II Present Structure and Future Trends in Key Materials Industries

1 INTRODUCTION

Before we can approach the main purpose of this book, to explain and interpret changes for the materials industries, first we need to review the present structure of key materials industries, because numerous readers may not be familiar with the status quo of these industries.

The introductory chapter dealt, in more general terms, with the question "Is there a resource constraint for the key materials industries?" The first part of the present chapter will give the actual resource situation and an overview for the most important industrial metals. In the following subchapters, the structure and future trends of six key materials industries are outlined, briefly covering their materials flow from feed stock to final uses. Current and future technologies are also discussed.

In concluding this chapter, we ask the question "Where are the basic materials industries heading?" This indicates problems and opportunities, furnishing reasons to examine new mechanisms to deal with the current and future situation of the basic materials industries. Thus providing a "spring board" to explain the methodology of technology planning and technology assessment as a means to obtain an analysis and to arrive at an adequate data base.

1.1 Overview of 5 Major Metals and Their Reserves

The five major industrial metals are steel, aluminium, copper, zinc and lead. Iron and steel, copper, and aluminium will be dealt with at greater length in separate sections later in this chapter. They are only given a brief overview here.

Table II provides data on 4 non-ferrous metals and their proven ore reserves for the decade 1966–1975. Comparing the first and the fourth column in this table we can see that within a decade the proven reserves of aluminium (bauxite) have been tripled, zinc ores increased by factor of 2.5, copper ores 2.3 and lead about doubled due to more intensive exploration efforts. These increases took place despite considerable continuous
mining of these ores during this decade. Comparing the second and third column, for copper, in Table II is a real “eye-opener”: five times more new copper reserves were proven as were mined during this decade.

Table II: Proven Ore Reserve Development for Copper, Aluminium, Lead and Zinc in the World (in million tons)

<table>
<thead>
<tr>
<th>Metal (ore)</th>
<th>Proven Reserves on 1.1.1966</th>
<th>Consumption in the years 1966 to 1975</th>
<th>New Proven Reserves</th>
<th>Proven Reserves on 1.1.1976</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper¹</td>
<td>195</td>
<td>- 63</td>
<td>+ 324</td>
<td>= 456</td>
</tr>
<tr>
<td>Aluminium</td>
<td>5 964</td>
<td>- 605</td>
<td>+ 11 913</td>
<td>= 17 272</td>
</tr>
<tr>
<td>Bauxite</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lead¹</td>
<td>93</td>
<td>- 33</td>
<td>+ 115</td>
<td>= 175</td>
</tr>
<tr>
<td>Zinc¹</td>
<td>75</td>
<td>- 54</td>
<td>+ 164</td>
<td>= 185</td>
</tr>
</tbody>
</table>

¹ Metal content


In the case of bauxite the situation is even more favorable: 20 times more bauxite was found than used! Within this decade, consumption amounted to 600 million tons and at the same time almost 12 billion tons of new bauxite deposits were proven. The total proven reserves of bauxite would be sufficient to last about 300 years at 1978’s rate of consumption.*

If we were to look at the reserves of iron ore, according to the US Bureau of Mines, the 1978 consumption rate of iron and steel can be maintained at least 200 additional years by using the known deposits of iron ore without counting the huge amounts of probable resources.

Therefore, we can say for the common metals, there is no reason to believe that within the foreseeable future, or even within one century, industrial production would be endangered because there would be a shortage of minerals. Even in a purely hypothetical case that one of the metals might be in short supply, for example copper or manganese, this would never be a situation compared to a catastrophic development. Rather, the material would become more expensive and its price would

* It is interesting that in “Government and The Nations Resource”, December 1976, a report of the National Commission on Supplies and Shortages in the USA, the known world reserves of aluminium are estimated to last only 23 years. This proves again that there is plenty of misleading information around, partly triggered by the self fulfilling prophecies of studies like “The Limits to Growth”.

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