



# 2013 Minerals Yearbook

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## ISRAEL

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# THE MINERAL INDUSTRY OF ISRAEL

By Thomas R. Yager

In 2013, 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 estimated bromine production amounted to 32%; potash, 6%; magnesium metal, 3%; and phosphate rock, 2%. Israel also accounted for nearly 6% of the world's polished diamond production, by value. Other domestically significant mining and mineral processing operations included the producers of cement, crushed stone, natural gas, and petroleum products. Israel consumed substantial amounts of bromine, phosphate rock, and potash in downstream processing operations; most of the final products of these operations were exported (Bray, 2014; Even-Zohar, 2014; Jasinski, 2014a, b; Ober, 2014).

## Minerals in the National Economy

In 2013, the mining and quarrying and the nonmetallic mineral products sectors combined accounted for about 1.3% 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 chemicals, chemical products, and petroleum products sector employed about 20,000 workers; nonmetallic minerals, about 10,300; mining and quarrying, about 4,200; and diamond cutting and polishing, about 2,600. Israel's total net exports amounted to \$56.9 billion in 2013, of which diamond accounted for 16.2%, and manufactured fertilizers, about 3%. Total net imports were valued at about \$71.1 billion, of which net mineral fuel imports accounted for 20.5%, and net diamond imports, 11.6% (Central Bureau of Statistics, 2014, p. 624, 690, 772, 781, 794, 824, 905–907; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., September 9, 2014).

## Production

In 2013, the production of natural gas increased by 106%; crude petroleum, by 70%; triple superphosphate, by 23%; other phosphatic fertilizers, by 18%; common clay, by 17%; sulfuric acid, by 14%; other sand, by 13%; and silica sand, by 11%. Lime production decreased by 61% in 2013; gypsum, by 40%; brick clay, by 16%; magnesium chloride, by 14%; and phosphoric acid, by 13% (table 1; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., September 9, 2014).

## 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 compounds and metal, natural gas, phosphate rock, potash, and salt. Bromine, cement, lead, magnesium compounds and metal, phosphate rock, potash, potassium nitrate, and sulfuric acid were produced by only one domestic company each. The three leading producers of crushed stone accounted for an estimated 65% of national production in 2013. The diamond cutting and polishing industry was composed of many small producers.

## Commodity Review

### Metals

**Copper.**—Altos Hornos de México S.A. de C.V. (AHMSA) planned to reopen the Timna copper mines near Eliat. In 2013, the company was engaged in construction of a new solvent extraction and electrowinning plant with a capacity of 30,000 metric tons per year (t/yr) (Altos Hornos de México S.A. de C.V., 2014, p. 3).

**Magnesium.**—Dead Sea Magnesium Ltd. (DSM) [a subsidiary of Israel Chemicals Ltd. (ICL)] was a producer of magnesium metal and magnesium alloys. From 2011 through 2013, DSM produced about 27,000 t/yr of magnesium metal. In 2012, the United States imported 13,300 metric tons (t) of magnesium metal and 3,550 t of magnesium alloys from Israel. In 2012, Israel's share of the United States' imports of magnesium metal and magnesium alloys was 82% and 28%, respectively (Bray, 2013).

### Industrial Minerals

**Bromine.**—Brines and carnallite from the Dead Sea were extracted by Dead Sea Bromine Company Ltd. (DSBC) (a subsidiary of ICL) at DSBC's plant at Sdom, which had a capacity of 280,000 t/yr. Bromine production increased to 184,943 t in 2013 from 173,940 t in 2012. DSBC consumed about 70% of its bromine for the manufacture of bromine compounds at its plants in China, Israel, and the Netherlands. Bromine compounds produced by DSBC were used in such applications as flame retardants, natural gas and crude petroleum production, pharmaceuticals, and water treatment (Israel Chemicals Ltd., 2014b, p. 69–70, 73–74, 80).

**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 2013, the value of Israel's cut and polished diamond exports increased to \$6.2 billion from \$5.6 billion in 2012. Of that amount, the

value of Israel's cut and polished diamond exports produced from domestic cutting and polishing operations decreased to \$1.2 billion from \$1.3 billion in 2012. The United States received 37% of Israel's polished diamond exports; Hong Kong, 27%; Switzerland, 9%; Belgium, 7%; and India, 2% (Rabinovich and Cohen, 2013; Even-Zohar, 2014; Israel Diamond Institute Group of Companies, 2014).

Israel's cut and polished diamond production declined in recent years because of competition from producers in China and India that had lower labor costs. The domestic diamond cutting and polishing industry also faced problems, including an aging workforce and prices of rough diamond increasing faster than those of polished diamond. In 2013, the industry employed 2,600 workers compared with 2,800 in 2012 and 4,800 in 2003. The Government planned to assist the diamond cutting and polishing industry with recruiting and paying workers, and providing export grants and marketing support (Central Bureau of Statistics, 2004, p. 12.68; 2014, p. 624; Rabinovich and Cohen, 2013).

**Magnesium Compounds.**—Dead Sea Periclase Ltd. (a subsidiary of ICL) produced about 43,000 t of magnesia from brines in the Dead Sea in 2013; the facility's capacity was 53,000 t/yr. ICL also produced magnesium chloride for use in deicing; output decreased to 91,040 t in 2013 from 105,610 t in 2012 (Israel Chemicals Ltd., 2014b, p. 73, 80; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., September 9, 2014).

**Phosphate Rock.**—Rotem Amfert Negev Ltd. (a subsidiary of ICL) produced phosphate rock at the Arad, the Oron, and the Zin Mines in the Negev Desert. The production of beneficiated phosphate rock increased to 3.58 million metric tons (Mt) in 2013 from 3.51 Mt in 2012. Total national production of phosphate fertilizers increased to 1.02 Mt in 2013 from about 855,000 t in 2012 (Israel Chemicals Ltd., 2014a, p. 11; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., September 9, 2014).

**Potash.**—Dead Sea Works (DSW) (a subsidiary of ICL) used carnallite from the Dead Sea as raw material for its potash plants. The company planned to increase capacity in increments by removing bottlenecks and improving technology at existing plants. By the end of 2014, the total planned increase in capacity was expected to be between 300,000 and 500,000 t/yr. DSW's potash production increased by 1.8% in 2013 (Israel Chemicals Ltd., 2014b, p. 54; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., September 9, 2014).

Global consumption (excluding China) of potassium nitrate for agricultural use amounted to about 1 Mt in 2013; Haifa Chemicals Ltd.'s production decreased to 374,000 t in 2013 from 403,500 t in 2012. Most of Haifa's production was in Israel; the company used 0.8 t of potash for every metric ton of potassium nitrate produced. Haifa also produced potassium nitrate for industrial applications (Gabison, 2009; Sociedad Quimica y Minera de Chile S.A., 2014, p. 40, 43;

Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., September 9, 2014).

### **Mineral Fuels**

**Coal and Natural Gas.**—The joint venture of Noble Energy Inc. of the United States and Delek Energy Group produced natural gas at the Mari-B offshore gasfield in the Mediterranean Sea. In 2013, Noble and Delek's production of dry natural gas increased to about 2.16 billion cubic meters from 1.05 billion cubic meters in 2012, of which the Tamar gasfield produced 1.58 billion cubic meters. Tamar started operations in 2013. Output from Mari-B and other fields decreased to 579 million cubic meters in 2013 from 1.05 billion cubic meters in 2012 as they approached the end of their life. At the end of 2013, reserves at Tamar and Tamar Southwest were estimated to be about 58 billion cubic meters and 12 billion cubic meters, respectively. Gross recoverable reserves at the Leviathan gasfield were estimated to be about 510 billion cubic meters in early 2013 (Petroleum Economist, 2013; Noble Energy, Inc., 2014, p. 3, 13, 16, 18).

Noble and Delek approved an expansion of Tamar's capacity in 2013. The originally planned capacity at Tamar was 10.2 billion cubic meters per year; capacity was likely to increase to nearly 12.4 billion cubic meters per year by the second half of 2015 and to 15.5 billion cubic meters per year in 2016. Noble and Delek also could start production at Leviathan as early as 2017; capacity was expected to be 16.5 billion cubic meters per year. Natural gas from Leviathan could supply a new power station in the West Bank that would be built by Palestine Power Generation Co. (Noble Energy, Inc., 2013, p. 15–16; 2014, p. 13).

In 2012, the state-owned utility Israel Electric Corporation Ltd. (IEC) consumed 1.85 billion cubic meters of natural gas in power generation. The company nearly tripled its consumption in 2013. The increase was mostly attributable to the startup of production at the Tamar gasfield. IEC decreased its consumption of imported coal to 11.8 Mt in 2013 from 14 Mt in 2012 (Israel Electric Corporation Ltd., 2014, p. 61, 63–65, 68).

Adira Energy Ltd. of Canada planned to drill its first well in the Gabriella and Yam Hadera offshore prospects by the end of August 2014. The company relinquished the Samuel prospect in 2013 (Adira Energy Ltd., 2013).

**Petroleum.**—At the end of 2013, Oil Refineries Ltd. and Paz Oil Company Ltd. had petroleum refineries with capacities of 197,000 barrels per day (bbl/d) and 110,000 bbl/d, respectively. Both companies increased their production in 2013.

In 2013, IEC's consumption of diesel fuel amounted to about 6,300 bbl/d compared with 39,800 bbl/d in 2012. Natural gas consumption increased as diesel consumption decreased (Israel Electric Corporation Ltd., 2014, p. 65).

### **Outlook**

The production of potash is likely to increase from 2014 to 2016 because of ICL's expansion. Natural gas production is

expected to increase from 2013 to 2019 with the opening of the Leviathan gasfield and the expansion of the Tamar gasfield. Refined copper production could also start in the near future. 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.

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

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2009	2010	2011	2012	2013	
METALS						
Iron and steel, steel, crude <sup>e</sup>	380,000	430,000	500,000 <sup>r</sup>	500,000 <sup>r</sup>	500,000	
Lead, refined secondary	26,000	27,000	27,000	21,791 <sup>r</sup>	22,418	
Magnesium metal	19,405	23,309	26,284	27,292	27,399	
INDUSTRIAL MINERALS						
Bromine, elemental	127,689	184,696	202,313	173,940	184,943	
Cement, hydraulic	thousand metric tons	4,759	5,139	5,480	5,892 <sup>r</sup>	6,398
Clays:						
Brick clay <sup>3</sup>	53,581	58,896	57,908	49,539 <sup>r</sup>	41,534	
Common clay	578,000	677,900	1,220,379	1,057,000 <sup>r</sup>	1,241,000	
Flint clay	NA	NA	300,000	280,000 <sup>e</sup>	280,000 <sup>e</sup>	
Diamond <sup>4, e</sup>	thousand carats	299 <sup>5</sup>	245 <sup>5</sup>	230	200	200
Gypsum	9,152	99,730	20,437	45,407	27,200	
Lime	428,552	657,897	715,487	769,611 <sup>r</sup>	300,391	
Magnesium compounds:						
Magnesia	NA	NA	40,000	42,000	43,000	
Magnesium chloride	132,636	135,930	126,988	105,610	91,040	
Phosphate:						
Phosphate rock, mine output:						
Beneficiated	thousand metric tons	2,697	3,135	3,105	3,514 <sup>r</sup>	3,578 <sup>3</sup>
P <sub>2</sub> O <sub>5</sub> content <sup>e</sup>	do.	1,700 <sup>r</sup>	1,800 <sup>r</sup>	1,900 <sup>r</sup>	1,600 <sup>r</sup>	1,600
Phosphatic fertilizers:						
Monoammonium phosphate	NA	NA	NA	86,600	85,980	
Triple superphosphate	NA	NA	NA	455,000	560,940	
Other	NA	NA	NA	315,580	371,610	
Complex	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA <sup>r</sup>	NA	
Phosphoric acid	NA	NA	NA	572,580	500,200	
Potassium:						
Potash:						
Gross weight	thousand metric tons	3,112	3,402	2,983	3,528	3,591
K <sub>2</sub> O equivalent	do.	1,870 <sup>r</sup>	2,040 <sup>r</sup>	1,790 <sup>r</sup>	2,116 <sup>r</sup>	2,155
Potassium nitrate	NA	NA	NA	403,500	374,000	
Salt, marketed	thousand metric tons	357	421	410	415	442
Sand:						
Silica sand	163,206	197,699	232,909	180,000 <sup>r, e</sup>	200,000 <sup>e</sup>	
Other <sup>e</sup>	thousand metric tons	5,000	4,000	3,500	4,000 <sup>r</sup>	4,500
Stone: <sup>e</sup>						
Crushed	do.	45,000	45,000	49,000	46,000 <sup>r</sup>	47,000
Dimension, marble	68,000	72,000	72,000	66,000	66,000	
Sulfur: <sup>e</sup>						
Byproduct from petroleum <sup>e</sup>	thousand metric tons	50 <sup>5</sup>	55	60	60	60
Sulfuric acid:						
Gross weight	do.	1,600	1,930	1,900 <sup>r</sup>	1,773 <sup>r, 3</sup>	2,030 <sup>3</sup>
S content	do.	520	630	620 <sup>r</sup>	580 <sup>r, 3</sup>	664 <sup>3</sup>
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural:						
Gross	million cubic meters	2,825	3,234	4,318	2,557 <sup>r</sup>	6,496
Dry	do.	1,178	1,344	1,788	1,047 <sup>r</sup>	2,160
Petroleum:						
Oil shale <sup>6</sup>	thousand 42-gallon barrels	228	221	213	217 <sup>r</sup>	220 <sup>e</sup>
Crude	do.	15	12	34	225 <sup>r</sup>	383

See footnotes at end of table.

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

(Metric tons unless otherwise specified)

Commodity <sup>2</sup>	2009	2010	2011	2012	2013	
MINERAL FUELS AND RELATED MATERIALS—Continued						
Petroleum—Continued:						
Refinery products:						
Liquefied petroleum gas	do.	6,009	6,554	6,600	5,777 <sup>r</sup>	6,200 <sup>e</sup>
Gasoline	do.	25,454	23,261	23,048	23,961 <sup>r</sup>	26,000 <sup>e</sup>
Naphtha	do.	3,025	3,609	5,713	3,978 <sup>r</sup>	4,300 <sup>e</sup>
Kerosene	do.	9,652	10,595	10,521	9,070 <sup>r</sup>	9,800 <sup>e</sup>
Distillate fuel oil	do.	28,258	28,162	26,573	29,206 <sup>r</sup>	31,000 <sup>e</sup>
Residual fuel oil	do.	16,224	16,790	16,523	12,075 <sup>r</sup>	13,000 <sup>e</sup>
Other	do.	9,130 <sup>r</sup>	11,800 <sup>r</sup>	12,800 <sup>r</sup>	12,000 <sup>r,e</sup>	13,000 <sup>e</sup>
Total	do.	97,750 <sup>r</sup>	100,800 <sup>r</sup>	101,800 <sup>r</sup>	96,100 <sup>r,e</sup>	105,000 <sup>e</sup>

<sup>e</sup>Estimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. <sup>r</sup>Revised. do. Ditto. NA Not available.

<sup>1</sup>Table includes data available through November 4, 2014.

<sup>2</sup>In addition to the commodities listed, caustic soda, secondary refined zinc, and semimanufactured steel are produced, but available information is inadequate to make reliable estimates of output.

<sup>3</sup>Includes flint clay from 2008 to 2010.

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

<sup>5</sup>Reported figure.

<sup>6</sup>Converted from metric tons of oil equivalent.

TABLE 2  
ISRAEL: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(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>
Do.	Shapir Civil and Marine Engineering Ltd.	Emek Haela Valley, Iron Village, and Zanuach	10,000 <sup>e</sup>
Do.	Hanson Israel (subsidiary of HeidelbergCement AG)	Migdal Zedeka and other quarries	8,000 <sup>e</sup>
Bromine	Dead Sea Bromine Company Ltd. (DSBC) [Israel Chemicals Ltd. (ICL), 100%]	Sdom	280
Cement	Nesher Israel Cement Enterprises Ltd. (Clal Industries and Investments Ltd., 75%)	Plant at Ramle	5,800
Do.	do.	Plants at Haifa and Hartuv	2,000

See footnotes at end of table.

TABLE 2—Continued  
ISRAEL: STRUCTURE OF THE MINERAL INDUSTRY IN 2013

(Thousand metric tons unless otherwise specified)

Commodity		Major operating companies and major equity owners	Location of main facilities	Annual capacity
Lead, refined, secondary		Hakurnas Lead Works Ltd.	Ashdod	38
Lime		Negev Industrial Minerals Ltd.	Mishor Rotem	180
Do.		Lime & Stone Production Company Ltd.	Shefeya	150
<b>Magnesium:</b>				
Magnesia		Dead Sea Periclase Ltd. [Israel Chemicals Ltd. (ICL), 100%]	do.	53
Magnesium, refined		Dead Sea Magnesium Ltd. (DSM) [Israel Chemicals Ltd. (ICL), 100%]	Sdom	34
Natural gas	million cubic meters	Delek Energy Group, 53%, and Noble Energy Inc., 47%	Tamar gasfield	10,200
Do.	do.	do.	Mari-B gasfield	6,200
<b>Petroleum:</b>				
Crude	thousand 42-gallon barrels	Lapidoth Israel Oil Prospectors Corp.	Heletz-Brur field	8
Do.	do.	do.	Kochav field	3
Refined	do.	Oil Refineries Ltd. (Israel Corp., 45.1%)	Haifa	71,900
Do.	do.	Paz Oil Company Ltd.	Ashdod	40,200
<b>Phosphate:</b>				
Phosphate rock		Rotem Amfert Negev Ltd. [Israel Chemicals Ltd. (ICL), 100%]	Arad, Oron, and Zin Mines in the Negev Desert	4,500
Phosphatic fertilizers		do.	Mishor Rotem	1,900
Do.		Haifa Chemicals Ltd.	Haifa	NA
Phosphoric acid <sup>1</sup>		Rotem Amfert Negev Ltd.	Mishor 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.	Atlit	14
Silica sand		Negev Industrial Minerals Ltd.	Mactesh Htira	300
<b>Steel:</b>				
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.	Mishor Rotem	2,400
Zinc		Numinor Chemical Industries Ltd.	Maalot	NA

<sup>0</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.