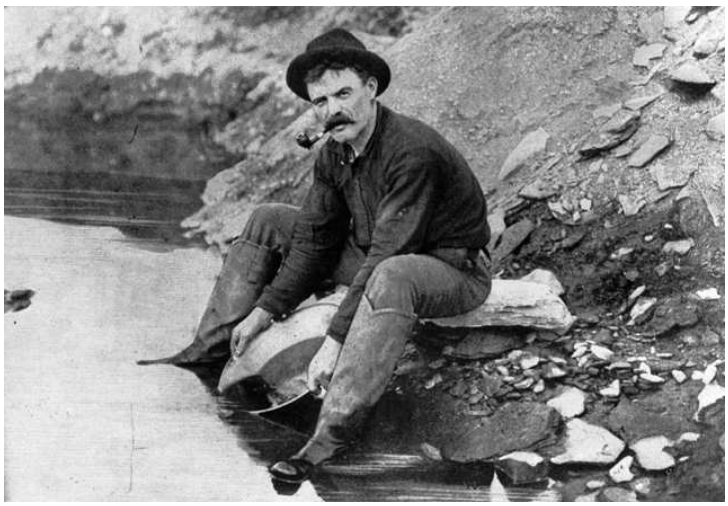
Blindern Campus, 16th September 2016

"If you can't grow it, you have to mine it"



"Sustainable"

When a word becomes so popular you begin hearing it everywhere, in all sorts of marginally related or even unrelated contexts, it means one of two things:

Either the word has devolved into:

- **A meaningless cliché**, or
- ***It has real conceptual heft***

"Sustainable"

"Green" falls squarely into the first category..

"Sustainable"

But "sustainable", which at first conjures up a similarly vague sense of environmental virtue, actually belongs in the second.

It has real conceptual heft.

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It has real conceptual heft.

.. but "sustainability" is a concept people have a hard time wrapping their minds around ..

Do YOU know what sustainability really means?

Write a sentence or two about what sustainability is!

Sustainability

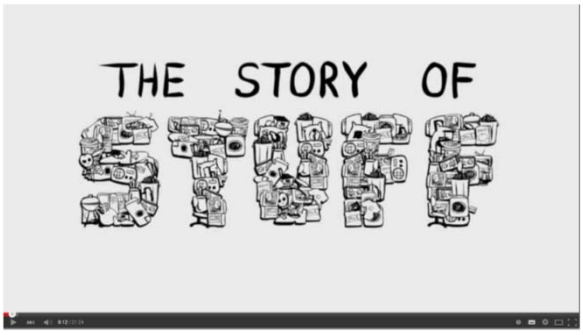
Another word could be:

Enduring

Hydrometallurgy & Sustainability

Is there a connection?

Story of Stuff



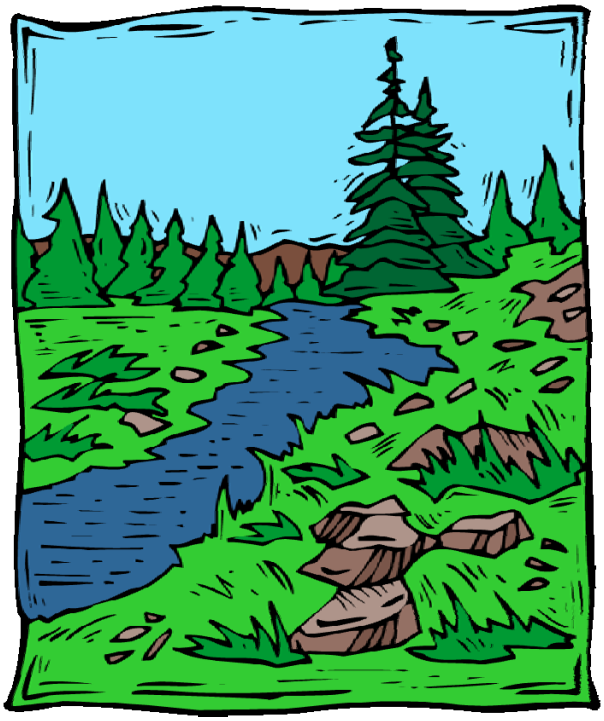
The Story of Stuff was written by Annie Leonard, Louis Fox, and Jonah Sachs, directed by Louis Fox and produced by Free Range Studios. Executive Producers included Tides Foundation and the Funders Workgroup for Sustainable Production and Consumption. It was released in December 2007.

http://storyofstuff.org/movies/story-of-stuff/

https://www.youtube.com/watch?v=9GorqroigqM

Sustainable Development

Is there a path to *Sustainable Development* that would give ***future generations*** the chance to be as well-off as their predecessors *without running out of natural resources, especially* ***metals***?



Sustainable Development

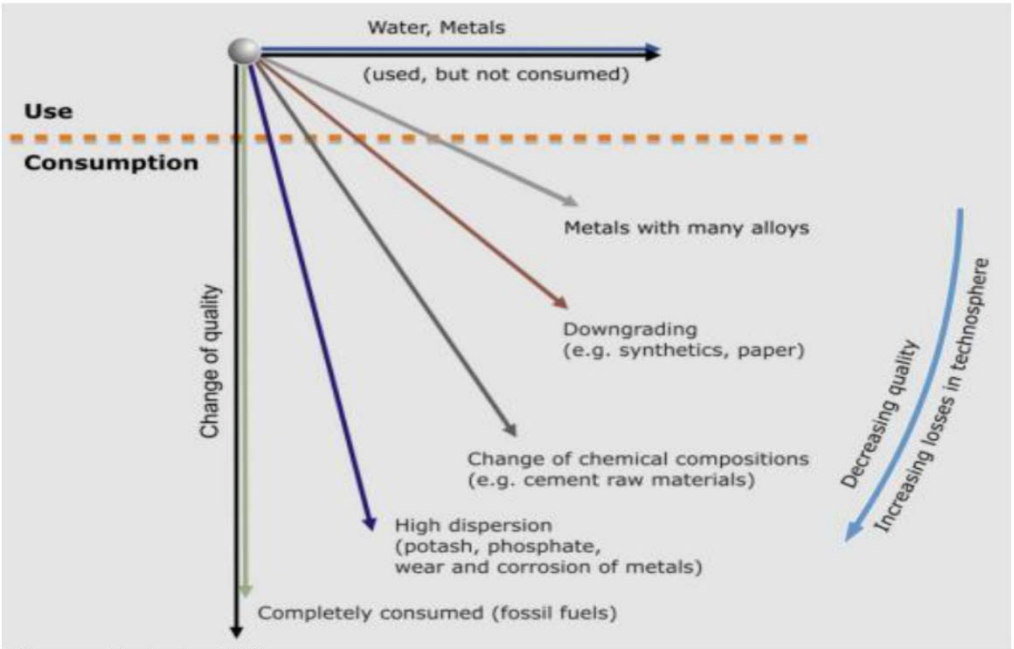
We have to consider three key resources:

1. The **geosphere** or primary resources,
2. the **technosphere** or secondary resources, which can be recycled and
3. **human ingenuity** and creativity.

Sustainable Development

We have *two resource extremes*: natural resources which are ***completely consumed*** (fossil fuels) *versus* natural resources (metals) which are ***wholly recyclable*** and can be used again.

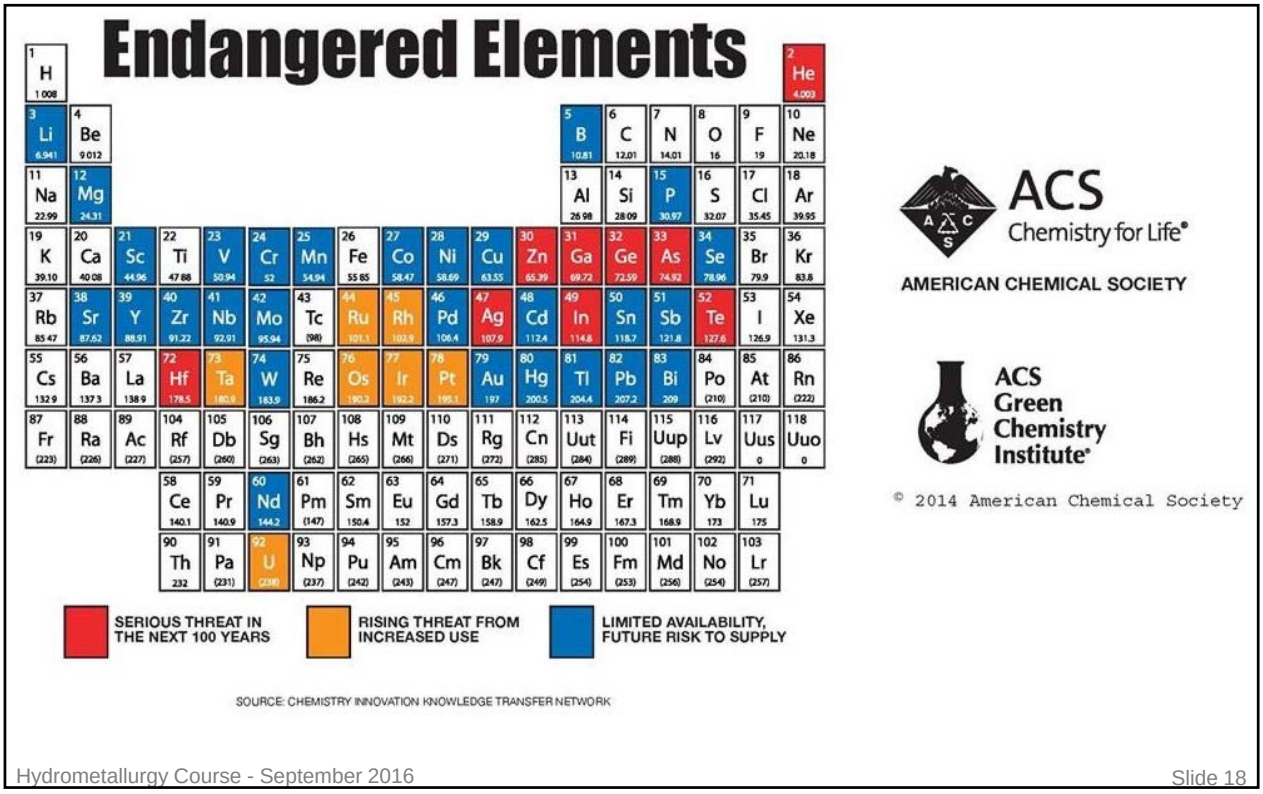
Resource Extremes



Sustainable Development

Metals survive use and are merely transferred from the geosphere to the technosphere.

There will, however, always be a need for contributions from the geosphere to offset inevitable metal losses in the technosphere.



Sustainable Development

.. but we do have a choice. We do not need raw materials as such, only the ***intrinsic property*** of a material that enables it to fulfil a function.

At the time when consumption starts to level off, chances improve of obtaining most of the material for our industrial requirements from the technosphere.

Sustainable Development

.. then a favorable ***supply equilibrium*** can emerge. Essential conditions for taking advantage of this opportunity: affordable energy and ingenuity to find new solutions for functions, to optimize processes and to minimize losses in the technosphere.

Source: V. Steinbach and F.-W. Wellmer : *Consumption and Use of Non-Renewable Mineral and Energy Raw Materials from an Economic Geology Point of View*, Sustainability 2010, 2, 1408; doi:10.3390/su2051408

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