The Austrian Minerals Plan
EU best practice – 7 years after
R. Holnsteiner
Intro

Mineral resources are the **basis for our industrial production and infrastructure development** and maintenance.

**Sufficient supply** with mineral resources is an indispensable fundament for functioning and successful economies.

EU is confronted with a number of challenges along the entire raw materials value chain to secure a **sustainable access** to non-energy non-agricultural raw materials.

EU raw materials industries provide ~ **280 billion € of added value**

> **11 million jobs** in the EU depend on the availability of raw materials.
Although the **geological availability** of raw materials is currently regarded **unproblematic**, yet shortages due to political (trade and geopolitical) factors and social demands are recorded.

- **finiteness** of mineral resources
- **site-dependency** of mineral extraction
- Future trends indicate that **global resource use could double** between 2010 and 2030

Raw materials supply is a **core competence of the industry**

Public administration has to provide **appropriate framework conditions** for a sufficient and sustainable supply with minerals resources.
**Austrian Minerals Strategy**

**Pillar 1:**
Securing minerals supply from domestic resources (Mining Act, Austrian Minerals Plan)

**Pillar 2:**
Securing minerals supply from other countries (Raw Materials Partnerships)

**Pillar 3:**
Promoting resources efficiency (substitution, recycling)

**Horizontal Measures**
Main problem = access to deposits

BGR (2008)
## Examples for competing land claims

<table>
<thead>
<tr>
<th>EU (28)*</th>
<th>No.</th>
<th>km²</th>
<th>% of country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natura-2000</td>
<td>27,312</td>
<td>787,606</td>
<td>18</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Austria</th>
<th>No.</th>
<th>km²</th>
<th>% of country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature reserves (national parks, Natura-2000 and nature protected areas)**</td>
<td>666 (tot. 1,349)</td>
<td>17,670 (tot. 38,096)</td>
<td>21</td>
</tr>
</tbody>
</table>

* Quelle: [www.wwf.de](http://ec.europa.eu/environment/nature/natura2000/barometer/index_en.htm)


<table>
<thead>
<tr>
<th>Austria</th>
<th>No.</th>
<th>km²</th>
<th>% of country</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forest roads*</td>
<td>ca. 260,000 km</td>
<td>1,040</td>
<td>1,20</td>
</tr>
<tr>
<td>Land requirem. for aggregate extraction (50 a)</td>
<td></td>
<td></td>
<td>0,14 – 0,2</td>
</tr>
</tbody>
</table>


“Federal Minister of Economy and Labour is invited to work out an Austrian Minerals Plan, which documents the deposits of mineral resources required.... (in a reasonable time)

On the basis of this documentation a plan covering the whole nation has should be elaborated, in relation to the specific demand of the countries and communities. This plan should be a future basis for extraction permits.”
Institutions on board

- Lead BMWFW (BMWA, BMWFJ)
- Provinces (land use managm. authorities, geol. experts, water managm. authorities)
- Geol. Survey
- Universities (Leoben, Wien)
- Research organisations (Academy of Science, BVÖ)
- Advocacy, Mining Associations (S&K, B&S)
- Chamber of Commerce, Labour Assoc.
- NGO`s (WWF)
Phase 1:

*baseline*

- **WG 1** Geology and resources (GBA)
- **WG 2** Mining, Mineral Economics (MUL)
- **WG 3** GIS implementation (BMWFW)
- **WG 4** Security of supply (BMWFW)

Phase 2:

*Adjustment of the results with the provinces*
Evaluation scheme

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shallow deposits (aggregates)
- demand-oriented safeguarding process

deep deposits (ores, industrial minerals)
- supply-oriented safeguarding process
Evaluation scheme - priorities

aggregates:

- expansion of existing extraction sites instead of green field (as far as possible)
- exploitation of deposit as complete as possible (avoid ruthless exploitation; dredging)
- safeguard sites where an environmental friendly exploitation is possible (hauling shaft - tunnel systems in case of hard rocks)
- consumer-near extraction sites to enhance economical efficiency (SME based RM-business) and reduce transport emissions
- safeguard conflict free best quality resources first
- consider multifunctional land use
**Evaluation scheme - priorities**

ores/industrial minerals:

- operational facilities like processing plants should be situated underground as far as possible
- recommended for safeguarding: deposits with enough reserves which could be exploited economically
- conditionally recommended for safeguarding: deposits with enough reserves which could not be exploited economically currently (but with suitable development in commodity prices and/or technical developments)
Evaluation scheme unconsolidated rocks
## Assessment of quality

<table>
<thead>
<tr>
<th>Lithology</th>
<th>Use</th>
<th>Geol. representative</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong> Well-washed gravels and sands without significant proportion of fines, loose</td>
<td>Concrete, Construction sand after sieving</td>
<td>Lower terraces, partly alluvial zones of large valleys</td>
</tr>
<tr>
<td><strong>B</strong> Gravels and sands partly with higher fines content, loose, partly consolidated/cem. gravels and sands</td>
<td>Concrete, Construction sand after sieving and ev. crushing</td>
<td>Lower terraces, high-terraces, alluvial zones of smaller side valleys, alluvial fans</td>
</tr>
<tr>
<td><strong>C</strong> Gravels and sands with high fines content, usually loose</td>
<td>Embankments, concrete after complex processing</td>
<td>High-terraces (brittle grains, friable agglom., Fe-content), interbedded with tertiary strata</td>
</tr>
<tr>
<td><strong>D</strong> Gravels and sands with high fines and blocks content</td>
<td>Embankments</td>
<td>Blocky gravel, blocky debris</td>
</tr>
<tr>
<td><strong>E</strong> Diamikton (mixture of clay, silt, sand, gravel and blocks)</td>
<td>Partly for embankments after processing, improper for use with high fines content</td>
<td>colluvium, solifluction layer</td>
</tr>
</tbody>
</table>
## Assessment of quantity

<table>
<thead>
<tr>
<th></th>
<th>Area (A)</th>
<th>Thickness (M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMM</td>
<td>&gt; 1 km²</td>
<td>&gt; 10m</td>
</tr>
<tr>
<td>AM</td>
<td>&gt; 1 km²</td>
<td>&gt; 3m</td>
</tr>
<tr>
<td>aM</td>
<td>&lt; 1 km²</td>
<td>&gt; 3m</td>
</tr>
<tr>
<td>Am</td>
<td>&gt; 1 km²</td>
<td>&lt; 3m</td>
</tr>
<tr>
<td>am</td>
<td>&lt; 1 km²</td>
<td>&lt; 3m</td>
</tr>
</tbody>
</table>
Step 4: Matrix assessment
quality vs. quantity
(=productivity)
## Assessment of regional importance

<table>
<thead>
<tr>
<th>Importance (alpine foreland)</th>
<th>Mining sites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a</strong> High (supraregional – regional)</td>
<td>many, large, active</td>
</tr>
<tr>
<td><strong>b</strong> High (regional – local)</td>
<td>few, active</td>
</tr>
<tr>
<td><strong>c</strong> Medium</td>
<td>some, inactive</td>
</tr>
<tr>
<td><strong>d</strong> Medium - low</td>
<td>few, inactive</td>
</tr>
<tr>
<td><strong>e</strong> Low</td>
<td>no sites known, geol. indications</td>
</tr>
</tbody>
</table>
Matrix calculation

Step 4: Matrix assessment
quality vs. quantity
(=productivity)

Step 6: Matrix assessment
productivity vs. regional importance
(5 classes of suitability)
Suitability zones 1 - 5

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Phase 1:

AK 1: Geologie (GBA)
AK 2: Bergwirtschaft (MUL)
AK 3: GIS (BMWFJ)
AK 4: Versorgungssicherheit (BMWFJ)

Phase 2:

Adjustment of the results with the provinces
Evaluation scheme uncons. rocks

Phase 1 - Ressourcenerhebung und Evaluierung: Kiessande

- Phase 1 Components:
  - K1: Dateninput
  - K2: Lithologische Karte und Geol. Karte
  - K3: Berechnung Rohstoffgeologisches Potential
  - K4: Regionale Bedeutung
  - K5: Vorland und Bergland
  - K6: Erstuntersuch einer Eignungskarte
  - K6a: Korrekturen
  - K7: Bewertungsgrundlage für Phase 2

Phase 2 - Kiessande Abstimmung mit den Bundesländern

- Phase 2 Components:
  - K8: Ermittlung von Eignungsklassen
  - K8a: Einbeziehung von betrieblichen Informationen
  - K9: GIS - Verschmelzung mit Konfliktpotentialen Wasser, Verkehrswege, Naturschutz, Poren
  - K10: Kontrollen der Flächen, wenn im/der nächst Verkehrszone bewohnt ist
  - K10a: Kontrollen der Flächen
  - K10b: Kontrollen der Flächen
  - K11: Ausweis der Flächen
  - K12: Ausweis der Flächen
  - K13a: Feststellung durch Raumordnung
  - K13b: Volumen nicht ausreichend
  - K13c: Feststellung durch Raumordnung
  - K13d: Feinmessung bei Konflikten
  - K14: Umsetzung durch die Raumordnungsbehörden der Länder

- Evaluation Kons. rocks

- Evaluation Kons. rocks

- Evaluation Kons. rocks

- Evaluation Kons. rocks

- Evaluation Kons. rocks

- Evaluation Kons. rocks

- Evaluation Kons. rocks

- Evaluation Kons. rocks

- Evaluation Kons. rocks
reduction to suitab. zones 1 - 3
Conflict elimination

e.g.: district of Tulln

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Conflict elimination
e.g.: district of Tulln, suitab. class. 1 - 5

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Conflict elimination
e.g.: district of Tulln, suitab. class. 1 - 3

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Conflict elimination
e.g.: district of Tulln, suitab. class. 1 - 3

Szenario 1: without zones where mining is forbidden ex lege (prohibitive zones)
Conflict elimination
e.g.: district of Tulln, suitab. class. 1 - 3

Szenario 2: without prohibitive zones, conflicting zones
Conflict elimination
e.g.: district of Tulln, suitab. class. 1 - 3

Szenario 2: without prohibitive zones, conflicting zones, priority zones of water management
Conflict elimination
e.g.: district of Tulln, residual zones

Szenario 3: without prohibitive zones, conflicting zones, priority zones of water management
Conflict elimination
e.g.: district of Tulln, residual zones

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Szenario 3: without prohibitive zones, conflicting zones, priority zones of water management (revised)
Conflict elimination

E.g.: district of Tulln, E 1 – 3, revised

Szenario 3: without prohibitive zones, conflicting zones, priority zones of water management (revised)
Conflict elimination
e.g.: district of Tulln, E 1 – 3, revised

Szenario 3: without prohibitive zones, conflicting zones, priority zones of water management (revised)
estimated demand for the district of Tulln
(annual demand per capita: ca. 7 m³)
50 years:
ca. 22,6 Mio m³

estimated demand for the district of Tulln + NW urban catchment of Vienna
(annual demand per capita: ca. 17,4 m³)
50 year:
ca. 60 Mio m³
Assessment of regional demand

gross volumes
Lower Austria tot.:
38.105 Mio m³ E 1
4.265 Mio m³ E 2

gross volumes
district Tulln
2.916 Mio m³ E 1
278 Mio m³ E 2

conflict free volumes
district Tulln:
31 Mio m³ E 1
71 Mio m³ E 2

reduced volumes due to mining losses
district Tulln:
ca. 55 Mio m³
Assessment of regional demand

estimated demand for the district of Tulln
(annual demand per capita: ca. 7 m³)
50 years:
ca. 22,6 Mio m³

estimated demand for the district of Tulln +
NW urban catchment of Vienna
(dem. p. cap.: ca. 17,4 m³/50 y: ca. 60 M. m³
supply: 102 Mio m³ (not reduced vol.)
supply: 55 Mio m³ (reduced volumes due to mining losses)
Results

Supply with aggregates, Austria in tot. conflict free, without reduction of vol. (Mio m³)

<table>
<thead>
<tr>
<th>Vers.-raum</th>
<th>E1, gesamt (Locker)</th>
<th>E2, gesamt (Locker)</th>
<th>E3, gesamt (Locker)</th>
<th>E1, trocken</th>
<th>E2, trocken</th>
<th>E3, trocken</th>
<th>Festgestein</th>
<th>Mindest-Bedarf</th>
<th>Lockergest. in % der Landesfläche</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>534</td>
<td>187</td>
<td>221</td>
<td>316</td>
<td>47</td>
<td>221</td>
<td>33</td>
<td>98</td>
<td>3,11</td>
</tr>
<tr>
<td>K</td>
<td>685</td>
<td>28</td>
<td>25</td>
<td>577</td>
<td>26</td>
<td>12</td>
<td>18</td>
<td>196</td>
<td>0,51</td>
</tr>
<tr>
<td>N</td>
<td>1.946</td>
<td>2.230</td>
<td>179</td>
<td>707</td>
<td>39</td>
<td>0</td>
<td>532</td>
<td>1.145</td>
<td>3,12</td>
</tr>
<tr>
<td>OÖ</td>
<td>1.309</td>
<td>3.814</td>
<td>13</td>
<td>583</td>
<td>3.489</td>
<td>13</td>
<td>197</td>
<td>493</td>
<td>2,38</td>
</tr>
<tr>
<td>S</td>
<td>292</td>
<td>83</td>
<td>137</td>
<td>156</td>
<td>77</td>
<td>128</td>
<td>718</td>
<td>179</td>
<td>0,95</td>
</tr>
<tr>
<td>ST</td>
<td>1.000</td>
<td>243</td>
<td>503</td>
<td>518</td>
<td>241</td>
<td>497</td>
<td>1.154</td>
<td>415</td>
<td>1,09</td>
</tr>
<tr>
<td>T</td>
<td>280</td>
<td>52</td>
<td>0</td>
<td>186</td>
<td>52</td>
<td>0</td>
<td>265</td>
<td>248</td>
<td>0,15</td>
</tr>
<tr>
<td>V</td>
<td>162</td>
<td>419</td>
<td>312</td>
<td>--</td>
<td>0</td>
<td>0</td>
<td>70</td>
<td>134</td>
<td>4,23</td>
</tr>
<tr>
<td>W</td>
<td>84</td>
<td>0</td>
<td>0</td>
<td>32</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>578</td>
<td>1,46</td>
</tr>
<tr>
<td><strong>Summe</strong></td>
<td><strong>6.292</strong></td>
<td><strong>7.056</strong></td>
<td><strong>1.380</strong></td>
<td><strong>3.075</strong></td>
<td><strong>3.971</strong></td>
<td><strong>871</strong></td>
<td><strong>2.987</strong></td>
<td><strong>3.486</strong></td>
<td></td>
</tr>
</tbody>
</table>
Assuming that the identified areas are safeguarded by means of land use management, a demand coverage for aggregates in the periods regarded can be ensured.

Sand, gravel, hard rocks: The demand can be provided, in compliance with transport distances <30 km for at least 50y/100y from a conflict-free surfaces with complete respect for the environment and groundwater protection. Claiming conflicting areas (e.g. Natura 2000 areas) for securing long term supply with aggregates is not required.

- soft and hard rocks could be safeguarded in a demand driven approach in a balanced amount.
Work of BMWFW in 2010 "completed"
- Results were submitted to the planning authorities of the regions for further implementation
- Implementation accompanied by expertise of BMWFW
- Periodic update is necessary due to developments in land use planning, legal affairs or reserve development (eg water management, nature prot. & conservation; mining information system for reserve monitoring.....)
- AMP as an impetus for a rethinking of spatial planning relevant expulsions on the basis of water management act (re-dimensioning of protection and conservation areas)
AMP as an impetus for a research project on the impact of dredging on the quality of surface and ground waters and other R & D projects

AMP as a "best practice model" for minerals planning in the Raw Material Initiative of European Commission

Implementation of AMP results in regulatory instruments of land use planning in Vorarlberg, Tirol, Burgenland

Ongoing coordination with regions concerning implementation of AMP results in regional development programs
Inconsistent position of industry and regions concerning implementation

No implementation in some regions, e.g. Upper Austria

AMP is currently a legally non-binding planning instrument

Currently “minerals planning” (AMP) is checked by Austrian Court of Auditors (BMWFU, Tyrol, Upper Austria, Lower Austria)
Securing Raw Material Supply:
- multidimensional matter (3-D land use management, variations in supply and demand with time and region, technological developments, variations in required minerals/commodities)
- Protection of deposits by means of minerals economics (optimal and complete extraction of deposits, supply/demand)
- Protection of deposits by means of spatial planning (securing access to deposits)
- Economical and efficient use of raw materials (resource efficiency)
- Multifunctional use of land
Securing Raw Material Supply:
- methodology is appropriate but extensive
- results could be applied „everlasting“ (improvements by progress of science)
- political consensus for transposition of minerals safeguarding at an early stage is the prerequisite for success (municipal, regional and federal level)
- conviction of raw materials industry is prerequisite for political consensus
Securing raw materials supply = securing the future

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