

Turkey MINING

Summit 2012

**Turkey's advantage in the current
minerals investment boom; focus on**

GRAPHITE

Sait UYSAL

Mining Professional - Turkey

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What is Graphite?

- Graphite is a natural form of carbon with the chemical formula C and is characterized by its hexagonal crystalline structure. It occurs naturally in metamorphic rocks such as marble, schist and gneiss

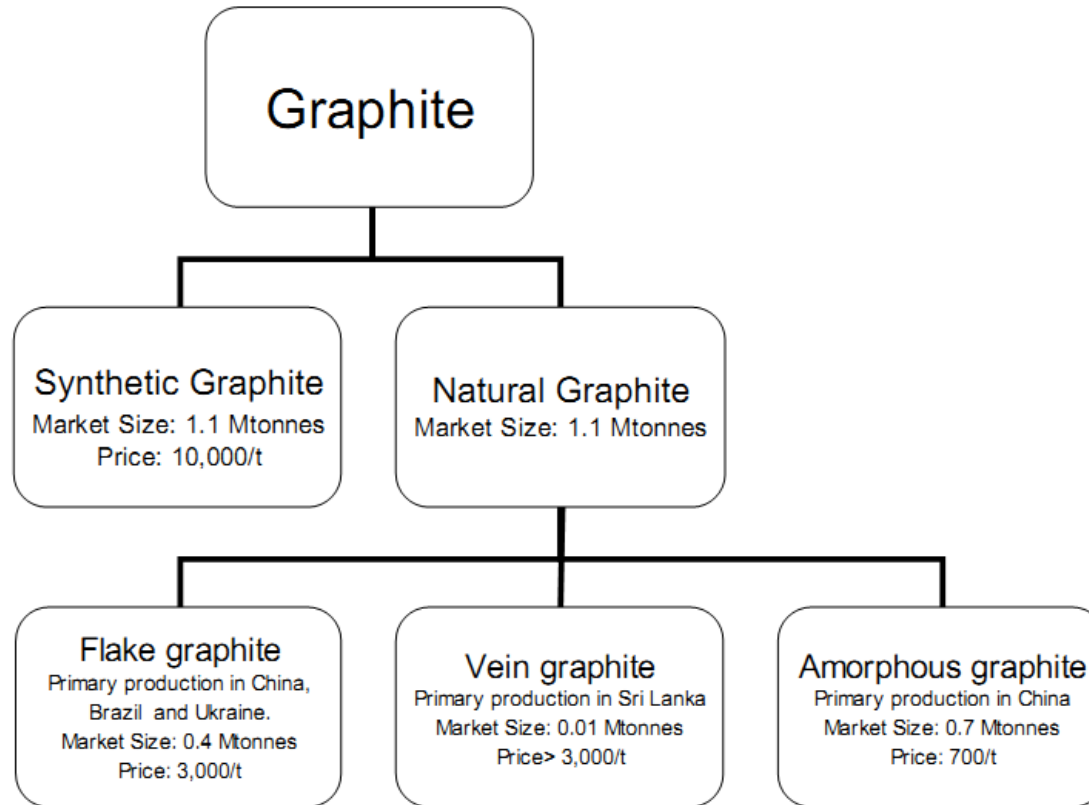


Graphite at A Glance

- The mineral graphite is one of the allotropes, and pure form of carbon.
- Allotropes of carbon are;
 - Graphite
 - Diamond
 - Coal
- Graphite is;
 - Excellent **HEAT** conductor
 - Excellent **ELECTRICITY** conductor
 - Heat resistant (Melting Point 3927 C°)
 - Chemical and Corrosion resistant
 - Resistant to acids and oxidising agents
 - Lubricating



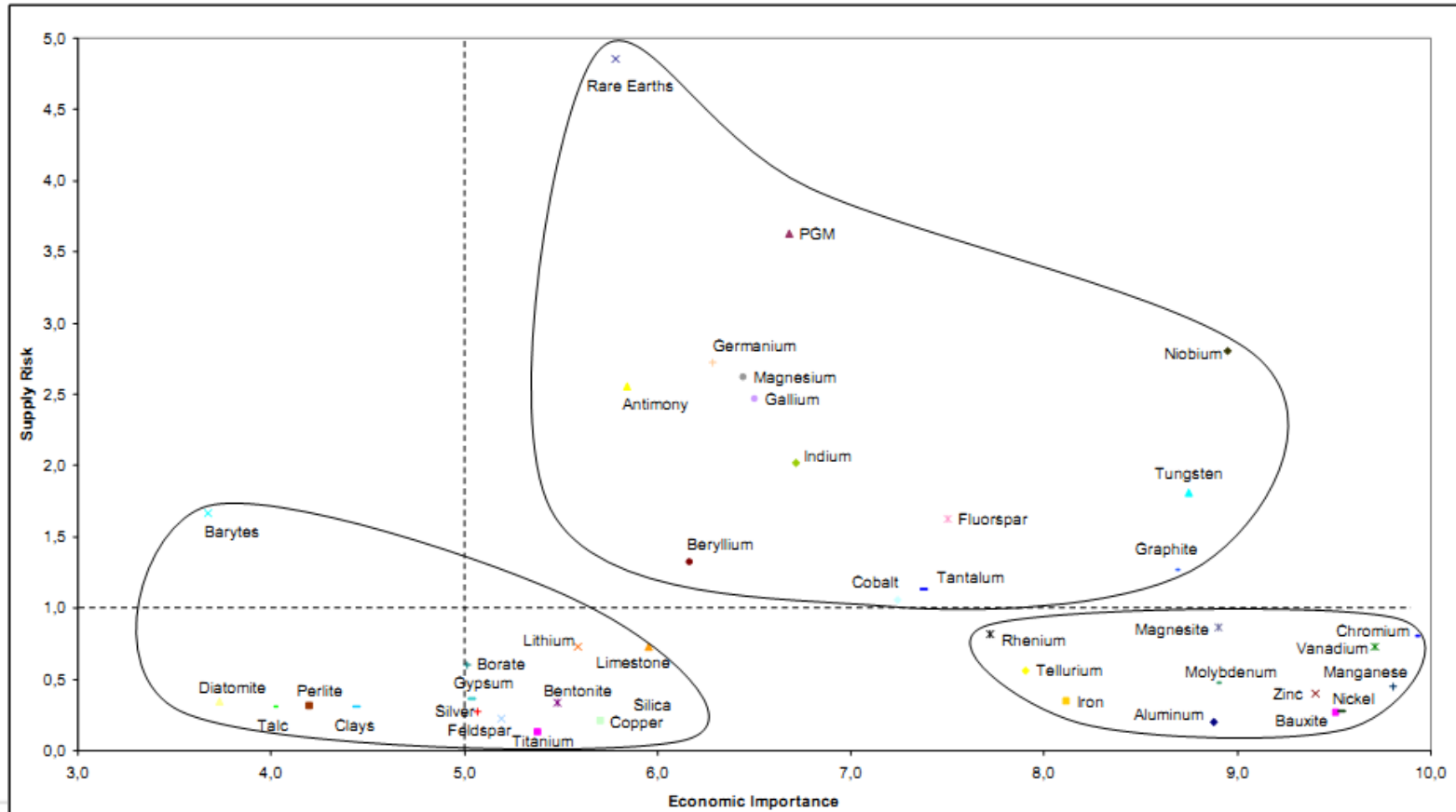
Types of Graphite



Source: Asbury, USGS, Northern Graphite Corporation



Critical Materials



List of critical raw materials at EU level (in alphabetical order):

Antimony	Indium
Beryllium	Magnesium
Cobalt	Niobium
Fluorspar	PGMs (Platinum Group Metals) ¹
Gallium	Rare earths ²
Germanium	Tantalum
Graphite	Tungsten

- EU is up to 95% dependent on imports, mainly from China
- recycling is very limited

Critical raw materials for the EU

Report of the Ad-hoc Working Group on defining critical raw materials

The ad-hoc Working Group is a sub-group of the Raw Materials Supply Group and is chaired by the European Commission

Version of 30 July 2010

Note: The full report will be available on the Enterprise and Industry Directorate General website http://ec.europa.eu/enterprise/policies/raw-materials/documents/index_en.htm

 **European Commission**
Enterprise and Industry

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BGS Industrial Minerals Risk List 2012

MINERAL	RELATIVE SUPPLY RISK INDEX	LEADING PRODUCER
FLUORSPAR	8.67	CHINA
GRAPHITE	8.67	CHINA
MAGNESITE	8.67	CHINA
NEPHELINE SYENITE	8.00	RUSSIA
ASBESTOS	7.33	RUSSIA
BARYTES	6.67	CHINA
BENTONITE	6.00	USA
ANDALUSITE MINERALS	6.00	SOUTH AFRICA
TALC	6.00	CHINA
FELDSPAR	5.33	TURKEY
KAOLIN	5.33	USA
PHOSPHATE	5.33	CHINA
SULPHUR	5.33	CHINA
GYPSUM	4.67	CHINA
SALT	4.67	CHINA
TITANIUM MINERALS	4.67	SOUTH AFRICA
IODINE	4.00	CHILE
DIATOMITE	3.33	USA
POTASH	2.00	CANADA

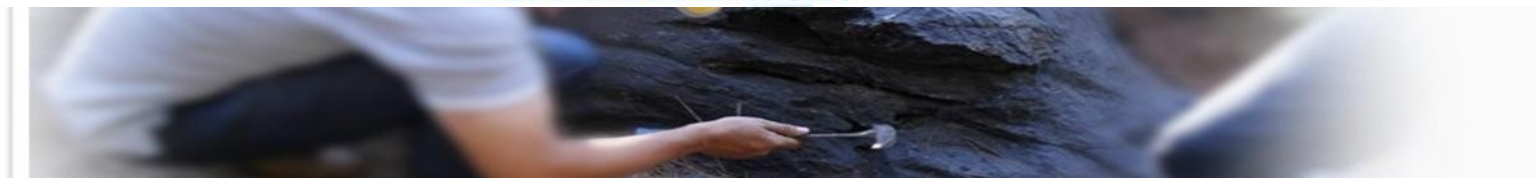
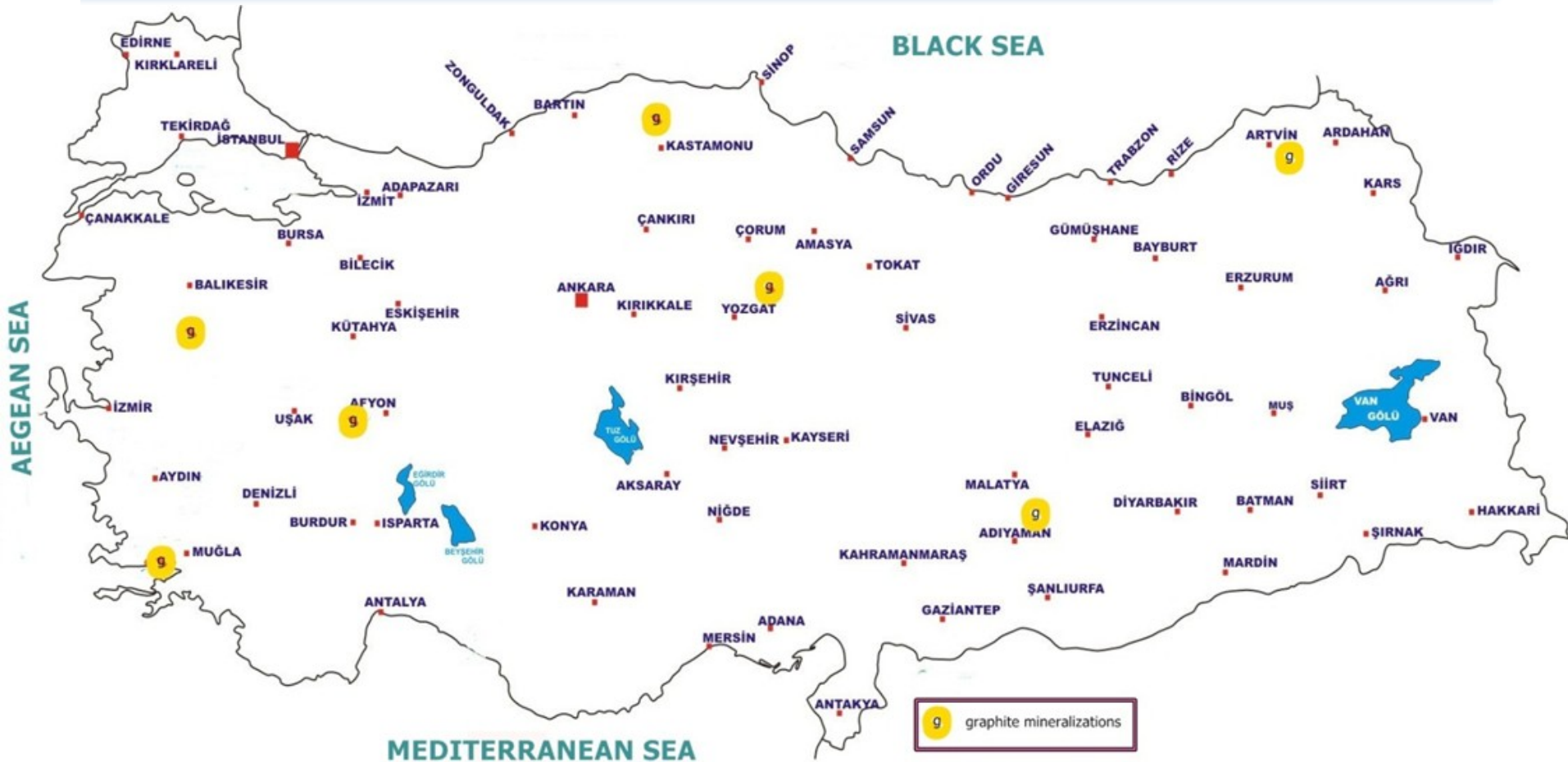


Graphite in Turkey

- Majority of the graphite occurrences in Turkey is mainly “amorphous” type.
- A graphite occurrence around Balıkesir city (West part of Turkey) has bigger crystalline structure. Most promising, most graphitized and high Carbon contented graphite mineralization explored in Balıkesir, Yozgat, Konya, Kastamonu and Adıyaman cities.
- Occurrences in other places like Kutahya, Muğla, Bandırma is mostly semi graphite

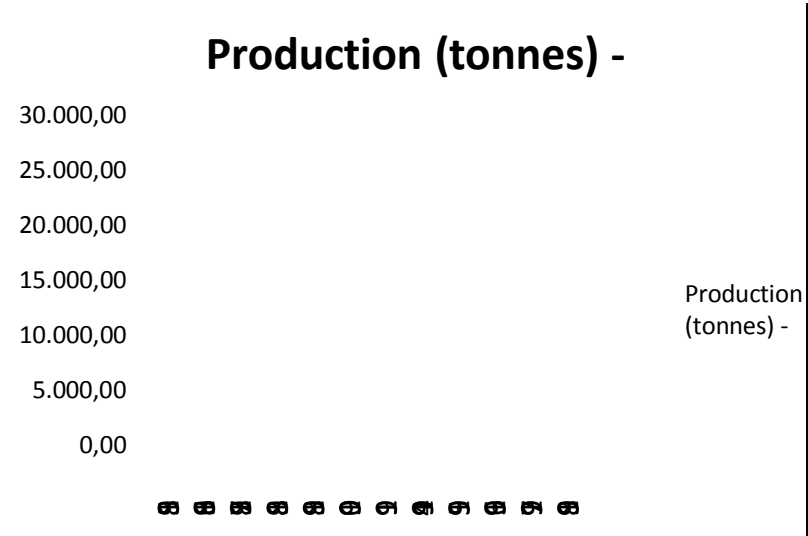


Graphite Mineralizations Map of Turkey



Production in Turkey 1985-1999

Year	Production (tonnes)	Consumption (tonnes)
1985	-	4.100,00
1986	3.586,00	4.000,00
1987	8.900,00	3.400,00
1988	12.911,00	13.000,00
1989	11.000,00	12.000,00
1990	18.712,00	18.712,00
1991	26.763,00	26.763,00
1994	5.000,00	25.000*
1995	5.000,00	25.000*
1996	5.000,00	25.000*
1997	5.000,00	25.000*
1998	5.000,00	25.000*
1999	5.000,00	25.000*



Source: Turkey State Planning Institute, 8th Quinquennially Development Plan, 2001

* = Rounded roughly

Production in Turkey 2003-2009

Year	Production (tonnes)
2003	0,00
2004	28,00
2005	0,00
2006	0,00
2007	0,00
2008	3.236,00
2009	2.400,00

Production (tonnes)

3.500,00
3.000,00
2.500,00
2.000,00
1.500,00
1.000,00
500,00
0,00

Production
(tonnes)

Source: http://www.migem.gov.tr/links/istatistikler/2003_2009_URETIM_%20BILGILERI.mht

Migem = Turkish Republic Ministry of Energy and Natural Resources - General Directorate of Mining Affairs

Conclusion

- Graphite demand will increase even there could be some price fluctuations
- Turkey has undiscovered, undeveloped graphite potential
- Some of the graphite potential areas is promising
- New applications also create new graphite demand (extra 500,000 mt by 2020)
- Europe depend on Import for graphite, very limited graphite potential in Europe, and graphite along with REE and PGM was declared as critical raw material for EU.
- Because of its position and closeness to Europe, low operating costs, and promising potentials of undeveloped graphite reserves, Turkey could be an alternative supplier for Europe
- New applications and technology will drive the demand but will take time
- Low cost projects are important
- Turkey has undiscovered, undeveloped potential and low cost production opportunities, and European market is next to it





**THANK YOU
QUESTIONS?**

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