



Turkey's Mining Industry

REPUBLIC OF TURKEY PRIME MINISTRY
INVESTMENT SUPPORT AND
PROMOTION AGENCY



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IN TURKEY

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Feb 2014

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Contents

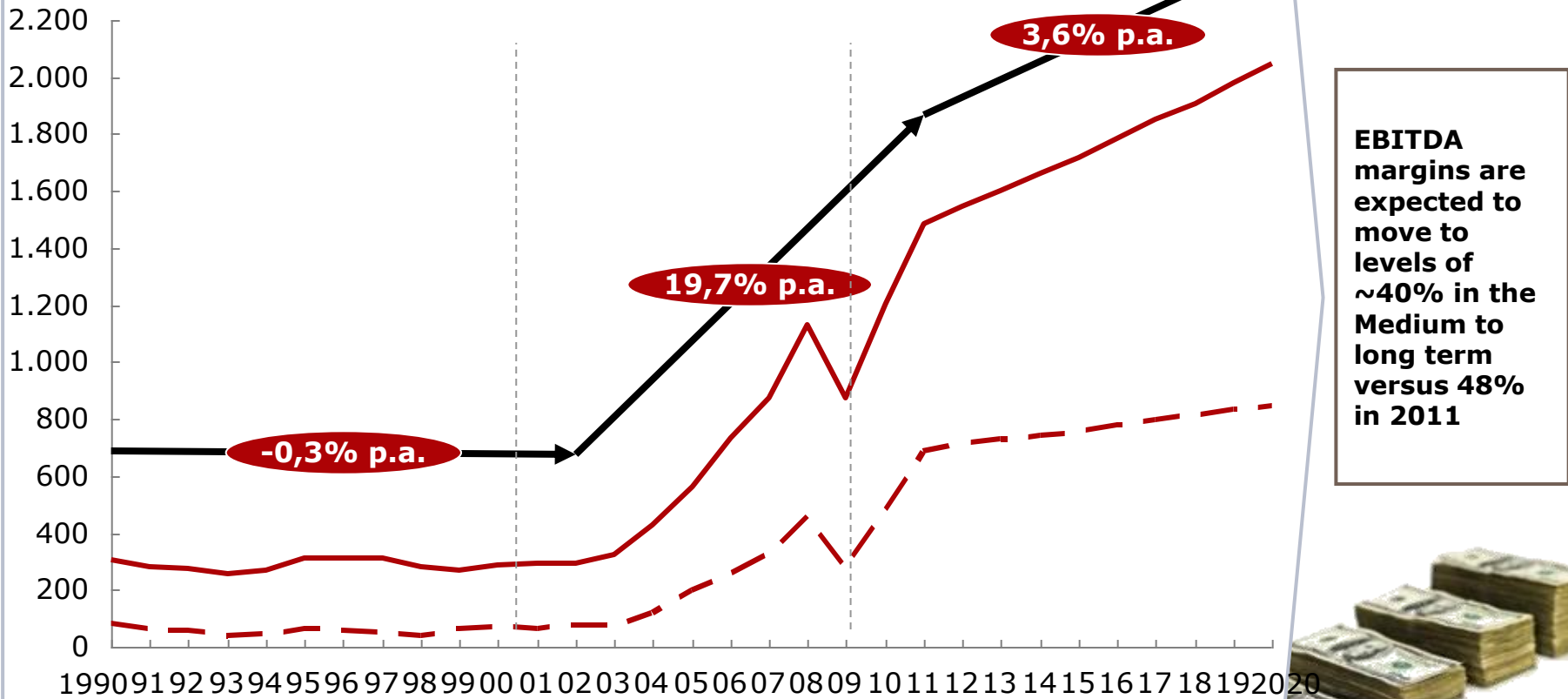
- **Mining overview**
 - Selected Minerals information
 - Business opportunities
 - Legislation



After years of stability, the mining industry has experienced fast growth in revenues and profit over the last 10 years and should manage a sustained growth and healthy profitability in the next decade

Revenues & EBITDA of the global mining industry

US\$ billion



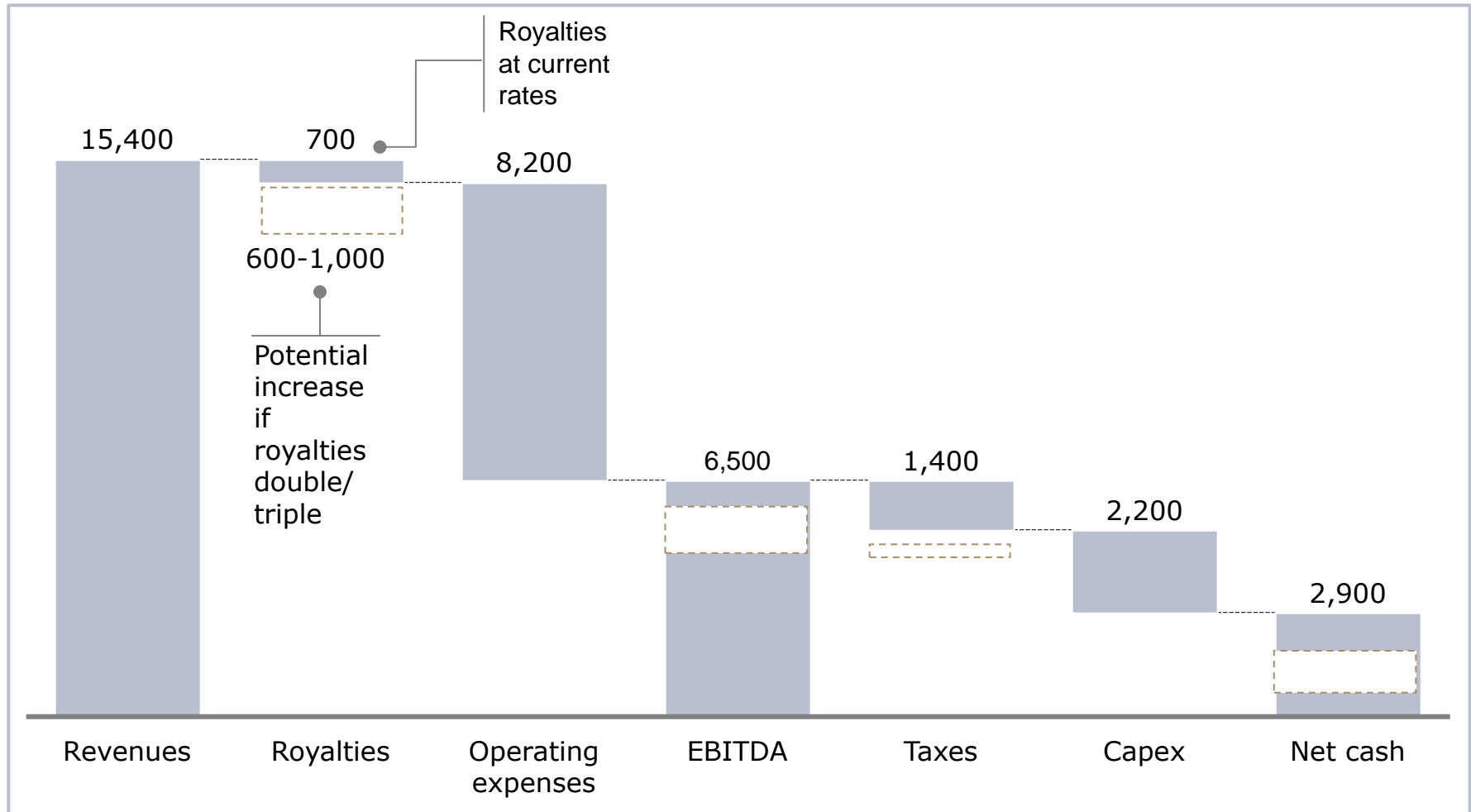
EBITDA margins are expected to move to levels of ~40% in the Medium to long term versus 48% in 2011



SOURCE: McKinsey Basic Materials Institute – Nov 2011

Over the next 10 years, the mining industry will accumulate up to US\$ 3 trillion in cash after capex – creating FDI opportunities for countries such as Turkey

2012-2022 aggregated figures, US\$ billions



SOURCE: McKinsey & Company Team analysis

Turkey: The rising star of the mining industry in the next century

Major untapped reserves potential

- Strong tectonic and magmatic history led to rich underground reserves
- Tethyan-Eurasia Metallogenic belt covers Turkey – high proven potential
- Mining wealth untapped: Entire Southeastern region which had no drilling since 80s, offers massive potential due to mineral wealth
- In the other regions, mining has been limited to surface excavations. Big potential with deep drilling

Established infrastructure

- In-depth geologic research and data for offered by General Directorate of Mineral Research & Exploration (MTA)
- Reliable power lines and available underground water resources
- World-leading construction sector offers low cost and on-budget field projects

Investor friendly environment

- Favorable tax regime – corporate tax 4-20%
- No nationalization threat – All mining companies treated against the law
- Ownership (transfer) rights clearly defined and protected by law

Considerations

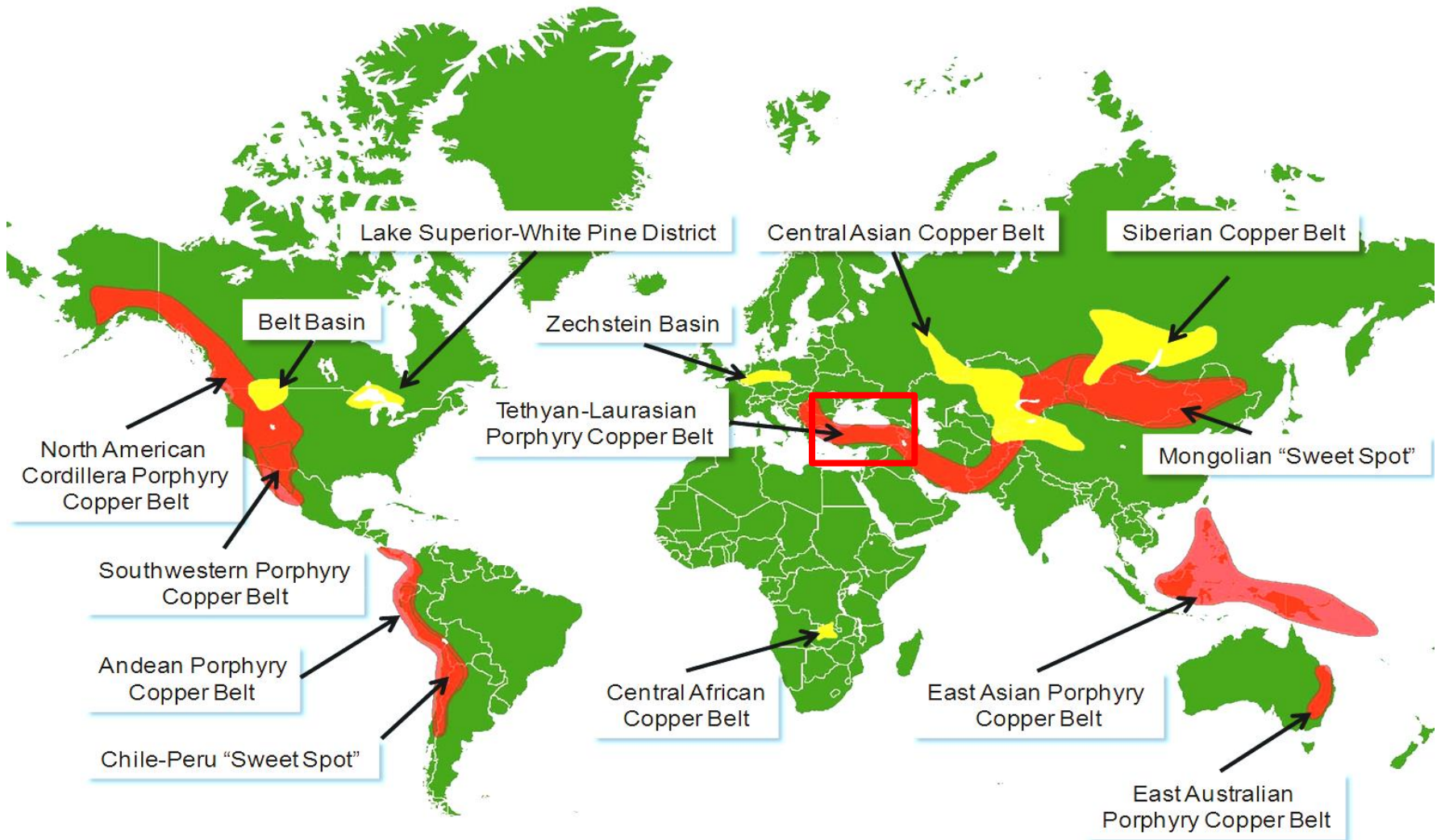
- Sophisticated geology requires expertise and model development – professional explorers have an edge



SOURCE: McKinsey & Company Team analysis

Important mineral belts of the world

- High probability of reserves
- Mid probability of reserves



Turkey stands as a very promising region for miners and explorers as the least explored portion of Tethyan Metallogenic Belt

Tethyan belt is formed as a result of the collision of African, Arabian and Indian plates with Eurasia

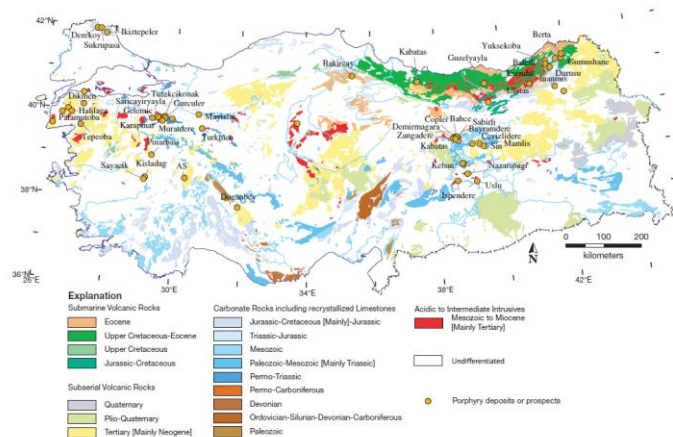
- Tethyan belt is one specific kind of ophiolite extending from the western Mediterranean via the Alps to southeastern Europe, through Turkey, the Lesser Caucasus, Iran, and the Himalayas to China



- So far, 6.5 kt gold, 80Mt copper reserves proven on Tethyan belt

Turkey is an important part of the Tethyan-Eurasia Metallogenic Belt within the Alpine-Himalayan orogenic system

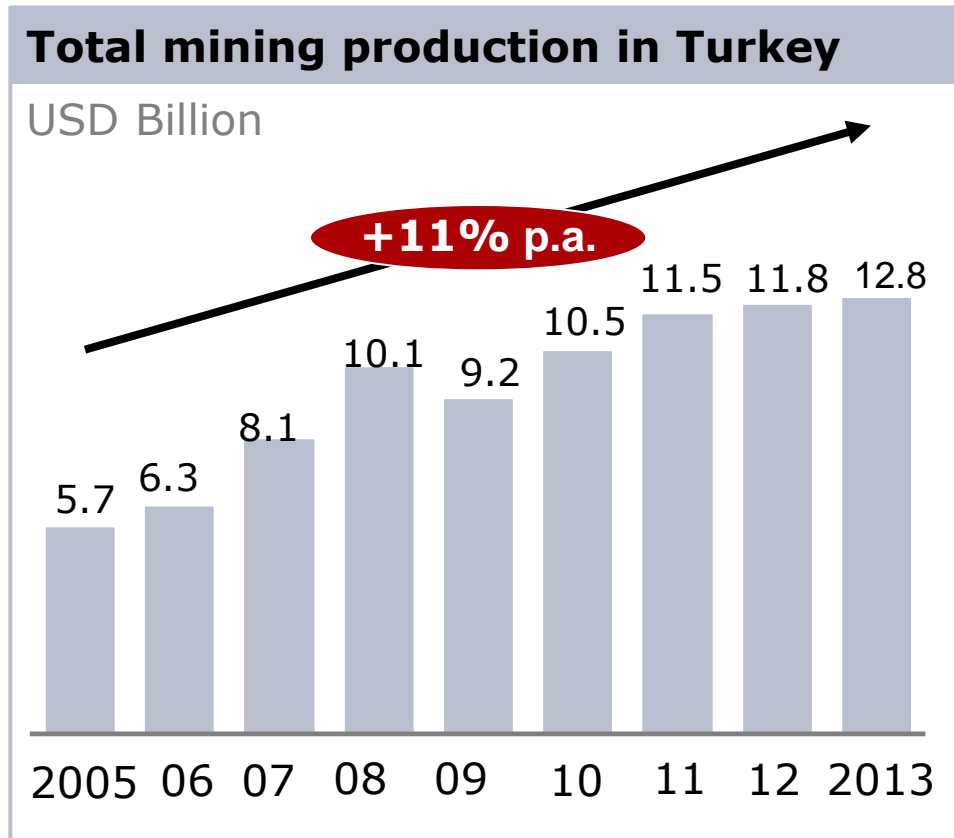
- Underground deposits of Turkey are mainly result of Alpine-Himalayan orogenic system
- Due to the collision of 3 continents with different geologic and tectonic settings, Turkey presents a variety of mineral deposits
- Turkey has high likelihood of having porphyry gold and copper deposits such as Kışladağ and Çöpler



SOURCE: Gentor resources; MTA General Directorate Of Mineral Research & Exploration; LIPS; Ozcan Yigit – Mineral Deposits of Turkey in Relation to Tethyan Metallogeny



In the last decade, mining in Turkey has grown significantly



- Big untapped regions in Turkey started to attract miners increasingly
- Miners in Turkey **do not go deep** in the ground and miss the extreme potential created by **Tethyan Belt** (avg. depth of mines in Turkey is ~100-150m)



SOURCE: MTA; Expert interview

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Turkish gold market overview

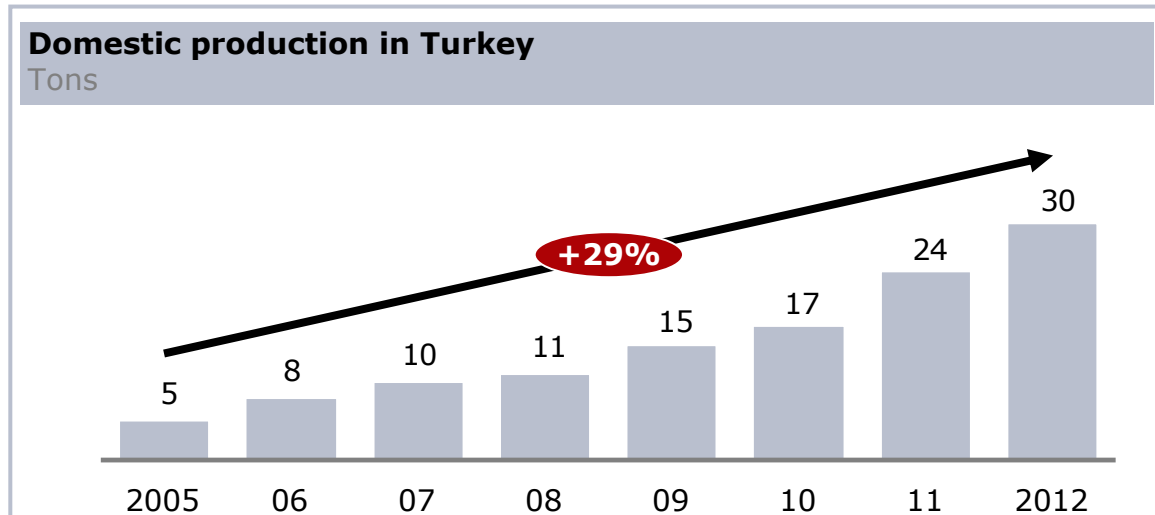
- Gold production is one of the few areas of the mining industry where Turkey is present at all steps of the value chain
- Currently Turkish gold reserves are around 700 tons, which increased from 600 tons over the last 5 years, while MTA alone discovered 45 tons of reserves in 2009. As a result, production grew 40% YoY from 2005 to 2012 and reached 29 tons in 2012 (5 tons in 2005)
- Based on a pure academic research, probable reserves estimated around 1,700-6,500 tons¹ which make up for as high as 1/8th of globally proven reserves. Such claims should be confirmed with further exploration investments
- Although exploration and production volumes keep growing, Turkey still has not captured its fair share out of global exploration investments

1 ODTU metallurgical engineer Ayhan Eler and MTA's cooperative study concluded 1,700-6,500 tons of gold potential in 580 different locations in Turkey

SOURCE: McKinsey & Company Team analysis; Gold potential in Turkey; Dr. Eler Ayhan (1997)



Trade deficit of unwrought gold has been decreasing due to price increase, yet further savings are possible by increasing production



- Gold imports have been diminishing due to rising prices, curtailing trade deficit since 2008
- High import volumes in 2005-2007 period allowed Turkey to increase exports to realize profits as prices were on the rise

- Gold production in Turkey gained momentum following the legislation change that lifted tax exemption for exporting unrefined gold
- Domestic production is increasing yet it is still low compared to the volume of gold trade
- In the long run, increasing production further will cap Turkey's import figures

SOURCE: Istanbul Gold Exchange; Gold miners association; ISPAT(Investment Support and Promotion Agency of Turkey); Expert interviews



Seydişehir is currently the only active reserve where production is far below the domestic demand



Chromite mine



Aluminum production



Semi product production



Port



Power plant

Aluminum production across Turkey



Oymapinar HES
(540 MW)

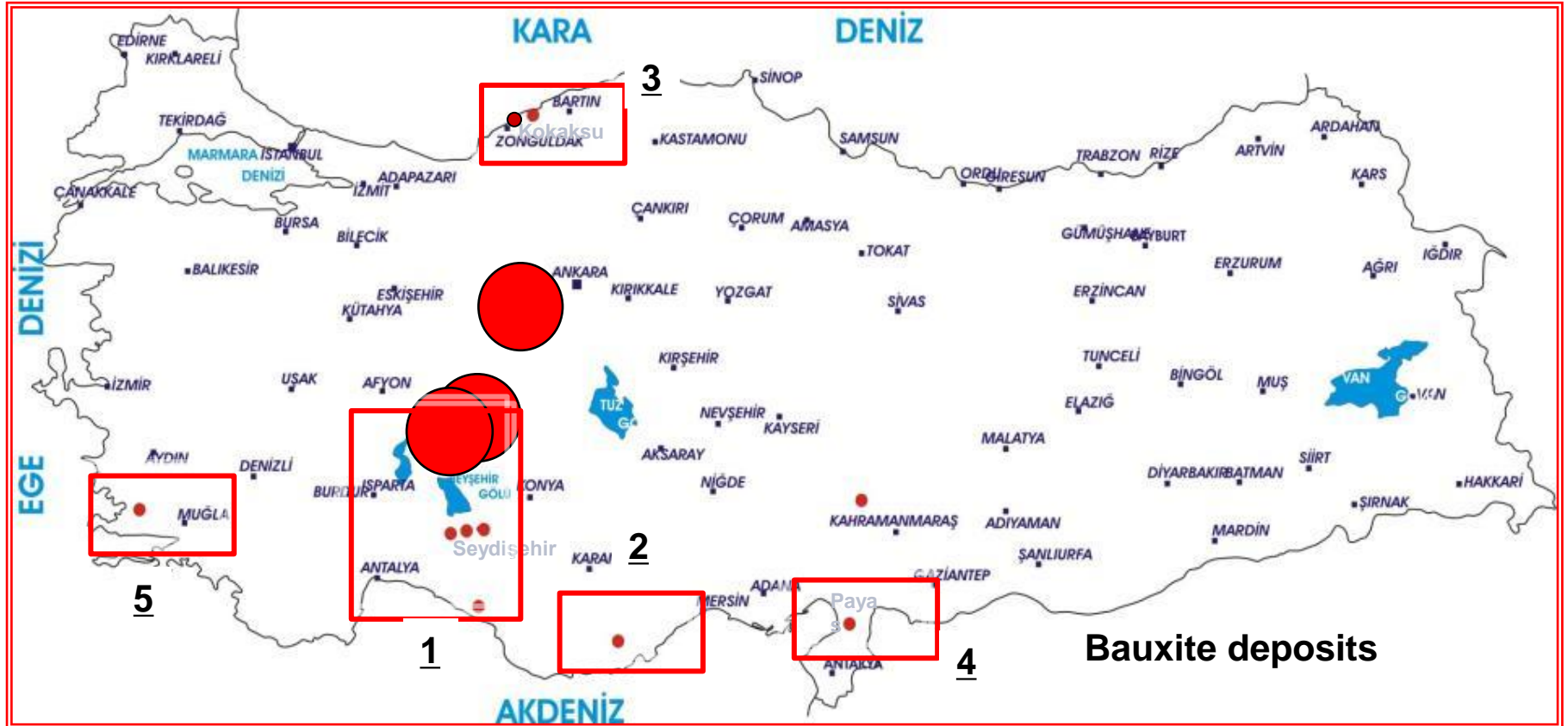
- Potentially can support production up to 200-300k
- Currently powering only 60k of production

- Seydişehir plant can and should feasibly increase primary production capacity:
 - Access to rich and high grade, bauxite reserves
 - Dedicated power supply and cheap energy (2-3 US¢/kwh)
 - Opportunity to enlarge capacity feasibility on top of existing infrastructure



SOURCE: Team analysis; Company websites; expert interviews

Bauxite reserves in Turkey concentrated in 5 major areas



Among the 5 reserves, only the first one is actively operated

1. Seydişehir-Akseki,
2. Silifke-Taşucu (S.Turkey),
3. Zonguldak (N.Turkey),
4. İslahiye-Payas and
5. Milas-Muğla



SOURCE: MTA

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In addition to primary opportunities, Turkey presents an increasing potential in secondary aluminium production as a result of growing industrial activity

HIGH LEVEL ANALYSIS

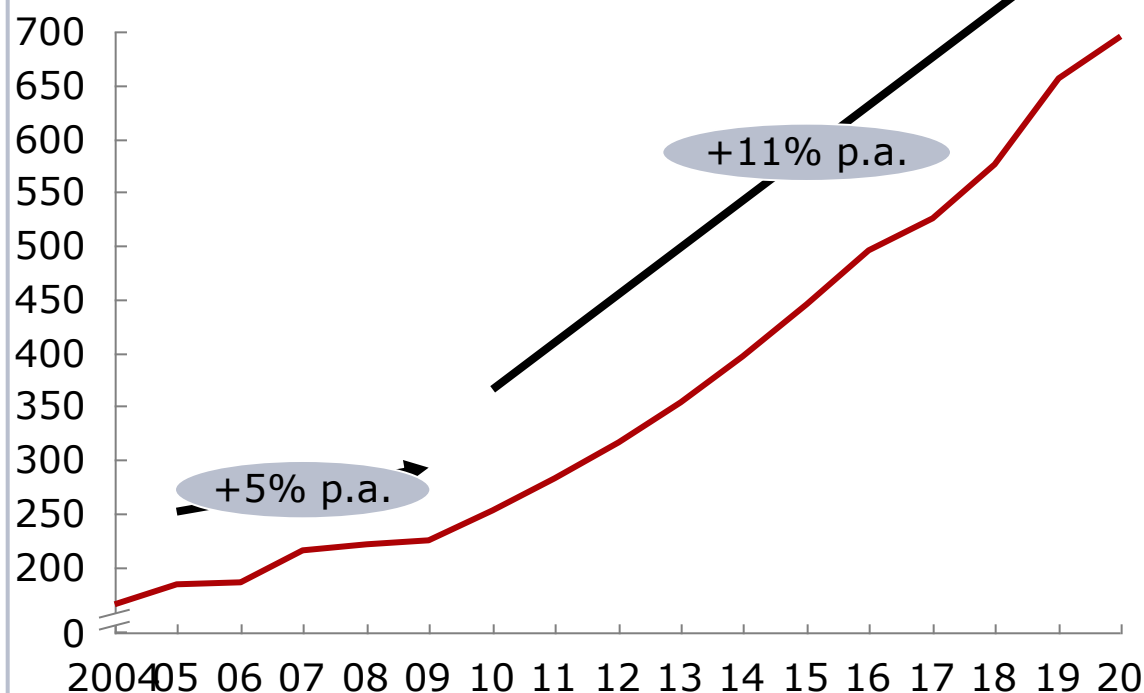
Key facts

- Aluminum scrap generation in Turkey keeps increasing even in 2009.
- Majority aluminum scrap generation is coming from new aluminum scrap (Aluminum and/or aluminum alloys from collection and/or treatment of aluminum products before final usage).
- Old aluminum scrap (Aluminum and/or aluminum alloys from the collection and/or treatment of aluminum products after use) in Turkey has not yet taken of but is likely to increase over time

Aluminium scrap generation in Turkey

Al scrap production¹

Thousand metric tons

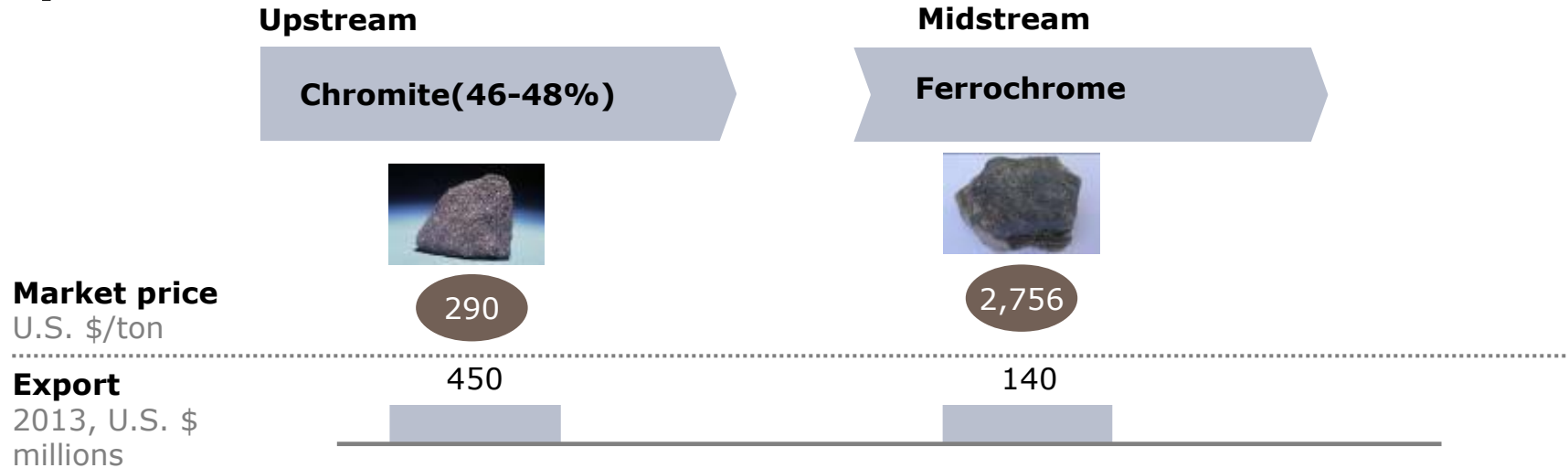


1 Al scrap generation w/o impact from import

SOURCE: EAA(European Aluminum Association); Aluminum Manufacturers' Union of Turkey; McKinsey analysis



Turkey is a net exporter in Chromium, however a net importer in Stainless Steel which uses Chromium as core input



- High FeCr grade is needed for high-quality ferrochrome
- 85% used for ferrochrome production
- Turkey is one of the largest global chromite producers with rich reserves
- Multiple mid-sized players
- Raw material and energy intensive
- 91% used for stainless steel production
- Turkey has a single producer, ETI Krom



SOURCE: McKinsey; Metal Bulletin

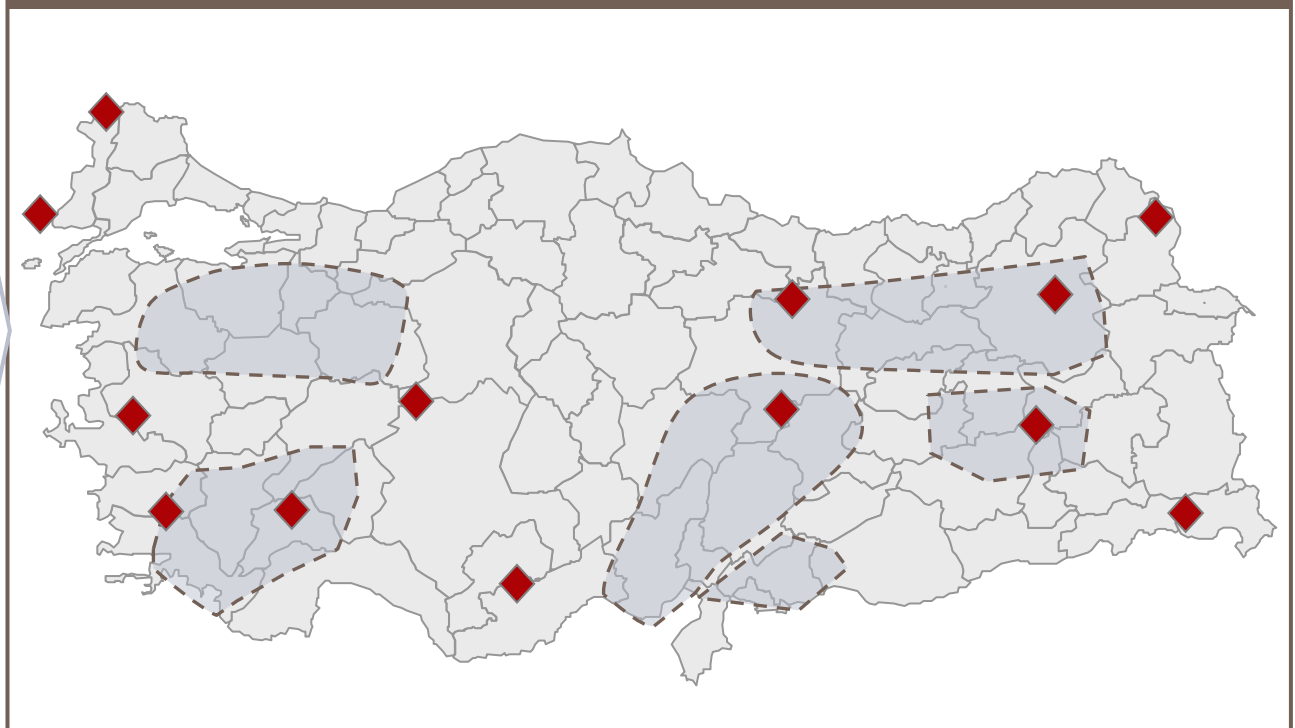
Turkey can be attractive in ferrochrome production by building integrated FerroChrome facilities where there are high grade reserves

◆ Lignite

■ Chromite

- **Attract investment for an integrated facility by bundling chromite and lignite fields**
 - **Access to raw material**
 - **Provision of cheap energy source**

Potential areas for integrated ferrochrome facilities



SOURCE: MTA; Team analysis

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Turkey is a net exporter of processed and unprocessed marble

Upstream

Raw Marble



250-350

Market price

U.S. \$/ton

Midstream

Slab



800-1,100

Export

2013, U.S.
\$ billions

1.141

1.083

- Raw material intensive
- Profitability largely depends on the quality of the ore
- Turkey has reserves and is a leading exporter of raw marble

- Raw material and capital intensive
- Turkey is a leading exporter of marble slabs

SOURCE: McKinsey; Interviews; USGS(U.S Geological Survey),IMMIB(Istanbul Minerals and Metals Exporters Association)



Turkey has important natural stone and marble deposits in all of the provinces



Most important marble types found in Turkey are

- Supreme Salome
- Elazığ cherry
- Milas wine-red
- Akşehir black
- Manyas white
- Bursa wine-red



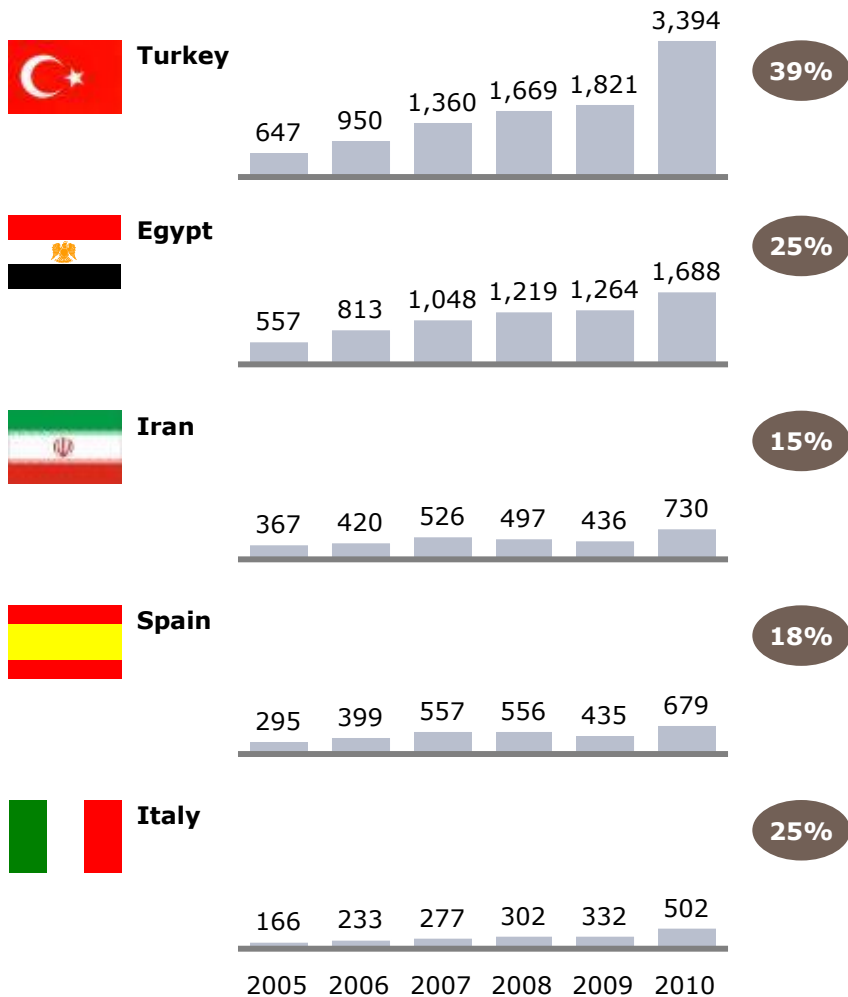
SOURCE: MTA

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Turkey is the fastest growing export country to China driven by marble quality and rich supplies

Raw marble exports to China

Thousand tons



"5 years ago, we were buying most of marble from Spain and Italy; today, we buy from Turkey"- *Real estate developer*

"There are 3 main weaknesses of marble from Egypt and Iran: a) Late-comer in market, b) Weak transportation capacity, c) Poorer quality of stone. This results in 10-20% price difference vs. Turkish marble"

- *Real estate developer*

"Turkey is top exporter to China and Shine is the #1 among all Turkish exporters. Levantina can match Shine's scale, but they are facing succession issues and their quarry is old"- *Customer*

"Chinese customers want something new and fresh, not Marfil. Marfil is like the white shirt in your wardrobe - it is classic and if you cannot decide what to wear, you go for it"- *Medium scale processor*

"Turkish marble has reasonable pricing, good quality and good political environment (unlike Iran and Egypt) that allows easy trade relationship - Iran's political/ trading environment is challenging (e.g. requires cash, no letter of credit)"

"- *Medium scale processor*

"Turkish is very popular and will stay like that. Turkey has variety, Italian supply is very small"- *Medium scale processor*

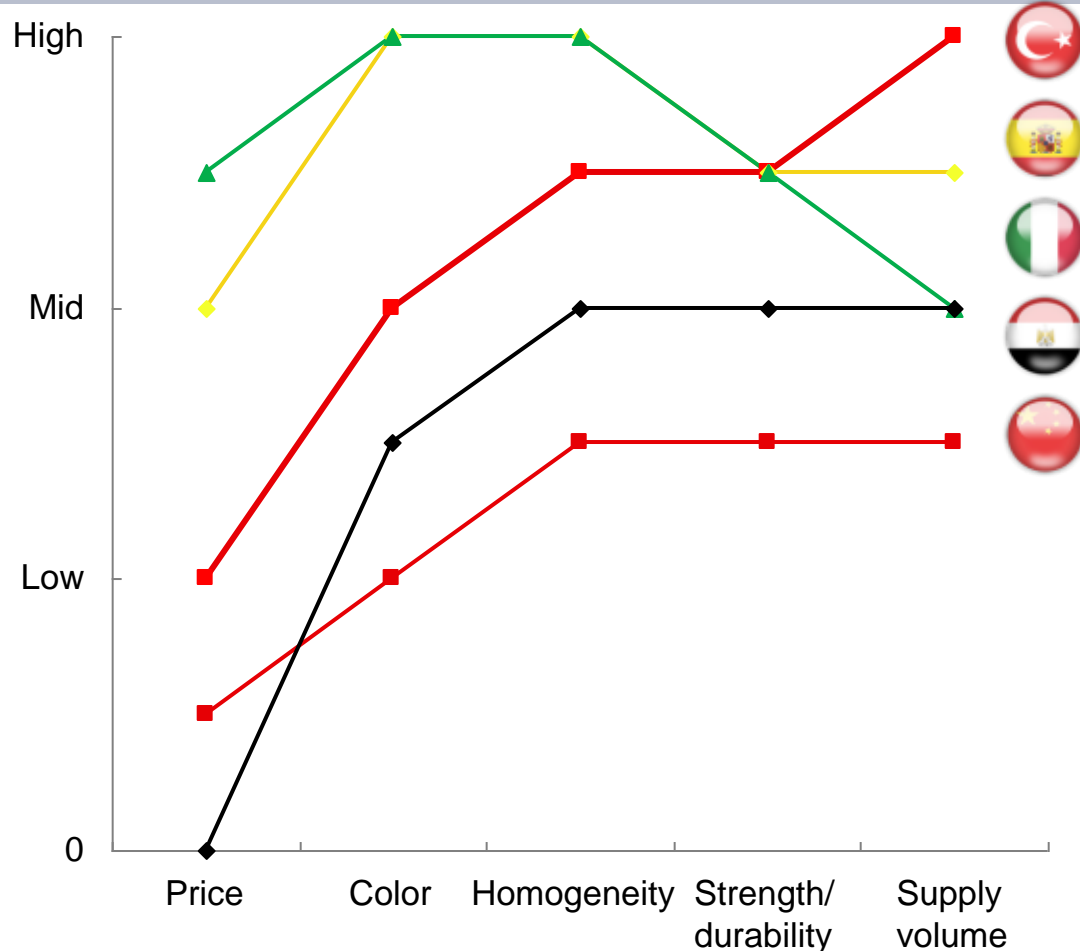
"Our marble has become very popular in last 4-5 years"- *Customer*

SOURCE: UN Comtrade

Turkish marble is well positioned to capture a large share out of the growing global market

—■— Turkish —◆— Spanish —▲— Italian —■— Chinese —◆— Egyptian

Brand rankings for marble



- Relative importance of key buying factors vary depending on the **project type** and **required volume**
 - “If small quantity, then color and texture come before price; if large quantity, then price comes first” – *Real estate developer*
 - “Turkey has the biggest reserves so it can guarantee supply stability because some projects are really big in China and need large amount of supply. Moreover, Chinese developers like unified look so tend to use same marble across their projects” – *Customer*
 - “Italian marble scores better than other marbles in all quality-related criteria (e.g. color, texture, strength) Turkish product is similar in looks and finish to Italian marble hence can be substituted in place of Italian at a cheaper price” - *Customer*



SOURCE: Interviews

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Boron has identified uses in almost 500 industries...

Special characteristics of Boron

- Strengthenener
- Isolation/insulation
- Inflammability
- Energy content (H₂ production)



Identified as areas of use



Glass manufacturing
Glass fiber



Ceramics manufacturing
Added to give thermal
shock resistance



Electronics and conductors
Semiconductors



Communication technology
Satellites



Construction/cement
Strengthenener



Metallurgy
Rare earth magnets



Chemicals
Water clarifier



Cleaning/whitening
Detergents



Agriculture
Fertilizers



Paper/pulp
Strengthenener



Energy/Nuclear
Shielding



Automotive industry
Anti-corrosion systems



Textiles
Fiber



Pharmaceutical/cosmetics
Neutron therapy for Cancer



SOURCE: ETİ Maden; team analysis

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... however current consumption is concentrated in a few industries

	Share of consumption Percent	Product	Benefits of Boron	Outlook
Glass manufacturing and construction	34	<ul style="list-style-type: none"> Isolating glass fiber 	<ul style="list-style-type: none"> Improve strength and chemical resistance of fiberglass products 	<ul style="list-style-type: none"> Push for energy efficiency through insulation will drive growth Continued growth from corrosion-resistant fabrics, composites reinforcement, and sound absorption Potential substitution by phosphates
Textiles	21	<ul style="list-style-type: none"> Borosilicate glass 	<ul style="list-style-type: none"> Optical properties, increase resistance to chemical attack and thermal shock 	<ul style="list-style-type: none"> Growth driven by shift from single to double or insulated glazing for energy efficiency Potential substitution by phosphates
Ceramics	19	<ul style="list-style-type: none"> Ceramic glass 	<ul style="list-style-type: none"> Increase strength, scratch resistance and chemical resistance 	<ul style="list-style-type: none"> GDP-level growth through home re-modeling with wall/floor tiles and household fixtures Potential substitution by phosphates
Agriculture	7	<ul style="list-style-type: none"> Fertilizer Pesticides 	<ul style="list-style-type: none"> Essential micronutrient for growth and development of healthy plants 	<ul style="list-style-type: none"> Growth in humid countries such as India and Indonesia will grow demand
Cleaning/whitening	5	<ul style="list-style-type: none"> Detergent Toothbrush 	<ul style="list-style-type: none"> Makes detergents more resistant to humidity and high temperatures 	<ul style="list-style-type: none"> Demand in humid and high temperature countries such as Middle East, India and Indonesia will grow
Other	14			



SOURCE: US geological survey; Eti Maden; analyst reports; team analysis

Feldspar

General overview

Reserves (million tons):

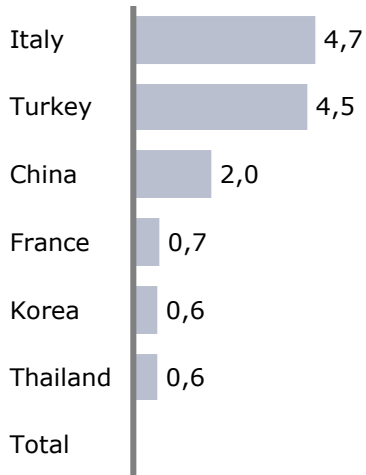
- World total: Large
- Turkey: 372

Turkey is world's one of the leading feldspar producer

"Feldspar is used in glassmaking, ceramics, and to some extent as a filler and extender in paint, plastics and rubber. In glassmaking, alumina from feldspar improves product hardness, durability, and resistance to chemical corrosion. In ceramics, the alkalis in feldspar act as flux, lowering the melting temperature of a mixture" USGS
Feldspar is mainly used in glass industry and pottery production

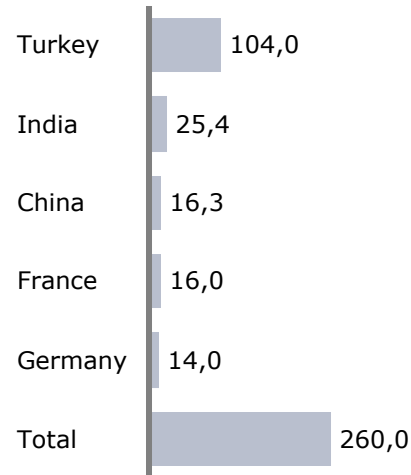
Top producers

Million ton



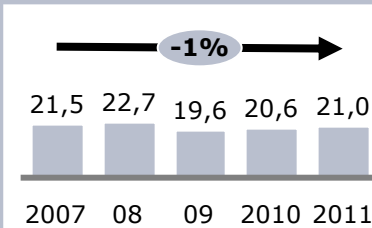
Top exporters

Million U.S.D \$



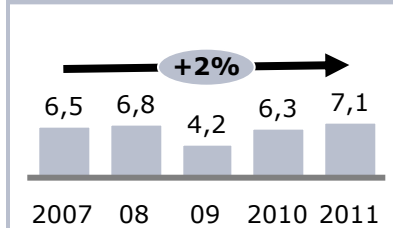
Yearly production, Global

Million tons



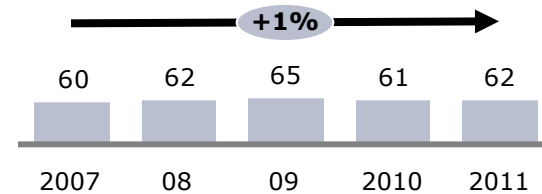
Yearly production, Turkey

Million tons



Prices

USD/t



Important feldspar reserves in Turkey



1 Based on US consumption



SOURCE: MIGEM(General Directorate of Mining Affairs), USGS, MTA, IMIB,Uncomtrade

Barite

General overview

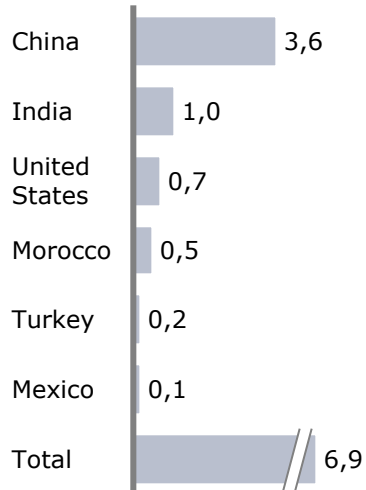
Reserves (million tons):

- World total: 170
- Turkey: 34.2

“The leading application of barite is as weighting agent in natural gas and oil field drilling muds. The density of barite helps in down-hole flow and bit lubrication. An additional benefit of barite is that it does not interfere with magnetic measurements taken in the borehole.”
USGS

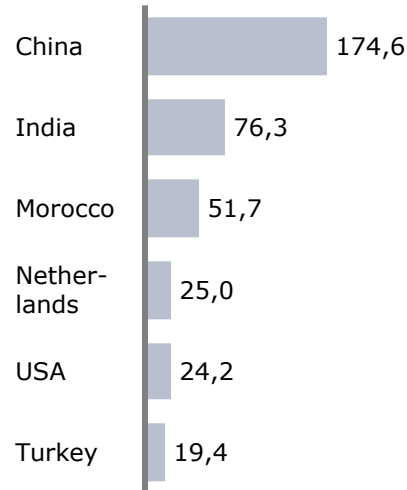
Top producers

Million ton



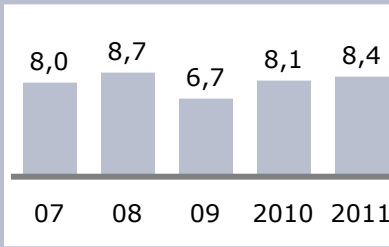
Top exporters

Million U.S.D \$



Yearly production, Global

Million tons



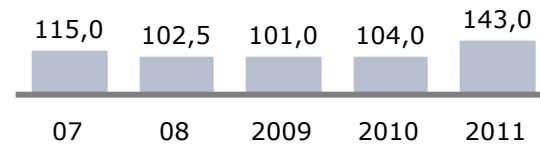
Yearly production, Turkey

Million tons



Prices

USD/t



Important barite reserves in Turkey



1 Based on US consumption

SOURCE: MIGEM, USGS, MTA, IMIB, UNcomtrade



Phosphate

General overview

Phosphate value chain

Phosphata rock

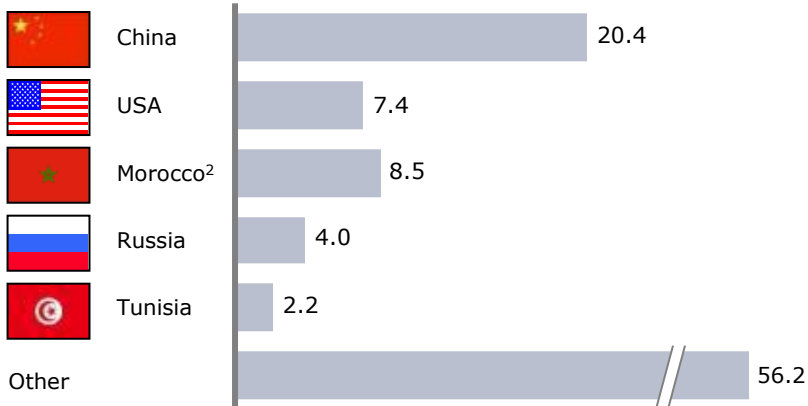
Fertilizer use

- Phosphoric acid
- Ammonium phosphate

- Reserves (million tons):
 - Global: 65,000
 - Turkey: 71
- "Phosphorus is an essential element for plant and animal nutrition and is consumed primarily as a principal component of nitrogen-phosphorus-potassium (NPK) fertilizers. Phosphate rock minerals are the only significant global resources of phosphorus" USGS
- Phosphoric acid: Besides nutrition use, phosphoric acid can also be used in acidic beverages
- Ammonium phosphate: Mainly used as a fertilizer ingredient due to high nitrogen content

Top producers

Million tons

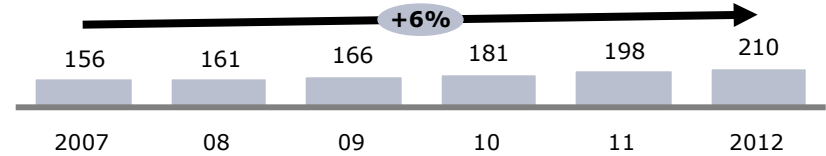


1 Phosphate rock

2 Western Sahara

Global production

Million tons



▪ Turkey's phosphate rock production is extremely low around 1,000 tons per annum

Global Trade¹

2010, U.S. \$ billions

Phosphate rock

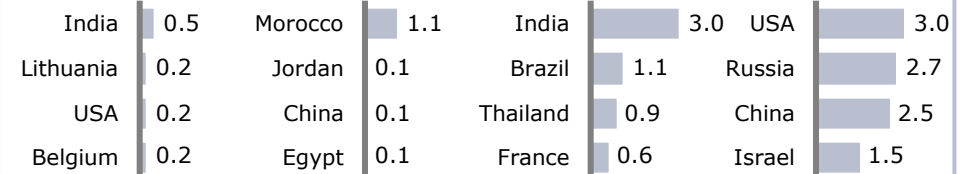
Fertilizers²

Top importers

Top exporters

Top importers

Top exporters



Important phosphate reserves in Turkey



3 Fertilizers include other input as well



SOURCE: USGS, MTA, MIGEM

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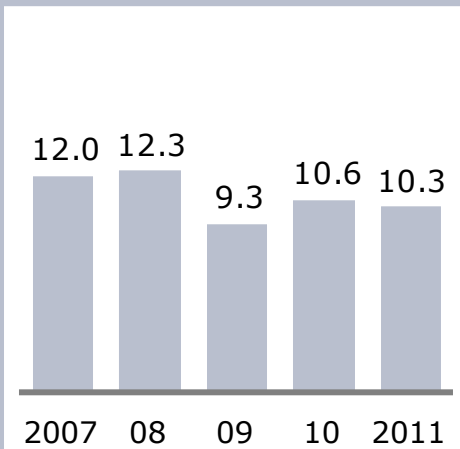
Bentonite

General overview

- Total market size is estimated to be USD 700 million in 2011
- Total global demand is estimated around 22 million tons indicating a shortage
- Bentonite and clay (kaolin) are readily hydratable aluminium silicates. Bentonite is used to assist in the clarification of juices, beverages, and other food products, as a binding agent for the preparation of pelleted animal feeds, and as an ingredient of coatings and adhesives for food packaging materials

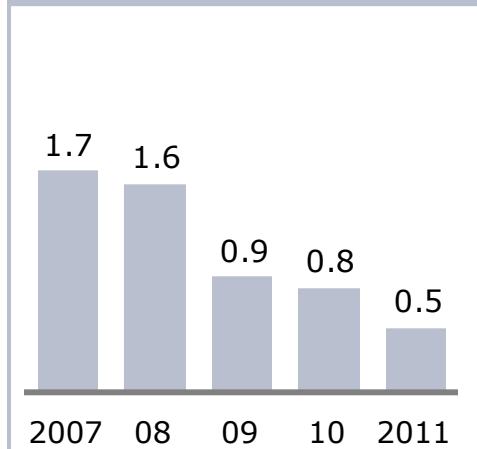
Yearly production, Global

Million tons



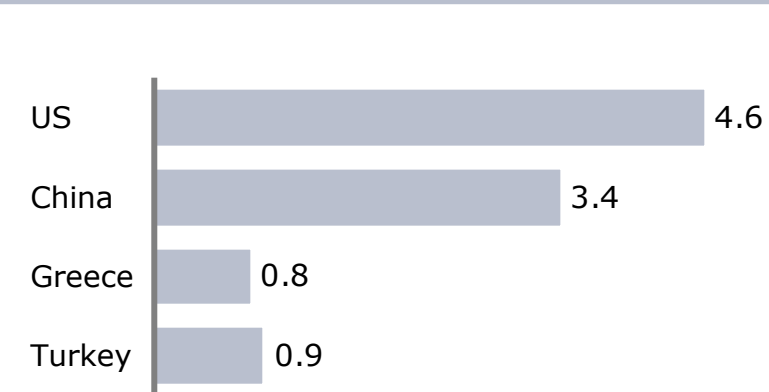
Yearly production, Turkey

Million tons



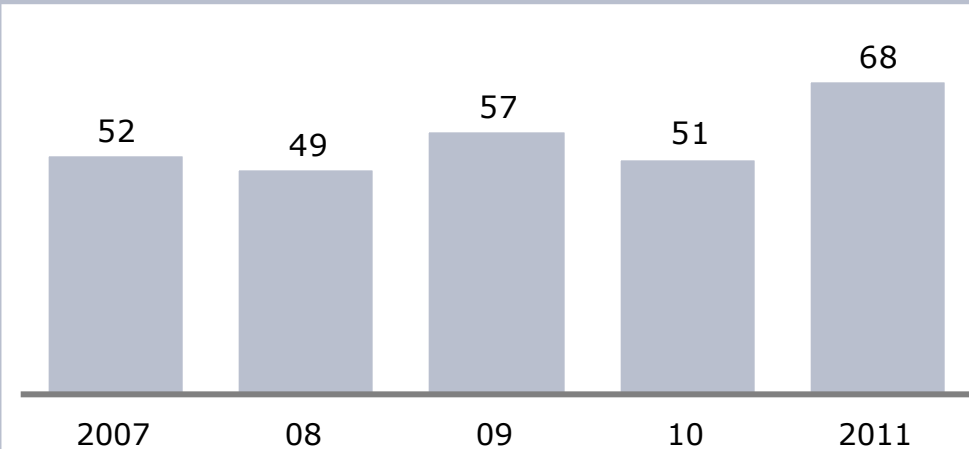
Top producers, 2010

Million tons



Prices

USD/t



SOURCE: VSGS, MIQM, Indian Bureau of Mines, US FDA

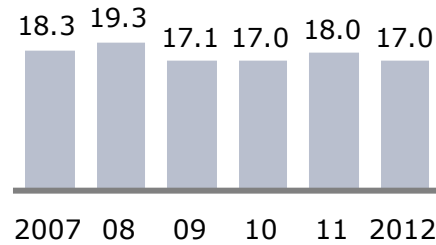
Pumice

General overview

- Pumice is a froth of felsic volcanic glass. It is rock foam with so much air in its structure that it often floats on water
- Mainly used in manufacturing of lightweight concrete or insulative low-density cinder blocks
- Total market is estimated to be around USD 400 million

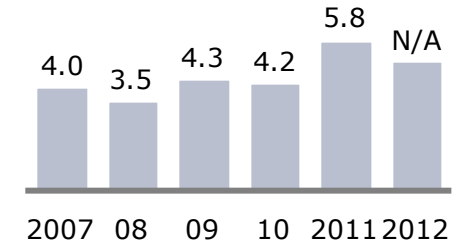
Yearly production, Global

Million tons



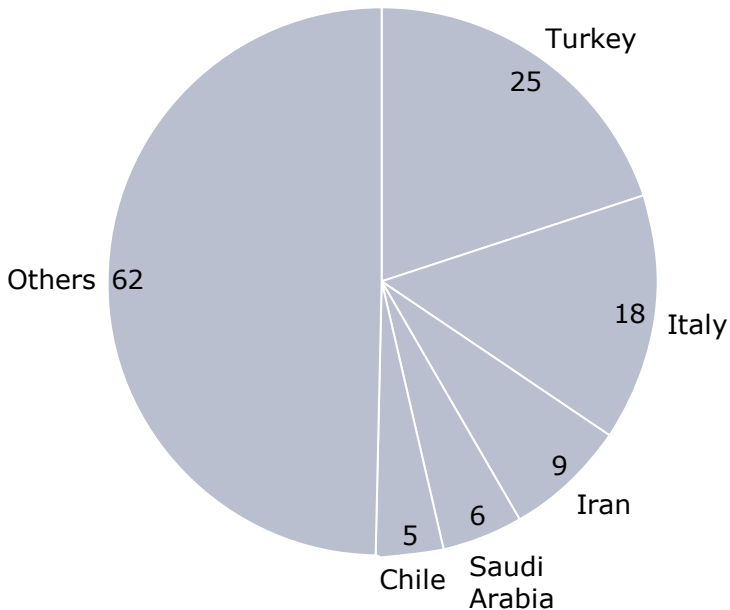
Yearly production, Turkey

Million tons



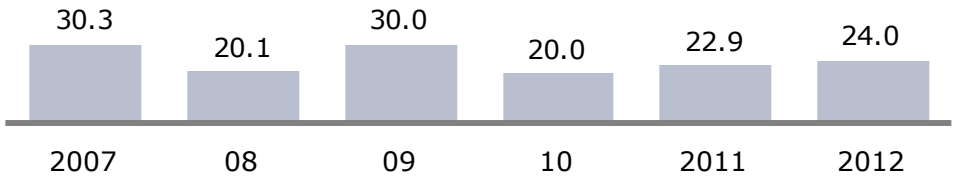
Share of global production, 2010

Percent



Prices

USD/t



Important pumice reserves in Turkey



SOURCE: USGS, MIGEM, University of Pittsburgh DGPS, team analysis

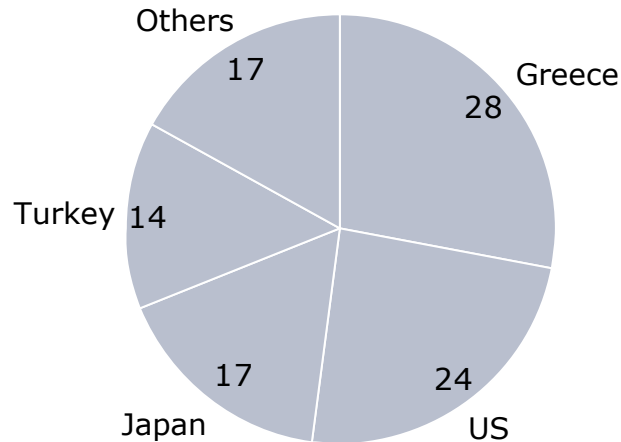
Perlite

General overview

- Mainly used in construction materials, horticultural materials, fillers and filters
- US and China are the main consumers of perlite

Key players

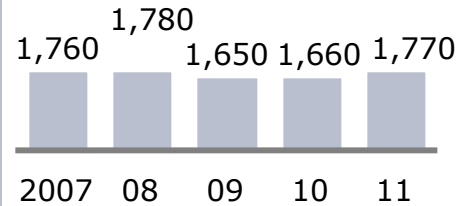
Percent



1 Crude ore

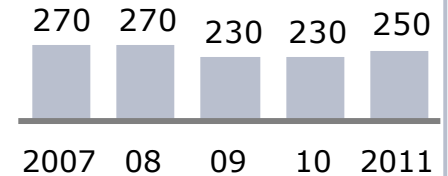
Yearly production, Global

Thousand tons



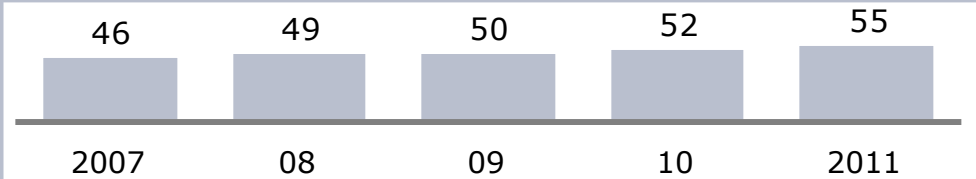
Yearly production, Turkey¹

Thousand tons



Prices

USD/t



Important perlite reserves in Turkey



SOURCE: USGS

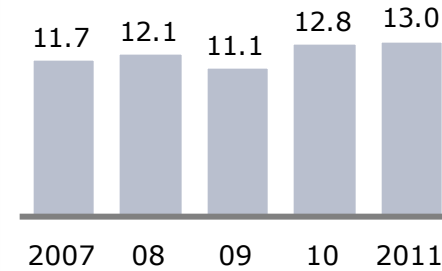
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Soda Ash

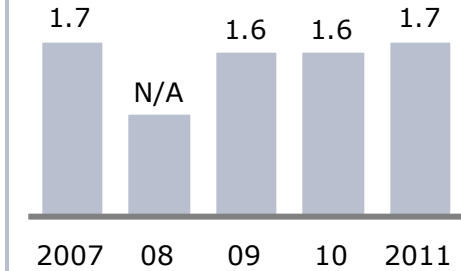
General overview

- Used in manufacturing of glass, making of soaps and detergents, manufacturing of paper and pulp, water treatment and drugs
- Turkey is an important producer with Eti Soda and Şişecam Soda being the biggest players

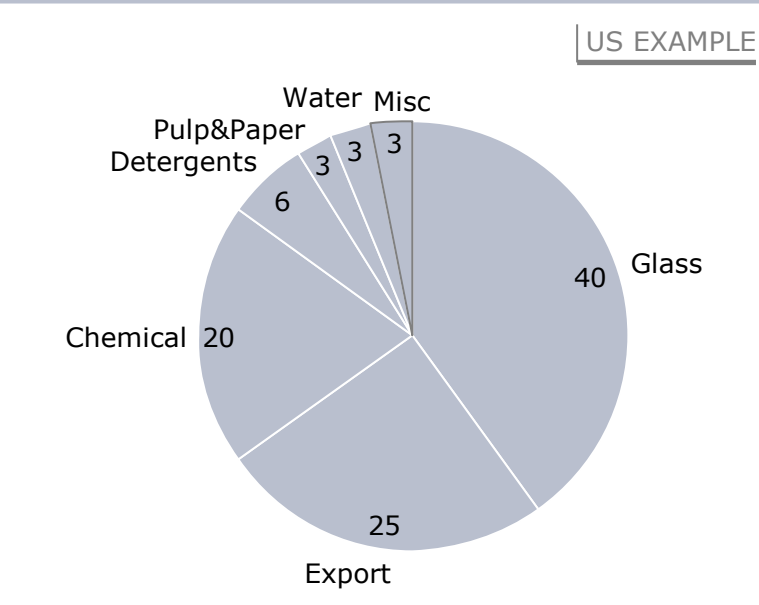
Yearly production¹, Global Million tons



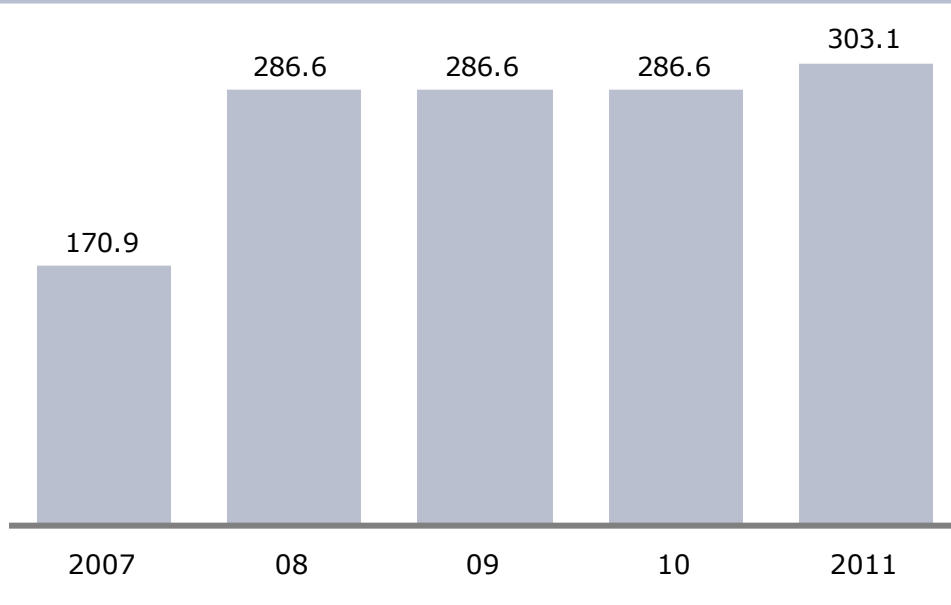
Yearly production¹, Turkey Million tons



Use of soda ash



Prices² USD/t



1 Natural production only 2 Estimates



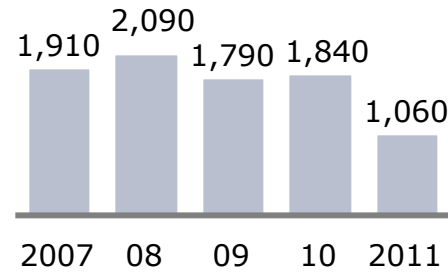
SOURCE: USGS; MIGEM, General Chemical Industrial Products

Diatomite

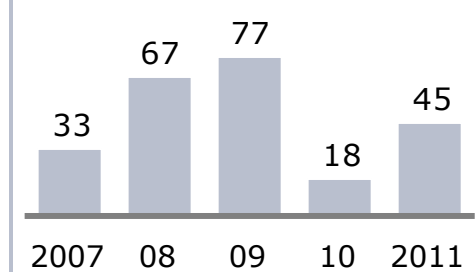
General overview

- Filtration (including the purification of beer, liquors, and wine, and the cleansing of greases and oils) is the largest end use for diatomite
- Transportation costs will continue to determine the maximum economic distance

Yearly production, Global Thousand tons

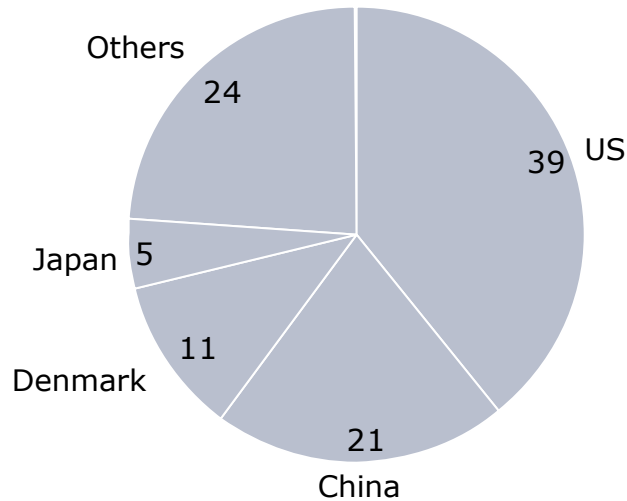


Yearly production, Turkey Thousand tons

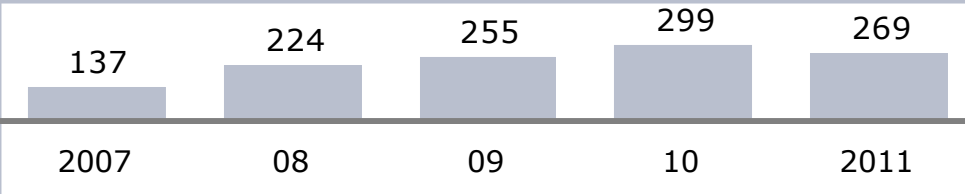


Key players

Percent



Prices USD/t



Important diatomite reserves in Turkey



SOURCE: USGS



Contents

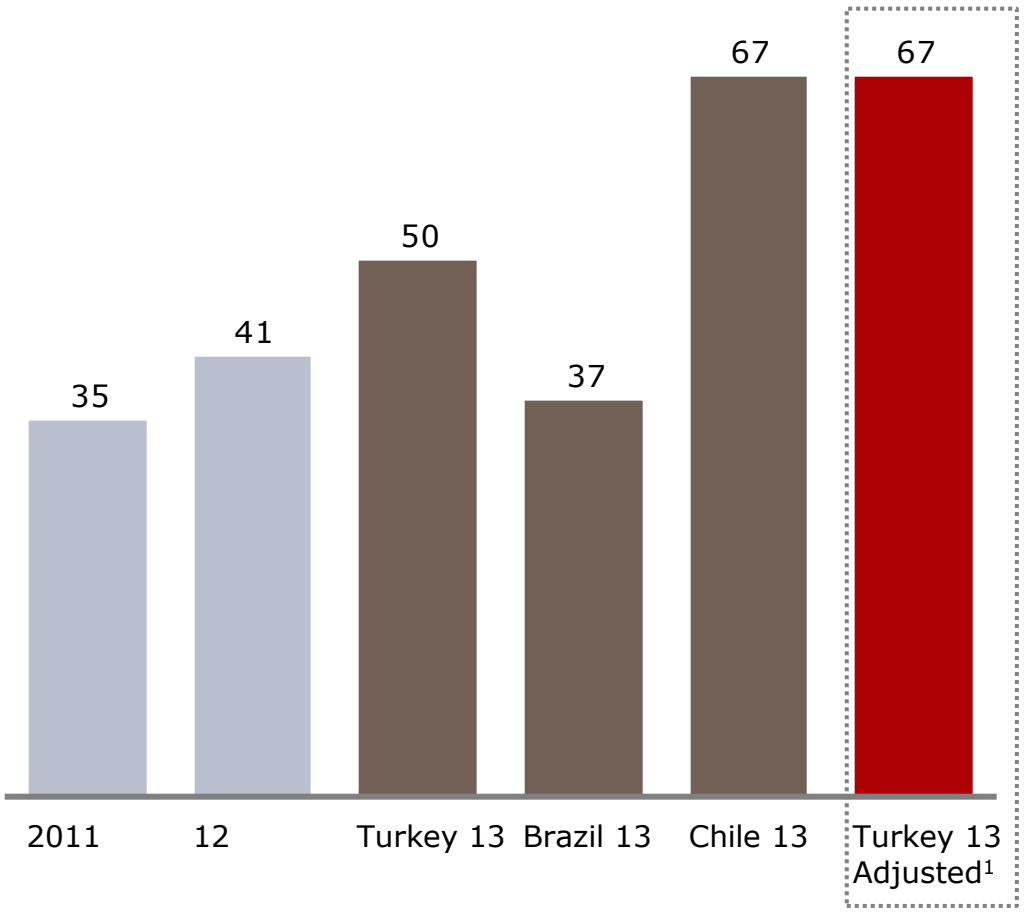
- Mining overview
- Minerals information
- **Business opportunities**
- Legislation

With the recent regulatory improvement, Turkey has become more attractive for mining investments

■ Historic
■ Current
■ Adjusted

PPI rating of Turkey in Fraser report

PPI index score out of 100



- Turkey has increased its ratings in most important aspects becoming more attractive
- Turkey also **increased the number of mining engineering department by 33%** since 2005 enriching the talent pool
- By the **successful policies** of government, especially **in economics**, the risk of instability does not exist anymore
- As the corporate tax rates and royalties show explicitly, Turkey is actually in a **superior spot in taxation regime** now than shown in the report

1 Adjustment is done on 3 metrics by taking the scores of the countries with similar attributes in regarding areas



SOURCE: Fraser Report; team analysis

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Promotion Agency of Turkey

Turkey also has the lowest corporate tax rates as well as low mining royalties

Country	Corporate tax rate Percent	Gold Percent	Copper Percent
Turkey	4 ¹ 16	4	2
Chile	20	0-14	0-14
Madagascar	21	NA	NA
Sweden	22	0	0
Egypt	25	NA	NA
Ghana	25	5	5
Mongolia	25	1-5	22-30
Zimbabwe	26	7	2
Canada	26	2-16	2-16
Burkina Faso	28	3-5	3
South Africa	28	1-5	1-7
Australia	30	0-3	3-4
Morocco	30	3	3
Niger	30	6	NA
India	32	2	4
Brazil	34	1	2
Mali	35	3	3
Zambia	35	6	6
DRC	40	3	2
USA	40	3	3

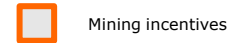
- Turkey charges the minimum corporate tax rate with 4% among the leading mining countries for mining companies
- Turkey stands at the lower end of loyalty fees which is encouraging for investment

1 Actual corporate tax for mining companies is 4% due to 80% tax incentive

SOURCE: PWC; KPMG Corporate Tax Tables; Deloitte Corporate Tax Table; Ministry websites



Mining investments are supported by the measures of Region V regardless of the location as mining is among specific priority investments



Regional investment incentive scheme							
Incentives	I	II	III	IV	V	VI	
• VAT Exemption	✓	✓	✓	✓	✓	✓	
• Custom Duty Exemption	✓	✓	✓	✓	✓	✓	
• Investment Contribution Rate (%)							
– Out of OIZ	15	20	25	30	40	50	
– Within OIZ	20	25	30	40	50	55	
• Payment for Employer's Share of Social Security Premium (Support Period)							
– Out of OIZ	2 years	3 years	5 years	6 years	7 years	10 years	
– Within OIZ	3 years	5 years	6 years	7 years	10 years	12 years	
• Land Allocation	✓	✓	✓	✓	✓	✓	
• Interest Support	N/A	N/A	✓	✓	✓	✓	
• Income Withholding Tax	N/A	N/A	N/A	N/A	N/A	10 years	
• Employees' Share for Social Security Premium Payment (Support Period)	N/A	N/A	N/A	N/A	N/A	10 years	

Tax deduction in regional incentives							
Regions	I	II	III	IV	V	VI	
• Investment contribution rate (%)	15	20	25	30	40	50	
• Tax deduction (%)	50	55	60	70	80	90	
• Investment contribution to be applied during investment / operational period (%)							
– Investment period	0	10	20	30	50	80	
– Operational period	100	90	80	70	50	20	

With 80% tax deduction, corporate tax in Turkey becomes 4%

- Mining investments are considered to be in the scope incentives only if they are at the development stage and exploration projects are left out of the scope
- There is support¹ on funding as well in form of
 - 5 points for TL loans
 - 2 points for foreign currencies

1 Max amount is TL 700k



SOURCE: ISPAT; team analysis

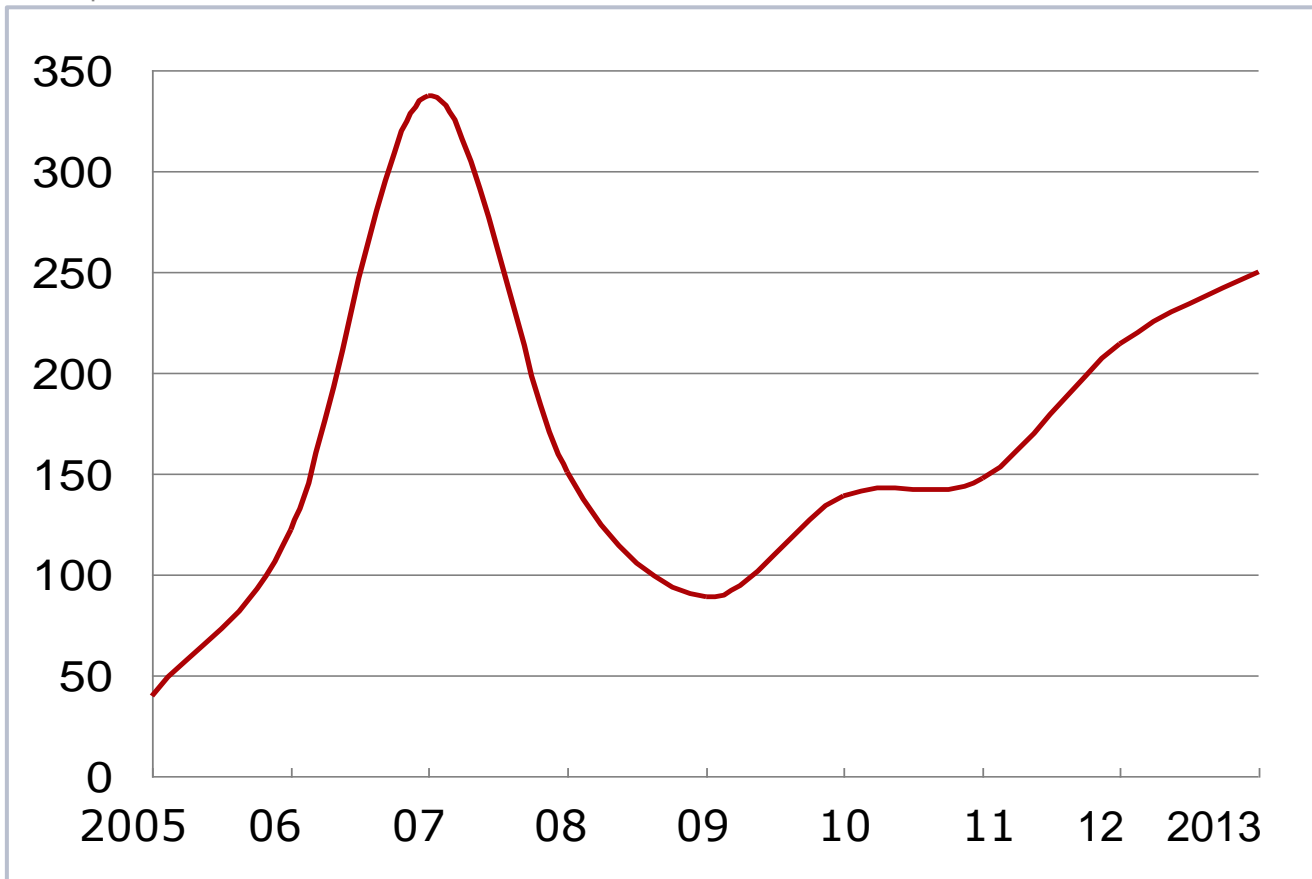
Furthermore, there are 4 activity specific additional incentives

- If the mining operators create additional added-value by processing minerals in the country, they pay 50% less royalty
- If the production takes place underground, the mine operator pays 50% less royalty
- The Value Added Tax (VAT) is collected on all minerals except gold, silver, and platinum exploration expenditures
- In addition, there are certain incentives for mining investments, commonly defined by the Cabinet Decree



AS a result, Turkey is attracting an increasing amount of FDI during the recovery from the global financial crisis

US\$ millions



- Decreasing production due to the global economic crisis and decreasing appetite on new projects affected mining FDI in Turkey negatively
- Since then, FDI has been rising



SOURCE: Ministry of Economy

Investment Support and
Promotion Agency of Turkey



Contents

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- **Legislation**

Once established in Turkey, Turkish and foreign companies have exactly the same rights

- 6th clause of mining law states that
 - Mining rights are given to
 - Turkish citizens eligible to use the civil rights
 - Companies having legal personality established in accordance with the laws of Turkish Republic that are made on the status of mining companies
 - Institutions of state-owned enterprises which are authorized in this regard, its subsidiaries and affiliates and other governmental agencies and administrations

- Furthermore, there is no **discrimination** towards foreign companies in any of the laws



SOURCE: Turkish mining law; expert interview

Metallic minerals are considered under the group IV mines

Group I

- Sand, gravel, brick clay, cement clay, marl etc.

Group II

- Marble, decorative stones, limestone, basalt etc.

Group III

- Salts, CO₂, gas

Group IV

- Lignite, coal, gold, silver, copper, zinc, chromium, iron, cobalt, nickel, aluminium, trona, sulfur etc.

Group V

- Diamond, sapphire, opal, amazonite etc.

Group VI

- Radioactive minerals

1 For the full list of minerals please refer to Turkish Mining Law - 5995

SOURCE: MIGEM



Licence timelines

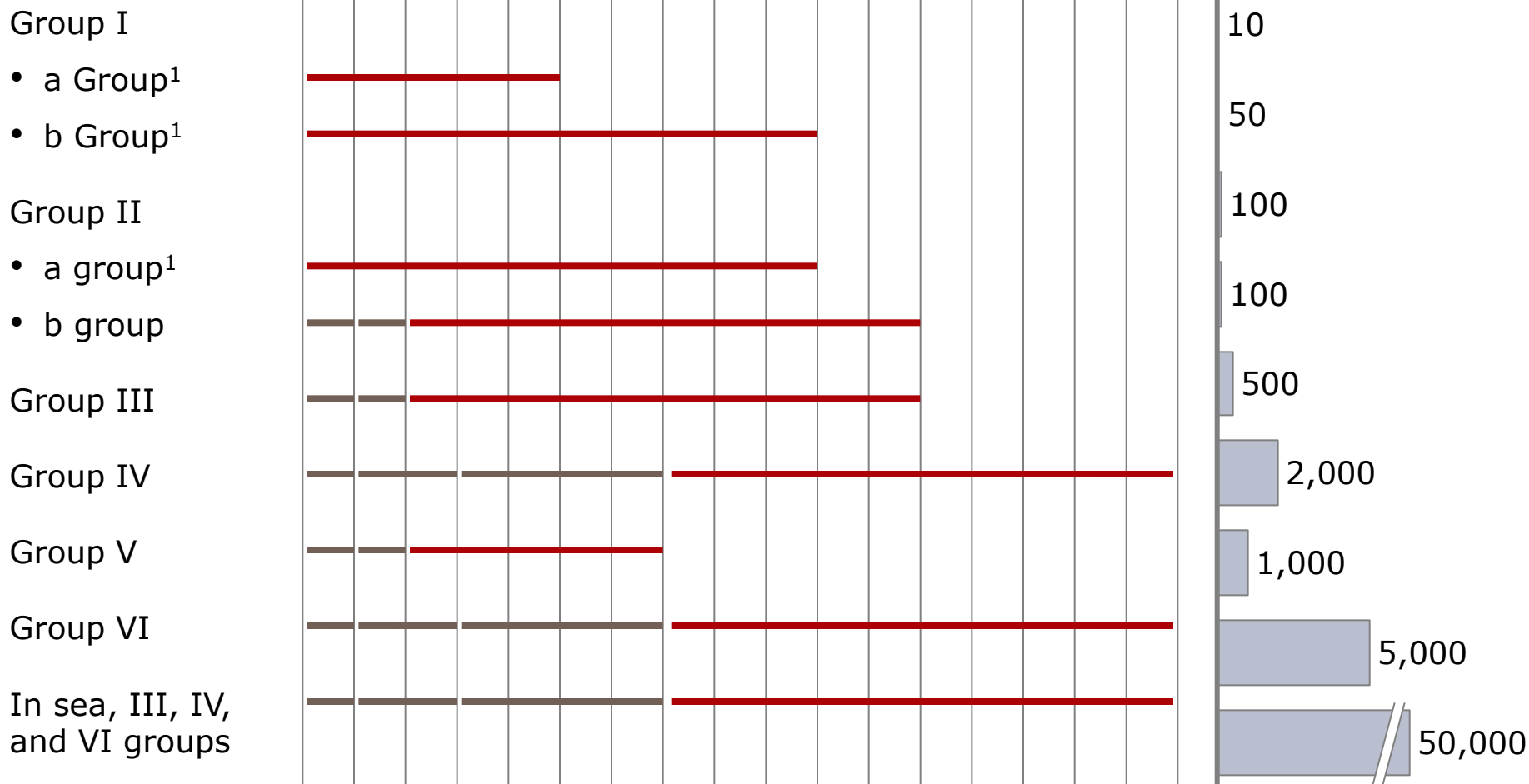
— Operating year — Exploratrion year

License period , (year)

License area (hectare)

License groups

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17



1 operating license is granted directly



SOURCE: ISPAT; MIGEM

Investment Support and Promotion Agency of Turkey

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