



# 2010 Minerals Yearbook

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ISRAEL [ADVANCE RELEASE]

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# THE MINERAL INDUSTRY OF ISRAEL

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In 2010, Israel played a significant role in the world's production of bromine, magnesium metal, phosphate rock, and potash. The country's share of the world's bromine production amounted to 34%; potash, 6%; magnesium metal, 4%; and phosphate rock, 2%. Israel was also a leading producer of several types of fertilizer. The country's share of the world's output of monopotassium phosphate was between 40% and 50%, and monoammonium phosphate, between 10% and 15%. In 2010, Israel accounted for 9% of the value of the world's polished diamond production (Even-Zohar, 2011; Israel Chemicals Ltd., 2011, p. 41; Jasinski, 2011a, b; Kramer, 2011b; Ober, 2011). Other domestically significant mining and mineral processing operations included the production of cement, crushed stone, natural gas, and petroleum products. Israel consumed substantial amounts of bromine and phosphate rock in downstream processing operations; most of the final products of these operations were exported.

## Minerals in the National Economy

In 2009 (the latest year for which national income statistics were available), the mining and quarrying and nonmetallic mineral products sectors accounted for about 0.9% of the gross domestic product (GDP), and the manufacture of iron, steel, and other metals, about 0.3%. The remainder of the manufacturing sector (which included diamond cutting and polishing, fertilizer production, and petroleum refining) accounted for 15% of the GDP. The nonmetallic minerals sector employed about 9,400 workers; mining and quarrying, about 3,500; and diamond cutting and polishing, about 3,000. Israel's total exports amounted to \$42.1 billion in 2009, of which diamond accounted for 13.9%; mining and quarrying, 2.6%; and nonmetallic mineral products, 0.6% (Central Bureau of Statistics, 2010, p. 578, 622, 714, 742, 812, 814).

## Production

In 2010, the production of triple superphosphate increased by an estimated 89%; monoammonium phosphate, by an estimated 86%; phosphoric acid, by an estimated 83%; lime, by 54%; bromine, by 45%; silica sand, by 21%; sulfuric acid, by an estimated 21%; magnesium metal, by 20%; salt, by 18%; common clay, by 17%; phosphate rock, by 16%; natural gas, by 14%; crude steel, by an estimated 13%; crushed stone, by an estimated 11%; and brick clay, by 10%. The production of sand decreased by an estimated 20% in 2010, and crude petroleum, by 16% (table 1; Sharbel Shehadeh, Mines Department, Ministry of National Infrastructures, written commun., July 18, 2011).

## Structure of the Mineral Industry

Most of Israel's mining and mineral processing operations were privately owned, including the producers of aggregates,

bromine, cement, lime, magnesium, natural gas, phosphate rock, potash, and salt. The state-owned petroleum refineries at Ashdod and Haifa were privatized in 2006 and 2007, respectively.

## Commodity Review

### Metals

**Copper.**—Altos Hornos de México S.A. de C.V. (AHMSA) planned to reopen the Timna copper mine near Eliat and to build a new solvent extraction and electrowinning plant. The company planned to produce 22,000 metric tons per year (t/yr) of refined copper starting in 2011; the life of the Timna Mine was projected to be 20 years (Nasr, 2009).

**Magnesium.**—Dead Sea Magnesium Ltd. [a subsidiary of Israel Chemicals Ltd. (ICL)] was a producer of magnesium metal and magnesium alloys. Magnesium metal production increased to 23,309 metric tons (t) in 2010 from 19,405 t in 2009. The company exported 84% of its production to the United States in 2009 (Kramer, 2011a).

### Industrial Minerals

**Bromine.**—Brines and carnallite from the Dead Sea were extracted by Dead Sea Bromine Group (DSBG) (a subsidiary of ICL). Bromine production increased to 184,696 t in 2010 from 127,689 t in 2009 in response to increased worldwide demand and decreased bromine production in China. Demand for bromine-based drilling liquids in the petroleum industry and bromine-based flame retardants in the automotive, construction, and electronics industries increased in 2010. DSBG consumed about 78% of its bromine for the manufacture of bromine compounds in China, Israel, and the Netherlands. Domestic consumers accounted for 2% of the value of the company's external sales in 2010 (Israel Chemicals Ltd., 2011, p. 64-66, 69-72).

**Diamond.**—Israel did not produce rough diamond, but the country was one of the world's leading diamond cutting and trading centers. Domestic diamond cutting and polishing companies specialized in large, high-value gemstones. In 2010, cut and polished diamond exports increased to \$5.8 billion from \$3.9 billion in 2009; the value of Israel's cut and polished diamond exports produced from domestic cutting and polishing operations increased to \$1.6 billion from \$1.4 billion. The United States was Israel's leading market for cut and polished diamond. Improved market conditions in 2010 for the Israeli diamond industry were attributable to increased demand from China and India (Even-Zohar, 2011; Israeli Diamond Industry, 2011; Krawitz, 2011).

**Phosphate Rock.**—Mining of phosphate rock by Rotem Amfert Negev Ltd. (a subsidiary of ICL) increased to nearly 3.14 million metric tons (Mt) in 2010 from 2.7 Mt in 2009. Rotem consumed 82% of its output for the manufacture of

phosphate fertilizers and phosphoric acid in Israel and in European countries. Higher fertilizer production was attributable to increases in demand resulting from the recovery from the worldwide economic crisis (Israel Chemicals Ltd., 2011, p. 46-47).

**Potash.**—Dead Sea Works (DSW) (a subsidiary of ICL) used carnallite from the Dead Sea as raw material for its potash plants. In 2009, DSW increased its production capacity by 250,000 t/yr of potash by using fewer of its brine ponds for salt precipitation and more for carnallite precipitation. The company planned to increase capacity gradually by an additional 500,000 t/yr by the end of 2014 by removing bottlenecks and improving technology at existing plants. Production increased modestly in 2010 (Israel Chemicals Ltd., 2011, p. 46).

Haifa Chemicals Ltd. was the leading consumer of ICL's potash production. The company used between 275,000 t/yr and 300,000 t/yr of potash in the production of about 500,000 t/yr of potassium nitrate (Gabison, 2009).

**Sulfur.**—Most of Israel's sulfur demand was met by imports from sources that included Canada, Germany, Kazakhstan, and Russia; sulfur was also recovered domestically by petroleum refineries. In 2010, ICL purchased about 630,000 t of sulfur for use in fertilizer manufacturing compared with 522,000 t in 2009 (Israel Chemicals Ltd., 2011, p. 48).

### **Mineral Fuels**

**Natural Gas.**—Noble Energy Inc. of the United States operated the Mari-B offshore gasfield in the Mediterranean Sea through its subsidiary Samedan Mediterranean Sea Inc. In 2010, Noble increased its production of dry natural gas to about 1.34 billion cubic meters from 1.18 billion cubic meters in 2009. The company discovered the Tamar prospect in 2009 and the Leviathan prospect in 2010. Resources at Tamar were estimated to be nearly 240 billion cubic meters, of which 48 billion cubic meters was reserves. Resources at Leviathan were estimated to be about 450 billion cubic meters (Noble Energy, Inc., 2011, p. 9, 115).

Noble planned to start field development drilling at the Tamar prospect in the first half of 2011 and to start production in late 2012 or early 2013. The company planned to produce at Mari-B until production started at Tamar. Production was unlikely to start at Leviathan before 2017 (Cohen, 2010; Noble Energy, Inc., 2011, p. 11-12).

In 2009, about 33% of the electricity generated in Israel was attributable to natural gas compared with 26% in 2008. The Mari-B gasfield accounted for 63% of Israel's natural gas consumption in power generation, and imports from Egypt accounted for 37% (Even, 2010).

In February 2010, Bontan Corp. announced that resources at the Mira and the Sarah offshore prospects were estimated to be 120 billion cubic meters and 42 billion cubic meters, respectively. Zion Oil & Gas Inc. of the United States started drilling at its onshore Joseph license in August. Adira Energy Ltd. of Canada started drilling at its onshore Eitan license in the Hula Valley in December (Bontan Corp., 2010).

**Petroleum.**—In 2010, Oil Refineries Ltd. and Paz Oil Company Ltd. had petroleum refineries with capacities of

197,000 barrels per day (bbl/d) and 90,000 bbl/d, respectively. Paz planned to increase its capacity by nearly 16% by 2012; the cost of the expansion was estimated to be \$118 million (Paz Oil Company Ltd., 2011, p. A-143, A-151).

### **Outlook**

The production of potash is likely to increase from 2011 to 2014 because of ICL's expansion. Copper mining is expected to restart in 2011. Natural gas production could increase in the near future; domestic consumption is projected to more than double from 2009 to 2015. Competition from Egyptian imports could constrain increases in Israeli production. Exports of natural gas were unlikely because of decreased demand in European markets and competition in Asian markets from producers that already have liquefied natural gas facilities. The production trends for the cement, crushed stone, and sand industries will depend on the strength of the domestic economy. The outlook for bromine, diamond, and phosphate rock and fertilizers will depend on market conditions in the world economy (Cohen, 2010; Even, 2010).

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TABLE 1  
ISRAEL: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2006	2007	2008	2009 <sup>e</sup>	2010 <sup>e</sup>
<b>METALS</b>					
Iron and steel, steel, crude <sup>e</sup>	480,000	480,000	480,000	380,000	430,000
Lead, refined secondary	25,000	25,000	27,000	26,000 <sup>r,3</sup>	27,000
Magnesium metal	24,581	29,618	32,051	19,405 <sup>r,3</sup>	23,309 <sup>3</sup>
<b>INDUSTRIAL MINERALS</b>					
Bromine, elemental	179,493	159,395	164,042	127,689 <sup>r,3</sup>	184,696 <sup>3</sup>
Cement, hydraulic thousand metric tons	5,089	5,000	4,819	4,759 <sup>r,3</sup>	5,139 <sup>3</sup>
Clays:					
Brick clay	54,925	29,474	63,499 <sup>r</sup>	53,581 <sup>r,3</sup>	58,896 <sup>3</sup>
Common clay	1,003,169	982,000	1,017,000	578,000 <sup>r,3</sup>	677,900 <sup>3</sup>
Flint clay	6,761	--	--	-- <sup>3</sup>	-- <sup>3</sup>
Kaolin	--	--	151	-- <sup>r,3</sup>	-- <sup>3</sup>
Diamond <sup>4</sup> thousand carats	642	521 <sup>r</sup>	400 <sup>r,e</sup>	299 <sup>r,3</sup>	245 <sup>3</sup>
Gypsum	110,754	82,974	9,975	9,152 <sup>r,3</sup>	99,730 <sup>3</sup>
Lime	158,264	282,000	480,554	428,552 <sup>r,3</sup>	657,897 <sup>3</sup>
Magnesium chloride	114,333	103,023	108,852	132,636 <sup>r,3</sup>	135,930 <sup>3</sup>
Phosphate:					
Phosphate rock, mine output:					
Beneficiated thousand metric tons	2,949	3,069	3,088	2,697 <sup>3</sup>	3,135 <sup>3</sup>
P <sub>2</sub> O <sub>5</sub> content do.	810	840	850	740	860
Phosphatic fertilizers, P <sub>2</sub> O <sub>5</sub> equivalent <sup>e</sup> :					
Monoammonium phosphate	11,000	13,000	11,000	7,000	13,000
Triple superphosphate	160,000	180,000	150,000	90,000	170,000
Phosphoric acid, P <sub>2</sub> O <sub>5</sub> equivalent <sup>e</sup>	520,000	570,000	490,000	290,000	530,000
Potash, K <sub>2</sub> O equivalent thousand metric tons	2,187	2,182	2,170	1,900 <sup>r,3</sup>	2,080 <sup>3</sup>
Salt, marketed do.	434	400	421	357 <sup>r,3</sup>	421 <sup>3</sup>
Sand:					
Silica sand	204,190	220,000	194,771 <sup>r</sup>	163,206 <sup>r,3</sup>	197,699 <sup>3</sup>
Other <sup>e</sup> thousand metric tons	7,000	6,000	6,000	5,000 <sup>r</sup>	4,000
Stone <sup>e</sup> :					
Crushed do.	43,500	42,000	46,000	45,000 <sup>r</sup>	50,000
Dimension, marble	83,000	75,000	75,000	68,000	72,000
Sulfur:					
Byproduct from petroleum thousand metric tons	42	34	50	50 <sup>r,3</sup>	50
Sulfuric acid <sup>e</sup> :					
Gross weight do.	2,000	2,050	1,900	1,600	1,930
S content do.	660	670	620	520	630
<b>MINERAL FUELS AND RELATED MATERIALS</b>					
Gas, natural:					
Gross million cubic meters	2,313	2,758	3,436	2,825 <sup>3</sup>	3,234 <sup>3</sup>
Dry do.	960	1,145	1,437	1,178 <sup>3</sup>	1,344 <sup>3</sup>
Petroleum:					
Oil shale <sup>e</sup>	452,000 <sup>3</sup>	450,000 <sup>e</sup>	450,000	410,000	430,000
Crude 42-gallon barrels	24,510	8,200	15,715	14,738 <sup>r,3</sup>	12,359 <sup>3</sup>
Refinery products:					
Liquefied petroleum gas thousand 42-gallon barrels	5,593	6,218	5,580 <sup>r</sup>	6,000 <sup>r</sup>	8,200
Gasoline do.	22,110	25,172	22,596 <sup>r</sup>	23,000 <sup>r</sup>	21,200
Naphtha do.	3,430	3,905	3,502 <sup>r</sup>	3,700 <sup>r</sup>	3,800
Kerosene do.	8,074	10,296	10,057 <sup>r</sup>	8,800 <sup>r</sup>	9,600
Distillate fuel oil do.	24,122	27,438	24,633 <sup>r</sup>	24,700 <sup>r</sup>	24,300
Residual fuel oil do.	22,683	24,435	21,745 <sup>r</sup>	18,000 <sup>r</sup>	16,000
Other <sup>e</sup> do.	13,347 <sup>3</sup>	6,313 <sup>3</sup>	5,700 <sup>r</sup>	6,200 <sup>r</sup>	8,500
Total <sup>e</sup> do.	99,359 <sup>3</sup>	103,777 <sup>3</sup>	93,800 <sup>r</sup>	90,400 <sup>r</sup>	91,600

See footnotes at end of table.

TABLE 1  
ISRAEL: PRODUCTION OF MINERAL COMMODITIES<sup>1</sup>

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<sup>6</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. <sup>do</sup> Ditto. -- Zero.

<sup>1</sup>Table includes data available through July 20, 2011.

<sup>2</sup>In addition to the commodities listed, caustic soda, magnesia, secondary refined zinc, semimanufactured steel, fertilizers, and a variety of crude construction materials, including aggregates, are produced, but available information is inadequate to make reliable estimates of output.

<sup>3</sup>Reported figure.

<sup>4</sup>Imported diamond cut in Israel.

TABLE 2  
ISRAEL: STRUCTURE OF THE MINERAL INDUSTRY IN 2010

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Aggregates		Lime & Stone Production Company Ltd. [Housing & Construction Holding Company Ltd., 50%, and Readymix (Israel) Ltd., 50%]	Modiim	6,000 <sup>e</sup>
Do.		do.	Dragot, Ein Harod, Eliat, Golani Junction, Kadarim, Revivim, Segev, and Shefar'am	5,000 <sup>e</sup>
Bromine		Dead Sea Bromine Group (DSBG) [Israel Chemicals Ltd. (ICL), 100%]	Sdom	280
Cement		Nesher Israel Cement Enterprises Ltd. (Clal Industries and Investments Ltd., 75%)	Plants at Haifa, Har Tuv, and Ramla	6,000
Lead, refined, secondary		Hakurnas Lead Works Ltd.	Ashdod	25
Lime		Lime & Stone Production Co. Ltd.	Shefeya	100
Do.		Negev Industrial Minerals Ltd.	Mishor Rotem	90
Magnesium:				
Magnesia		Dead Sea Periclase Ltd. (DSP) [Israel Chemicals Ltd. (ICL), 100%]	do.	35
Magnesium, refined		Dead Sea Magnesium Ltd. [Israel Chemicals Ltd. (ICL), 100%]	Sdom	35
Natural gas	million cubic meters	Delek Energy Group, 53%, and Noble Energy Inc., 47%	Mari-B gasfield	6,200
Petroleum:				
Crude	thousand 42-gallon barrels	Lapidoth Israel Oil Prospectors Corp.	Heletz-Brur	8
Do.	do.	do.	Kochav	3
Refined	do.	Oil Refineries Ltd. (Israel Corp., 45.1%)	Haifa	71,900
Do.	do.	Paz Oil Company Ltd.	Ashdod	32,900
Phosphate:				
Phosphate rock		Rotem Amfert Negev Ltd. [Israel Chemicals Ltd. (ICL), 100%]	Arad, Oron, and Zin	4,500
Phosphatic fertilizers		do.	Rotem	1,800
Do.		Haifa Chemicals Ltd.	Haifa	NA
Phosphoric acid <sup>1</sup>		Rotem Amfert Negev Ltd.	Rotem	640
Do.		Haifa Chemicals Ltd.	Haifa	NA
Potash		Dead Sea Works (DSW) (Israel Chemicals Ltd. (ICL), 100%)	Sdom	3,200
Salt		do.	do.	700
Do.		Israel Salt Industries Ltd. (subsidiary of Danker Group)	Eliat	150
Do.		do.	Kalia	60
Do.		do.	Atlit	16
Sand		Negev Industrial Minerals Ltd.	Mactesh Htira	300
Steel:				
Crude		Hod Metal Products & Manufacturing Co. Ltd.	Akko	300
Do.		Yehuda Steel Ltd.	Ashdod	180
Billet		do.	Bene Ayish	200
Do.		do.	Ashdod	180
Do.		Hod Metal Products & Manufacturing Co. Ltd.	Akko	300
Rebar		Yehuda Steel Ltd.	Bene Ayish	200
Do.		do.	Ashdod	120
Do.		Hod Metal Products & Manufacturing Co. Ltd.	Kiryat Gat	300
Sulfur		Oil Refineries Ltd.	Ashdod	40
Do.		Paz Oil Company Ltd.	Haifa	33
Sulfuric acid		Rotem Amfert Negev Ltd.	Rotem	2,400
Zinc		Numinor Chemical Industries Ltd.	Maalot	NA

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

<sup>1</sup>P<sub>2</sub>O<sub>5</sub> equivalent.