

For a secure future.

> German Qualität

>



> Shortage of raw materials



2010



2021



2033



2044



2056?



No Niobium – No Modern Cruises:
this raw material is needed to
make special steel that is strong and good
for welding. REMONDIS is developing
recycling methods.



> Shortage of raw materials



2010



2012



2015



2017



2020



2022



2025?



No Water – No Life: approx.
4 billion people will be living in
countries suffering from serious water
shortages in 2025. REMONDIS provides
professional water management
services.

> Shortage of raw materials



2010



2041



2072



2104?



No Tantalum – No
Mobiles: the availability of this raw material has been classified as particularly critical; its static lifetime is currently estimated to be 94 years. REMONDIS is researching recycling methods.

One world is not enough. No Raw Materials – No High Standard of Living.



Humans are living above their means: for years now, the world's population has been consuming more natural reserves than the Earth is able to produce. If life continues at this pace, then our raw material reserves will be used up more and more quickly and some will have become scarce before the end of this century.

Raw materials are the basis of our lives. They provide food, heat and light and are the basis of practically all the things we need every day. The Earth's resources are being mined at an ever greater rate so that we can maintain the standards we have become accustomed to. This not only affects the fossil fuels, i.e. oil, coal and gas, but also minerals, metals and other base materials.

No raw material is infinite

Huge volumes of raw materials are already needed today and demand is increasing all the time. Our planet's reserves are being

used up at an ever faster rate. Experts warn that certain materials may even become scarce during this century, e.g. some of the rare earths but also various bulk raw materials.

Rethinking and changing our behaviour

If we run out of raw materials, this will have very serious consequences as modern life is very resource-intensive. Handling these valuable materials efficiently is one of the biggest challenges of our time. And REMONDIS' core business.

Standards of living and the supply of raw materials are closely intertwined!

The need for raw materials is growing.

> Development

Technological, economic and demographic developments are speeding up the consumption of raw materials. As a result, natural reserves are being depleted at an ever faster rate.

Some raw materials are needed in bulk, others are essential even in very small amounts. In the worst case scenario, supply bottlenecks of raw materials will prevent the spread of future-oriented innovations.

One home for many

Eight million people will be living on Earth in 2025 – almost one fifth more than the population today. Much greater volumes will be needed, therefore, to supply the world's population.

Exploding demand

The high consumption rate of the industrial nations is currently still being compensated for by the low consumption rate of poorer countries. However, the rise of the threshold countries is leading to an increase in demand there, too. Technological progress is also taking its toll: new developments are extending areas of use. Many

basic materials will, therefore, be needed in much greater quantities in the future. This situation is further aggravated by the fact that several kinds of future technologies rely on the same raw materials, some of which are very rare.

Volatile raw materials markets

The effects of the looming shortages can already be felt. One indicator of this is the often tense situation on the raw materials markets. Global prices are spiralling as supply and demand are no longer in harmony.



Whilst some raw materials can be substituted with other materials, many will remain indispensable. Countries, with few natural resources, are for the most part or even fully dependent on imports. There will be serious consequences if they are unable to import the

materials required in sufficient quantities and at acceptable prices: everyday products will become a rarity and, as a result, unaffordable. Today's standard of living will no longer be able to be maintained.



2010



2018



2027



2036



2044?

No Copper – No Cars.
REMONDIS recycles this rare material.



> Recycling

Recycling guarantees supplies.

Those people who believe a solution to this problem does not need to be found until the natural raw materials have actually run out are making a mistake. If the raw materials, that are urgently needed, become rarer and more expensive, then they will also become more and more coveted. Political scientists and futurologists assume that disputes over natural reserves will increase in the future.

Supplying primary raw materials involves risks

Many natural reserves are found in just a few regions. The countries which mine the materials dominate the market. They can cut their production or restrict exports. The unbalanced distribution structure is also leading to insecurity: over the long-term the situation cannot remain the same with industrial nations consuming more than they are statistically entitled to. The emerging countries will increasingly assert their rights. For, raw materials must not be used up by just a few countries or by just a few generations.

Furthermore, the mining of primary raw materials often results in huge damage being done to nature: forests are being cut down,

earth and stone removed, the air and rivers polluted. The situation is made worse by the fact that many raw materials are mined in regions which do not enforce high environmental standards.

The solution: recovering materials

Consistent recycling is necessary if long-term supplies of the raw materials are to be guaranteed. Modern water management ensures that people have sufficient supplies of this life-sustaining element. An efficient environmental service sector returns used material to the production cycle as high quality raw materials. This conserves natural resources, extends their lifetime and contributes towards ensuring the bases of our standards of living are maintained.

A responsible environmental service sector creates the framework conditions for a reduced demand and fairer distribution of our resources.

> Supply situation



2010



2026



2042



2058



2074



2090



2106



2122



2137?



No Titanium – No
Modern Aviation:

this rare material provides
stability for the undercarriage, engines, fuselage and wings. REMONDIS is making every effort to close the life cycle of this material.

Sought-after raw materials – Facts about the supply situation.



Raw material	Reserves ¹⁾	Resources ¹⁾	Static Lifetime ²⁾	Top 3 ¹⁾	Source
■ Chromium	350 million t	12 billion t	14 years	74.2%	U.S. Geological Survey (2010), Fraunhofer ISI (2009)
■ Gallium	no data	1 million t	no data	no data	U.S. Geological Survey (2010)
■ Gold	47,000 t	no data	19 years	31.0%	U.S. Geological Survey (2010)
■ Indium	11,000 t ³⁾	no data	18 years	74.5%	U.S. Geological Survey (2010, 2008)
■ Cobalt	6.6 million t	15 million t ⁴⁾	106 years	60.7%	U.S. Geological Survey (2010)
■ Copper	540 million t	3 billion t	34 years	49.5%	U.S. Geological Survey (2010)
■ Niobium	2.9 million t	460 million t	46 years	99.0%	U.S. Geological Survey (2010)
■ Phosphorus	2.2 billion t	no data	97 years	65.8%	U.S. Geological Survey (2010)

¹⁾ as in 2009 ²⁾ as in 2010 ³⁾ as in 2007 ⁴⁾ plus 1 billion tonnes of hypothetical resources on the sea bed

Reserves: exact amount of raw material recorded that, under today's conditions, can be mined economically | **Resources:** amounts of raw material that cannot currently be mined economically and has not yet been accounted for
Static lifetime: the reserves of a raw material divided by the current global annual consumption | **Top 3:** producing countries

> Supply situation



2010



2012



2014



2016



2018



2020



2022



2024



2026



2029?



No Gold – No Televisions:
this precious metal will
not be able to be mined for much
longer – reserves are expected
to last around another 20 years.
REMONDIS recovers gold.

Raw material	Reserves ¹⁾	Resources ¹⁾	Static Lifetime ²⁾	Top 3 ¹⁾	Source
■ PGM*	71,000 t	100,000 t	189 years	89.8%	U.S. Geological Survey (2010)
■ RE**	99 million t	no data	797 years	99.0%	U.S. Geological Survey (2010)
■ Tantalum	110,000 t	no data	94 years	72.5%	U.S. Geological Survey (2010)
■ Titanium	730 million t	2 billion t	127 years	56.0%	U.S. Geological Survey (2010), Fraunhofer ISI (2009)
■ Tungsten	2.8 million t	no data	47 years	88.5%	U.S. Geological Survey (2010)
■ Zinc	200 million t	1.9 billion t	17 years	49.7%	U.S. Geological Survey (2010)
■ Zircon	56 million t	60 million t	45 years	85.0%	U.S. Geological Survey (2010)

¹⁾ as in 2009 ²⁾ as in 2010 ³⁾ as in 2007 ⁴⁾ plus 1 billion tonnes of hypothetical resources on the sea bed *platinum group metals **rare earth metals

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A plea for a sustainable industrial society.

Guest commentary by Prof. Martin Faulstich.

> Commentary

“It is genuinely possible to create a sustainable industrial society. A clear course must be set, however, to achieve this as well as extensive joint efforts made by all those active in politics, science and the economy.”

Our task for the coming century will be to transform our current ‘resource-hungry’ industrial society into a sustainable industrial society that handles our resources in a just way that goes beyond country borders and generations. We have, in principle, been aware of the elements needed to achieve this aim – sufficiency, efficiency and substitution – for a long time now.

The question of sufficiency, i.e. with what material outlay we wish to achieve happiness and satisfaction, has certainly been suppressed for too long. The discussion, however, about the limits to growth shows that this subject is back on the agenda.

And what about efficiency? The increases in efficiency that we have achieved over the last few decades thanks to the certainly

impressive work carried out by engineers have already been nullified through increased consumption. Greater efforts must, without a doubt, be made in this area.

Looking at energy supply, the German Advisory Council on the Environment (SRU) has shown that it is certainly possible for Germany as part of the European Union to be supplied with reliable and affordable electricity purely from renewable sources by 2050.

Now, a modern industrial society does not only need electricity, heat and mobility for final consumers but also a large number of metals and minerals which are hard or practically impossible to substitute. Supplies of many common metals such as lead, zinc, copper, tungsten and nickel have a static lifetime of only a few

decades. Furthermore, our high-tech industry is dependent on many critical raw materials such as tantalum, niobium, platinum, neodymium and indium.

Many of these raw materials are in the hands of just a few countries and a few companies thus clearly restricting free market mechanisms. When, in the future, natural reserves have been exhausted and even the old disposal sites have been removed, the industrial society of the future will have to rely on a comprehensive recycling sector that is based for the most part on secondary raw materials.



> Prof. Martin Faulstich

Prof. Martin Faulstich is Professor of Resource and Energy Technology at the Technical University in Munich and a founding director of the Straubing Centre of Science, a Bavarian joint facility focusing on renewable energy and renewable raw materials. In addition, Prof. Faulstich is Chairman of the Board of the ATZ Development Centre for Energy, Raw Materials and Materials in Sulzbach-Rosenberg. As Chairman of the German Advisory Council on the Environment (SRU), Prof. Faulstich acts as an adviser to the German Government.

Our strategy: the future. REMONDIS is taking responsibility.

> Profile

With its global activities, the REMONDIS Group offers a wide range of convenient service systems, high quality raw materials and innovative products. Another core business area is generating energy. As a result, REMONDIS is always a strong partner for local inhabitants, local councils and for companies.

Valuable raw materials are found deep in the ground. Or at REMONDIS.

REMONDIS is making every effort to ensure that natural resources are used economically and efficiently on a long-term basis. For today's sources of raw materials – and in particular those of the future – are not of a primary but a secondary nature. They are no longer found deep in the ground but are part of the huge material streams that REMONDIS handles every day.

Guaranteeing raw materials by recycling.

The ongoing aim is to conserve existing resources as much as possible. One way is to consistently collect and recycle all materials

that can be returned to the production cycle or be used to generate energy. Today, REMONDIS already collects and processes more than 25 million tonnes of recyclables. The results are high quality raw materials, convincing top quality products and environmentally friendly sources of energy. Furthermore, REMONDIS' services create a whole range of additional advantages – added value not only from a business and ecological point of view but also from a social point of view. So that future generations can find what they need to survive.

> Water, raw materials, energy and services: REMONDIS' range of services**Water resources management**

REMONDIS is active in all areas of water resources management. The company has been providing effective and economic solutions for more than 25 years now – for water supply and wastewater treatment as well as in the area of plant construction work and plant operations.

Energy

REMONDIS has been supplying high-energy fuels in the energy market for some years now and operates power plants to generate electricity, steam and heat – for its own production processes as well as for the open market.

Recycling/Raw materials

REMONDIS covers all stages of the supply chain in the environmental service branch – from collecting and processing materials to recycling or disposing of them. Besides carrying out material flow management, the company is also pushing forward future-oriented technologies and product developments.

Services

REMONDIS also focuses on providing professional services. It offers both public and private sector clients comprehensive services that also cover many related fields of activity.

REMONDIS implements its comprehensive service systems in 26 countries in Europe, Asia and Australia/Oceania. These systems contribute towards ensuring supplies of raw materials and also standards of living are maintained.

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