

Presentations



Business Lunch Talk
about Future Topics
in Raw Materials
21th March 2011 in Brussels

Imprint

This proceeding was compiled by Projektträger Jülich as one of the organiser of the Business Lunch Talk. It provides the presentations and other information given at this meeting.

For further information about the FP6 Foresight Support Action “**SMART**” and its outcome **MaterialsEuroRoads**, please refer to <http://www.materialseuroroads.net> or send an email to ptj-smart-ssa@fz-juelich.de

If you wish to get more information or to be invited to the next Business Lunch Talk, please contact Dr. Gerd Schumacher, email: g.schumacher@fz-juelich.de

Printed by: Grafische Medien, Forschungszentrum Jülich GmbH

April 2011

Table of Content

Introduction.....	5
Agenda.....	7
<i>Overview about the German funding activities in raw materials</i>	9
Herbert Zeisel (BMBF, Division 511)	
<i>Research and Innovation action in raw materials sector in FP7 NMP</i>	15
Renzo Tomellini (European Commission; DG RTD/DGG3/G3: Unit “Materials”)	
<i>Raw materials Initiatives in France</i>	31
François Piuzzi (MESR) / Bruno Goffé (CNRS INSU)	
<i>ETP SMR - Implementation action Plan</i>	37
Henryk Karaś (ETP SMR)	
<i>Umicore view on an “ideal” FP8 Programme</i>	51
Manfred Diehl (Umicore, EUMAT)	
Attendees List 2011	53

Introduction

The latest Business Lunch Talk was held in Brussels on the 21th March 2011. About 30 participants from 11 EU Member and Associated States attended the meeting in order to discuss future topics in Raw Materials.

Attention towards raw materials for non-energetic industrial production has gathered increasing momentum with the adoption of “the raw materials initiative” in November 2008 and the Europe 2020 Strategy, including such flagships such as “Industrial policy for the globalisation era”, “Innovation Union” and “Resource Efficiency”. Materials for non-energetic applications were identified as a potential European Innovation Partnership in Innovation Union. Raw materials-related topics are also included or foreseen in FP7 in the Work Programme for Theme 4 “Nanosciences, Nanotechnologies, Materials and New Production Technologies – NMP”.

The presentations gave an overview of current activities in the field of raw materials, with emphasis on activities on the European level and national activities in France and Germany, and also outlined the challenges facing the world with ever increasing demands for industrial strategic raw materials, tackling both technological and non-technological barriers to innovation.

Keeping in mind that materials innovation is an important driver for all technical innovations and is increasingly impacting emerging technologies, Renzo Tomellini, Head of Unit “Added-value Materials” in the Research & Innovation Directorate-General, gave an insight into current European activities in raw materials. He highlighted that addressing the challenges of Raw Materials within the Commission requires co-ordination across Commission DGs. With regard to the European Innovation Partnerships, it was felt in the subsequent discussion that more consideration should be given to financial engineering and the involvement of the Member States.

Representatives of two European Technology Platforms, ETP SMR and EUMat, discussed the main issues of European Mining as well as those of the mineral and chemical industries related to the raw materials sector. Suggesting that the mining topics had not been supported at appropriate levels in FP6, Henryk Karás, the chairman of ETP Sustainable Mineral Resources, welcomed the return towards raw materials and mining topics in FP7. Manfred Diehl, representative of EUMat and Vice President for EU Governmental Affairs at Umicore, discussed the existing funding instruments and shared Umicore’s vision of an ‘ideal’ funding programme, with continuous funding possibilities throughout the innovation chain from R&D to demo pilot plant. He identified this as another area characterised by the “European paradox”, that EU has a world-leading position on many aspects of the scientific aspects of Raw Materials but often fails to convert this science into innovation.

In the presentations and following discussion, there was a consensus of opinion about the crucial fields of activities:

- Exploration and mining
- Substitution
- Recycling
- Resource efficiency

These pillars are reflected in the raw materials strategies of many Member States. In order to facilitate the identification of research priorities to be solved on European level, a collection of existing national strategies in Raw Materials was felt to be valuable. Starting with the website of the European Commission http://ec.europa.eu/enterprise/policies/raw-materials/documents/index_en.htm (where links to national raw materials strategies are listed) further links need to be compiled.

The Business Lunch Talk is a direct outcome of the FP6 Specific Support Action “SMART”, a foresight activity in materials technology. Since the European strategic materials actions were felt to be fragmented, a networking platform “MaterialsEuroRoads” was set up after the SMART project to coordinate and accelerate efforts in this area. An annual meeting was also initiated to facilitate the dialogue between materials foresight activities / researchers and funding bodies in the Member States and in Europe as a whole.

After two meetings, the Annual Meeting of MaterialsEuroRoads (March 2007 in Paris and May 2008 in London) with fruitful discussion about the way forward in materials technology, the format of this meeting was improved by creating a more condensed version with respect to time frames and audience. This was the beginning of the “Business Lunch Talk”, which first took place in Brussels in July 2008 and was followed by meetings in Brussels, in October 2009 and in February 2011.

These proceedings collect the four presentations and a speech given at the Business Lunch Talk on 21th March 2011. We would like to take this opportunity to thank the speakers for their stimulating presentations and also to Lee Vousden for his skilful moderation of the event. We also express our gratitude to the attendees for their contributions in the closing discussion.

We hope you find the presentations interesting and informative.

The National Delegates / National Contact Points for NMP of France, Germany and the United Kingdom

Agenda for Business Lunch Talk about Future Topics in Raw Materials, 21th March 2011

Venue: KOWI, Rue du Trône 98, 1050 Brussels,
Phone: +32 02 5480210

Organization: Joint Activity of the German, French and British
Delegation of the PC NMP
Forschungszentrum Jülich, PtJ,
Phone: +49 (0) 2461-61-3545 (G. Schumacher)

- 12.00 Arrival of the participants, lunch and coffee
- 12.45 **Opening;** Overview about the German funding activities in Raw Materials (Dr. Herbert Zeisel)
- 12.55 Dr. Renzo Tomellini (European Commission; DG RTD/DGG3/G3)
Research and innovation action in raw materials sector in Theme 4 NMP, including Innovation Partnerships on Raw Materials for a Modern Society
- 13.25 Dr. François Piuze (Ministère de l'Enseignement Supérieur et de la Recherche, CEA)
Raw Materials Initiatives in France
- 13.45 Mr. Henryk Karás (Chairman ETP SMR)
Implementation Action Plan of the ETP SMR
- 14.05 Dr. Manfred Diehl (Umicore, EUMat)
Raw Materials: Research activities of academia and industry in Germany
- 14:25 Discussion
- ***What are the joint interest of the member states, industry (ETPs) and academia in raw materials?***
 - ***Which research priorities should be solved on European level?***
 - ***Which are the appropriate funding instruments?***
- 15:00 End of the event; Coffee and possibility for informal discussions



Bundesministerium
für Bildung
und Forschung

Overview about the German funding activities in raw materials

21th March 2011

Dr. Herbert Zeisel, Division 511, BMBF

FORSCHUNG

Ideen zünden!



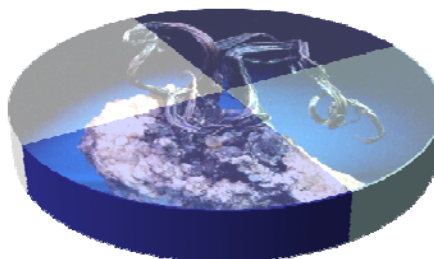
Bundesministerium
für Bildung
und Forschung

Different Competencies

In Germany Raw Materials is a comprehensive activity of several federal ministries...

BMU – Federal
Ministry for the
Environment, Nature
Conservation and
Nuclear Safety

BMBF – Federal
Ministry of Education
and Research



BMWi – Federal
Ministry of Economics
and Technology

BMELV – Federal
Ministry of Food,
Agriculture and
Consumer Protection

Picture taken from: Museum Freiberg, photo: A. Massanek

The German Government's Raw Materials Strategy

Securing a sustainable supply
of non-energy mineral resources for Germany

The German Raw Materials Strategy

Core Objectives:

- Reducing trade barriers and distortions of competition
- Helping German commerce to diversify its sources of raw materials
- Sustainable economic activity and enhanced materials efficiency
- Establishing raw materials partnerships with selected countries
- New technologies for recycling
- Paving new ways through materials research and substitution of critical materials
- Coordinated approach of different research programmes related to raw materials
- creating transparency and good governance in minerals extraction
- dovetailing national measures with European policy on raw materials





The raw materials strategy of the Federal Government

2007: The Federal Government elaborated the strategy „Elements of a raw materials strategy“

2007: An Interministerial Committee on Raw Materials (IMC) was established

- ➔ identification industrial problems deriving from raw materials supply
- ➔ developing interministerial solutions

2010: New Strategy, because:

- Resource rich countries like China and India have given a strategic orientation to their raw materials policies
- the demand profiles for raw materials will change due to advances in technology
- the European raw materials initiative needs to be adjusted with Germany's national policy on raw materials



Leading German Raw Materials Research Organisations

☹ Comprehensive research on resource technologies designed to safeguard and assure the supply of strategic raw materials has been neglected during the last couple of decades ...



☺ But still centers of competences are existing and new ones will be established!

Deutsche Rohstoffagentur/ German Raw Materials Agency

- Founded on 4th October 2010 within the Federal Institute for Geosciences and Natural Resources (BGR - Bundesanstalt für Geowissenschaften und Rohstoffe) in Hannover – to be completed until 2013/14
- 1st stage: Contact Bureau of the German Raw Materials Agency to tie requests coming from the economy, to identify the economical needs and to coordinate public presentations

Organisation in 5 Modules

- Raw materials Information system
- Service for the German economy
- Professional support in raw materials related funding programmes
- R&D projects (precompetitive)
- Cooperation with resource-rich countries



Archives of BGR with geological reports and maps; source: BGR

Freiberg Institute of Resource Technology (RIF)

- 17th December 2010: Technische Universität Bergakademie Freiberg and Forschungszentrum Dresden-Rossendorf succeeded with their proposal for a “Research Institute dedicated to the development of technologies to assure the sustained supply of raw materials and resource efficiency”



Bundesforschungsministerin Annette Schavan, Sachsens Ministerpräsident Stanislaw Tillich and the Principal of the TU Bergakademie Freiberg, Prof. Bernd Meyer; source BMBF

Focus of the proposed institute

- Increasing the availability of primary raw materials
- Increasing the availability of secondary raw materials
- Increasing the material and energy efficiency
- Product-specific raw material selection and substitution
- Evaluating the sustainability of resource technologies



Funding measure „MatRessource“ within the BMBF Programme WING

Materials for a resource efficient industry and society - MatRessource

Substitution, efficient use of materials and (Nano-)Recycling

Development in innovative materials with regard to substitution of materials,
increased materials yields, recycling of nanomaterials

Corrosion protection

Extending the operating lifetime of components and industrial plants ,
increasing efficiency in energy production, reduction of environmental impact

Catalysis and process optimisation

Securing the raw materials supply, enhancement of the materials efficiency
in order to protect the environment and to secure the quality of life,
Process optimisation and process safety

Proposal submission: February 2011 and 2012



FONA funding measure „r³“

Innovative Technologies for Resource Efficiency – Strategic Metals and Minerals – r³

- **Sustainable strategic use of strategic metals and industrial minerals**
 - Recycling of strategic metals and industrial minerals
 - Saving of strategic metals and industrial minerals through technological or functional substitution
- **Urban Mining“ – Recovery of recyclables from man-made deposits**
 - Recovery of recyclables through dismantling of infrastructure
 - Recovery of recyclables through dismantling of old landfills, tailings, and ashes
- **Methods for resource efficiency assessment**





NMP.2011.4.0-6 ERA-NET on the industrial handling of raw materials for european industries

European Research Area – Network on the Industrial Handling of Raw Materials for European Industries: ERA-MIN

Coordinator: CNRS (France)

Participants: Material innovation Institute (M2i, Netherlands),
TEKES (Finland), Projektträger Jülich (JÜLICH, Germany),
VINNOVA (Sweden), Hungarian Office for Mining & Geology
(MBFH, Hungary), NCBiR (Poland), BMBF (Germany), BIS (UK)

Objective: overcoming the current state of fragmentation of the
European mineral resources related research area, developing
convergences between public research programmes, industry
and the European Commission

Research and Innovation action in raw materials sector in FP7 NMP



Renzo Tomellini
European Commission
Head of Unit "Materials"

renzo.tomellini@ec.europa.eu

Please note that this presentation is not legally binding and does not represent any commitment on behalf of the European Commission.



1

Innovation from Materials

Some 70 percent of all technical innovations hinge directly or indirectly on the properties of the materials they use.

Material innovations can be used in practically all technology sectors and branches of industry.



Material innovations have the potential to reduce environmental pollution, save energy, conserve resources, make mobility less dangerous and improve the quality of life.

Source: ACATECH, 2009.

<http://www.research-in-germany.de/dachportal/en/downloads/download-files/9554/high-tech-strategy-2006-112-page1.pdf>



2

Impact of Advanced Material Technology

Impact of advanced material technology on ICT, Energy & Biotechnology
(% growth attributable to advanced materials)

	1970	1980	1990	2000	2010	2020	2030
ICT	15	25	40	55	65	75	85
Energy	10	15	30	45	55	65	70
Biotechnology	5	10	20	30	45	55	65

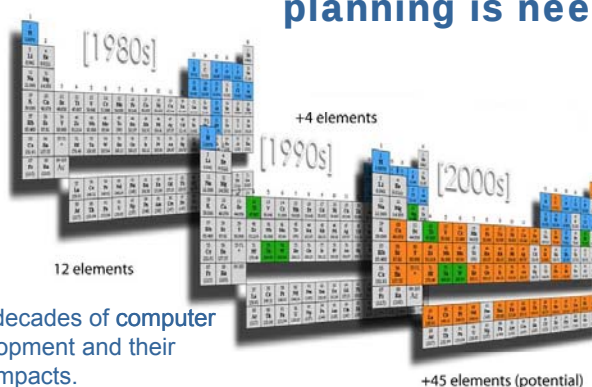
Advanced materials have an earlier & greater impact in
ICT (incl. electronics),
followed by Energy (incl. construction)
and Biotechnology (incl. health)

Source: Sanford M. Moskowitz, « The Advanced Materials Revolution », John Wiley & Sons Inc, 2009



3

Many technologies require raw materials: planning is needed



The dynamics of two decades of computer chip technology development and their mineral and element impacts.

In the 1980s, computer chips were made with a palette of twelve minerals or their elemental components. A decade later, sixteen elements were employed. Today, as many as sixty different minerals (or their constituent elements) are used in fabricating the high-speed, high-capacity integrated circuits that are crucial to this technology.

SOURCE: "Minerals, critical minerals and the US economy, The National Academies Press, 2007: from Intel Corporation.



4

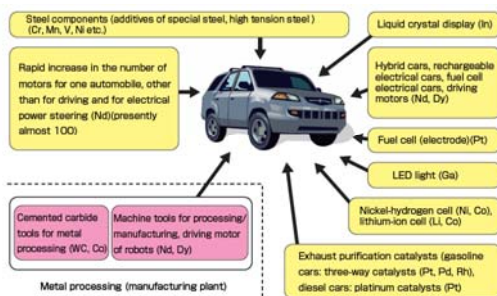
Some applications are already competing or will do it soon

- Rare metals are also essential parts of energy technologies
 - 3 MW wind turbine - 2 t magnet - 600 kg Nd
 - 350 GW of additional wind power in EU = 210 kt Nd = 10 kt/y Nd
- ... as well as in other important applications (incl. consumer and defence electronics)
 - 1 hybrid motor – 1 kg Nd
 - 100 million vehicles by 2030 in EU = 100 kt Nd = 5 kt/y Nd
- Resources of some rare and noble metals are limited and often concentrated in a small number of countries
 - Nd annual production: 20 kt
 - Chinese monopoly



5

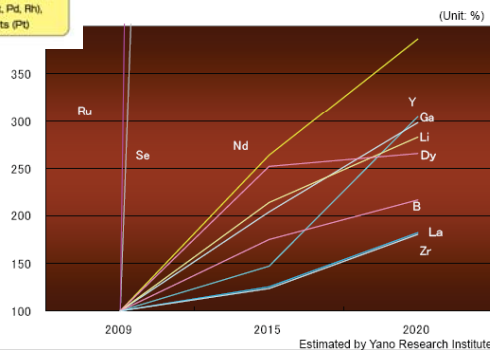
The importance is growing ...



The automotive sector is currently the largest user of rare metals

Source: AIST

JP foresees a rapid increase in the demand for rare metals



How to recycle materials?

- 1) Design products for recyclability (Cradle to Cradle philosophy)
- 2) Close the recycle loop (i.e. lighter, thinner, smaller products)
- 3) Recycling is part of the waste hierarchy (3Rs: reduce, reuse, recycle)



Material Scarcity, Materials Innovation Institute, 2009 (the Netherlands)
http://www.m2i.nl/images/stories/m2i%20material_scarcity%20report.pdf



7

Potential solutions

- **Smart exploration of investment opportunities**
 - ▶ *Toyota invests in Vietnamese mines*
- **Improved access to raw materials**
 - ▶ *USA are reopening the Mountain Pass mine*
- **Improved trade agreements**
 - ▶ *JP / Indian Rare Metals Ltd agreement*
- **Improved efficiency in material utilisation**
- **Enhanced recycling practices (urban mining)**
- **R&D on material substitution**
 - ▶ e.g. Permanent magnets: Nd-Fe-B → Sm-Fe-B



8

The EU Raw Materials Initiative:

meeting our critical needs for growth and jobs in Europe

Securing reliable and undistorted access to raw materials is increasingly becoming an important factor for the EU's competitiveness and crucial to the success of the Lisbon Partnership for growth and jobs.



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels,
14/06/2008 699

November
2008

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT AND THE COUNCIL
THE RAW MATERIALS INITIATIVE — MEETING OUR CRITICAL NEEDS FOR
GROWTH AND JOBS IN EUROPE

(SEC(2008) 2741)

International discussion addressed also at the UN, G8 and G20

http://ec.europa.eu/enterprise/newsroom/ctf/document.cfm?action=display&doc_id=894&userservice_id=1



9

Definition of critical materials

Some raw materials can be considered to be particularly critical, because of 3 main reasons:

- 1) Their significant economic importance for key sectors
- 2) A high supply risks
- 3) The lack of substitutes

June
2010

Hence, the European Commission has identified
14 critical raw materials at EU level:

Antimony	Indium
Beryllium	Magnesium
Cobalt	Niobium
Fluorspar	PGMs (Platinum Group Metals)
Gallium	Rare earths
Germanium	Tantalum
Graphite	Tungsten

Production concentration of critical raw mineral materials



"Critical raw materials for the EU". Report of the MSG Ad-hoc working group on defining critical raw materials June 2010.



10

Achievements since 2008

1. List of 14 critical raw materials
2. EU trade strategy (including use of **litigation**)
3. Promotion of development instruments (Addis Abeba/Tripoli)
4. New research opportunities (ProMine)
5. Guidelines on the implementation of Natura 2000
(http://ec.europa.eu/environment/nature/natura2000/index_en.htm)



11

The economic impact of export restrictions on raw materials – the OECD Report

June 2010

OECD Trade Policy Studies
The Economic Impact
of Export Restrictions
on Raw Materials



- Noting the high level of interdependence between exporting and importing countries, the significance of export restrictions for the world economy should be more broadly recognised;
- Since no economy is fully sufficient of every raw material, it is a global challenge which requires coordinated responses.
- Transparency regarding the use and implementation of export restrictions should be substantially improved.
- Exploring a framework to discipline export restrictions at the WTO could enhance predictability and facilitate free trade of raw materials.

<http://www.oecd-ilibrary.org/docserver/download/fulltext/2210021e.pdf?expires=1300351739&id=0000&accname=ocid194935&checksum=C7AA2B36B9F1BCA6A0D7A784CCCF3057>



12

Tackling the challenges in commodity markets and on raw materials

February
2011

Raw materials would now form a full part of the bloc's free trade agreements, with '**raw materials diplomacy**' aimed at securing strategic partnerships with key supply countries. Improved cooperation with the African Union in particular is being envisaged.

"Urban mining" - the extraction of useful materials from urban waste – is one of the main sources of metals and minerals for European industry. To improve Europe's **recycling industries**, new market-based instruments favouring secondary raw materials could be introduced.

Resource efficiency could also be increased early on, at the manufacturing stage, to ensure that **products are recyclable and durable** and promote the use of secondary raw materials.

http://ec.europa.eu/enterprise/policies/raw-materials/files/docs/communication_en.pdf



13

The EU COUNCIL ...

- Invites the Commission to **further promote innovation and research** and development efforts in the raw materials value chain, including exploration, extraction, processing, recycling, ecodesign, resource-efficient production and substitution,
- **Invites the Commission to assess the case for launching a European Innovation Partnership (EIP) on raw materials and to come forward with proposals for this as appropriate, whilst fully respecting the principle of subsidiarity;**
- Notes with interest the EC intention to use **EU research funding for improving technologies** for the detection, identification, tracking and location of **illegal shipments**.
- Calls for **stronger cooperation in applied research** in order to identify substitute materials that will reduce the EU's dependence on critical raw materials.

10th March
2011

http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/intm/119744.pdf



14

EUROPE 2020 Strategy

An Europe's Integrated Strategy for smart, sustainable and inclusive growth

7 flagship initiatives:

- SMART GROWTH: based on knowledge and innovation
 - – **Innovation Union**
 - – **Youth on the move**
 - – **Digital agenda for Europe**
- SUSTAINABLE GROWTH: a competitive and sustainable economy
 - – **Resource efficient Europe**
 - – **An industrial policy in the globalisation era**
- INCLUSIVE GROWTH: high-employment society
 - – **An agenda for new skills and jobs**
 - – **European platform against poverty**



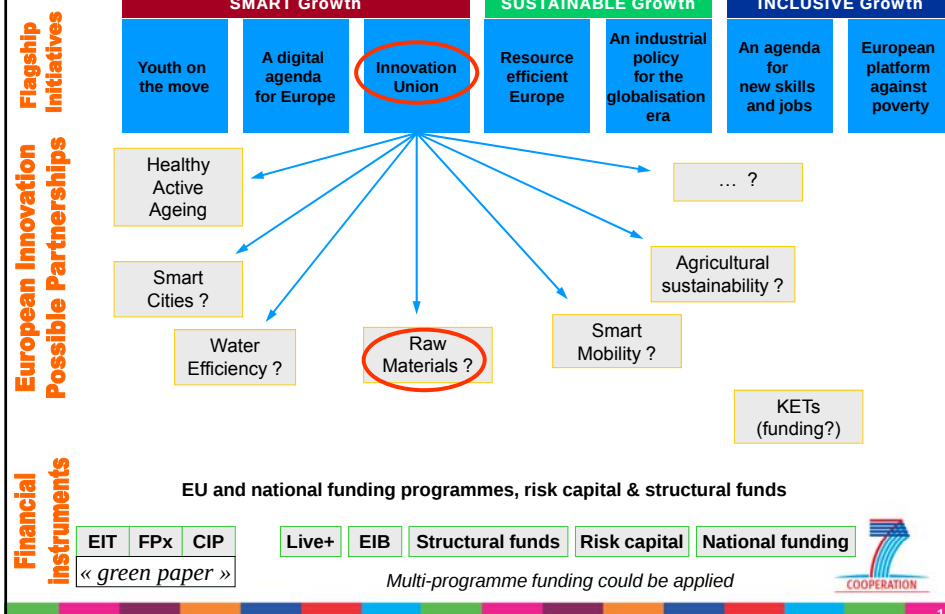
March 2010

<http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%2007%20-%20Europe%202020%20-%20EN%20version.pdf>



15

EU 2020 Strategy



16

What are European Innovation Partnerships?

WHY?

To pool efforts for breakthroughs

WHAT?

They are a new way of **bringing together public and private actors** at EU, national and regional level to tackle the big challenges we face such as climate change, energy and food security, health and an ageing population. These challenges also represent opportunities for new business and the Partnerships will aim to give the EU a first-mover advantage in these markets.

WHEN?

The first Partnership deals with **active and healthy ageing** and aims to add an average of two years of healthy life for everyone in Europe.



17

Innovation Partnerships: one of the building blocks of the Innovation Union



18

The European Innovation Partnerships connect supply-side and demand-side tools:

Science, R&D, Innovation

Supply-side:

- Funding and tax incentives in MS and Regions

EU level:

- ESFRI, ERANet, JPI
- FP7, CIP
- EIB-type, Cohesion Funds
- KICs
- ETPs, JTI

International:

- COST, EUREKA, ESA etc

Demand-side and Framework conditions:

- Regulation, procurement in MS and regions

EU level:

- Standards/ Labelling
- Regulation
- Public procurement
- clusters
- State aid
- IP and knowledge transfer
- Lead Market Initiative

Market, consumers

Societal challenge - Partnership



19

Benefits for policy makers

A framework for local, regional, national and EU-wide actions by:

- Aligning resources and share results in areas such as health, environment, transport
- Actions could foster smart specialisation
- Actions can be combined – at any level - to create speed and critical mass

Innovation Partnerships' Governance structures:

The Steering group composition should be adapted to specificities of each EIP tasks, such as:

- problem analysis
- measures needed
- identify partners and commitments
- identify milestones to enable monitoring



20

European Innovation Partnerships: the timetable

- 2010: Pilot on active and healthy ageing
 - Aim: two additional healthy life years by 2020
 - ◆ Council, Parliament supported the concept
 - ◆ First meetings with Member States and stakeholders to start preparing contents
- 2011: Commission plans to present proposals from February pending on advancement and building on pilot experience, EP and Council will decide
 - ◆ Topics considered: smart cities, water, **raw materials**, mobility, agriculture...



21

European Innovation Partnerships: timetable, role of Commission

- Preparation of EIP themes and EU funding programmes will go partially in parallel => EIP broad-line contents should be ready around **Summer 2011** that they could be taken into account in preparation of the funding programmes
- Commission will
 - ◆ facilitate preparations and organise EU level consultations
 - ◆ provide support for the Steering Group
 - ◆ take necessary initiatives falling its responsibility
 - ◆ report regularly to EP and Council



22



EUROPEAN COMMISSION
Community research

Which role for the 7th European Framework Programme for Research (FP7) ?





EU research:
<http://ec.europa.eu/research/index.cfm?lg=en>

Seventh Framework Programme:
http://ec.europa.eu/research/fp7/index_en.cfm

Industrial Technologies website:
http://ec.europa.eu/research/industrial_technologies/index_en.html


23



EUROPEAN COMMISSION / Research & Innovation / 7th Framework Programme

The 7th European Framework Programme (FP7)

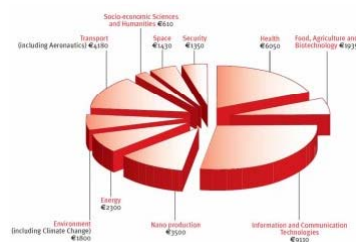
- **The Framework Programme is the strategic instrument for Research policy:**
 - ✓ General principles, objectives, financial means
 - ✓ Proposed by the Commission for co-decision by European Council and Parliament
- **The FP is implemented by Specific Programmes:**
 - ✓ Cooperation; Ideas; People; Capacities
 - ✓ Detailed research content
 - ✓ Types of activities and where they apply
 - ✓ Normally one call for research proposal per year, in summer


24

FP7 2007-2013 Budget

Cooperation

	Budget (€ million)
1. Health	6 100
2. Food, agriculture and fisheries, and biotechnology	1 935
3. Information and communication technologies	9 050
4. Nanotechnologies, Materials and Production (NMP)	3 475
5. Energy	2 350
6. Environment	1 890
7. Transport	4 160
8. Socioeconomic research	623
9. Space	1 430
10. Security	1 400
Total	32 413



* Not including non-nuclear activities of the Joint Research Centre: €1 751 million



25

WP NMP

Critical materials: what's in progress?

MINING
RECYCLING
SUBSTITUTION

RESEARCH
STRUCTURING
INDICATORS



26

Example of granted FP7 project

PROMINE: Nano-particle products from new mineral resources in Europe

Research area NMP-2008-4.0-5: Innovative concepts and processes for strategic mineral supply and for new high added value mineral-based products

Project description

ProMine targets extractive and end-user industries. Included, economic evaluation, life cycle cost analysis, and environmental sustainability: <http://promine.gtk.fi>

Upstream, the first ever Pan-EU **GIS based mineral resource** and advanced modelling system for the extractive industry will be created. Demonstrating the reliability of new (Bio) technologies for an **eco-efficient** production of **strategic metals**.

Downstream, a new strategy will be developed for the European extractive industry which looks not only at **increasing production** but also at **delivering high value**, tailored nano-products which will form the **new raw materials** for the manufacturing industry.

ProMine research focuses on five nano-products:

- Conductive metal (Cu, Ag, Au) fibres,
- Rhenium and rhenium alloy powders,
- Nano-silica,
- Iron oxyhydroxysulphate, and
- New nano-particle based coatings for printing paper.



27

Running projects from call 2010

NMP.2010.1.2-2:

substitution of materials or components utilising "green nanotechnology"

Expected impact: In terms of technology development ...

- to demonstrate the viability of the "**green nanotechnology**" concept to enhance **environmental sustainability** of manufacturing processes;
- to promote the creation of markets for products and processes utilising "**green nanotechnology**";
- in the long term, to provide a significant contribution to the **reduction** on the demand of **scarce or non-environmentally friendly raw materials**, **elimination** of use of **hazardous substances** in production processes and the **reduction** of **non-eco waste** material.



28

Under evaluation ...

Call for proposals launched in July 2010 (WP NMP 2011)

- i. developing new technologies for clean intelligent mining activities (advanced underground technologies for intelligent mining and for inspection, maintenance and excavation),
- ii. eco-design for new products - and eco-efficient and cost-effective method of production,
- iii. finding substitutions (Novel materials for replacement of critical materials, Platinum GE and Rare Earth) *NMP-2011-2.2-4*
- iv. networking at MS level (research on materials science and engineering, including international cooperation) *NMP-2011-4.0-6*

... and new opportunities with next call in July 2011



29

Find a project



<http://cordis.europa.eu/fp6/projects.htm>



http://cordis.europa.eu/fp7/projects_en.html



30

General Information



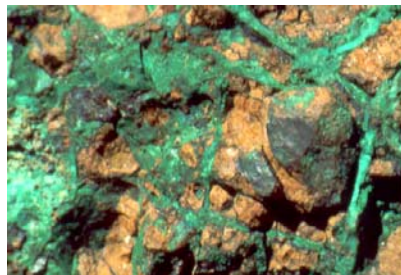
- EU research:
<http://ec.europa.eu/research>
- Seventh Framework Programme:
http://ec.europa.eu/research/fp7/index_en.cfm
- Information on research programmes and projects:
<http://cordis.europa.eu/>
- Industrial Technologies Website (NMP WP):
http://ec.europa.eu/research/industrial_technologies/index_en.html
- Information requests:
<http://ec.europa.eu/research/enquiries/>

Thank you
for your
attention!





Eramet Ni Mine New Caledonia



Garnierite Ni Ore

Raw Materials Initiatives in France

Bruno Goffé (CNRS INSU)

François Piuzzi (Education and Research Minister)

Future Topics in Raw Materials 21 mars 2011

1

Main French Institutions to be concerned

Ministries : Research, Industry, environment

Public Institutions :

- CNRS : Fondamental research
- BRGM : French Geological survey
- Ifremer : marine ressources
- CEA : Recycling, Uranium ressources
- IRD : Fondamental research for developing countries
- Universities, Instituts and « Grandes Ecoles »

Companies

- AREVA
- ERAMET
- RHODIA
- TECHNIP

Funding agencies

- ANR (national research)
- Ademe (Environnement)
- FUI (Inter - ministry R&D funding)
- OSEO (SME funding)
- ...



Future Topics in Raw Materials 21 mars 2011

2

Recent Main French Initiatives

2008 : National research prospective for Earth sciences organised by the National Institut for earth sciences and astronomy **INSU** (Now one of the 10 instituts of CNRS) put forward the raw materials as a fundamental question

2009-2011 : Following the « Grenelle de l'environnement » recommendations, the Environment Ministry put the recycling of rare elements as a step of Eco-technology developpement through **ADEME** and **OSEO**

2009-2011 : **ANR** calls for recycling projects (**very few answers**)

2010 : **REMIMA** (Marine Mineral ressources) roadmap coordinated by **IFREMER**

2011 January : **COMES** (Strategic Committee for strategic elements)

2011 February : Working group on non-energetic raw material, **Research Ministry**

2011 February : Era-Net project ERA – MIN is submitted, coordination by **CNRS**

2011 March : The Programmation group « fossil energy, geothermy and critical metals » of **ANCRE** recommends a national research platform on strategic metals

2011 - 2012 : National initiative « investissement d'avenir » invests 250M€ in recycling research (Economie circulaire), **ADEME** will be the funding agency

2012 - 2021 : National initiative « investissement d'avenir » will sustain at less two main Laboratoire d'excellence (Labex) on raw material, **ANR** will be the funding agency

Future Topics in Raw Materials 21 mars 2011

3

Main proposals (are also in ERAMIN)

Three main axis are identified :

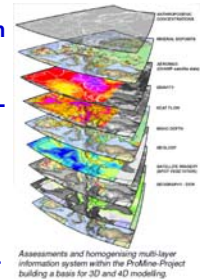
- primary resources,
- secondary resources
- cross cutting issues :
 - minerals intelligence
 - international cooperation,
 - training

Future Topics in Raw Materials 21 mars 2011

4

Primary resources

- The production of minerals and metals from EU sources should be fostered through research, exploration methods, re-appraisal of existing data
- The development of a 3-D (geology, geochemistry)/4-D (its evolution over time) representation of the EU terrestrial crust,
- The development of European base infrastructures for HD imaging, exploring, monitoring, understanding the underground at the upper-crust scale,
- Foster better knowledge of EU seabed,
- Analyse the possibility to have **European deep-sea mining strategy** including other environmental challenges,
- The development of the support infrastructure (e.g., ships) and technologies necessary to recover metal deposits from the seafloor on a commercial scale. Encourage the development of specific technologies that have minimal environmental impact when mining ore deposits in the deep ocean,
- The environmental impacts of mine activities from the pre-mine to the post mine times need to be addressed (**Mine Observatory**),
- The further development of mining, ore processing and metallurgical technologies aiming at an **increased recovery of the valuable components of the bulk material extracted from mines and quarries** while reducing energy, water and chemicals consumption and **reducing problematic emissions into the environment (air, soil and water)**.



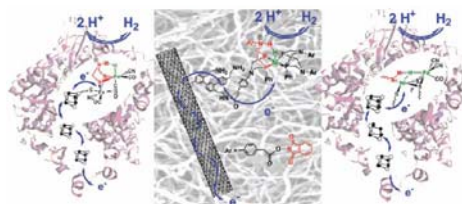
Assessments and homogenizing multi-layer information system within the ProMine-Project building a basis for 3D and 4D modelling

Future Topics in Raw Materials 21 mars 2011

5

Secondary resources

- **Recycling through design and process development for efficient dismantling of end-of-life products and recovery of their mineral and metal contents for further use.** Recycling should also be applied to existing mining, processing, metallurgical or combustion waste from which valuable minerals and metals could be extracted,
- **Reduction of minerals and metals consumption, and their eco-efficient use, through smart design of goods and smart materials based on concepts such as nanotechnologies,** as well as the substitution of rare minerals and metals by more common ones, while reducing energy and water use as well as harmful emissions.



Future Topics in Raw Materials 21 mars 2011

6

Cross cutting issues

- Minerals intelligence
 - Minerals intelligence should comprise analysis and description of industrial supply chains to identify criticality factors specific to individual minerals and metals; monitoring and analysis of global production and trade of minerals and metals; foresight on demand and supply and their underpinning long-term trends; of mining companies, their controls, their exploration and mining projects, mergers and acquisitions; monitoring of trade distortions. The development of an EU minerals intelligence capacity have to be based on the capacities existing in individual Member States, in close connection with the industry,
 - The development of public understanding and acceptance of mineral resources related issues.
- Training
 - Foster EU training in geosciences,
 - Development of the mobility of researchers across the EU.
- International cooperation
 - The reflections and actions must be adapted in function of countries, the cooperation is different with developed countries compared to developing countries, but both must be taken into account,
 - Development of teaching (training) in all these scientific and technical fields and provision of access to EU training centres to students and professionals from developing countries,
 - Development of the mobility of researchers between the EU and the mineral rich developing world/ EU neighbouring countries.

Future Topics in Raw Materials 21 mars 2011

7

The « Research platform on strategic metals » project :

(as proposed in ANCRE Annual meeting in march)

duration: 10 ans beginning 2012		Global Running Cost: 200 M€ (without public salaries) infrastructure: 30 M€
Coordination: CNRS		
<u>Public establishments</u> BRGM, CEA, CNRS, Ifremer Universities, and « Grandes Ecoles »	<u>Companies</u> ➤ Areva, Eramet, Imeris, Renault, Rhodia, St Gobain, Veolia..... ➤ « Pôles de compétitivité » ➤ Agences régionales de développement ➤ SME, ...	<u>International network</u> ➤ Europe (ERA-NET) Germany, UK, Finland, Hungary, Slovakia, Sweden, ... ➤ North America Canada (Quebec) ➤ Africa and ACP countries
<u>Funding Agencies</u> ANR, ADEME, FUI,		

Future Topics in Raw Materials 21 mars 2011

8

Thank you for your attention





EUROPEAN TECHNOLOGY PLATFORM
ON SUSTAINABLE MINERAL RESOURCES

ETP SMR – Implementation Action Plan (5 years of activities in the EU RTD area).

**Henryk Karaś, chairman of HLG, European Technology
Platform on Sustainable Mineral Resources (ETP SMR),**

BLT about Future Topics in Raw Materials Brussels, 21st March 2011



EUROPEAN TECHNOLOGY PLATFORM
ON SUSTAINABLE MINERAL RESOURCES

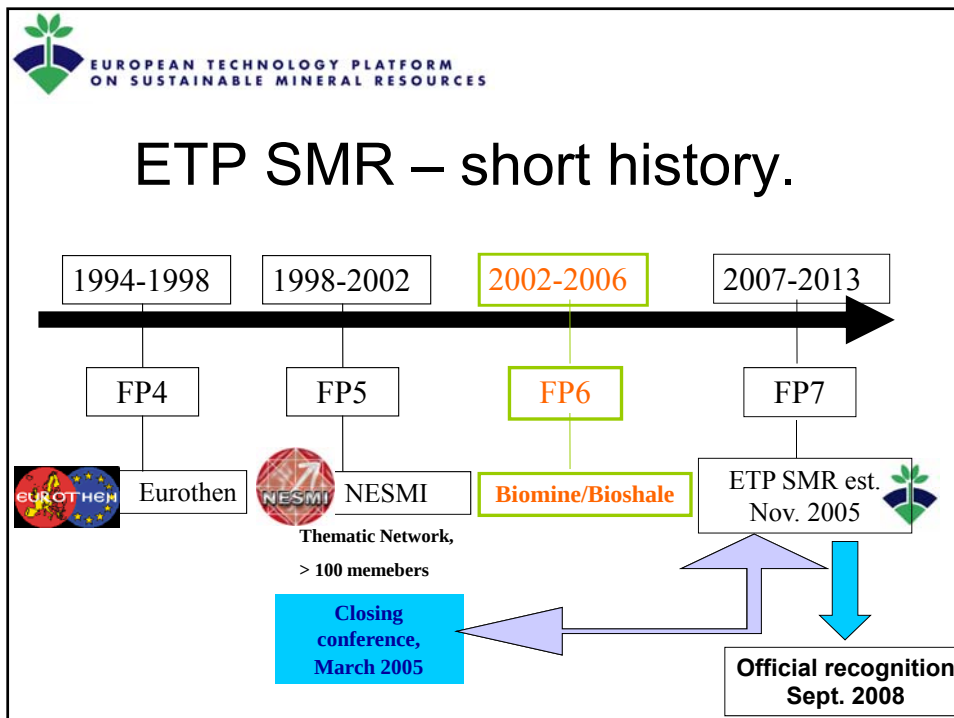
Content of presentation:

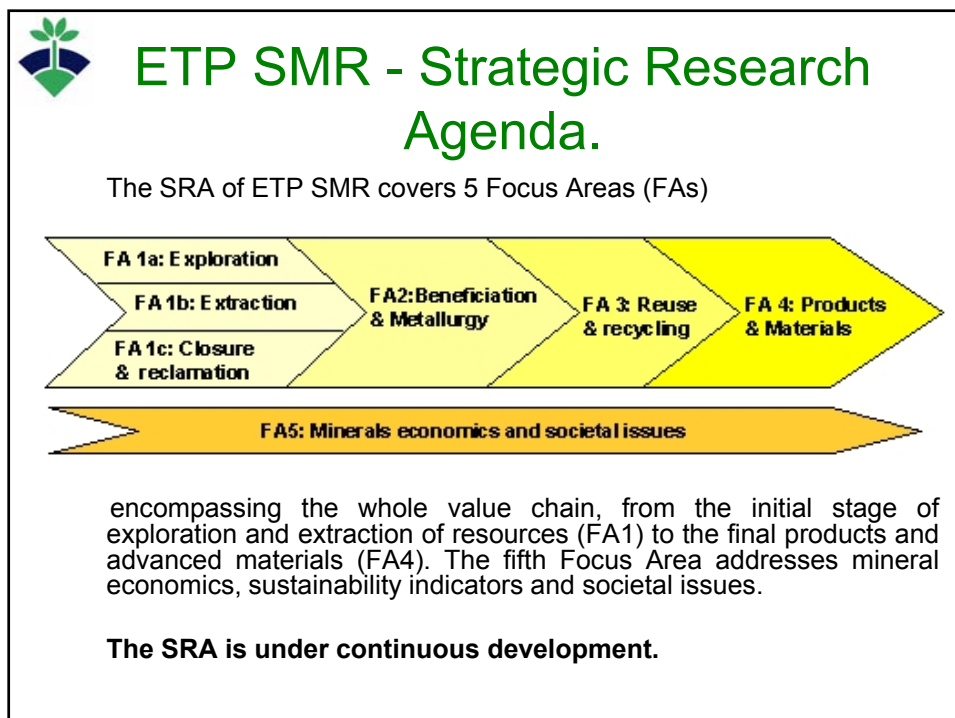
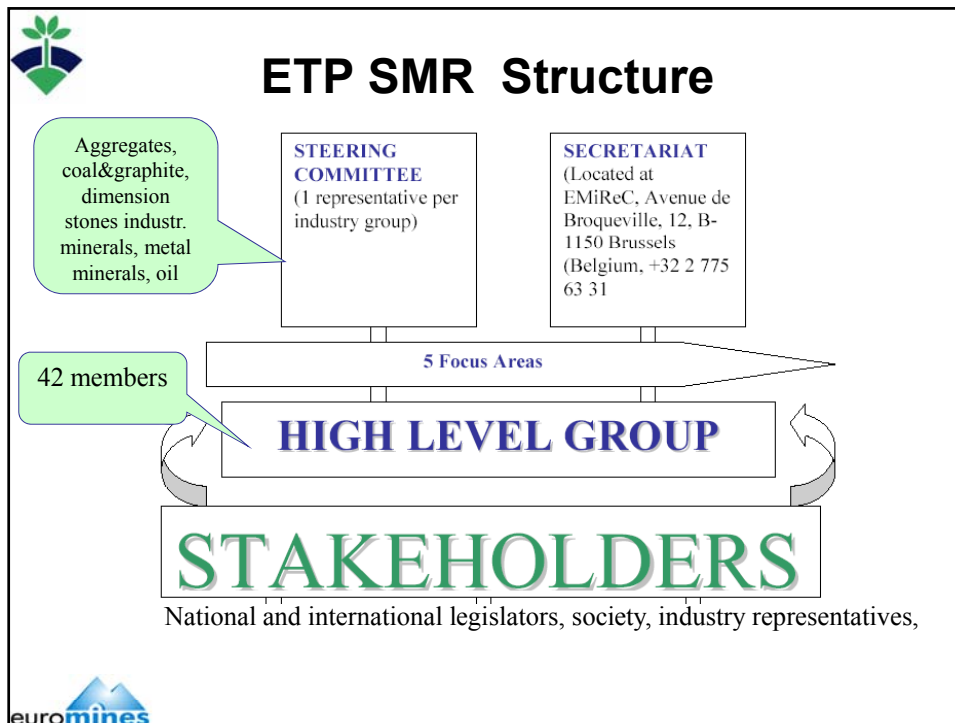
1. ETP SMR – short introduction.
2. Mining sector– important factor of the European economy;
3. Flagship Initiative EUROPE 2020: Resource efficient Europe;
4. EUROPE 2020 innovation programme – underlining the role of RMI.
5. Action Plan for ETP SMR in Europe 2020 programme.

EPT on Sustainable Mineral Resources



- Website: www.etpsmr.org
- Information on EPT SMR and its tasks
- Strategic Research Agenda, updated in December 2009.

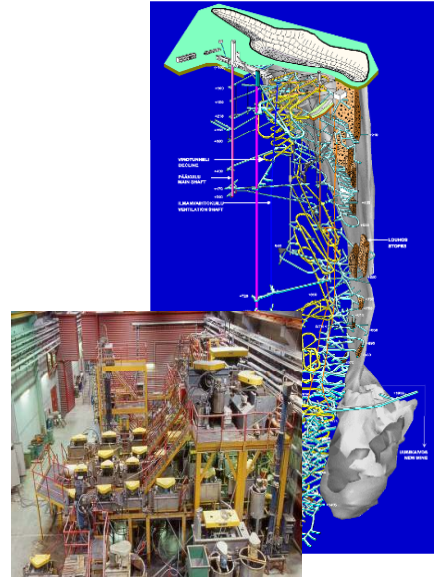




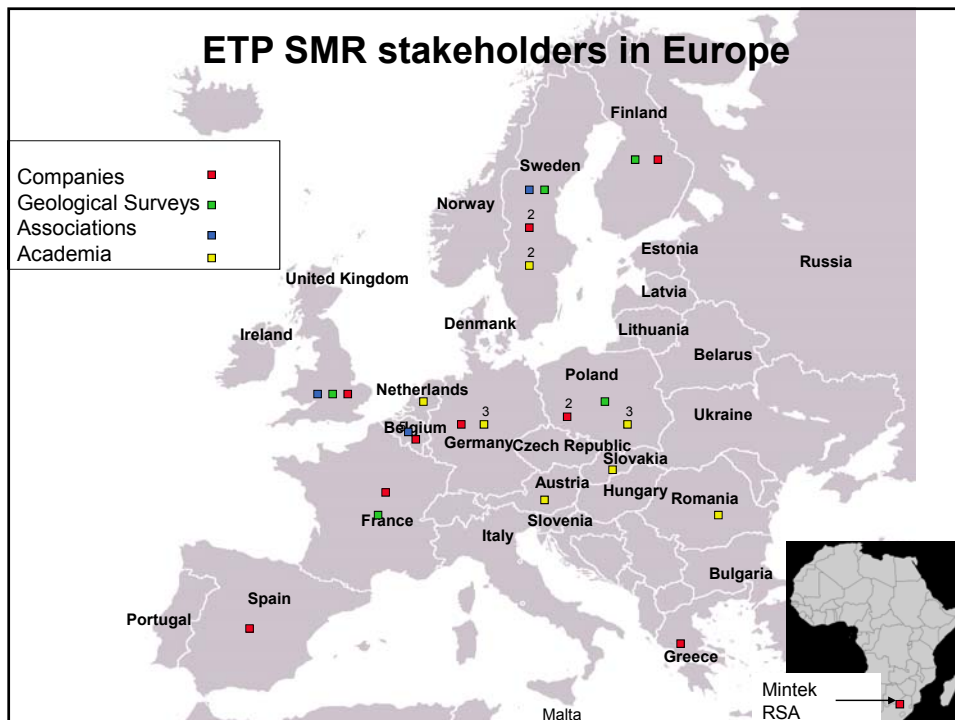


ETP SMR - Vision.

- Reshape a „traditional” industry from resource-driven to a knowledge-driven industry;
- Supply and secure the mineral resources needed by the EU economy with related low environmental footprint;
- Strengthen world leadership and competitiveness in minerals sector technology;
- Add value for customers and the society.



Source, GTK, Finland





ETP SMR stakeholders representing the mineral industry sector in Europe

Companies:	Associations:	Academia:
BHP Billiton ; UK Boliden ; Sweden ELMIN , Greece Kali & Salz AG ; Germany KGHM ; Poland LKAB ; Sweden LW (h.coal) „Bogdanka” , Poland MEED ; France Outotec ; Finland S&B Industrial Minerals ; SGL Carbon ; Germany Technip ; France Tecnicas Reunidas ; Spain UMICORE ; Belgium Geological Surveys: BRGM , France; British Geological Survey ; Geol. Survey of Sweden ; GTK , Finland;	EuroGeoSurveys , the Association of the European Geological Surveys; EUROGIF , the European Oil and Gas Innovation Forum; Euromines , the European Association of Mining Industries; Eurometux , Belgium IMA-Europe , the European Industrial Minerals Association; MINFO , the Swedish Mineral Processing Research Organization; MIRO , Mineral Industry Research Organization;UK MITU , the Swedish Mineral Industry Research Organization; PNFMP , Polish Non Ferrous Metal Platform; UEPG , the European Union Association of Aggregate Producers;	IMBIGS , Institute of Mechanized Construction and Rock Mining, Poland; LTU , Lulea University of Technology, Sweden; Mineral and Energy Economy Research Institute of Polish Academy of Sciences , Poland; TUKE , Technical University of Košice; Slovak Republic TNO , The Netherlands; University of Leoben , Austria; RWTH University of Aachen , Germany; National R&D Institute for Non-ferrous and Rare Metals , Romania; IMN , Non-Ferrous Metals Institute, Poland; MINTEK (RSA)

Main issues of the European Mining.

1. Exploration and mining – is getting increasingly difficult due to problems with access to land: conflict of interests (Natura 2000).
2. Permitting and appealing issues: very long processes, too many instances and possibilities to appeal,
3. Increasing trade distortion taken by third countries.
4. Bad image within the population: dangerous branch (safety & environment), *dirty* industry
5. Human resources: age pyramid
6. Education: low interest and status for the mining industry at all stages and levels in many EU countries
7. Technology and R&D: lack of support from EC between 2000-2006. More support starting from 2007.

Mineral Resources for Europe, Supply potential and issues
 Pierre Heeroma, Vice President Exploration, New Boliden
 28th-29th April 2009, Prague





International Panel
for Sustainable
Resource Management



The metals challenge – the world.

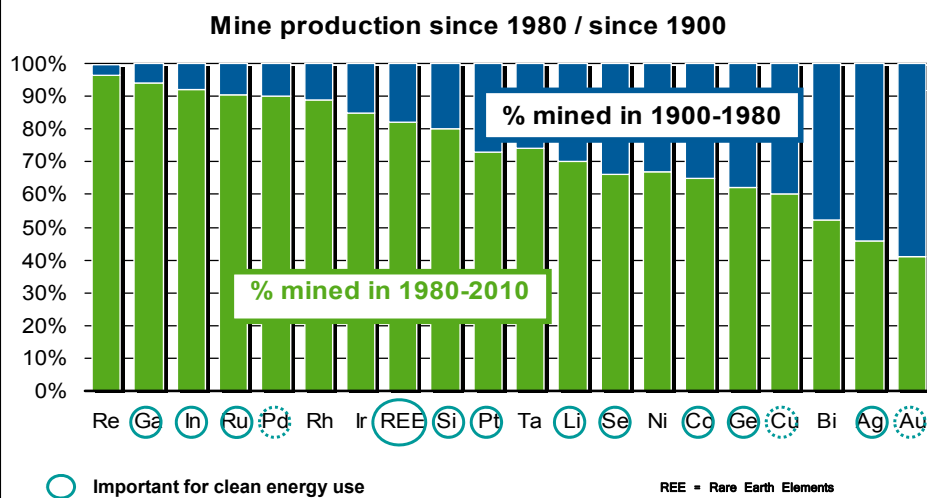
– Metals are essential for economic development:

- Base metals like steel, copper and aluminum, mainly for buildings and infrastructure
- Precious and specialty metals, like REE, palladium and indium for modern/clean technologies.

– Global demand for metals is increasing:

- E.g. copper and aluminum have doubled in the past 2 decades
- Rising demand in emerging economies and developing countries
- Very strong demand growth for many precious and ('technology') metals

The rapid growth of demand for some metals in the last 30 years.



source: Christian Hagelüken, Mark Caffarey - UMICORE EU-US Workshop, 3.12.2010, MIT



International Panel
for Sustainable
Resource Management



The metals challenge – the world.

– The increasing global demand for metals causes many problems and challenges:

- Increasing environmental pressures from extraction and manufacturing of raw materials
- Growing dependence on regional or economic concentrations of natural resources
- Increasing risks of international crisis (e.g. war lord activities in parts of Africa)
- Social tensions among local populations (land owner issues etc.)

New situation of extractive industry in the EU from the year 2007.

Public introduction of the EC Working Document *SEC (2007) 771* in June 2007 by DG Ent. & Industry which described the situation of non-energy raw materials branch in the EU.

Main topics of the document:

- 1.Importance of raw materials for the EU economy.
- 2.Trends on the international raw material markets.
- 3.Risks associated with the supply of raw materials for the EU economy.
4. **Lack of the European policy in non-energy raw materials.**

Key assumptions of the new policy in raw materials announced in May 2008 by DG Ent.& Industry.

1. Increase the sustainable supply of raw materials from European sources

2. Ensure sustainable and more transparent supply from third countries

3. Encourage capacity building in developing countries

4. Encourage greater efficiency in the use of resources

5. Establish an adequate EU Knowledge Base on raw materials



**Draft outline Communication
Hans Pieterse, Paul Anciaux**



The Raw Material Initiative - an integrated strategy to ensure access to raw materials in Europe, Nov. 2008.

- “We must act, to ensure that access to raw materials for enterprises will not be hampered”.
- „We need fair play rules on external markets, a good framework to foster sustainable raw materials supply from EU sources as well as improved efficiency in resource use and recycling”.
- „It is our aim to make sure that European industry will be able to continue to play a leading role in new technologies and innovation.”



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels,
COM(2008) 699

COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN
PARLIAMENT AND THE COUNCIL
THE RAW MATERIALS INITIATIVE — MEETING OUR CRITICAL NEEDS FOR
GROWTH AND JOBS IN EUROPE

(SEC(2008) 2741)



source: citations from press conference of Guenter Verheugen, Brussels, Nov. 2008



Innovation - activity of the ETP SMR in the EU NMP FP7 research fund between 2007 - 2009.

- **Priority A:** Innovative concepts and processes for new high added value mineral products (**ProMine, Experl**)
- **Priority B:** Technologies for a sustainable increased self-sufficiency in resources (**One Geology, Eurogeosource**)
- **Priority C:** New strategies and technologies for mineral resources extraction, processing and recovery.
- **Priority D:** Reducing environmental footprint (**EO-MINERS, Impactmine**)



Innovation - EU FP 7 NMP Research Funds, 2010-11.

Theme 4 - NANOSCIENCES, NANOTECHNOLOGIES, MATERIALS AND NEW PRODUCTION TECHNOLOGIES.

Call for proposals open on e.g.:

- networking at MS level (research on materials science and engineering, including international cooperation, **ERA-NET in minerals**)
- developing new technologies for eco-efficient intelligent mining activities (**advanced underground technologies for intelligent mining and for inspection, maintenance and excavation**),
- eco-design for new products - and eco-efficient and cost-effective method of production, (**management of industrial water**),
- finding substitutions (**novel materials for replacement of critical materials, Platinum GE and Rare Earth**)

ETP Sustainable Minerals Resources a Platform of dialogue.

industrial technologies 2010 
integrating nano, materials and production

Abraão Carvalho
Head of Unit ENTR/G/3
Metals, Minerals, Raw Materials



Why Intelligent Mine - ?

With deposits increasingly tough to reach, future technological advances may have to be implemented with the knowledge that they will increase the cost base to address the following challenges:

- **Safety standards in tougher environments**
- **Predictive exploration efficiency to identify deeper opportunities**
- **Drilling in tougher environments**
- **Environmental restrictions in sensitive areas**
- **Automation to address the lack of skilled workforce availability and, crucially, improve safety for workers**

source: Jürgen Leibbrandt, Executive Vice President
Market Development, **CODELCO**
IWCC Joint Meeting, Rio de Janeiro, May 2010

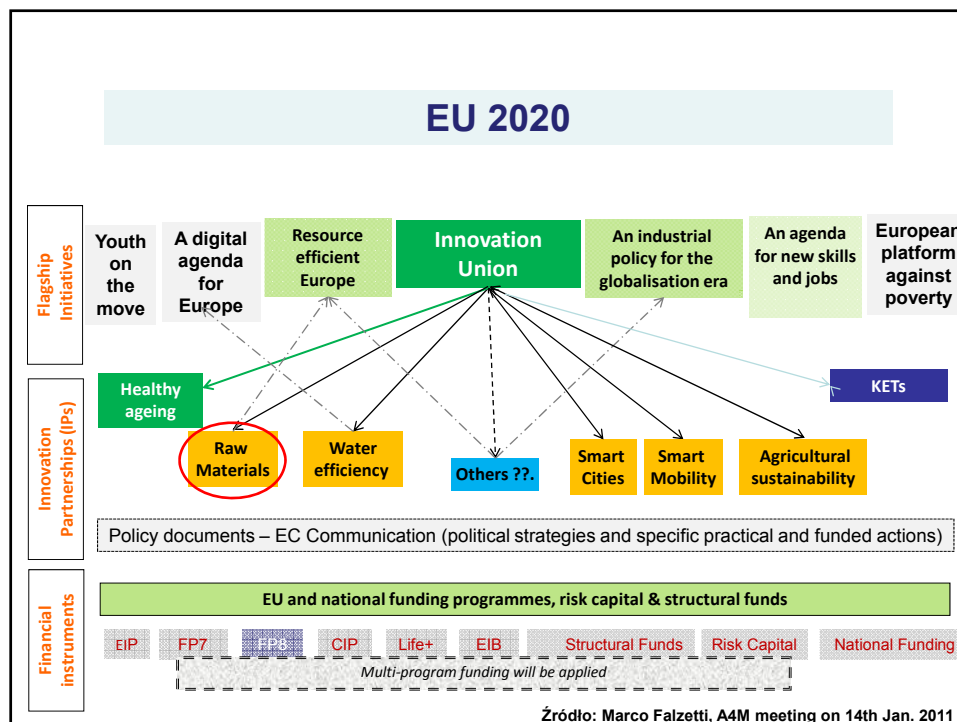
NMP.2011.4.0-6 ERA-NET on the Industrial Handling of Raw Materials for European industries

Technical content/scope:

- The objective of the ERA-NET is **to step up coordination of research programmes in the field of industrial production and supply of raw materials.**
- The ERA-NET should create an **efficient long-lasting working platform** to benchmark national programmes and establish eventually joint RTD programme between the involved partners, resulting in joint/coordinated calls within the project.
- ERA-NET shall also contribute to the development of the “Raw materials for a modern society” Innovation Partnership that the European Commission may launch at a later stage.
- The ERA-NET is expected to establish an efficient collaboration with industry, in particular with the **European Technology Platform on Sustainable Mineral Resources** in road mapping and networking activities.

NMP.2011.4.0-6 ERA-NET consortium

Participant no.	Participant organisation name	Country
1 (Coordinator)	CNRS	France
2	Material innovation Institute (M2i)	Netherlands
3	TEKES	Finland
4	JÜLICH	Germany
5	VINNOVA	Sweden
6	Hungarian Office for Mining & Geology (MBFH)	Hungary
7	NCBiR	Poland
8	BMBF	Germany
9	BIS	UK



EIP, Non-Energy Raw Materials for a Modern Society

Year 2020 target:

Europe needs to make a significant step ahead by 2020 to ensure a **secure supply and achieve efficient and sustainable management of non-energy materials in Europe**. The proposed Partnership will contribute to long term raw **material supply security**, to **increase resource efficiency** in the EU, to the development of new **European based recycling activities** (largely focused on SME).

The strategy is addressing the entire supply chain:

- extract better and more (REE and other critical minerals);
- recycle more;
- find alternatives/substitutions for critical and environmentally /energy demanding raw materials;
- better resource efficiency in production and social activity.

EIP (2010-2020) building-blocks/work packets.

Programme announced by DG Ent., Brussels, 9th Dec.2010

WP1 – Developing new innovative technologies and solutions for sustainable raw materials supply;

WP2 – Developing new innovative technologies and solutions for the substitution of critical materials;

WP3 – Improving Europe's raw materials knowledge and infrastructure base ;

WP4 – Improving the regulatory framework via promotion of excellence and promoting recycling through public procurement and private initiatives;

WP5 – International cooperation;

EIP – the opportunity for European economy and for European mineral sector:

- *Novel technologies for exploration, minerals extraction and processing; process control through intelligent IT based systems;*
- *New technological processes for treatment of and extraction of polymetallic materials;*
- *Innovative methods for gaining value from waste;*
- *Complete utilization of resources from secondary materials and scrap treatment to development of combined highly-efficient technologies for metals recovery from scraps and multi-metallic and multi-material (e-scrap) waste.*



Conclusions.

- **The extractive industry can be one of the main pillars of the European economy (security of supply has become an important issue in Europe).**
- **There is great potential for sustainable supply of raw materials from the EU resources (primary and secondary).**
- **Recycling and re-use can be a strong alternatives for increasing demand for strategic raw materials.**
- **Expanded RTD in FP7 and FP8 programme – a place for implementation of many of the EU RMI activities.**
- **ETP SMR is becoming important player in fostering the RTD in mineral sector in Europe.**



EUROPEAN TECHNOLOGY PLATFORM
ON SUSTAINABLE MINERAL RESOURCES

www.etpsmr.org



Thank you for your attention.

Umicore view on an “ideal” FP 8 Programme

Europe in the past has been facing the problem that many excellent R&D results could not be transferred into market products and business for European industry, but were finally marketed by Asian companies. This lack of innovation is also mirrored by the present FP 7 Programme which focuses on R&D and small pilot scale and is ending there. There is no opportunity for companies to receive funding for the next step towards a market product and this step is requiring more effort, expenditures and comprehends higher risk.

At the same time, Europe has demonstrated continuous leadership in the industry for technology materials for key applications, such as automotive catalysts, and new developments, such as energy storage, renewable energies, flat panel displays or energy efficient lighting.

Many European and particular German companies excel in metal based material solutions and are world-leader in their respective fields: Heraeus, H.C. Starck, Chemetall, Süd-Chemie, Plansee, BASF, Umicore, Johnson Matthey and Rhodia to name but a few. This European leadership in technology materials depends heavily on intensive continuous research and development.

Due to its expertise in materials science, combined with a structural shortage of natural resources, Europe has historically been at the forefront of recycling technologies. Our recycling industries have developed and deployed best-in-class technologies and have been at the vanguard of developing a more sustainable landscape for industry and consumers alike. These technologies are also essential in increasing the resource security for Europe. The Raw Materials Initiative addresses this issue which has relevance for many Directorates General.

The new tool of PPPs, which are very much end consumer and market pull driven, in the present structure implies the risk that crucial development work in tier 4 or 5 companies (and that is in most of the cases materials technology) is not on the radar screen of this very much market driven approach. However, none of the grand societal challenges can be solved without further progress or break throughs in materials technology.

How could a FP 8 structure overcome the above-mentioned issues? In my view there is no one fits all solution. So our proposal would go into 2 different models supplementing each other.

1. For some well defined areas we would form small efficient clusters of major stakeholders from industry, where universities, institutes or even municipalities and regions could be associated. These clusters should comprise in a well defined area the whole value chain from raw material providers to end consumer manufacturers and in order to close the material loop recycling. There is already a quite good example with the existing JTIs, where Umicore is a member of the Hydrogen and Fuel Cell JTI. However, the complex legal structure and the double administration is major drawback, but can be overcome. The advantage is that major stakeholders in the respective area are setting their own ambitious targets and discuss and decide on the roadmap how to achieve those targets. All projects have to be in line with the roadmap.

A 2nd example going the same direction is the German Electro-Mobility Platform, which is under formation. Again here major stakeholders, predominantly from industry, are defining a 10 years programme in order to bring Germany by 2020 into a globally leading position in electro-mobility. This is only feasible if the approach again comprises the whole value chain and when the activities over the value chain are highly aligned. Again from the start materials technology and recycling have a major emphasis there.

We believe for several European key areas a limited number of those highly efficient industrial clusters could be established. When the whole value chain is involved and the development processes are adjusted over the value chain it is driven by end consumer needs and guarantees that basic R&D in materials can be as quick as possible transferred into market products.

2. For other core topics not organised as such industrial cluster a broader more general set of programmes should be established. Here it is crucial that these programmes are addressing different sectors of the development chain from fundamental R&D over pilot to 1st demo or semi industrial scale plants. Already today we have a similar structure with FP 7 aiming at fundamental and applied research, CIP for pilot and LIFE+ for demo and 1st mover industrialisation. However these programmes have completely different addressees so that they cannot build on each other. Ideal would be if a consortium, which successfully terminated an R&D project, could without big time gap go into the next phase in the same or in another programme and continue with process development and up scaling into pilot. Again after a successful pilot funding for a 1st demo or semi industrial pilot plant should be available. Project durations should be kept flexible according to the progress which could shorten the allover timeline from research to market product.

Business Lunch Talk about Future Topics, 21th March 2011

First name	Last Name	Affiliation	email
Manfred	Diehl	Umicore	manfred.diehl@eu.umicore.com
Joanna	Frost	UK Research Office	Jo.Frost@bbsrc.ac.uk
Aharon	Gedanken	BIU - Bar-Ilan University	Aharon.Gedanken@biu.ac.il
Milan	Grohol	EU COM RTD	milan.grohol@ec.europa.eu
Ulf	Holmgren	Vinnova	Ulf.Holmgren@VINNOVA.se
Caroline	Jacobs	BIS - Department for Business, Innovations & Skills	caroline.jacobs@bis.gsi.gov.uk
Henryk	Karas	ETP SMR	h.karas@kgmh.pl
Gilles	Le Marois	CEA Grenoble, NMP NCP	gilles.le-marois@cea.fr
Show-Ling	Lee-Müller	PtJ - Projektträger Jülich	s.l.lee-mueller@fz-juelich.de
Luis	Melo	FCT	Luis.Melo@fct.mctes.pt
Elisa	Molinari	Universita di Modena	elisa.molinari@unimore.it
Lucía Íñigo	Paarmann	MICINN - Ministerio de Ciencia e Innovación	lucia.inigo@cdti.es
Jaroslav Piekarski		Polish Academy of Sciences, The Institute of Fundamental Technological Research	jaroslav.piekarski@kpk.gov.pl
Francois	Piuzzi	MESR - Direction Generale pour la Recherche et l'Innovation	francois.piuzzi@recherche.gouv.fr
Robert	Quarshie	MaterialsKTN	Robert.Quarshie@materialskt.net
Gimi A.	Rimbu	National Research Institute for Electrical Engineering, INC DIE ICPE - CA	rimbu@icpe-ca.ro
Olaf	Rotthaus	VDI-TZ	rotthaus@vdi.de
Katharina	Schumacher	PtJ - Projektträger Jülich	k.schumacher@fz-juelich.de
Matthijs	Soede	EU COM RTD	matthijs.soede@ec.europa.eu
Jacques	Thernier	Ministère de l'Économie, de l'Industrie et de l'Emploi	Jacques.Thernier@finances.gouv.fr
Renzo	Tomellini	EU COM RTD	Renzo.Tomellini@ec.europa.eu
Lee	Vousden	BIS - Department for Business, Innovations & Skills	lee.vousden@bis.gsi.gov.uk
Antje	Wittenberg	EU COM ENTR	antje.wittenberg@ec.europa.eu
Frank	Wolf	BMBF - Federal Ministry of Education and Research	frank.wolf@bmbf.bund.de
Petra	Wolff	BMBF - Federal Ministry of Education and Research	petra.wolff@bmbf.bund.de
Herbert	Zeisel	BMBF - Federal Ministry of Education and Research	Herbert.Zeisel@bmbf.bund.de

