Past, Present and Future of Mining: the Italian Case

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ISPRA – Geological Survey of Italy
Mining history in Italy

- **Mining in Italy has a very long history** even in pre-Roman time.
- More than 3,000 mining sites active in the period 1870-2020.

Exploitation of:
- **Metallic minerals** (now zeroed) and **industrial minerals** was widespread in the Alps, Liguria, Tuscany, Calabria and Sardinia.
- **Sulphur mines** (also zeroed) characterized Sicily and to a lesser extent, Marche and Romagna.
- **Coal** (mainly **brown coal**) was exploited along the alluvial plain of central Italy.
Despite its important mining history, nowadays Italy does not play a relevant role in mineral exploration and in the international race to grab mineral resources. For many minerals, Italy is strongly or, as with metals, totally dependent on foreign markets. The energy crisis, the pandemic and the Ukrainian conflict have shown that it is essential to diversify the raw materials supply chain by also utilising the domestic resources.
Minerals for ecological transition, including CRMs, still exist in Italy

- The research and exploitation of metallic minerals has been **abandoned at the end of the previous century** as the result of inappropriate political-economic decisions.
- This caused the decline of university education and **loss of knowledge on mineral resources**.
- **Italy’s mining potential needs to be re-evaluated** through a joint work of academics, public administrators and mining professionals, to create a new generation of experts.
- Italy is one of the few countries in the world that **does not exploit its metal ores** and know little about them, and it is the only European country that **does not have its own strategy for supplying solid mineral resources**.
- The Italian scientific community agrees that significant mineral resources still exist in Italy, in primary and secondary deposits (extractive waste), including CRMs.

Source: ISPRA
Mines State of Activity (2021)

96 Active concessions; 76 Operating mines

<table>
<thead>
<tr>
<th>Mineral</th>
<th>2015</th>
<th>2016</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement marls</td>
<td>5185</td>
<td>5537</td>
<td>6509</td>
</tr>
<tr>
<td>Industrial minerals</td>
<td>5223</td>
<td>5703</td>
<td>4355</td>
</tr>
<tr>
<td>(Kaolin, Feldspar, Bentonite, Clays)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt</td>
<td>2081</td>
<td>2085</td>
<td>2674</td>
</tr>
<tr>
<td>Talc and Fluorspar</td>
<td>1490</td>
<td>345</td>
<td>483</td>
</tr>
<tr>
<td>TOTAL production (t*1000)</td>
<td>13980</td>
<td>13671</td>
<td>14020</td>
</tr>
</tbody>
</table>

Source: Istat. 2020-21 production data are being processed

• 2 active CRMs mines (fluorspar);
• No extraction of metal ores. The Pb-Zn-Ag Gorno mines (Lombardy) ceased operations in 1980.
• Several exploration licenses (Ni, Pb, Zn, Co, Au, Ag, Cu, PGE, Ti) have been granted in Northern Italy
Mining concessions and exploration licences (CRMs and other metals)
Operating CRM mines

<table>
<thead>
<tr>
<th>Region</th>
<th>Mineralogy</th>
<th>Location</th>
<th>Coordinates</th>
<th>Operator</th>
<th>Country</th>
<th>Type</th>
<th>Condition</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lazio</td>
<td>Fluorspar</td>
<td>Pianciano Nuova</td>
<td>42,068991, 12,149843</td>
<td>SO.RI.CO.M. ltd</td>
<td>Italy</td>
<td>Extractive</td>
<td>Open pit</td>
<td>Brownfield</td>
</tr>
<tr>
<td></td>
<td>Fluorspar, Barite</td>
<td>Pianciano Nuova</td>
<td>42,068991, 12,149843</td>
<td>SO.RI.CO.M. ltd</td>
<td>Italy</td>
<td>Extractive</td>
<td>Open pit</td>
<td>Brownfield</td>
</tr>
<tr>
<td>Sardinia</td>
<td>Fluorspar</td>
<td>Genna Tres Montis</td>
<td>39,520489, 9,259135</td>
<td>Società Mineraria del Gerrei</td>
<td>Italy</td>
<td>Extractive</td>
<td>Underground</td>
<td>Brownfield</td>
</tr>
</tbody>
</table>

Genna Tres Montis
F, Pb, Zn, Ag, Ba, REE

About 300,000 t/y

Pianciano nuova
Fluorspar
About 300,000 t/y
Gorno Project: a scoping study stage

7.79Mt at 6.8% Zinc, 1.8% Lead and 32g/t Silver

2022 - Negative Environmental Impact Assessment (EIA)

Zinc is not yet a critical mineral but may soon become one
RIMIN – Areas for operative mineral research (1985-2000)
Two exploration stage projects: Alpe Laghetto and Punta Corna

<table>
<thead>
<tr>
<th>Piedmont</th>
<th>Cobalt</th>
<th>Nickel, Copper, Platinum, Cobalt, Palladium, Gold</th>
<th>Alpe Laghetto</th>
<th>45,902672</th>
<th>8,238115</th>
<th>Ivrea Minerals Pty Ltd</th>
<th>Australia</th>
<th>Extractive</th>
<th>Openpit &amp; Underground</th>
<th>Greenfield</th>
<th>Exploration</th>
<th>Active</th>
<th>E3, F3.3, G4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piedmont</td>
<td>Cobalt</td>
<td>Cobalt, Silver, Nickel</td>
<td>Punta Corna</td>
<td>45,255832</td>
<td>7,195292</td>
<td>Energia Minerals Italia</td>
<td>Italy-Australia</td>
<td>Extractive</td>
<td>Underground</td>
<td>Brownfield, Greenfield</td>
<td>Exploration</td>
<td>Active</td>
<td>E2, F2, G2</td>
</tr>
</tbody>
</table>

Two exploration stage projects: Alpe Laghetto and Punta Corna
High grade cobalt mine, Punta Corna (Piemonte)

- Stacked hydrothermal veins, with mineralisation defined over >2km strike length
- A comparative study showed strong similarities to the Bou Azzer Cobalt, Nickel, Gold deposits in Morocco – (the worldwide highest grade cobalt mine)

- High-grade cobalt, nickel, copper and silver results from grab sampling:
  - 5.0% Co, 6.5% Ni, 0.3% Cu, 11g/t Ag, and 5.8% Cu, 405g/t Ag
  - 1.0% Co, 0.4% Ni, 0.2% Cu and 38/t Ag
  - 2.2% Cu and 450g/t Ag, 1.2% Cu and 260g/t

- Planned drillings will start in 2023
Grassroot stage projects: lithium from high salinity brines

- Three exploration licenses in central Italy (Lazio region) in the Tuscany-Lazio geothermal system.
- The reservoirs are dominated with high salinity brines unexploited for geothermal power but very promising for lithium.
- Studies conducted in the 1990s in the Cesano brines suggest the potential feasibility of lithium recovery from these fluids.
- Test Well Cesano C1 yielded brines from a depth of 1,390m with a lithium content of 350 mg/l and 380 mg/l. (more than the average 200 mg/l lithium concentrations of the brines of the Salton Sea geothermal field in California which is regarded as the most significant lithium brine resource in the USA).
Abandoned extractive industries have generated huge quantities of extractive waste deriving from extraction, processing/treatment, drilling etc. that may represent potential new deposit of critical and non-critical resources, which could be reused in a circular economy perspective.

In the Sardinian mining district there are about 70 million cubic meters, with a consequent high environmental impact.

They generally have good mineral potential, e.g. red mud of Monteponi (Iglesias), with 7-8% average zinc content.

In several cases the storage deposits also contain interesting quantities of CRMs (e.g. REE in Silius)
Future perspectives: CRM National Board – WG Mining

✓ A National Board on CRMs jointly established by two Ministries in 2021

✓ ISPRA coordinates a WG on Mining composed by experts from research and policy makers (national and regional), aiming at defining potential mineral resources (primary and secondary) and identify best options for sustainable exploration.
Future perspectives: CRM National Board – WG Mining

- First list of CRMs and update Italian mining map
- Qualitative assessment of extractive waste
- Support to policy for extractive waste management
- Statistical data on mining

- In-depth analysis in CRMs areas
- Quantitative assessment of extractive waste
- Criteria for social acceptability
- Sustainable national mining strategy

- Definition of areas not suitable for issuing permits for mining activities and those open to research
WP 2 Raw Materials Inventory

- EU primary and secondary onshore CRM resources
- EU offshore CRM resources
- EU International Center of Excellence on Sustainable Resource Management;
- Resource management using the UNFC (United Nations Framework Classification system);
WP 5, ACTION 5.1 – Sustainable mining of primary and secondary mineral deposits, from exploration to land rehabilitation

- Realization of web-based Italian Solid Mineral Resources Information System (ISMRIS)
- Update of the Sardinian mining and mineral resources database as prototype on new national mining map
THANKS FOR YOUR ATTENTION

Mining is not everything, but without mining everything is nothing (Max Planck)