



2014 Minerals Yearbook

ISRAEL

THE MINERAL INDUSTRY OF ISRAEL

By Thomas R. Yager

In 2014, 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, excluding the United States, amounted to 43%. Israel's share of world potash production was 5%; magnesium metal, 3%; and phosphate rock, 2%. Israel also accounted for more than 4% 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 (Even-Zohar, 2015; Bray, 2016; Jasinski, 2016a, b; Schnebele, 2016).

Minerals in the National Economy

In 2014, the mining and quarrying and the nonmetallic mineral products sectors combined accounted for about 1% of the gross domestic product (GDP), and the manufacture of iron, steel, and other metals, about 0.2%. The remainder of the manufacturing sector (which included diamond cutting and polishing, fertilizer production, and petroleum refining) accounted for 11.3% of the GDP. The chemicals, chemical products, and petroleum products sector employed about 20,000 workers; nonmetallic minerals, about 10,600; mining and quarrying, about 4,100; and diamond cutting and polishing, about 2,600. Israel's total net exports amounted to \$57.7 billion in 2014, of which diamond accounted for 16.2% and manufactured fertilizers, nearly 3%. Total net imports were valued at about \$71.5 billion, of which net mineral fuel imports accounted for 17.9%, and net diamond imports, 12% (Central Bureau of Statistics, 2015, a–d).

The mining sector was governed by the Mining Ordinance of 1925 and subsequent regulations enacted in 1973 and 1978. The regulations enacted in 1978 included the establishment of the Quarry Rehabilitation Fund. Upstream exploration and production of natural gas and petroleum were governed by the Petroleum Law of 1952 and the Petroleum Regulations of 1953. Downstream production and other activities were governed by the Natural Gas Sector Law of 2002, which established a licensing system for natural gas distribution and transmission and liquefied natural gas facilities.

Production

In 2014, the production of gypsum increased by 201%; magnesium chloride, by 49%, other sand, by an estimated 22%; brick clay, by 20%; refined lead, by 18%; crude petroleum, by 15%; natural gas, by 11%; and flint clay and marble, by 10% each. Triple superphosphate production decreased by 21% in 2014; common clay, by 20%; lime, by 17%; other phosphate fertilizers, by 15%; and sulfuric acid, by 10%

(table 1; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., November 11, 2015).

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 (table 2). Bromine, cement, lead, magnesium compounds and metal, phosphate rock, phosphoric acid, potash, potassium nitrate, and sulfuric acid were produced by only one domestic company each. The diamond cutting and polishing industry was composed of many small producers.

Commodity Review

Metals

Iron and Steel.—Israel's steel plants produced about 500,000 t/yr of steel from remelted scrap. At the end of 2014, Yehuda Steel Ltd. was engaged in the construction of a new plant with a capacity of 350,000 t/yr that would produce rebar from remelted scrap (Metal Bulletin Magazine, 2015).

Magnesium.—Dead Sea Magnesium Ltd. (DSM) [a subsidiary of Israel Chemicals Ltd. (ICL)] was a producer of magnesium metal and magnesium alloys. In 2014, DSM's production of magnesium metal was about 26,000 metric tons (t) compared with nearly 27,400 t in 2013. In 2014, the United States imported 11,700 t of magnesium metal and 3,690 t of magnesium alloys from Israel. In 2014, Israel's share of the United States' imports of magnesium metal and magnesium alloys was 72% and 24%, respectively (Bray, 2016; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., November 11, 2015).

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 decreased to about 174,000 t in 2014 from nearly 185,000 t in 2013. In 2014, DSBC consumed 73% 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., 2015, p. 53, 56).

Cement.—Nesher Israel Cement Enterprises Ltd. (Clal Industries and Investments Ltd., 75%) was the only domestic producer of cement. In 2014, the company's production increased to 6.6 million metric tons (Mt) from nearly 6.4 Mt in 2013 (Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., November 11, 2015).

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 2014, the value of Israel's cut and polished diamond exports increased to \$6.3 billion from \$6.2 billion in 2013. Of that amount, the value of Israel's cut and polished diamond exports produced from domestic cutting and polishing operations decreased to \$1 billion from \$1.3 billion in 2013. The United States received 38% of Israel's polished diamond exports; Hong Kong, 30%; Belgium, 9%; Switzerland, 6%; and the United Kingdom, 4% (Coren, 2014; Even-Zohar, 2015; Israel Diamond Institute Group of Companies, 2015).

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, and by the development of cutting and polishing industries in such African countries as Botswana and Namibia that mined diamond. The domestic diamond cutting and polishing industry also faced problems including an aging workforce, increased taxes, lack of available credit, and prices of rough diamond increasing faster than those of polished diamond. In 2013 and 2014, the industry employed 2,600 workers compared with 5,000 in 2004. The Government planned to assist the diamond cutting and polishing industry with establishing new diamond cutting and polishing facilities and training workers (Central Bureau of Statistics, 2006, p. 560; 2015d; Coren, 2014; Even-Zohar, 2015).

Magnesium Compounds.—Dead Sea Periclase Ltd. (a subsidiary of ICL) produced about 45,000 t of magnesia from brines in the Dead Sea in 2014; the facility's capacity was 53,000 t/yr. ICL also produced magnesium chloride for use in deicing; output increased to about 136,000 t in 2014 from about 91,000 t in 2013 (Israel Chemicals Ltd., 2015, p. 56, 88; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., November 11, 2015).

Phosphate Rock.—Rotem Amfert Negev Ltd. (a subsidiary of ICL) produced phosphate rock at the Oron, the Rotem, and the Zin Mines in the Negev Desert. The production of beneficiated phosphate rock decreased to 3.36 Mt in 2014 from 3.58 Mt in 2013. The estimated remaining life of the Zin Mine was 10 years; the Rotem Mine, 8 years; and the Oron Mine, 7 years (Israel Chemicals Ltd., 2015, p. 92, 107).

ICL consumed 73% of the phosphate rock mined by Rotem in the production of phosphate fertilizers and phosphoric acid. The production of triple superphosphate decreased to 443,610 t in 2014 from 560,940 t in 2013; monoammonium phosphate, to 78,330 t from 85,980 t; and other phosphate fertilizers, to 316,460 t from 371,610 t. Phosphoric acid output also decreased

to 480,710 t in 2014 from 530,460 t in 2013 (Israel Chemicals Ltd., 2015, p. 44; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., November 11, 2015).

Potash.—Dead Sea Works (DSW) (a subsidiary of ICL) used carnallite from the Dead Sea as raw material for its potash plants. The company completed plans to increase capacity in increments by removing bottlenecks and improving technology at existing plants. By the end of 2014, the total increase in capacity was between 300,000 t/yr and 500,000 t/yr. DSW's potash production decreased to about 3.5 Mt in 2014 from 3.59 Mt in 2013 because of labor disputes (Israel Chemicals Ltd., 2015, p. 50, 88; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., November 11, 2015).

Global consumption (excluding China) of potassium nitrate for agricultural use was more than 1 Mt in 2014; Haifa Chemicals Ltd.'s production increased to 397,600 t in 2014 from 374,000 t in 2013. 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., 2015, p. 15; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., November 11, 2015).

Sulfur.—An estimated 60,000 t/yr of sulfur was recovered from petroleum refining. ICL consumed more than 650,000 t/yr of sulfur in the production of fertilizers, which was nearly 1% of world sulfur production in 2014. The company produced about 1.82 Mt of sulfuric acid in 2014 compared with 2.03 Mt in 2013 (table 1; Apodaca, 2016; Israel Chemicals Ltd., 2015, p. 111; Michael Danon, Senior Coordinator, Health, Safety, and Environment in Quarries and Mines, Ministry of National Infrastructures, Energy and Water Resources, written commun., November 11, 2015).

Mineral Fuels

Natural Gas.—Noble Energy Inc. of the United States, Delek Group, and their joint-venture partners produced natural gas at the Tamar offshore gasfield in the Mediterranean Sea; Noble and Delek also produced natural gas at Mari-B. In 2014, Noble and Delek's sales of dry natural gas increased to about 2.39 billion cubic meters from 2.16 billion cubic meters in 2013. Sales from the Tamar gasfield increased to 2.26 billion cubic meters in 2014 from 1.58 billion cubic meters in 2013. In 2014, sales from Mari-B and other fields decreased to 129 million cubic meters from 580 million cubic meters in 2013 as the fields approached the end of their life. At the end of 2014, reserves at Tamar and Tamar Southwest were estimated to be about 56 billion cubic meters. Resources at the Leviathan gasfield were estimated to be about 620 billion cubic meters at yearend (Delek Group, 2015, p. A-16; Noble Energy, Inc., 2014, p. 3–4, 21, 65).

In 2014, Noble, Delek, and their partners were negotiating an agreement with Union Fenosa Gas SA (UFG) of Spain

to supply natural gas to UFG's liquefied natural gas (LNG) plant in Egypt. Depending on the outcome of negotiations, the Tamar field could supply 4.5 billion cubic meters per year for a 15-year period starting in 2017. Noble planned to complete an expansion of Tamar's capacity to 12 billion cubic meters per year from 10 billion cubic meters per year by June 2015. Capacity would increase to 20.4 billion cubic meters to supply natural gas to UFG; nearly 16 billion cubic meters per year would be supplied to the domestic market (Delek Group, 2014, p. A-1; 2015, p. A-31).

Noble, Delek, and their partners also were considering the development of the Leviathan gasfield in the Mediterranean Sea. Depending on approval of the first stage of the project in early 2018, production could start in 2018. The companies planned to produce 16 billion cubic meters per year at Leviathan; estimated capital costs of the project were between \$6 billion and \$7 billion (Delek Group, 2014, p. A-2).

Petroleum.—At the end of 2014, 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 (table 2). Both companies increased their production in 2014.

Outlook

The production of potash is likely to increase between 2015 and 2016 because of ICL's expansion. Natural gas production is expected to increase between 2015 and 2020 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 COMMODITIES¹

(Metric tons unless otherwise specified)

Commodity ²	2010	2011	2012	2013	2014	
METALS						
Iron and steel, steel, crude ^c	430,000	500,000	500,000	500,000	500,000	
Lead, refined secondary	27,000	27,000	21,791	22,418	26,426	
Magnesium metal	23,309	26,284	27,292	27,399	26,000 ^e	
INDUSTRIAL MINERALS						
Bromine, elemental	184,696	202,313	173,940	184,943	173,796	
Cement, hydraulic	thousand metric tons	5,139	5,480	5,892	6,398	6,603
Clays:						
Brick clay ³	58,896	57,908	49,539 ^r	41,534	50,000	
Common clay	677,900	1,220,379	1,057,000 ^r	1,241,000	996,640	
Flint clay ^c	NA	300,000 ⁴	270,000 ^r	290,000 ^r	320,000	
Diamond ^{5,c}	thousand carats	245 ⁴	230	200	200	
Gypsum	99,730	20,437	45,407	27,200	82,000	
Lime	657,897	715,487	769,611	300,391	250,000	
Magnesium compounds:						
Magnesia	NA	40,000	42,000	43,000	45,000	
Magnesium chloride	135,930	126,988	105,610	91,040	135,966	
Phosphate:						
Phosphate rock, mine output:						
Beneficiated	thousand metric tons	3,135	3,105	3,514	3,578 ³	3,357 ³
P ₂ O ₅ content ^c	do.	1,800	1,900	1,600	1,600	1,500
Phosphatic fertilizers:						
Monoammonium phosphate	NA	NA	86,600	85,980	78,330	
Triple superphosphate	NA	NA	455,000	560,940	443,610	
Other	NA	NA	315,580	371,610	316,460	
Phosphoric acid	NA	NA	572,870 ^r	530,460 ^r	480,710	
Potassium:						
Potash:						
Gross weight	thousand metric tons	3,402	2,983	3,528	3,591	3,503
K ₂ O equivalent	do.	2,149 ^r	1,884 ^r	2,229 ^r	2,268 ^r	2,213
Potassium nitrate	NA	NA	403,500	374,000	397,600	
Salt, marketed	thousand metric tons	421	410	415	442	460
Sand: ^c						
Silica sand	197,699 ⁴	232,909 ⁴	180,000	200,000	200,000	
Other	thousand metric tons	4,000	3,500	4,000	4,500	5,500
Stone: ^c						
Crushed	do.	45,000	49,000	46,000	47,000	46,000
Dimension, marble	64,000 ^r	58,000 ^r	63,000 ^r	67,000 ^r	74,000	
Sulfur:						
Byproduct from petroleum ^c	thousand metric tons	55	60	60	60	60
Sulfuric acid:						
Gross weight	do.	1,930 ^e	1,900 ^e	1,773	2,030	1,818
S content	do.	630 ^e	620 ^e	580	664	594
MINERAL FUELS AND RELATED MATERIALS						
Gas, natural:						
Gross	million cubic meters	3,234	4,318	2,557	6,496	7,677
Dry	do.	1,344	1,788	1,047	2,160	2,389
Petroleum:						
Oil shale ⁶	thousand 42-gallon barrels	221	213	217	217 ^r	220 ^e
Crude	do.	12	34	225	383	440
Refinery products:						
Liquefied petroleum gas	do.	6,554	6,600	5,777	4,651 ^r	4,991
Gasoline	do.	23,261	23,048	23,961	21,776 ^e	24,016
Naphtha	do.	3,609	5,713	3,978	6,952 ^r	6,772
Kerosene	do.	10,595	10,521	9,070	10,471 ^r	9,297
Distillate fuel oil	do.	28,162	26,573	29,206	23,061 ^r	24,175

See footnotes at end of table.

TABLE 1—Continued
ISRAEL: PRODUCTION OF MINERAL COMMODITIES¹

Commodity ²	2010	2011	2012	2013	2014	
Petroleum—Continued:						
Refinery products—Continued:						
Residual fuel oil	thousand 42-gallon barrels	16,790	16,523	12,075	15,636 ^f	15,087
Asphalt	do.	NA	NA	NA	1,378	1,203
Lubricants	do.	NA	NA	NA	225	41
Other	do.	11,800	12,800	12,000 ^e	18,000 ^{r,e}	20,000 ^e
Total	do.	100,800	101,800	96,100 ^e	102,000 ^{r,e}	106,000 ^e

^eEstimated; estimated data are rounded to no more than three significant digits; may not add to totals shown. ^fRevised. do. Ditto. NA Not available.

¹Table includes data available through February 19, 2016.

²In addition to the commodities listed, caustic soda, secondary refined zinc, and semimanufactured steel were produced, but available information was inadequate to make reliable estimates of output.

³Includes flint clay in 2010.

⁴Reported figure.

⁵Imported diamond cut in Israel.

⁶Converted from metric tons of oil equivalent.

TABLE 2
ISRAEL: STRUCTURE OF THE MINERAL INDUSTRY IN 2014

(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 ^c
Do.		do.	Dragot, Ein Harod, Eilat, Golani Junction, Kadarim, Revivim, Segev, and Shefar'am	5,000 ^c
Do.		Shapir Civil and Marine Engineering Ltd.	Emek Haela Valley, Iron Village, and Zanuach	10,000 ^c
Do.		Hanson Israel (subsidiary of HeidelbergCement AG)	Migdal Zedeka and other quarries	8,000 ^c
Bromine		Dead Sea Bromine Company (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 Har-Tuv	2,000
Lead, refined, secondary		Hakurnas Lead Works Ltd.	Ashdod	38
Lime		Negev Industrial Minerals Ltd.	Mishor Rotem	180
Do.		Lime & Stone Production Co. Ltd.	Shefeya	150
Magnesium:				
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	Noble Energy Inc., 36%; Isramco Negev 2 LLP, 28.75%; Avner Oil Exploration, 15.625%; Delek Group, 15.625%	Tamar gasfield	10,000
Do.	do.	Delek Group, 53%, and Noble Energy Inc., 47%	Mari-B gasfield	6,200
Petroleum:				
Crude		Lapidoth Israel Oil Prospectors Corp.	Heletz field	NA
Refined	thousand 42-gallon barrels	Oil Refineries Ltd. (Israel Corp., 45.1%)	Haifa	71,900
Do.	do.	Paz Oil Company Ltd.	Ashdod	40,200
Phosphate:				
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
Phosphoric acid ¹		do.	do.	640
Potash		Dead Sea Works (DSW) (Israel Chemicals Ltd. (ICL), 100%)	Sdom	3,600 ^c
Salt		do.	do.	700
Do.		Israel Salt Industries Ltd. (subsidiary of Danker Group)	Eilat	150
Do.		do.	Atlit	14
Silica sand		Negev Industrial Minerals Ltd.	Mactesh Htira	300
Steel:				
Crude		Hod Metal Products & Manufacturing Co. Ltd.	Acre	300
Do.		Yehuda Steel Ltd.	Ashdod	180
Billet		do.	Bene Ayish	200
Do.		do.	Ashdod	180
Do.		Hod Metal Products & Manufacturing Co. Ltd.	Acre	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.	Ma'a lot-Tarshisha	NA

^cEstimated; estimated data are rounded to no more than three significant digits. Do., do. Ditto. NA Not available.

¹P₂O₅ equivalent.